Think solution. NITTO SEIKO

Controller for Servo type screw driving unit

NITOMAN RC75、RC755

User's Manual
Ver1.15

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 teaching pendent to the teaching pendent connector.

Otherwise, malfunctions or faults may occur.

[Basics]

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

RC75 and RC755 are controllers for the machines with servo positioning function (servo up/down automatic screw tightening machine FEEDMAT FM513VZ, etc.). Connecting the operating pendant (optional accessory) that provides operation panel functions and pendant functions simplifies screw tightening control.

(Major features)

- Low-cost machine pursuing cost performance
- Small-size controller
- 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.)
- The controller uses a high-performance servo motor, ensuring high-precision, high-stability positioning.
- The controller can be operated without using a battery by storing programs and data in the flash ROM.
- Number of external general-purpose inputs and outputs: 16 inputs and 16 outputs
- Since the stopper-type origin return method is used, no origin sensor is required.
- With original position control commands, the controller enables complicated control without using a program.
- The controller provides the thrust control function to execute tightening operations based on optimum tightening speed and thrust settings. (In case of servo type screw driving unit)
- The controller enables high-precision detection of screw loose-fitting through axis coordinate control using an encoder. (In case of servo type screw driving unit)
- 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 (FX3UC-□□MT-D□□, MITSUBISHI ELECTRIC), handy display (GT1030-HBDW, MITSUBISHI ELECTRIC) and the servo amplifier (MR-JN-10A□, 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

RC *1 – *2 – *3 *4

*1 Series	
755	For desktop screw tightening robot
75	For separate controller

*2 Type	
RC755 Series	
T1	SR395DT Type-1, Type-3B
T2	SR395DT Type-2, Type-3D
T4	SR395DT Type-4
RC75 Series	
T1	FM513VZ
T2	FM520VZZ
T3	SR375Y0

*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.
Servo power supply extension cable CBMMT-A1-□□□ (□□. □m) ・・ The necessary pce.
Servo brake extension cable CBMBK-A1-□□□ (□□. □m) ・・・・・・ 1 pce.
Servo encoder extension cable CBMEN-A1-□□□ (□□. □m) ・・・・ The necessary 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

Teaching pendant RC75-TP ・・・・・・・・・・・・・・・・・・・・・・・ 1 pce.
EXE. IO cable CBEX2-A1-030 (3m) ・・・・・・・・・・・・・・・・・・ 1 pce.

・Specify the models of optional items when purchasing them.

Related manual

・FX3UC 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.

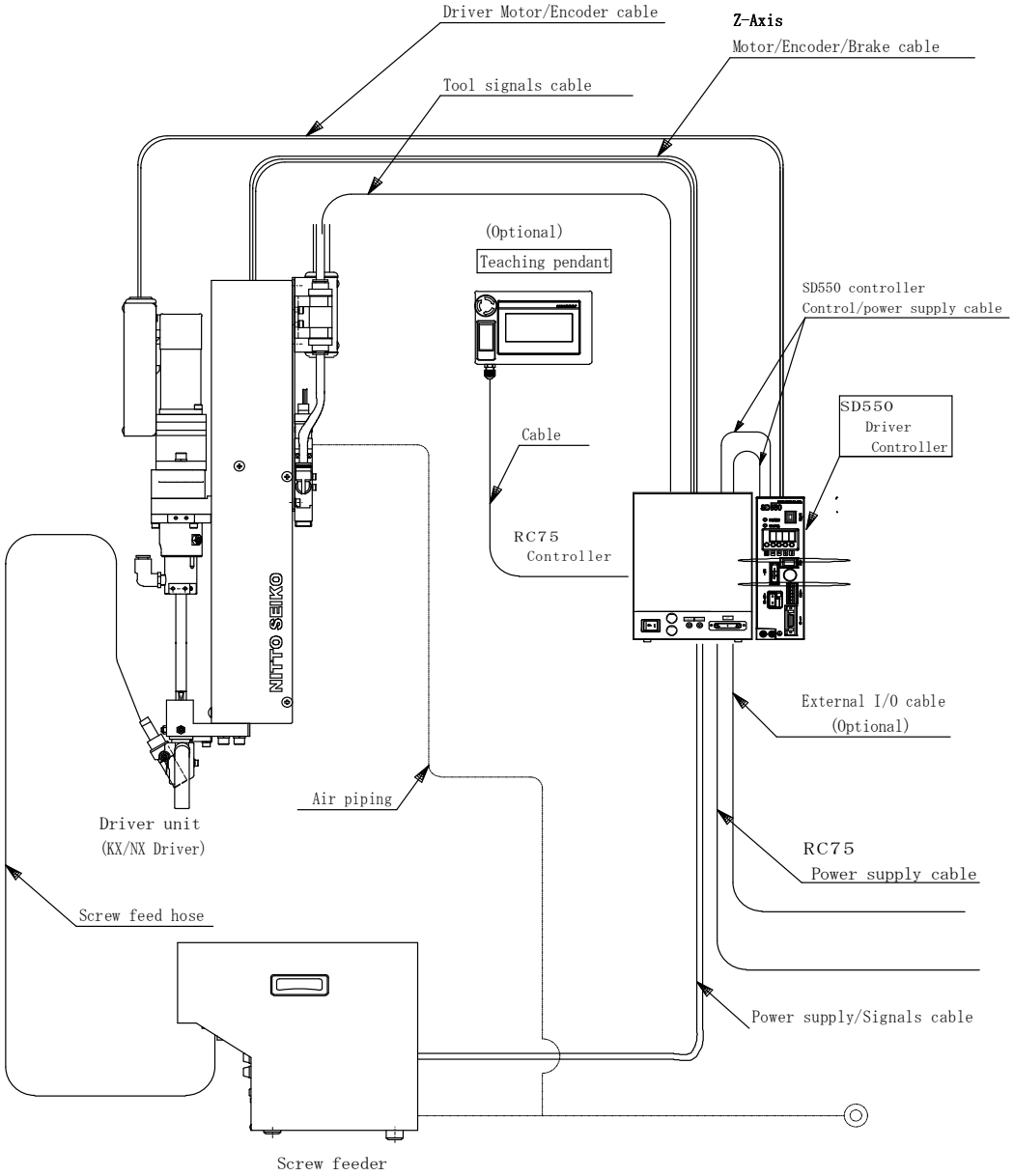
5) Expiration of charged repair period after discontinuance of production

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

2. Configuration of system

2.1 Connections

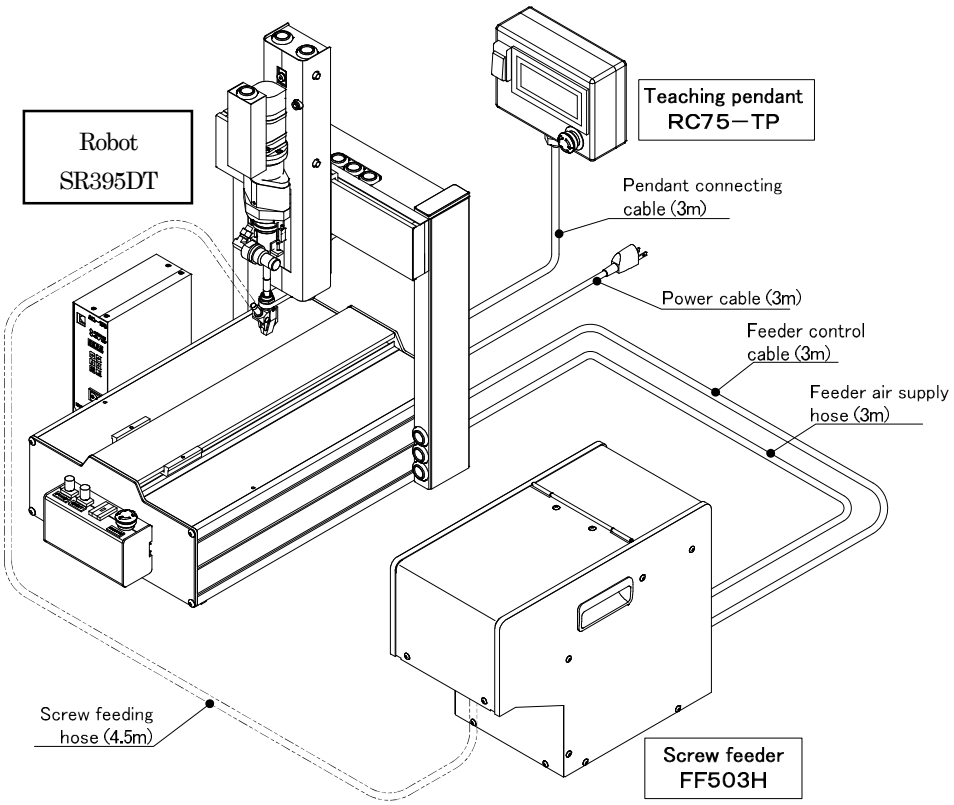
1) Connections between RC75 and FM513VZ



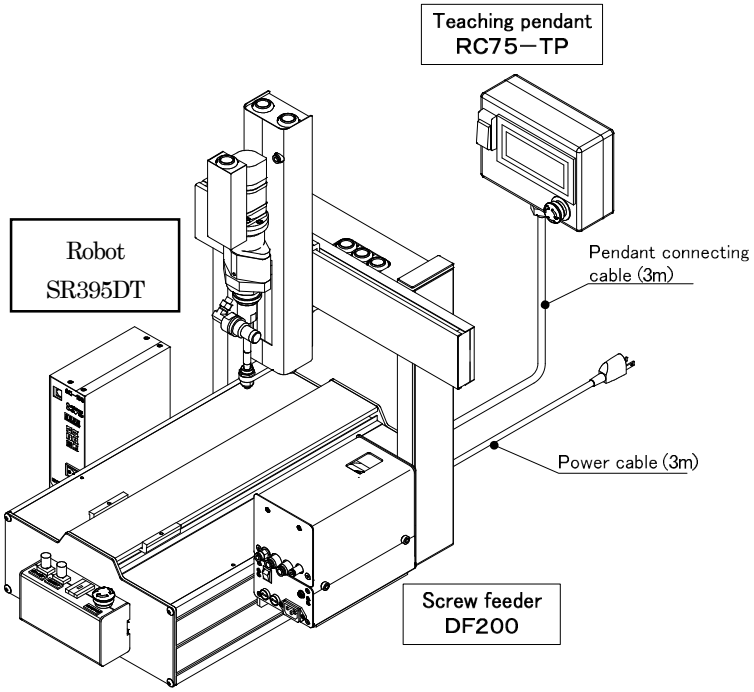
Distance between standard units	
Tool unit → RC75 controller	3m
RC75 controller → Feeder	3m
Feeder → Tool unit	3m

2）RC755 controller system configuration diagram

Air pressure feeding type



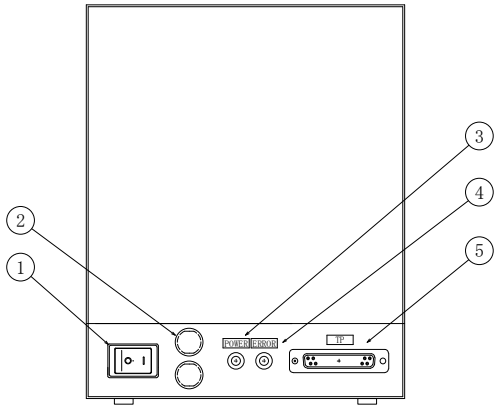
Pick up type



2.2 Names and functions of components

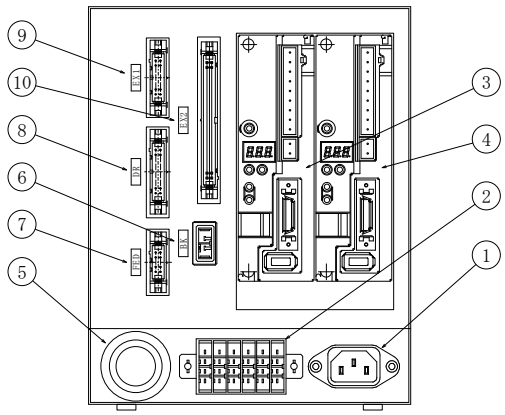
2.2.1 RC75 series controller

1) RC75 front view



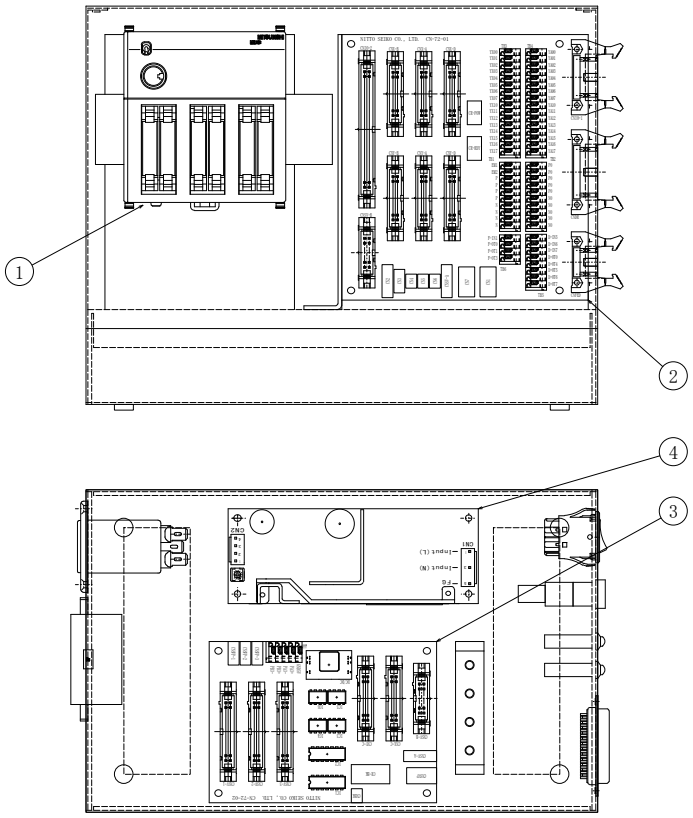
①	Power supply switch	Power supply switch for the controller. Pressing [|] turns ON the power supply. Pressing [○] turns OFF the power supply.
②	Fuse holder	Type FGMB 250V 10A
③	POWER lamp (green)	While power is supplied to the controller, this lamp is lit.
④	ERROR lamp (red)	When a fault occurs, this 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 RC75-TP teaching pendant to this connector. Be sure to connect the teaching pendant or a dummy connector to the TP connector.If this connector has no connection, the machine is brought into emergency stop status.

2) RC75 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	Power supply tap (6P) connector for screw tightening machine peripheral equipment ・For connector AC power supply ・For feeder power supply (CBFED-P1-□□□ connection) ・For driver controller power supply (CBDR-P1-□□□ connection) ・For servo amplifier motor power supply Type of connector on controller side : Dynamic D3200 series Plug housing 4P (TE) (Note 1) Connector insert position is not specified. (Note 2) Do not connect any equipment other than the controller's control target equipment.
③ ④	AC servo amplifier	AC servo amplifier Model : MR-JN-10□ Connect the following cables for the servo axes. ・Connect the motor power supply cable CBMMT-A1-□□□ to the servo amplifier connector CNP1 (U,V,W). ・Connect the encoder cable CBMMT-A1-□□□ to the servo amplifier connector CN2.
⑤	Cable through hole ϕ28	Cable through hole to insert a cable into the controller.
⑥	BK connector	Connect the servo motor brake cable CBMBK-A1-□□□. Type of connector on controller side : Dynamic D3200 series Plug housing 2P (TE)
⑦	FED connector	Connect the FEEDER (standard model: FF503H) control cable CBFED-S1-□□□. Type of connector on controller side : MIL-SPEC male connector 10P
⑧	DR connector	Connect the driver (standard model: SD550) control cable SD550-IO-□□□. Type of connector on controller side : MIL-SPEC male connector 20P
⑨	EX1 connector	Connect the tightening tool unit control cable CBEX1-A1-□□□. Type of connector on controller side : MIL-SPEC male connector 16P
⑩	EX2 connector	Connect the external I/O control cable CBEX2-A1-□□□. Type of connector on controller side : MIL-SPEC male connector 50P

3) RC75 internal view



□	PLC	NPN : FX3UC-□□MT-D (MITSUBISHI ELECTRIC) PNP : FX3UC-□□MT-DSS (MITSUBISHI ELECTRIC)
②	I/O conversion Main board	CN-75-01B (NITTO SEIKO) For detailed description, see the next section.
③	I/O conversion Servo board	CN-75-02B (NITTO SEIKO) For detailed description, see the next section.
④	Power supply	IN: 100□200 VAC multi input　OUT: 24 VDC　50W

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

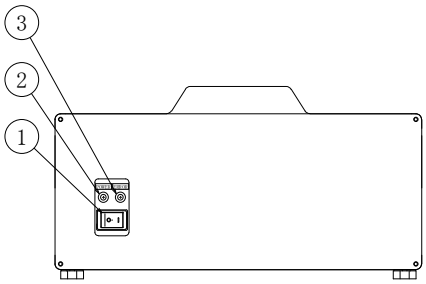
	Network modules for CC-Link	CC-Link communications module: 2N-32CCL (MITSUBISHI ELECTRIC) Interface adapter: FX2NC-CNV-IF (MITSUBISHI ELECTRIC)

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

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

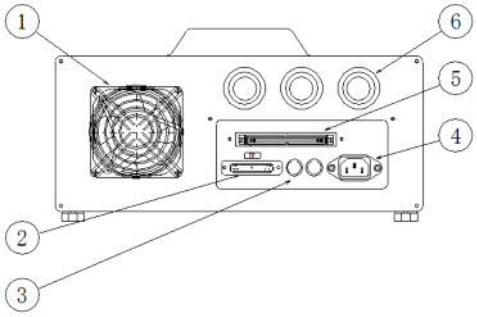
2.2.2 RC755 series controller

1) RC755 front view



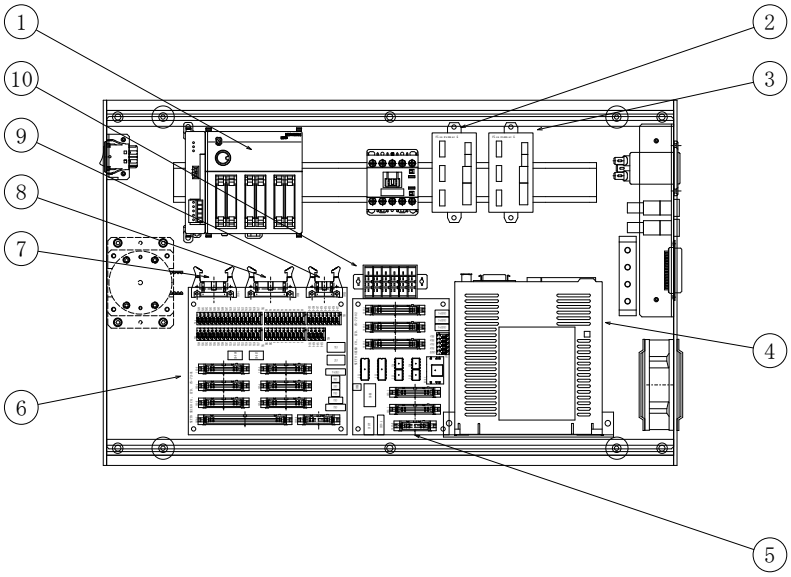
①	Power supply switch	Power supply switch for the controller. Pressing [|] turns ON the power supply. Pressing [○] turns OFF the power supply.
②	POWER lamp (green)	While power is supplied to the controller, this lamp is lit.
③	ERROR lamp (red)	When a fault occurs, this lamp lights up, or blinks. Lit: The machine immediately stops at occurrence of the fault. Blinking (1 sec.): The machine stops after cycle end, or outputs warning.

2) RC755 back view



□	Erectric fan	It is a cooling fan of blowing-off type. Do not place an object in front of the fan. Doing so will reduce the cooling effect of the fan.
②	TP connector	Connect the RC75-TP teaching pendant to this connector. Be sure to connect the teaching pendant or a dummy connector to the TP connector.If this connector has no connection, the machine is brought into emergency stop status.
③	Fuse holder	Type FGMB 250V 10A
④	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
⑤	EX2 connector	Connect the external I/O control cable CBEX2-A1-□□□. Type of connector on controller side : MIL-SPEC male connector 50P
⑥	Cable through hole (three places)	Cable through hole to insert a cable into the controller.

3) RC755 internal view



□	PLC	NPN : FX3UC-□□MT-D (MITSUBISHI ELECTRIC) PNP : FX3UC-□□MT-DSS (MITSUBISHI ELECTRIC)
②	For X-axis servo amplifier	AC servo amplifier Model : Si-02D
③	For Y-axis servo amplifier	AC servo amplifier Model : Si-02D
④	For Z-axis servo amplifier	AC servo amplifier Model : MR-JN-10□ Connect the following cables for the servo axes. ・Connect the motor power supply cable CBMMT-A1-□□□ to the servo amplifier connector CNP1 (U,V,W). ・Connect the encoder cable CBMMT-A1-□□□ to the servo amplifier connector CN2.
⑤	I/O conversion Servo board	CN-75-02B (NITTO SEIKO) For detailed description, see the next section.
⑥	I/O conversion Main board	CN-75-01B (NITTO SEIKO) For detailed description, see the next section.
⑦	EX1 connector	Connect the tightening tool unit control cable CBEX1-A1-□□□. Type of connector on controller side : MIL-SPEC male connector 16P
⑧	DR connector	Connect the driver (standard model: SD550) control cable SD550-IO-□□□. Type of connector on controller side : MIL-SPEC male connector 20P
⑨	FED connector	Connect the FEEDER (standard model: FF503H) control cable CBFED-S1-□□□. Type of connector on controller side : MIL-SPEC male connector 10P

⑩	POW connector	Power supply tap (6P) connector for screw tightening machine peripheral equipment ・For connector AC power supply ・For feeder power supply (CBFED-P1-□□□ connection) ・For driver controller power supply (CBDR-P1-□□□ connection) ・For servo amplifier motor power supply Type of connector on controller side : Dynamic D3200 series Plug housing 4P (TE) (Note 1) Connector insert position is not specified. (Note 2) Do not connect any equipment other than the controller's control target equipment.

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

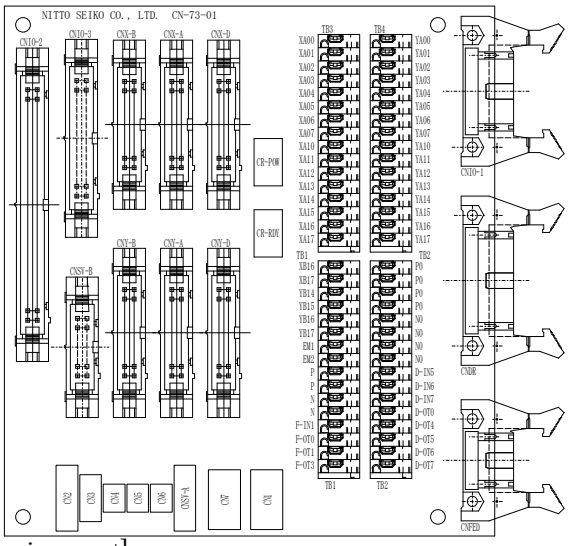
	Network modules for CC-Link	CC-Link communications module: 2N-32CCL (MITSUBISHI ELECTRIC) Interface adapter: FX2NC-CNV-IF (MITSUBISHI ELECTRIC)

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

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

2.2.3 RC75,RC755 series contoroller internal I/O board

1) RC75,RC755 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	
14	XA15	
15	XA16	
16	XA17	

TB4 (16P)

No.	Cable code	Signal name
1	YA00	
2	YA01	
3	YA02	
4	YA03	
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	EXE fault retry
2	XB17	EXE fault braek
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

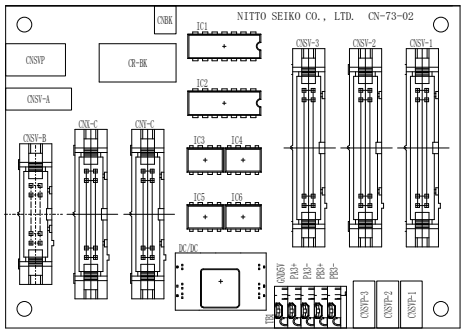
TB2 (16P)

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 (EX2).	24 VDC (+) is supplied between R-P0 of the external I/O signal cable (EX2).
SP2	24 VDC (+) is not supplied between R-P of the external I/O signal cable (EX2).	24 VDC (+) is supplied between R-P of the external I/O signal cable (EX2).
SP3	Enables output to the external I/O signal EX2 cable YB14.	Disables output to the external I/O signal EX2 cable YB14.
SP4	Enables output to the external I/O signal EX2 cable YB15.	Disables output to the external I/O signal EX2 cable YB15.
SP5	Enables output to the external I/O signal EX2 cable YB16.	Disables output to the external I/O signal EX2 cable YB16.
SP6	Enables output to the external I/O signal EX2 cable YB17.	Disables output to the external I/O signal EX2 cable YB17.
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

2) RC75,RC755 internal I/O conversion SERVO board



[Terminal block assignment]

TB1 (5P)

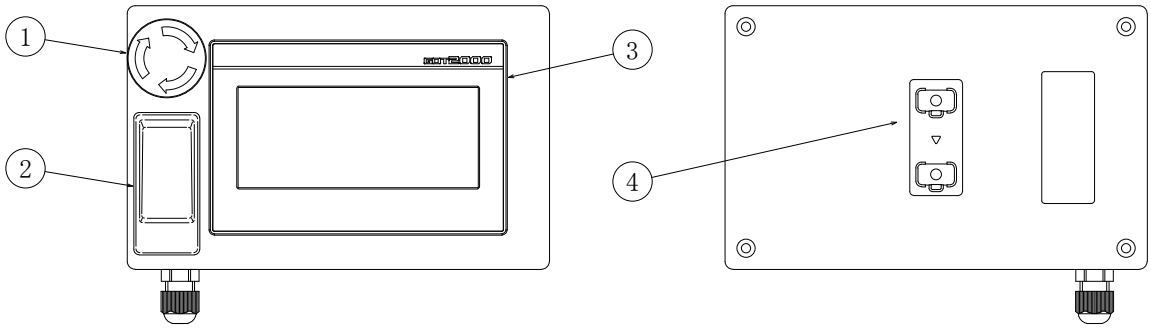
No.	No.	Cable code
1	GND5V	3rd-Axis control pulse input GND
2	PA3+	3rd-Axis control pulse input phase A+
3	PA3-	3rd-Axis control pulse input phase A-
4	PB3+	3rd-Axis control pulse input phase B+
5	PB3-	3rd-Axis control pulse input phase B-

[Short-circuit pin assignment]

No.	1-2 short-circuited (Default setting)	2-3 short-circuited
SP1	1st-Axis control uses MELSERVO-JN	1st-Axis control uses Si-servo
SP2	2nd-Axis control uses MELSERVO-JN	2nd-Axis control uses Si-servo
SP3	3rd-Axis control uses MELSERVO-JN	3rd-Axis control uses Si-servo

2.2.4 RC75,RC755 series pendant

1) RC75-TP teaching pendant (Optionally available depending on equipment model)



①	Emergency stop switch	Push-lock/turn-reset type emergency stop switch Once the button is pressed, it is locked in the pressed status, and the machine is brought into emergency stop status. To reset the emergency stop status, turn the button in the direction indicated by arrow (clockwise). Model : A165E-S-01 (OMRON)
②	Deadman switch	3-poistion type deadman switch. When a hand is released from the switch, the switch is OFF. The switch turns ON when it is pushed by one stage, and then turns OFF when it is pushed by one more stage.To move each axis in the JOG mode during teaching operation, push the deadman switch to one stage to turn it ON. Model : HE3B-M2PB (IDEC)
③	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-PMBDS (MITSUBISHI ELECTRIC)
④	Bracket	Model : WM-1 (TAKACHI) MAX Load 2kg Max load is a dead load in the states that I attached a bracket to well. Because you might be damaged when you treat a bracket violently, please be careful.

3. Specifications

3.1 Specifications of controller

1) RC75 controller main unit

Model RC75	Standard specifications	Option
Power supply voltage	Single phase, 200～230VAC 50/60Hz	Single phase, 100～115VAC 50/60Hz
Number of axes to be controlled	Maximam 2 axis	
Positioning system	PTP semi-closed loop control	
Position detecting system	Incremental encoder	
Serial port	RS-422 (For teaching pendant)	
Memory	Flash memory backup	
External input	Standard user port, 16-pos.	32 points can be added.
External output	Standard user port, 16-pos.	32 points can be added.
Field network		CC-Link、Ethernet
Teaching system	MDI, remote teaching, direct teaching	
Point control	1000 points	
Point work information	9-sets per point (operation pattern, torque, etc.)	
Sequence program	16K steps (including 13K steps used for the system)	
Outside dimensions WxHxD	170×210×270mm	
Weight	Approximately 6.5 kg	
Teaching pendant		Handy type touch panel (with emergency stop switch and deadman switch). Teaching pendant can be used as control panel
PC software		Provided

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

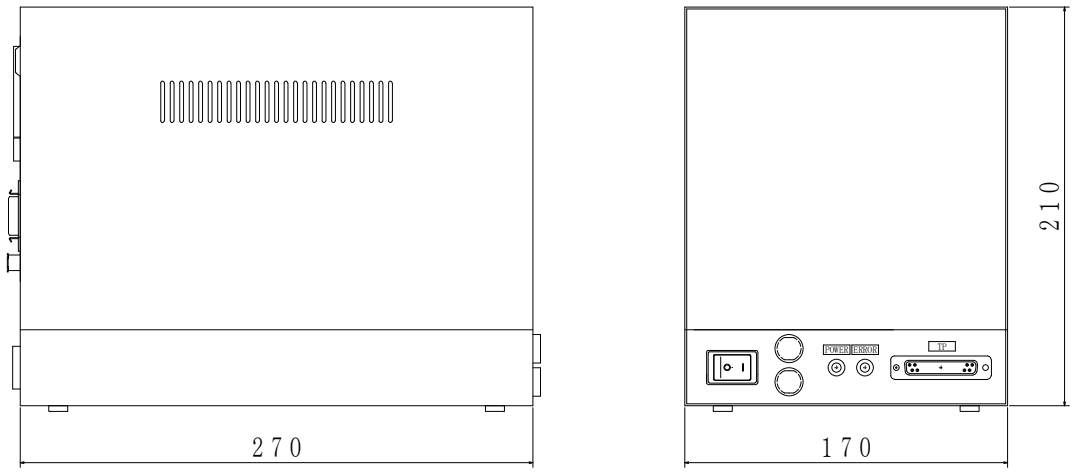
2) RC755 controller main unit

Model RC755	Standard specifications	Option
Power supply voltage	Single phase, 200～230VAC 50/60Hz	Single phase, 100～115VAC 50/60Hz
Number of axes to be controlled	Maximam 3 axis	
Positioning system	PTP semi-closed loop control (Z-axis) PTP open loop control (X,Y-axis)	
Position detecting system	Incremental encoder	
Serial port	RS-422 (For teaching pendant)	
Memory	Flash memory backup	
External input	Standard user port, 16-pos.	32 points can be added.
External output	Standard user port, 16-pos.	32 points can be added.
Field network		CC-Link、Ethernet
Teaching system	MDI, remote teaching, direct teaching	
Point control	1000 points	
Point work information	9-sets per point (operation pattern, torque, etc.)	
Sequence program	16K steps (including 13K steps used for the system)	
Outside dimensions WxHxD	SR395DT internal	
Weight	Approximately 6.5 kg	
Teaching pendant	Handy type touch panel (with emergency stop switch and deadman switch). Teaching pendant can be used as control panel	
PC software		Provided

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

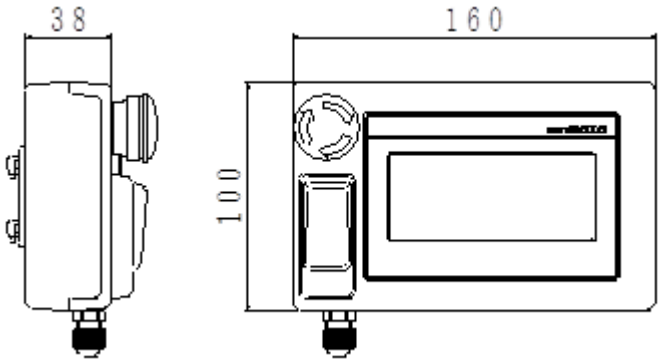
3.2 Outside dimensions

1) RC75 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) RC75-TP (optional) Unit [mm]

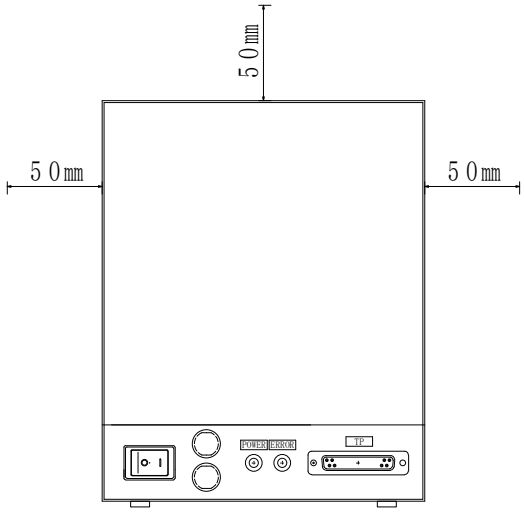


(Note 1) Cable length : 3m

3.3 Installation

1) RC75 series controller main unit

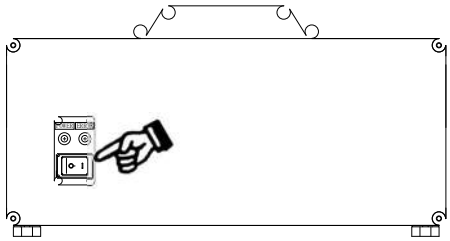
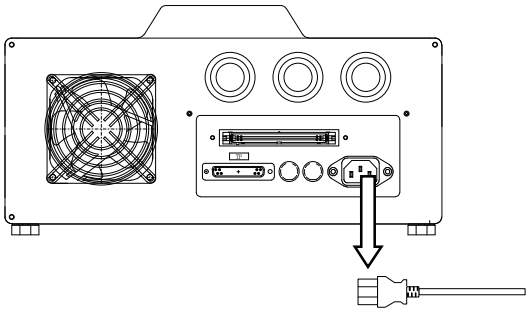
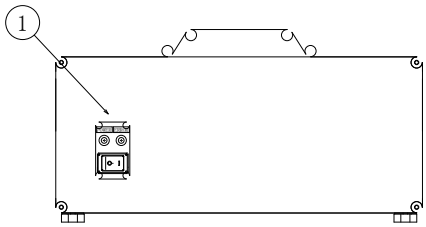
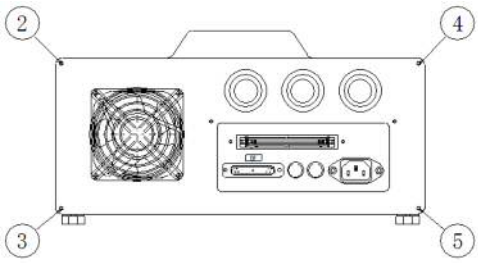
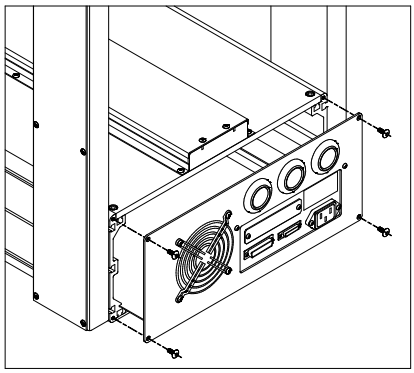
[Installation condition]

Operating 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. 

2) RC755 series controller main unit

The robot controller RC755 is built in the SR395DT.

Described below is the method of pulling out the robot controller (RC755) from the SR395DT.

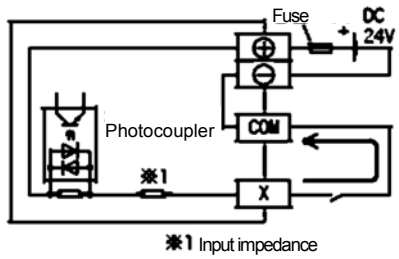
	Operating procedure	Display/Status
1	Turn OFF the power switch.	
2	Disconnect the AC plug from the power receptacle.	
3	Remove the screw located above the power lamp on the front of the robot. (①] in the figure right)	
4	Remove the four rear-panel-fixing screws on the rear of the robot. (② to ⑤ in the figure right)	
5	Slowly pull out the rear panel, while paying attention to the internal cables.	

3.4 Specifications of external I/O

1) External general-purpose signal inputs

Items	Specifications
Number of input points	Standard user port: Internal 32 ports External I/O cable: 16 inputs
Input voltage	24 VDC + 20%-15% Ripple (p-p): within 5%
Input current	5mA/24VDC
Response time	Approx. 10 ms
Connection method	Photocoupler

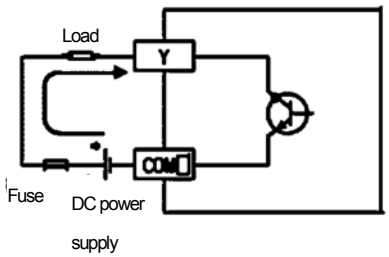
Internal circuit configuration



2) External general-purpose signal outputs

Items	Specifications
Number of output points	Standard user port: Internal 32 ports External I/O cable: 16 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 (EX2). 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
XB00	RETURN	Performs an origin return operation, if it is right after power-on, or moves to the stand-by position (ascent position), if origin return has been completed. Upon completion of origin return, the Origin signal (YB01)
XB01	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.
XB02	CYCLE START	Performs an automatic single cycle operation. If the Origin signal (YB01) is not ON at the start, then an automatic single cycle operation will start after an automatic origin return is complete.
XB03	SCREW FEEDING	By turning this signal ON when an automatic single cycle operation is suspended, a screw is pressure fed.
XB04 | XB13	TABLE SELECTION 1 TABLE SELECTION 2 TABLE SELECTION 4 TABLE SELECTION 8 TABLE SELECTION 16 TABLE SELECTION 32 TABLE SELECTION 64 TABLE SELECTION 128	At the start of automatic single cycle operation, captures the table select signals (XB04 to XB13) and determines the table No. that runs automatically. Up to 200 patterns of table nos can be selected (0 to 199).

Table No.	XB 13	XB 12	XB 11	XB 10	XB 07	XB 06	XB 05	XB 04
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
8	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
9	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
10	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
11	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
12	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
13	OFF	OFF	OFF	OFF	ON	ON	OFF	ON
14	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
15	OFF	OFF	OFF	OFF	ON	ON	ON	ON
|	|	|	|	|	|	|	|	|
197	ON	ON	OFF	OFF	OFF	ON	OFF	ON
198	ON	ON	OFF	OFF	OFF	ON	ON	OFF
199	ON	ON	OFF	OFF	OFF	ON	ON	ON

[External input]

PLC I/O	Signal name	Description
XB14	FAULT OK CONTINUD	Enabled when CHOICE is selected in operation parameter setting item 15.AFTER TIGHTEN FAIL. Select this item to handle the tightening work at the position subject to fault judgment as OK to proceed to the next process. (The fault is not stored in the memory of the equipment.)
XB15	FAULT NG CONTINUD	Enabled when CHOICE is selected in operation parameter setting item 15.AFTER TIGHTEN FAIL. Select this item to handle the tightening work at the position subject to fault judgment as NG to proceed to the next process. (The tightening point subject to fault is stored in the memory of the equipment.)
XB16	FAULT RETRY	Enabled when CHOICE is selected in operation parameter setting item 15.AFTER TIGHTEN FAIL. Select this item to retry tightening work at the position subject to fault judgment. (In case where the operation can be conducted after clearing screw feed fault or operator's manual correction, etc.)
XB17	FAULT BREAK	Enabled when CHOICE is selected in operation parameter setting item 15.AFTER TIGHTEN FAIL. Select this item to interrupt tightening work and quit the cycle. (The tightening point subject to fault is stored in the memory of the equipment.)

[External output]

PLC I/O	Signal name	Description
YB00	READY (START POSSIBLE)	This signal turns ON when the system is ready for automatic single cycle operation. When this signal is OFF, turning ON the Cycle Start (XB02) will not start the operation. [READY ON condition] (all of the following conditions must be met) ・The Operation Preparation is ON. ・There is no error condition. ・The system is not running. ・The Teaching or Setting screen is not displayed.
YB01	HOME POSITION	This signal is output when the tool is at the origin or the stand-by position (ascent position).
YB02	ALARM	This signal is output when an error occurs. It is turned OFF by turning ON the external reset input (XB01) or by resetting all errors from the operation panel.
YB03	DURING RUNNING	This signal turns ON during an automatic single cycle operation.
YB04	CYCLE COMPLETION	This signal is output upon completion of an automatic single cycle operation and it is turned OFF when the next Cycle Start (XB02) is turned ON.
YB05	DURING FEEDING	This signal turns ON when screws are fed. While screws are fed, the Cycle Start (XB02) cannot be turned ON.
YB06	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).
YB07	TIGHTENING TORQUE FAULT	This signal is output when tightening torque is NG, or when tightening operation is not completed within the specified time. At occurrence of the tightening torque fault, the tightening tool will return to the home position (standby position).
YB10	TIGHTENING HEIGHT FAULT	This signal is output when a screw cannot be tightened to the specified height. At occurrence of screw rise fault, the tightening tool will return to the home position (standby position).
YB11	SCREW FEED FAULT / SCREW PICKUP FAULT	This signal is output when screw feed fault or screw pickup fault occurs. For detection of screw feed fault, the screw feed detection sensor (option) is required.
YB12	BUZZER ON	Buzzer is output according to the patter No. specified in the operation parameter setting item 19.BUZZER OUTPUT .

[Other]

・R-EM1/R-EM2 Emergency Stop Input

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

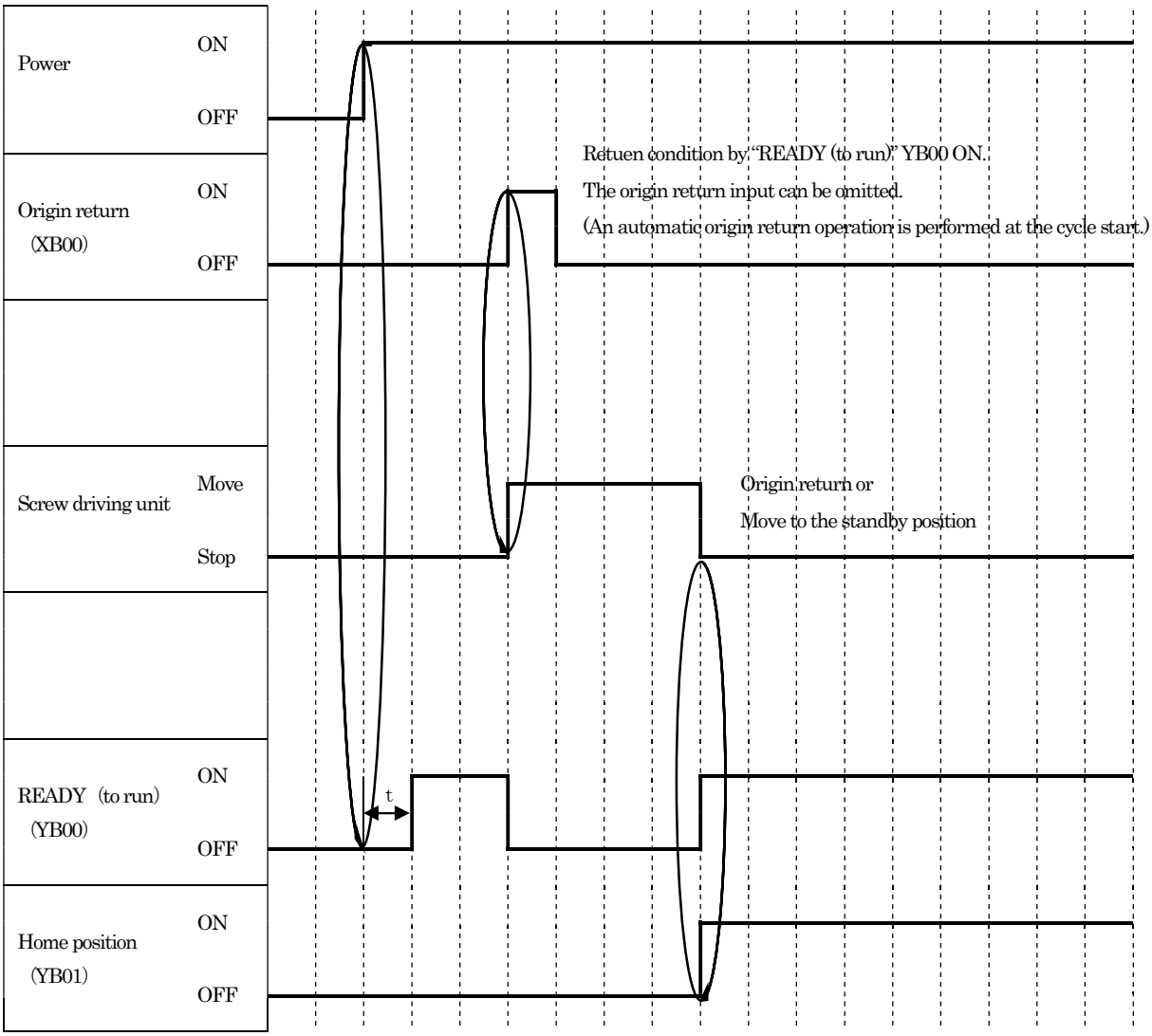
The system is delivered with the R-EM1/R-EM2 lines of external I/O cable short-circuited.

[Timing chart]

1. Origin Return

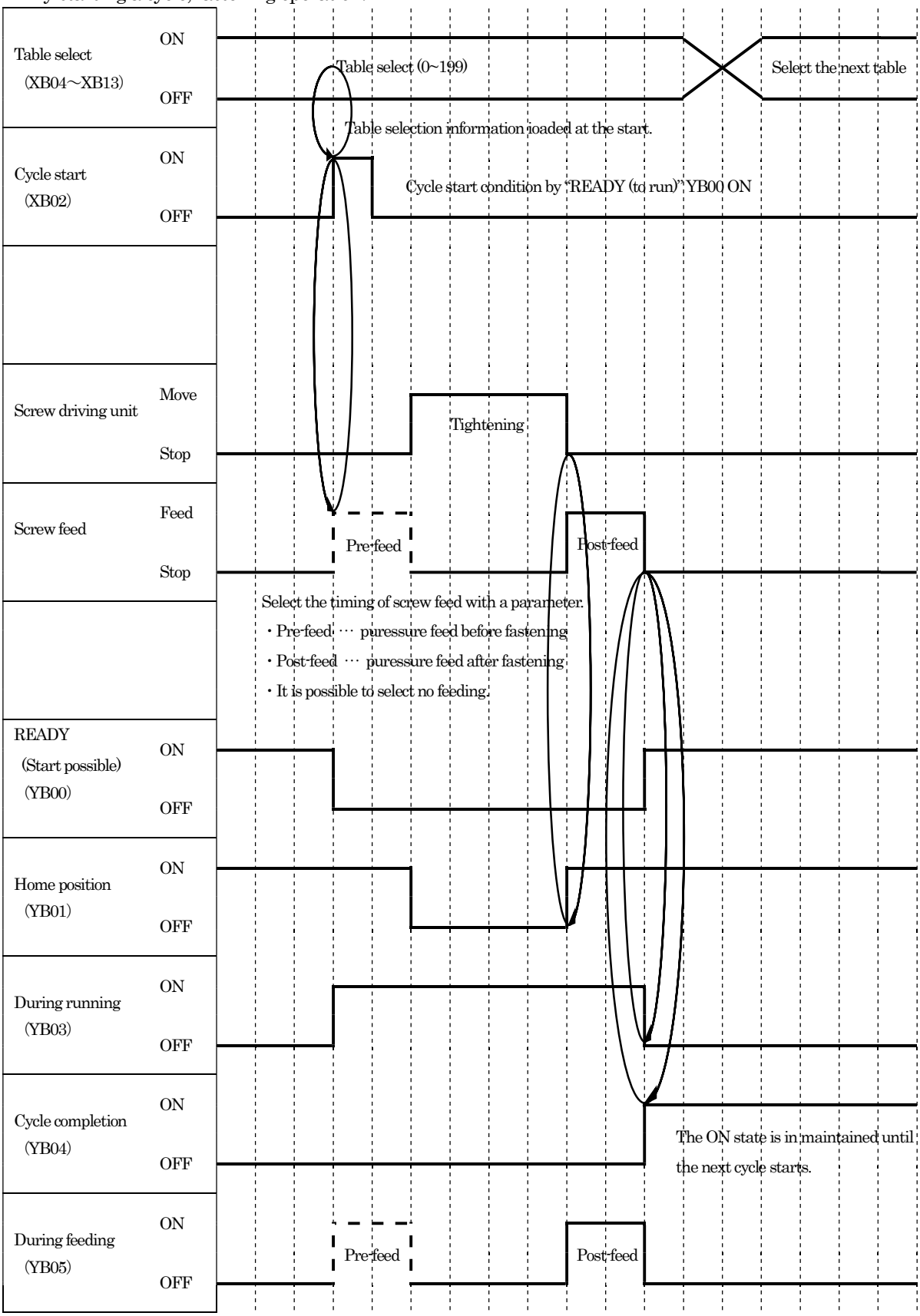
For the first operation after the Operation Preparation turns ON, an origin return shall be performed. For the second operation onward, the tool moves to the aerial stand-by position.

The origin return operation is performed by pushing the up/down shaft to the end of stroke and the farthest l imit will be considered as the origin (0 coordinate). As this machine employs an incremental encoder, an origin return operation is essential after the servo power is turned ON.



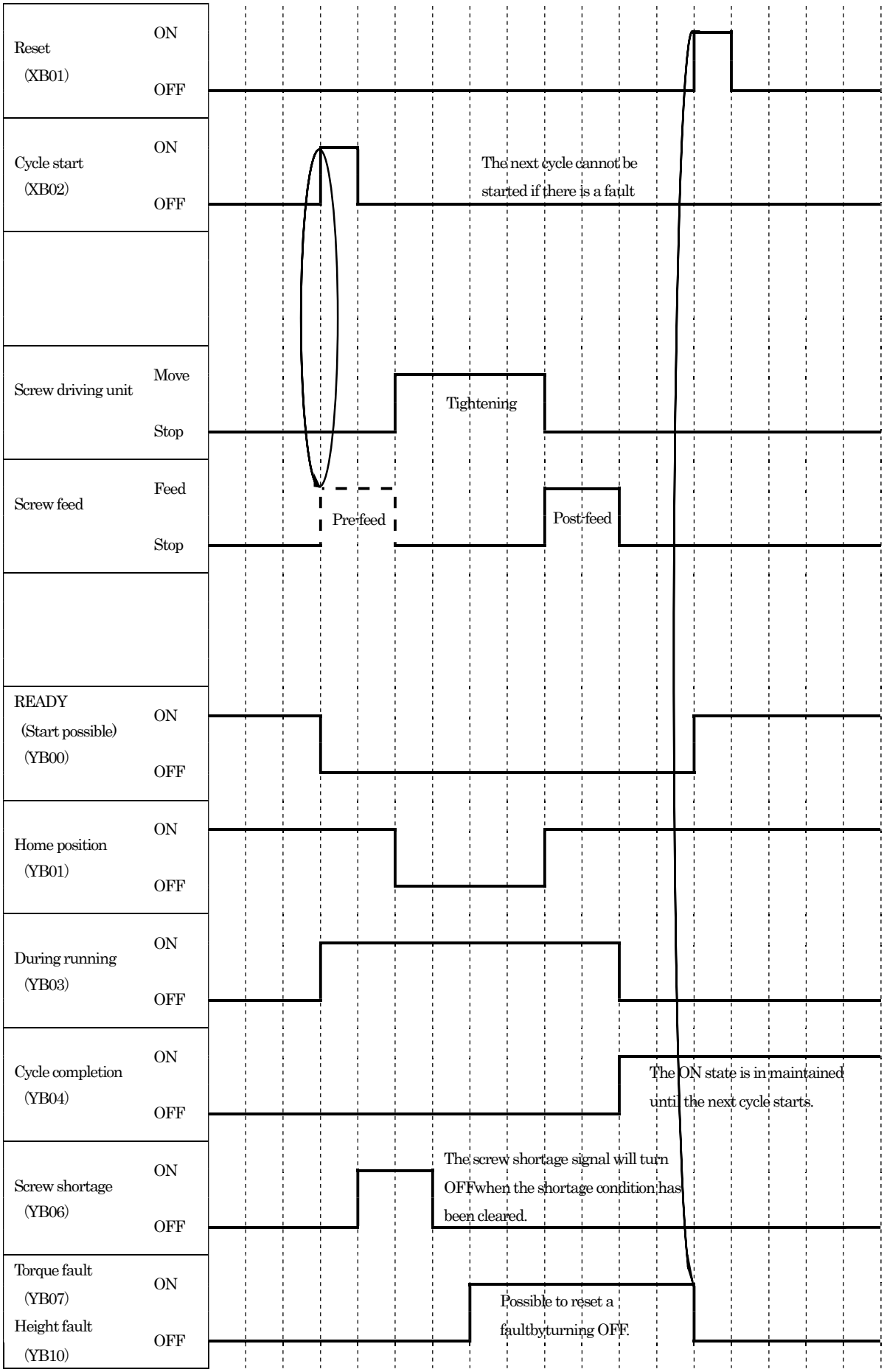
2. Automatic Operation

By starting a cycle, fastening operation.



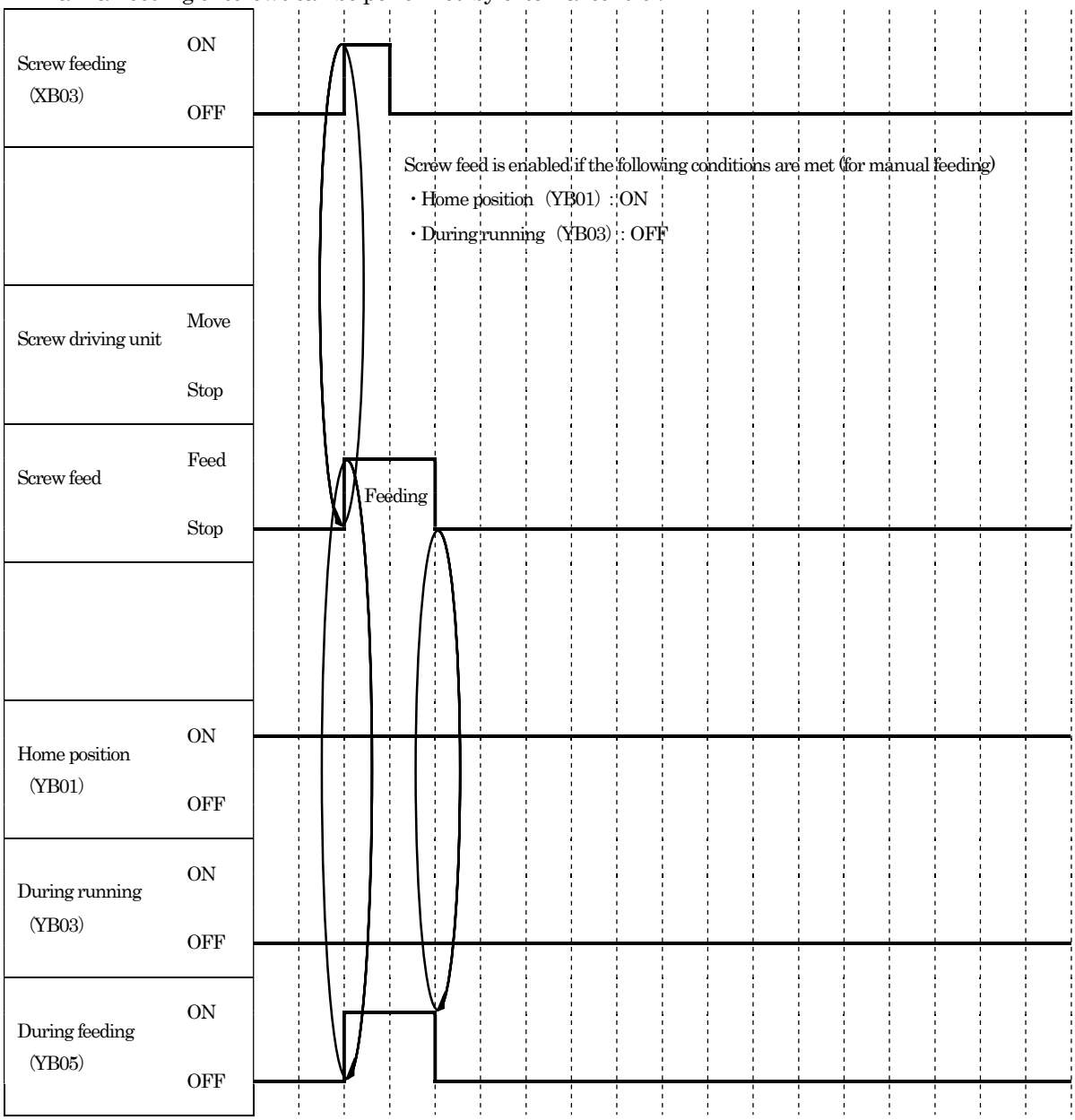
3. Fastening Error

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 (XB01) ON after the cycle has stopped.



4．Feeding

Manual feeding of screws can be performed by external control.

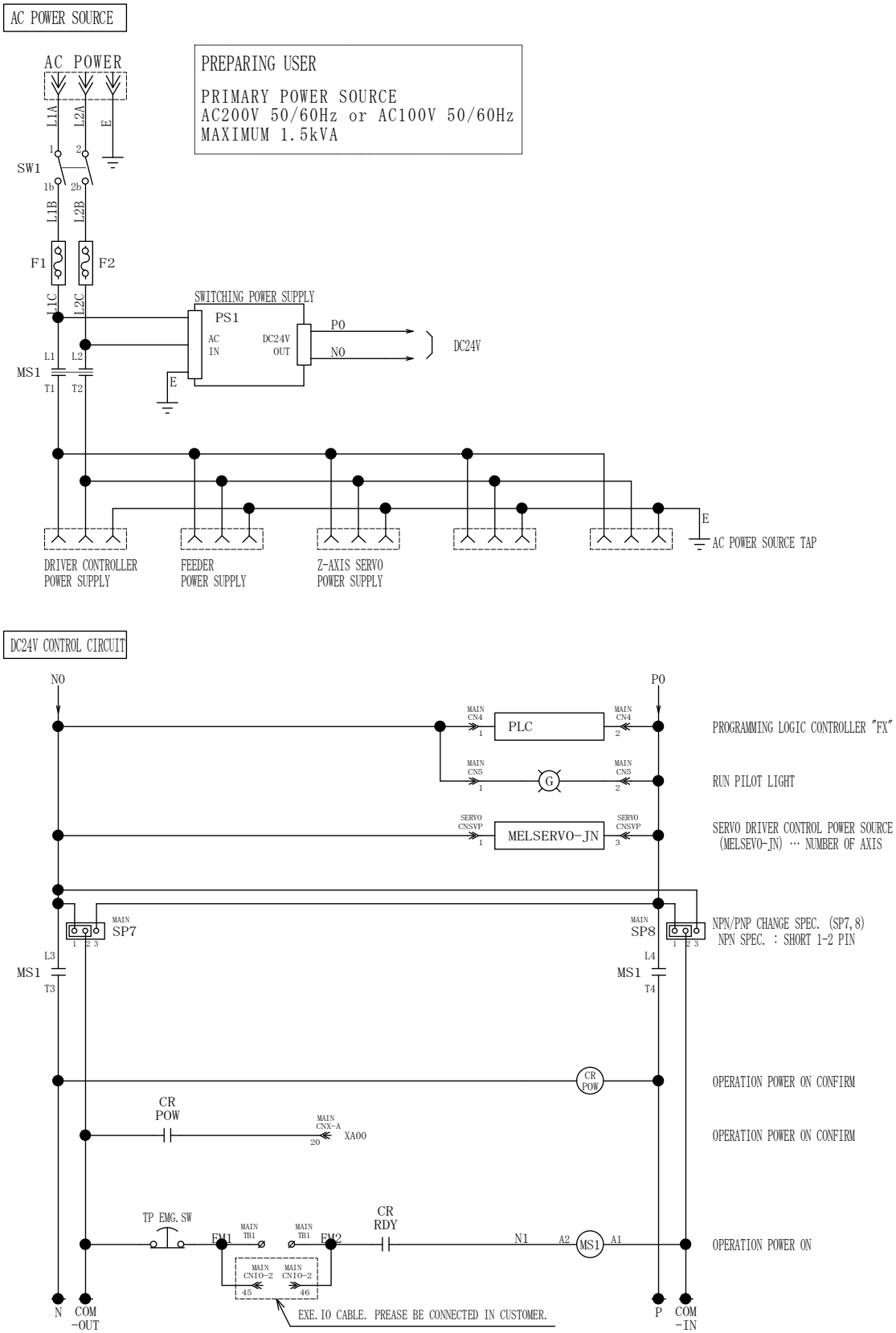


4. Wiring

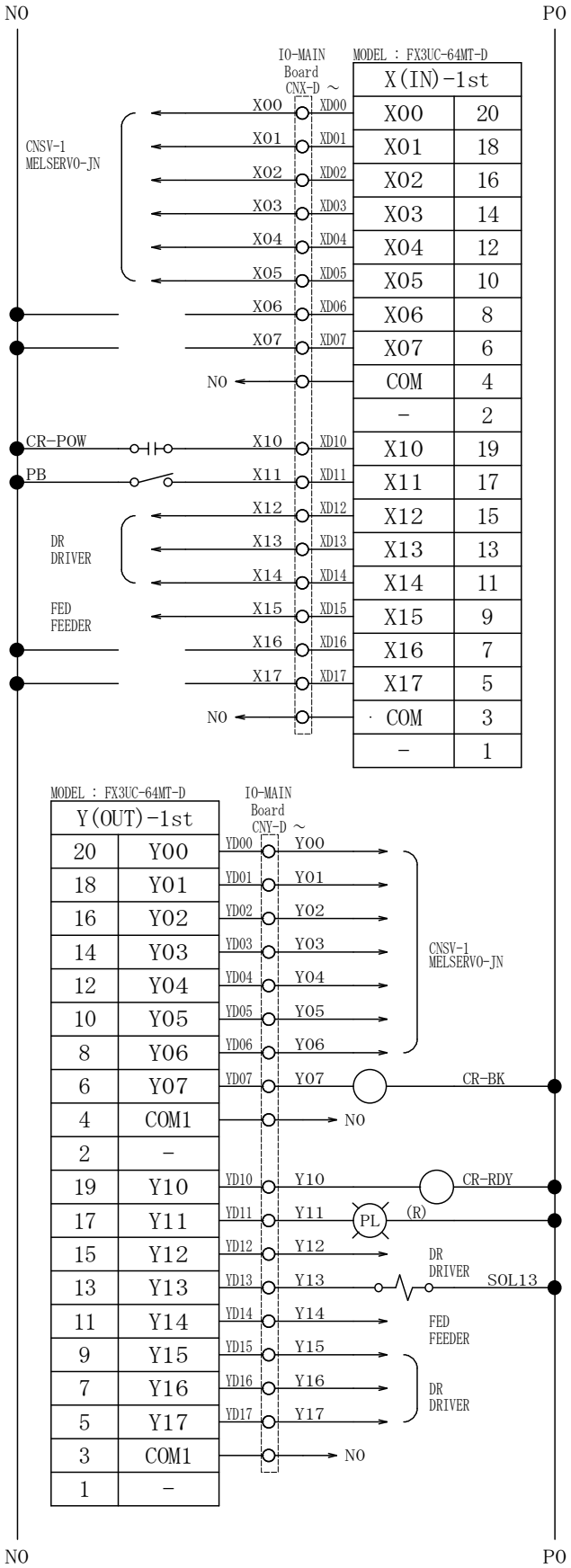
4.1 Development connection diagram

4.1.1 Development connection diagram RC75-T1

1) RC75-T1 Development connection diagram



2) RC75-T1 PLC I/O diagram

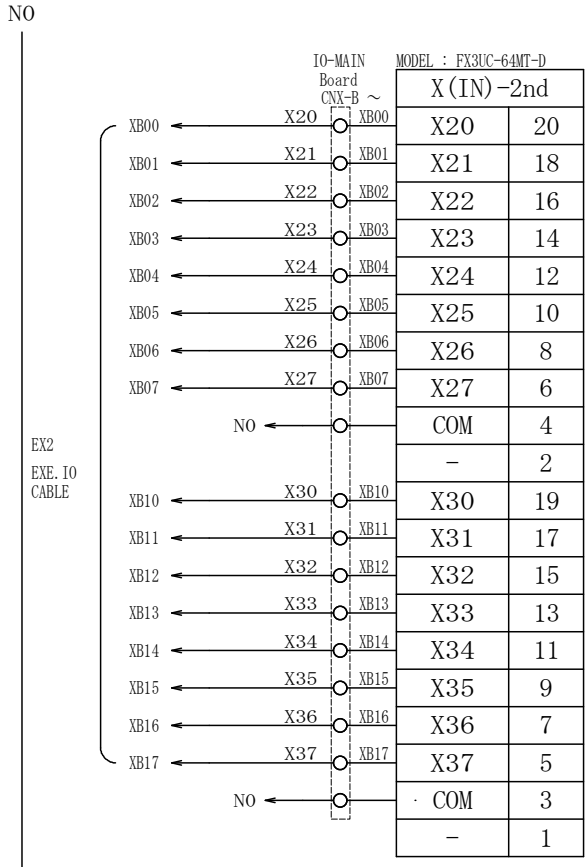


SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE
SV1 RD READY
SV1 INP IN POSITION
SV1 TLC LIMITING TORQUE
EX1
EX1

OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1

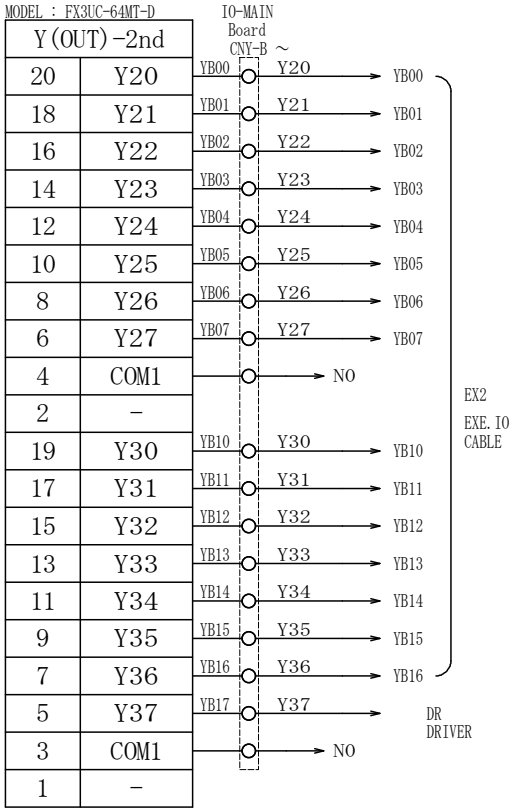
SV1 PP COMMAND PULSE
SV1 CR CLEAR
SV1 SON SERVO ON
SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 NP COMMAND PULSE +/-
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
MOTOR BREAK OFF

OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
EX1 VACUUM
FED SCREW FEED
DR CHANNEL SELECT CH. 1
DR CHANNEL SELECT CH. 2
DR CHANNEL SELECT CH. 4



EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128



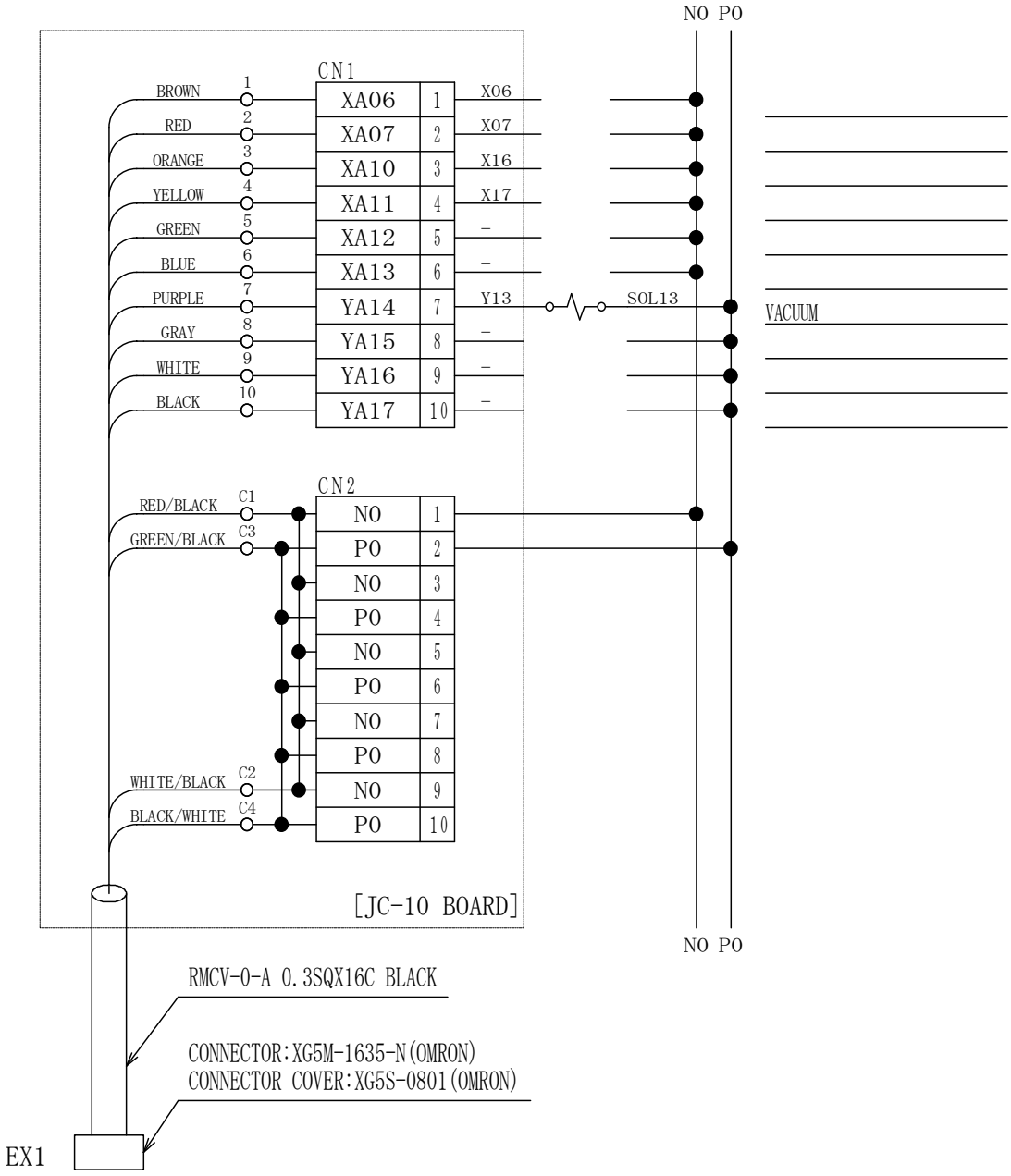
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

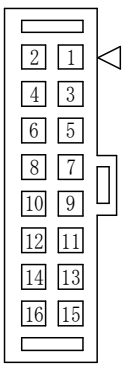
DR CHANNEL SELECT CH.8 THIS CONNECT EX2 CABLE Pin36(BLUE4)YB17 TO IO MAIN BOARD TB4 YA12

NO PO

3) RC75-T1 tip tool I/O diagram



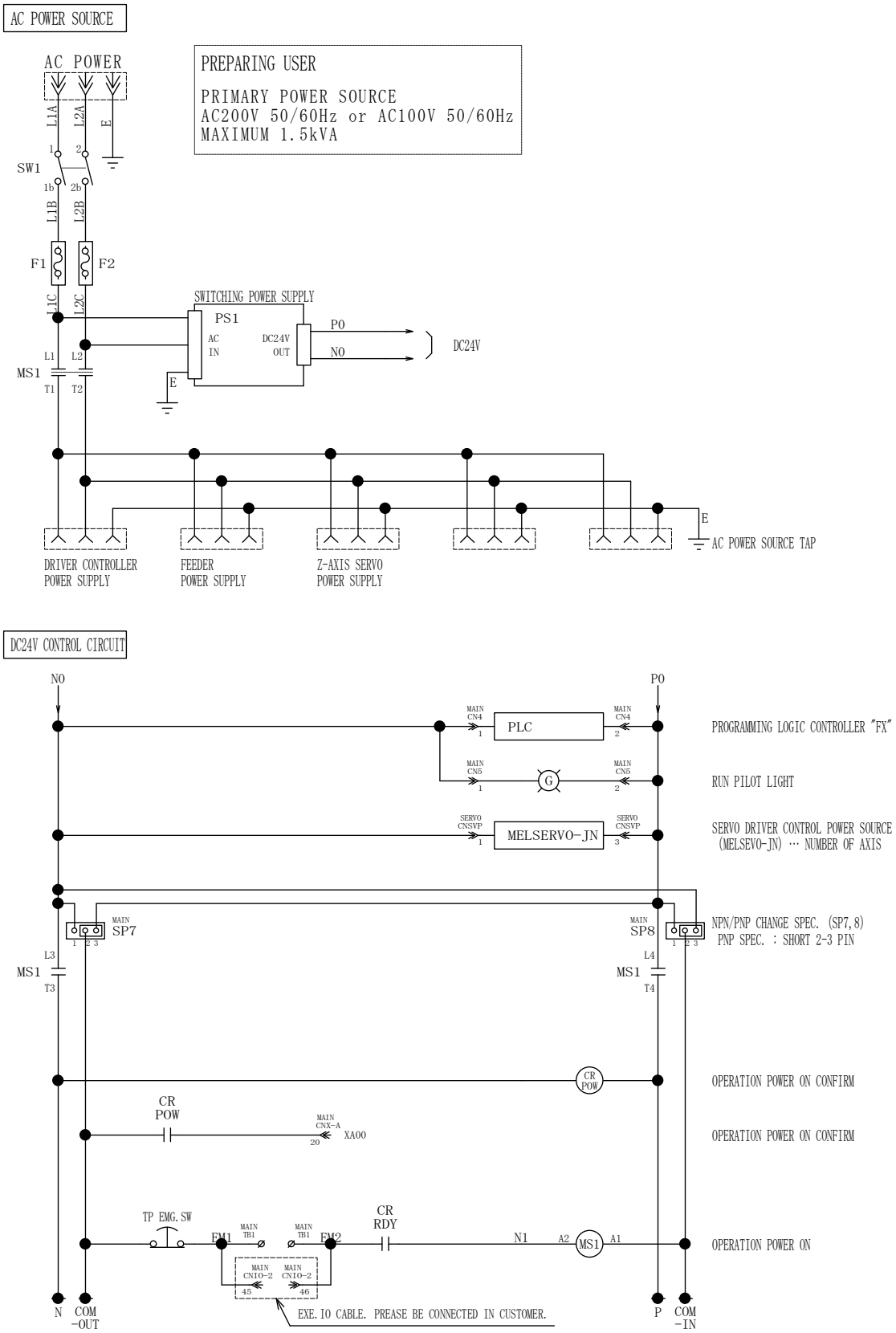
CONNECTOR PIN ASSIGNMENT



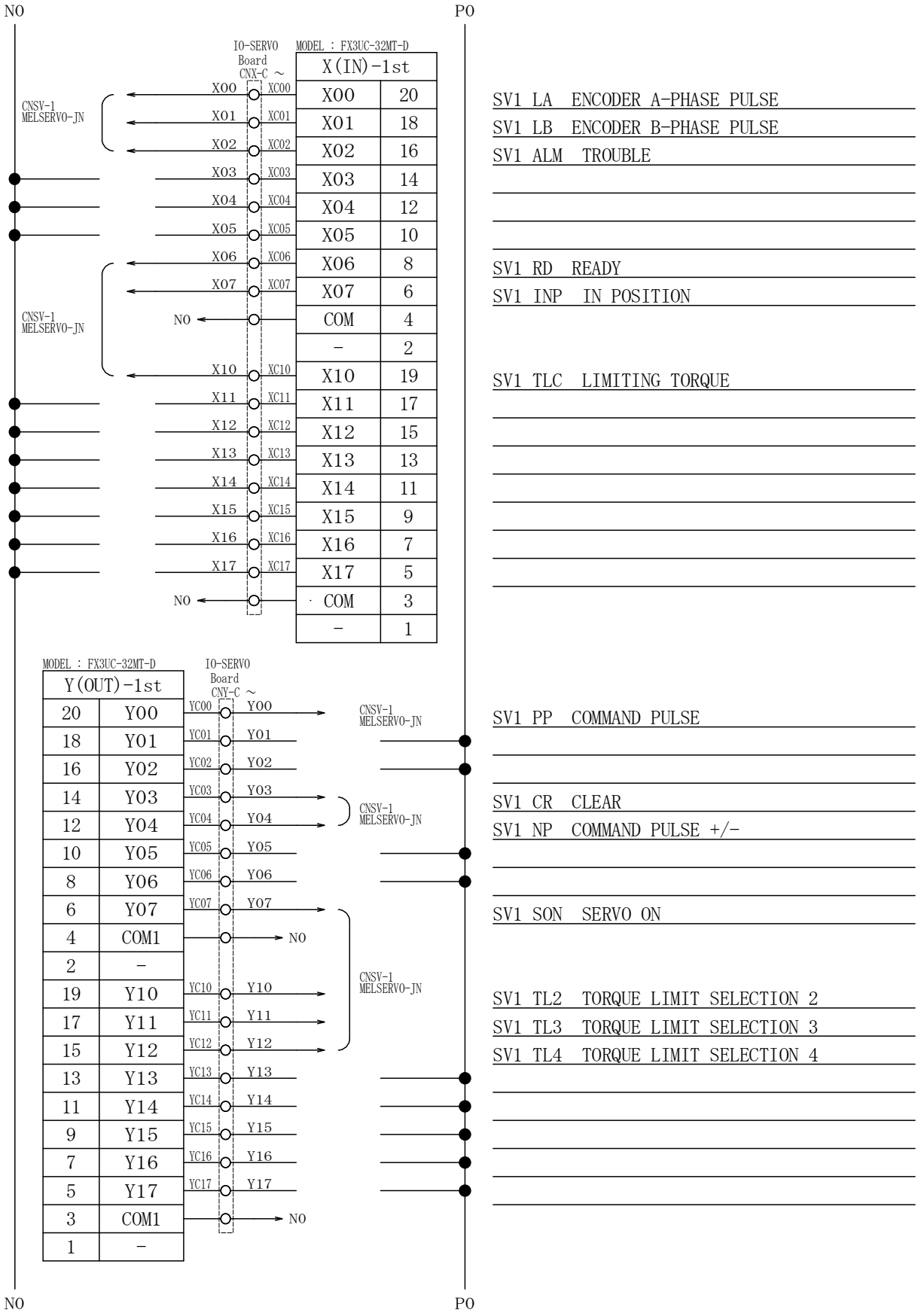
PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

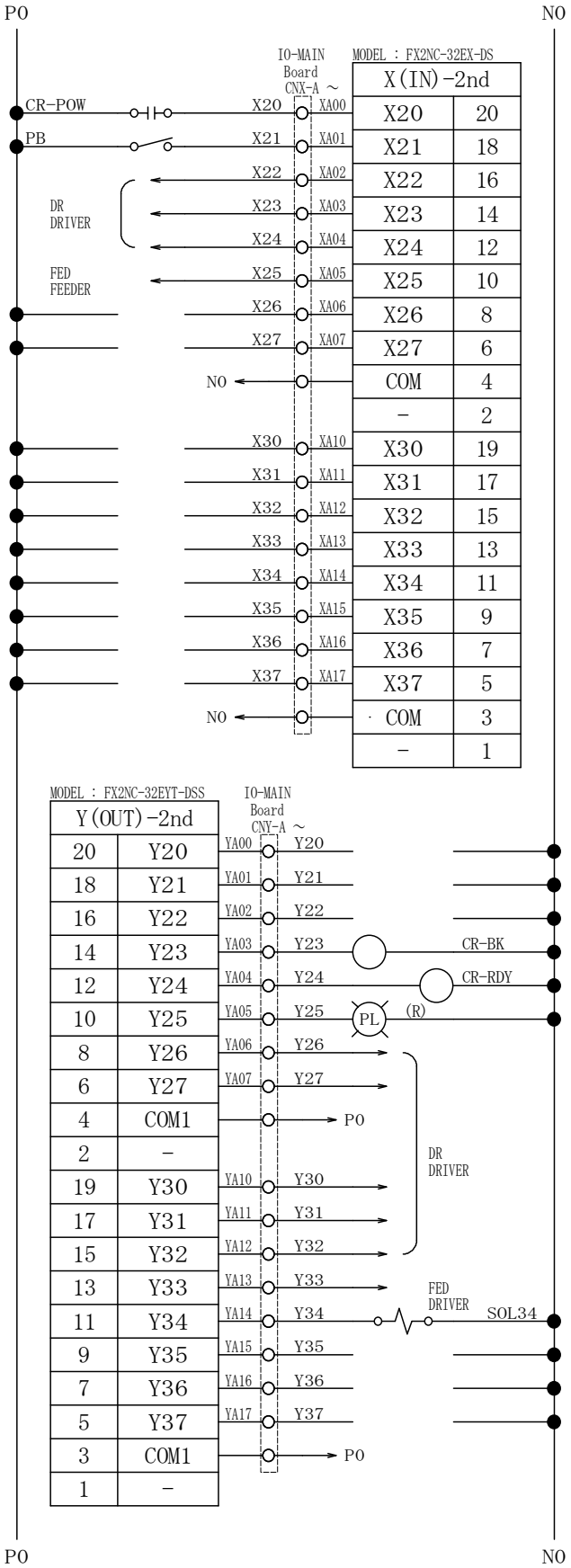
4.1.2 Development connection diagram RC75-T1-P

1) RC75-T1-P Development connection diagram



2) RC75-T1-P PLC I/O diagram



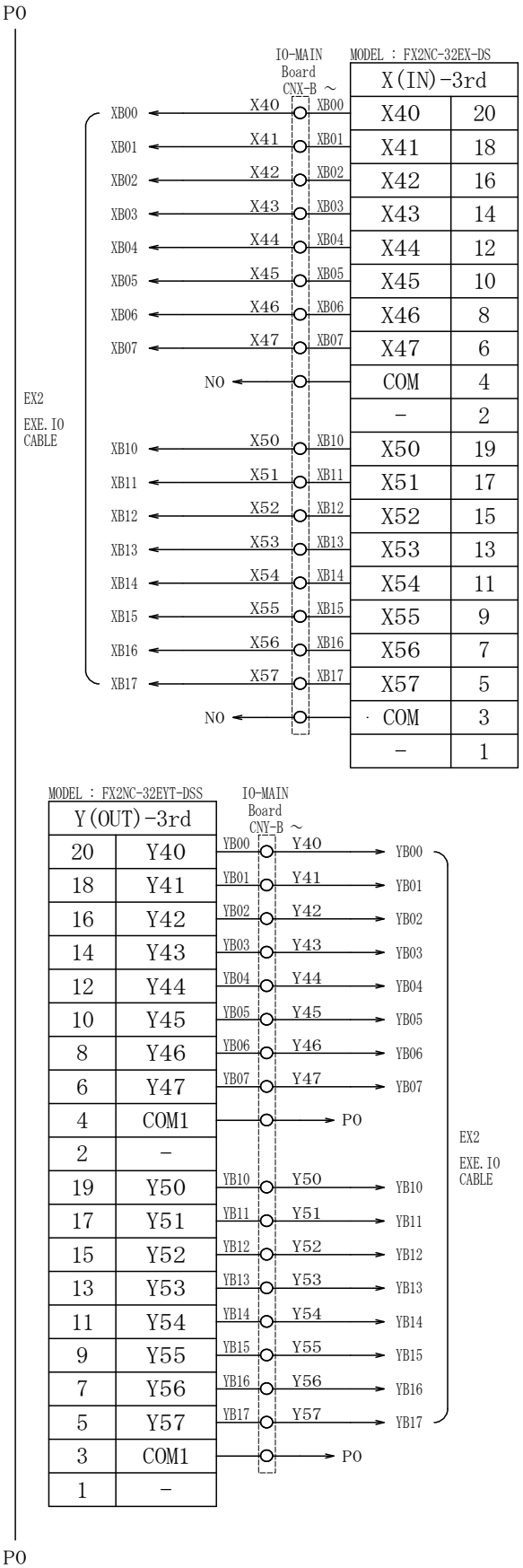


OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1

EX1
EX1
EX1
EX1

MOTOR BREAK OFF
OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
DR CHANNEL SELECT CH.1

DR CHANNEL SELECT CH.2
DR CHANNEL SELECT CH.4
DR CHANNEL SELECT CH.8
FED SCREW FEED
EX1 VACUUM
EX1
EX1
EX1



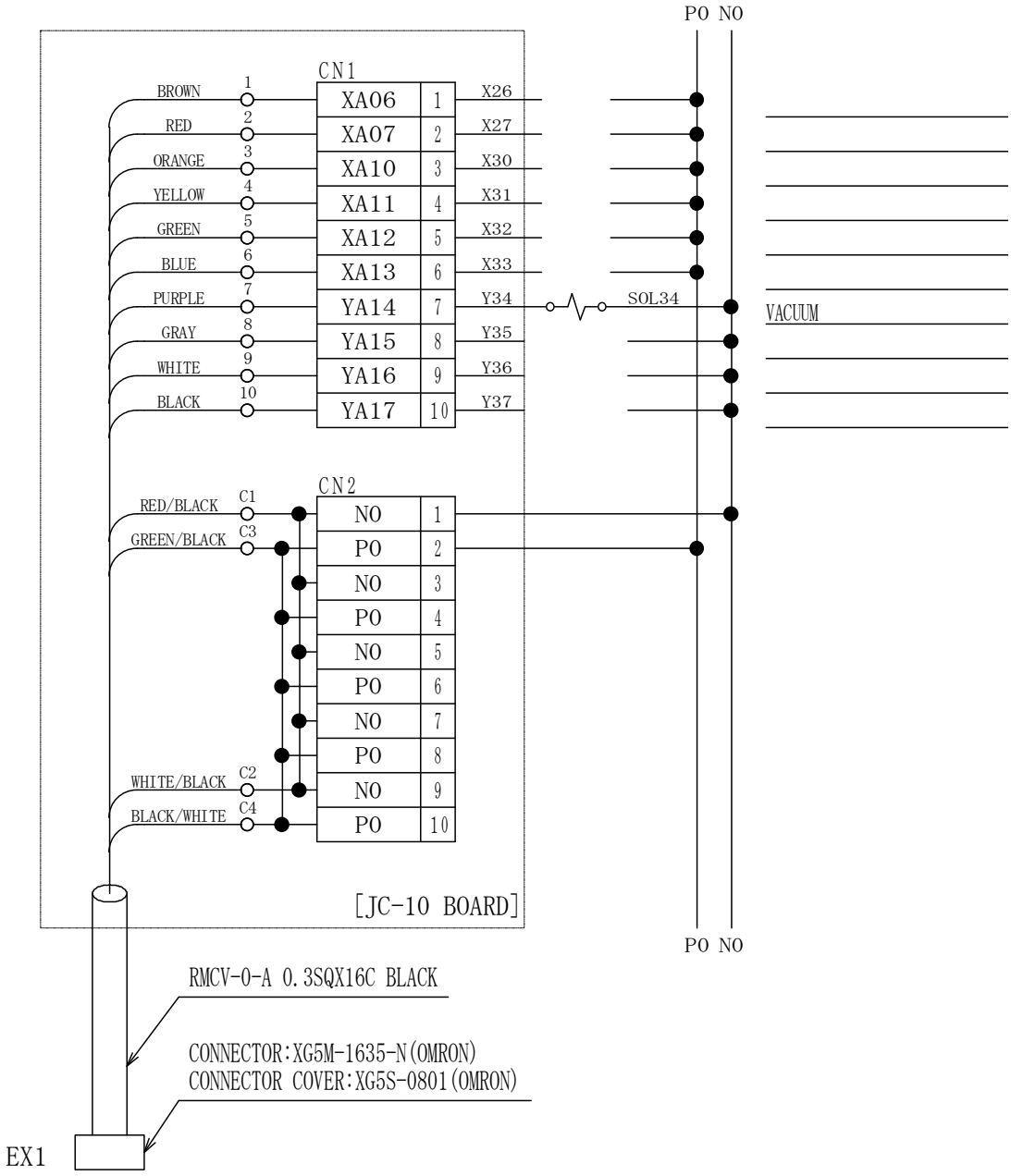
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128

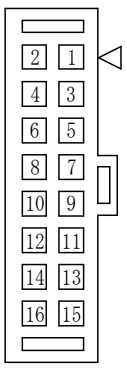
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC75-T1-P tip tool I/O diagram



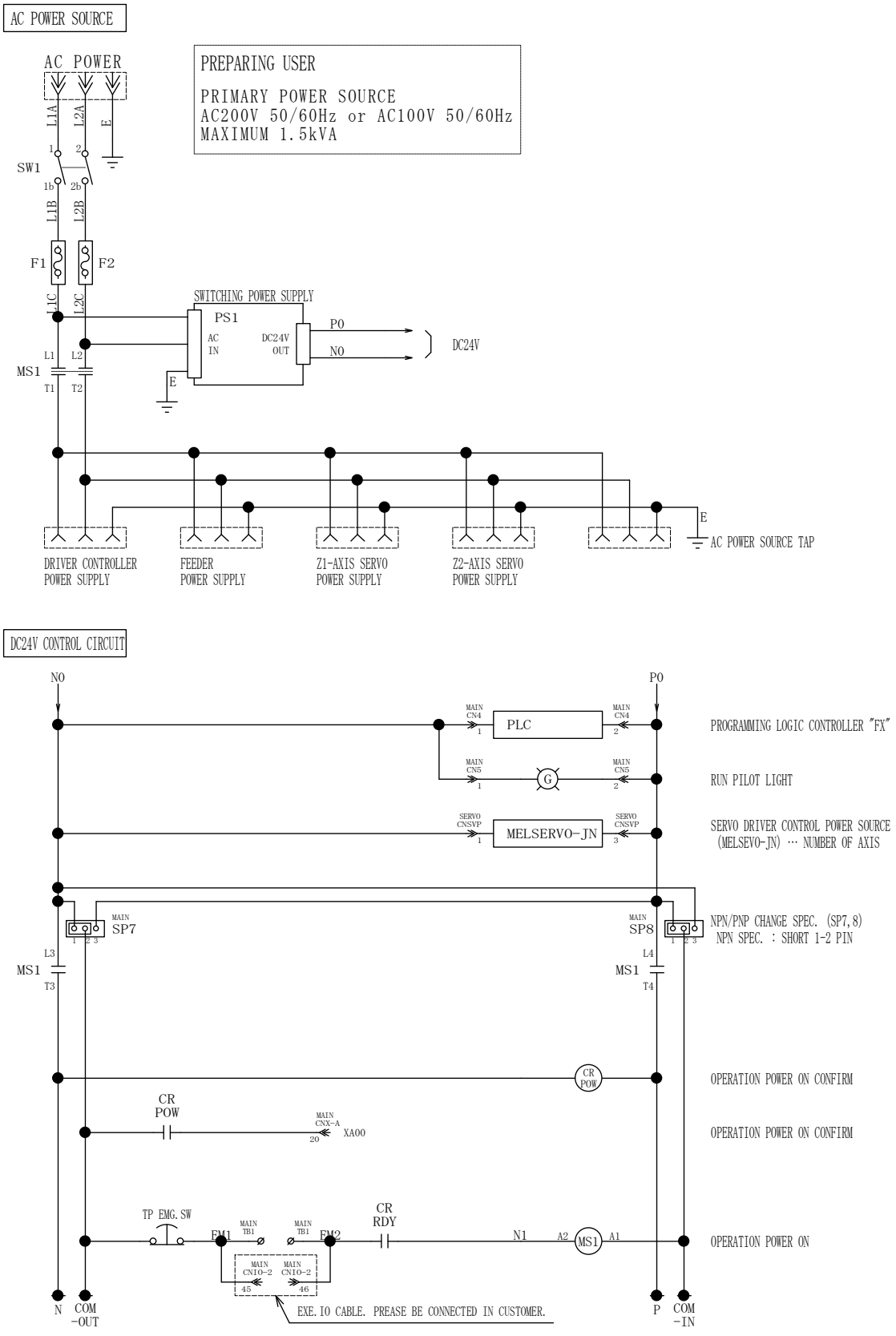
CONNECTOR PIN ASSIGNMENT



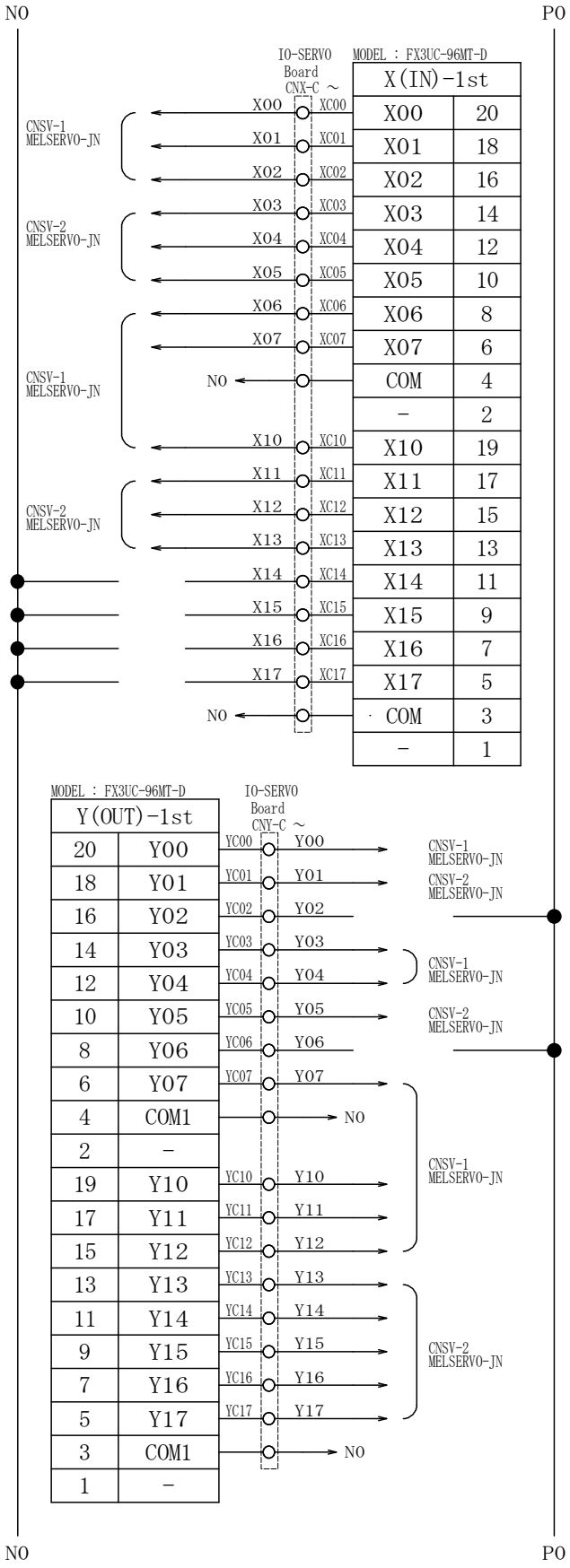
PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.1.3 Development connection diagram RC75-T2

1) RC75-T2 Development connection diagram



2) RC75-T2 PLC I/O diagram



SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE
SV2 LA ENCODER A-PHASE PULSE
SV2 LB ENCODER B-PHASE PULSE
SV2 ALM TROUBLE
SV1 RD READY
SV1 INP IN POSITION

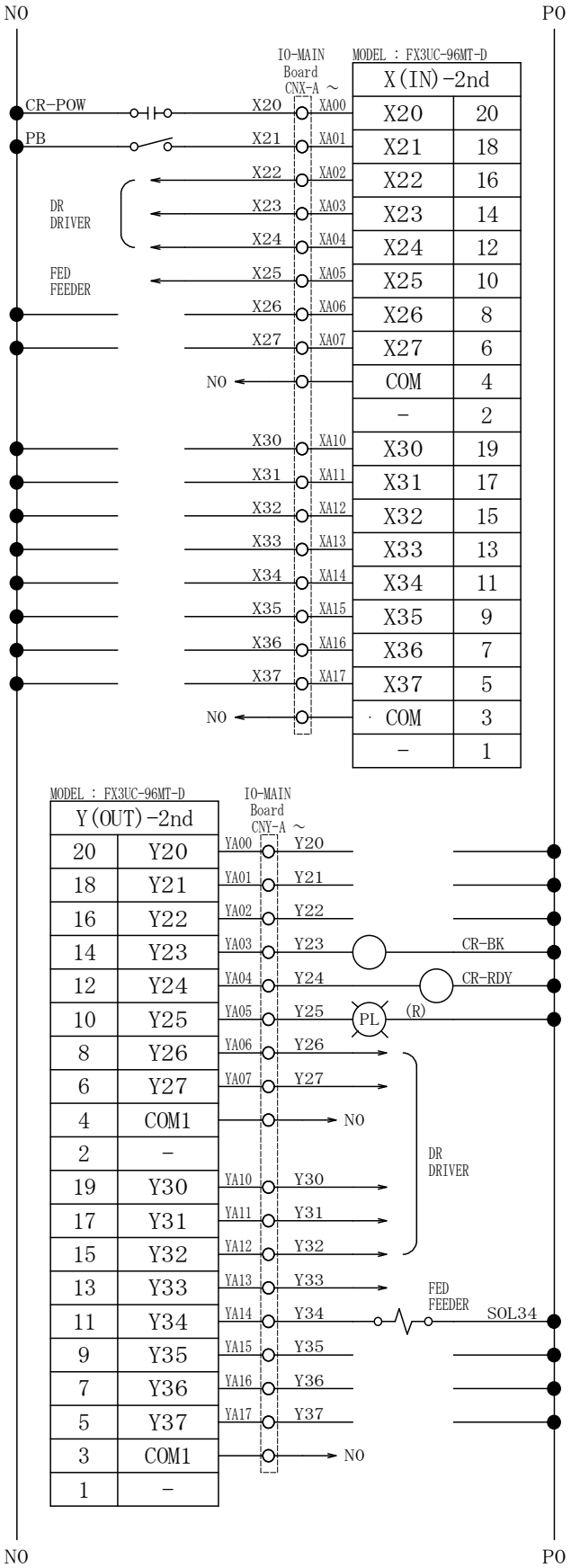
SV1 TLC LIMITING TORQUE
SV2 RD READY
SV2 INP IN POSITION
SV2 TLC LIMITING TORQUE

SV1 PP COMMAND PULSE
SV2 PP COMMAND PULSE

SV1 CR CLEAR
SV1 NP COMMAND PULSE +/-
SV2 NP COMMAND PULSE +/-

SV1 SON SERVO ON

SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
SV2 CR CLEAR
SV2 SON SERVO ON
SV2 TL2 TORQUE LIMIT SELECTION 2
SV2 TL3 TORQUE LIMIT SELECTION 3
SV2 TL4 TORQUE LIMIT SELECTION 4

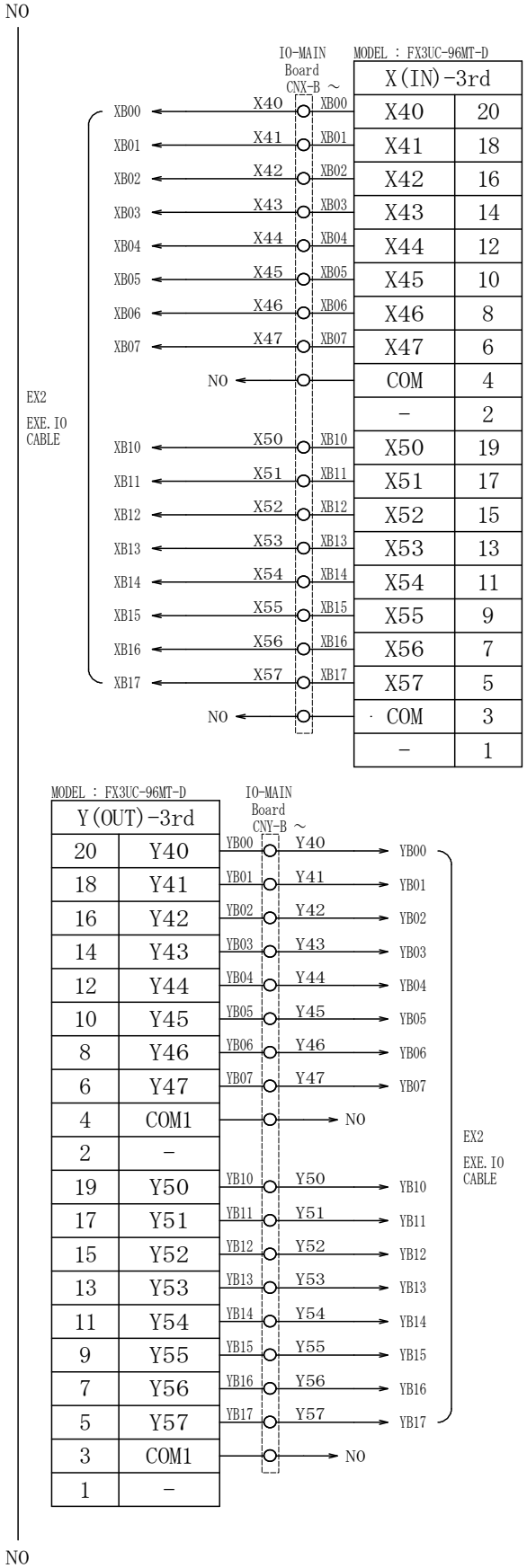


OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1

EX1
EX1
EX1
EX1

MOTOR BREAK OFF
OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
DR CHANNEL SELECT CH.1

DR CHANNEL SELECT CH.2
DR CHANNEL SELECT CH.4
DR CHANNEL SELECT CH.8
FED SCREW FEED
EX1 VACUUM
EX1
EX1
EX1



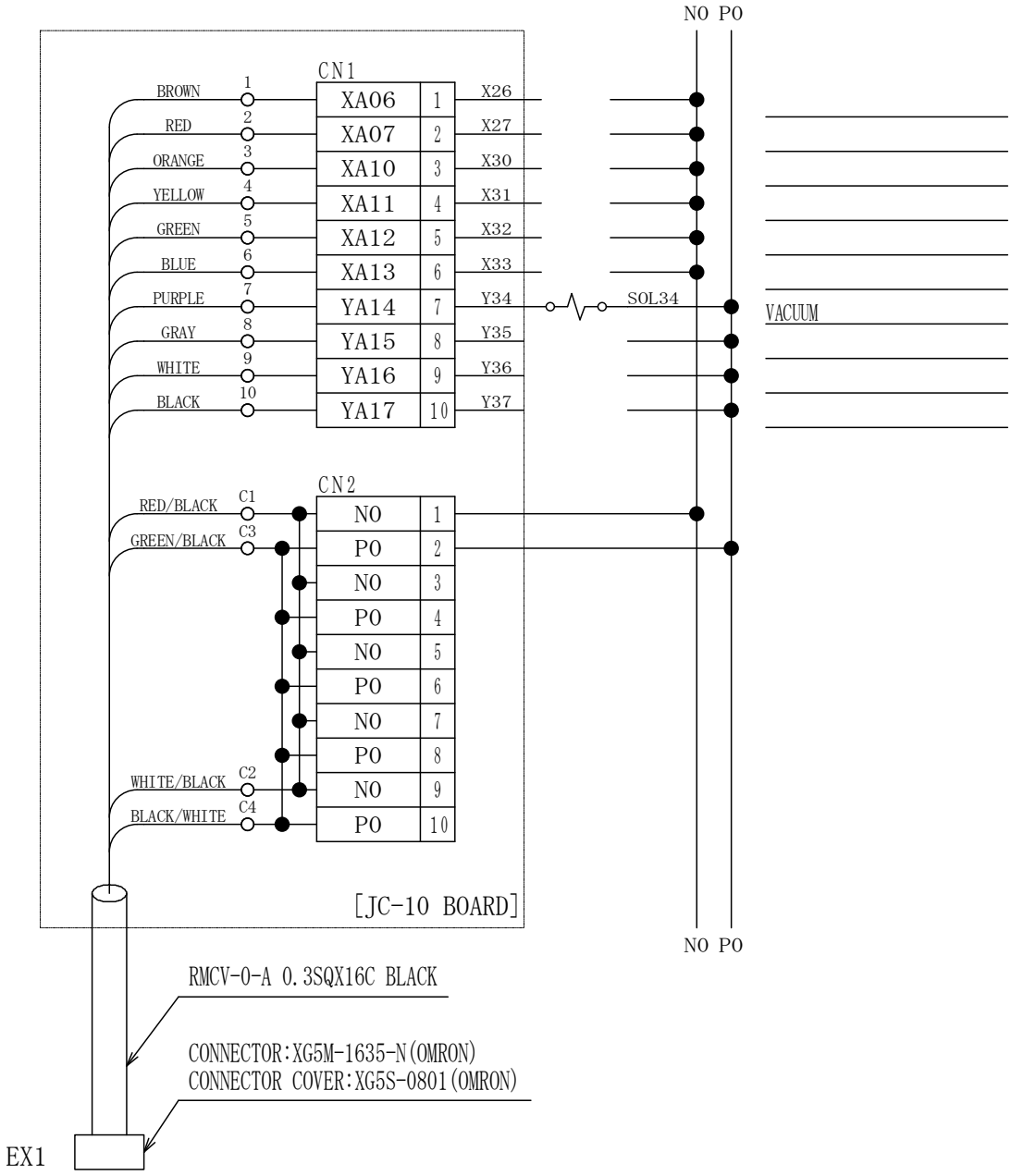
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128

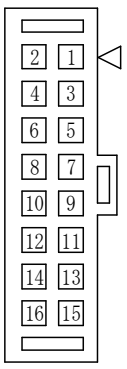
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC75-T2 tip tool I/O diagram



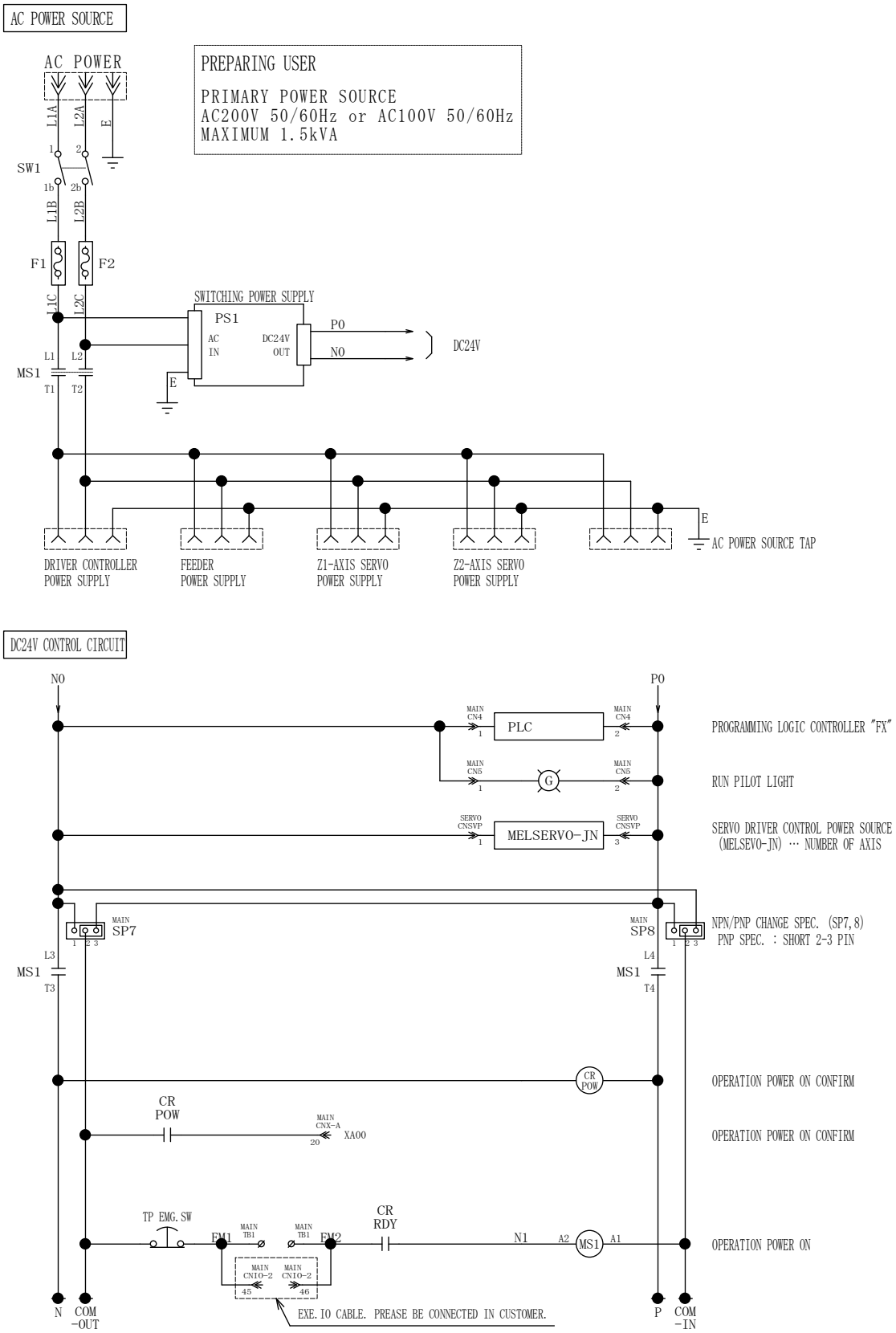
CONNECTOR PIN ASSIGNMENT



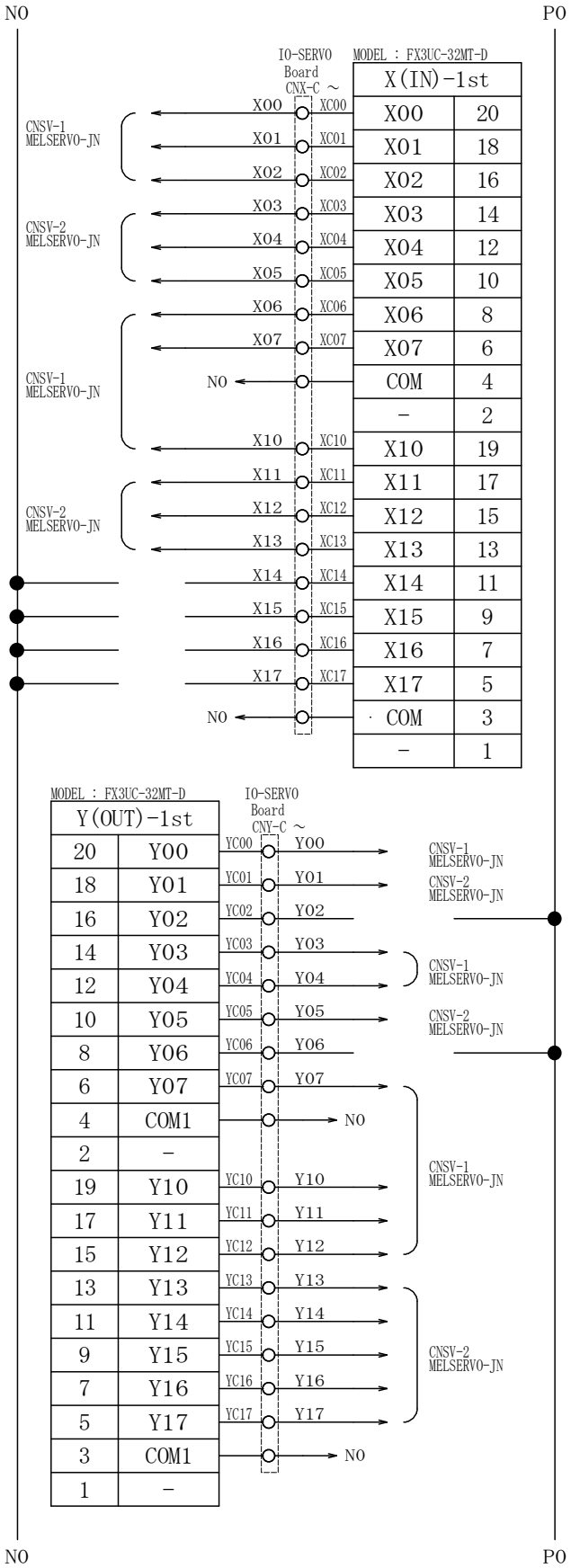
PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.1.4 Development connection diagram RC75-T2-P

1) RC75-T2-P Development connection diagram



2) RC75-T2-P PLC I/O diagram



SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE
SV2 LA ENCODER A-PHASE PULSE
SV2 LB ENCODER B-PHASE PULSE
SV2 ALM TROUBLE
SV1 RD READY
SV1 INP IN POSITION

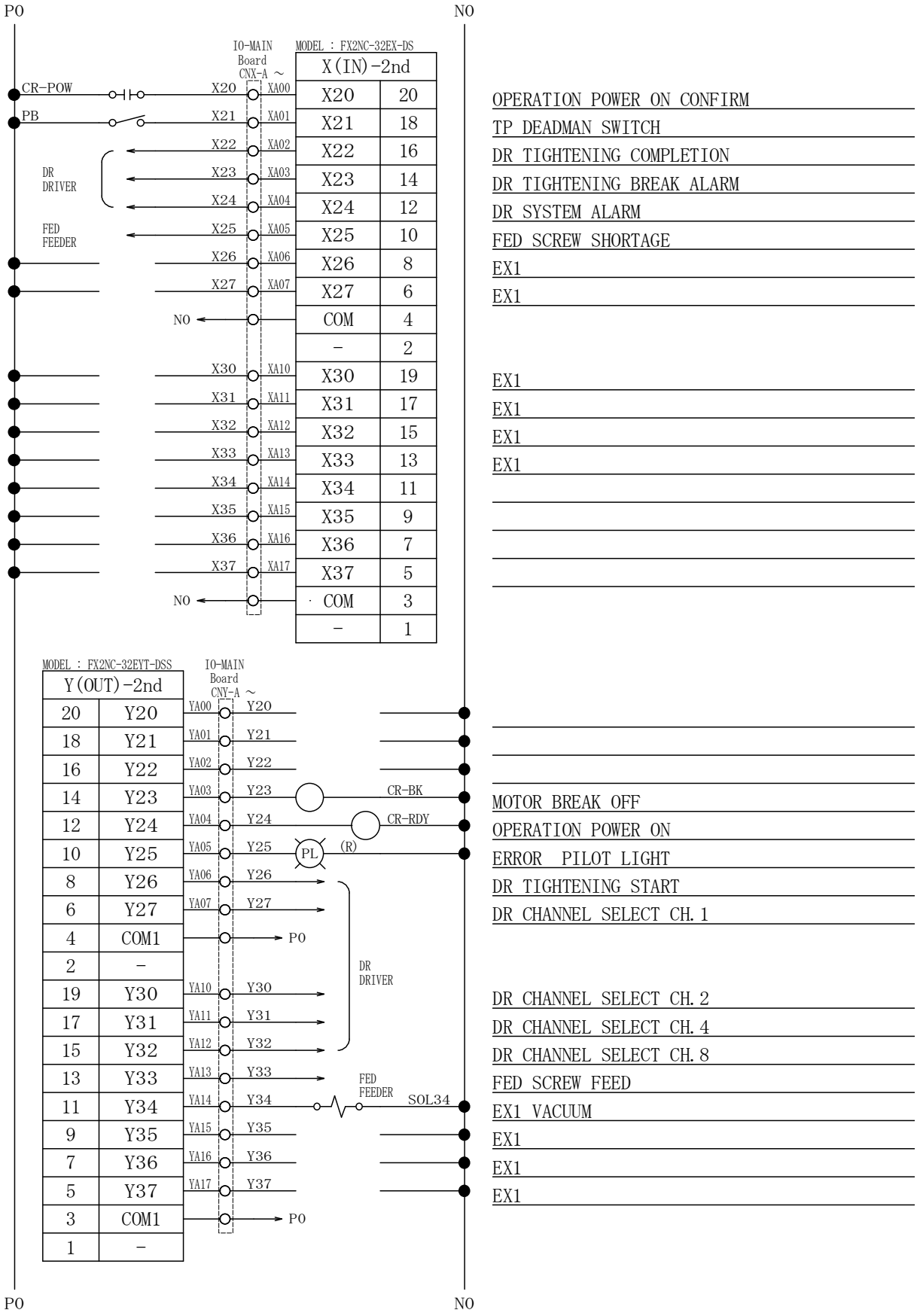
SV1 TLC LIMITING TORQUE
SV2 RD READY
SV2 INP IN POSITION
SV2 TLC LIMITING TORQUE

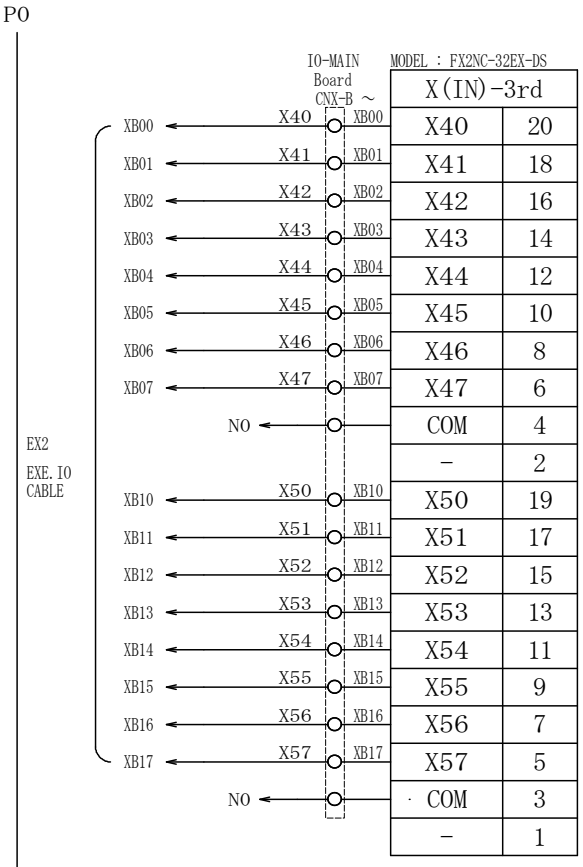
SV1 PP COMMAND PULSE
SV2 PP COMMAND PULSE

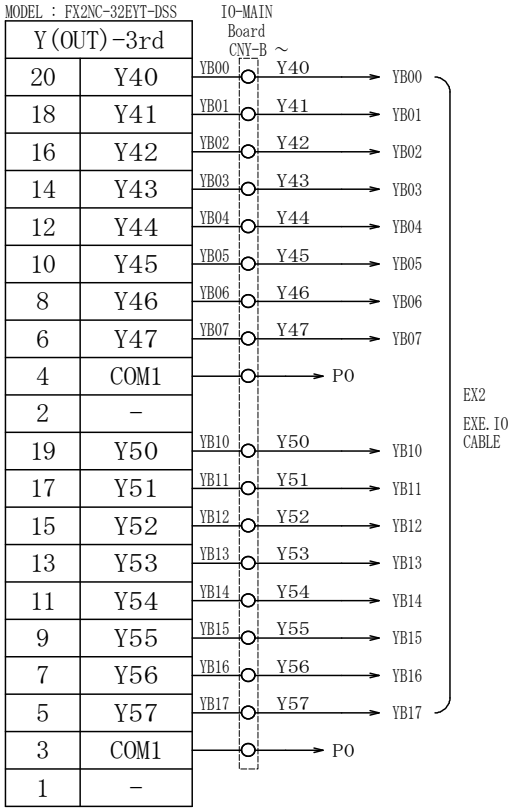
SV1 CR CLEAR
SV1 NP COMMAND PULSE +/-
SV2 NP COMMAND PULSE +/-

SV1 SON SERVO ON

SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
SV2 CR CLEAR
SV2 SON SERVO ON
SV2 TL2 TORQUE LIMIT SELECTION 2
SV2 TL3 TORQUE LIMIT SELECTION 3
SV2 TL4 TORQUE LIMIT SELECTION 4


P0
N0
IO-MAIN Board CNX-A ～
MODEL : FX2NC-32EX-DS
X(IN)-2nd
CR-POW
PB
DR DRIVER
FED FEEDER
X20 XA00 X20 20
X21 XA01 X21 18
X22 XA02 X22 16
X23 XA03 X23 14
X24 XA04 X24 12
X25 XA05 X25 10
X26 XA06 X26 8
X27 XA07 X27 6
N0 COM 4
- 2
X30 XA10 X30 19
X31 XA11 X31 17
X32 XA12 X32 15
X33 XA13 X33 13
X34 XA14 X34 11
X35 XA15 X35 9
X36 XA16 X36 7
X37 XA17 X37 5
N0 COM 3
- 1
OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1
EX1
EX1
EX1
EX1
EX1
MODEL : FX2NC-32EYT-DSS
Y(OUT)-2nd
IO-MAIN Board CNY-A ～
20 Y20 YA00 Y20
18 Y21 YA01 Y21
16 Y22 YA02 Y22
14 Y23 YA03 Y23 CR-BK
12 Y24 YA04 Y24 CR-RDY
10 Y25 YA05 Y25 PL (R)
8 Y26 YA06 Y26
6 Y27 YA07 Y27
4 COM1 P0
2 -
19 Y30 YA10 Y30
17 Y31 YA11 Y31
15 Y32 YA12 Y32
13 Y33 YA13 Y33
11 Y34 YA14 Y34
9 Y35 YA15 Y35
7 Y36 YA16 Y36
5 Y37 YA17 Y37
3 COM1 P0
1 -
DR DRIVER
FED FEEDER
SOL34
MOTOR BREAK OFF
OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
DR CHANNEL SELECT CH.1
DR CHANNEL SELECT CH.2
DR CHANNEL SELECT CH.4
DR CHANNEL SELECT CH.8
FED SCREW FEED
EX1 VACUUM
EX1
EX1
EX1
P0
N0





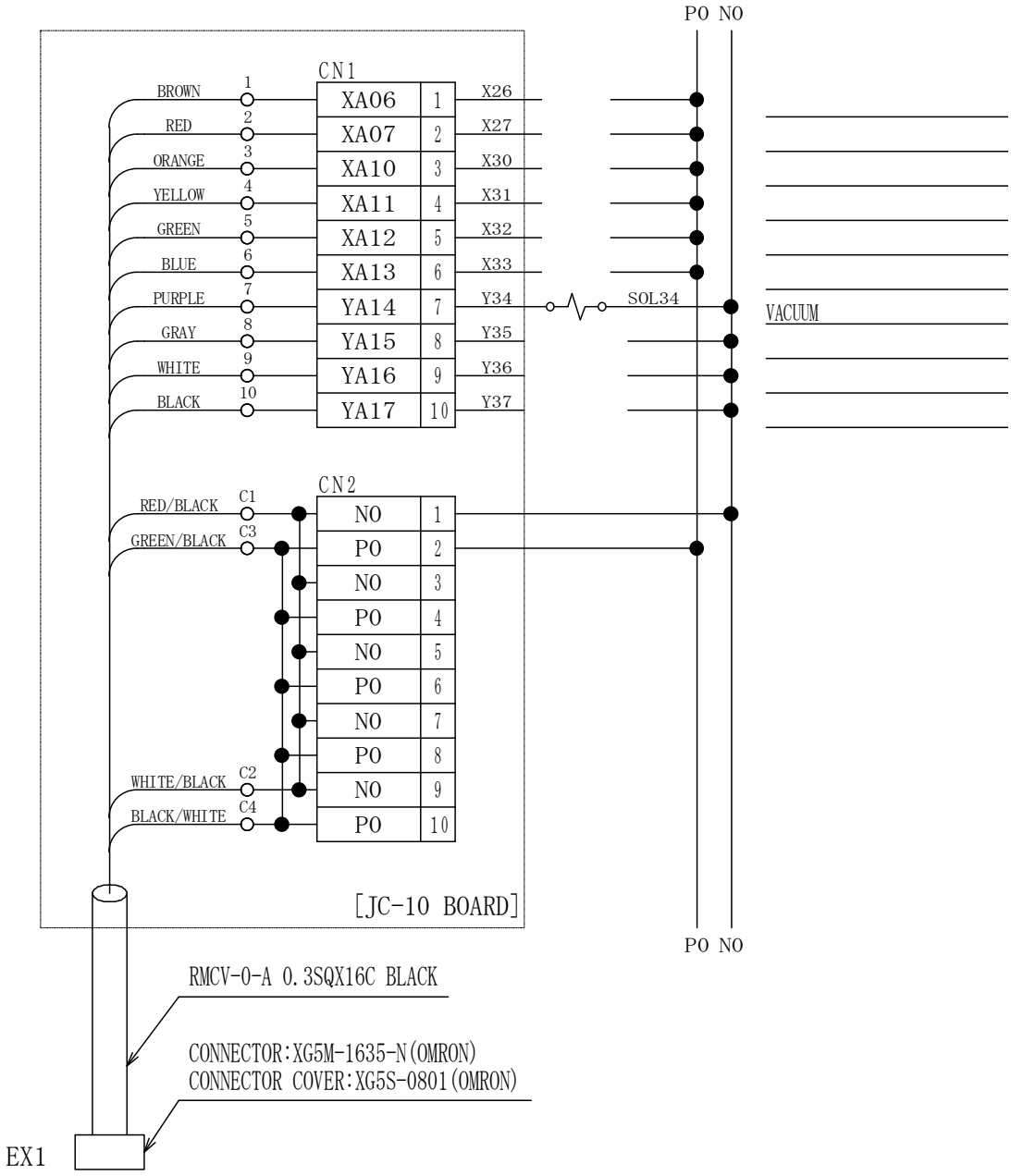
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128

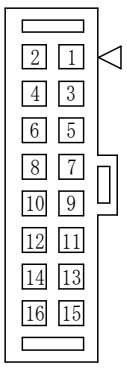
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC75-T2-P tip tool I/O diagram



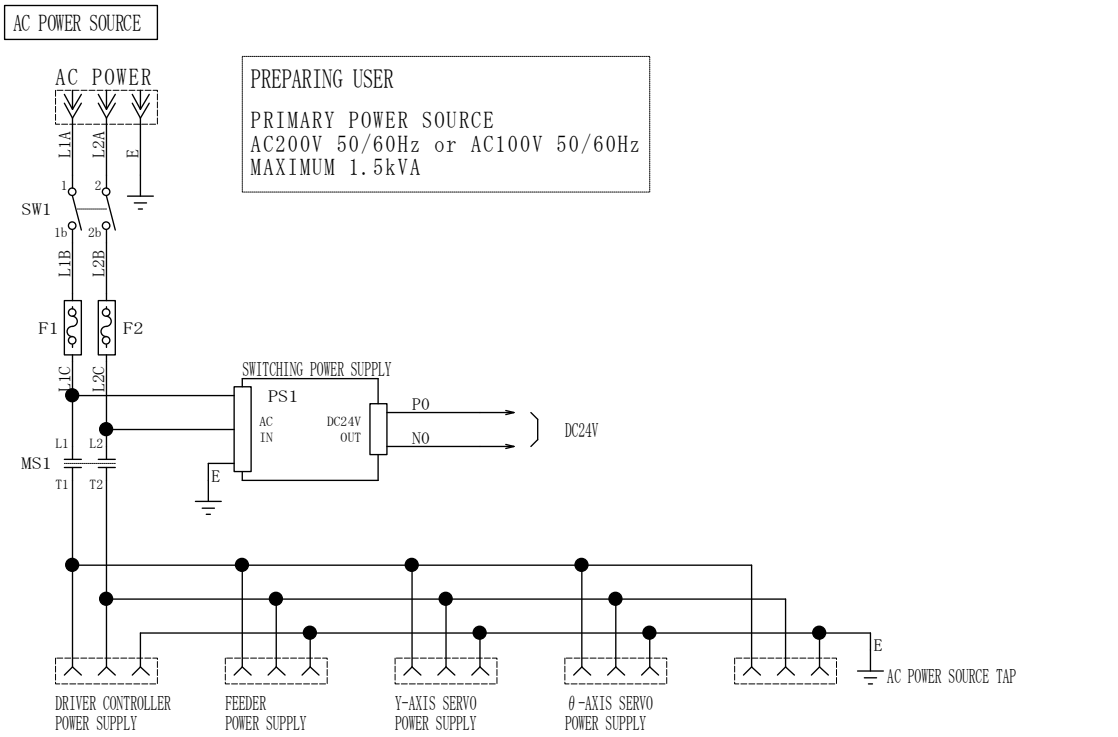
CONNECTOR PIN ASSIGNMENT

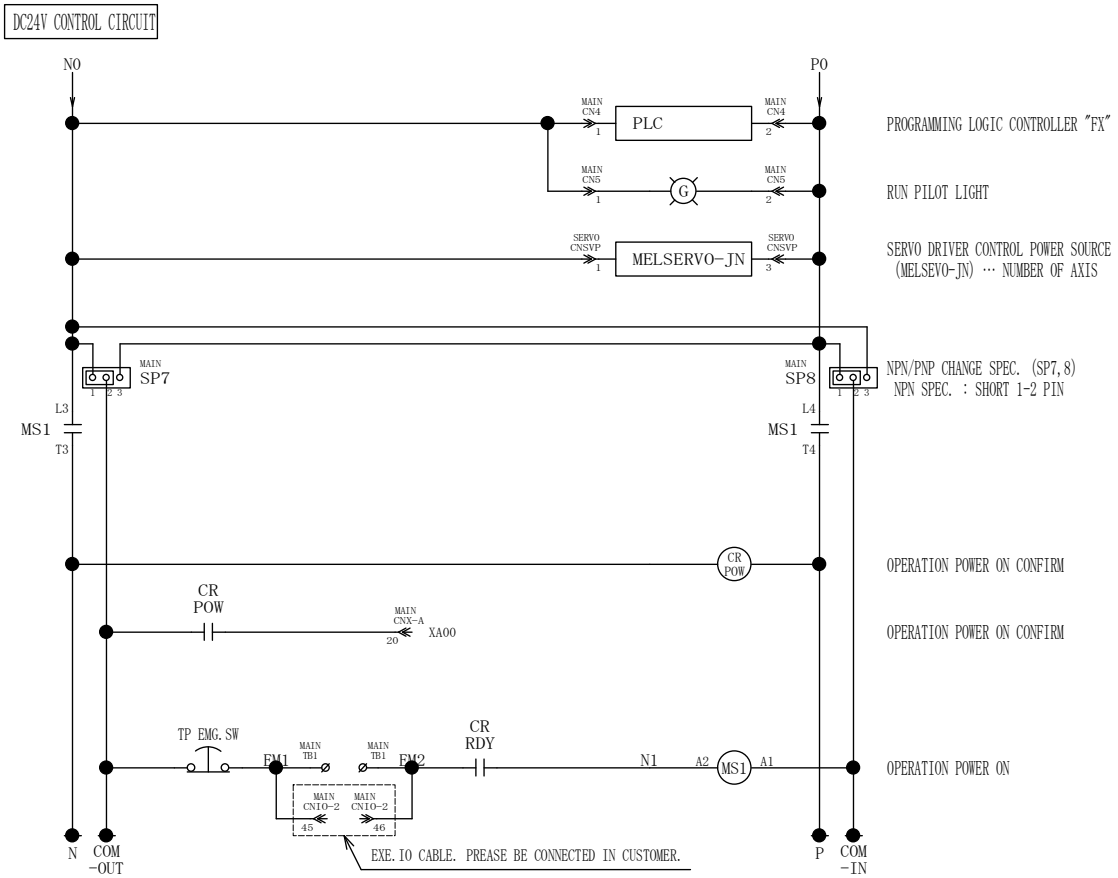


PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

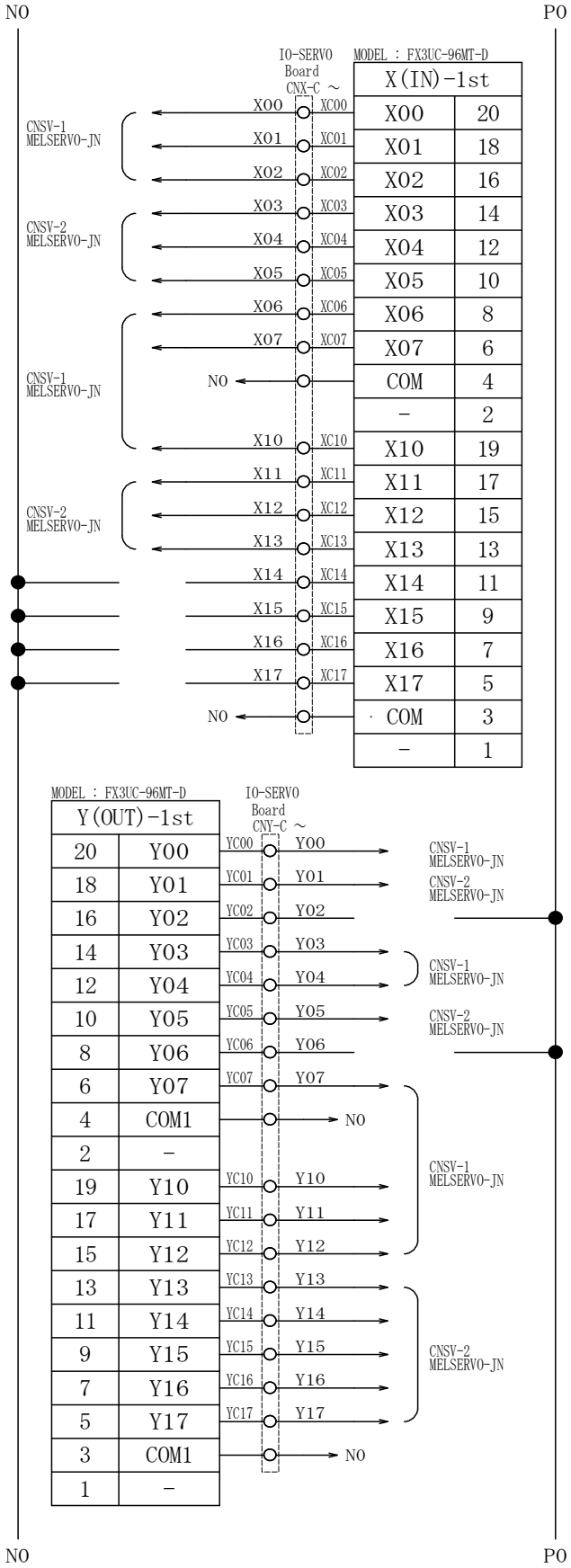
4.1.5 Development connection diagram RC75-T3

1) RC75-T3 Development connection diagram





2) RC75-T3 PLC I/O diagram



SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE
SV2 LA ENCODER A-PHASE PULSE
SV2 LB ENCODER B-PHASE PULSE
SV2 ALM TROUBLE
SV1 RD READY
SV1 INP IN POSITION

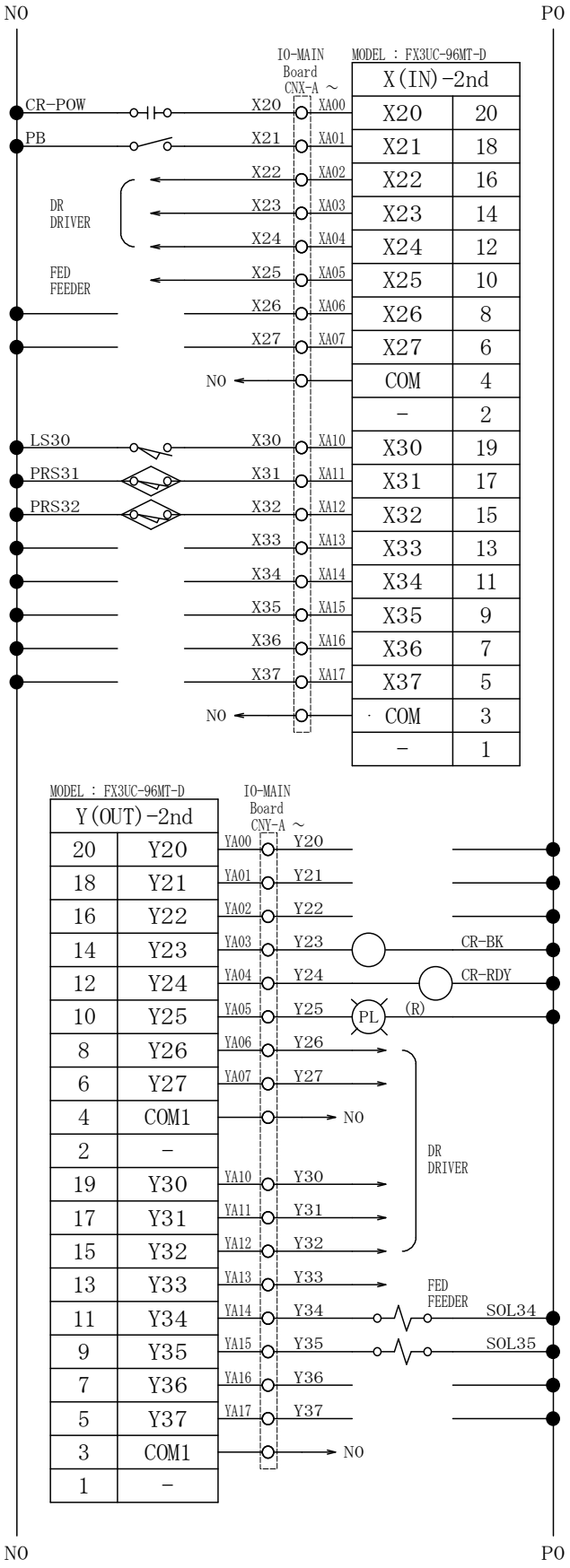
SV1 TLC LIMITING TORQUE
SV2 RD READY
SV2 INP IN POSITION
SV2 TLC LIMITING TORQUE

SV1 PP COMMAND PULSE
SV2 PP COMMAND PULSE

SV1 CR CLEAR
SV1 NP COMMAND PULSE +/-
SV2 NP COMMAND PULSE +/-

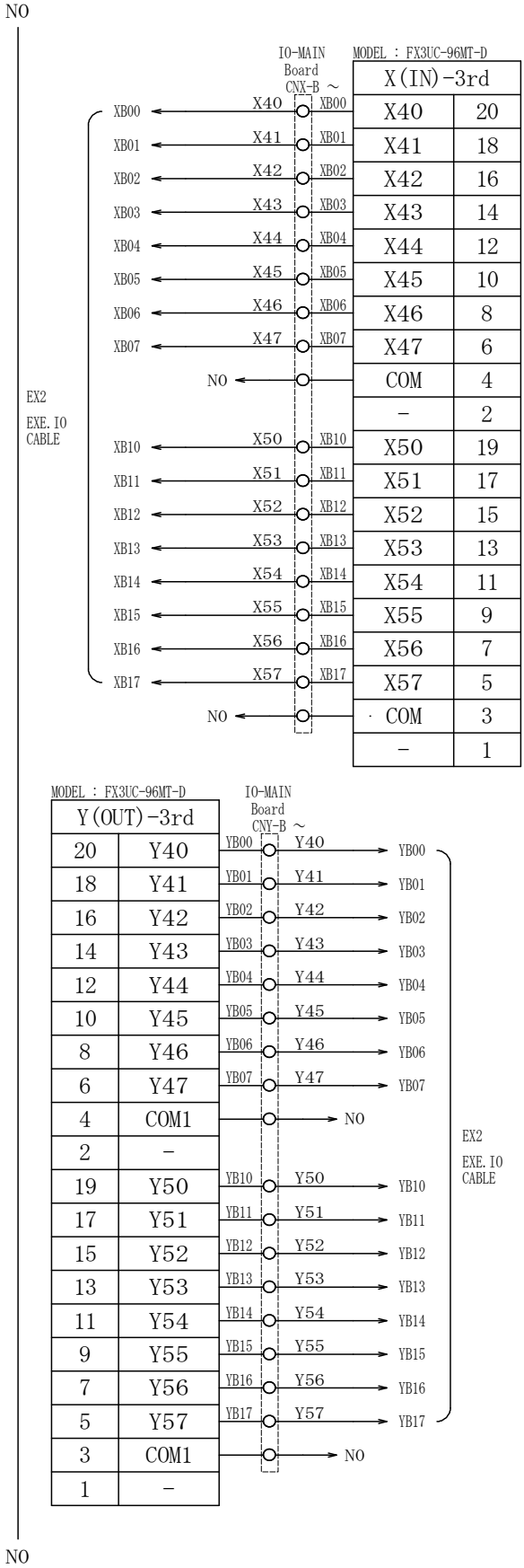
SV1 SON SERVO ON

SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
SV2 CR CLEAR
SV2 SON SERVO ON
SV2 TL2 TORQUE LIMIT SELECTION 2
SV2 TL3 TORQUE LIMIT SELECTION 3
SV2 TL4 TORQUE LIMIT SELECTION 4



X(IN)-2nd		
X20	20	OPERATION POWER ON CONFIRM
X21	18	TP DEADMAN SWITCH
X22	16	DR TIGHTENING COMPLETION
X23	14	DR TIGHTENING BREAK ALARM
X24	12	DR SYSTEM ALARM
X25	10	FED SCREW SHORTAGE
X26	8	EX1
X27	6	EX1
COM	4	
-	2	
X30	19	EX1 DRIVER RETURNED
X31	17	EX1 VACUUM SHUTOFF
X32	15	EX1 SCREW HEIGHT DETECTION
X33	13	EX1
X34	11	
X35	9	
X36	7	
X37	5	
COM	3	
-	1	

Y(OUT)-2nd		
20	Y20	
18	Y21	
16	Y22	
14	Y23	MOTOR BREAK OFF
12	Y24	OPERATION POWER ON
10	Y25	ERROR PILOT LIGHT
8	Y26	DR TIGHTENING START
6	Y27	DR CHANNEL SELECT CH.1
4	COM1	
2	-	
19	Y30	DR CHANNEL SELECT CH.2
17	Y31	DR CHANNEL SELECT CH.4
15	Y32	DR CHANNEL SELECT CH.8
13	Y33	FED SCREW FEED
11	Y34	EX1 VACUUM
9	Y35	EX1 DRIVER ADVANCE
7	Y36	EX1
5	Y37	EX1
3	COM1	
1	-	



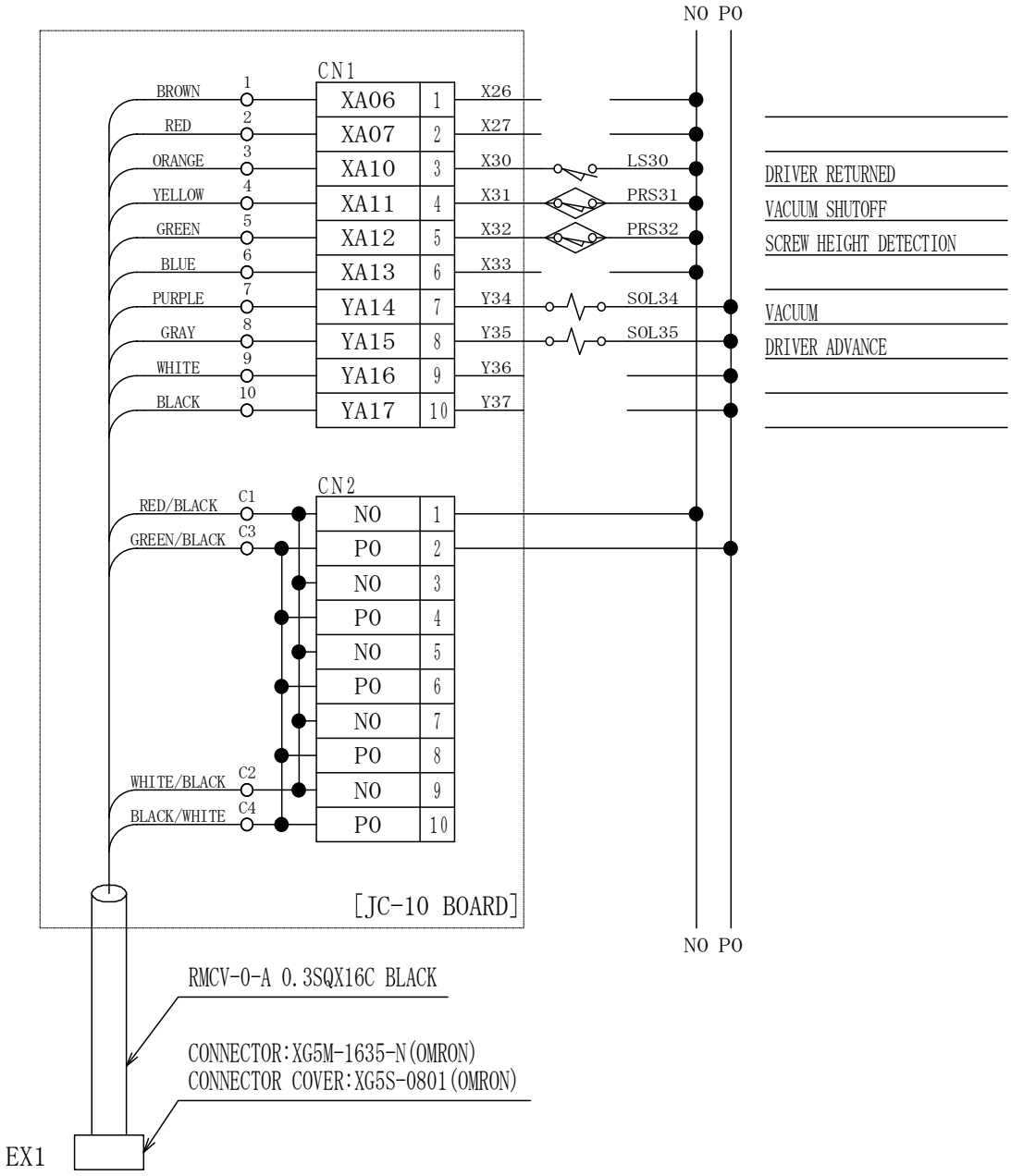
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

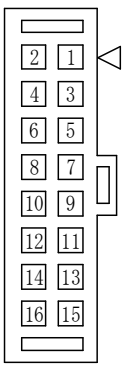
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC75-T3 tip tool I/O diagram



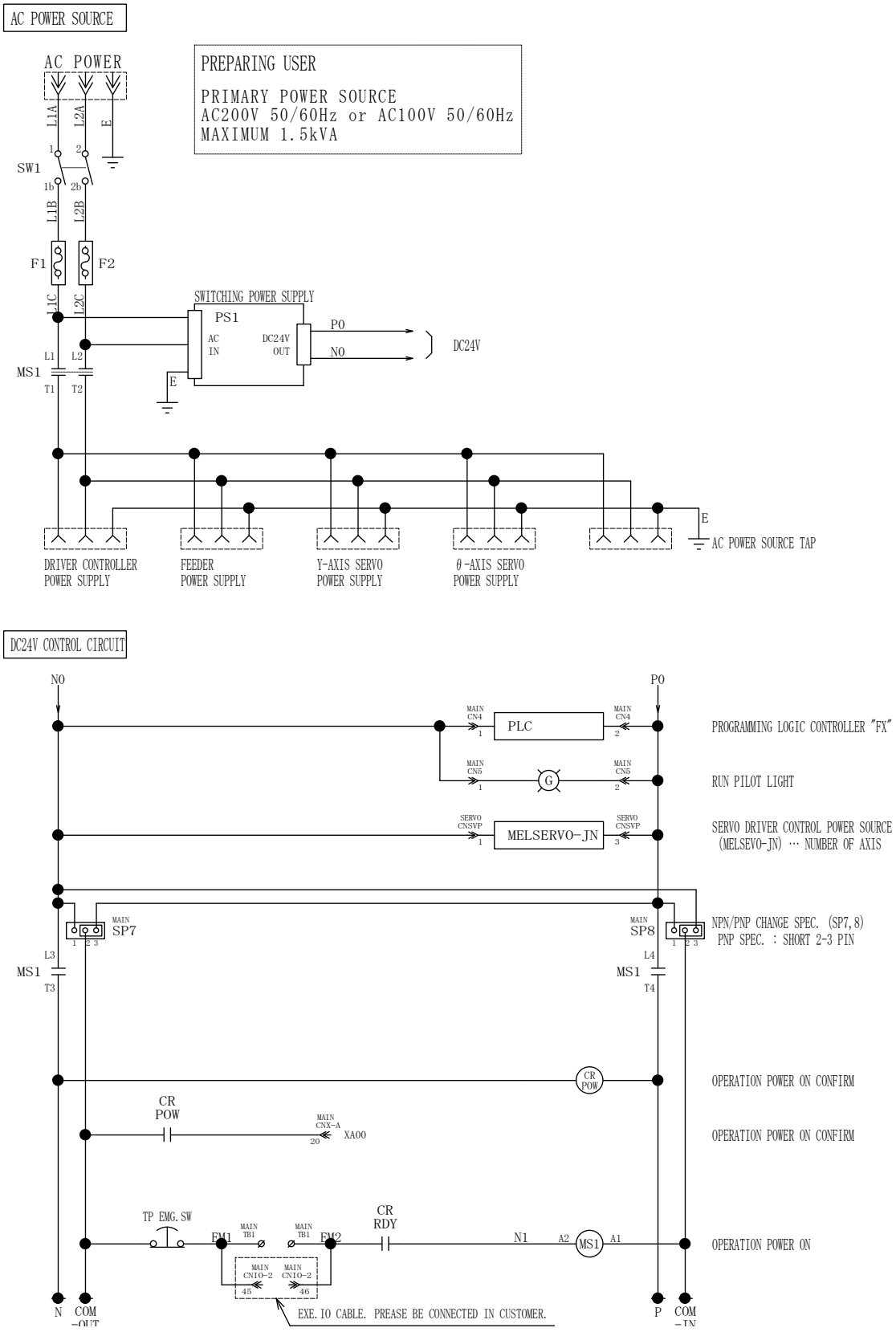
CONNECTOR PIN ASSIGNMENT



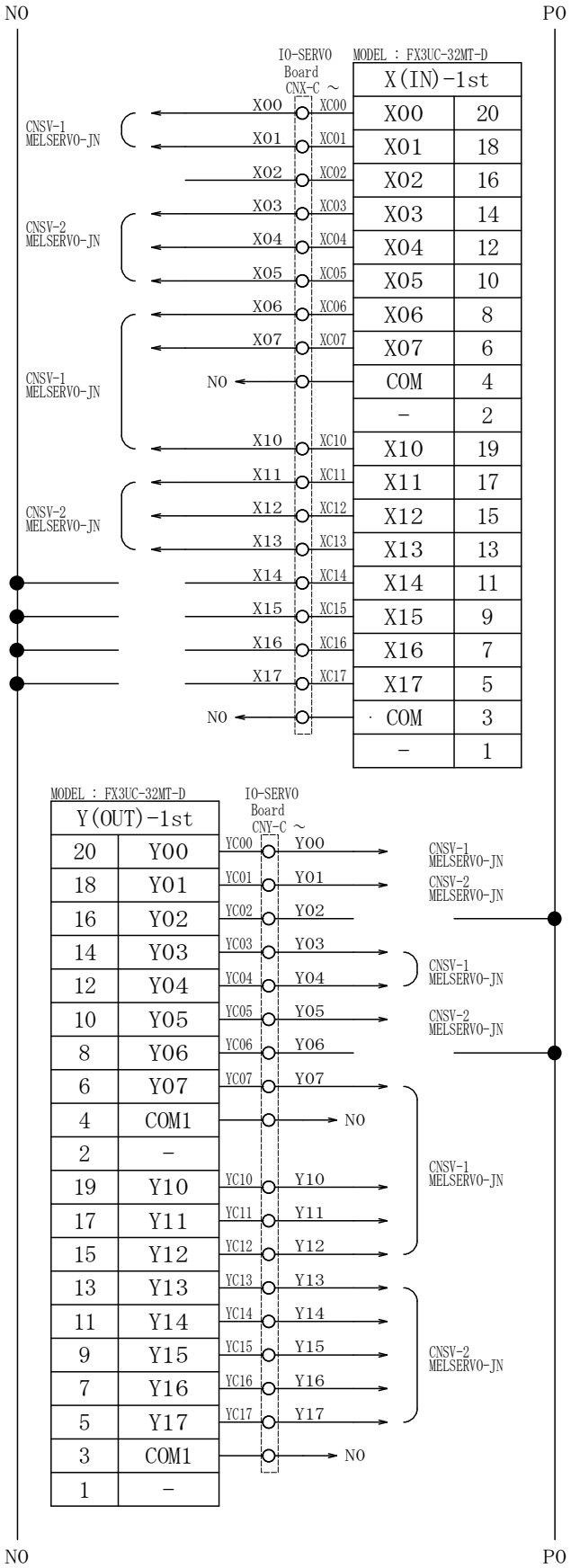
PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.1.6 Development connection diagram RC75-T3-P

1) RC75-T3-P Development connection diagram



2) RC75-T3-P PLC I/O diagram



SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE
SV2 LA ENCODER A-PHASE PULSE
SV2 LB ENCODER B-PHASE PULSE
SV2 ALM TROUBLE
SV1 RD READY
SV1 INP IN POSITION

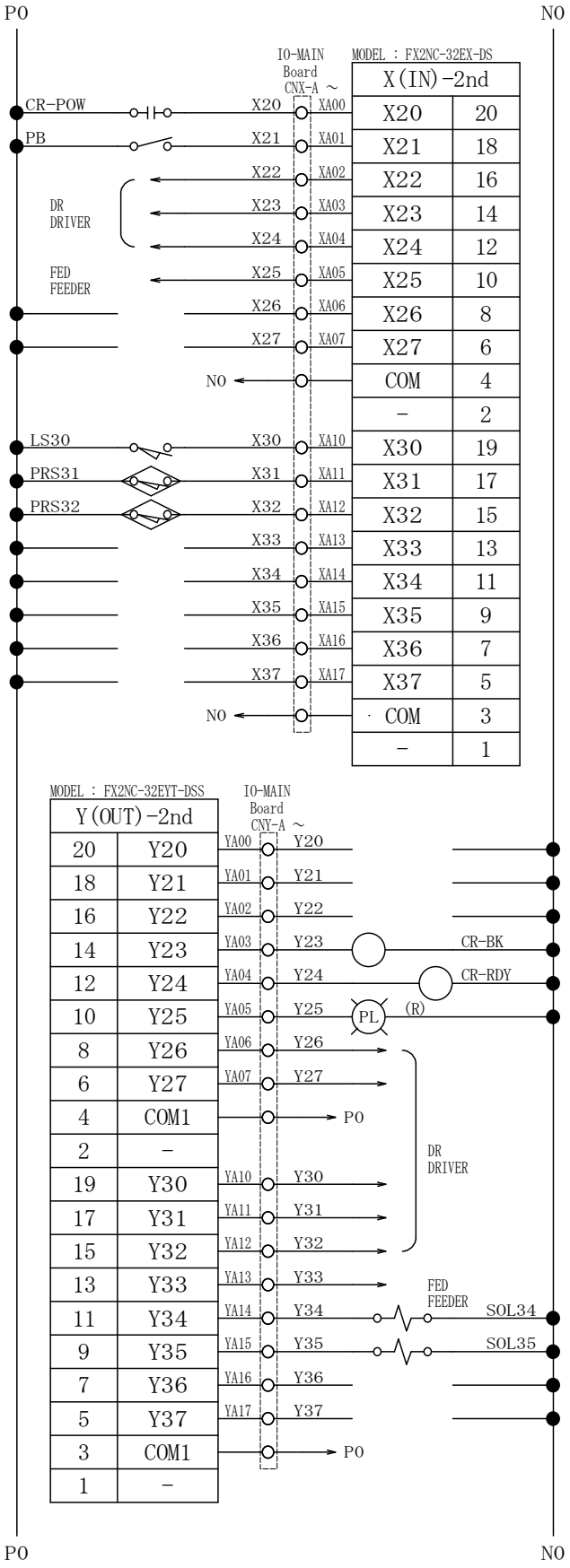
SV1 TLC LIMITING TORQUE
SV2 RD READY
SV2 INP IN POSITION
SV2 TLC LIMITING TORQUE

SV1 PP COMMAND PULSE
SV2 PP COMMAND PULSE

SV1 CR CLEAR
SV1 NP COMMAND PULSE +/-
SV2 NP COMMAND PULSE +/-

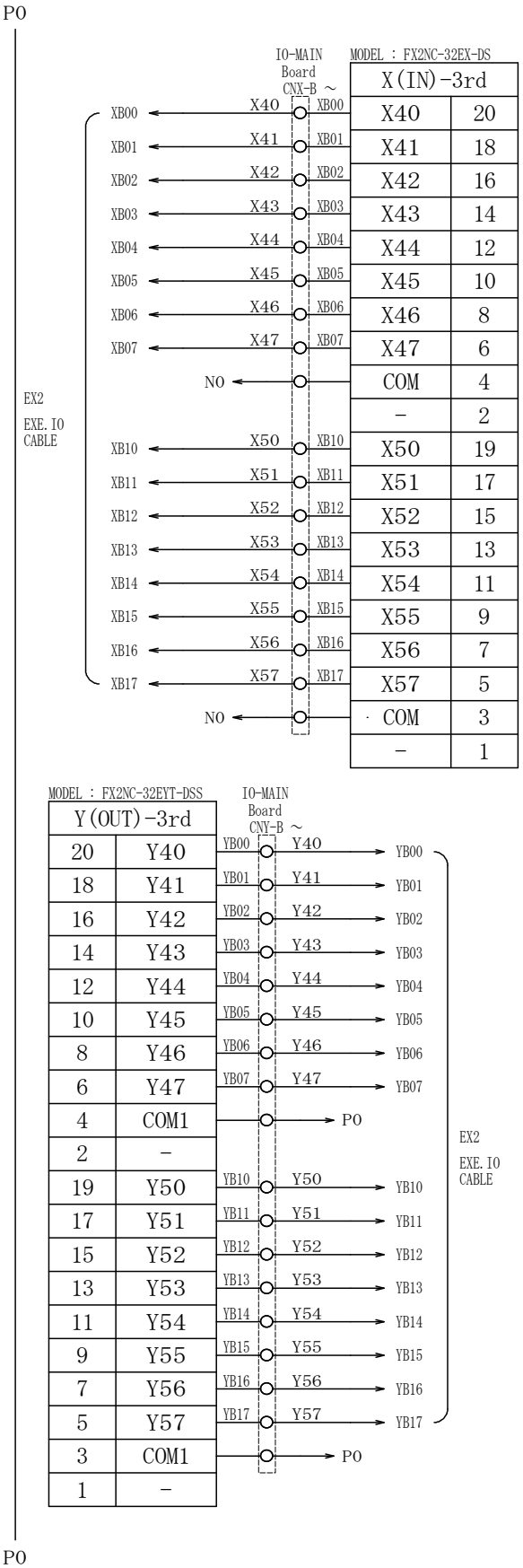
SV1 SON SERVO ON

SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
SV2 CR CLEAR
SV2 SON SERVO ON
SV2 TL2 TORQUE LIMIT SELECTION 2
SV2 TL3 TORQUE LIMIT SELECTION 3
SV2 TL4 TORQUE LIMIT SELECTION 4



X20	XA00	20	OPERATION POWER ON CONFIRM
X21	XA01	18	TP DEADMAN SWITCH
X22	XA02	16	DR TIGHTENING COMPLETION
X23	XA03	14	DR TIGHTENING BREAK ALARM
X24	XA04	12	DR SYSTEM ALARM
X25	XA05	10	FED SCREW SHORTAGE
X26	XA06	8	EX1
X27	XA07	6	EX1
N0		COM 4	
		– 2	
X30	XA10	19	EX1 DRIVER RETURNED
X31	XA11	17	EX1 VACUUM SHUTOFF
X32	XA12	15	EX1 SCREW HEIGHT DETECTION
X33	XA13	13	EX1
X34	XA14	11	
X35	XA15	9	
X36	XA16	7	
X37	XA17	5	
N0		COM 3	
		– 1	

Y20	YA00	20	
Y21	YA01	18	
Y22	YA02	16	
Y23	YA03	14	MOTOR BREAK OFF
Y24	YA04	12	OPERATION POWER ON
Y25	YA05	10	ERROR PILOT LIGHT
Y26	YA06	8	DR TIGHTENING START
Y27	YA07	6	DR CHANNEL SELECT CH.1
COM1	P0	4	
–		2	
Y30	YA10	19	DR CHANNEL SELECT CH.2
Y31	YA11	17	DR CHANNEL SELECT CH.4
Y32	YA12	15	DR CHANNEL SELECT CH.8
Y33	YA13	13	FED SCREW FEED
Y34	YA14	11	EX1 VACUUM
Y35	YA15	9	EX1 DRIVER ADVANCE
Y36	YA16	7	EX1
Y37	YA17	5	EX1
COM1	P0	3	
–		1	



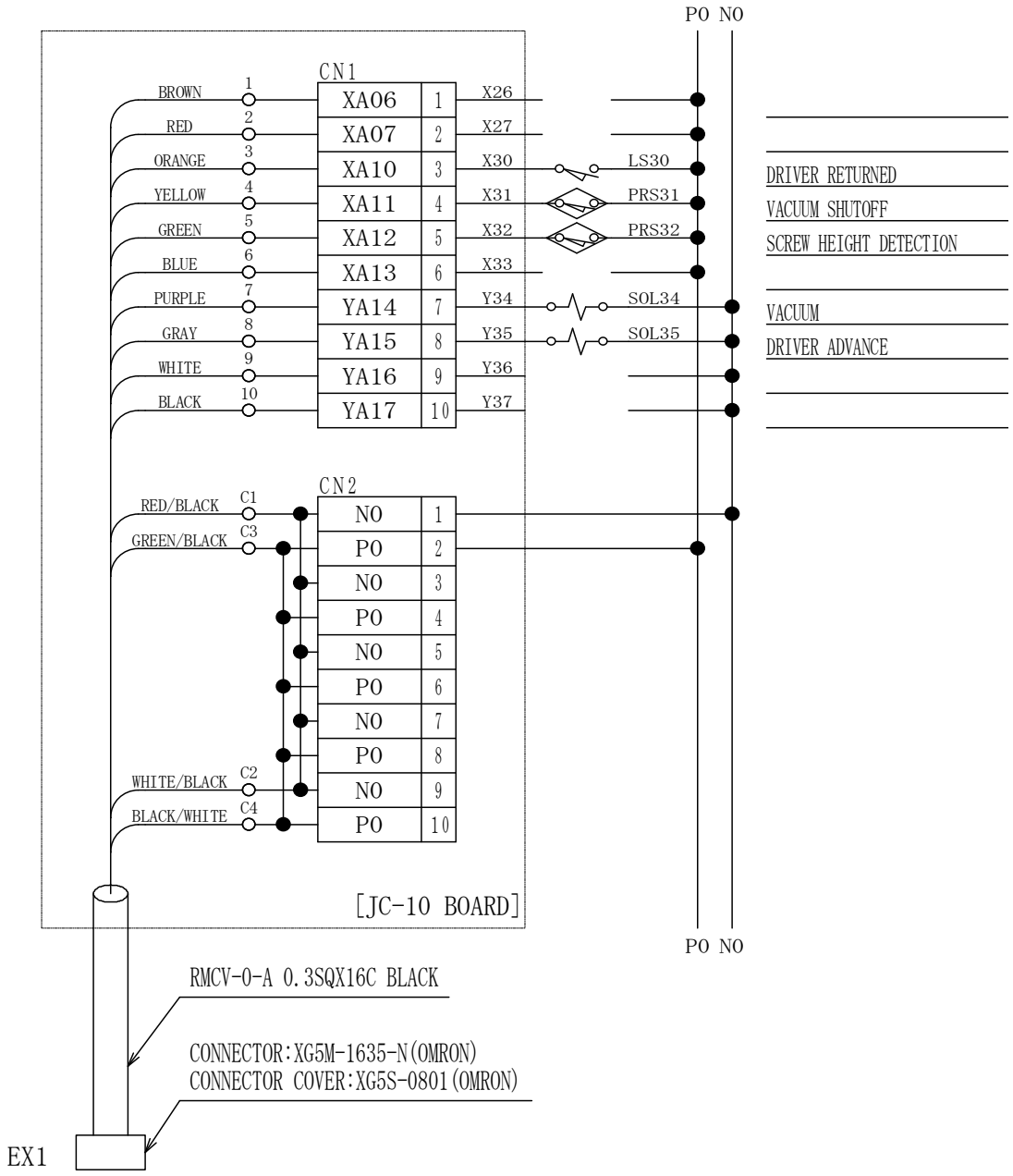
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

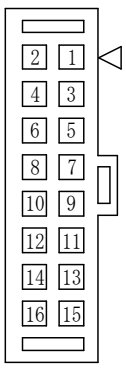
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC75-T3-P tip tool I/O diagram



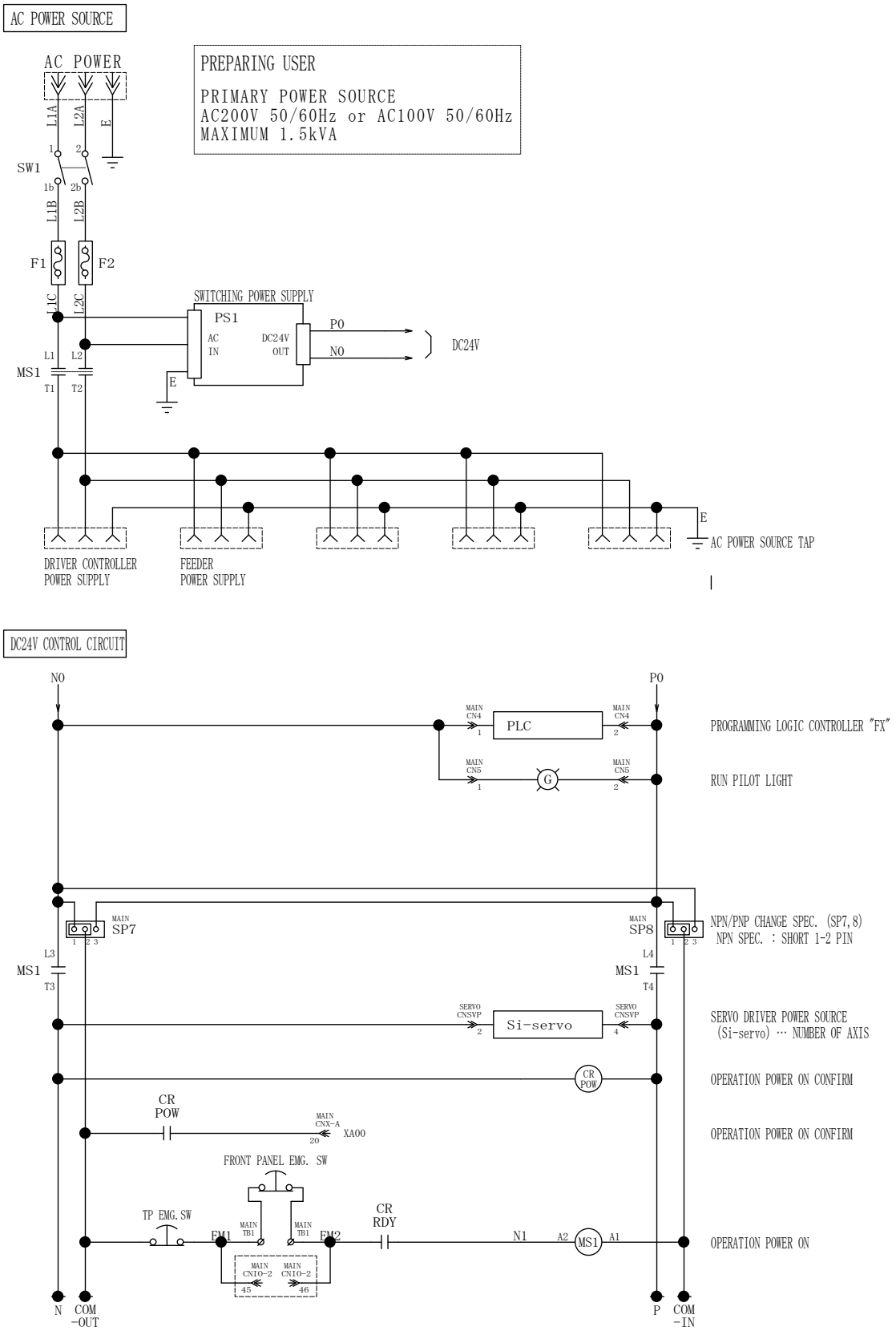
CONNECTOR PIN ASSIGNMENT



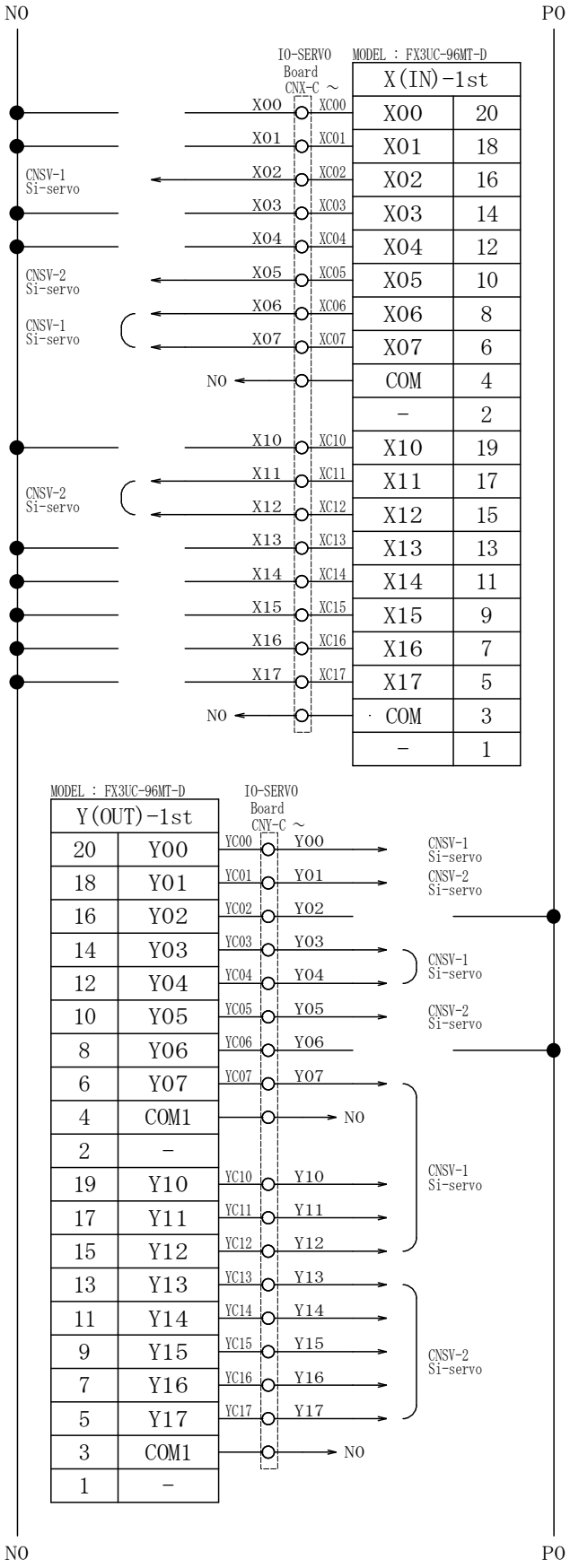
PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.1.7 Development connection diagram RC755-T1

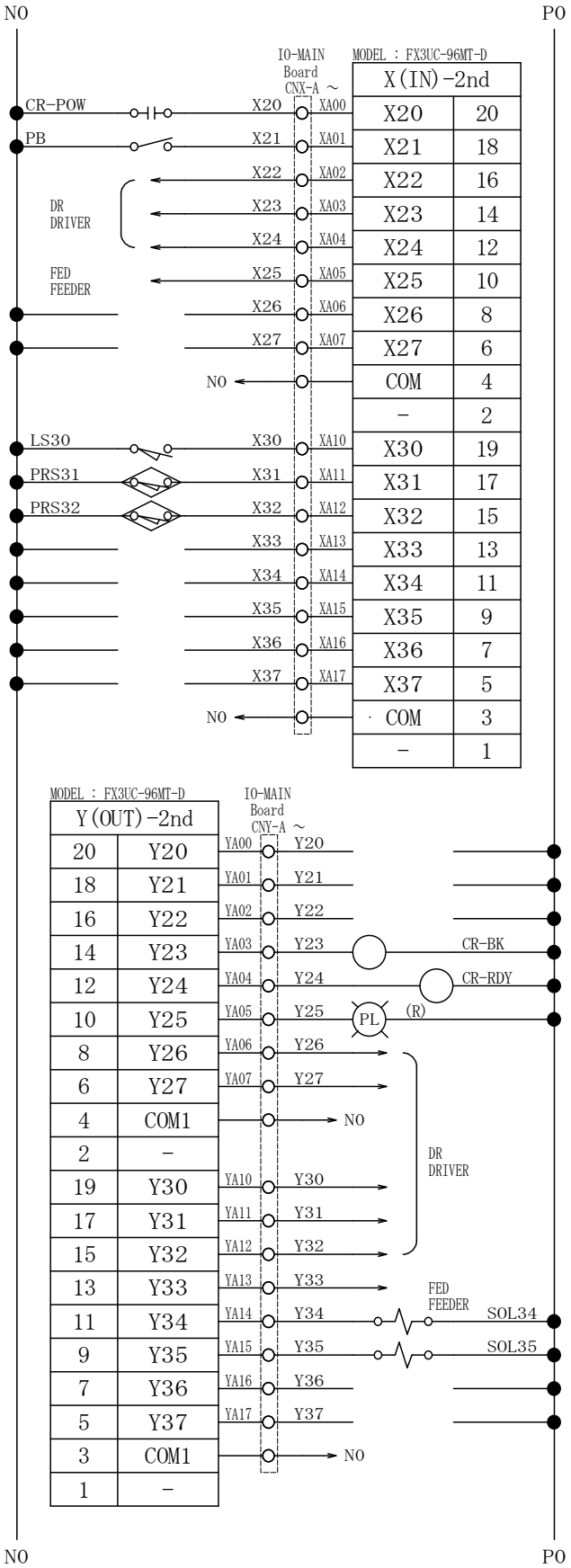
1) RC755-T1 Development connection diagram



2) RC755-T1 PLC I/O diagram

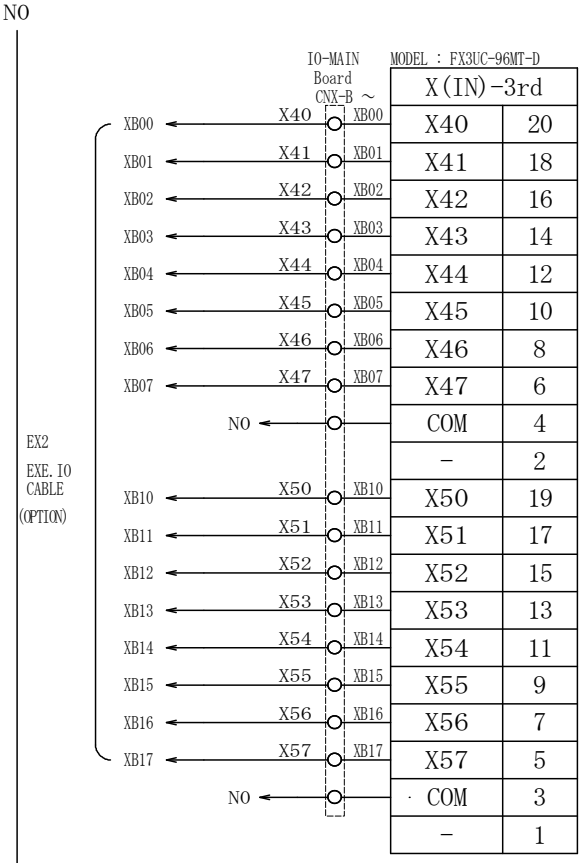


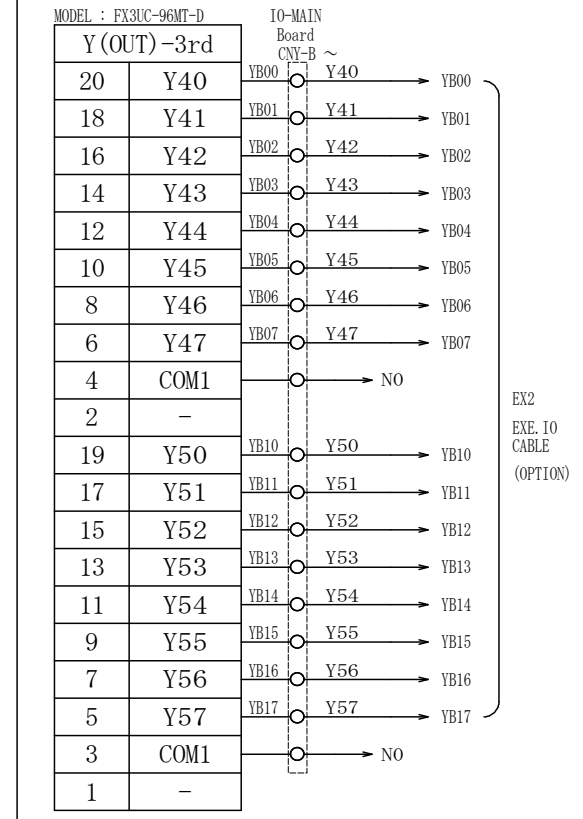
SV1 ALM	ALARM DETECTION
SV2 ALM	ALARM DETECTION
SV1 RDY	SERVO READY
SV1 INP	POSITIONING COMPLETION
SV2 RDY	SERVO READY
SV2 INP	POSITIONING COMPLETION
SV1 CWN	COMMAND PULSE
SV2 CWN	COMMAND PULSE
SV1 ARST	ALARM RESET/DEVIATION CLEAR
SV1 CCWN	COMMAND PULSE +/-
SV2 CCWN	COMMAND PULSE +/-
SV1 SVON	SERVO ON
SV1 TSEL0	TORQUE LIMIT SELECT 0
SV1 TSEL1	TORQUE LIMIT SELECT 1
SV1 TSEL2	TORQUE LIMIT SELECT 2
SV2 ARST	ALARM RESET/DEVIATION CLEAR
SV2 SVON	SERVO ON
SV2 TSEL0	TORQUE LIMIT SELECT 0
SV2 TSEL1	TORQUE LIMIT SELECT 1
SV2 TSEL2	TORQUE LIMIT SELECT 2



X(IN)-2nd		
X20	20	OPERATION POWER ON CONFIRM
X21	18	TP DEADMAN SWITCH
X22	16	DR TIGHTENING COMPLETION
X23	14	DR TIGHTENING BREAK ALARM
X24	12	DR SYSTEM ALARM
X25	10	FED SCREW SHORTAGE
X26	8	EX1
X27	6	EX1
COM	4	
-	2	
X30	19	EX1 DRIVER RETURNED
X31	17	EX1 VACUUM SHUTOFF
X32	15	EX1 SCREW HEIGHT DETECTION
X33	13	EX1
X34	11	
X35	9	
X36	7	
X37	5	
COM	3	
-	1	

Y(OUT)-2nd		
20	Y20	
18	Y21	
16	Y22	
14	Y23	MOTOR BREAK OFF
12	Y24	OPERATION POWER ON
10	Y25	ERROR PILOT LIGHT
8	Y26	DR TIGHTENING START
6	Y27	DR CHANNEL SELECT CH.1
4	COM1	
2	-	
19	Y30	DR CHANNEL SELECT CH.2
17	Y31	DR CHANNEL SELECT CH.4
15	Y32	DR CHANNEL SELECT CH.8
13	Y33	FED SCREW FEED
11	Y34	EX1 VACUUM
9	Y35	EX1 DRIVER ADVANCE
7	Y36	EX1
5	Y37	EX1
3	COM1	
1	-	





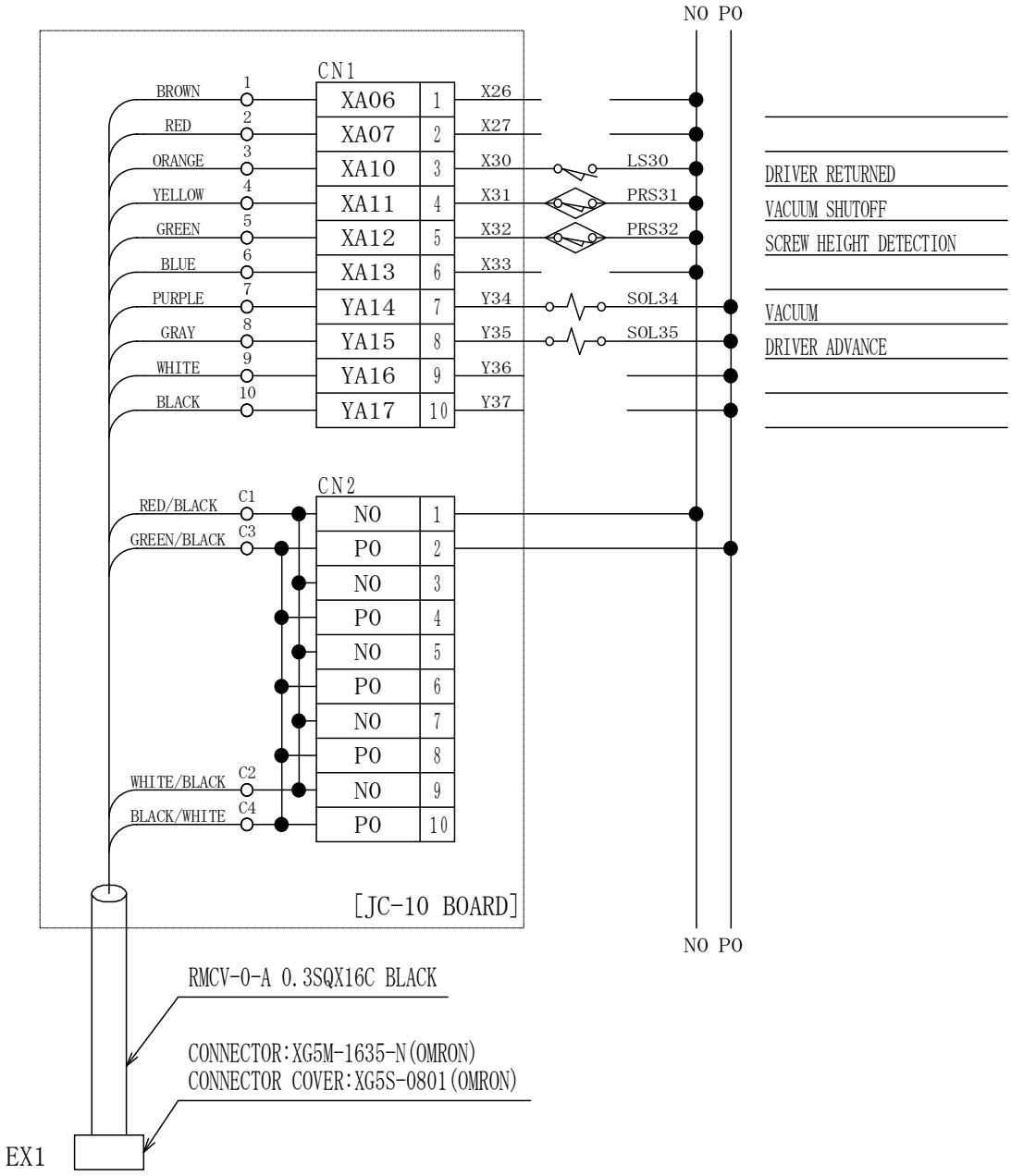
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

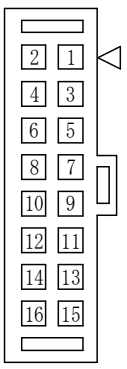
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC755-T1 tip tool I/O diagram



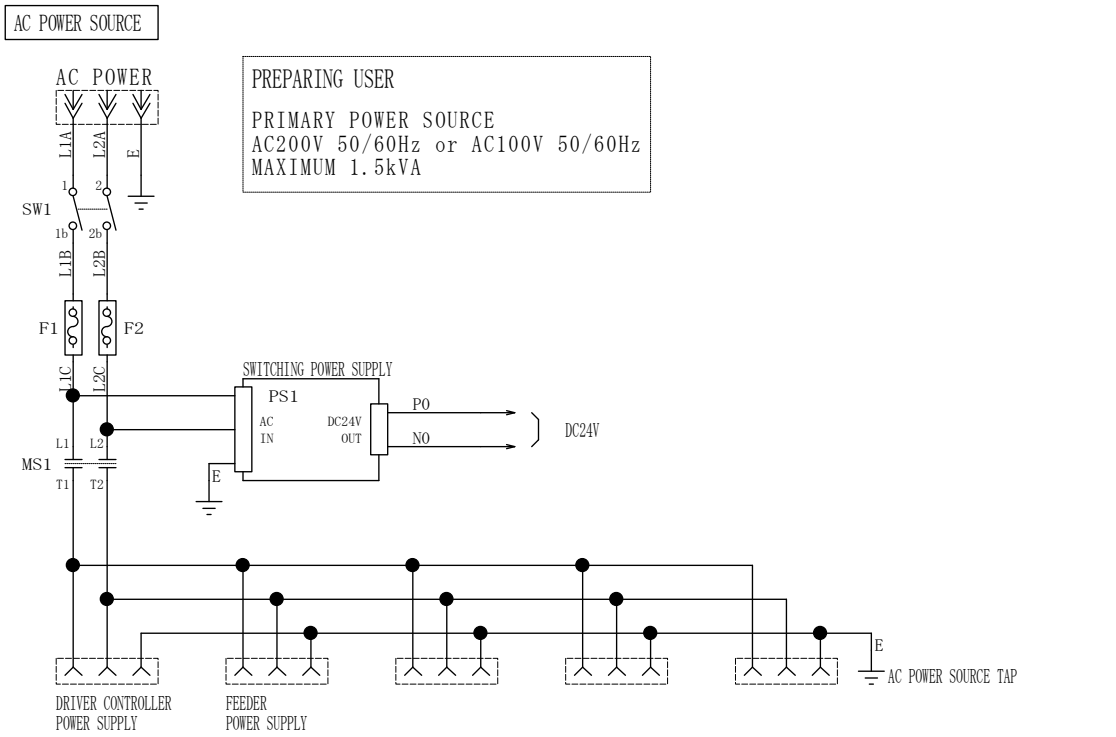
CONNECTOR PIN ASSIGNMENT

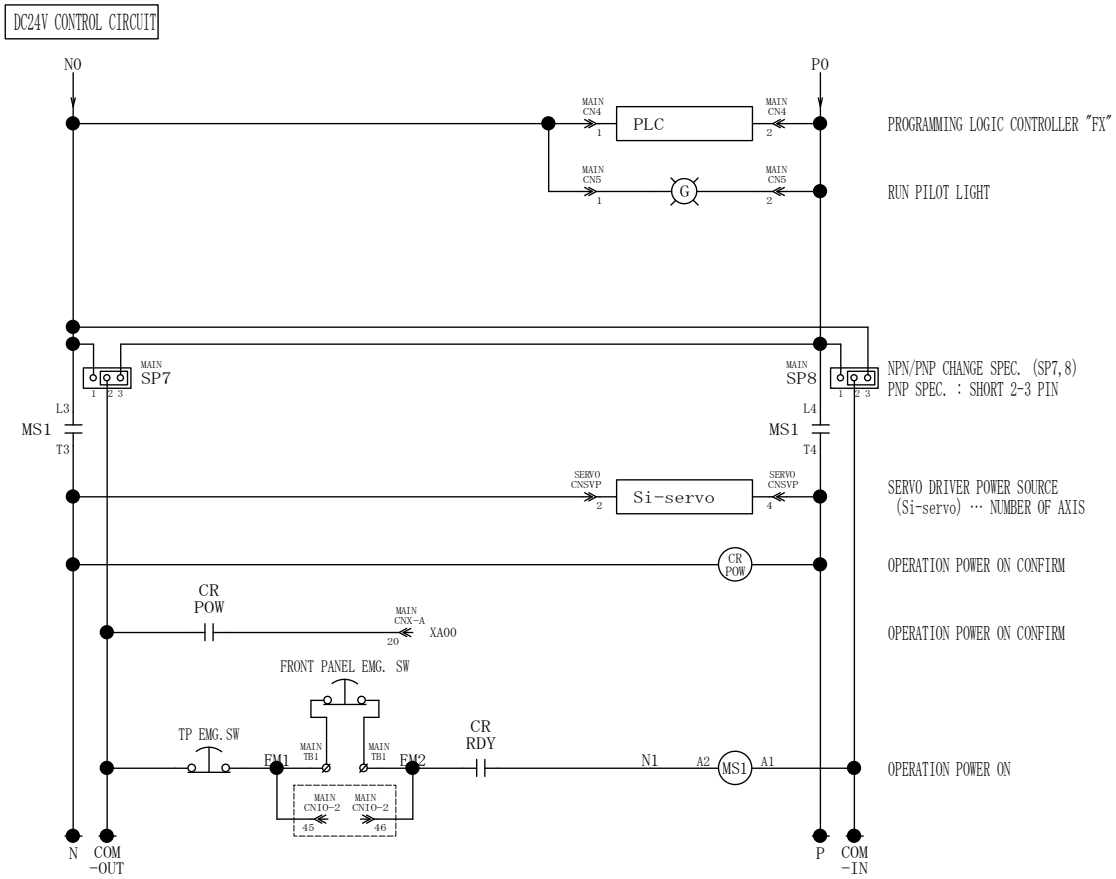


PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

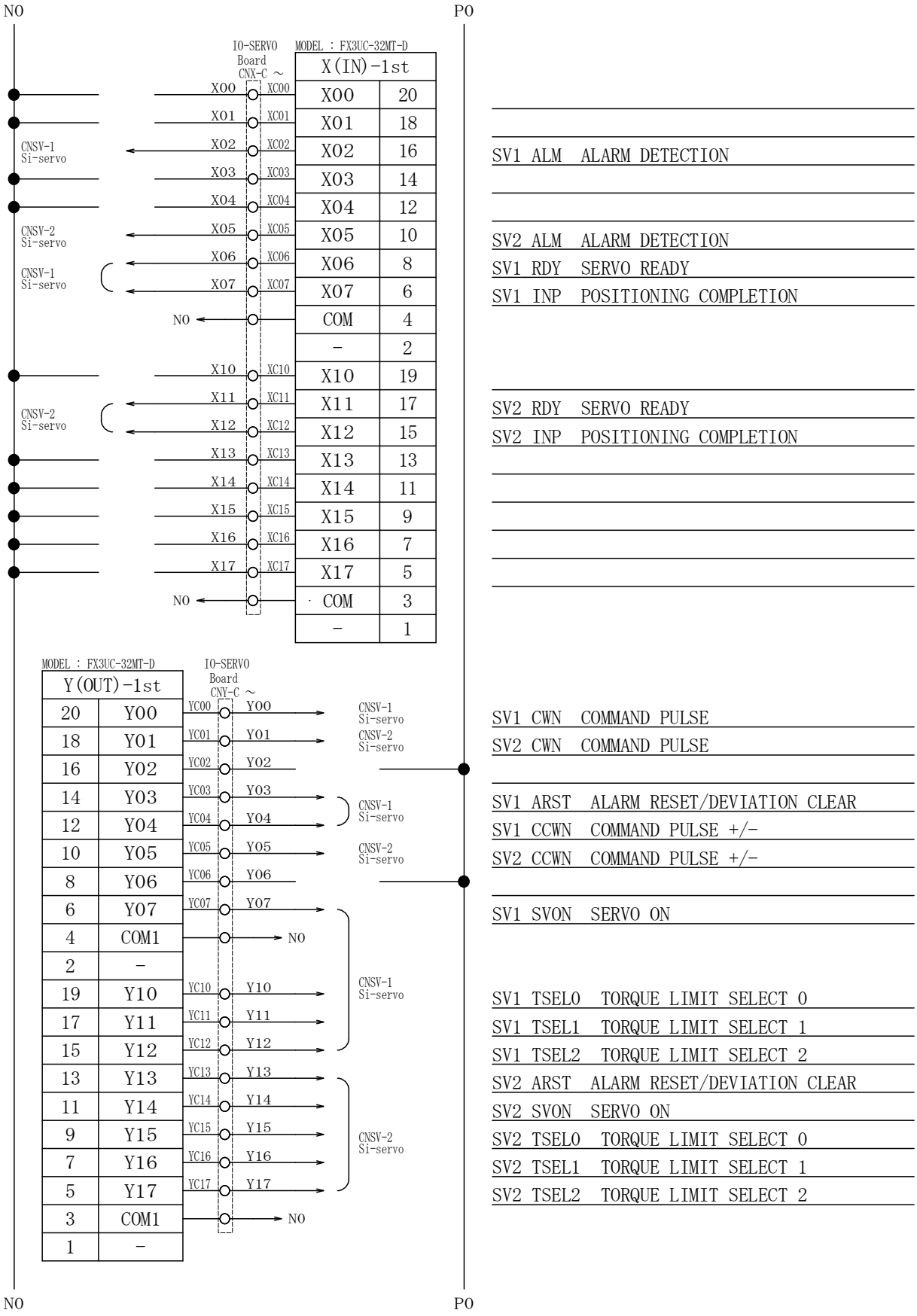
4.1.8 Development connection diagram RC755-T1-P

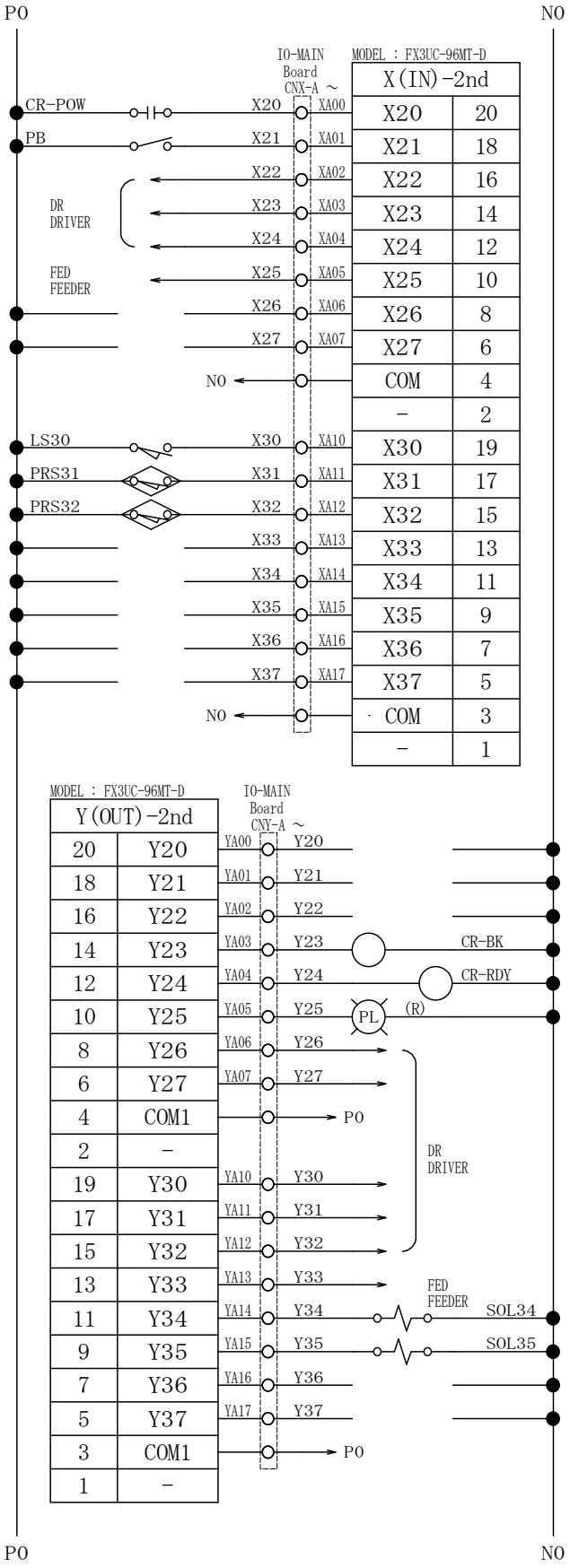
1) RC755-T1-P Development connection diagram





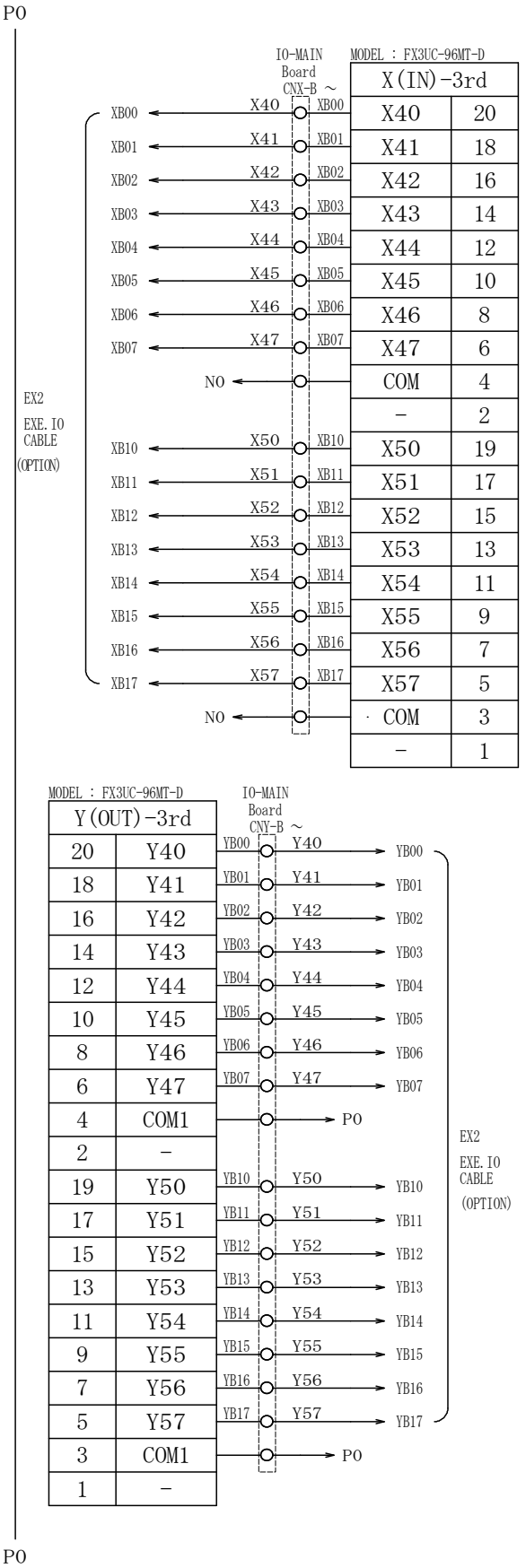
2) RC755-T1-P PLC I/O diagram





X(IN)-2nd		
X20	20	OPERATION POWER ON CONFIRM
X21	18	TP DEADMAN SWITCH
X22	16	DR TIGHTENING COMPLETION
X23	14	DR TIGHTENING BREAK ALARM
X24	12	DR SYSTEM ALARM
X25	10	FED SCREW SHORTAGE
X26	8	EX1
X27	6	EX1
COM	4	
-	2	
X30	19	EX1 DRIVER RETURNED
X31	17	EX1 VACUUM SHUTOFF
X32	15	EX1 SCREW HEIGHT DETECTION
X33	13	EX1
X34	11	
X35	9	
X36	7	
X37	5	
COM	3	
-	1	

Y(OUT)-2nd		
20	Y20	
18	Y21	
16	Y22	
14	Y23	MOTOR BREAK OFF
12	Y24	OPERATION POWER ON
10	Y25	ERROR PILOT LIGHT
8	Y26	DR TIGHTENING START
6	Y27	DR CHANNEL SELECT CH.1
4	COM1	
2	-	
19	Y30	DR CHANNEL SELECT CH.2
17	Y31	DR CHANNEL SELECT CH.4
15	Y32	DR CHANNEL SELECT CH.8
13	Y33	FED SCREW FEED
11	Y34	EX1 VACUUM
9	Y35	EX1 DRIVER ADVANCE
7	Y36	EX1
5	Y37	EX1
3	COM1	
1	-	



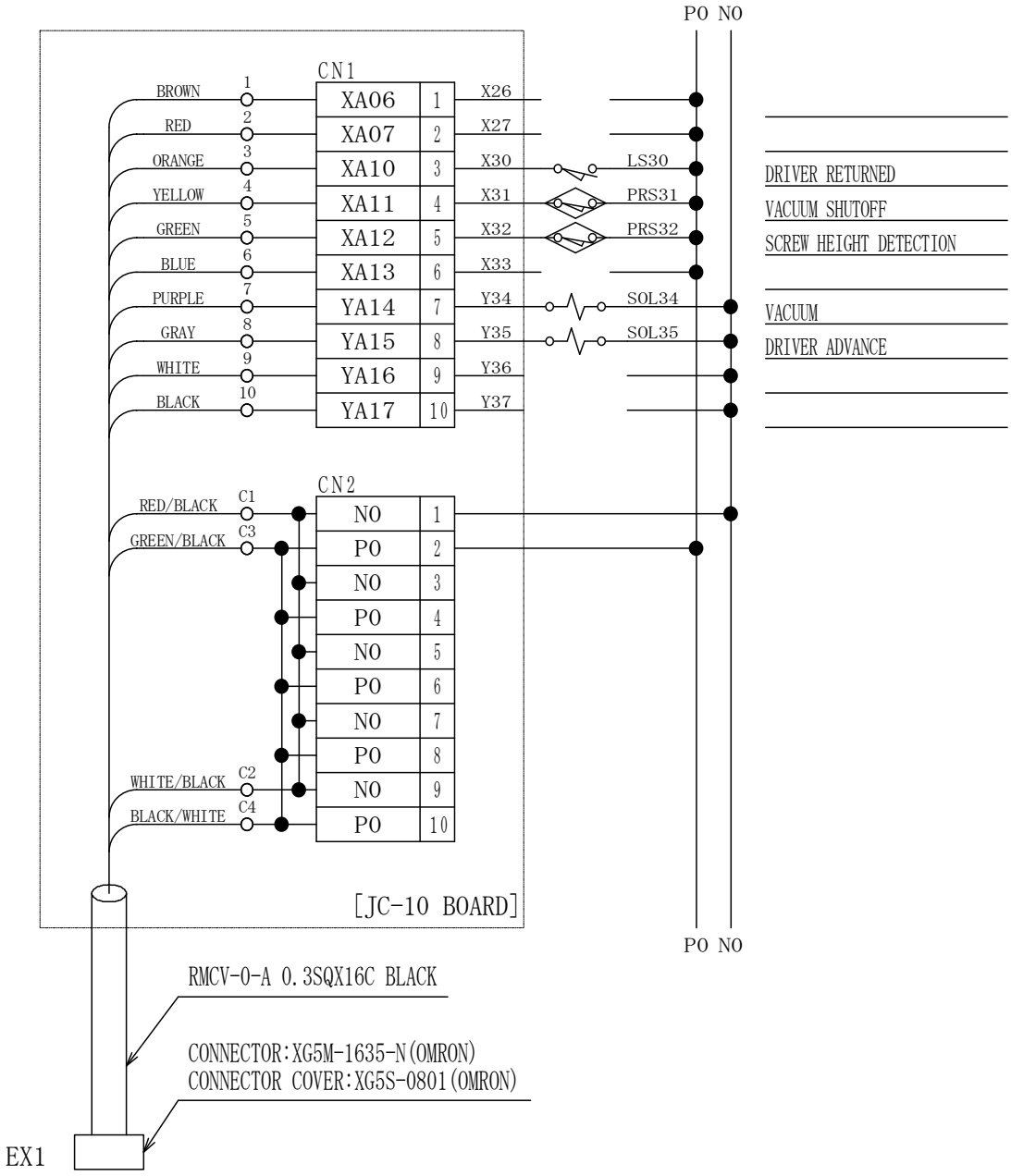
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

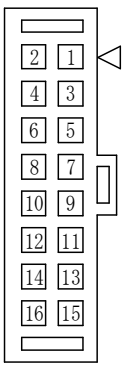
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC755-T1-P tip tool I/O diagram



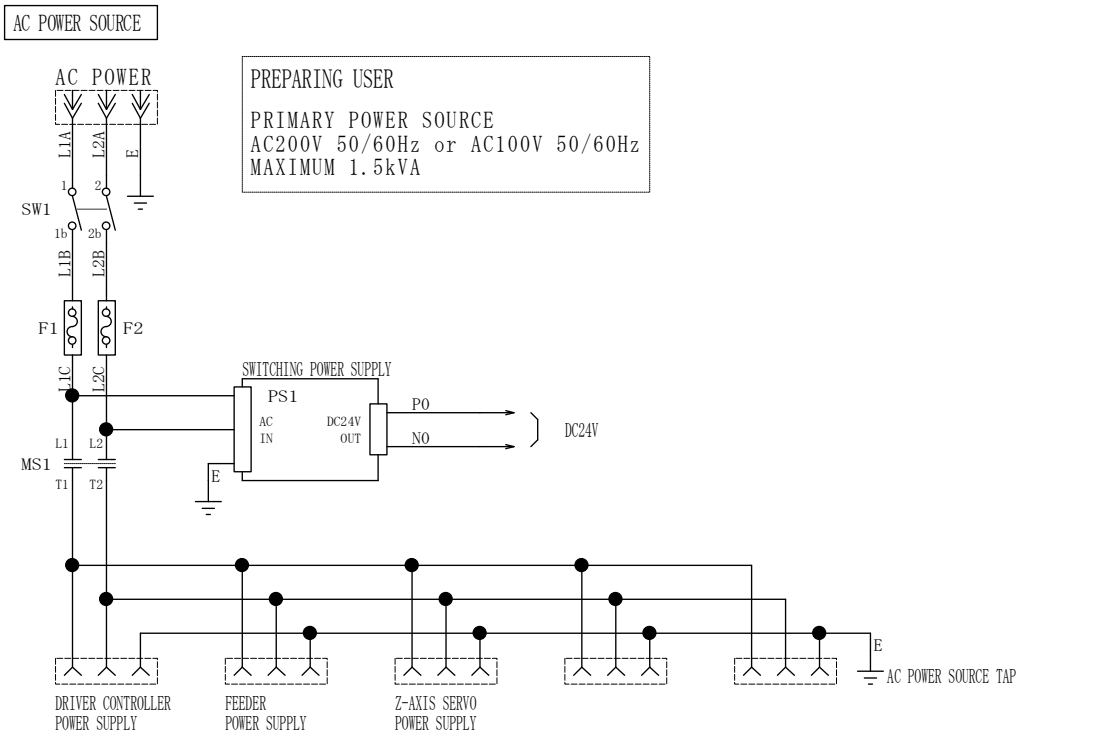
CONNECTOR PIN ASSIGNMENT

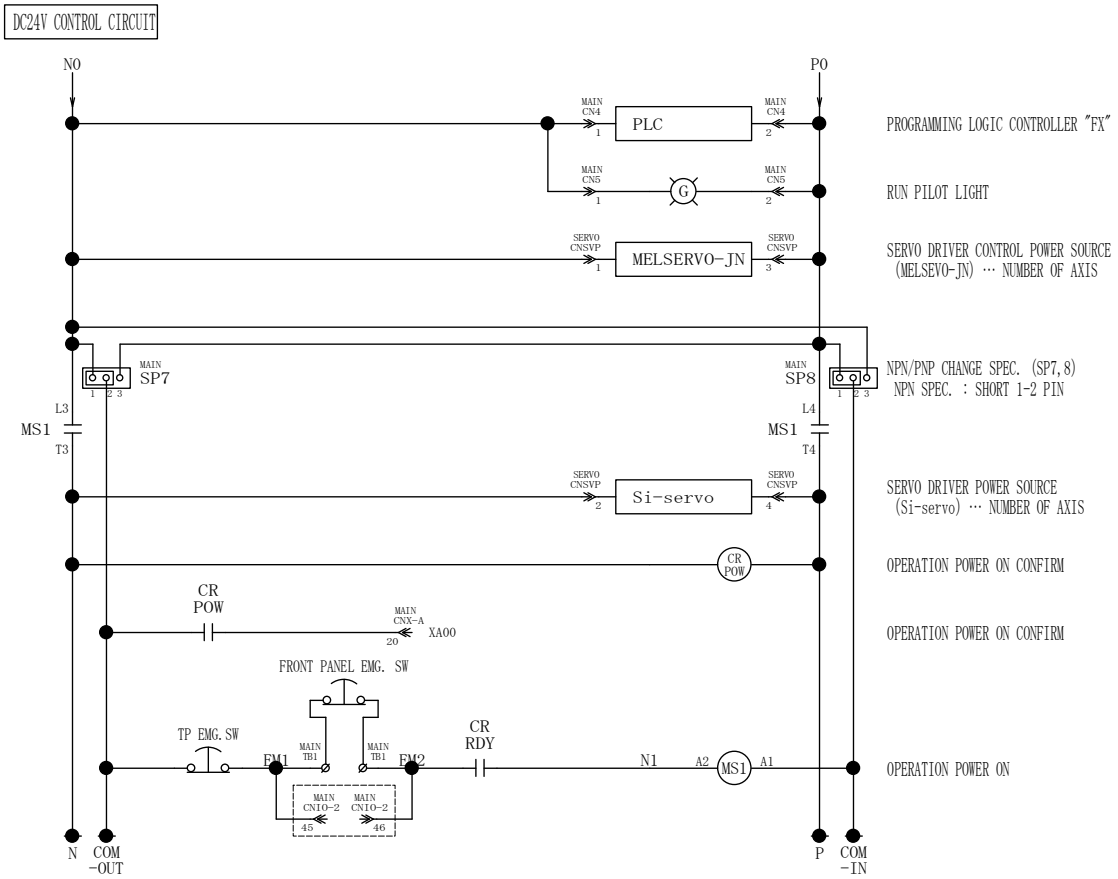


PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

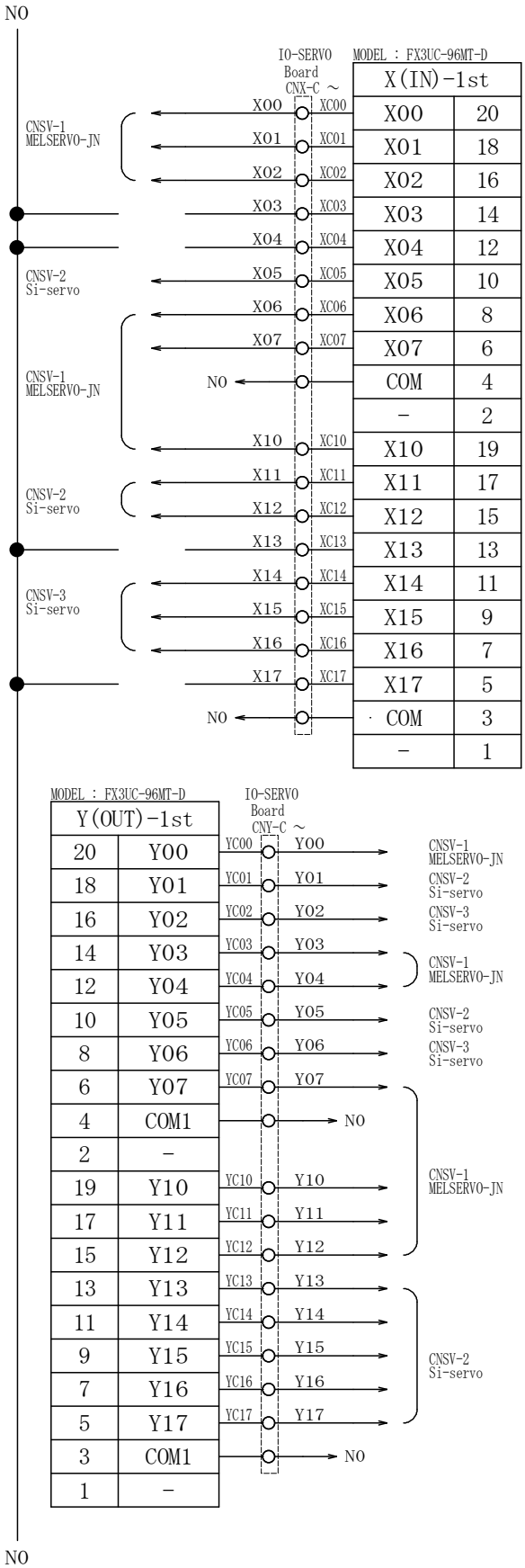
4.1.9 Development connection diagram RC755-T2

1) RC755-T2 Development connection diagram





2) RC755-T2 PLC I/O diagram



SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE

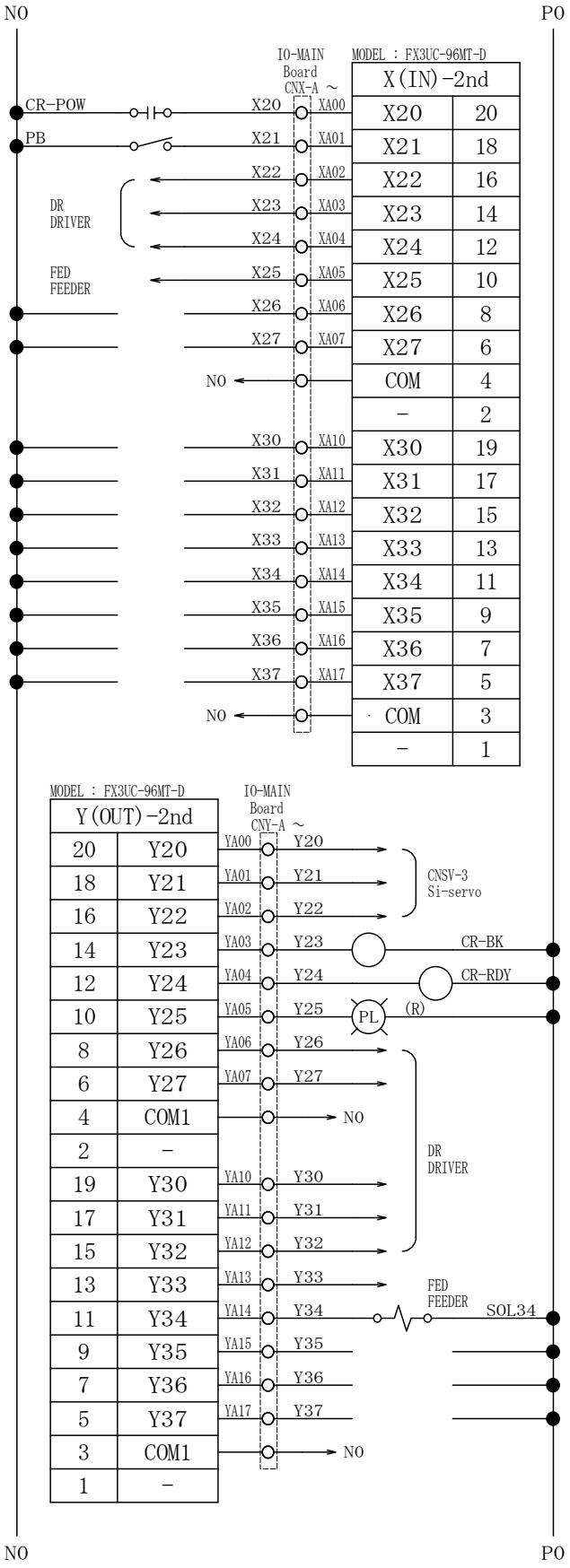
SV2 ALM ALARM DETECTION
SV1 RD READY
SV1 INP IN POSITION

SV1 TLC LIMITING TORQUE
SV2 RDY SERVO READY
SV2 INP POSITIONING COMPLETION

SV3 ALM ALARM DETECTION
SV3 RDY SERVO READY
SV3 INP POSITIONING COMPLETION

SV1 PP COMMAND PULSE
SV2 CWN COMMAND PULSE
SV3 CWN COMMAND PULSE
SV1 CR CLEAR
SV1 NP COMMAND PULSE +/-
SV2 CCWN COMMAND PULSE +/-
SV3 CCWN COMMAND PULSE +/-
SV1 SON SERVO ON

SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
SV2 ARST ALARM RESET/DEVIATION CLEAR
SV2 SVON SERVO ON
SV2 TSEL0 TORQUE LIMIT SELECT 0
SV2 TSEL1 TORQUE LIMIT SELECT 1
SV2 TSEL2 TORQUE LIMIT SELECT 2

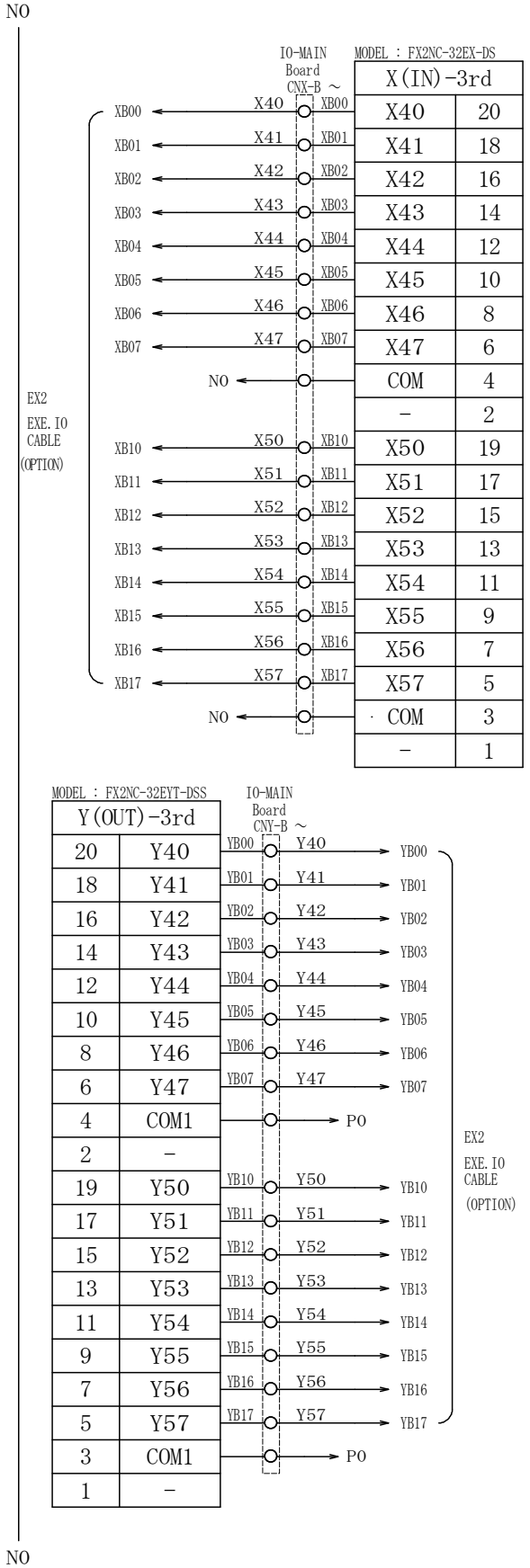


OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1

EX1
EX1
EX1
EX1

SV3 ARST ALARM RESET/DEVIATION CLEAR
SV3 SVON SERVO ON
SV3 TSEL0 TORQUE LIMIT SELECT 0
MOTOR BREAK OFF
OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
DR CHANNEL SELECT CH.1

DR CHANNEL SELECT CH.2
DR CHANNEL SELECT CH.4
DR CHANNEL SELECT CH.8
FED SCREW FEED
EX1 VACUUM
EX1
EX1
EX1



EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

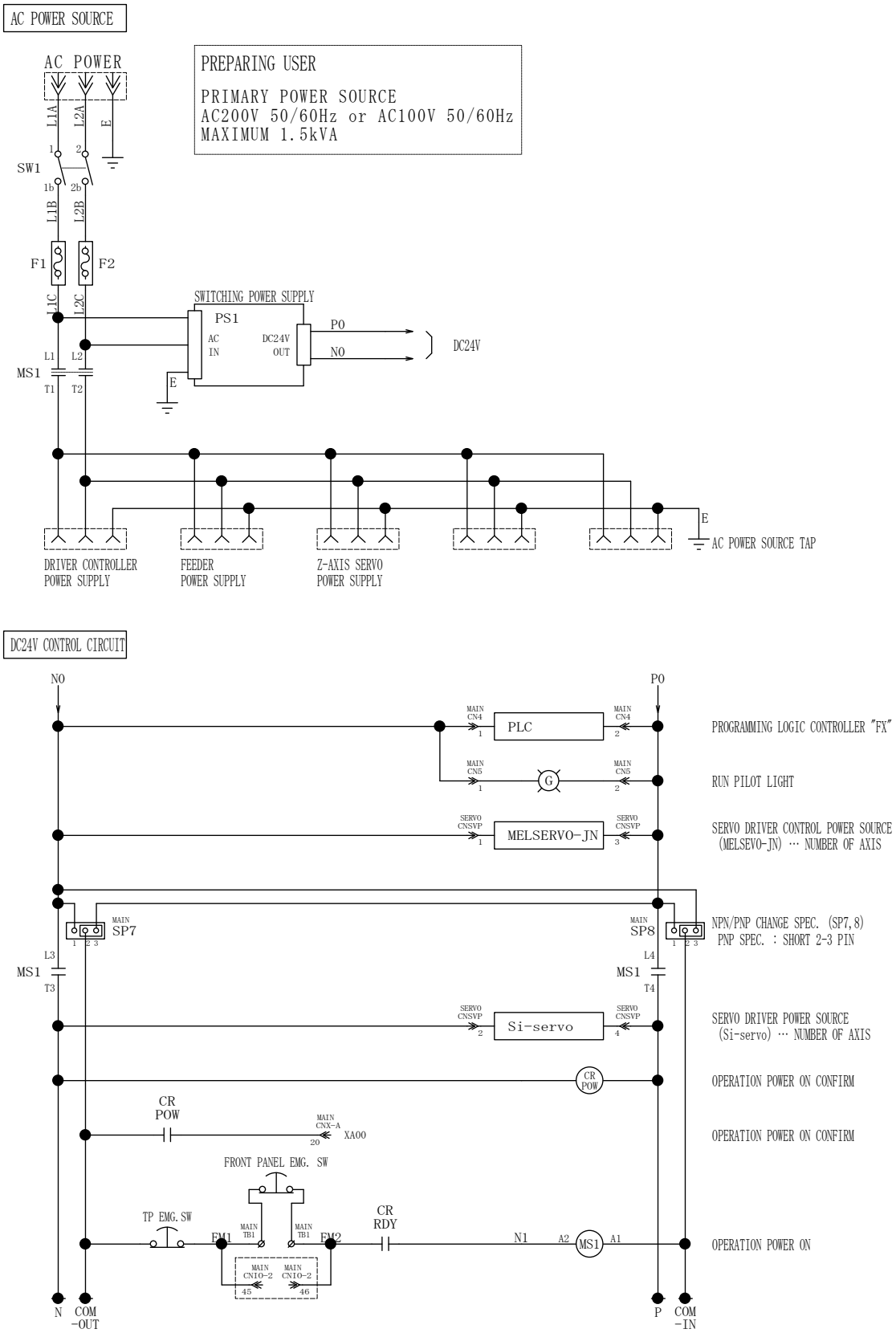
EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

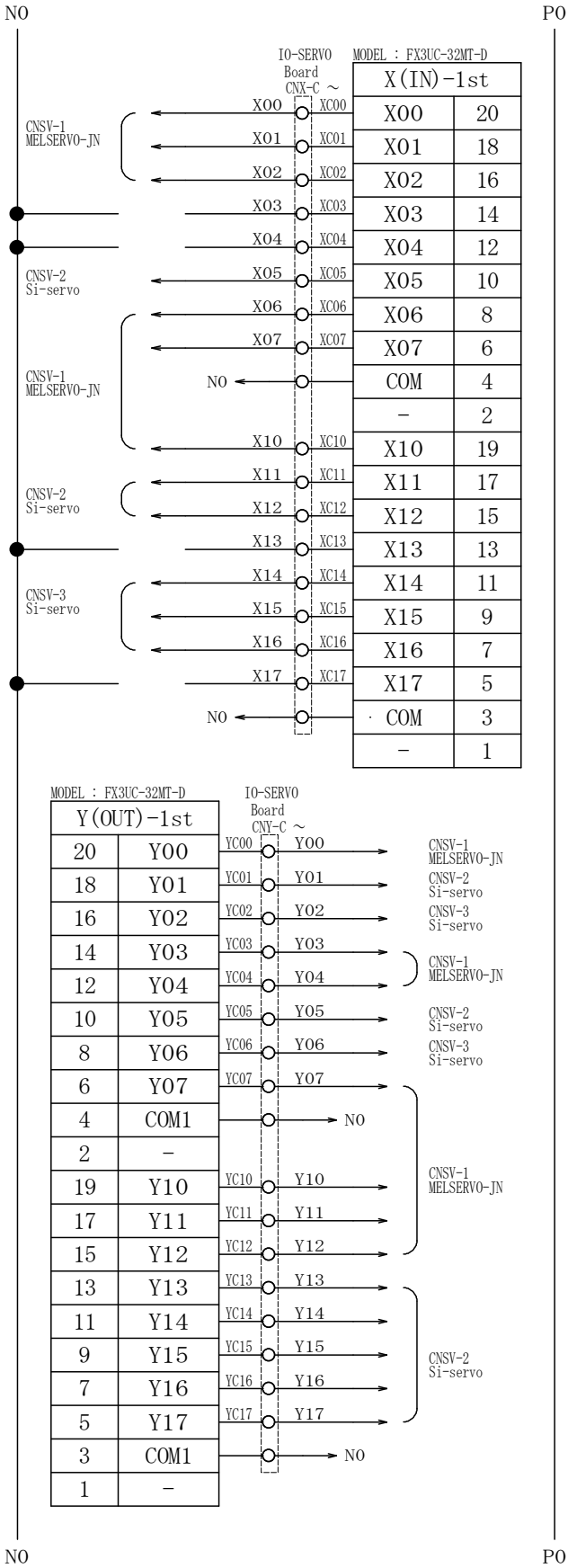
EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

4.1.10 Development connection diagram RC755-T2-P

1) RC755-T2-P Development connection diagram



2) RC755-T2-P PLC I/O diagram



SV1 LA ENCODER A-PHASE PULSE
SV1 LB ENCODER B-PHASE PULSE
SV1 ALM TROUBLE

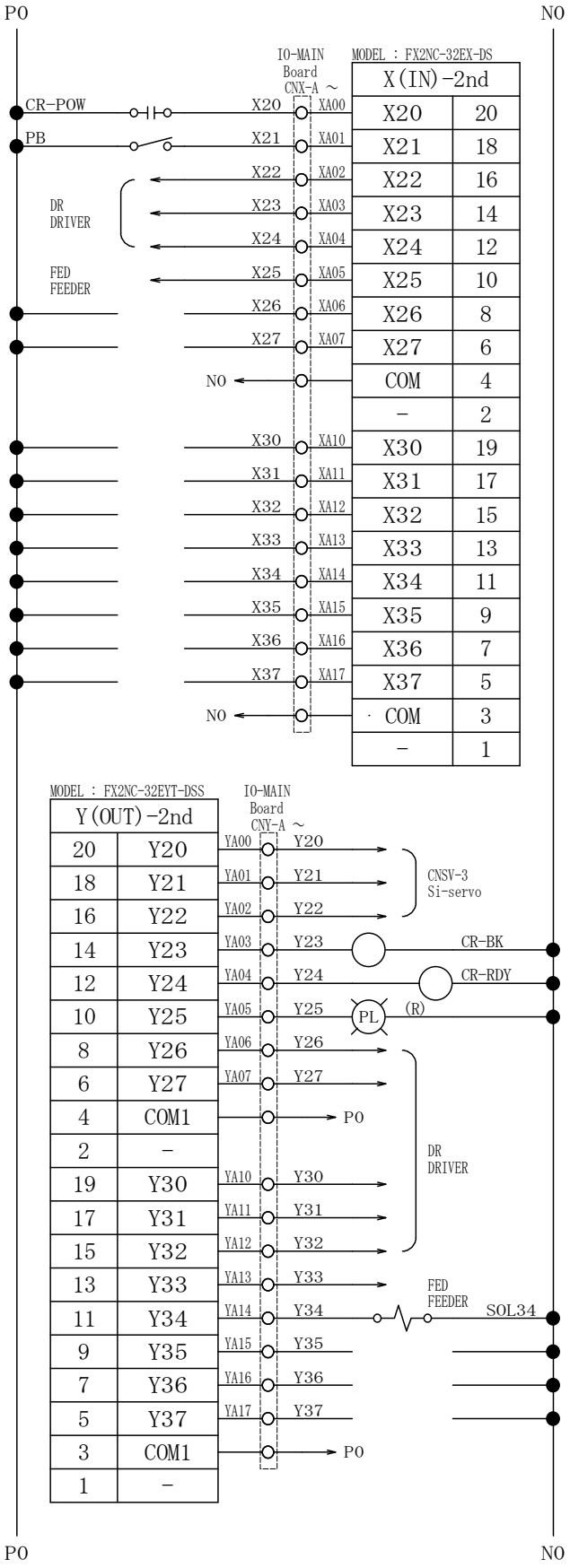
SV2 ALM ALARM DETECTION
SV1 RD READY
SV1 INP IN POSITION

SV1 TLC LIMITING TORQUE
SV2 RDY SERVO READY
SV2 INP POSITIONING COMPLETION

SV3 ALM ALARM DETECTION
SV3 RDY SERVO READY
SV3 INP POSITIONING COMPLETION

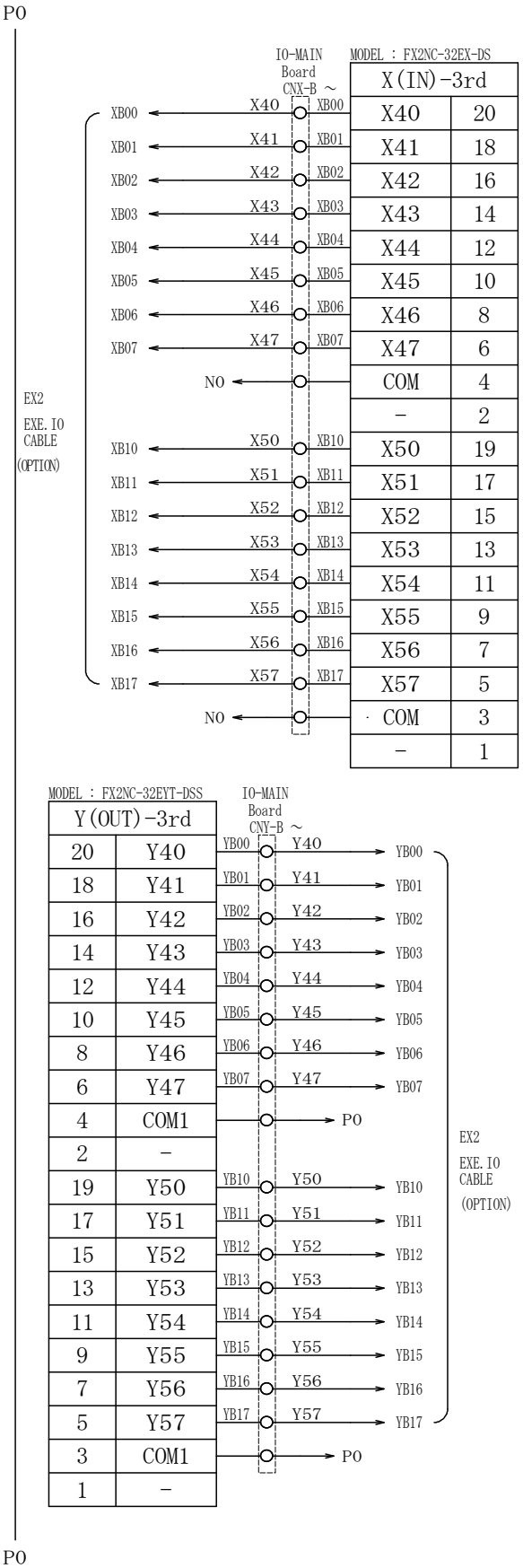
SV1 PP COMMAND PULSE
SV2 CWN COMMAND PULSE
SV3 CWN COMMAND PULSE
SV1 CR CLEAR
SV1 NP COMMAND PULSE +/-
SV2 CCWN COMMAND PULSE +/-
SV3 CCWN COMMAND PULSE +/-
SV1 SON SERVO ON

SV1 TL2 TORQUE LIMIT SELECTION 2
SV1 TL3 TORQUE LIMIT SELECTION 3
SV1 TL4 TORQUE LIMIT SELECTION 4
SV2 ARST ALARM RESET/DEVIATION CLEAR
SV2 SVON SERVO ON
SV2 TSEL0 TORQUE LIMIT SELECT 0
SV2 TSEL1 TORQUE LIMIT SELECT 1
SV2 TSEL2 TORQUE LIMIT SELECT 2



X(IN)-2nd		
X20	20	OPERATION POWER ON CONFIRM
X21	18	TP DEADMAN SWITCH
X22	16	DR TIGHTENING COMPLETION
X23	14	DR TIGHTENING BREAK ALARM
X24	12	DR SYSTEM ALARM
X25	10	FED SCREW SHORTAGE
X26	8	EX1
X27	6	EX1
COM	4	
-	2	
X30	19	EX1
X31	17	EX1
X32	15	EX1
X33	13	EX1
X34	11	
X35	9	
X36	7	
X37	5	
COM	3	
-	1	

Y(OUT)-2nd		
20	Y20	SV3 ARST ALARM RESET/DEVIATION CLEAR
18	Y21	SV3 SVON SERVO ON
16	Y22	SV3 TSEL0 TORQUE LIMIT SELECT 0
14	Y23	MOTOR BREAK OFF
12	Y24	OPERATION POWER ON
10	Y25	ERROR PILOT LIGHT
8	Y26	DR TIGHTENING START
6	Y27	DR CHANNEL SELECT CH.1
4	COM1	
2	-	
19	Y30	DR CHANNEL SELECT CH.2
17	Y31	DR CHANNEL SELECT CH.4
15	Y32	DR CHANNEL SELECT CH.8
13	Y33	FED SCREW FEED
11	Y34	EX1 VACUUM
9	Y35	EX1
7	Y36	EX1
5	Y37	EX1
3	COM1	
1	-	



EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

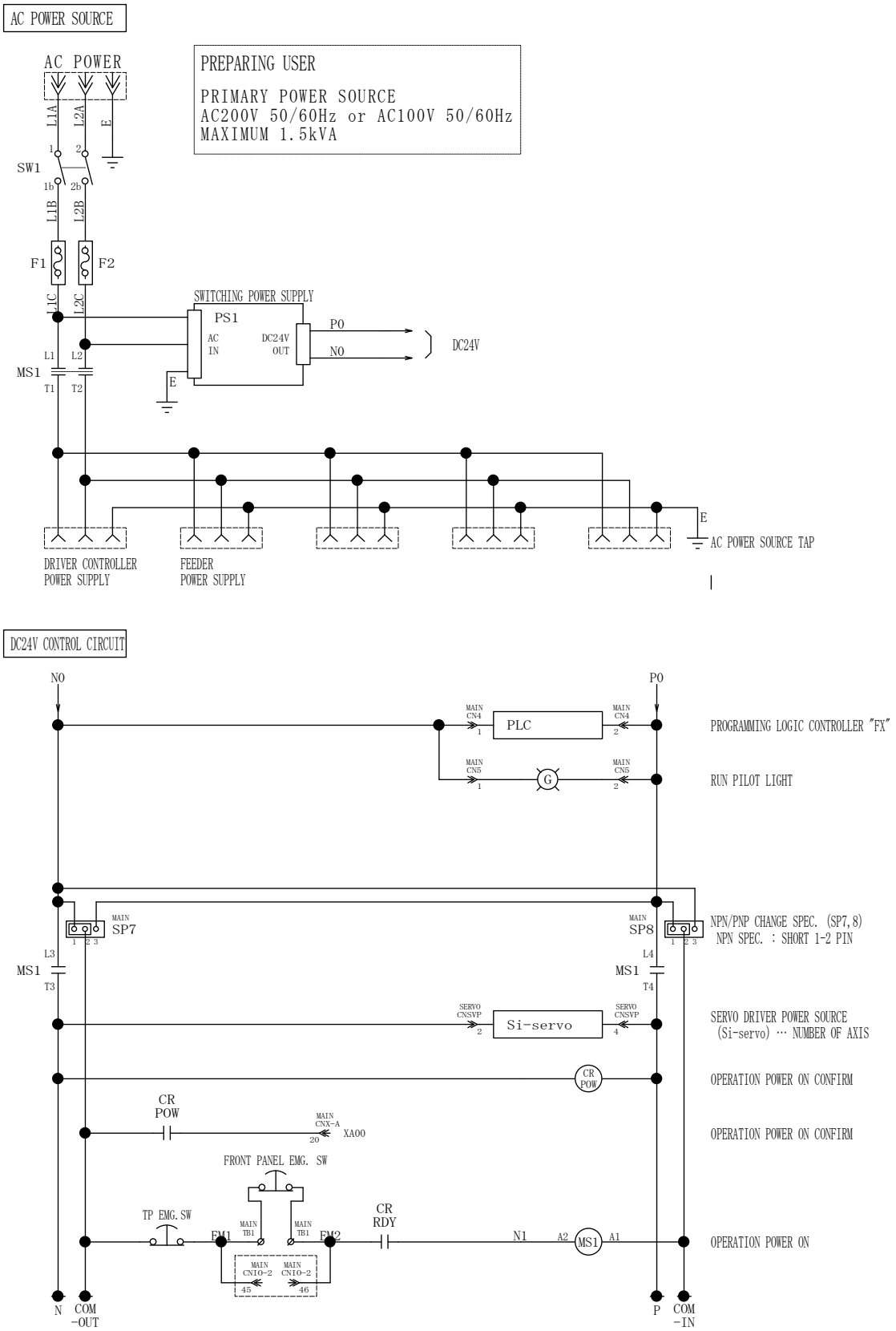
EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

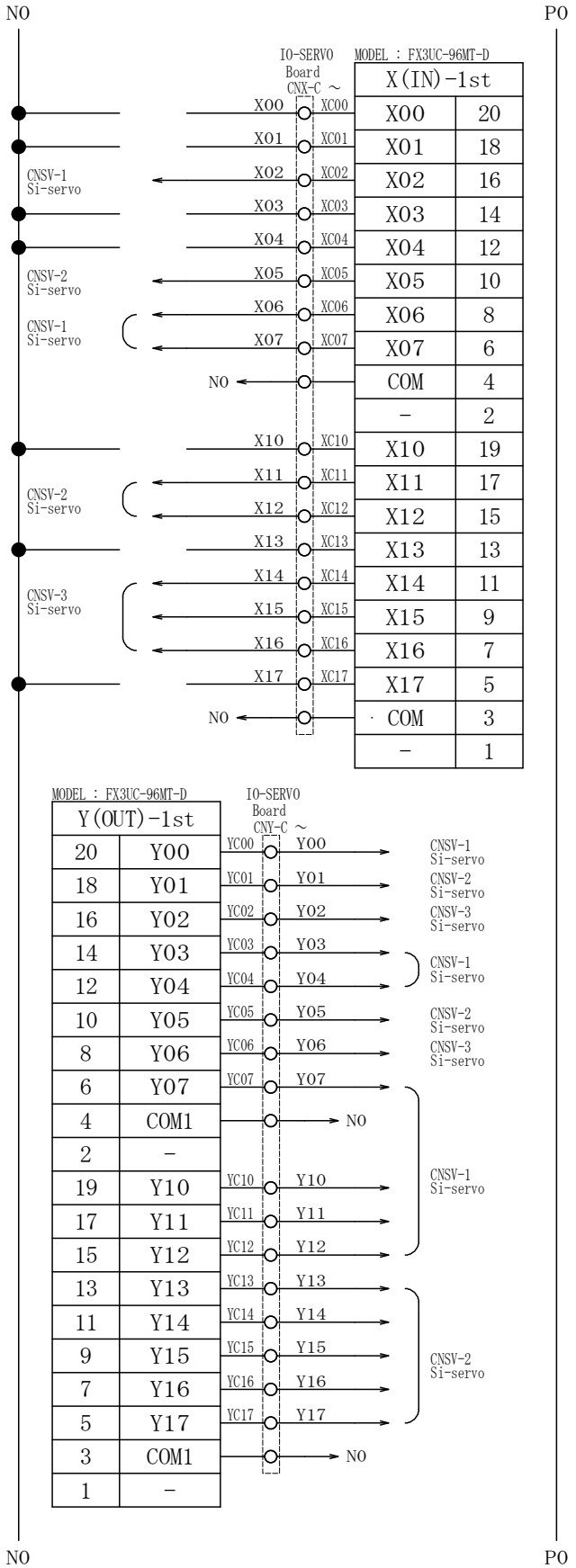
EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

4.1.11 Development connection diagram RC755-T4

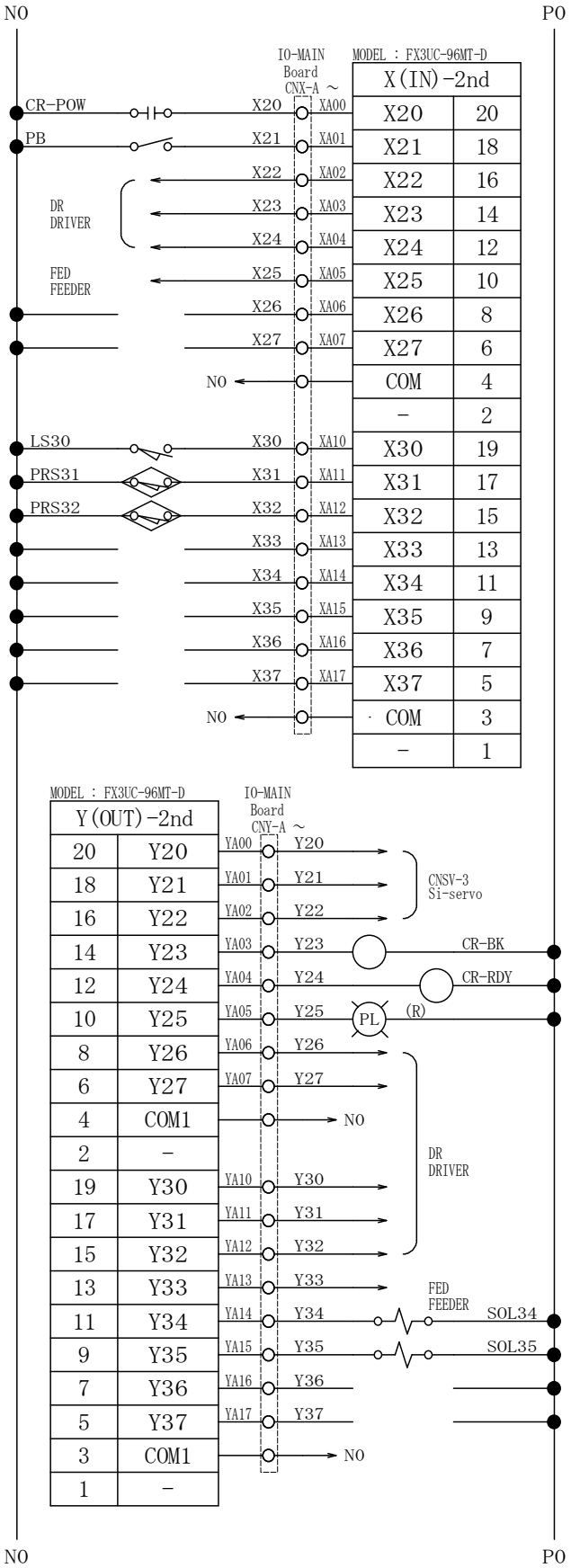
1) RC755-T4 Development connection diagram



2) RC755-T4 PLC I/O diagram



SV1 ALM	ALARM DETECTION
SV2 ALM	ALARM DETECTION
SV1 RDY	SERVO READY
SV1 INP	POSITIONING COMPLETION
SV2 RDY	SERVO READY
SV2 INP	POSITIONING COMPLETION
SV3 ALM	ALARM DETECTION
SV3 RDY	SERVO READY
SV3 INP	POSITIONING COMPLETION
SV1 CWN	COMMAND PULSE
SV2 CWN	COMMAND PULSE
SV3 CWN	COMMAND PULSE
SV1 ARST	ALARM RESET/DEVIATION CLEAR
SV1 CCWN	COMMAND PULSE +/-
SV2 CCWN	COMMAND PULSE +/-
SV3 CCWN	COMMAND PULSE +/-
SV1 SVON	SERVO ON
SV1 TSEL0	TORQUE LIMIT SELECT 0
SV1 TSEL1	TORQUE LIMIT SELECT 1
SV1 TSEL2	TORQUE LIMIT SELECT 2
SV2 ARST	ALARM RESET/DEVIATION CLEAR
SV2 SVON	SERVO ON
SV2 TSEL0	TORQUE LIMIT SELECT 0
SV2 TSEL1	TORQUE LIMIT SELECT 1
SV2 TSEL2	TORQUE LIMIT SELECT 2



X(IN)-2nd		
CR-POW	X20	XA00
PB	X21	XA01
	X22	XA02
DR DRIVER	X23	XA03
	X24	XA04
FED FEEDER	X25	XA05
	X26	XA06
	X27	XA07
NO		COM
		-
LS30	X30	XA10
PRS31	X31	XA11
PRS32	X32	XA12
	X33	XA13
	X34	XA14
	X35	XA15
	X36	XA16
	X37	XA17
NO		COM
		-

X(IN)-2nd	
X20	20
X21	18
X22	16
X23	14
X24	12
X25	10
X26	8
X27	6
COM	4
-	2
X30	19
X31	17
X32	15
X33	13
X34	11
X35	9
X36	7
X37	5
COM	3
-	1

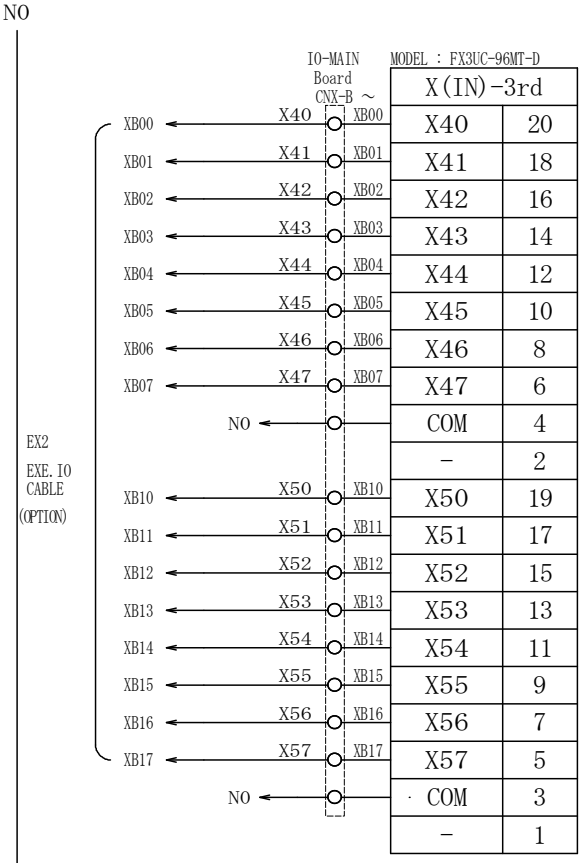
OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1

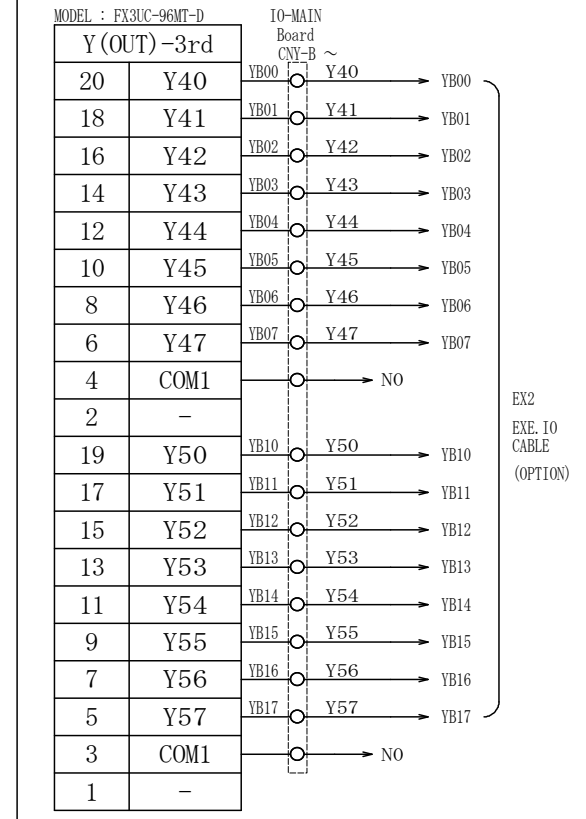
EX1 DRIVER RETURNED
EX1 VACUUM SHUTOFF
EX1 SCREW HEIGHT DETECTION
EX1

Y(OUT)-2nd		
20	Y20	YA00
18	Y21	YA01
16	Y22	YA02
14	Y23	YA03
12	Y24	YA04
10	Y25	YA05
8	Y26	YA06
6	Y27	YA07
4	COM1	NO
2	-	
19	Y30	YA10
17	Y31	YA11
15	Y32	YA12
13	Y33	YA13
11	Y34	YA14
9	Y35	YA15
7	Y36	YA16
5	Y37	YA17
3	COM1	NO
1	-	

SV3 ARST ALARM RESET/DEVIATION CLEAR
SV3 SVON SERVO ON
SV3 TSEL0 TORQUE LIMIT SELECT 0
MOTOR BREAK OFF
OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
DR CHANNEL SELECT CH.1

DR CHANNEL SELECT CH.2
DR CHANNEL SELECT CH.4
DR CHANNEL SELECT CH.8
FED SCREW FEED
EX1 VACUUM
EX1 DRIVER ADVANCE
EX1
EX1





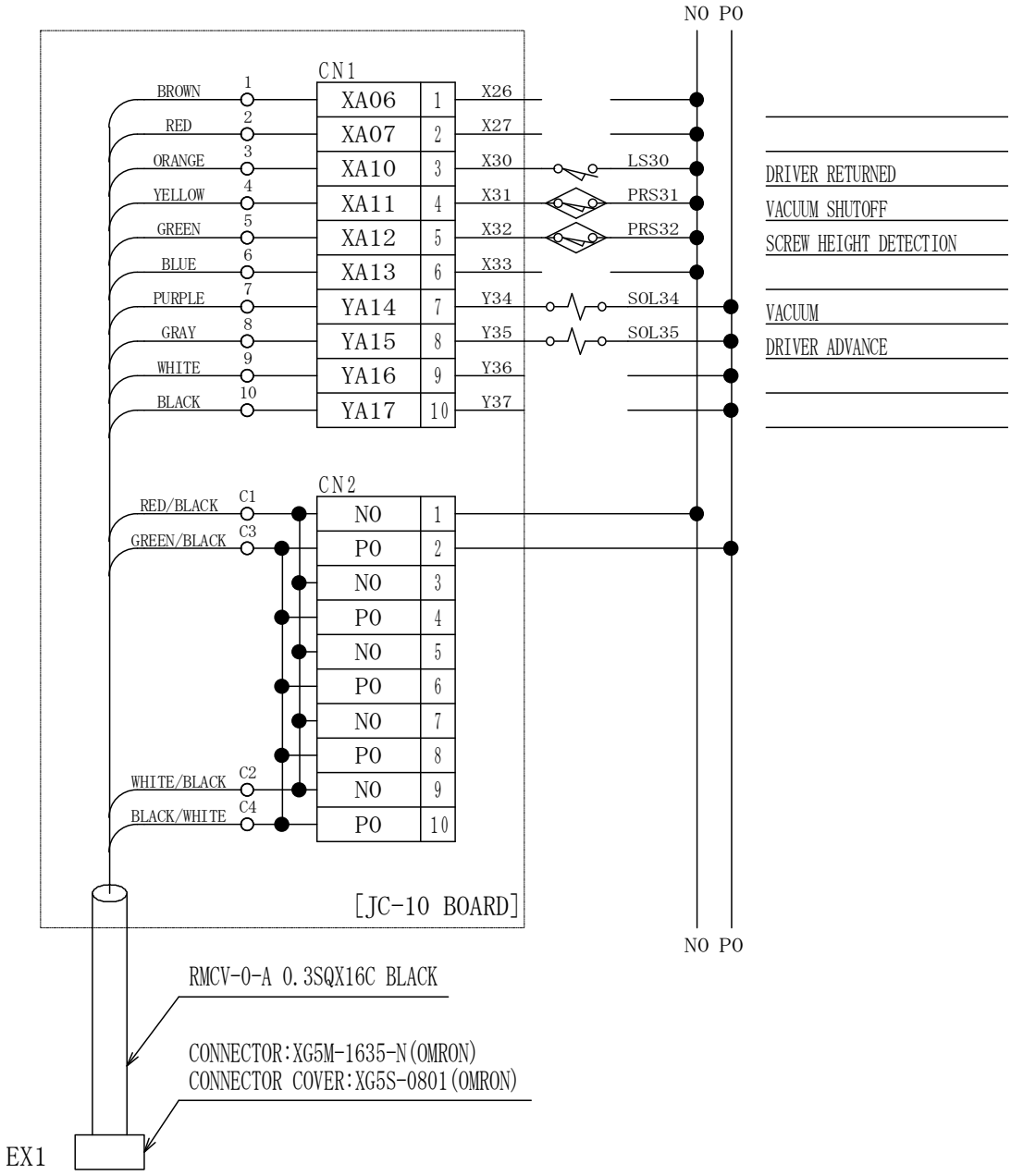
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

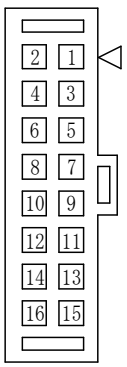
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC755-T4 tip tool I/O diagram



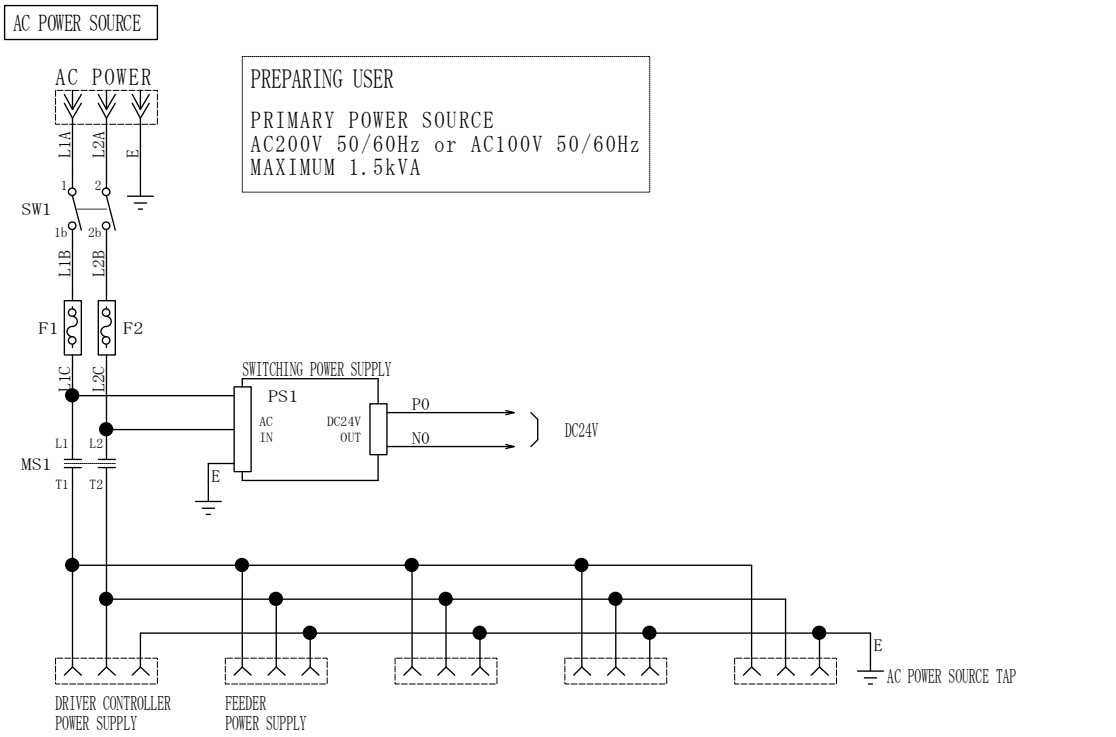
CONNECTOR PIN ASSIGNMENT

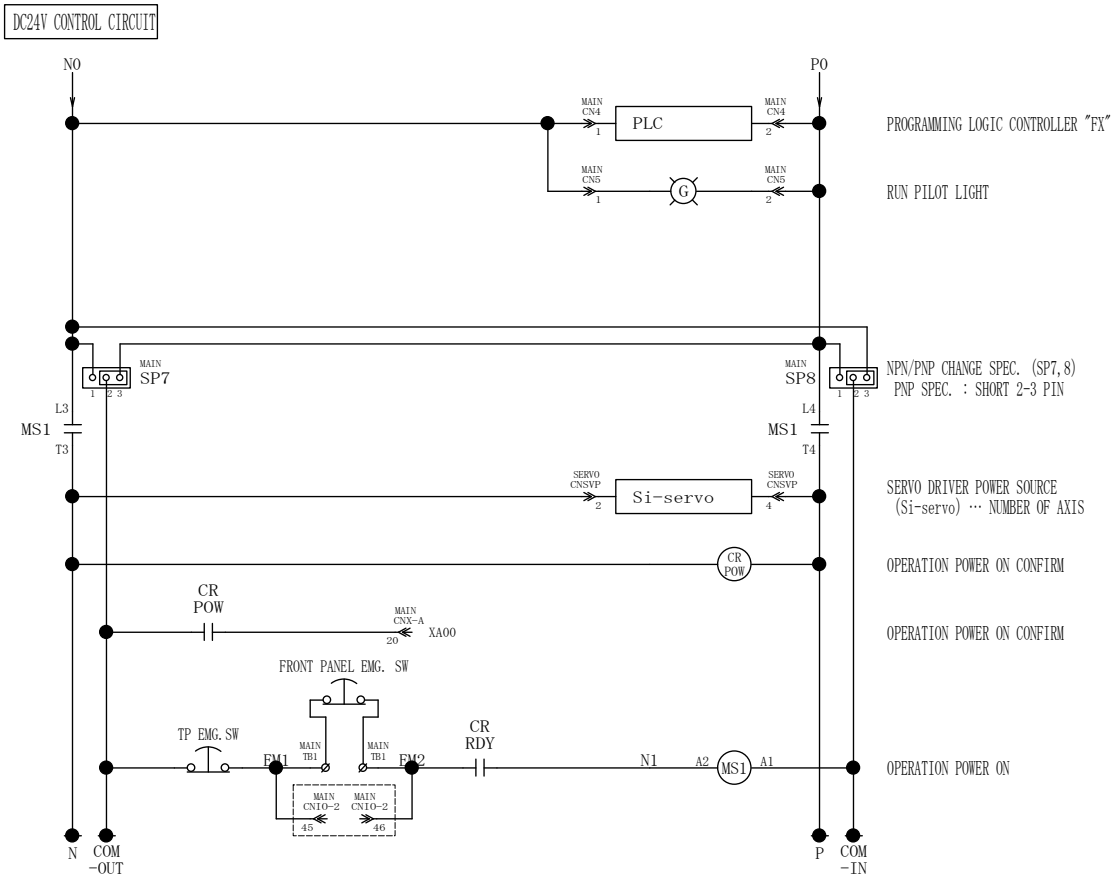


PIN No.	WIRE No.	PIN No.	WIRE No.
1	PO	9	XA10
2	PO	10	YA16
3	NO	11	XA11
4	NO	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

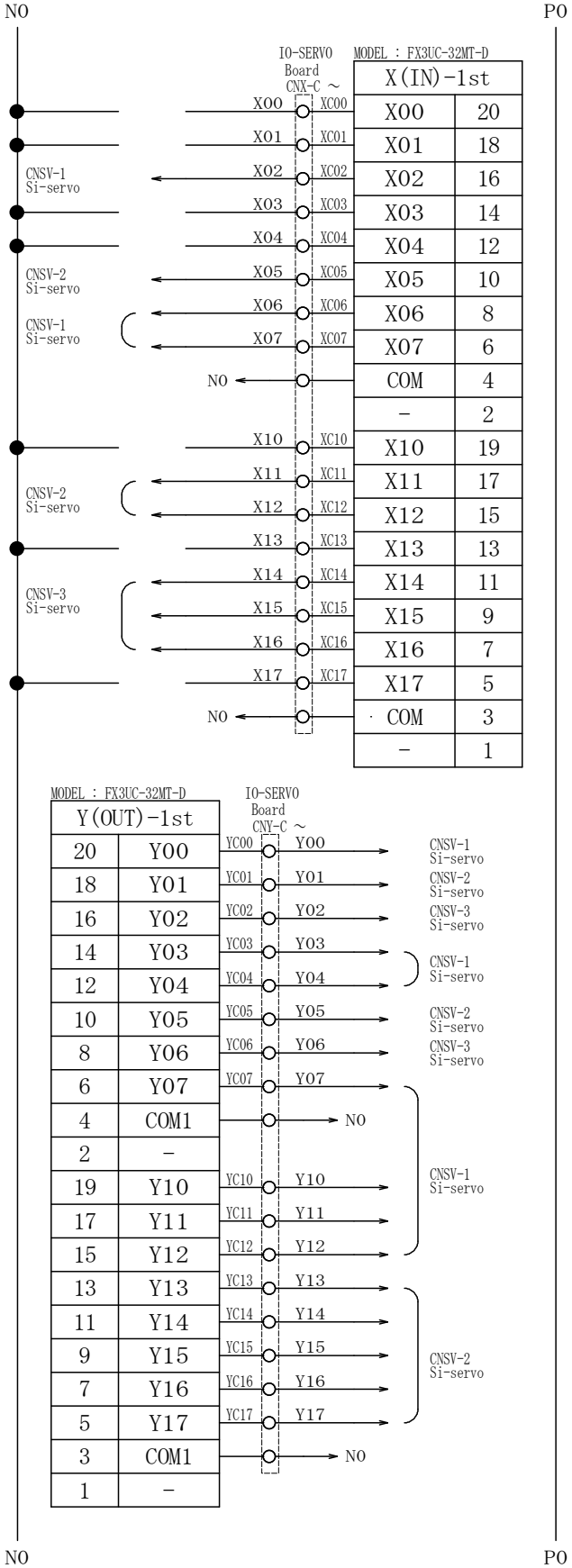
4.1.12 Development connection diagram RC755-T4-P

1) RC755-T4-P Development connection diagram





2) RC755-T4-P PLC I/O diagram



SV1 ALM ALARM DETECTION

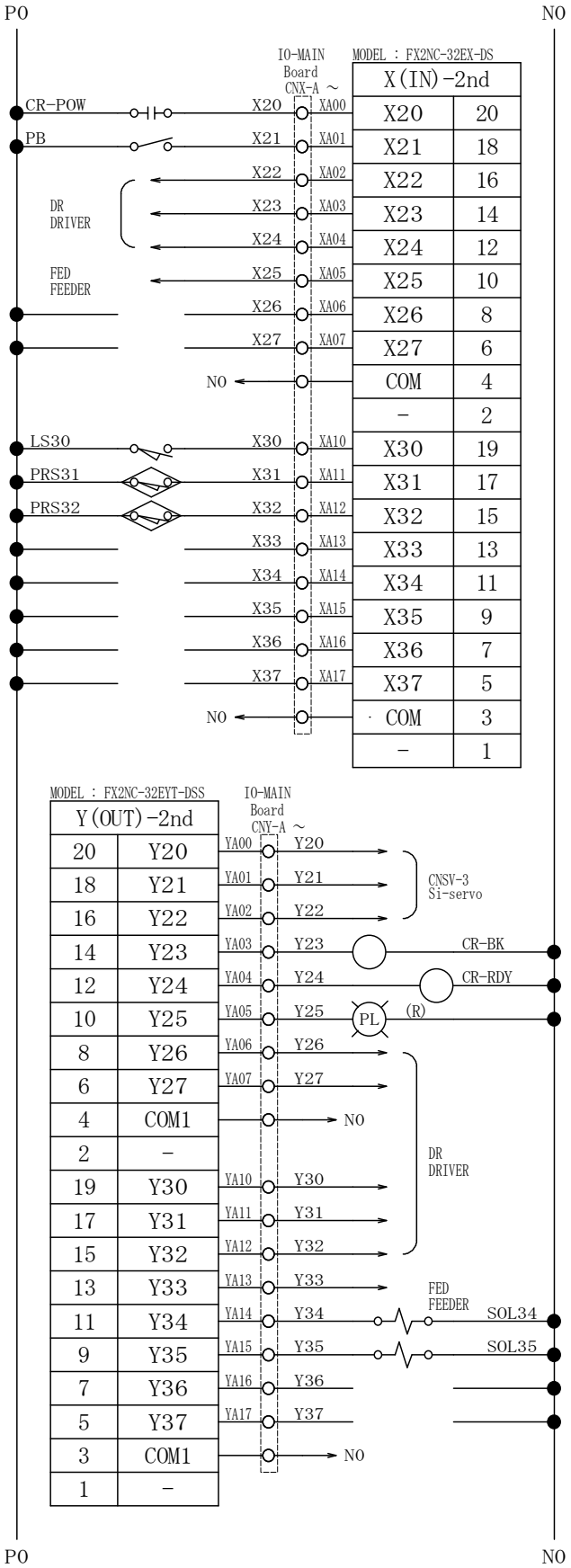
SV2 ALM ALARM DETECTION
SV1 RDY SERVO READY
SV1 INP POSITIONING COMPLETION

SV2 RDY SERVO READY
SV2 INP POSITIONING COMPLETION

SV3 ALM ALARM DETECTION
SV3 RDY SERVO READY
SV3 INP POSITIONING COMPLETION

SV1 CWN COMMAND PULSE
SV2 CWN COMMAND PULSE
SV3 CWN COMMAND PULSE
SV1 ARST ALARM RESET/DEVIATION CLEAR
SV1 CCWN COMMAND PULSE +/-
SV2 CCWN COMMAND PULSE +/-
SV3 CCWN COMMAND PULSE +/-
SV1 SVON SERVO ON

SV1 TSEL0 TORQUE LIMIT SELECT 0
SV1 TSEL1 TORQUE LIMIT SELECT 1
SV1 TSEL2 TORQUE LIMIT SELECT 2
SV2 ARST ALARM RESET/DEVIATION CLEAR
SV2 SVON SERVO ON
SV2 TSEL0 TORQUE LIMIT SELECT 0
SV2 TSEL1 TORQUE LIMIT SELECT 1
SV2 TSEL2 TORQUE LIMIT SELECT 2

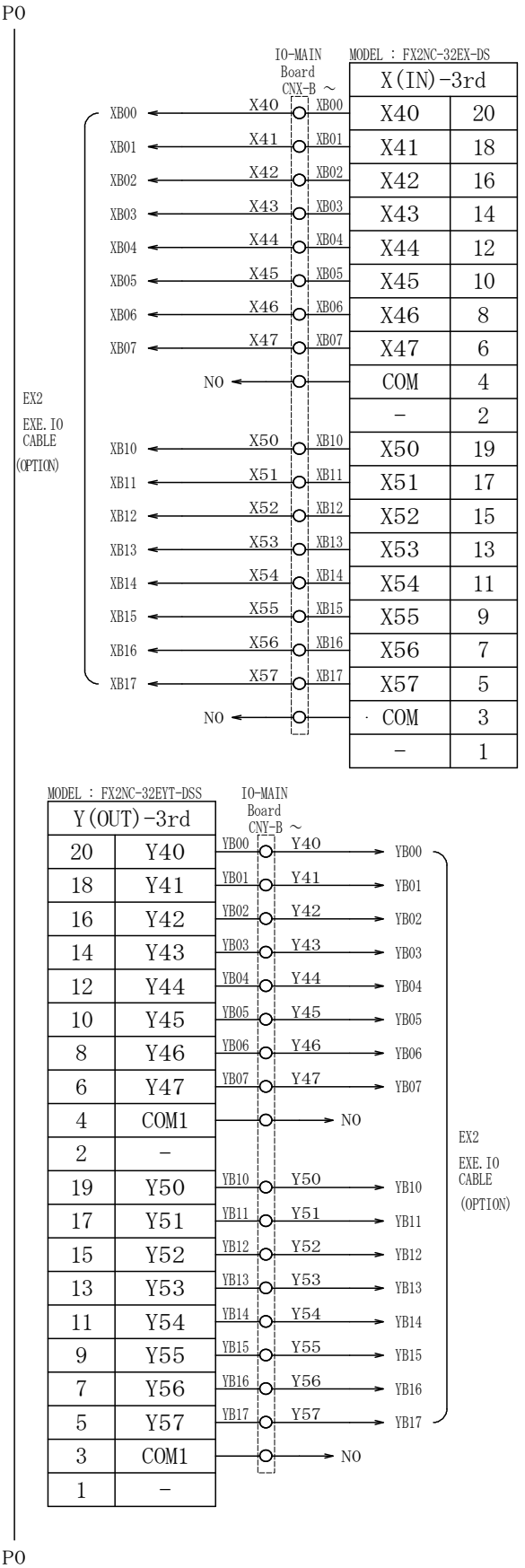


OPERATION POWER ON CONFIRM
TP DEADMAN SWITCH
DR TIGHTENING COMPLETION
DR TIGHTENING BREAK ALARM
DR SYSTEM ALARM
FED SCREW SHORTAGE
EX1
EX1

EX1 DRIVER RETURNED
EX1 VACUUM SHUTOFF
EX1 SCREW HEIGHT DETECTION
EX1

SV3 ARST ALARM RESET/DEVIATION CLEAR
SV3 SVON SERVO ON
SV3 TSEL0 TORQUE LIMIT SELECT 0
MOTOR BREAK OFF
OPERATION POWER ON
ERROR PILOT LIGHT
DR TIGHTENING START
DR CHANNEL SELECT CH.1

DR CHANNEL SELECT CH.2
DR CHANNEL SELECT CH.4
DR CHANNEL SELECT CH.8
FED SCREW FEED
EX1 VACUUM
EX1 DRIVER ADVANCE
EX1
EX1



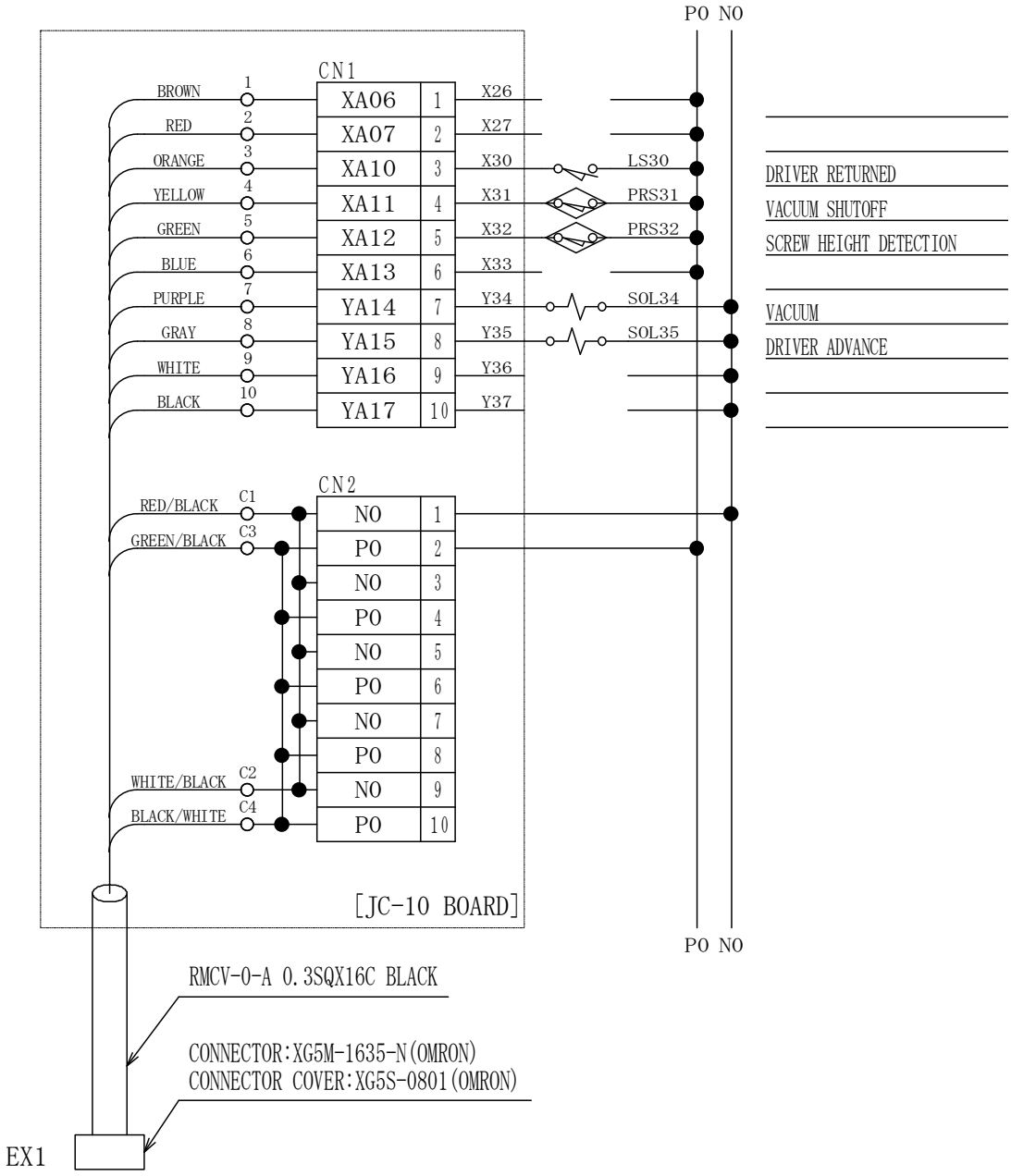
EXE RETURN
EXE RESET
EXE CYCLE START
EXE SCREW FEED
EXE TABLE SELECTION 1
EXE TABLE SELECTION 2
EXE TABLE SELECTION 4
EXE TABLE SELECTION 8

EXE TABLE SELECTION 16
EXE TABLE SELECTION 32
EXE TABLE SELECTION 64
EXE TABLE SELECTION 128
EXE FAULT OK CONTINUD
EXE FAULT NG CONTINUD
EXE FAULT RETRY
EXE FAULT BREAK

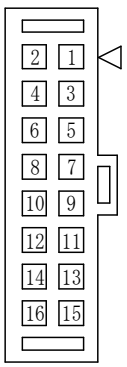
EXE READY(START POSSIBLE)
EXE HOME POSITION
EXE ALARM
EXE DURING RUNNING
EXE CYCLE COMPLETION
EXE DURING FEEDING
EXE SCREW SHORTAGE
EXE TIGHTENING TORQUE FAULT

EXE TIGHTENING HEIGHT FAULT
EXE SCREW FEED FAULT/SCREW PICKUP FAULT
EXE BUZZER ON (ALARM、CYCLE COMPLETION)

3) RC755-T4-P tip tool I/O diagram



CONNECTOR PIN ASSIGNMENT

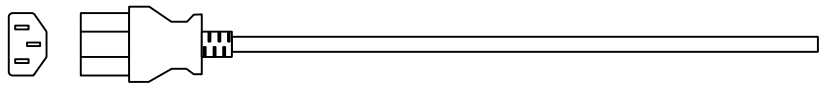


PIN No.	WIRE No.	PIN No.	WIRE No.
1	P0	9	XA10
2	P0	10	YA16
3	N0	11	XA11
4	N0	12	YA17
5	XA06	13	XA12
6	YA14	14	-
7	XA07	15	XA13
8	YA15	16	-

4.2 External cable diagram

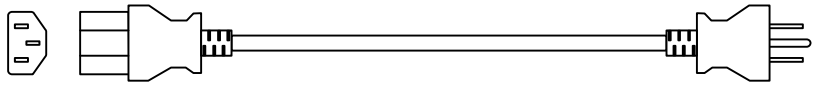
1) AC power supply cable

・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)



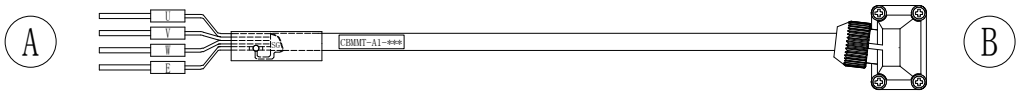
2) Servo power supply extension cable

・CBMMT-A1-□□□

Connector A … For connection to the servo amplifier connector CNP1(U,V,W) at the back of the controller.

Connector B … JN4FT04SJ1-R(JAE), For connection to the motor power supply connector.

Cable … UL2517 AWG19×4C(H)



Pin No. A	Cable code	Cable	Pin No. B	Signal
	U	Red	2	Motor power supply phase U
	V	White	3	Motor power supply phase V
	W	Black	4	Motor power supply phase W
	E	Green	1	Motor power supply ground

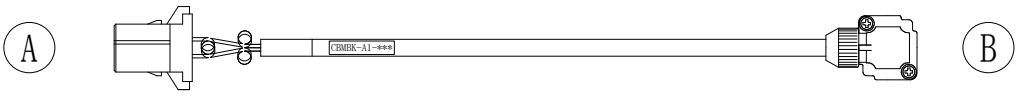
3) Servo power brake extension cable

・CBMBK-A1-□□□

Connector A … 1-178128-2 (TE) , For connection to connector BK at the back of the controller.

Connector B … JN4FT02SJ1-R(JAE) , For connection to the motor brake connector.

Cable … RMFES-A(CL3X) AWG20 2 芯 (DYDEN)



Pin No. A	Cable code	Cable	Pin No. B	Signal
1	B1	Black	1	Motor brake
2	B2	Black	2	Motor brake

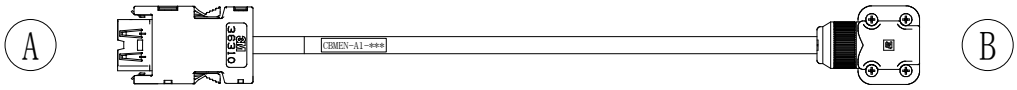
4) Motor encoder extension cable

・CBMEN-A1-□□□

Connector A … 36210-0100PL(3M) , For connection to the servo amplifier connector CN2 at the back of the controller.

Connector B … 1674320-1(TE) , For connection to the motor encoder connector.

Cable … RMCS-SB(2464)#26×3P (DYDEN)



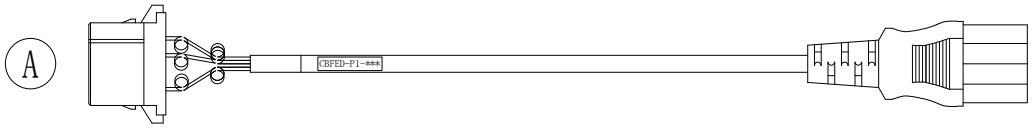
Pin No. A	Cable code	Cable	Pin No. B	Signal
1	P5	Red	3	
2	LG	Green	6	
3	MR	Black	5	
4	MMR	White	4	
9	BAT	Yellow	2	
		Brown		
Hood	SG	Shield	9	

5) 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

6) 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				

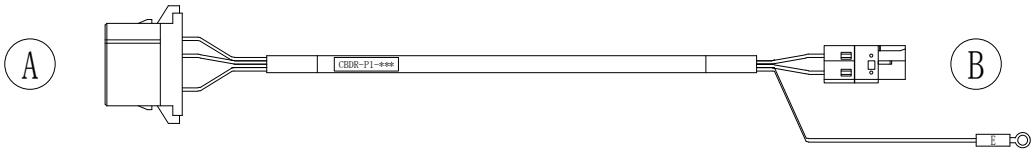
7) Driver power supply cable

・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

8) Driver control cable

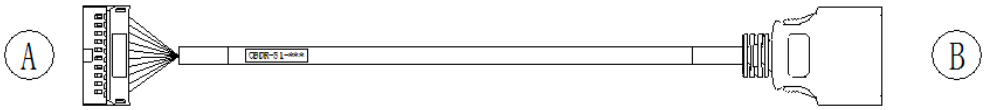
・SD550-IO-□□□ : For driver SD550

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)



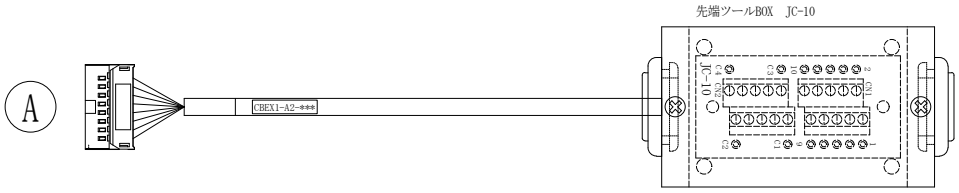
Pin No. A	Cable code	Pin No. B	Signal
1	COM IN	1	Common for input signal
2	COM IN	2	Common for input signal
3	COM OUT	3	Common for output signal
4	COM OUT	4	Common for output signal
5	D-IN0	5	Start
6	D-IN1	6	Channel number selection CH1
7	D-IN2	7	Channel number selection CH2
8	D-IN3	8	Channel number 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	

9) 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			

10) EXT2 signal cable

・CNEX2-CBO-□□□ : For external I/O

Connector A … XG5M-2635-N(OMRON), For connection to connector EX2 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	XB00	White(1 red)	EXE input Return
6	YB00	White (1 black)	EXE output READY (start possible)
7	XB01	Yellow(1 red)	EXE input Reset
8	YB01	Yellow (1 black)	EXE output Home position
9	XB02	Pink(1 red)	EXE input Cycle start
10	YB02	Pink (1 black)	EXE output Alarm
11	XB03	Orange(2 red)	EXE input Screw feed
12	YB03	Orange (2 black)	EXE output During running
13	XB04	Gray(2 red)	EXE input Table selection 1
14	YB04	Gray (2 black)	EXE output Cycle comoletion
15	XB05	White(2 red)	EXE input Table selection 2
16	YB05	White (2 black)	EXE output During feeding
17	XB06	Yellow(2 red)	EXE input Table selection 4
18	YB06	Yellow (2 black)	EXE output Screw shortage
19	XB07	Pink(2 red)	EXE input Table selection 8
20	YB07	Pink (2 black)	EXE output Tightening torque fault
21	XB10	Orange(3 red)	EXE input Table selection 16
22	YB10	Orange (3 black)	EXE output Tightening height fault
23	XB11	Gray(3 red)	EXE input Table selection 32
24	YB11	Gray (3 black)	
25	XB12	White(3 red)	EXE input Table selection 64
26	YB12	White (3 black)	
27	XB13	Yellow(3 red)	EXE input Table selection 128
28	YB13	Yellow (3 black)	
29	XB14	Pink(3 red)	
30	YB14	Pink (3 black)	
31	XB15	Orange(4 red)	
32	YB15	Orange (4 black)	
33	XB16	Gray(4 red)	
34	YB16	Gray (4 black)	
35	XB17	White(4 red)	
36	YB17	White (4 black)	
37	SP37	Yellow(4 red)	
38	SP38	Yellow (4 black)	
39	SP39	Pink(4 red)	
40	SP40	Pink (4 black)	
41	SP41	Orange(5 red)	
42	SP42	Orange (5 black)	
43	SP43	Gray(5 red)	
44	SP44	Gray (5 black)	
45	EM1	White(5 red)	Emergency stop relay contact (b contact)
46	EM2	White (5 black)	Emergency stop relay contact (b contact)
47	P	Yellow(5 red)	24VDC (Emergency stopON : Open circuit)
48	P	Yellow (5 black)	24VDC (Emergency stopON : Open circuit)
49	N	Pink(5 red)	0V (Emergency stopON : Open circuit)
50	N	Pink (5 black)	0V (Emergency stopON : Open circuit)

4.3 Connections between controller and external cable

The cables for the RC75,RC755 controller and the tightening tool are not connected at the time of shipment. Before using the controller, connect necessary cables to the RC75,RC755 controller.

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

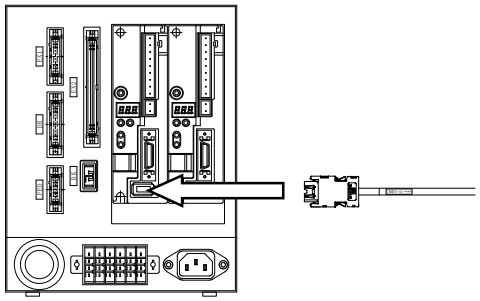
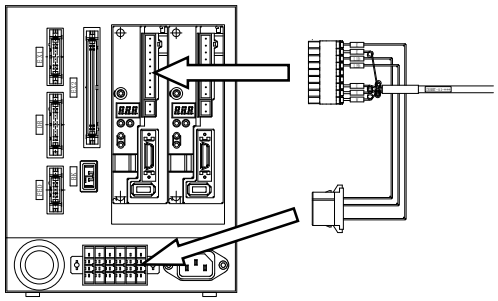
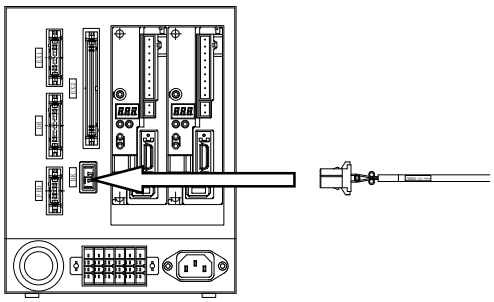
Failure to observe this instruction may result in electric shock and damage to the product.

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

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

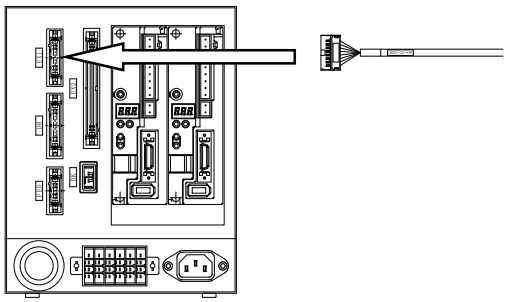
1) Connecting the servo and encoder cables

Note) This operation is necessary only in the case of RC75 controller.

Procedure		
1	Connect the servo axis encoder cable to the servo amplifier connector CN2 for the servo shaft. **CAUTION)** **Check the combination of the amplifier and the cable. Ensure correct connections by referring to the label.**	
2	Connect the servo axis motor power supply cable to the servo amplifier connector CNP1 for the servo axes and the power supply tap (6P) connector.. **CAUTION)** **Check the combination of the amplifier and the cable. Ensure correct connections by referring to the label.**	
3	Connect the servo motor brake cable into the BK connector of the servo amplifier.	

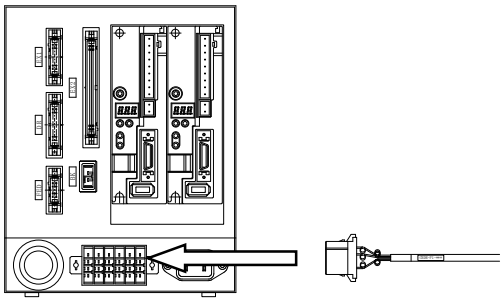
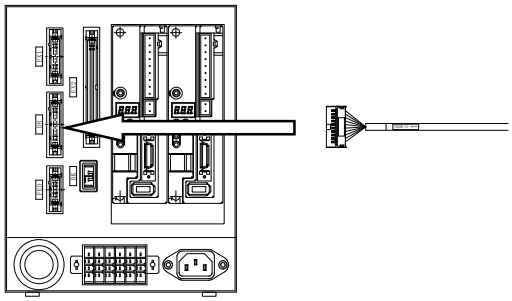
2) Connecting the screw driver tool signal cable

Note) This operation is necessary only in the case of RC75 controller.

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

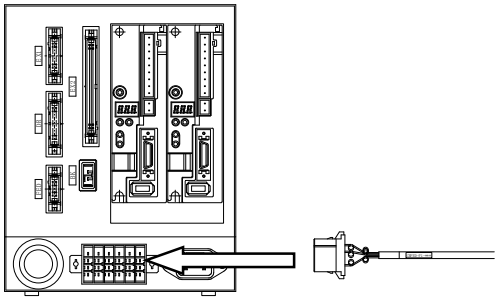
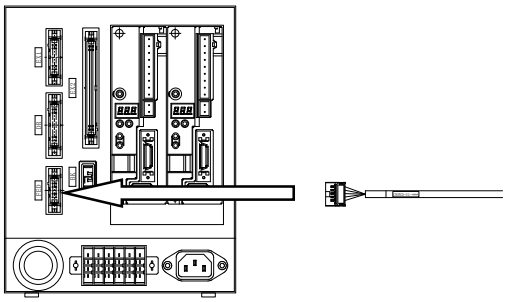
3) Connecting the driver cable (for NITTO SEIKO KX/NX series driver)

Note) This operation is necessary only in the case of RC75 controller.

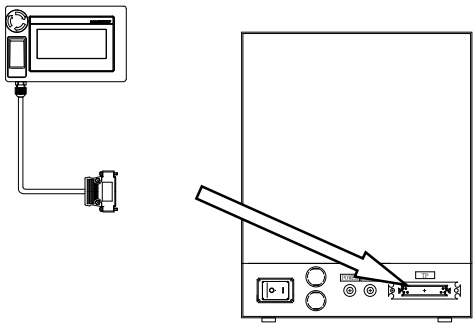
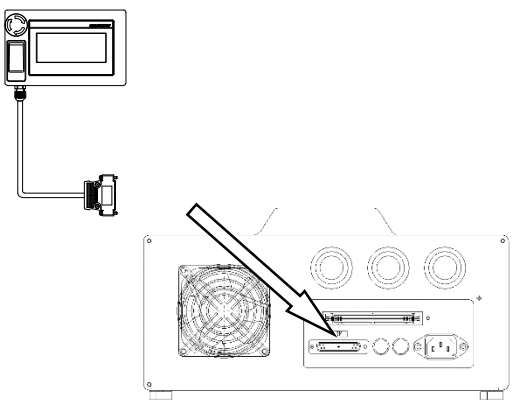
Procedure		
1	Connect the driver power supply cable connector to the pawer supply tap (6P) connector at the back of the controller.	
2	Connect the driver control cable connector to the DR connector at the back of the controller.	

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

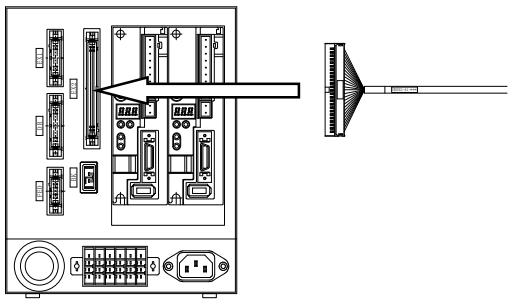
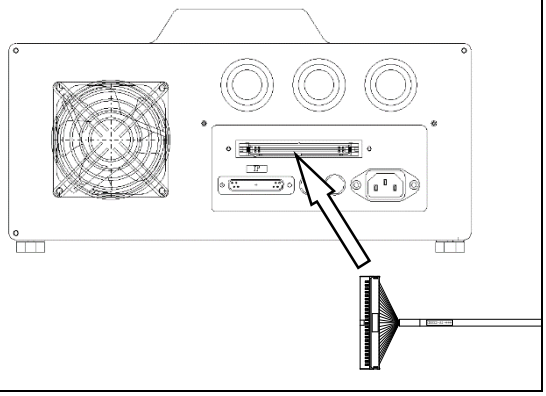
Note) This operation is necessary only in the case of RC75 controller.

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.	

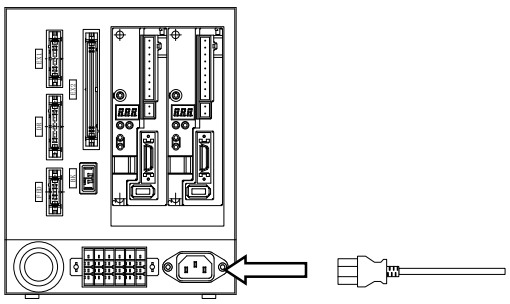
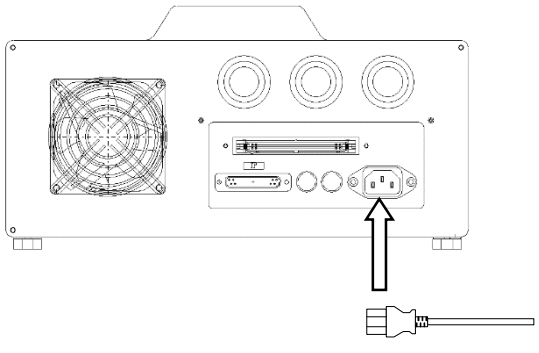
5) Connecting the operation pendant cable (optional)

Procedure		
1	Connect the operation pendant cable connector to the TP connector at the front of the controller. **CAUTION)** **Before connecting/disconnecting the teaching pendant cable connector, be sure to turn OFF the controller power supply. Connecting/disconnecting the teaching pendant cable connector while the power supply turned ON causes a fault.**	RC75 series  RC755series 

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

Procedure		
1	Connect the external I/O connector to the EX2 connector at the back of the controller.	RC75 series  RC755 series 

7) 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.**	RC75 series  RC755 series 

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 (FX3UC-□□MT-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.

(Caution)
To execute automatic cycle operation while the "backup battery voltage low" alarm is activated, set the count-up set value at "0", so that a count-up fault will not occur.

2) Touch panel (GT1030-HBDW, 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)

3) Servo amplifier (MR-JN-10A□, MITSUBISHI ELECTRIC)
Battery replacement is not required.

4) Servo driver (Si-servo、SANMEI)
Battery replacement is not required.

6. Functions of the Pendant

6.1 Outline of functions

RC75-TP uses a graphic operation terminal (GT1030-HBDW, 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) RC75-TP provides operation panel functions required for automatic operation and manual operation.
2) RC75-TP 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.
3) RC75-TP provides teaching pendant functions such as edition of position information (teaching operation) and jog operation.
4) RC75-TP provides a thrust change control function to support tightening quality improvement.

Through development of the dedicated software, RC75-TP enables easy operations of the above functions.

6.1.1 Emergency stop function

This function is used to turn OFF the ready switch, and to execute emergency stop operation.

[Major function]
・Ready status reset operation using the hardware switch, emergency stop operation and emergency stop status indication are enabled on the operation panel screen.

If you push the emergency stop switch (red switch) at the upper left of the operation pendant when the machine is in ready status, the machine is brought into emergency stop status. Execute this operation to turn OFF the ready switch, or when a hazardous condition occurs during machine operation.

6.1.2 Emergency stop reset function

This function is used to reset the emergency stop status.

[Major function]
・The emergency stop reset operation using the hardware switch, emergency stop reset status indication are enabled on the operation panel screen.

The emergency stop switch (red switch) at the upper left of the operation pendant provides a “push-lock & turn-reset” function. To reset the emergency stop switch, turn the switch clockwise.

POINT: If the machine remains in emergency stop status even after the emergency stop switch is reset on the operation panel, check the “external emergency stop switch”.

6.1.3 Graphic operation terminal

This system uses the graphic operation terminal (GT1030-HBDW, 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 operating environment based on an interactive method.

[Major function]

1) Compact operation panel that enables operations of all necessary functions
2) Simplified easy-to-see operating 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 six modes: "AUTO mode", "FAULT mode", "MANUAL mode", "TEACH mode", "SETUP mode" and "Flash ROM".

[Operation mode list]

Mode		Major function
Main menu	AUTO mode	・Automatic cycle operation ・Model (Table) change ・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 (Return, Point change, Tightening, Screw feed, Driver advance/retraction, Driver rotation, Vacuum, Cycle step, bit change)
	TEACH mode	・Point information registration ・Jog operation ・Thrust change operation ・Brake ON/OFF operation ・Point moving
	SETUP mode	・Operation parameter registration ・System parameter registration ・Instruction code registration ・Clock setup ・PLC I/O test ・Operating for driver SD550memory sheets (Option)
	Flash ROM	・Reading data from ROM ・Writing data into ROM

6.1.4 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, teaching operations and flash ROM registration 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]

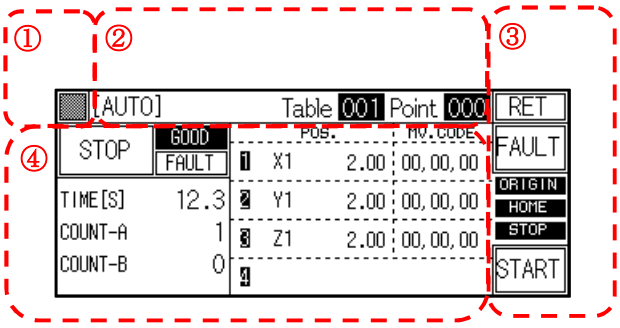
LEVEL 2 password	7 1
LEVEL 3 password	2 1 0

6.2 Basic operations

6.2.1 Basic operations on the operation panel

1) Basic screen layout

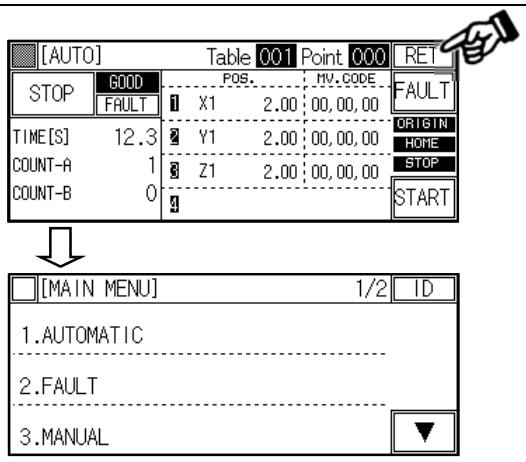
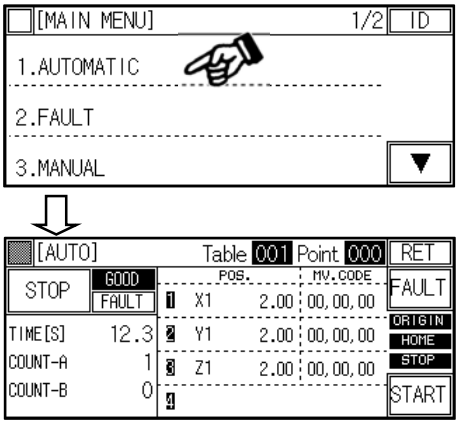
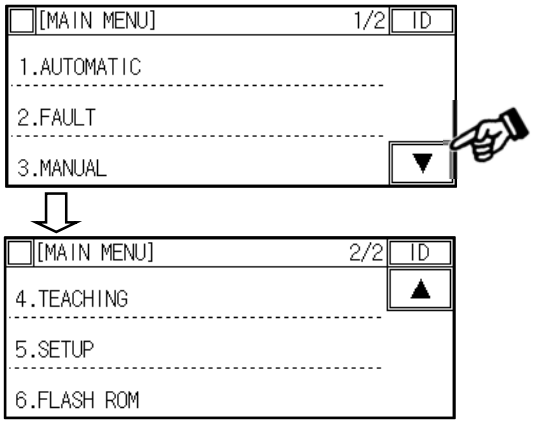
This section describes the basic screen layout.

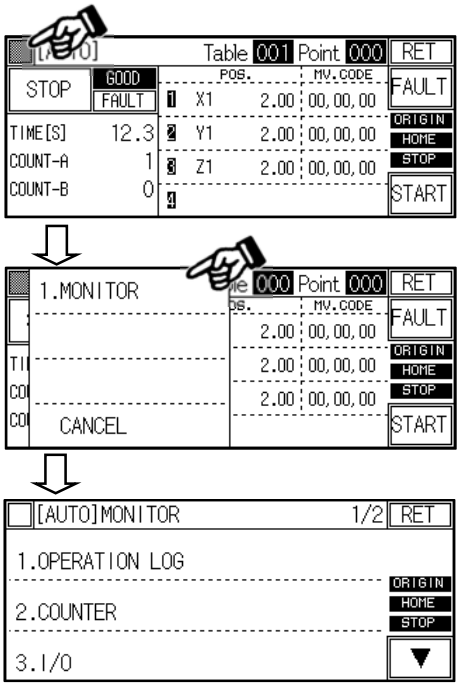


①	Indicates whether a sub menu is provided or not. ・ ▣ indicator ⋯ Sub menu is provided. ・ □ indicator ⋯ No sub menu is provided.
②	Displays a screen name (mode), a table number and a point number currently selected. ・Pressing the "Table No." numeric field displays the table No. selection window, allowing you to change the table No. ・Pressing the "Point No." numeric field displays the point No. change window, allowing you to change the point No.
③	・Screen change Screens can be changed over with the RET 、 ▼ and ▲ switches. ・Status indication The machine status is indicated with the ORIGIN , HOME and STOP indicators. 1. Origin return complete/incomplete indicator ORIGIN : Origin return is not completed. ORIGIN : Origin return is completed. 2. Standby position indicator HOME : The machine is not at the standby position. HOME : The machine is at the standby position. 3. Servo operation indicator MOVE : Servo is in operation. STOP : Servo is not in operation. ・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

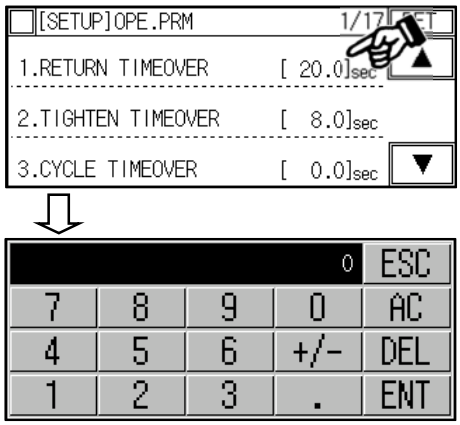
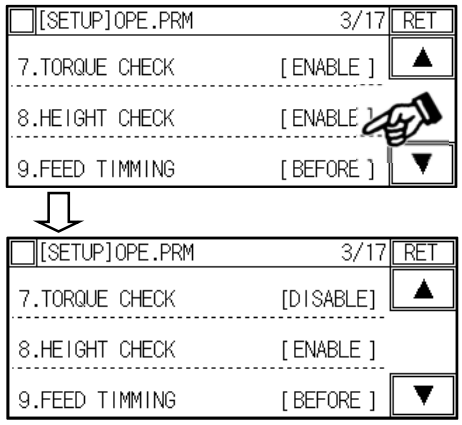
Change over the screen, conduct the following A to D steps:

A	If you press the RET switch, the screen changes to the upper hierarchical layer. Furthermore, screen change is enabled by pressing some switches on the [AUTO] screen (FAULT switch, etc.)	
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

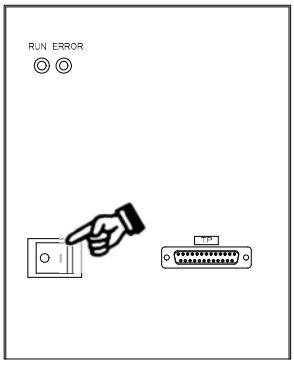
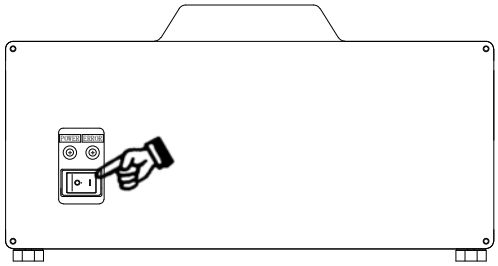
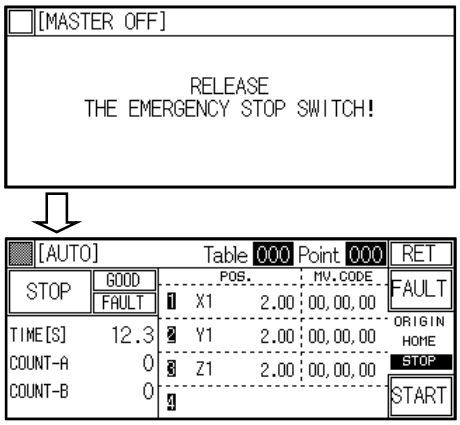
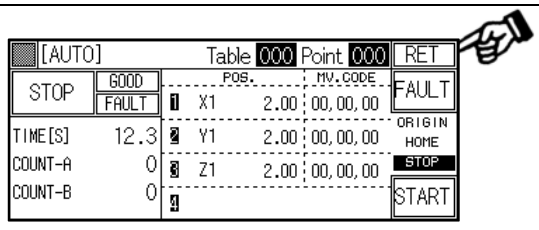
Set value registration procedure is described below.

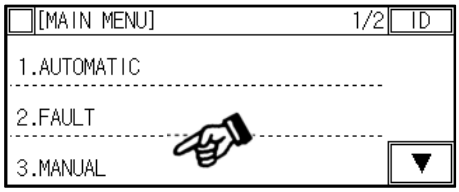
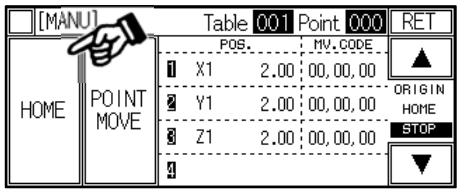
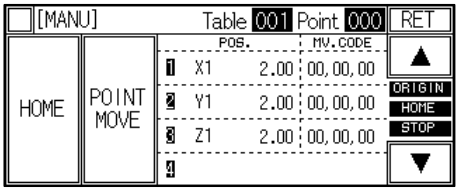
A	A value in [ ] (brackets) can be changed. ・[When a numerical value is displayed in [ ] (brackets), touching the filed in [ ] displays numeric keys, enabling you to change the value. ・When a character string is displayed in [ ] (brackets), touching the filed in [ ] changes the character string.	・Numerical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

6.2.2 Origin return

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

Origin return operation can be executed with the external input signal. However, this section describes the origin 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.	RC75 serice  RC755 serice 
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 AUTO mode appears.	
3	Press the RET switch. Note) The origin return operation with the START Switch of AUTO screen is possible, too.	

	Operating procedure	Display/Status
4	Press 3.MANUAL . The operation mode changes to the MANUAL mode.	
5	Press the HOME switch.	
6	The unit will return to the origin.	
7	After the origin return operation is completed, the ORIGIN status indicator at the center right of the screen is highlighted.	

(Note)

Unless the machine is located at the home position, automatic operation is disabled.

Before starting automatic operation, return the machine to the home position, unless it is not at the home position.

For manual operations and teaching operations involving servo motor operations, it is necessary that the machine should be returned to the home position first.

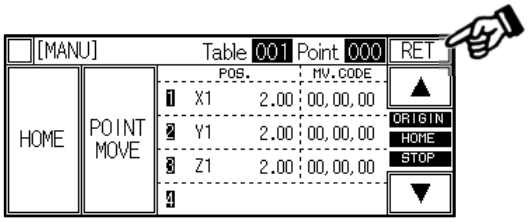
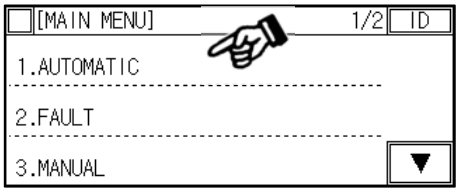
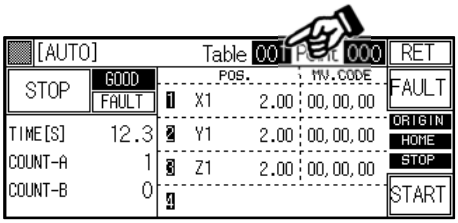
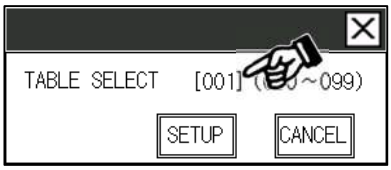
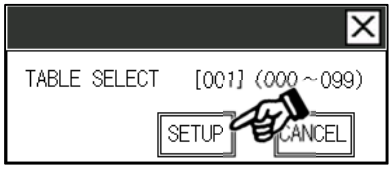
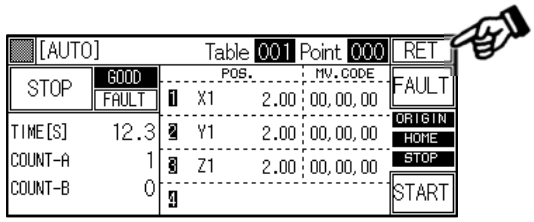
(Otherwise, teaching may be applied in the condition where the machine is offset from the home position.)

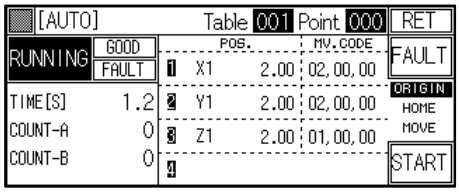
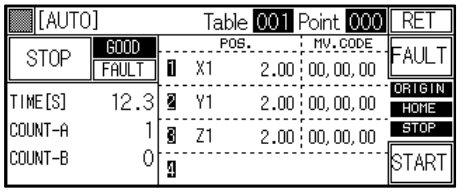
6.2.3 Automatic cycle operation

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

To execute automatic cycle operation, the following procedure is required. The following description is based on the assumption that teaching and parameter setup required for automatic cycle operation have been conducted and the machine has completed the origin return operation.

- Change to the AUTO mode (Figure below, Steps 1～2)
- Operation point No. selection (Figure below, Steps 3～5)
- Automatic cycle operation start (Figure below, Steps 6～8)

	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press 1.AUTOMATIC . The operation mode changes to the AUTO mode.	
3	Press the displayed numeric (TableNo.) at the top of the screen.	
4	Press the area in [ ] (brackets) for [TABLE SELECT] in the displayed window, Enter a Table No. used for the automatic cycle operation by using the displayed numeric keys, and press ENT .	
5	Press the SETUP swith in the displayed window.	
6	Press the START switch.	

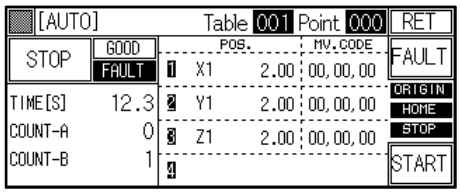
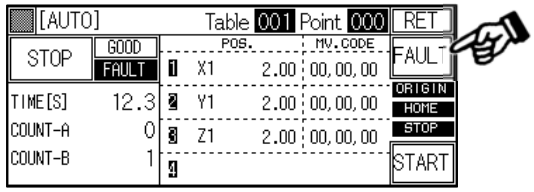
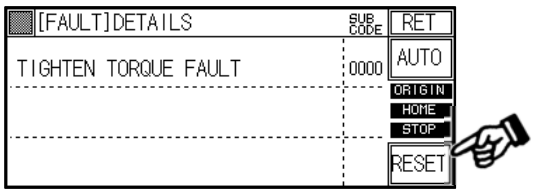
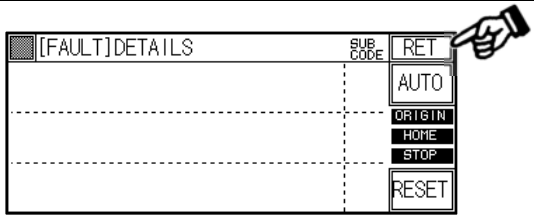
	Operating procedure	Display/Status
7	The unit starts automatic cycle operation.	
8	After the automatic cycle is completed, a judgment result is displayed in the bottom line.	

Subsequently, automatic cycle operation can be executed by repeating Steps 6 to 8.

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.	
2	Press the FAULT switch. The screen changes to the FAULT screen.	
3	Identify the fault condition, and press the RESET switch at the right bottom of the screen.	
4	Press the AUTO switch.	

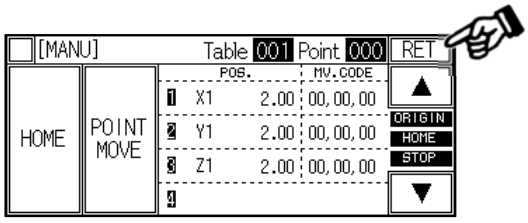
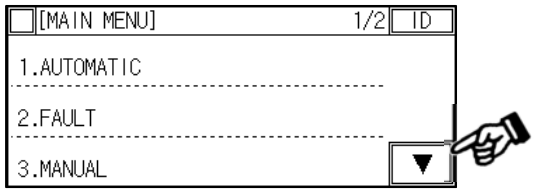
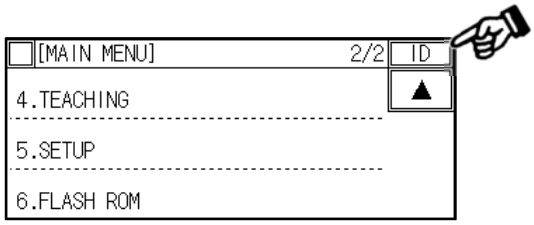
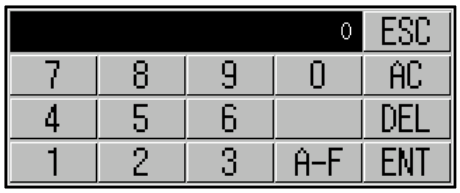
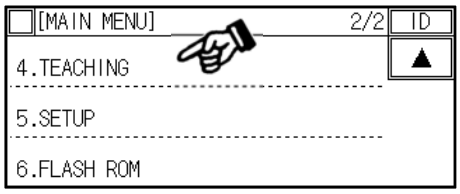
6.2.5 Setting the servo free

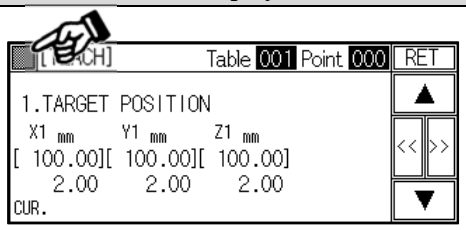
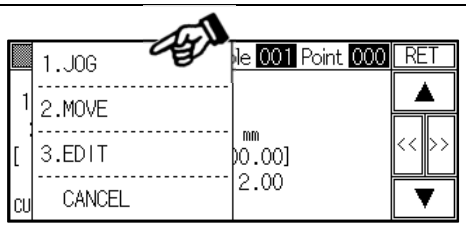
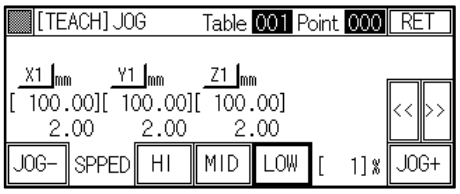
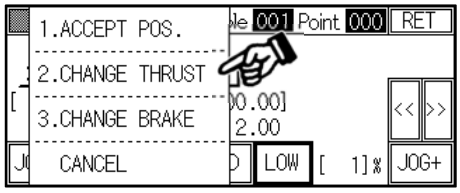
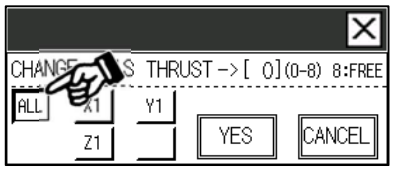
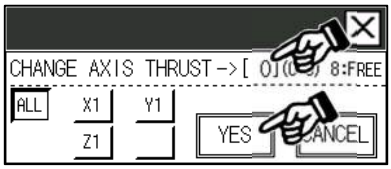
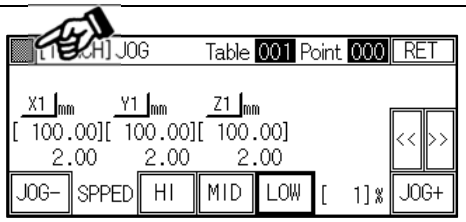
If you set the servo free, it is useful for tightening tool centering operation and driver bit replacement.

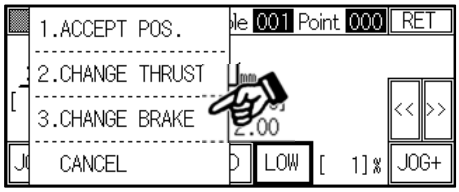
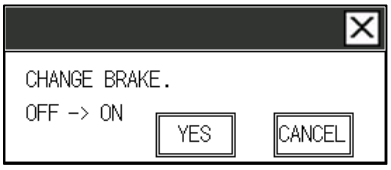
To set the servo free, the following procedure is required. The following description is based on the assumption that the machine has completed the origin return operation.

When the servo is free, the tightening tool may fall under its own weight.

During operation, keep your hand off the tightening tool.

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.TEACHING . The screen changes to the TEACH mode.	

	Operating procedure	Display/Status
6	Press the ▢ button at the left top of the screen.	
7	Press 1.JOG in the displayed window.	
8	Press ▢ at the upper left corner of the screen.	
9	Press 2.CHANGE THRUST in the displayed window.	
10	Select an axis on which servo is set free in the displayed window. This setting is enabled for all axes, or for each axis.	
11	Make sure that the value in [ ] is "8", and press the YES switch. Pressing the value in [ ] displays the key window. 「0～7」: Servo ON status 「8」 : Servo OFF status **CAUTION)** **When the brake is released, the tightening tool may fall. Use thorough caution.**	
12	When the Z-axis servo is set free, the brake is activated. To deactivate the brake, press at the upper left of the screen again.	

	Operating procedure	Display/Status
13	Press 3.CHANGE BRAKE in the displayed window.	
14	To deactivate the brake, press the YES switch in the displayed window.	

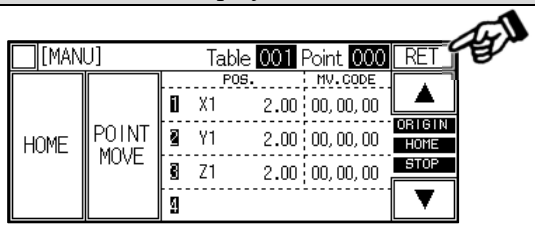
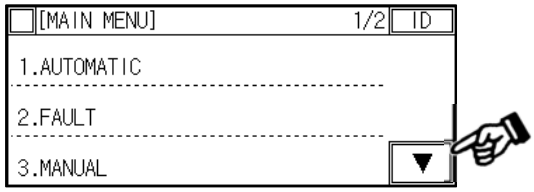
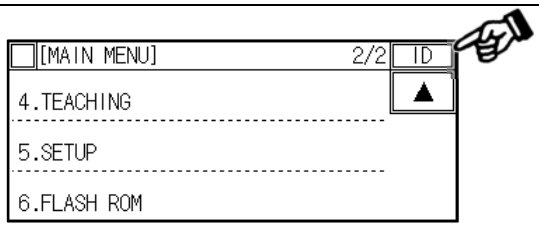
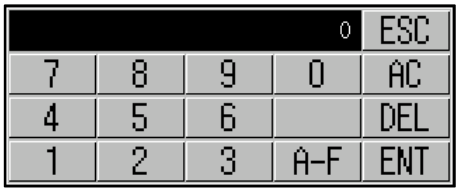
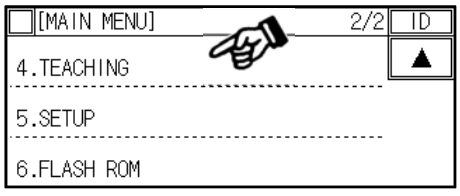
6.2.6 Teaching position change 1 (Direct teaching)

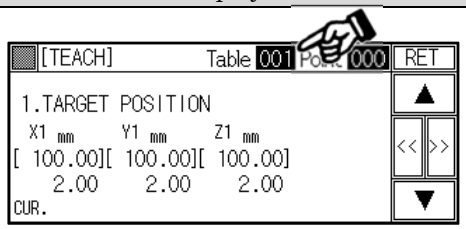
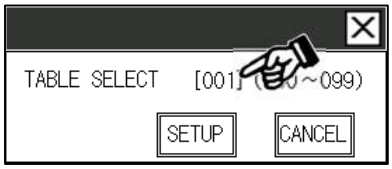
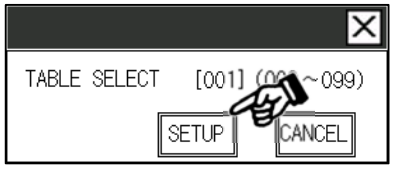
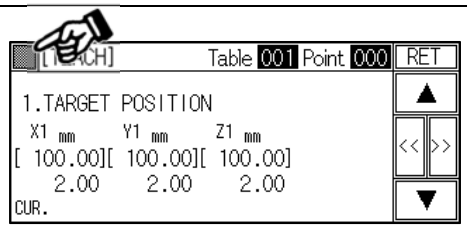
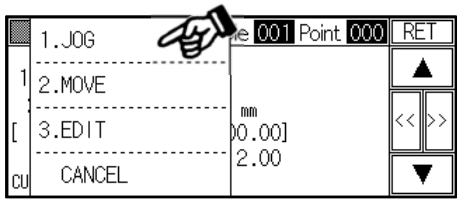
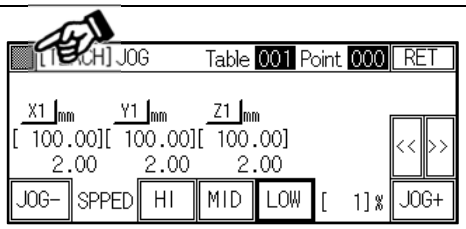
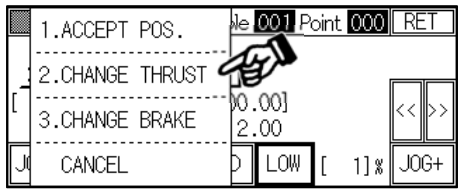
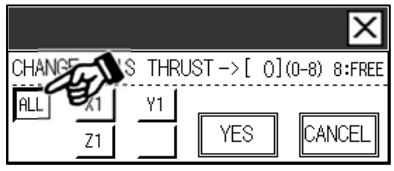
To execute fine thrust control, or to make judgment of screw loose fitting based on an up/down axis coordinate value, teaching of a tightening position is required. "Tightening position" means a position at which the driver bit is properly fit in a screw that has been normally tightened and sufficient thrust is applied to the screw.

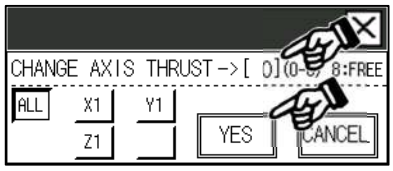
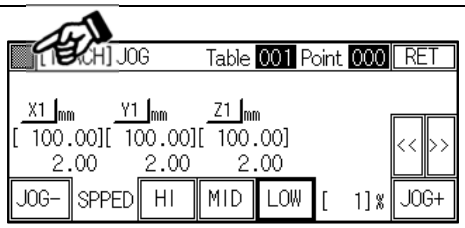
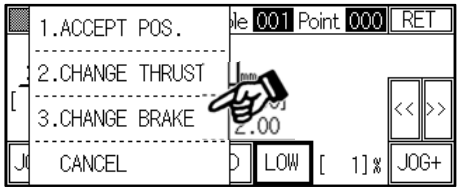
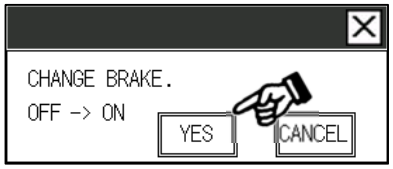
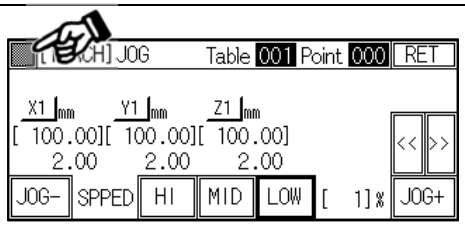
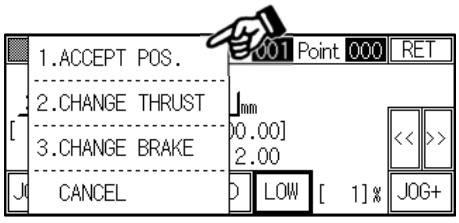
"Direct teaching" is the teaching method to register a tightening position by moving the axis directly with an operator's hand, after the servo and the brake are turned OFF.

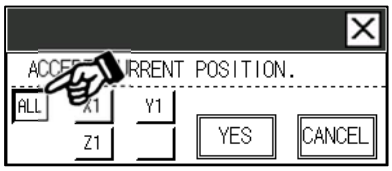
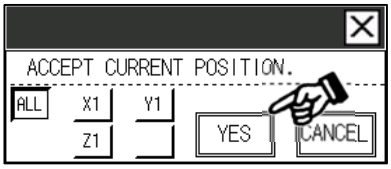
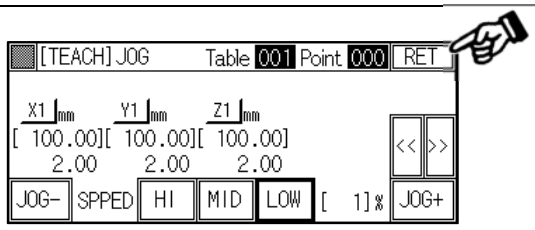
To change a tightening position through direct teaching, the following procedure is required. The following description is based on the assumption that settings required for the operation have been conducted and the machine has completed origin return operation.

- Change to the teaching mode (Figure below, Steps 1～5)
- Teaching point No. selection (Figure below, Steps 6～8)
- Servo free (Figure below, Steps 9～17)
- Position registration (Figure below, Steps 18～23) ← Repeating the number of tightening

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.TEACHING . The screen changes to the TEACH mode.	

	Operating procedure	Display/Status
6	Press the displayed numeric (TableNo.) at the top of the screen.	
7	Press the area in [ ] (brackets) for [TABLE SELECT] in the displayed window, Enter a Table No. used for the automatic cycle operation by using the displayed numeric keys, and press ENT .	
8	Press the SETUP swith in the displayed window.	
9	Press the ▣ button at the left top of the screen.	
10	Press 1.JOG in the displayed window.	
11	Press ▣ at the upper left corner of the screen.	
12	Press 2.CHANGE THRUST in the displayed window.	
13	Select an axis on which servo is set free in the displayed window. This setting is enabled for all axes, or for each axis.	

	Operating procedure	Display/Status
14	Make sure that the value in [ ] is "8", and press the YES switch. Pressing the value in [ ] displays the key window. 「0～7」: Servo ON status 「8」 : Servo OFF status **CAUTION)** **When the brake is released, the tightening tool may fall. Use thorough caution.**	
15	When the Z-axis servo is set free, the brake is activated. To deactivate the brake, press ▢ at the upper left of the screen again.	
16	Press 3.CHANGE BRAKE in the displayed window.	
17	o deactivate the brake, press the YES witch in the displayed window.	
18	Move the tightening tool to a tightening position while holding the axis by hand.	
19	If position registration is acceptable, press ▢ at the upper left of the screen.	
20	Press 1.ACCEPT POS. in the displayed window.	

	Operating procedure	Display/Status
21	Select an axis subject to current position registration in the displayed window. This setting is enabled for all axes, or for each axis.	
22	After selection of the axis subject to current position registration, press the YES switch. Now, the tightening position registration is enabled.	
23	Press the >> switch to increment the point No. by "1". Several tightening points can be registered per table. The machine 1-cycle operation continues until all registered points are completed.	

To change data, execute flash ROM writing operation.

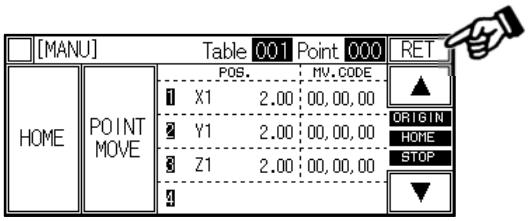
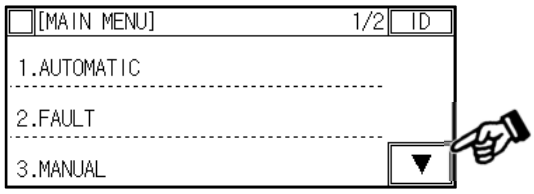
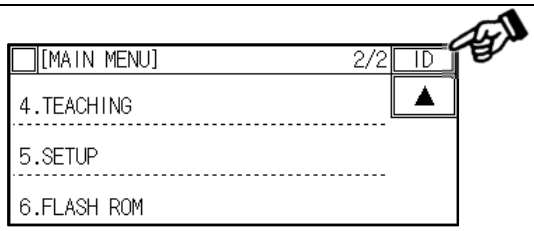
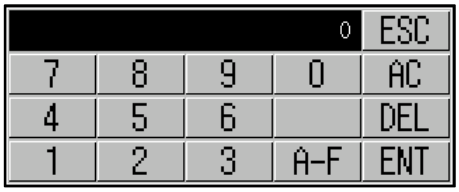
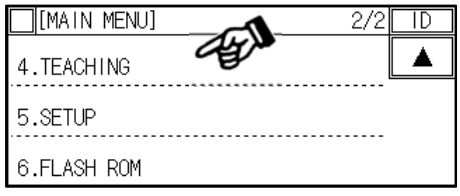
6.2.7 Tightening position change 2 (Remote teaching)

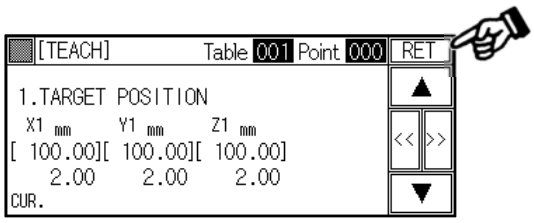
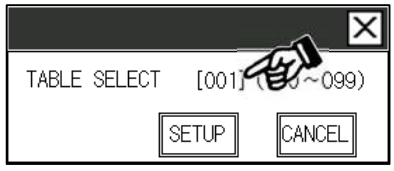
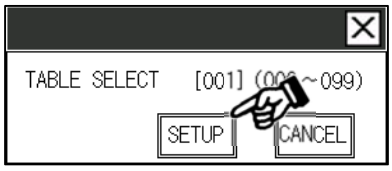
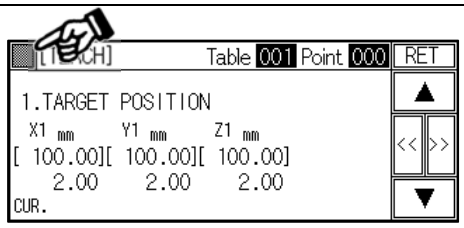
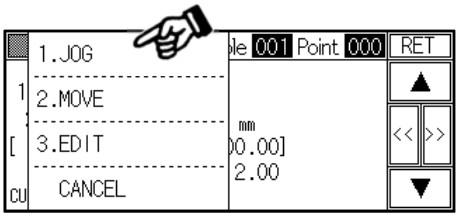
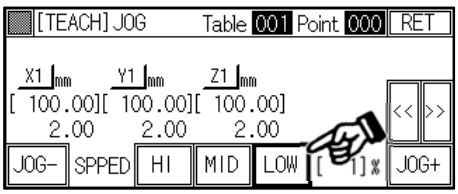
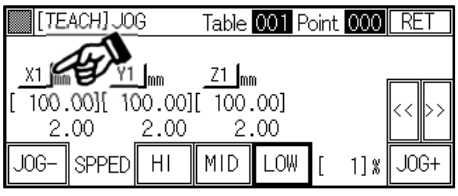
To execute fine thrust control, or to make judgment of screw loose fitting based on an up/down axis coordinate value, teaching of a tightening position is required. "Tightening position" means a position at which the driver bit is properly fit in a screw that has been normally tightened and sufficient thrust is applied to the screw.

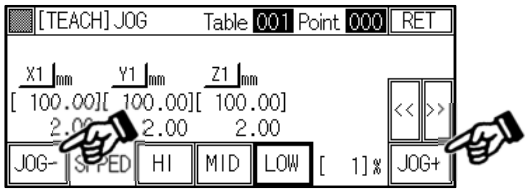
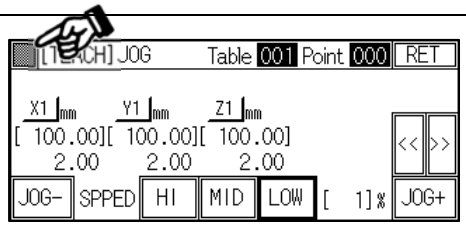
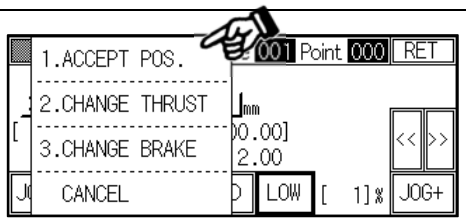
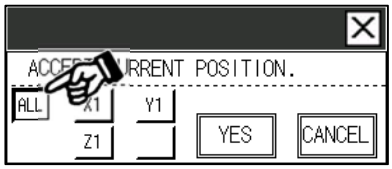
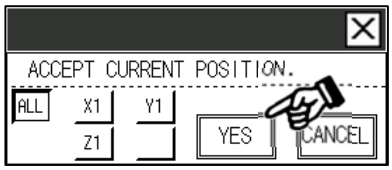
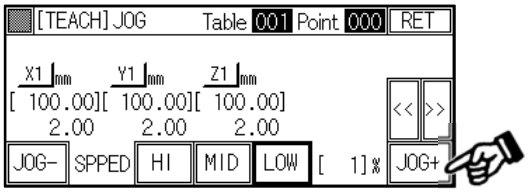
"Remote teaching" is the teaching method to register a tightening position by moving the robot through JOG operation.

To change a tightening position through remote teaching, the following procedure is required. The following description is based on the assumption that settings required for the operation have been executed and the machine has completed origin return operation.

- Change to the teaching mode (Figure below, Steps 1～5)
- Teaching point No. selection (Figure below, Steps 6～8)
- JOG operation (Figure below, Steps 9～14) ← Repeating the number of tightening
- Position registration (Figure below, Steps 15～19) ← Repeating the number of tightening

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.TEACHING . The screen changes to the TEACH mode.	

	Operating procedure	Display/Status
6	Press the displayed numeric (TableNo.) at the top of the screen.	
7	Press the area in [ ] (brackets) for [TABLE SELECT] in the displayed window, Enter a Table No. used for the automatic cycle operation by using the displayed numeric keys, and press ENT .	
8	Press the SETUP swith in the displayed window.	
9	Press the ▣ button at the left top of the screen.	
10	Press 1.JOG in the displayed window.	
11	Select a JOG moving speed. ・ HI High speed: 10% (initial setting) ・ MID Middle speed: 5% (initial setting) ・ LOW Low speed: 1% (initial setting) (Each speed setting can be changed with the parameter.) The JOG speed can be changed to a desired value by directly changing the value in [ ] (brackets).	
12	Select an axis subject to JOG operation. Press an axis name to be selected.	

	Operating procedure	Display/Status
13	You can execute JOG operation by pressing the JOG+ or JOG- switch and the deadman switch simultaneously. With one push of these switches, the axis moves by 0.02 mm. While you keep these switches pressed, the up/down axis continuously moves. The JOG motion stops at the stroke end, even if you keep these switches pressed.	
14	Move the tightening tool to a tightening position through JOG operation.	
15	If position registration is acceptable, press ■ at the upper left of the screen.	
16	Press 1.ACCEPT POS. in the displayed window.	
17	Select an axis subject to current position registration in the displayed window. This setting is enabled for all axes, or for each axis.	
18	After selection of the axis subject to current position registration, press the YES switch. Now, the tightening position registration is enabled.	
19	Press the >> switch to increment the point No. by "1". Several tightening points can be registered per table. The machine 1-cycle operation continues until all registered points are completed.	

To change data, execute flash ROM writing operation.

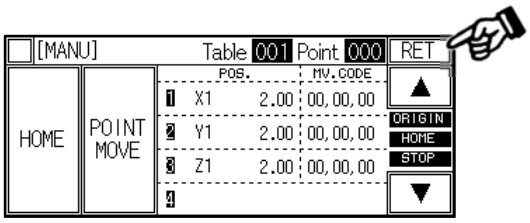
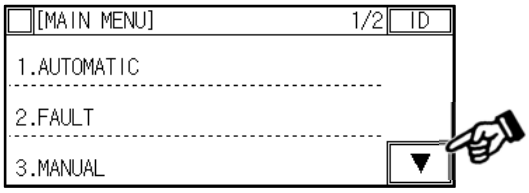
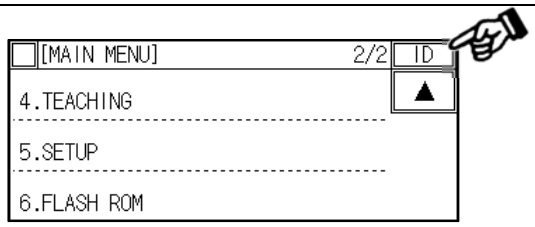
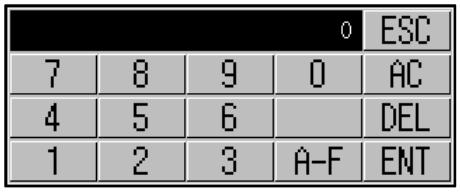
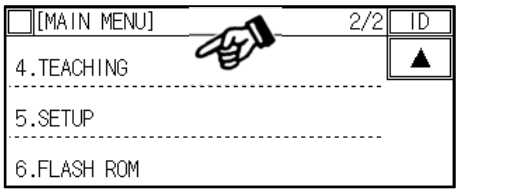
6.2.8 Tightening position change 3 (MDI teaching)

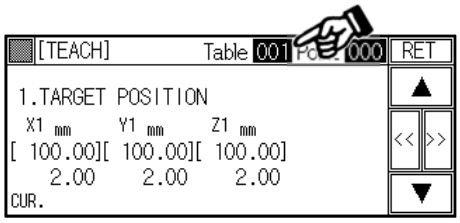
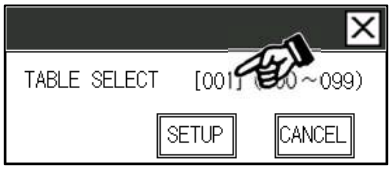
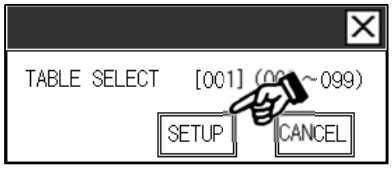
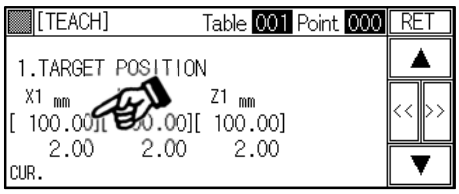
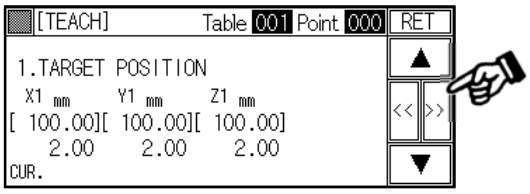
To execute fine thrust control, or to make judgment of screw loose fitting based on an up/down axis coordinate value, teaching of a tightening position is required. "Tightening position" means a position at which the driver bit is properly fit in a screw that has been normally tightened and sufficient thrust is applied to the screw.

"MDI teaching" is the teaching method to register a tightening position through numerical input with numeric keys.

To change a tightening position through MDI teaching, the following procedure is required. The following description is based on the assumption that settings required for the operation have been executed and the machine has completed origin return operation.

- Change to the teaching mode (Figure below, Steps 1～5)
- Teaching point No. selection (Figure below, Steps 6～8)
- MID operation (Figure below, Steps 9～10) ← Repeating the number of tightening

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 4.TEACHING . The screen changes to the TEACH mode.	

	Operating procedure	Display/Status
6	Press the displayed numeric (TableNo.) at the top of the screen.	
7	Press the area in [ ] (brackets) for [TABLE SELECT] in the displayed window, Enter a Table No. used for the automatic cycle operation by using the displayed numeric keys, and press ENT .	
8	Press the SETUP swith in the displayed window.	
9	Press the value in [ ] for the target position. Directly enter a coordinate value with the displayed numeric keys, and press ENT .	
10	Press the >> switch to increment the point No. by "1". Several tightening points can be registered per table. The machine 1-cycle operation continues until all registered points are completed.	

6.2.9 Changing a screw parameter

Through fine thrust control, the machine enables optimum tightening operations. A screw parameter defines setting values required for tightening operations under optimum thrust control. With the tightening operation instruction code "No. 0" (standard setting), the machine executes 2-stage tightening operations (temporary tightening → final tightening) according to a screw parameter by loading up/down axis position coordinates, moving speed and thrust information registered in the screw parameter.

Ten patterns of screw parameters are available. Select a parameter number to be used for each point.

To set up a screw parameter, setup of a screw parameter No. to be used, and detailed setup of each screw parameter are required. The following description is based on the assumption that screw parameter No. 0 is used, and the machine has completed origin return operation.

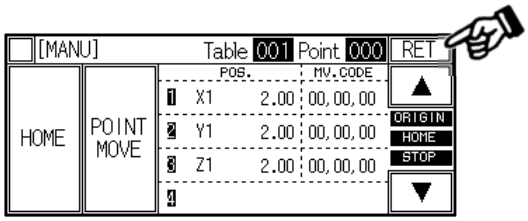
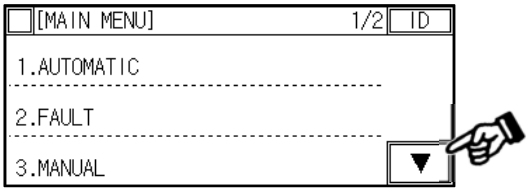
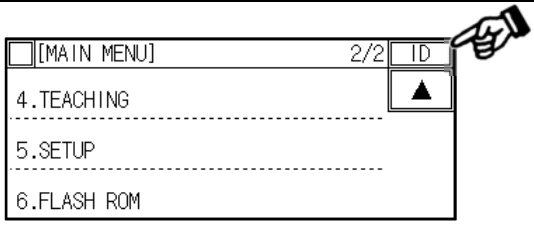
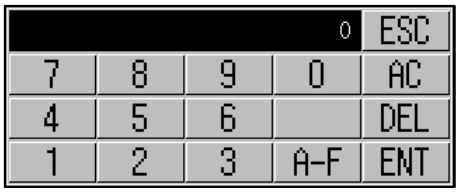
[Procedure 1] Selecting a screw parameter No. for each point

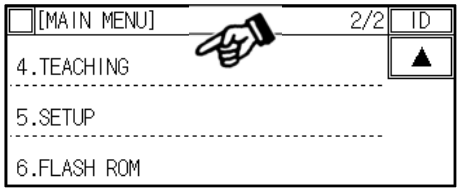
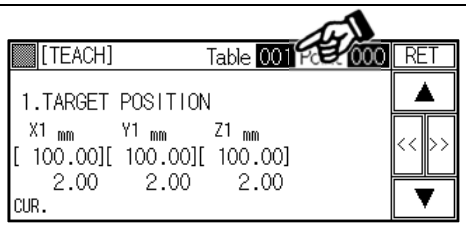
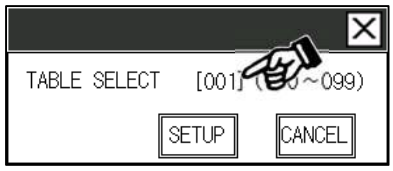
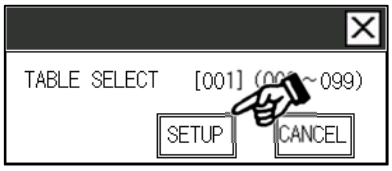
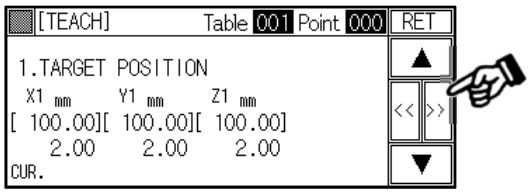
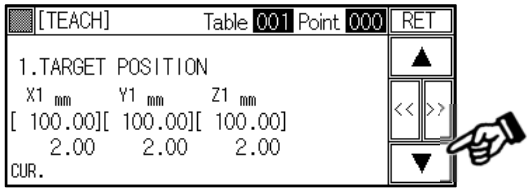
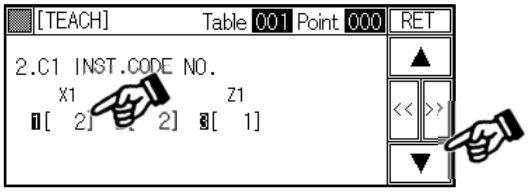
- Change to the TEACH mode (Figure below, Steps 1～5)
- Teaching model No. selection (Figure below, Steps 6～8)
- Parameter No. registration for a screw being used (Figure below, Steps 9～16) ← Repeating the number of tightening

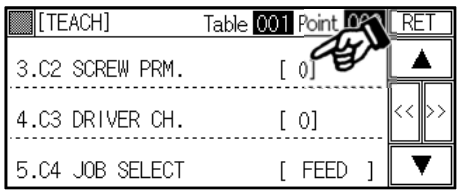
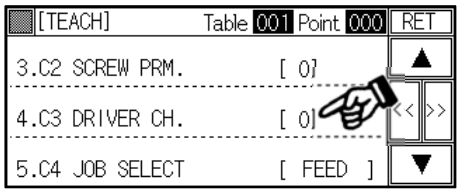
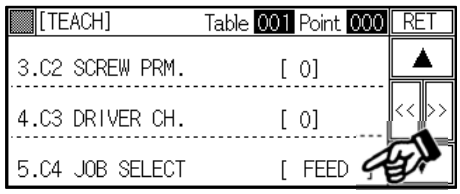
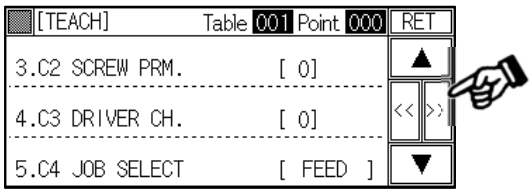
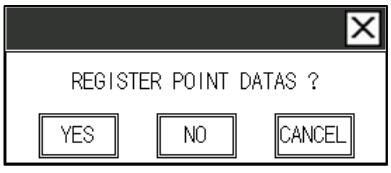
[Procedure 2] Detailed setting of a screw parameter No. for a screw being used

- Change to the SETUP mode (Figure below, Steps 1～5)
- Screw parameter No. selection (Figure below, Steps 6～8)
- Registration of screw parameter detailed information change (Figure below, Steps 9～12)

[Procedure 1] Selecting a screw parameter No. for each point

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	

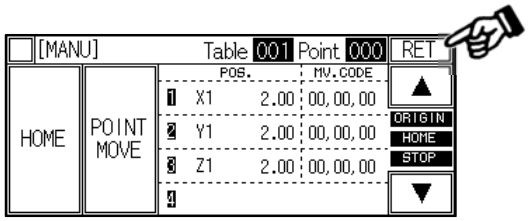
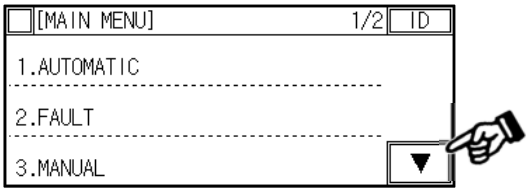
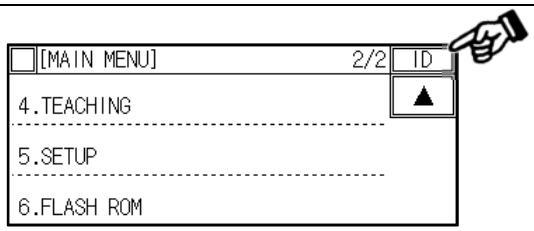
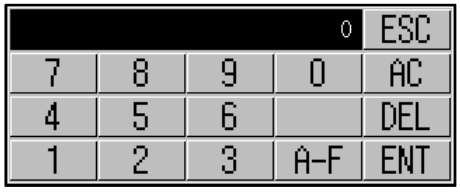
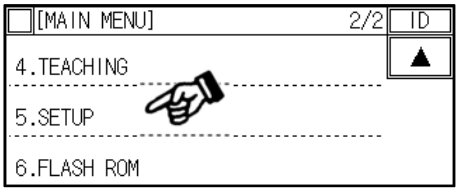
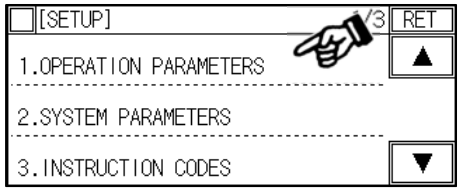
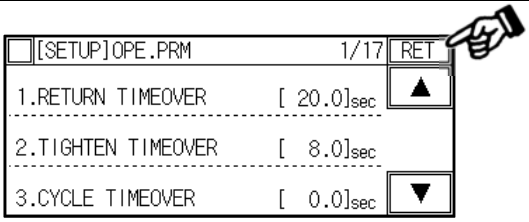
	Operating procedure	Display/Status
5	Press 4.TEACHING . The screen changes to the TEACH mode.	
6	Press the displayed numeric (TableNo.) at the top of the screen.	
7	Press the area in [ ] (brackets) for [TABLE SELECT] in the displayed window, Enter a Table No. used for the automatic cycle operation by using the displayed numeric keys, and press ENT .	
8	Press the SETUP swith in the displayed window.	
9	Select a target tightening point No. with the << or >> switch. Also, pressing the "Point No." numerical display field at the top of the screen enables point No. selection.	
10	Press the ▼ switch.	
11	Set an instruction code according to the screw parameter settings. Press the number in [ ], and enter a set value for 2.C1 INST.CODE NO. Details of instruction codes are described in Section 13. After input, press the ▼ switch to go to the next item selection screen.	

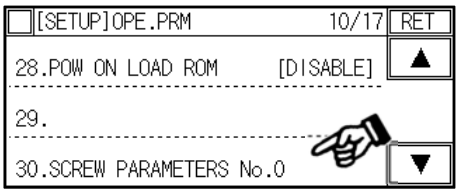
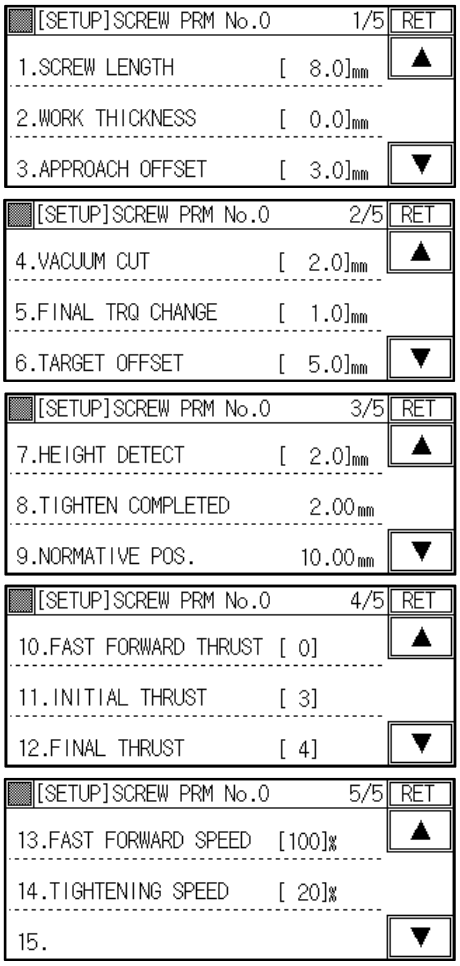
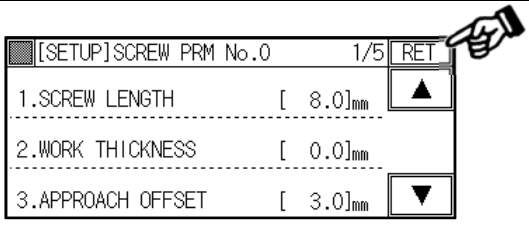
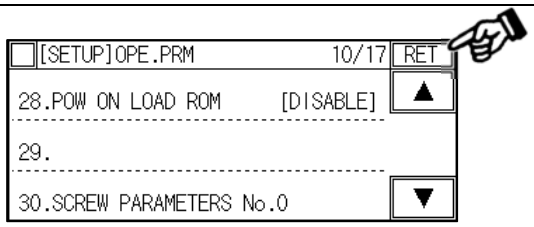
	Operating procedure	Display/Status
12	Press the number in [ ], and enter a set value for 3.C2 SCREW PRM. .	
13	Set a CH according to the screw parameter settings. Press the number in [ ], and enter a set value for 4.C3 DRIVER CH. .	
14	Select a tightening mode according to the screw parameter settings. Press the character string in [ ], and select a set value for 4. C3 DRIVER CH. . Every time the character strings in [ ] is pressed, the displayed tightening mode will be changed as follows: FEED : Tightening operation with screw feed enabled RETIGHT : Tightening operation with screw feed disabled PICKUP : Tightening operation with screw pickup enabled PASS : No point move END : Table end (Judged to be cycle end point)	
15	After registration of all set values, press the RET switch, or press the << or >> switch to change the point.	
16	Press the YES switch in the displayed window. If there is no data change, this registration window will not appear. **Press the YES switch to complete registration procedure.**	

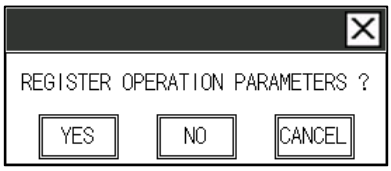
Repeat the above steps 9 through 16, to register all necessary tightening points.

To change data, execute flash ROM writing operation.

[Procedure 2] Detailed setting of a screw parameter No. for a screw being used

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 5.SETUP . The screen changes to the SETUP mode.	
6	Press 1.OPERATION PARAMETERS . The screen changes to the OPERATION PARAMETER SETUP mode.	
7	Press the ▼ switch to show OPE. PRM "10/17".	

	Operating procedure	Display/Status
8	Press 30.SCREW PARAMETERS No.0 The screen changes to the No. 0 screw parameter setup screen. To set up Nos. 1 to 9 screw parameters, press the ▼ switch to change the screen, and select each screw parameter No.	
9	If you press the area in [ ] (brackets) for a setting item to be changed, numeric keys are displayed, enabling you to change the set value. The screen can be changed with the ▼ or ▲ switch. For description on a set value of each screw parameter, refer to "SETUP mode".	
10	Press the RET switch.	
11	Press the RET switch.	

	Operating procedure	Display/Status
12	Press YES in the displayed window.	

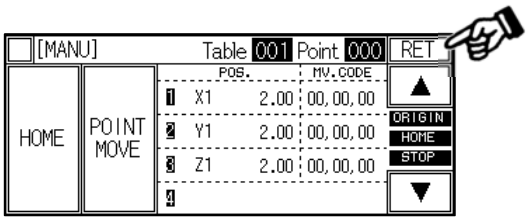
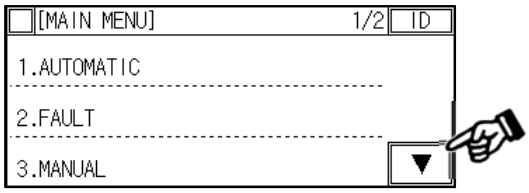
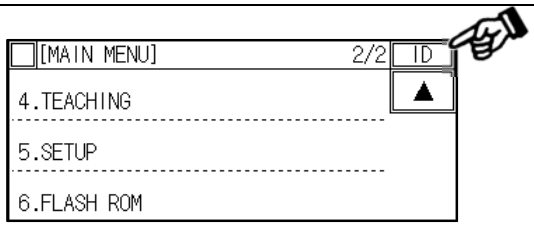
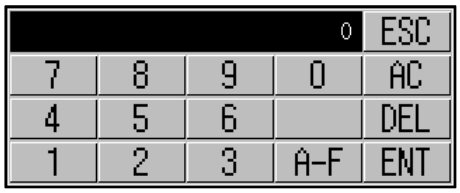
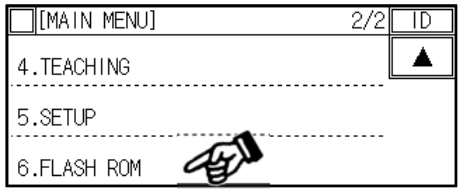
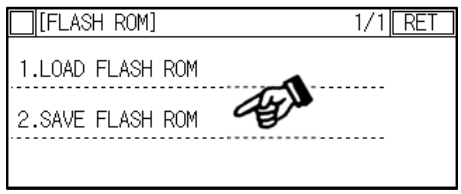
To change data, execute flash ROM writing operation.

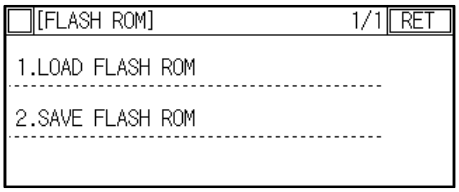
6.2.10 Writing into flash ROM

Registered data is stored in the battery backup area of the controller's internal PLC. However, if the PLC battery voltage drops, data stored in the battery backup area will be lost. Flash ROM writing operation is intended to transfer data from the battery backup area into the flash ROM area. Once data are written in the flash ROM, the data will not be lost even if the PLC battery voltage drops.

After you change a parameter setting or teaching position, be sure to register the data into the flash ROM.

The following procedure should be conducted on the main menu screen.

	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 2 or higher authorized level is required.	
4	Enter the password for LEVEL 2 or higher authorized level with the displayed numeric keys, and press ENT switch.	
5	Press 6.FLASH ROM	
6	Press 2.SAVE FLASH ROM	

	Operating procedure	Display/Status
7	Press YES in the displayed window. Set data are written into the flash ROM, and stored.	
8	The message window closes, and the saving procedure is completed.	

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.

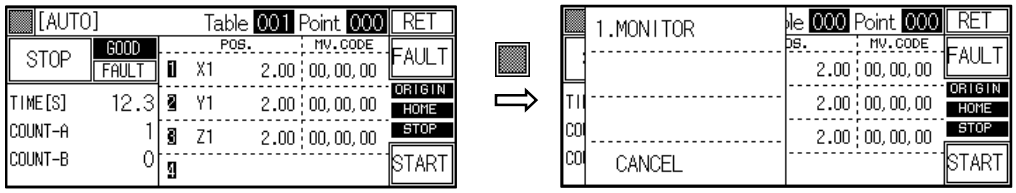
[Major functions]

- Automatic cycle start
- Table (Model) selecting function
- Monitor functions
  - Running operation log
  - Counter setup
  - PLC I/Omonitor
  - Point of infomation
  - Point recode status
  - Operation parameters

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]

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.
TIME [S]	Automatic 1-cycle operation time (Real time during operation)
COUNT-A	Displays a COUNT-A total value. * 5.SETUP → 1.OPERATION PARAMETERS → 16.COUNT-A
COUNT-B	Displays a COUNT-B total value. * 5.SETUP → 1.OPERATION PARAMETERS → 17.COUNT-B
POS	Displays an axis name and the current coordinate.
MOV. CODE	Displays instruction code operation status. AA - BB - CC AA : Instruction code No. BB : Step No. in instruction code CC : Step No. in operation code processing
FAULT	Changes to the FAULT screen.
START	HOME Lit … Executes automatic cycle operation. HOME Unlit … Executes return operation.

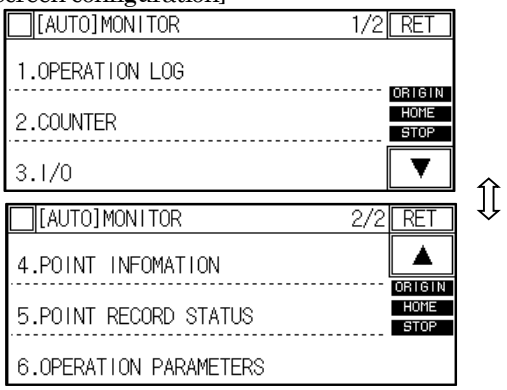
[Description on sub menu]

1.MONITOR	The screen changes to the Monitor menu.
CANCEL	Closes sub menu display window.

7.3 Monitor screen

You can monitor information on automatic operation, such as tightening operation indicator and counter display/setup.

[Screen configuration]



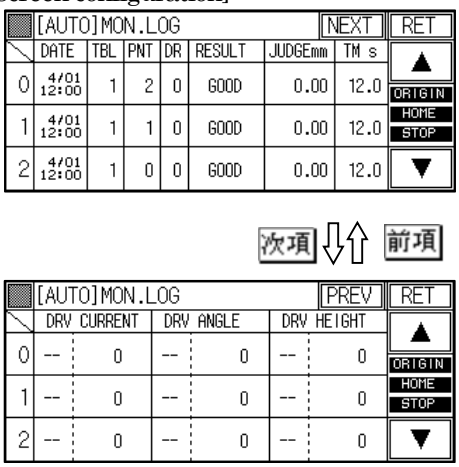
[Description on screen]

1.OPERATION LOG	Changes to the Operation log screen.
2.COUNTER	Changes to the Counter display screen.
3.I/O	Changes to the I/O monitor screen.
4.POINT INFOMATION	Changes to the Point information display screen.
5.POINT RECORD STATUS	5.SETUP → 2.SYSTEM PARAMETERS → 2.PROGRAM CONFIG Displays the current table No., point No., number of tables that can be registered, and number of points that can be registered per table, according to the set value of "number of tables that can be registered".
6.OPERATION PARAMETERS	Changes to the Operation parameter information display screen.

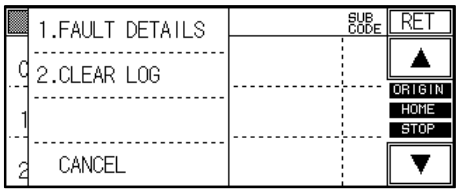
7.3.1 Operation log monitor

You can monitor automatic cycle logs for up to 100 events.

[Screen configuration]



・Sub menu screen

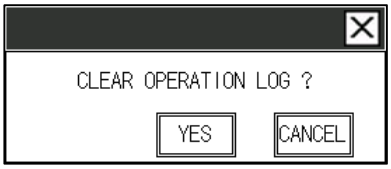


[Description on screen]

Log display	DATE	Displays date/time of automatic cycle end in the format of "MM/DD HH:MM".
	TBL	Displays a table number under operation.
	PNT	Displays a point number under operation.
	DR	Displays an operating driver CH.
	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 ・PICKUP : Screw pick-up fault (optional) ・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 : (Not used)
	JUDGE mm	Displays a screw loose fitting judgment value ([mm]) at completion of tightening. This value is used as a screw loose fitting judgment value. The screw loose fitting judgment value is calculated with the following equation: Screw loose fitting judgment value = Up/down axis coordinate value at completion of tightening − Teaching position
	TM s	Displays an automatic cycle operation time ([sec]).

Log display	DRV CURRENT	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 ANGLE	Displays history only when the SD550 communication function (option) is used. Driver angle judgment result and angle judgment value are displayed.
	DRV HEIGHT	Displays history only when the SD550 communication function (option) is used. Driver's screw tightening height (loose fitting) judgment result and judgment value are displayed.
	LOG (Left side value)	Log Nos. 0 to 99 are displayed.
▲ ▼		Scrolls the screen. (Log Nos. 0 to 99)
NEXT PREV		Changes a line displayed.

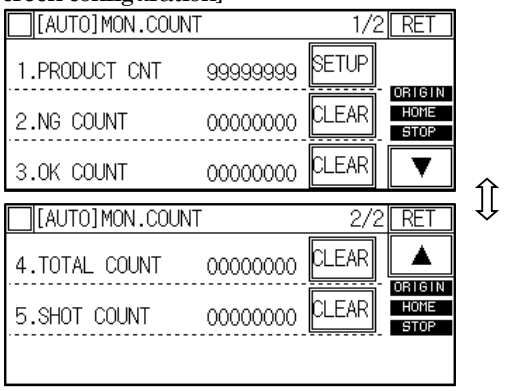
[Description on sub menu]

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

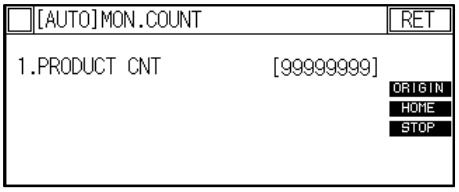
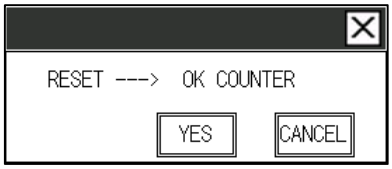
7.3.2 Counter monitor

You can monitor and clear the counters.

[Screen configuration]



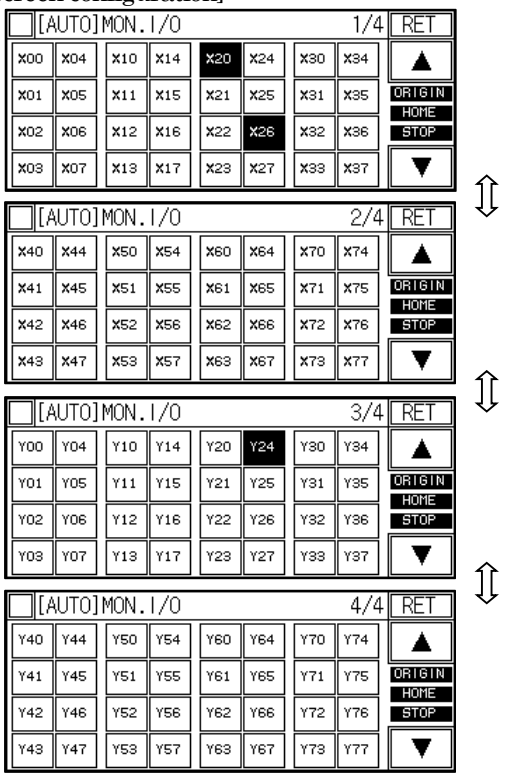
[Description on screen]

1.PRODUCT CNT	Target production count. At completion of the machine cycle, the count will decrease. If the next cycle is started when the remaining production count is "0", the **"Production Complete"** alarm is output. When the production count is set at "99999999", the above function is disabled.
2.NG COUNT	This counter counts at completion of a cycle **with** a tightening fault.
3.OK COUNT	This counter counts at completion of a cycle **without** a tightening fault.
4.TOTAL COUNT	This counter counts at completion of all cycles.
5.SHOT COUNT	This counter counts at start of tightening (AUTO mode only). The count value serves as reference for bit replacement timing.
SETUP	Pressing the SETUP witch changes the display to the production count input screen, allowing you to enter a target production count. Pressing the number in [ ] displays numeric keys, allowing input. 
CLEAR	Pressing the CLEAR switch displays the counter clear confirmation window. If you select YES, the count value will be reset to "0". 

7.3.3 I/O monitor

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

[Screen configuration]



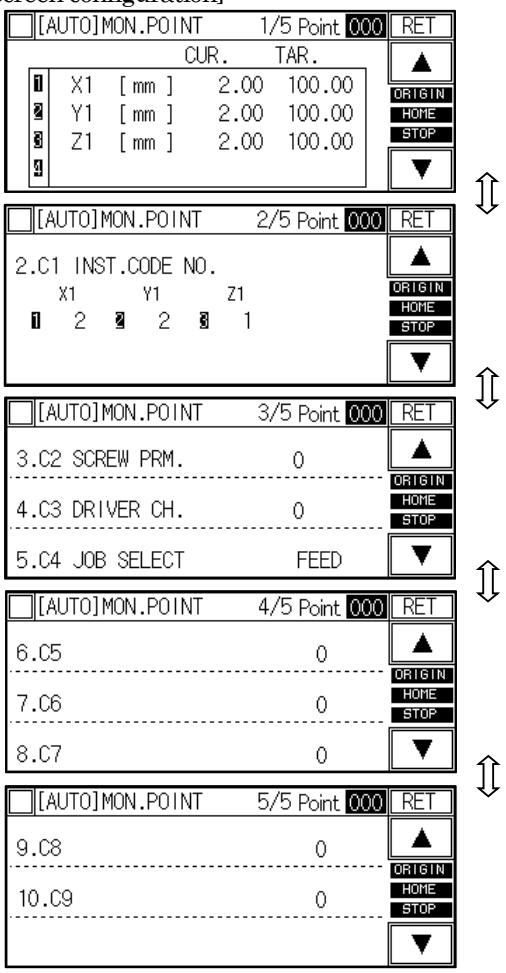
[Description on screen]

X**	Displays status of 64 inputs (X00 to X77 standard inputs). X00 : OFF X00 : ON
Y**	Displays status of 64 outputs (Y00 to Y77 standard outputs). Y00 : OFF Y00 : ON

7.3.4 Point information monitor

This screen allows you to monitor the parameter information (specified in teaching) on the currently selected point No.

[Screen configuration]



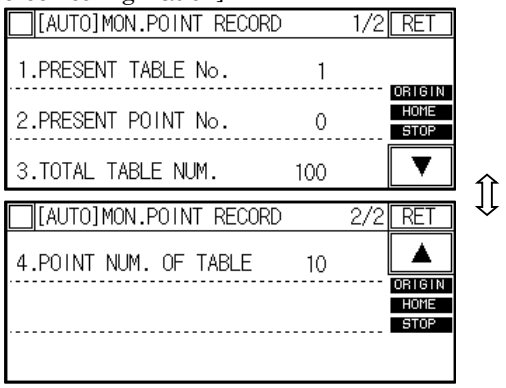
[Description on screen]

Point and parameters information display	Displays point and parameters information on a currently selected point No.

7.3.5 Point record status monitor

This screen allows you to monitor the current table No., point No., number of tables that can be registered, and number of points that can be registered per table, according to the set value of "TOTAL TABLE NUM." of the system parameter settings.

[Screen configuration]



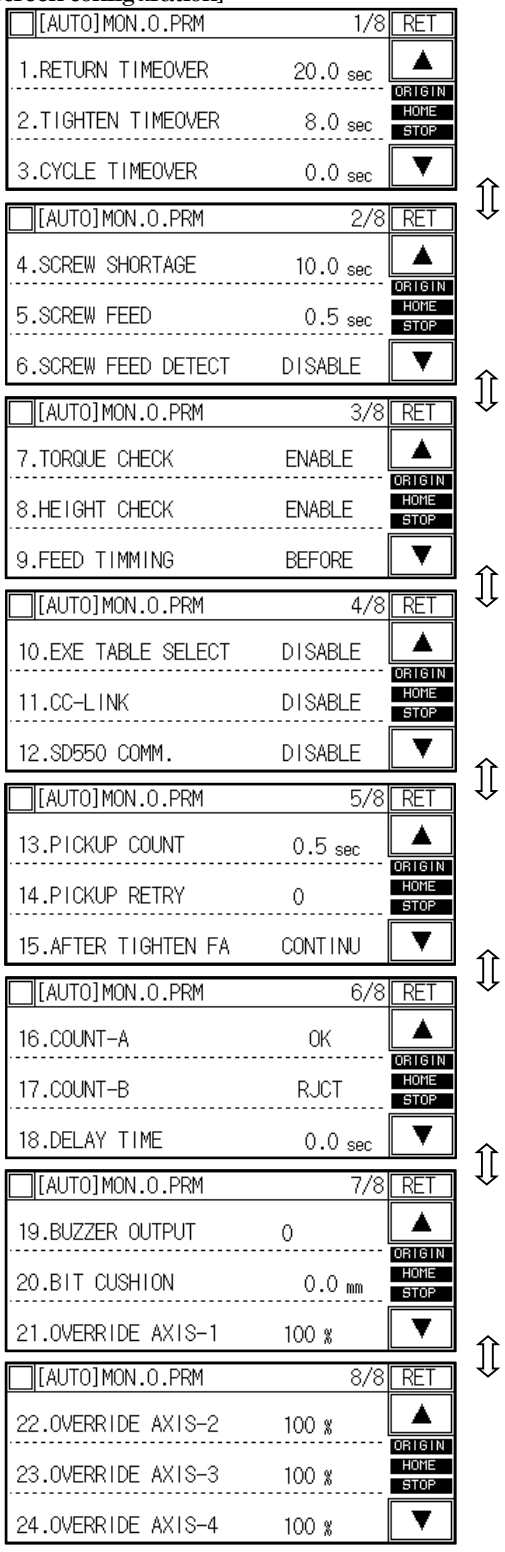
[Description on screen]

1.PRESENT TABLE No.	Currently selected table number is displayed.
2.PRESENT POINT No.	Currently selected point number is displayed.
3.TOTAL TABLE NUM.	Total number of tables that can be registered
4.POINT NUM. OF TABLE	display the total number of points that I can register in one table.

7.3.6 Operation parameter information monitor

You can monitor a part of operation parameter setup information (parameter Nos. 0 to 24).

[Screen configuration]



Note)
Operation parameter information setup should be conducted in the SETUP mode.

[Description on screen]

SETUP parameter information display	Displays setup parameter information.

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	
(WARNING 15)	M815	
(WARNING 16)	M816	
(WARNING 17)	M817	
(WARNING 18)	M818	
(WARNING 19)	M819	
LOW SCREW	M820	When the "Screw shortage" input ON duration exceeds the time specified in the "Screw shortage" operation parameter, this fault is output. When the "Screw shortage" input is turned OFF, this fault will be automatically reset.
(WARNING 21)	M821	
(WARNING 22)	M822	
(WARNING 23)	M823	
(WARNING 24)	M824	
(WARNING 25)	M825	
(WARNING 26)	M826	
(WARNING 27)	M827	
(WARNING 28)	M828	
(WARNING 29)	M829	
(WARNING 30)	M830	
(WARNING 31)	M831	

8.3 Running fault

At occurrence of a fault, the touch panel backlight color turns pink. The machine operation conforms to the tightening fault processing mode (continue, interrupt, or selection)*1. During occurrence of a fault, automatic operation cannot be started.

*1 Operation parameter setting items. Details are described in Section 11.3

[Running fault list]

Name of fault	Memory	Description
(RUNNING FAULT 1)	M832	
(RUNNING FAULT 2)	M833	
(RUNNING FAULT 3)	M834	
(RUNNING FAULT 4)	M835	
(RUNNING FAULT 5)	M836	
(RUNNING FAULT 6)	M837	
(RUNNING FAULT 7)	M838	
(RUNNING FAULT 8)	M839	
(RUNNING FAULT 9)	M840	
(RUNNING FAULT 10)	M841	
(RUNNING FAULT 11)	M842	
(RUNNING FAULT 12)	M843	
(RUNNING FAULT 13)	M844	
(RUNNING FAULT 14)	M845	
(RUNNING FAULT 15)	M846	
(RUNNING FAULT 16)	M847	
ANGLE FAULT	M848	Used for SD550 communication (option). When the SD550 function's angle judgment result is NG, this fault occurs. Fault judgment is enabled when the operation parameter setting item 12.SD550 COMM. is set to [ENABLE].
(RUNNING FAULT 18)	M849	
TIGHTEN TORQUE FAULT	M850	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 2.TIGHTEN TIMEOVER set value of the operation parameter.
SCREW HEIGHT FAULT	M851	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 21)	M852	

Name of fault	Memory	Description
BEFORE TIGHTEN FAULT	M853	Optional judgment function If large thrust is detected before the up/down shaft moves To a screw tightening start position, this fault is output. This function is effective for detection of a fault when a screw is re-tightened after it is tightened once, or when a screw is not fit in the tightening hole.
TIGHTEN FORWARD FAULT	M854	Optional judgment function If the up/down shaft speed falls below a specified value after he up/down shaft moves to a screw tightening start osition, this fault is output. This function is effective for detection of a fault when tightening is executed without a screw.
SCREW FEED FAULT	M855	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 6.SCREW FEED DETECT is set to [DISABLE] , this fault will not be detected.
SCREW PICKUP FAULT	M856	When screw removing operation is not normally completed, this fault occurs. Screw removal judgment procedure depends on specifications of each machine.
(RUNNING FAULT 26)	M857	
(RUNNING FAULT 27)	M858	
(RUNNING FAULT 28)	M859	
(RUNNING FAULT 29)	M860	
(RUNNING FAULT 30)	M861	
(RUNNING FAULT 31)	M862	
PRODUCTION OMPLETED!	M863	AUTO mode sub menu 1.MONITOR → 2.COUNTER Production count value is "0". If production count is "1" or more, the fault output is not activated. If production count is set at "99999999", the count will not decrease, disabling production completion output.

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]

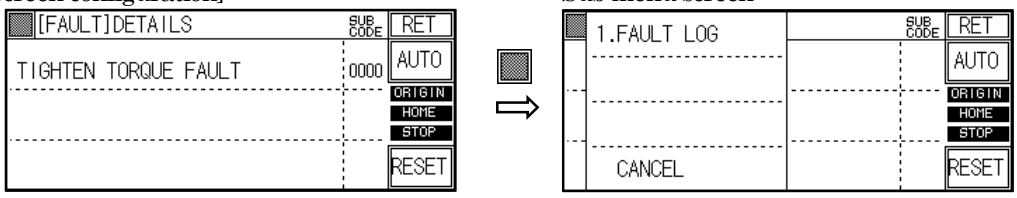
Name of fault	Memory	Description
(SYSTEM FAULT 1)	M864	
(SYSTEM FAULT 2)	M865	
RETURN TIMEOVER	M866	When a return operation time exceeds the 1.RETURN TIMEOVER set value of the operation parameter, this fault is indicated.
CYCLE TIMEOVER	M867	When a 1-cycle operation time exceeds the 3.CYCLE TIMEOVER set value of the operation parameter, this fault is indicated.
DRIVER COMM. FAULT	M868	If a communication error occurs when the SD550 communication function (option) is used, this fault is output.
DRIVER ROTATION FAULT	M869	If driver's rotation cannot be confirmed at start of tightening, it is judged to be fault.
DRIVER UP/DOWN FAULT	M870	If the up/down axis lowering completion cannot be confirmed after tightening command is issued, it is judged to be fault.
AXIS1 SERVO AMP FAULT	M871	When AXIS 1 servo amplifier system alarm output is detected, it is indicated as fault. After ensuring safety, turn OFF the controller power supply, and then turn it ON again. For details, refer to the servo amplifier operation manual.
AXIS2 SERVO AMP FAULT	M872	When AXIS 2 servo amplifier system alarm output is detected, it is indicated as fault. After ensuring safety, turn OFF the controller power supply, and then turn it ON again. For details, refer to the servo amplifier operation manual.
AXIS3 SERVO AMP FAULT	M873	When AXIS 3 servo amplifier system alarm output is detected, it is indicated as fault. After ensuring safety, turn OFF the controller power supply, and then turn it ON again. For details, refer to the servo amplifier operation manual.
AXIS4 SERVO AMP FAULT	M874	When AXIS 4 servo amplifier system alarm output is detected, it is indicated as fault. After ensuring safety, turn OFF the controller power supply, and then turn it ON again. For details, refer to the servo amplifier operation manual.
Si-servo COMM. FAULT	M875	When a communication error occurs with servo type [SI] selection, the fault signal is output.
AREA SENSOR FAULT	M876	Area sensor (option) operation error.
(SYSTEM FAULT 14)	M877	
SCREW PARAMETER VALUE F	M878	If screw parameters have not been set at start of tightening, it is judged to be fault.
(SYSTEM FAULT 16)	M879	
CC-LINK COMM	M880	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.

Name of fault	Memory	Description
CC-LINK SETUP	M881	If the current setting is not normal when the CC-Linkfunction (option) is used, this fault is output.
(SYSTEM FAULT 19)	M882	
AXIS CONFIG FAULT	M883	The axis No. that has been set on the hardware can be freely changed with the software. If multiple axis selection occurs due to a setting error, it is indicated as fault.
AXIS1 SOFT LIMIT FAULT	M884	If the current position of AXIS 1 exceeds the movable range that has been set in the system parameter setting item [3.AXIS PARAMETERS] → [1.1st-AXIS PARAMETERS] → [10.SOFT LMT+] [11.SOFT LMT-], it is indicated as fault.
AXIS2 SOFT LIMIT FAULT	M885	If the current position of AXIS 2 exceeds the movable range that has been set in the system parameter setting item [3. AXIS PARAMETERS] → [2.2nd-AXIS PARAMETERS] → [10.SOFT LMT+] [11.SOFT LMT-], it is indicated as fault.
AXIS3 SOFT LIMIT FAULT	M886	If the current position of AXIS 3 exceeds the movable range that has been set in the system parameter setting item [3. AXIS PARAMETERS] → [3.3rd-AXIS PARAMETERS] → [10.SOFT LMT+] [11.SOFT LMT-], it is indicated as fault.
AXIS4 SOFT LIMIT FAULT	M887	If the current position of AXIS 4 exceeds the movable range that has been set in the system parameter setting item [3. AXIS PARAMETERS] → [4.4th-AXIS PARAMETERS] → [10.SOFT LMT+] [11.SOFT LMT-], it is indicated as fault.
(SYSTEM FAULT 25)	M888	
(SYSTEM FAULT 26)	M889	
(SYSTEM FAULT 27)	M890	
DRIVER ALARM	M891	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 operation 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 29)	M892	
(SYSTEM FAULT 30)	M893	
(SYSTEM FAULT 31)	M894	
(SYSTEM FAULT 32)	M895	

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.
AUTO	Changes to the AUTO mode main screen.
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.

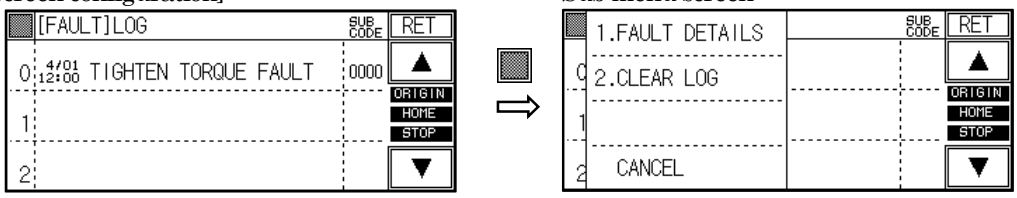
[Description on sub menu]

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 100 fault logs.

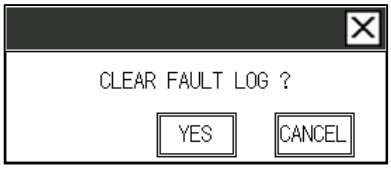
[Screen configuration]



[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. 0 to 99)

[Description on sub menu]

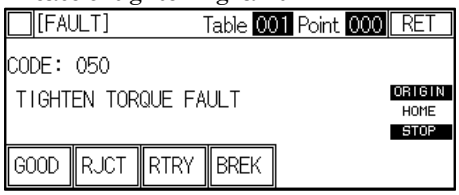
1.FAULT DETAILS	Changes to the fault details screen.
2.CLEAR LOG	Clears log data. To clear log data, press YES . 
CANCEL	Closes sub menu display window.

8.7 Operation of tightening fault (choice mode) screen

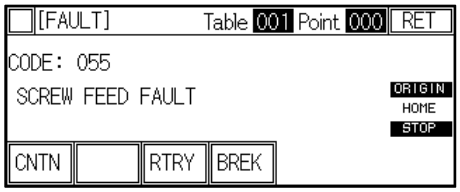
When [CHOICE] is set in the operation parameter setting item 15.AFTER TIGHTEN FAIL , the fault processing mode can be selected to cope with a tightening fault or screw feed fault (cycle stop fault). The current operation cycle is paused until selection of the fault processing is made.

[Screen configuration]

・In case of tightening fault



・In case of screw feed fault



[Description on screen]

GOOD or CNTN	Used to select the next operation with the operation selection switch and reset the error. Select this item to handle the tightening work at the position subject to fault judgment as OK to proceed to the next process.
RJCT	Used to select the next operation with the operation selection switch and reset the error. Select this item to handle the tightening work at the position subject to fault judgment as NG to proceed to the next process. In case of screw feed fault, this item cannot be selected.
RTRY	Used to select the next operation with the operation selection switch and reset the error. Select this item to retry tightening at the position subject to fault judgment. (In case where the operation can be conducted after clearing screw feed fault or operator's manual correction, etc.)
BREK	Used to select the next operation with the operation selection switch and reset the error. Select this item to interrupt tightening work to quit the current cycle.

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, teaching must be completed in the TEACH mode, and proper setup must be completed in the SETUP mode.

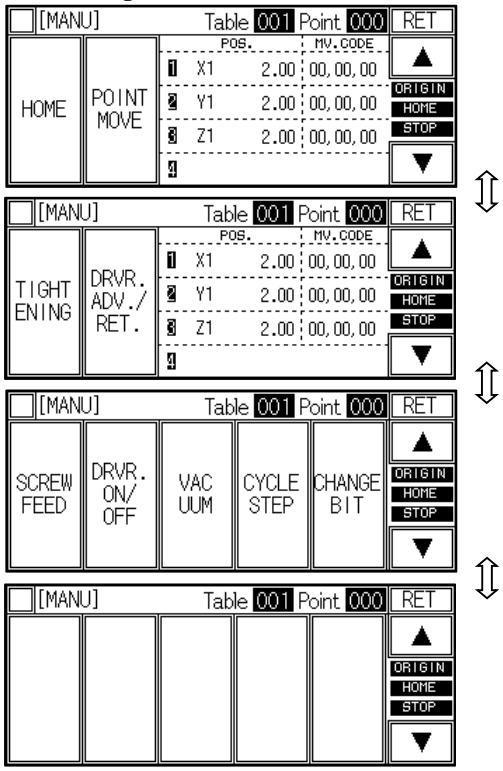
[Major functions]

- Machine origin return (Standby position move)
- Change point move
- Tightening operation
- Driver forward/return operation
- Screw feed operation
- Driver rotating operation
- Vacuum operation
- Table No. selection operation
- Cycle step operation
- Bit change operation

9.2 Manual screen

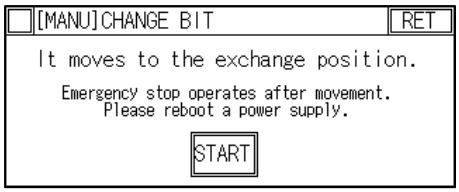
You can execute various manual operations.

[Screen configuration]



[Description on screen]

HOME	This switch is used to return the machine to the home position (standby position).
POINT MOVE	When several tightening points have been set in the currently selected table, the machine moves to the next tightening point. When the tightening tool is at the down position, point move is disabled. **An axis other than up/down axis (5.UP/DOWN AXIS 1 6.UP/DOWN AXIS2 in the system parameter setting item 1.AXIS CONFIG) can be moved.**
TIGHTENING	This switch is used to execute tightening operation. The machine operates according to the current point setting (instruction code, etc.).
DRVR. ADV./RET.	This switch is used to execute driver up/down (tightening tool forward/return) operation. The up/down axis moves between an overhead position and teaching position for each point.
SCREW FEED	This switch is used to start the screw feeder. When the tightening tool is in the down stroke, screw feed is disabled.
DRVR. ON/OFF	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.
CYCLE STEP	This switch is used to executes semi-automatic operation with the current model. [CYCLE STEP] button operation wait time is provided between cycles. This function is effective in operation check after teaching. (Example) Cycle step → Point move → Cycle step→ Tightening tool down → Cycle step → Tightening tool up → Cycle step → Point move
CHANGE BIT	This switch is used to moves the bit to the bit replacement coordinate that has been registered in instruction code No. 14. Pressing this switch displays the bit replacement confirmation screen. To execute bit replacement, press START . 

10. TEACH Mode of the Pendant

This chapter describes teaching functions.

Teaching operation moves the machine servo axes to arbitrary position. Erroneous operation may result in fault of the machine depending on machine configuration. For operation, read this controller manual carefully, and understand the controller and peripheral equipment handling procedures thoroughly.

CAUTION

The teaching mode can be accessed only by entering a password for LEVEL 2 or higher authorized level.

POINT

To execute JOG operations, it is necessary to operate the deadman switch and the operation switch on the touch panel simultaneously, in order to ensure safety.

10.1 Outline of functions

10.1.1 Teaching method

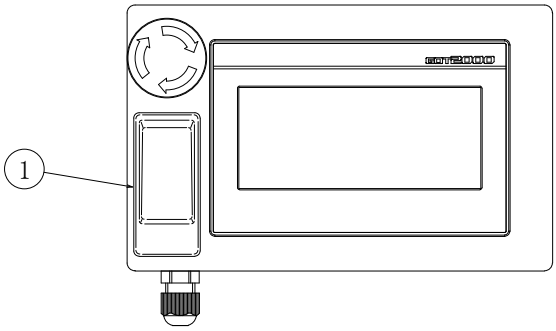
This system provides the "teaching function" to execute teaching of tightening position coordinates. Features of this function are described below.

The system provides the following teaching modes: "Manual data input (MDI) teaching", "Remote teaching" and "Direct teaching". For auxiliary operations of these teaching modes, "JOG" operations are enabled.

- "Manual data input (MDI) teaching" is the method to execute teaching through numeric input using the numeric keypad.
- "Remote teaching" is the method to execute teaching by moving the tightening unit up/down axis through JOG operations.
- "Direct teaching" is the method to execute teaching by moving the tightening unit up/down axis manually to a target point with the servo turned OFF.
- "JOG operations" are auxiliary operations to move the tightening unit up/down axis in teaching process.

Note1) During the above "JOG operations", it is necessary to operate the "deadman switch" located on the left side of the teaching pendant (see the figure below) and the operation switch on the touch panel simultaneously, in order to ensure safety.

Note2) Bit cushion with built-in tightning unit if the object at position,clamping state that bits cushions bend will always go the teaching would tightning complete position.
It may impact on the deviation clearing timing during ascent.



①	Deadman switch	3-poistion type deadman switch. When a hand is released from the switch, the switch is OFF. The switch turns ON when it is pushed by one stage, and then turns OFF when it is pushed by one more stage. To move each axis in the JOG mode during teaching operation, push the deadman switch to one stage to turn it ON.

10.1.2 Table/point management

One coordinate value can be registered per point. Also, by using the instruction code that can be set for each point, the controller enables complicated operations (e.g. pickup + tightening operation), instead of one point = one operation. Point operations are controlled by the table that defines a group of points per constant value. To execute one process with several points, operations at the relevant points in the table can be sequentially executed by specifying the table.

Information on up to 1000 points (1000 points per table) can be stored.

When the setting of system parameter setting item [2.PROGRAM CONFIGURATION] → [1.TABLE RECORD NUMBER] is [100], 10 points (=1000/100) will be assigned per table (Point Nos. 0 to 9). The total number of available tables can be changed in the range of 1 to 1000.

◎ Table・Point setting list (Example, Table record number : set value [100])

Table No.	Point No.	Internal point No.	Note
0	0	0	Standby point (With the standard specification, table No. is handled as fixed point.)
	1	1	Screw pickup point
	2	2	Bit change point
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
	8	8	
	9	9	
1	0	10	Tightening point 1
	1	11	Tightening point 2
	2	12	Tightening point 3
	3	13	End
	4	14	
	5	15	
	6	16	
	7	17	
	8	18	
	9	19	
99	0	990	
	1	991	
	2	992	
	3	993	
	4	994	
	5	995	
	6	996	
	7	997	
	8	998	
	9	999	

・To control the table change from an external device, specify a table No., and turn ON the cycle start signal. Through this procedure, tightening operations at point No. 0 through a point just before "C4 JOB SELECT" [END] point in the specified table will be executed. For example, when table No. 1 of the above table is specified and then the cycle start signal is turned ON, tightening operations at points Nos. 0 to 2 in table No. 1 will be executed.

・Use of a point handled as fixed point (e.g. table No. 0 standby position) shall be referred to with the instruction code.

◎ Setting of number of tables that can be registered by the standard machine model, and number of points assigned to a table

(Standard settings)

Model	System parameter	The number of the points per 1 table	Note
	Table record number		
SR395DT Type-1	100	10	
SR395DT Type-2	100	10	
SR395DT Type-3B,3D	100		
SR395DT Type-4	100	10	
SR375Y θ	100	10	
FM513VZ	1000	1	Single axis specification
FM520VZZ	1000	1	Single axis specification

Table connection function

With the standard setting of the number of tables that can be registered for multiple axis configuration, the number of points per table is 10 points, which cannot cope with tightening operations when the number of points is more than 10.

In this case, two or more tables can be connected to execute continuous operations, enabling tightening operations at points more than those assigned in one table. With the table connection function, the number of points can be increased for the table where the number of point operations exceeds the table point setting number only, enabling efficient point control.

◎Table connection procedure

- Set 8□□□ for point information "10.C9" of the final point in the target table.
  (This setting is invalid for any point other than the final point.)
- [8□□□] … The highest order digit "8" is the fixed value indicating table connection. Enter the connection target table No. in the first to third digits of "□□□".
- There is no limitation in the number of tables connected.
- To quit tightening work, execute point work selection [END]. Even if several tables are connected, priority is given the work completion command of point work selection [END].

Table No.	Point No.	Point job	Note
1	0	Tightening Point 1	
	1	Tightening Point 2	
	2	Tightening Point 3	
	3	Tightening Point 4	
	4	Tightening Point 5	
	5	Tightening Point 6	
	6	Tightening Point 7	
	7	Tightening Point 8	
	8	Tightening Point 9	
	9	Tightening Point 10	"10.C9" set value [8010]
10	0	Tightening Point 11	
	1	Tightening Point 12	
	2	Tightening Point 13	
	3	END	
	4		
	5		
	6		
	7		
	8		
	9		

10.1.3 Point infomation

For each point, you should register various settings required for automatic cycle operations, as well as coordinate values of tightening tool up/down axis tightening position, etc. By changing over the points with different settings, the machine can execute tightening operations suitable for target workpieces.

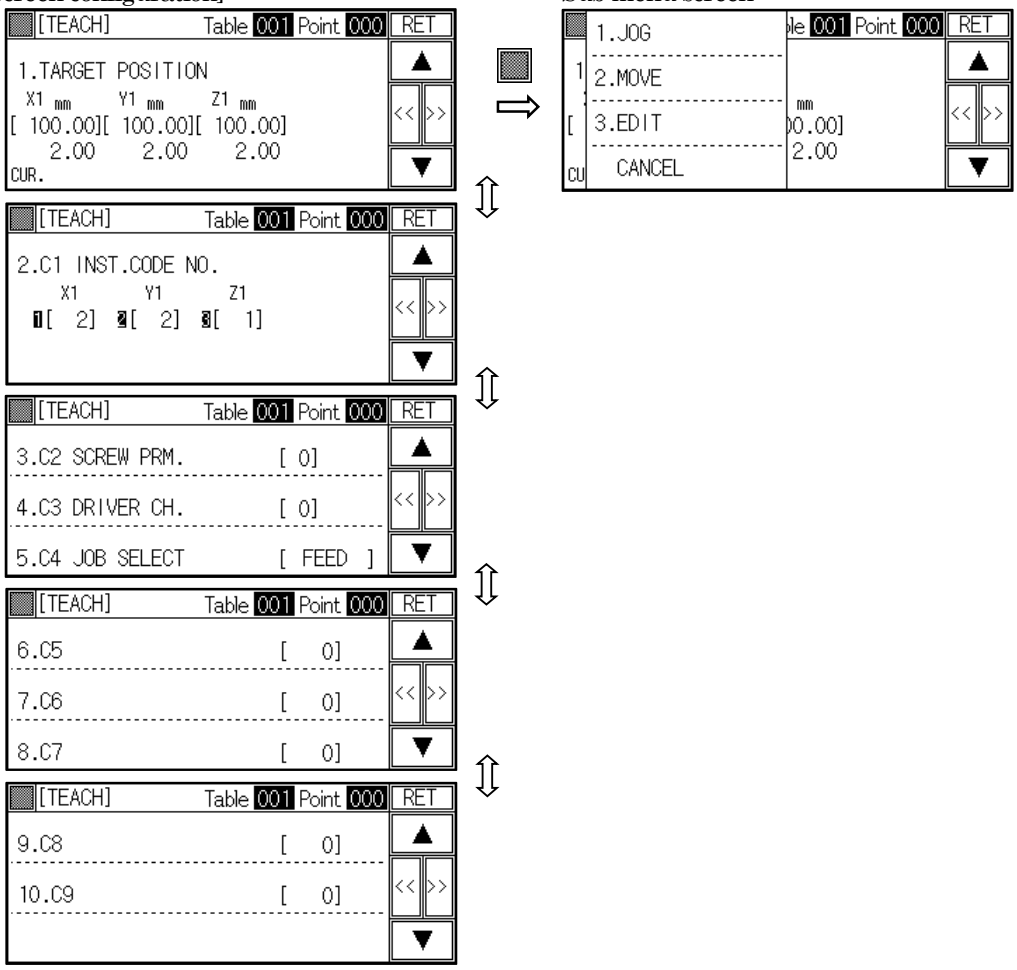
・List of set values (Information given in the following table can be set per point.)

Point infomation	Description
Position data	Target position (4 axis)
Information 1	Instruction code (4 axis)
Information 2	Screw parameter
Information 3	Driver CH.
Information 4	Job select
Information 5	(Spare)
Information 6	(Spare)
Information 7	(Spare)
Information 8	(Spare)
Information 9	(Spare) * For the final point in the table, this item is used for table connection setting.

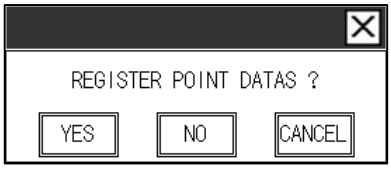
10.2 TEACH mode main screen

You can set up information for each point.

[Screen configuration]



[Description on screen]

RET	Used to return to the [MAIN MENU] screen. If there is a change in currently displayed point information, a registration confirmation message appears. To proceed with registration, press YES . To cancel registration, press NO .  **Pressing the YES switch completes registration.**
<<、>>	Used to change a point No. If there is a change in currently displayed point information, a registration confirmation message appears. (See the above description.)
▲、▼	Used to change over point information screens.

[Description on screen]

<table>
<tr><td>1. TARGET POSITION</td><td>Displays a registered target position.
・TAR. … Displays the target position of the currently selected table and point No. Touching in [ ] enables numerical input.
・CUR. … Displays the current coordinate of the axis.</td></tr>
<tr><td>2. C1 INST.CODE NO.</td><td>All servo operations are activated by executing preset instruction codes. Twenty patterns of instruction codes (No. 0 to 19) are available. (Among these instruction codes, 6 patterns are used for the system and other 14 patterns can be freely changed.)
Setting range : 0～19

Details of the instruction codes are displayed in Section 13.

Assignment of instruction code Nos. to tightening points by standard model (Standard settings)
<table>
<tr><th rowspan="2">Controller Model</th><th rowspan="2">Model</th><th colspan="4">Instruction code No.</th></tr>
<tr><th>1st Axis</th><th>2nd Axis</th><th>3rd Axis</th><th>4th Axis</th></tr>
<tr><td>RC75-T1</td><td>FM513VZ</td><td>0</td><td></td><td></td><td></td></tr>
<tr><td>RC75-T2</td><td>FM520VZZ</td><td>1</td><td>0</td><td></td><td></td></tr>
<tr><td>RC75-T3</td><td>SR375Y θ</td><td>2</td><td>2</td><td></td><td></td></tr>
<tr><td>RC755-T1</td><td>SR395DT Type-1</td><td>2</td><td>2</td><td></td><td></td></tr>
<tr><td>RC755-T2</td><td>SR395DT Type-2</td><td>2</td><td>2</td><td>1</td><td></td></tr>
<tr><td>RC755-T4</td><td>SR395DT Type-4</td><td>2</td><td>2</td><td>2</td><td></td></tr>
</table></td></tr>
<tr><td>3. C2 SCREW PRM.</td><td>This parameter is used for screw tightening under thrust control. Select a parameter No. (0 to 9) for the screw being used.
Setting range : 0～9

For the screw parameter setting procedure, refer to 6.2.9.</td></tr>
<tr><td>4. C3 DRIVER CH.</td><td>Select a driver controller operation channel for tightening operation. Channel No. can be selected from 0 to 15.
Setting range : 0～15

For the driver CH setting procedure (for the controller equipped with the optional SD550 communication function), refer to Section 16 of this manual. For the controller without the SD550 communication function, refer to the driver controller operation manual in a separate volume.</td></tr>
<tr><td>5. C4 JOB SELECT</td><td>The tightening operation mode can be changed by pressing [ ] and the following switches: FEED RETIGHT PICKUP PASS END .
FEED : Tightening operation with screw feed enabled
RETIGHT : Tightening operation with screw feed disabled
PICKUP : Tightening operation with screw pickup enabled
PASS : No tightening operation at the relevant point
END : Model end (judged as cycle end point)</td></tr>
<tr><td>6.C5 ～ 9.C8</td><td>(Not used)</td></tr>
</table>

[Description on screen]

10.C9	(Not used) When 8□□□ is set for the final point in the table, table connection is enabled, so that the number of points executed in one cycle can be set more than the total number of points per table. (For any point other than the final point, this setting is disabled.) Setting [8□□□] …The highest order digit "8" is the fixed value indicating table connection. Enter the connection target table No. in the first to third digits of "□□□".

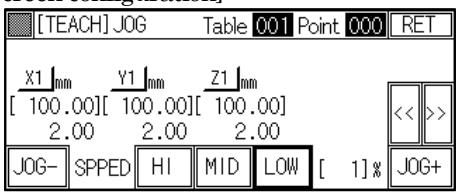
[Description on sub menu]

1.JOG	Changes the display to the teaching screen for teaching point registration, JIG operation, thrust change, etc.
2.MOVE	Used to confirm registered teaching point move operations, and enables return to standby position and point move operations. **CAUTION)** **Before MOVE operation, ensure safety, and make sure that the machine can be stopped in emergency.**
3.EDIT	Enables point insertion, point deletion, point copy, table deletion and table copy operations. The number of points cannot be set higher (or lower) than the number allowable for registration.
CANCEL	Closes sub menu display window.

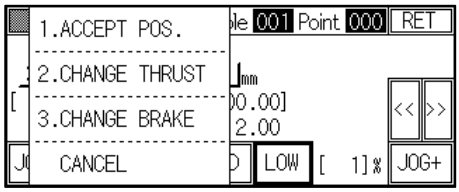
10.3 Teaching JOG screen

This screen allows you to conduct direct teaching, remote teaching and MDI teaching. (Refer to 6.2.6 to 6.2.8)

[Screen configuration]



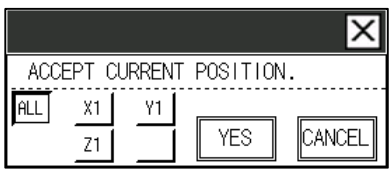
・Sub menu screen



[Description on screen]

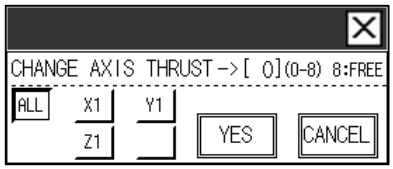
Axis selection	Select an axis subject to JOG operation. Selection is enabled for each axis. ・ X1 : Not selected X1 : Selected ・TAR. … Displays the target position of the point No. in the table currently selected. Touching [ ] enables numerical input. ・CUR. … Displays the current coordinate of the selected axis.
SPEED	Selects a JOG moving speed. HI High speed: 10% (initial setting) MID Middle speed: 5% (initial setting) LOW Low speed: 1% (initial setting) (Each speed setting can be changed with the parameter.) The JOG speed can be changed to a desired value by directly changing the value in [ ] (brackets).
JOG+ 、 JOG-	When the [JOG+] or [JOG□] switch and the deadman switch are simultaneously pressed, the machine executes JOG moving operation at a speed specified in the "SPEED" parameter. With one push of these switches, the axis moves by 0.01 mm. While you keep these switches pressed, the axis continuously moves. The JOG motion stops at the stroke end, even if you keep these switches pressed.
<< 、 >>	Used to select a point No. If there is a change in currently displayed point information, a registration confirmation message appears.

[Description on sub menu]

1.ACCEPT POS.	Registers the current position as target position. Specify an axis for registration. If the current position is acceptable, press YES . 

2.CHANGE THRUST

Pressing [ ] displays a numeric key window, allowing the thrust setting to a desired value. Specify an axis for thrust change. Press the YES switch, if acceptable.



Current limitation parameters registered in the servo amplifier are as follows:

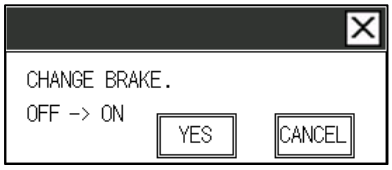
Setting range : 0 ～ 8

0	Current limit value 300[%] (Maximum output current value is fixed)
1	Current limit value 100[%] ← For origin return
2	Current limit value 30[%]
3	Current limit value 40[%]
4	Current limit value 50[%]
5	Current limit value 60[%]
6	Current limit value 70[%]
7	Current limit value 80[%]
8	Servo free

The servo brake will be automatically activated by turning the servo OFF.

3.CHANGE BRAKE

Used to change the up/down axis brake ON/OFF status.
Use thorough caution when deactivating the brake! Turning OFF the break may cause the tightening tool to fall.



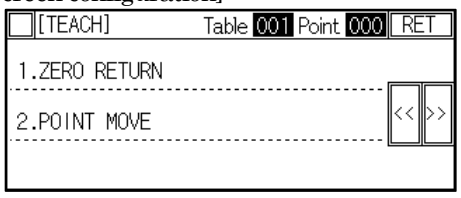
CANCEL

Closes sub menu display window.

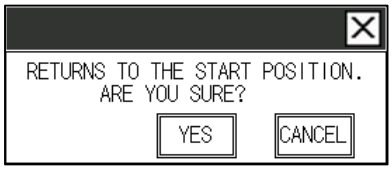
10.4 Teaching move screem

The following functions are effective in maintenance after teaching (point move, etc.).

[Screen configuration]



[Description on screen]

1.ZERO RETURN	Returns all axes to the origin. **Before using this function, ensure safety.** As a condition to conduct teaching, axis zero return operation must be completed. Use this function for teaching after emergency stop. 
2.POINT MOVE	Changes the display to the point move screen. Use this function for teaching position check, etc. For details, refer to the next section.

WARNING !!

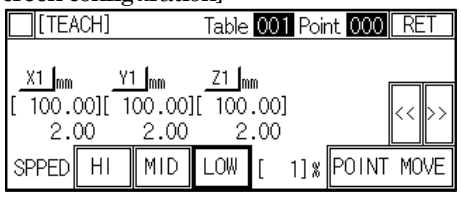
These operations automatically move the machine. Before operation, ensure safety.

If an unintended operation is executed due to erroneous teaching, press the emergency stop switch of the teaching pendant to stop the machine immediately.

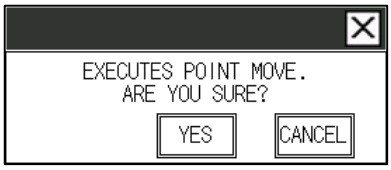
10.5 Teaching point move screen

Each axis can be moved to a teaching position. Use this screen to check the teaching position.

[Screen configuration]



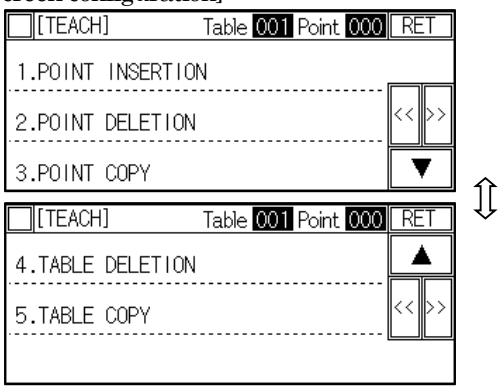
[Description on screen]

Axis selection	Select an axis subject to point move. Several axes can be selected. ・ X1 : Unselected X1 : Selected ・TAR. … Displays a target position of the point No. in the table currently selected. Touching [ ] enables numerical input. ・CUR. … Displays the current coordinate of the axis.
SPEED	Selects a JOG moving speed. HI High speed: 10% (initial setting) MID Middle speed: 5% (initial setting) LOW Low speed: 1% (initial setting) (Each speed setting can be changed with the parameter.) The JOG speed can be changed to a desired value by directly changing the value in [ ] (brackets).
POINT MOVE	Changes the display to the final confirmation screen to execute point move.  If you press the deadman switch and the YES switch simultaneously, all selected axes move at the speed specified in SPEED. Releasing these switches stops moving the axes.
<<、>>	Used to select a point No. If there is a change in currently displayed point information, a registration confirmation message appears.

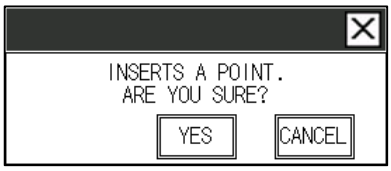
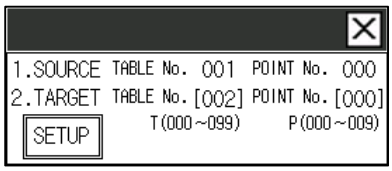
10.6 Teaching edit screen

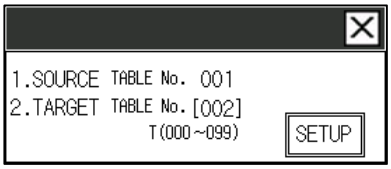
These functions are used to add, delete and copy teaching points, and to delete and copy tables.

[Screen configuration]



[Description on screen]

1.POINT INSERTION	Used to add a new point by carrying down the current point No. You cannot add a point over the registrable number of tables for system parameter registration. A confirmation screen appears. Press the YES switch. 
2.POINT DELETION	Used to delete current point information. If a point has been registered after the current point No., the next point information will be shift to the current point. A confirmation screen appears. Press the YES switch. 
3.POINT COPY	Used to copy information on the points of the current table to those of a desired table. Specify a copy destination table No. and point No., and press the SETUP switch. Touching [ ] for the copy destination table No. and point No. displays numeric keys. After entering a number, press the ENT switch. 

4.TABLE DELECTION	Used to initialize information on the current table (all points of the table). A confirmation screen appears. Press the YES switch. 
5.TABLE COPY	Used to copy information on the current table (all points in the table) to a desired table. Specify a copy destination table No. and press the SETUP switch. Touching [ ] for the copy destination table No. displays numeric keys. After entering a number, press the ENT switch. 

11. SETUP Mode of the Pendant

This chapter describes the SETUP mode.

11.1 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
- Instruction code 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.

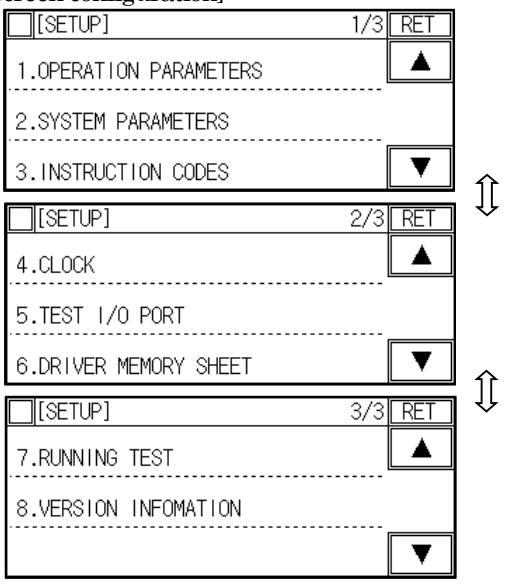
CAUTION

The SETUP (operation setup) mode can be accessed only by entering a password for LEVEL 3 or higher authorization level.

11.2 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]



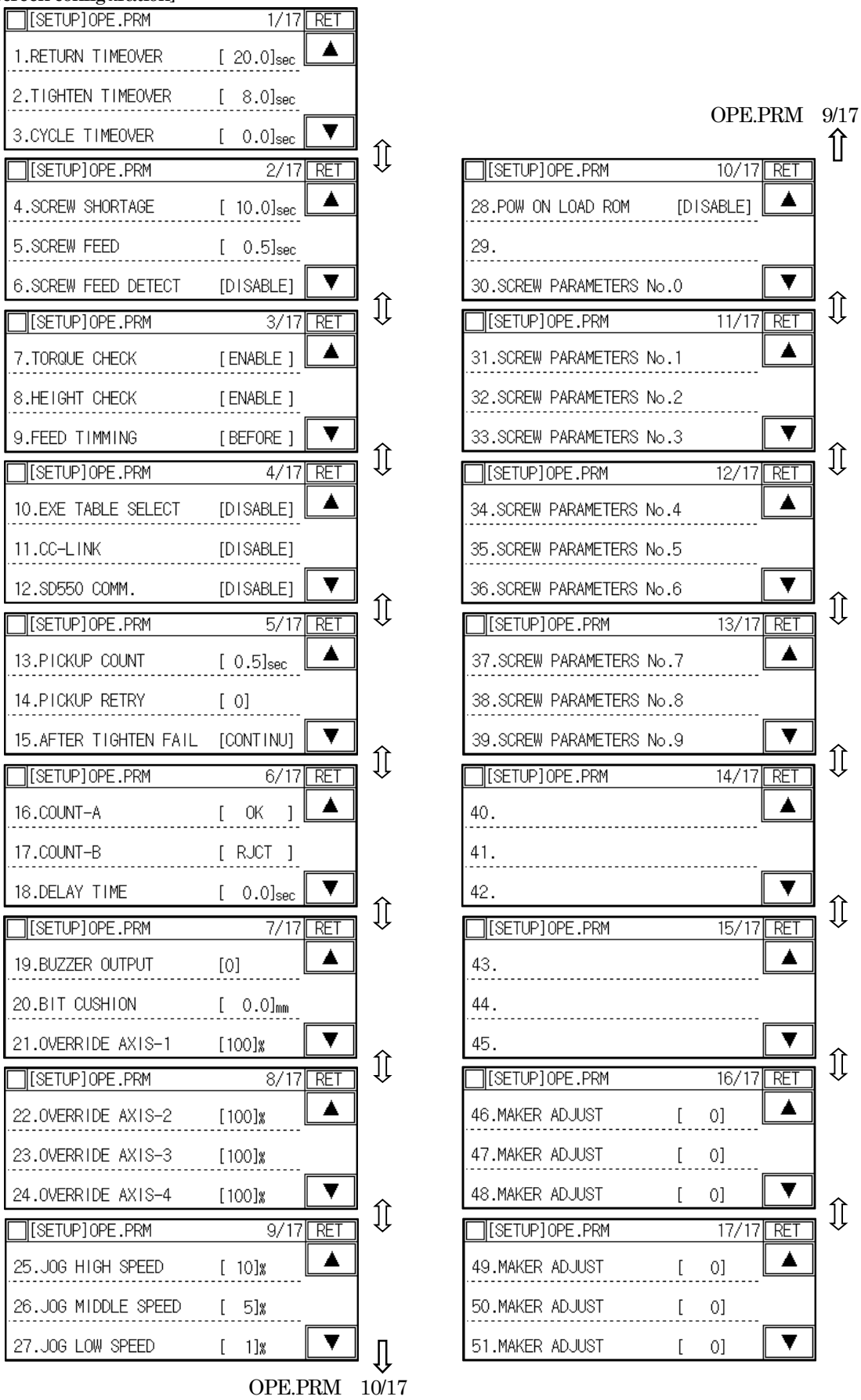
[Description on screen]

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

11.3 Operation parameter setup screen

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

[Screen configuration]



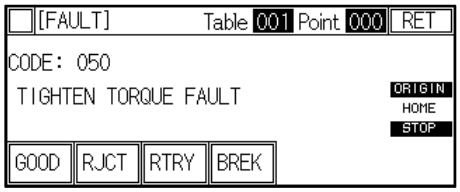
[Description on screen]

1.RETURN TIMEOVER	Sets a time to output the "RETURN TIMEOVER" error, when return operation continues for a specified time or longer. Setting range : 0.0～999.9 [sec]
2. 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]
3. 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.
4. SCREW SHORTAGE	Sets a time to activate the "screw shortage fault" output when screw shortage occurs. Setting range : 0.0～999.9 [sec]
5. SCREW FEED	Sets a screw feed time. (When NITTO SEIKO FF503H pressure feeder is used) Setting range : 0.0～999.9 [sec]
6. SCREW FEED DETECT	Specifies whether to enable or disable screw feed detection. (When NITTO SEIKO pressure feeder FF503 is used) DISABLE : Screw feed is disabled. ENABLE : Screw feed is enabled. To enable screw feed detection, a screw feed detection sensor (optional) is required. When screw feed detection is enabled, screw pressure-feed status can be checked. If screw feed detection sensor does not turn ON during press-feed operation, the "screw feed fault" output is activated.
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. When this item is set to ENABLE , the machine enables tightening Torque control , providing high tightening quality.
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. For screw rise judgment, the detection sensor (option) is required. If the machine is not equipped with this sensor, set this item to DISABLE . When this function is ENABLE , the machine enables detection of a tightening fault due to screw rise, providing high tightening quality.

[Description on screen]

9. 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 : Screw pressure-feed is executed during tightening. DISABLE : Screw feed is not executed. However, to use this function, it is necessary that the screw feed mechanism can cope with each feed timing. If setting change is required, contact a system administrator, or sales representative of NITTO SEIKO.
10. EXE TABLE SELECT	Specifies whether to determine an operation point for an automatic cycle by using an external signal. DISABLE : An operation point is selected with the operation pendant. ENABLE : An operation point is selected with an external signal.
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 optionally available. If this function is not provided, set this item to DISABLE .
13. PICKUP COUNT	Sets a wait time for pickup confirmation after the tightening tool lowers to the screw pickup position until it moves up (for the machine with the screw pickup function).
14. PICKUP RETRY	Sets a number of retry pickup operations in case where screw pickup is not judged OK (as controller PLC judgment).

[Description on screen]

15. AFTER TIGHTEN FAIL	Used to change the fault processing mode to cope with a tightening fault in the AUTO mode. Select any item among the following: CONTINUE BRAKE CHOICE CONTINUE : Continues operation by one cycle without pause, even if a tightening fault occurs. BRAKE : Stops cycle operation at occurrence of a tightening fault. If standby position setting is completed, the machine moves to the standby position after pause. CHOICE : Pauses cycle operation at occurrence of a tightening fault. (If standby position setting is completed, the machine moves to the standby position.) The processing selection screen appears on the operation panel, allowing the operator to select a fault processing mode among the following four types:  GOOD : Select this item to handle the tightening work at the position subject to fault judgment as OK to proceed to the next process. (The fault is not stored in the memory.) RJCT : Select this item to handle the tightening work at the position subject to fault judgment as NG to proceed to the next process. (The fault is stored in the memory.) RTRY : Select this item to retry tightening work at the position subject to fault judgment. (In case where the operation can be conducted after manual correction) BREK : Select this item to interrupt tightening work and quit the current cycle. (The fault is stored in the memory.)
16.COUNT-A	Selects a type of counter "A" to be displayed on the AUTO screen. GOAL : arget production count of the machine. The count value decrements at end of one cycle. NG : The count value increments when a tightening fault is stored in the memory at end of one cycle. OK : The count value increments when a tightening fault is not stored in the memory at end of one cycle. TOTAL : The count value increments at end of one cycle. SHOT : The count value increments at start of tightening.

[Description on screen]

17.COUNT-B	Selects a type of counter "B" to be displayed on the AUTO screen. GOAL : arget production count of the machine. The count value decrements at end of one cycle. NG : The count value increments when a tightening fault is stored in the memory at end of one cycle. OK : The count value increments when a tightening fault is not stored in the memory at end of one cycle. TOTAL : The count value increments at end of one cycle. SHOT : The count value increments at start of tightening.
18. DELAY TIME	Delays driver's rotation start time during retightening. Setting range : 0.0～999.9[sec]
19. BUZZER OUTPUT	Selects an external buzzer output control pattern: Patturn [0] : Disables buzzer output. Patturn [1] : Activates buzzer output at occurrence of a fault. Patturn [2] : Activates buzzer output at completion of a cycle. Patturn [3] : Activates buzzer output at occurrence of a fault, and at completion of a cycle.
20. BIT CUSHION	Sets tightening tool bit cushion [mm]. The standard setting of the tightening tool bit cushion for a screw with 3 mm or less nominal diameter is 3.0 mm. When the bit cushion is not provided, set this parameter at "0.0" mm. This parameter is used for correction of the tightening start position coordinates. If the object at position,clamping state that bits cushions bend will always go the teaching would tightning complete position. It may impact on the deviation clearing timing during ascent.
21. OVERRIDE AXIS-1	Sets a moving speed override. The 1st-axis moving speed can be changed (decreased) by setting an override.
22. OVERRIDE AXIS-2	Sets a moving speed override. The 2nd-axis moving speed can be changed (decreased) by setting an override.
23. OVERRIDE AXIS-3	Sets a moving speed override. The 3rd-axis moving speed can be changed (decreased) by setting an override.
24. OVERRIDE AXIS-4	Sets a moving speed override. The 4th-axis moving speed can be changed (decreased) by setting an override.
25. JOG HIGH SPEED	Sets a JOG speed when HI is selected for the "SPEED" parameter on the TEACH screen in the teaching mode.
26. JOG MIDDLE SPEED	Sets a JOG speed when MID is selected for the "SPEED" parameter on the TEACH screen in the teaching mode.
27. JOG LOW SPEED	Sets a JOG speed when LOW is selected for the "SPEED" parameter on the TEACH screen in the teaching mode.

[Description on screen]

28. POW ON LOAD ROM	Specifies whether to read information from the flash ROM every time the power supply is turned ON. DISABLE : When the power supply is turned ON, information is not read from the flash ROM. ENABLE : When the power supply is turned ON, information is read from the flash ROM. When "ENABLE" is selected, changed information will not be stored, unless it is written into the flash ROM after a change. When the PLC battery voltage has dropped, information is read from the flash ROM every time the power supply is turned ON, even if this parameter is set to "DISABLE".
30. SCREW PARAMETERS No.0	Changes to the screw parameter No. 0 setup screen.
31. SCREW PARAMETERS No.1	Changes to the screw parameter No. 1 setup screen.
32. SCREW PARAMETERS No.2	Changes to the screw parameter No. 2 setup screen.
33. SCREW PARAMETERS No.3	Changes to the screw parameter No. 3 setup screen.
34. SCREW PARAMETERS No.4	Changes to the screw parameter No. 4 setup screen.
35. SCREW PARAMETERS No.5	Changes to the screw parameter No. 5 setup screen.
36. SCREW PARAMETERS No.6	Changes to the screw parameter No. 6 setup screen.
37. SCREW PARAMETERS No.7	Changes to the screw parameter No. 7 setup screen.
38. SCREW PARAMETERS No.8	Changes to the screw parameter No. 8 setup screen.
39. SCREW PARAMETERS No.9	Changes to the screw parameter No. 9 setup screen.
46. MAKER ADJUST	This parameter is used for the manufacturer's adjustment. Do not change the default setting.
47. MAKER ADJUST	This parameter is used for the manufacturer's adjustment. Do not change the default setting.
48. MAKER ADJUST	This parameter is used for the manufacturer's adjustment. Do not change the default setting.
49. MAKER ADJUST	This parameter is used for the manufacturer's adjustment. Do not change the default setting.
50. MAKER ADJUST	This parameter is used for the manufacturer's adjustment. Do not change the default setting.
51. MAKER ADJUST	This parameter is used for the manufacturer's adjustment. Do not change the default setting.

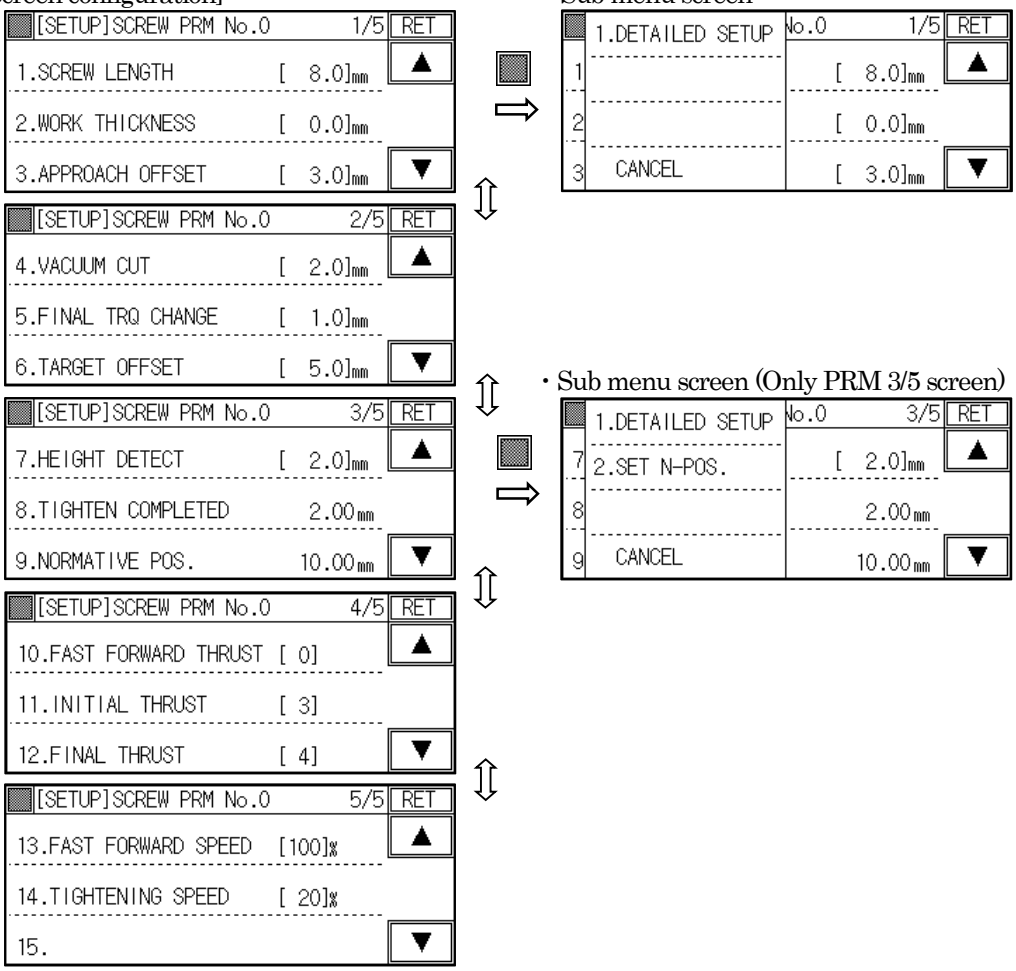
11.3.1 Screw parameter simplified setup

You can set or check the screw parameters for simplified setup.

When selected screw parameter information is intended for simplified setup, or when no parameter has been set, the simplified setup screen is displayed as the initial screen.

Simplified setup is the conventional setting mode that has been used for our screw tightening robots.

[Screen configuration]



・Sub menu screen

・Sub menu screen (Only PRM 3/5 screen)

[Description on screen]

1.SCREW LENGTH	Sets a length under the neck of the screw being used. Setting range : 0～999.9 [mm]
2. WORK THICKNESS	Sets a target workpiece thickness. The workpiece thickness is a dimension of an object to be inserted between a screw and the workpiece tap. This parameter is used as an offset dimension to change thrust and speed immediately before a screw touches the workpiece tap. Setting range : 0～999.9 [mm]

[Description on screen]

3. APPROACH OFFSET	<u>Standard specification</u> Sets an offset dimension to change thrust (temporary tightening thrust) and speed (tightening speed) of the up/down axis (tightening driver) immediately before a tightening surface. Setting range : 0～999.9 [mm] (Note) ・If a small value is set, the screw guide collides against a workpiece at a fast forward speed and thrust (high speed and high thrust), causing damage to the workpiece and internal threads. ・If a large value is set, the speed changes to a tightening speed (low speed) at a higher position. This results in a longer moving time, causing a tightening fault. <u>2-servo specification (FM520VZZ、RC75-T2)</u> Sets an offset dimension to stop the screw guide up/down axis (Z1 axis) immediately before a workpiece. Setting range : 0～999.9[mm] (Note) ・If the set value is larger than the screw length, the screw will completely protrude from the screw guide when moving to the tightening start position, which may result in vacuum chuck failure.
4. VACUUM CUT	Sets an offset dimension from a teaching position, as a position to turn OFF vacuum. Setting range : 0～999.9 [mm] (Note) ・When the tightening driver reaches a position above a teaching position at a height of the "vacuum OFF" set value, the vacuum (vacuum chuck of a screw) is turned OFF. ・If a large (high) value is set, vacuum will turn OFF before a screw reaches the workpiece, which may cause a screw fall and oblique tightening.
5. FINAL TRQ CHANGE	Sets a dimension from a teaching position, as a position to change the tightening driver's thrust to a final tightening thrust. Setting range : 0～999.9 [mm] (Note) ・If a large value is set, the thrust will be changed to the final tightening thrust at a higher position. This causes the tightening driver to be overloaded during rotation, which may result in a longer tightening time, and cause a tightening fault. ・If this parameter is set too small for workpieces with height variations, the up/down axis will not reach the final tightening change position, causing a tightening fault. ・Normally, for a machine screw, this parameter should be set at 1.0 to 2.0 mm.

[Description on screen]

6. TARGET OFFSET	To cancel target workpiece variations, set an offset dimension from a teaching position. Setting range : 0～999.9 [mm] (Note) ・When tightening a workpiece whose height is smaller than the teaching value because of variations in workpiece height, the up/down axis (tightening driver bit) may not reach the teaching position, if the up/down axis down stroke aims at the teaching position. To prevent this, set a "target offset" to define a target position that is lower than the teaching position by the offset value. ・If this parameter is set too small for workpieces with height variations, the up/down axis (tightening driver bit) will not reach the tightening position, causing a tightening fault. Normally, for a machine screw, this parameter should be set at 2.0 to 5.0 mm.
7. HEIGHT DETECT	Sets a screw height (screw loose fitting) detection width. The height detection width is a detection width (□) from a teaching position. Setting range : 0～999.9 [mm] (Note) ・If the up/down axis position at the time of tightening driver torque up is within a range of the detection width (□) relative to a teaching position, the tightening height (screw loose fitting) is judged OK. ・If an extremely small value is set for this parameter, it causes "tightening height (screw loose fitting) fault" to frequently occur, because of variations in the driver bit, screw and workpiece dimensions. Normally, for a machine screw, this parameter should be set at 2.0 mm or more.
8.TIGHTEN COMPLETED (Only 2-servo Specification) FM520VZZ、 RC75-T2	Stores the information on positional relationship between the screw guide up/down axis (Z1 axis) and bit up/down axis (Z2 axis) for each screw type. The setting screen can be called from the sub menu. Setting range : 0～999.9[mm]
9.NORMATIVE POS. (Only 2-servo Specification) FM520VZZ、 RC75-T2	Stores the information on positional relationship between the screw guide up/down axis (Z1 axis) and bit up/down axis (Z2 axis) for each bit type. The setting screen can be called from the sub menu. Setting range : 0～999.9[mm]
10. FAST FORWARD THRUST	Sets an up/down axis fast forward thrust as a thrust pattern No. Setting range : 0～8 (Note) ・Normally, this parameter should be set at "0" (300%).
11. INITIAL THRUST	Sets an up/down axis temporary tightening thrust as a thrust pattern No. Setting range : 0～8 (Note) ・If the workpiece has internal threads, the screw will spontaneously lower while the tightening driver rotates during temporary tightening operation. If a large thrust is applied in this step, the tightening driver is loaded more than required during rotation, disabling ideal tightening operation. Therefore, "temporary tightening thrust" should be set at a small value. ・If the set value is too large, the tightening driver is loaded more than required during rotation. This may result in a longer tightening time, and cause a tightening fault, unless the temporary tightening thrust of the tightening driver is increased. ・Normally, for a machine screw, this parameter should be set at "3" (40%).

[Description on screen]

12. FINAL THRUST	Sets an up/down axis final tightening thrust as a thrust pattern No. Setting range : 0～8 (Note) ・Normally, when the tightening driver's tightening thrust is changed to the final tightening thrust for final tightening of a cross recessed socket head screw, the driver bit will come over the cross recess on the screw head (come-out), unless the driver bit thrust is increased, disabling tightening operation. Therefore, the "final tightening thrust" should be a value at which the bit will not come over the cross recess on the screw head. ・If the set value is too small, the driver bit will come over the cross recess on the screw head in final tightening operation, which may cause a tightening fault. ・Normally, for a machine screw, this parameter should be set at "4" (50%) or "5" (60%).
13. FAST FORWARD SPD	Sets an up/down axis fast forward speed as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・Normally, for a machine screw, this parameter should be set at 80 to 100%.
14. TIGHTENING SPEED	Sets an up/down axis tightening speed as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・During temporary and final tightening operations, the screw will be spontaneously lowered while the tightening driver rotates. This parameter should be set at a little higher speed than the screw lowering speed with rotation of the tightening driver, so that the tightening bit will not come out of the recess on the screw head. ・If the speed is too low, the tightening bit will come out of the recess on the screw head, causing a tightening fault. ・Normally, for a machine screw, this parameter should be set at 20 to 30%.

[Description on sub menu]

1.DETAILED SETUP	Changes to the screw parameter detailed setup screen.
CANCEL	Closes sub menu display window.

＊The following menu is available on screen configuration page 3 only.

1.DETAILED SETUP	Changes to the screw parameter detailed setup screen.
2.SET N-POS.	Changes to the Normative position, tightening completed offset setup screen.
CANCEL	Closes sub menu display window.

(Remarks)

The screw parameter simplified setup data can be developed to detailed setup after completion of entry. During development, the following simplified setup parameters will be developed to detailed setup parameters. For common items, detailed setup values will be changed to those registered in simplified setup, regardless of whether development is applied or not.

Screw parameter detailed setup	Development information
SCREW LENGTH [mm]	Common item (Simplified setup: Screw length [mm])
WORK THICKNESS [mm]	Common item (Simplified setup: Workpiece thickness [mm])
APPROACH OFFSET [mm]	Common item (Simplified setup: Approach offset on workpiece [mm])
VACUUM CUT [mm]	Common item (Simplified setup: Vacuum OFF [mm])
FINAL TRQ CHANGE [mm]	Common item (Simplified setup: Final tightening change point [mm])
TARGET OFFSET [mm]	Common item (Simplified setup: Target offset [mm])
HEIGHT DETECT － [mm]	Common item (Simplified setup: Height detection width [mm])
HEIGHT DETECT ＋ [mm]	Simplified setup: Height detection width [mm] is transferred.
RETURN CHANGE [mm]	0.0 [mm]
FAST FORWARD 1 THRUST	Common item (Simplified setup: Fast forward thrust)
FAST FORWARD 2 THRUST	Simplified setup: Temporary tightening thrust is transferred.
INITIAL THRUST	Common item (Simplified setup: Temporary tightening thrust)
FINAL THRUST	Common item (Simplified setup: Final tightening thrust)
HEIGHT DETECT THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 1 THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 2 THRUST	0 (Maximum thrust setting)
FAST FORWARD 1 SPD [%]	Common item (Simplified setup: Fast forward speed [%])
FAST FORWARD 2 SPD [%]	Simplified setup: Tightening speed [%] is transferred.
INITIAL SPD [%]	Common item (Simplified setup: Tightening speed [%])
FINAL SPD [%]	Simplified setup: Tightening speed [%] is transferred.
RETURN 1 SPD [%]	100 [%]
RETURN 2 SPD [%]	100 [%]
NORMATIVE POS.*1 [mm]	Common item (Simplified setup: Normative pos. *1 [mm])
TIGHTEN COMPLETED *1 [mm]	Common item (Simplified setup: Tightening completed *1 [mm])

*1 : The parameter is valid in case of 2-servo specification (FM520VZZ、RC75-T2)

11.3.2 Screw parameter detailed setup

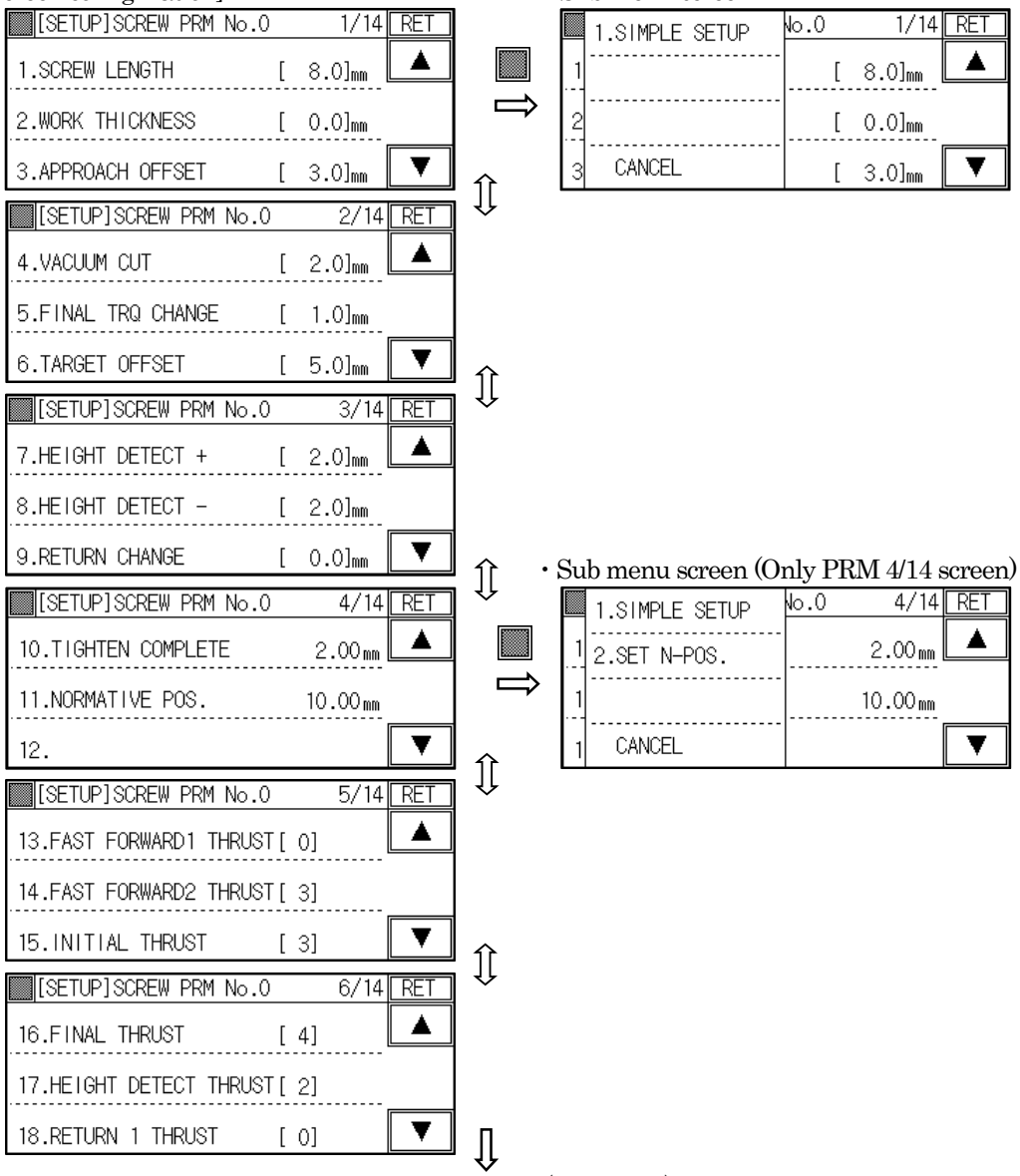
You can execute screw parameter detailed setup, and check the settings.

During selection of a screw parameter No., if the selected screw parameter is intended for detailed setup, the detailed setup screen is displayed as the initial screen.

In detailed screw parameter setup, the following settings are enabled in addition to those for simplified screw parameter setup.

- Thrust and speed parameters can be individually set for a range from "approach offset on workpiece" to "tightening start position" (Fast-forward 2).
- Final tightening speed parameter can be individually set.
- Height detection width can be individually set in the "+" and "–" directions from a teaching reference point.
- Thrust parameter during height detection can be individually set.
- Position, thrust and speed parameters during move to "return change point" (Return 1) can be individually set.
- Thrust and speed parameters during move to "overhead position" (Return 2) can be individually set.

[Screen configuration]



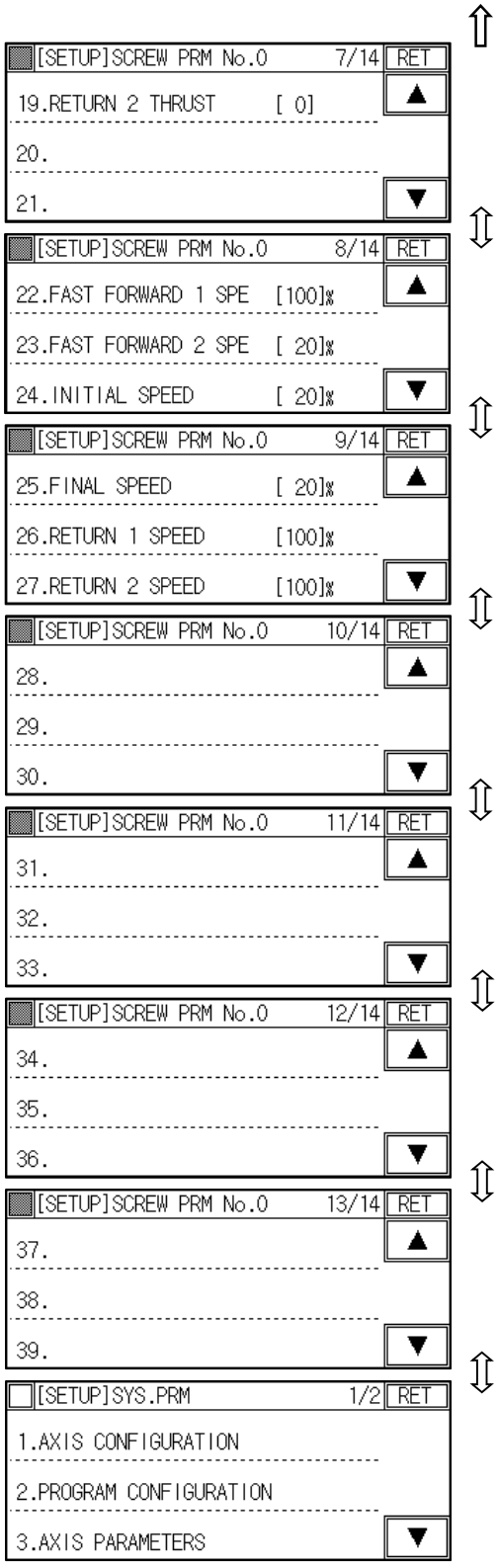
・Sub menu screen

・Sub menu screen (Only PRM 4/14 screen)

Screw PRM.D 7/14 (Next page)

[Screen configuration]

Screw PRM.D 6/14 (Prev. page)



[Description on screen]

1.SCREW LENGTH	Sets a length under the neck of the screw being used. Setting range : 0～999.9 [mm]
2. WORK THICKNESS	Sets a target workpiece thickness. The workpiece thickness is a dimension of an object to be inserted between a screw and the workpiece tap. This parameter is used as an offset dimension to change thrust and speed immediately before a screw touches the workpiece tap. Setting range : 0～999.9 [mm]
3. APPROACH OFFSET	**Standard specification** Sets an offset dimension to change thrust (temporary tightening thrust) and speed (tightening speed) of the up/down axis (tightening driver) immediately before a tightening surface. Setting range : 0～999.9 [mm] (Note) ・If a small value is set, the screw guide collides against a workpiece at a fast forward speed and thrust (high speed and high thrust), causing damage to the workpiece and internal threads. ・If a large value is set, the speed changes to a tightening speed (low speed) at a higher position. This results in a longer moving time, causing a tightening fault. **2-servo specification (FM520VZZ、RC75-T2)** Sets an offset dimension to stop the screw guide up/down axis (Z1 axis) immediately before a workpiece. Setting range : 0～999.9[mm] (Note) ・If the set value is larger than the screw length, the screw will completely protrude from the screw guide when moving to the tightening start position, which may result in vacuum chuck failure.
4. VACUUM CUT	Sets an offset dimension from a teaching position, as a position to turn OFF vacuum. Setting range : 0～999.9 [mm] (Note) ・When the tightening driver reaches a position above a teaching position at a height of the "vacuum OFF" set value, the vacuum (vacuum chuck of a screw) is turned OFF. ・If a large (high) value is set, vacuum will turn OFF before a screw reaches the workpiece, which may cause a screw fall and oblique tightening.
5. FINAL TRQ CHANGE	Sets a dimension from a teaching position, as a position to change the tightening driver's thrust to a final tightening thrust. Setting range : 0～999.9 [mm] (Note) ・If a large value is set, the thrust will be changed to the final tightening thrust at a higher position. This causes the tightening driver to be overloaded during rotation, which may result in a longer tightening time, and cause a tightening fault. ・If this parameter is set too small for workpieces with height variations, the up/down axis will not reach the final tightening change position, causing a tightening fault. ・Normally, for a machine screw, this parameter should be set at 1.0 to 2.0 mm.

[Description on screen]

6. TARGET OFFSET	To cancel target workpiece variations, set an offset dimension from a teaching position. Setting range : 0～999.9 [mm] (Note) ・When tightening a workpiece whose height is smaller than the teaching value because of variations in workpiece height, the up/down axis (tightening driver bit) may not reach the teaching position, if the up/down axis down stroke aims at the teaching position. To prevent this, set a "target offset" to define a target position that is lower than the teaching position by the offset value. ・If this parameter is set too small for workpieces with height variations, the up/down axis (tightening driver bit) will not reach the tightening position, causing a tightening fault. Normally, for a machine screw, this parameter should be set at 2.0 to 5.0 mm.
7. HEIGHT DETECT +	Sets a screw height (screw loose fitting) detection width. The height detection width (+) is a detection width from a teaching position. Setting range : 0～999.9 [mm] (Note) ・If the up/down axis position at the time of screw tightening driver thrust up is within a range between "height detection width (+)" and "height detection width (-)" relative to a teaching position, the tightening height (screw loose fitting) is judged OK. ・If an extremely small value is set for this parameter, it causes "tightening height (screw loose fitting) fault" to frequently occur, because of variations in the driver bit, screw and workpiece dimensions. Normally, for a machine screw, this parameter should be set at 2.0 mm or more.
8. HEIGHT DETECT -	Set a screw height (screw loose fitting) detection width. The height detection width (□) is a detection width from a teaching position. Setting range : 0～999.9 [mm] (Note) ・If the up/down axis position at the time of screw tightening driver thrust up is within a range between "height detection width (+)" and "height detection width (-)" relative to a teaching position, the tightening height (screw loose fitting) is judged OK. ・If an extremely small value is set for this parameter, it causes "tightening height (screw loose fitting) fault" to frequently occur, because of variations in the driver bit, screw and workpiece dimensions. Normally, for a machine screw, this parameter should be set at 2.0 mm or more.
9. RETURN CHANGE	If the tightening driver returns at high thrust and high speed at the start of return operation, load is instantaneously applied to the workpiece. To reduce the load, set an offset dimension from a teaching position to define a change point so that the tightening driver returns at low thrust and low speed until the middle of the return stroke. Setting range : 0～999.9 [mm] (Note) ・Normally, this parameter should be set at 0.0 to 10.0 mm.
10.TIGHTEN COMPLETED (Only 2-servo Specification) FM520VZZ、 RC75-T2	Stores the information on positional relationship between the screw guide up/down axis (Z1 axis) and bit up/down axis (Z2 axis) for each screw type. The setting screen can be called from the sub menu. Setting range : 0～999.9[mm]

[Description on screen]

11.NORMATIVE POS. (Only 2-servo Specification) FM520VZZ、 RC75-T2	Stores the information on positional relationship between the screw guide up/down axis (Z1 axis) and bit up/down axis (Z2 axis) for each bit type. The setting screen can be called from the sub menu. Setting range : 0～999.9[mm]
13. FAST FORWARD 1 THRUST	Sets a thrust for the up/down axis "fast forward 1" operation (from an overhead position to a position immediately before the screw guide touches a workpiece) as a thrust pattern No. Setting range : 0～8 (Note) ・Normally, this parameter should be set at "0" (300%).
14. FAST FORWARD 2 THRUST	Sets a thrust for the up/down axis "fast forward 2" operation (from an overhead position immediately before the screw guide touches a workpiece to a position immediately before a screw touches a tap hole) as a thrust pattern No. Setting range : 0～8 (Note) ・For a machine screw, this parameter should be set at "2" (30%).
15. INITIAL THRUST	Sets an up/down axis temporary tightening thrust as a thrust pattern No. Setting range : 0～8 (Note) ・If the workpiece has internal threads, the screw will spontaneously lower while the tightening driver rotates during temporary tightening operation. If a large thrust is applied in this step, the tightening driver is loaded more than required during rotation, disabling ideal tightening operation. Therefore, "temporary tightening thrust" should be set at a small value. ・If the set value is too large, the tightening driver is loaded more than required during rotation. This may result in a longer tightening time, and cause a tightening fault, unless the temporary tightening thrust of the tightening driver is increased. ・Normally, for a machine screw, this parameter should be set at "3" (40%).
16. FINAL THRUST	Sets an up/down axis final tightening thrust as a thrust pattern No. Setting range : 0～8 (Note) ・Normally, when the tightening driver's tightening thrust is changed to the final tightening thrust for final tightening of a cross recessed socket head screw, the driver bit will come over the cross recess on the screw head (come-out), unless the driver bit thrust is increased, disabling tightening operation. Therefore, the "final tightening thrust" should be a value at which the bit will not come over the cross recess on the screw head. ・If the set value is too small, the driver bit will come over the cross recess on the screw head in final tightening operation, which may cause a tightening fault. ・Normally, for a machine screw, this parameter should be set at "4" (50%) or "5" (60%).
17. HEIGHT DETECT THRUST	Sets a thrust for the up/down axis height detection as a thrust pattern No. Reducing the thrust for height detection can eliminate workpiece warpage during tightening, enabling proper screw loose fitting judgment. Setting range : 0～8 (Note) ・Normally, for a machine screw, this parameter should be set at "2" (30%). However, depending on the equipment configuration to set the appropriate thrust No.

[Description on screen]

18. RETURN 1 THRUST	Sets a thrust for the up/down axis "return 1" operation (from a tightening completion position to a return change point) as a thrust pattern No. Setting range : 0～8 (Note) ・Normally, this parameter should be set at "2" (30%).
19. RETURN 2 THRUST	Sets a thrust for the up/down axis "return 2" operation (from a return change point to an overhead position) as a thrust pattern No. Setting range : 0～8 (Note) ・Normally, this parameter should be set at "0" (300%).
22. FAST FORWARD 1 SPD	Sets a speed for the up/down axis "fast forward 1" operation (from an overhead position to a position immediately before the screw guide touches a workpiece) as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・Normally, for a machine screw, this parameter should be set at 80 to 100%.
23. FAST FORWARD 2 SPD	Sets a speed for the up/down axis "fast forward 2" operation (from an overhead position immediately before the screw guide touches a workpiece to a position immediately before a screw touches a tap hole) as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・Normally, for a machine screw, this parameter should be set at 10 to 30%.
24. INITIAL SPD	Sets a speed for the up/down axis temporary tightening operation as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・During temporary and final tightening operations, the screw will be spontaneously lowered while the tightening driver rotates. This parameter should be set at a little higher speed than the screw lowering speed with rotation of the tightening driver, so that the tightening bit will not come out of the recess on the screw head. ・If the speed is too low, the tightening bit will come out of the recess on the screw head, causing a tightening fault. ・Normally, for a machine screw, this parameter should be set at 10 to 30%.
25. FINAL SPD	Sets a speed for the up/down axis final tightening operation as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・During temporary and final tightening operations, the screw will be spontaneously lowered while the tightening driver rotates. This parameter should be set at a little higher speed than the screw lowering speed with rotation of the tightening driver, so that the tightening bit will not come out of the recess on the screw head. ・If the speed is too low, the tightening bit will come out of the recess on the screw head, causing a tightening fault. ・Normally, for a machine screw, this parameter should be set at 10 to 30%.

[Description on screen]

26. RETURN 1 SPD	Sets a speed for the up/down axis "return 1" operation (from a tightening completion position to a return change point) as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・Normally, for a machine screw, this parameter should be set at 10 to 30%.
27. RETURN 2 SPD	Sets a speed for the up/down axis "return 2" operation (from a return change point to an overhead position) as a ratio to the maximum speed. Setting range : 0～100 [%] (Note) ・Normally, for a machine screw, this parameter should be set at 80 to 100%.

[Description on sub menu]

1.SIMPLE SETUP	Changes to the screw parameter simplified monitor screen.
CANCEL	Closes sub menu display window.

＊The following menu is available on screen configuration page 4 only.

1.SIMPLE SETUP	Changes to the screw parameter simplified monitor screen.
2.SET N-POS.	Changes to the Normative position, tightening completed offset setup screen.
CANCEL	Closes sub menu display window.

11.3.3 Normative position, tightening completed offset setup

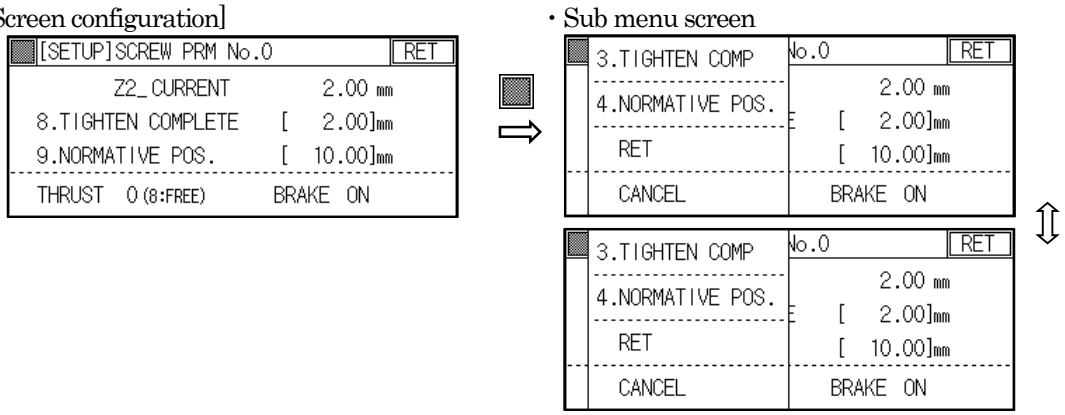
This section describes normative position and tightening completion offset position setting procedure.
With the sub menu of the screw parameter setting screens, you can go to the normative position and tightening completion offset position settings screens.

* These parameter settings are required for the machine of two servo type (FM520VZZ, RC75-T2).

To go to the normative position and tightening completion offset position settings screens:

- Sub menu of p. 3/5 of the screw parameter simplified setting screen [2. SET N-POS.]
- Sub menu of p. 4/14 of the screw parameter detailed setting screen [2. SET N-POS.]

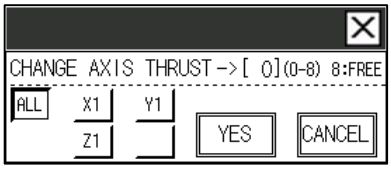
[Screen configuration]

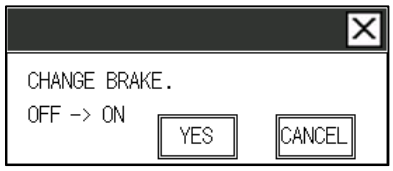
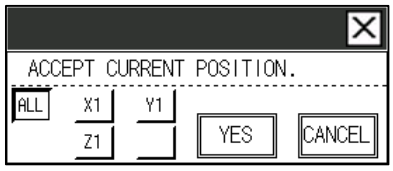
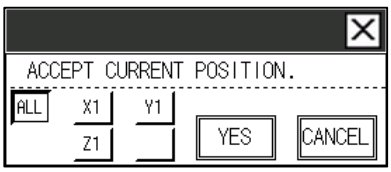


[Description on screen]

Z2_CURRENT	Monitor output of the bit up/down axis current position for the machine of two servo type (FM520VZZ, RC75-T2)
8.TIGHTEN COMPLETED	Touching the value in [ ] displays numeric keys, allowing numerical input.
9.NORMATIVE POS.	Touching the value in [ ] displays numeric keys, allowing numerical input.
THRUST	Monitor output of the bit up/down axis thrust parameter
MOTOR BRAKE	Monitor of the screw guide up/down axis motor brake ON/OFF status. ON : Activates the motor brake. OFF : Deactivates the motor brake.

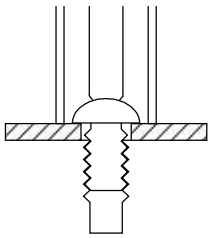
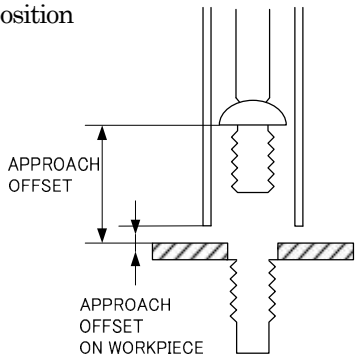
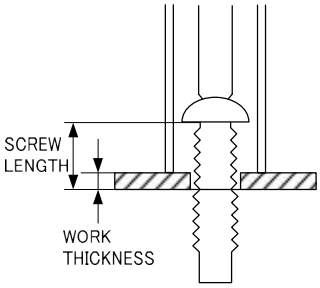
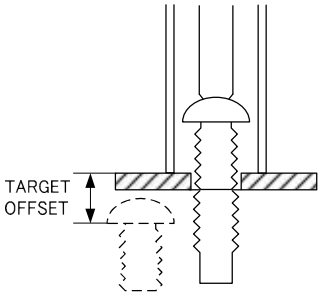
[Description on sub menu]

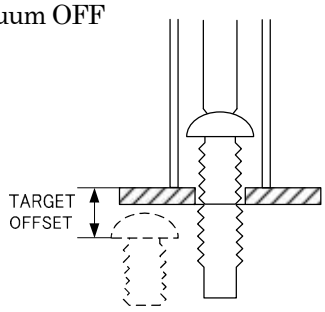
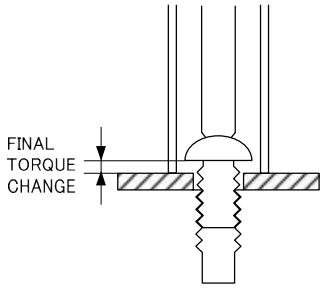
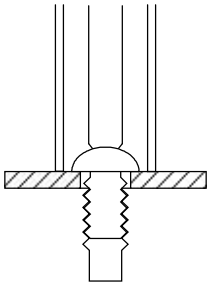
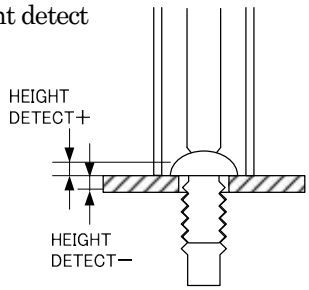
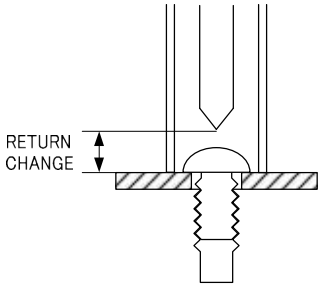
<table>
<tr><td>1.CHANGE THRUST</td><td>Pressing [ ] displays a numeric key window, allowing the thrust setting to a desired value. Specify an axis for thrust change. Press the YES switch, if acceptable.
 

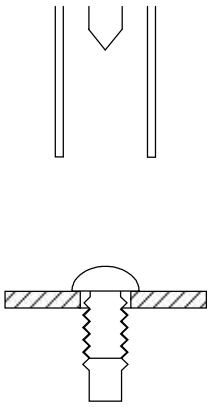
Current limitation parameters registered in the servo amplifier are as follows:
Setting range : 0 ～ 8
<table>
<tr><td>0</td><td>Current limit value 300[%] (Maximum output current value is fixed)</td></tr>
<tr><td>1</td><td>Current limit value 100[%] ← For origin return</td></tr>
<tr><td>2</td><td>Current limit value 30[%]</td></tr>
<tr><td>3</td><td>Current limit value 40[%]</td></tr>
<tr><td>4</td><td>Current limit value 50[%]</td></tr>
<tr><td>5</td><td>Current limit value 60[%]</td></tr>
<tr><td>6</td><td>Current limit value 70[%]</td></tr>
<tr><td>7</td><td>Current limit value 80[%]</td></tr>
<tr><td>8</td><td>Servo free</td></tr>
</table>
The servo brake will be automatically activated by turning the servo OFF.</td></tr>
<tr><td>2.CHANGE BRAKE</td><td>Used to change the up/down axis brake ON/OFF status.
Use thorough caution when deactivating the brake! Turning OFF the break may cause the tightening tool to fall.
 
</td></tr>
<tr><td>3.TIGHTEN COMP</td><td>Used to register the current position of the bit up/down axis as tightening completion offset position, Press the YES switch on the displayed screen to confirm registration.
 
</td></tr>
<tr><td>4.NORMATIVE POS.</td><td>Used to register the current position of the bit up/down axis as normative position, Press the YES switch on the displayed screen to confirm registration.
 
</td></tr>
<tr><td>NEXT RET</td><td>Used to change the sub menu items.</td></tr>
<tr><td>CANCEL</td><td>Closes sub menu display window.</td></tr>
</table>

11.3.4 Supplementary description on screw parameters

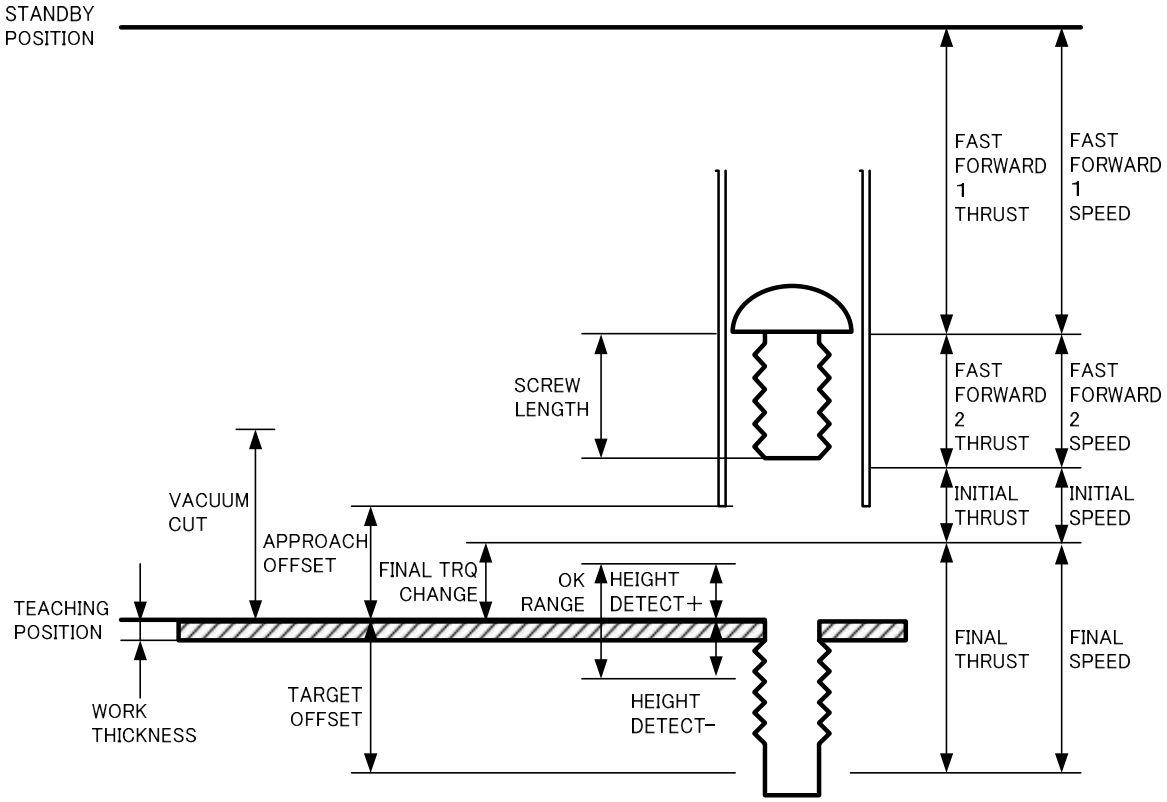
This section describes tightening operations using screw parameters in time series.

Step	Figure	Description
	Teaching position 	Register a position at which the driver bit is fit in a tightened screw as a teaching position (target position), which serves as a reference position for tightening operation.
1	Overhead position	Tightening starts from an overhead position.
2	Moving to the "approach offset" position 	The screw guide stops immediately before it touches a workpiece. Position … Approach offset on workpiece |Teaching position − Screw length| + Approach offset on workpiece Thrust Fast forward 1 thrust Speed Fast forward 1 speed
3	Moving to tightening start position 	The screw guide stops immediately before it touches a workpiece tap hole. Position … Tightening start position Teaching position − Screw length + Work thickness − Bit cushion Thrust Fast forward 2 thrust Speed Fast forward 2 speed
4	Start of temporary tightening 	The screw guide starts to move forward, targeting a more advanced position than the teaching position. Position … Target position Teaching position + Target offset Thrust Initial thrust Speed Initial speed

Step	Figure	Description
5	Vacuum OFF 	Vacuum turns OFF after the screw guide passes through the vacuum OFF position. Position … Vacuum cut position Teaching position — Vacuum cut Thrust Initial thrust (Continued) Speed Initial speed (Continued)
6	Start of final tightening 	Thrust and speed are changed after the screw guide passes through the final tightening position. Position (Final tightening change position) Teaching position — Final torque change position Thrust Final tightening thrust Speed Final tightening speed
7	Completion of tightening 	At completion of tightening, the screw guide stops moving to the rget position, and the thrust is changed to a height detection hrust. After the trust change, there is a certain delay time. Position Stop Thrust Height detection thrust Speed No move
8	Height detect 	Screw loose fitting judgment is conducted by checking if the difference between the teaching position and the current position is within a specified range. Position (Screw loose fitting judgment position) Stop Thrust Height detection thrust (Continued) Speed No move
9	Moving to return change point 	The screw guide moves to the return change point, and stops. Position (Retraction change position) Teaching position — Retraction change point Thrust Return 1 thrust Speed Return 1 speed

Step	Figure	Description
10	Moving to overhead position 	The screw guide moves to the overhead position. Position (Overhead space) Overhead space Thrust Return 2 thrust Speed Return 2 speed
11	Completion of tightening	

[Screw parameter explanation diagram]

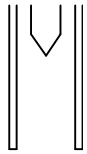
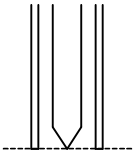
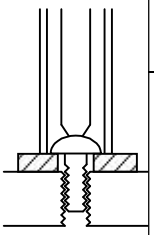
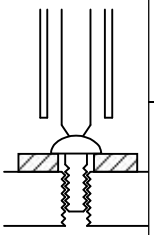
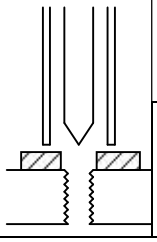


11.3.5 Supplementary description on screw parameters 2 (2-servo specification)

With the machine of 2-servo specification (FM520VZZ、RC75-T2), two up/down axis (screw guide up/down axis and bit up/down axis) are associated to execute tightening operation. This section describes the screw parameter handling procedure for 2-servo specification.

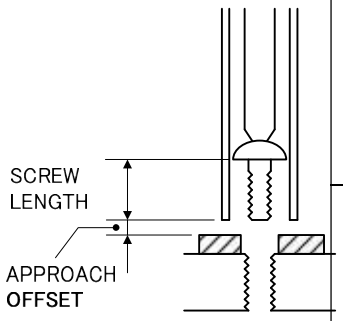
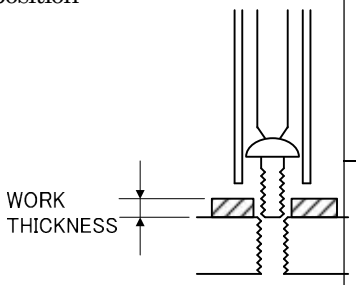
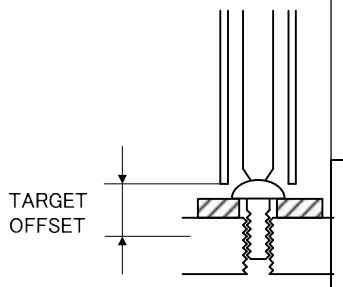
Preparation for tightening operation

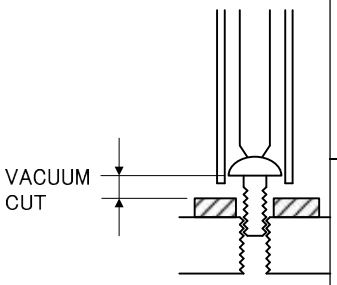
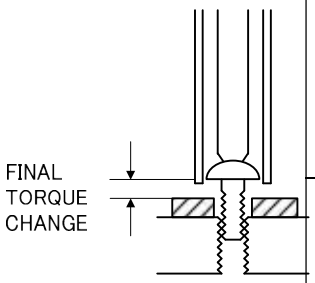
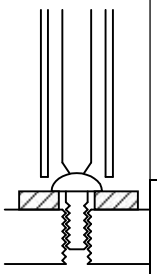
To execute tightening operation, the following parameters ([Normative position], [Tightening completed offset] and [Teaching position]) should be registered in advance.

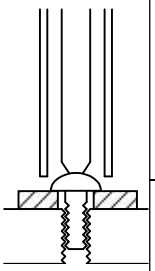
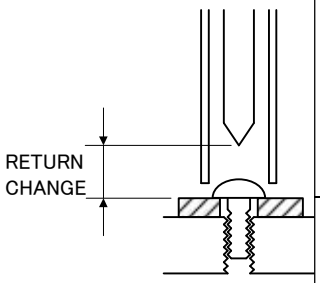
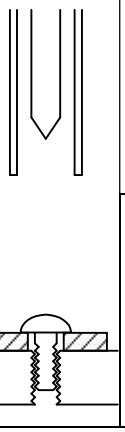
Figure	Description (Z1 : Z-axis for screw guide, Z2 : Z-axis for bit)	
Origin position 	Z1	Position The upper end of the axis is defined as origin. (Stopper origin return)
	Z2	Position The upper end of the axis is defined as origin. (Stopper origin return)
Normative position (Z-axis for bit) 	Z1	Position Arbitrary position
	Z2	Position Coordinate of the bit up/down axis position at which the bit is pushed down, with the tip of the bit aligned with the tip of the screw guide
Tightening completed offset (Z-axis for bit) 	Z1	Position Position at which the screw guide is in contact with a workpiece surface
	Z2	Position Position at which the screw is pushed down, with the bit fit in the screw after completion of tightening [Z2 normative position] - [Z2 current position]
Teaching position 	Z1	Position Arbitrary position
	Z2	Position Position at which the screw is pushed down, with the bit fit in the screw after completion of tightening
Teaching position (Internal coversion value) 	Z1	Position [Z1 current position] + [Z2 current position] - [Z2 normative position]
	Z2	Position [Z2 normative position]

Tightening

This section describes tightening operations using screw parameters in time series.

Step	Figure	Description (Z1 : Z-axis for screw guide, Z2 : Z-axis for bit)	
1	Overhead position	Z1	Position Standby position
		Z2	Position Standby position
2	Moving to the "approach offset" position  The screw guide stops immediately before it touches a workpiece.	Z1	Position [Z1 teaching position] + [Tighten completed offset] - [Approach offset] Thrust Fast forward 1 thrust Speed Fast forward 1 speed
		Z2	Position [Z2 normative position] - [Tighten completed offset] - [Screw length] - [Bit cushion] Thrust Fast forward 1 thrust Speed Fast forward 1 speed
3	Moving to tightening start position  The screw guide stops immediately before it touches a workpiece tap hole.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position [Z2 Approach offset] + [Work thickness] + [Approach offset] Thrust Fast forward 2 thrust Speed Fast forward 2 speed
4	Start of temporary tightening  The screw guide starts to move forward, targeting a more advanced position than the teaching position.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position [Z2 normative position] - [Tighten completed offset] + [Target offset] + [Approach offset] Thrust Initial thrust Speed Initial speed

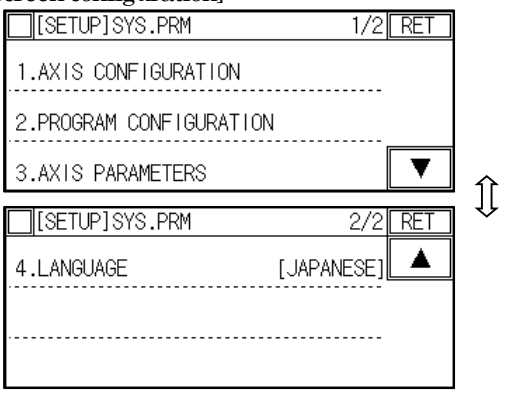
Step	Figure	Description (Z1 : Z-axis for screw guide, Z2 : Z-axis for bit)	
5	Vacuum OFF  Vacuum turns OFF after the screw guide passes through the vacuum OFF position.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position [Z2 Normative position] - [Tighten completed offset] - [Vacuum cut] + [Approach offset] Thrust Initial thrust (Continued) Speed Initial speed (Continued)
6	Start of final tightening  At completion of tightening, the screw guide stops moving to the target position, and the thrust is changed to a height detection thrust. After the trust change, there is a certain delay time.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position [Z2 Normative position] - [Tighten completed offset] - [Final torque change point] + [Approach offset] Thrust Final tightening thrust Speed Final tightening speed
7	Completion of tightening  At completion of tightening, the screw guide stops moving to the target position, and the thrust is changed to a height detection thrust. After the trust change, there is a certain delay time.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position Stop Thrust Height detection thrust (Lower thrust) Speed Stop

Step	Figure	Description (Z1 : Z-axis for screw guide, Z2 : Z-axis for bit)	
8	Height detect  Screw loose fitting judgment is conducted by checking if the difference between the teaching osition and the current position is within a specified range.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position Stop Thrust Height detection thrust (Continued) Speed Stop
9	Moving to return change point  The screw guide moves to the return change point, and stops.	Z1	Position Unchanged Thrust Unchanged Speed Unchanged
		Z2	Position [Z2 Normative position] - [Return change point] Thrust Return 1 thrust (Simple setup : Maximum) Speed Return 1 speed (Simple setup : Maximum)
10	Moving to overhead position 	Z1	Position Overhead space Thrust Return 2 thrust (Simple setup : Maximum) Speed Return 2 speed (Simple setup : Maximum)
		Z2	Position Overhead space Thrust Return 2 thrust (Simple setup : Maximum) Speed Return 2 speed (Simple setup : Maximum)

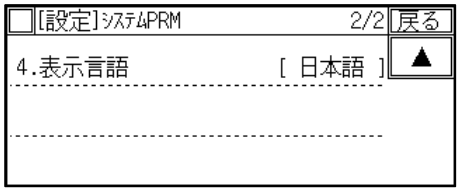
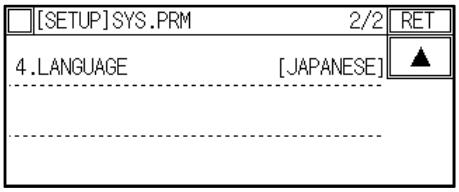
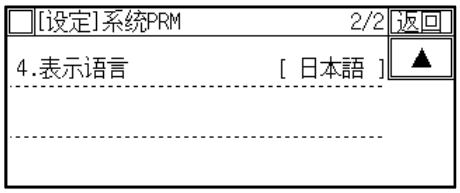
11.4 System parameter setup screen

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

[Screen configuration]



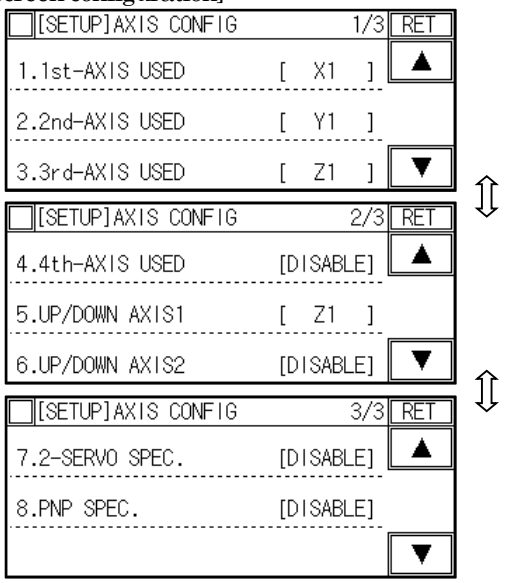
[Description on screen]

1.AXIS CONFIGRATION	Changes to the axis configration setup screen.
2.PROGRAM CONFIGRATION	Changes to the program configration setup screen.
3.AXIS PARAMETERS	Changes to the axis parameters setup screen.
4. 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. 

11.4.1 System parameter axis configuration screen

You can execute axis configration parameter setup, and check the settings.

[Screen configuration]



[Description on screen]

1.1st-AXIS USED	Specify a name of the axis to be used as the first axis. X1 X2 Y1 Y2 Z1 Z2 A1 A2 B1 B2 : When an axis name is selected, the relevant axis is regarded as "Used" DISABLE : No axis is used. If an axis that is not actually provided is selected as "Used", the servo pack alarm is activated.。
2.2nd-AXIS USED	Specify a name of the axis to be used as the second axis. X1 X2 Y1 Y2 Z1 Z2 A1 A2 B1 B2 : When an axis name is selected, the relevant axis is regarded as "Used" DISABLE : No axis is used. If an axis that is not actually provided is selected as "Used", the servo pack alarm is activated.。
3.3rd-AXIS USED	Specify a name of the axis to be used as the third axis. X1 X2 Y1 Y2 Z1 Z2 A1 A2 B1 B2 : When an axis name is selected, the relevant axis is regarded as "Used" DISABLE : No axis is used. If an axis that is not actually provided is selected as "Used", the servo pack alarm is activated.。

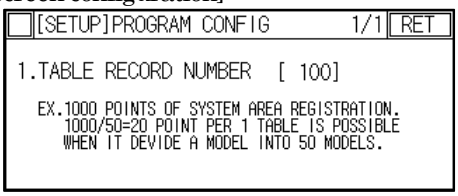
[Description on screen]

4.4th-AXIS USED	Specify a name of the axis to be used as the fourth axis. X1 X2 Y1 Y2 Z1 Z2 A1 A2 B1 B2 : When an axis name is selected, the relevant axis is regarded as "Used" DISABLE : No axis is used. If an axis that is not actually provided is selected as "Used", the servo pack alarm is activated.。
5.UP/DOWN AXIS1	Specify a name of the axis to be used as "UP/DOWN AXIS 1". This axis is specified as the first axis of the Z-axis servo tightening machine, or as the screw guide up/down axis of 2-servo specification (FM520VZZ, RC75-T2). X1 X2 Y1 Y2 Z1 Z2 A1 A2 B1 B2 : Select a name of axis. DISABLE : No axis is used. If an axis that is not actually provided is selected as "Used", the servo pack alarm is activated.
6. UP/DOWN AXIS2	Specify a name of the axis to be used as "UP/DOWN AXIS 2". This axis is specified as the second axis of the Z-axis servo tightening machine, or as the bit up/down axis of 2-servo specification (FM520VZZ, RC75-T2). X1 X2 Y1 Y2 Z1 Z2 A1 A2 B1 B2 : Select a name of axis. DISABLE : No axis is used. If an axis that is not actually provided is selected as "Used", the servo pack alarm is activated.
7.2-SERVO SPEC.	Specify whether the machine is 2-servo specification (FM520VZZ, RC75-T2) or not. ENABLE : The machine is handled as 2-servo specification. DISABLE : The machine is not handled as 2-servo specification.
8.PNP SPEC.	Specify whether the machine is PNP specification. ENABLE : The machine is handled as PNP specification. DISABLE : The machine is handled as NPN specification.

11.4.2 System parameter program configuration screen

You can execute program configration parameter setup, and check the settings.

[Screen configuration]



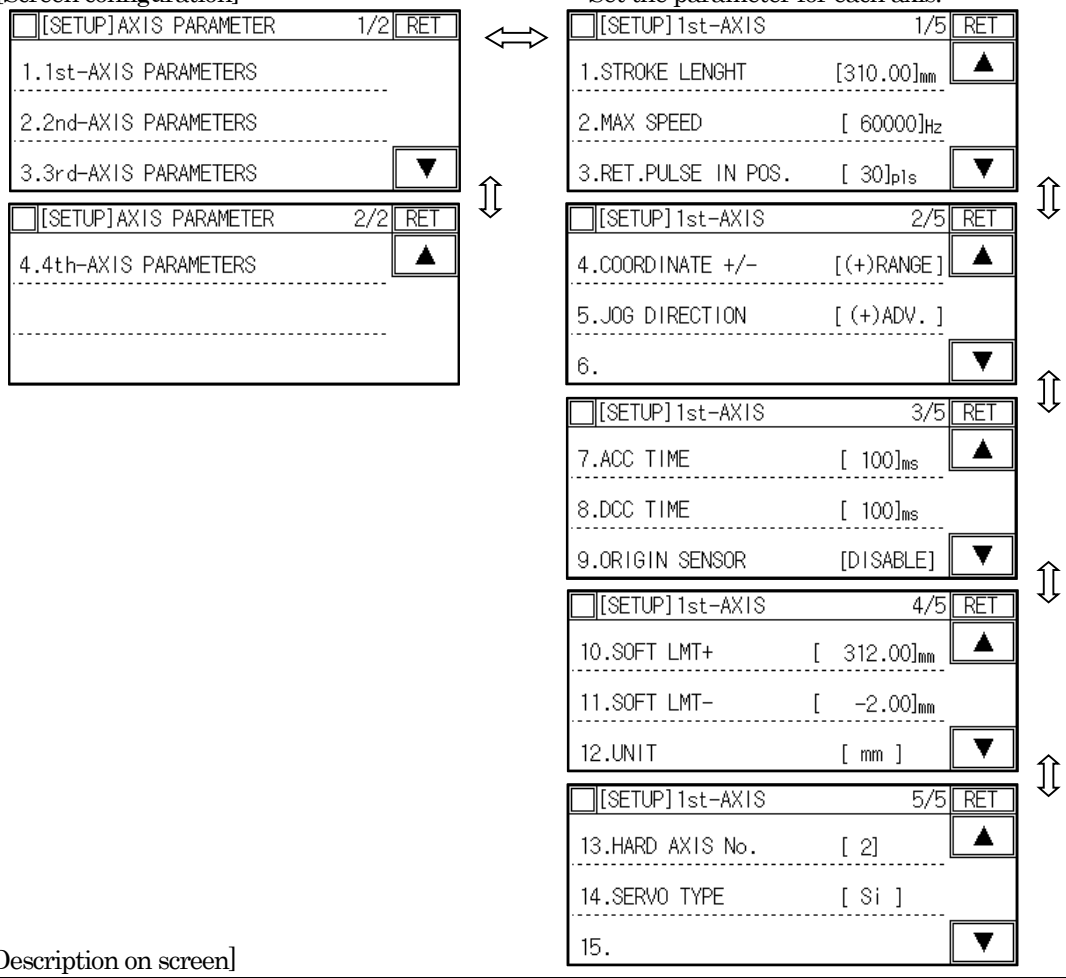
[Description on screen]

1.TABLE RECORD NUMBER	Set a number of tables that can be registered. Touching the value in [ ] displays numeric keys. Enter a value, and press the ENT switch to register the value. Setting range : 1～1000 **CAUTION: If this setting is changed after teaching, it causes teaching data corruption.**

11.4.3 System parameter axis parameters screen

This screen is used to set parameters required to drive the motor. Parameter setting is required for each axis being used.

[Screen configuration]



[Description on screen]

1. STROKE LENGHT	Sets a tightening tool stroke length ([mm]). Pulse output operation or JOG operation limit is determined by the stroke length setting. Specifications stroke +20mm is a standard set value. Setting range : 0.00～999.99 [mm]
2. MAX SPEED	Sets the maximum frequency of pulse output ([Hz]). Setting range : 1～100000 [Hz] The maximum frequency is calculated for each tightening tool with the following formula: Maximum frequency = Lead of ball thread [mm] × 100 × 50 [rps] 50: Rated motor rotation speed per second
3. RET.PULSE IN POS.	Sets a position judgment width (□) ([pulse]) for judgment of arrival at a target position. With the standard setting, 1 pulse corresponds to 0.01 mm. Setting range : 0～999 [pulse]
4. COORDINATE +/-	Sets an up/down axis coordinate range to be displayed. (+)RANGE : The up/down axis coordinate value is a positive value. (−)RANGE : The up/down axis coordinate value is a negative value. The origin return stroke end is defined as "0". The available range is a single range, either the positive or negative range. Normally, use (+)RANGE .

[Description on screen]

5. JOG DIRECTION	Sets a JOG direction. The JOG direction depends on the setting of the above parameter (4. COORDINATE +/-) and the tightening tool mounting direction. (+)ADV. : "JOG +" operation corresponds to advence stroke. (+)RET. : "JOG +" operation corresponds to retreat stroke.
7. ACC TIME	Sets an acceleration time for overall moving operation. Setting range : 50～5000 [msec]
8. DCC TIME	Sets a deceleration time ([msec]) for overall moving operation. Setting range : 50～5000 [msec]
9. ORIGIN SENSOR (Optional)	Specify whether the origin sensor check is conducted or not for stopper origin return detection. DISABLE : Origin sensor check is not conducted during origin return. ENABLE : Origin sensor check is conducted during origin return.
10. SOFT LMT＋	Motor drive limitation value for "+" direction
11. SOFT LMT－	Motor drive limitation value for "-" direction
12. UNIT	Set the axis control unit. mm : Control unit is [mm] .(Orthogonal axes) deg : Control unit is [degree] . (Rotation axis)
13. HARD AXIS No.	Set hardware axes. (Detailed description is given on the next page.) Setting range : 0～4
14. SERVO TYPE	This controller's PLC outputs a pulse signal, and the positioning unit receives the pulse signal to execute move/positioning operation. As the positioning unit, either MELSERVO-JN (MITSUBISHI ELECTRIC) or Si-servo (Sanmei Electronics) can be specified for each axis. JN : MELSERVO-JN (MITSUBISHI ELECTRIC) Si : Si-servo (SANMEI)

Model.	Axis No.	System parameter	
		Axis config.	Servo type
SR395DT Type-1	1st axis	X1	Si
	2nd axis	Y1	Si
	3rd axis	DISABLE	-
	4th axis	DISABLE	-
SR395DT Type-2	1st axis	X1	Si
	2nd axis	Y1	Si
	3rd axis	Z1	JN
	4th axis	DISABLE	-
SR375Y θ	1st axis	Y1	JN
	2nd axis	A1	JN
	3rd axis	DISABLE	-
	4th axis	DISABLE	-
FM513VZ	1st axis	Z1	JN
	2nd axis	DISABLE	-
	3rd axis	DISABLE	-
	4th axis	DISABLE	-
FM520VZZ	1st axis	Z1	JN
	2nd axis	Z2	JN
	3rd axis	DISABLE	-
	4th axis	DISABLE	-

13. Detailed description on hardware assignment

This controller provides high-speed counter inputs for two axes, and pulse outputs for three axes, as standard configuration. Among these axes, the axis subject to tightening thrust control is limited to the first or second axis only for a reason of hardware limitation. Tightening thrust control cannot be applied to the third axis.

For example, with the machine of "XYZ" 3-axis specification, the Z axis is defined as the first axis, because the Z axis cannot be assigned to the third axis. However, if the teaching pendant axis operation sequence is "ZXY", it does not conform to the operation sequence of existing equipment, resulting in inconvenience. To cope with this problem, if the teaching pendant axis assignment is independent of the hardware axis assignment, operation is enabled according to the existing axis configuration sequence, which will not affect operability of the teaching pendant. Specifically, with the following settings, the teaching pendant axis assignment is "XYZ", while hardware axis assignment is "ZXY".

[Example of axis assignment settings of XYZ 3-axis specification]

Axis config..	Axis No.	System parameter		Hard Axis Name
		Axis config.	Hard config	
XYZ 3-axis	1st axis	X1	2	Z
	2nd axis	Y1	3	X
	3rd axis	Z1	1	Y
	4th axis	DISABLE	0	-

↑

Setting to link teaching pendant and hardware axis assignment

Note) Set the teaching pendant axis assignment with the system parameter "AXIS CONFIGRATION", and set the hardware axis assignment with the system parameter "HARD ASSIGNMENT".

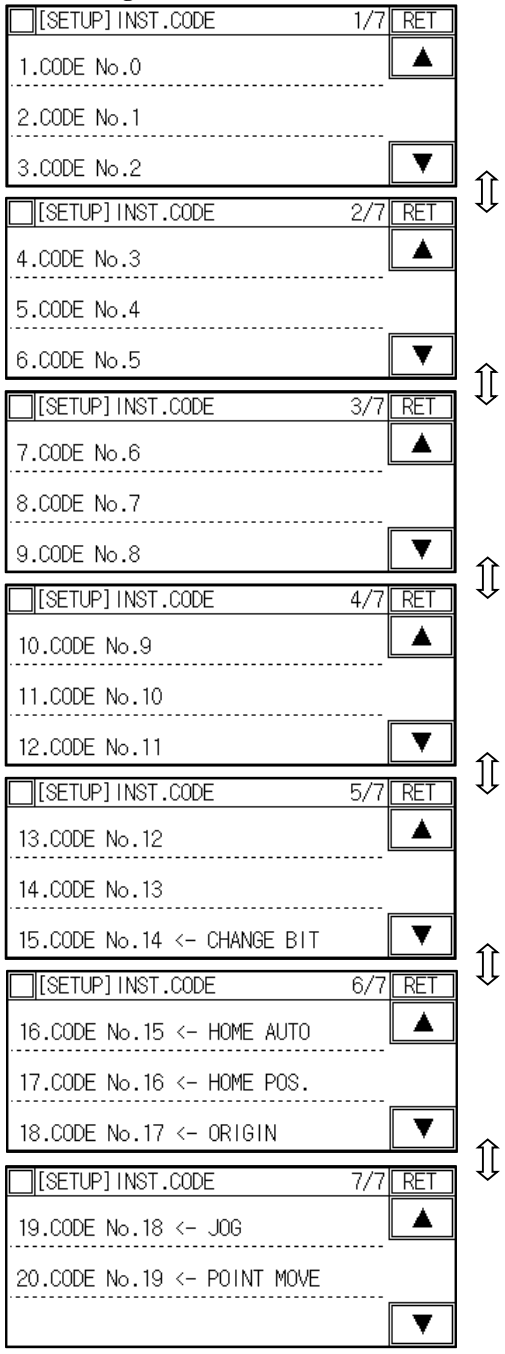
[Axis assignment setting by the type of standard model]

Model..	Axis No.	System parameter		System parameter
		Axis config.	Hard config	
SR395DT Type-1	1st axis	X1	1	X
	2nd axis	Y1	2	Y
	3rd axis	DISABLE	0	-
	4th axis	DISABLE	0	-
SR395DT Type-2	1st axis	X1	2	Z
	2nd axis	Y1	3	X
	3rd axis	Z1	1	Y
	4th axis	DISABLE	0	-
SR395DT Type- 3	1st axis	X1	1	X
	2nd axis	Y1	2	Y1
	3rd axis	Y2	3	Y2
	4th axis	DISABLE	0	-
SR375Y θ	1st axis	Y1	1	Y
	2nd axis	A1	2	θ
	3rd axis	DISABLE	0	-
	4th axis	DISABLE	0	-
FM513VZ	1st axis	Z1	1	Z
	2nd axis	DISABLE	0	-
	3rd axis	DISABLE	0	-
	4th axis	DISABLE	0	-
FM520VZZ	1st axis	Z1	1	Z1 (SG)
	2nd axis	Z2	2	Z2 (bit)
	3rd axis	DISABLE	0	-
	4th axis	DISABLE	0	-

11.5 Instruction code selection menu screen

Selects an instruction code No. to be set, or to be confirmed among instruction codes Nos. 0 to 19.

[Screen configuration]



[Description on screen]

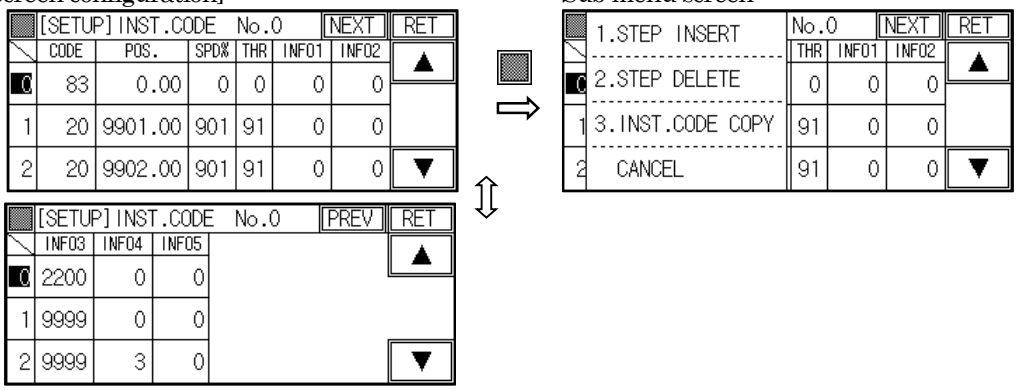
1.CODE No.0	Changes to the instruction code No. 0 setup screen. With the standard specifications, up/down axis tightening operation has been registered. ・RC75-T1 … Up/down axis tightening operation ・RC75-T2 … Screw guide up/down axis (Z1 axis) operation ・RC755-T2 … Up/down axis tightening operation sub instruction code (to be called from instruction code No. 1)

2.CODE No.1	Changes to the instruction code No. 1 setup screen. With the standard specification, up/down axis tightening operation has been registered. ・RC75-T2 … Bit up/down axis (Z2 axis) operation ・RC755-T2 … Up/down axis tightening operation instruction code
3.CODE No.2	Changes to the instruction code No. 2 setup screen.
4.CODE No.3	Changes to the instruction code No. 3 setup screen.
5.CODE No.4	Changes to the instruction code No. 4 setup screen.
6.CODE No.5	Changes to the instruction code No. 5 setup screen.
7.CODE No.6	Changes to the instruction code No. 6 setup screen.
8.CODE No.7	Changes to the instruction code No. 7 setup screen.
9.CODE No.8	Changes to the instruction code No. 8 setup screen.
10.CODE No.9	Changes to the instruction code No. 9 setup screen.
11.CODE No.10	Changes to the instruction code No. 10 setup screen.
12.CODE No.11	Changes to the instruction code No. 11 setup screen.
13.CODE No.12	Changes to the instruction code No. 12 setup screen.
14.CODE No.13	Changes to the instruction code No. 13 setup screen.
15.CODE No.14 <- CHANGE BIT	Changes to the instruction code No. 14 setup screen. With the standard specification, manual bit replacement has been registered.
16.CODE No.15 <- HOME AUTO	Changes to the instruction code No. 15 setup screen. With the standard specification, move to standby position in one-cycle operation has been registered.
17.CODE No.16 <- HOME POS.	Changes to the instruction code No. 16 setup screen. With the standard setting, the standby position move instruction code has been registered.
18.CODE No.17 <- ORIGIN	Changes to the instruction code No. 17 setup screen. With the standard setting, the origin return instruction code has been registered.
19.CODE No.18 <- JOG	Changes to the instruction code No. 18 setup screen. With the standard setting, the JOG move instruction code has been registered.
20.CODE No.19 <- POINT MOVE	Changes to the instruction code No. 19 setup screen. With the standard setting, the point move instruction code has been registered.

11.5.1 Instruction code setup screen

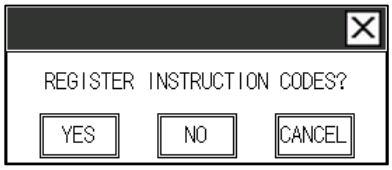
You can execute instruction code setup, and check the settings.
For details of the instruction codes, refer to "Instruction codes".

[Screen configuration]

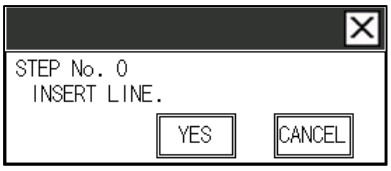
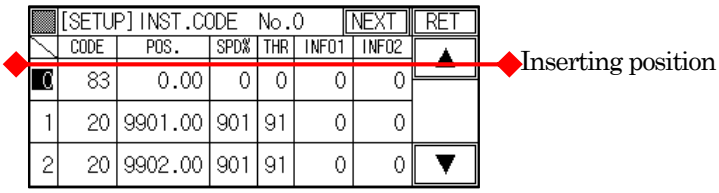
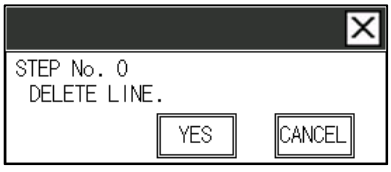
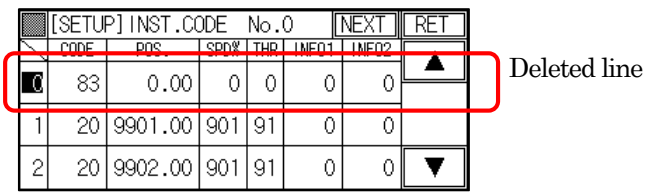


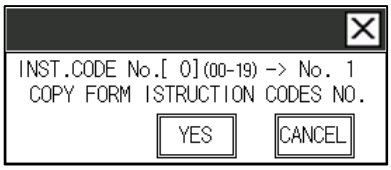
[Description on screen]

Instruction code setup		Nos. 0 to 19 are displayed, 1 step data per line
	CODE	Sets an operation code. Setting range : 0～9999 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	POS.mm	Sets a position information code. Setting range : －999.99～9999.99 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	SPD%	Sets a speed information code. Setting range : 0～999 (A set value exceeding "100" should be used for special codes.) Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	THR	Sets a thrust information code. Setting range : 0～99 (A set value exceeding "7" should be used for special codes.) Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	INFO1	Sets "Information 1". Setting range : 0～9999 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	INFO2	Sets "Information 2". Setting range : 0～9999 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	INFO3	Sets "Information 3". Setting range : 0～9999 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
	INFO4	Sets "Information 4". Setting range : 0～9999 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.

Instruction code setup	INFO5	Sets "Information 5". Setting range : 0～9999 Pressing a numeric setting field displays numeric keys, allowing you to enter a value.
▲ ▼		Scrolls the screen. (No. 0 to 19)
NEXT PREV		Used to change the displayed instruction code string.
RET		Registers an instruction code that has been set. To register the change, press YES . If you do not register it, press NO . 

[Description on sub menu]

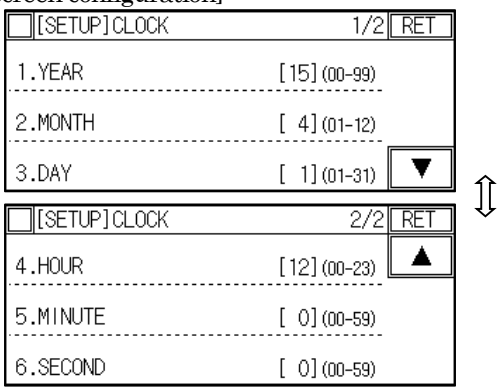
1.STEP INSERT	Inserts one line. Press YES .  The step is inserted in the fixed position as shown below. After adjusting the displayed position with the ▲ or ▼ key, insert a step. 
2.STEP DELETE	Deletes one line. Press YES .  The step is deleted in the fixed position as shown below. After adjusting the displayed position with the ▲ or ▼ key, delete a step. 

3.INST.CODE COPY	Information is copied from a specified instruction code No. to a currently selected instruction code No.  Pressing the area in [ ] (brackets) for CODE No. in the window displays numeric keys, allowing you to enter a value. After confirming the input, press ENT on the numeric keypad, and then press YES .
CANCEL	Closes sub menu display window.

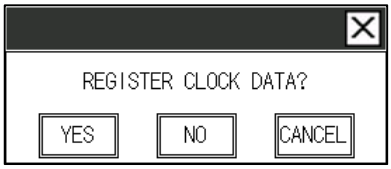
11.6 Clock data setup screen

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]



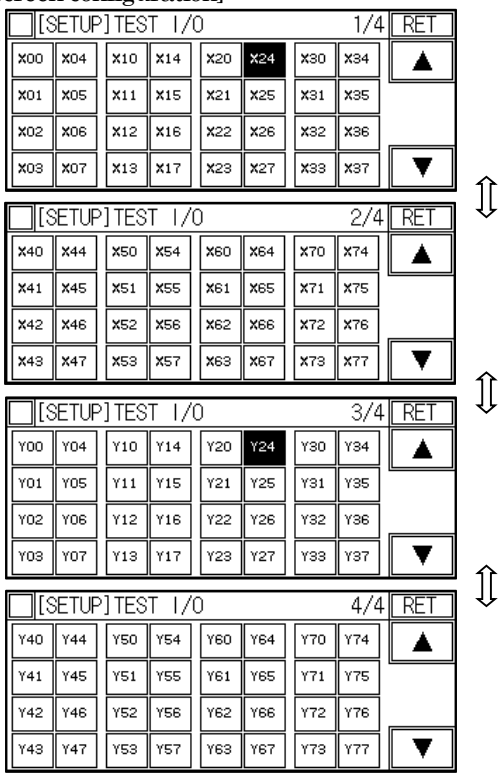
[Description on screen]

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 . 

11.7 Test I/O port screen

This screen enables forced output from controller's PLC.

[Screen configuration]



[Description on screen]

X**	Displays status of 64 inputs (X00 to X77 standard inputs). X00 : OFF X00 : ON
Y**	Displays status of 64 outputs (Y00 to Y77 standard outputs). Touching each address display field forcedly turns ON/OFF the output. Y00 : OFF Y00 : ON Note 1) Y24 is ready ON/OFF output. It cannot be forcedly turned ON/OFF. Note 2) When you exit from the IO test screen, forced output ON status will be reset. Note 3) Before activating forced output, ensure safety, and check the machine status thoroughly.

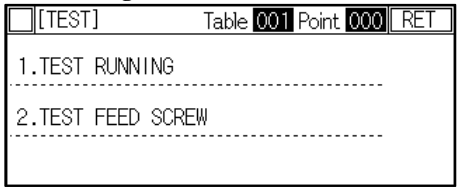
11.8 Running test screen

This screen is used to execute running test.

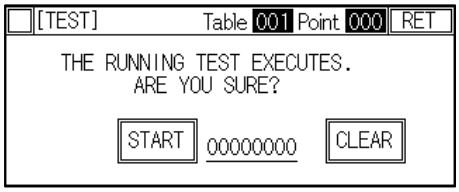
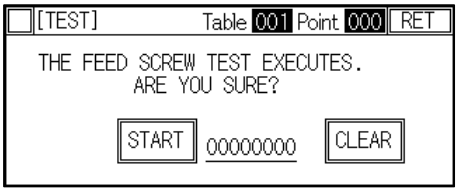
CAUTION

The running test function is provided for the standard specification. For some special specifications, the running test function cannot be used.

[Screen configuration]



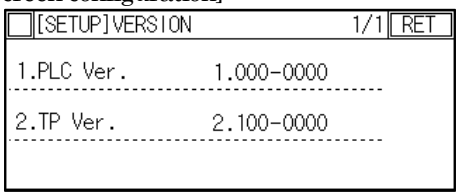
[Description on screen]

1.TEST RUNNING	Changes to the Running test screen.  START … Starts running operation. During execution of running operation, pressing END , or exiting from the running test screen quits the running cycle. CLEAR … Clears the running test counter.
2.TEST FEED SCREW	Changes to the Screw feeding test screen  START … Starts screw feed test operation. During execution of screw feed test operation, pressing END , or exiting from the screw feed test screen quits the screw feed test cycle. CLEAR … Clears the screw feed test counter.

11.9 Version information display screen

You can check system version information.

[Screen configuration]



[Description on screen]

1.PLC Ver.	Displays version information of the RC75, RC755 controller's internal PLC. Display format: Version No. □ Derivative No.
2.TP Ver.	Displays touch panel version information of the teaching pendant. Display format: Version No. □ Derivative No.

12. Flash ROM Mode of the Pendant

12.1 Outline

Registered information is stored in the battery backup area (R register) of the controller's internal PLC. When the PLC battery voltage drops, the data stored in battery backup area (R register) will be lost. The flash ROM wiring operation is to transfer data from the battery backup area (R register) into the flash ROM area (ER register). Once data is written in the flash ROM, the data will not be lost, even if the PLC battery voltage drops.

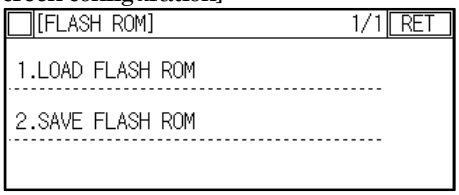
After changing a parameter value or teaching position, be sure to execute the flash ROM writing operation.

Through flash ROM reading operation, you can read data from the flash ROM. The system automatically reads data from the flash ROM at the time when the controller power switch is turned ON, if either of the following conditions is satisfied: ENABLE setting of the operation parameter 28.POW ON LOAD ROM ; or PLC battery voltage drop.

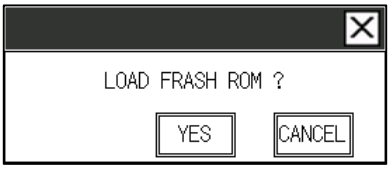
12.2 Flash ROM screen

You can read data from the flash ROM, or write data into the flash ROM.

[Screen configuration]



[Description on sub menu]

1.LOAD FLASH ROM	Data are transferred from the flash ROM area (ER register) into the battery backup area (R register). To execute this processing, press YES . 
2.SAVE FLASH ROM	Data are transferred from the battery backup area (R register) into the flash ROM area (ER register). To execute this processing, press YES . 

13. Instruction Codes

13.1 Outline

During servo operation, RC75 and RC755 will execute operation codes in sequence according to the instruction codes that has been set, as the screw tightening robot executes point data in sequence from the first step. With arbitrary settings of instruction codes, the system executes various operations, as well as tightening operations, without using a sequence program.

All servo operations of RC75 and RC755 are enabled by execution of instruction codes that have been set. 20 patterns of instruction codes (Nos. 0 to 19) are available. (Among 20 patterns of instruction codes, 9 patterns are used for the system, and 11 patterns can be freely changed.) 20 steps of operation codes can be registered in one instruction code.

1) Standard instruction code Nos. 0 to 19 assignment tabl

Instruction code No.	Standard assignment	Note
0	Z-Axis Tightening	
1	Z-Axis Movement	
2	X,Y-Axis Movement	RC75-T1 : Screw pickup
3		(Spera)
4		(Spera)
5		(Spera)
6		(Spera)
7		(Spera)
8		(Spera)
9		(Spera)
10		(Spera)
11		(Spera)
12		(Spera)
13		(Spera)
14	Bit change	For manual operation
15	Move to standby position (For automatic cycle)	
16	Move to standby position (For return)	
17	Origin return	
18	JOG operation	For teaching operation
19	Point moving operation	For teaching operation

(Note) The blank fields indicate no instruction code assignment.

2) Instruction code matrix data assignment (20 steps)

DM	+0	+1,2	+3	+4	+5	+6	+7	+8	+9
No.	Ope. code	Pos.[mm]	Speed [%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0	0000	000000.00	100	1	0	0	0	0	0
1									
19									

Description on items

Operation code	Command to be executed.
Position [mm]	Position information to be used for execution of the operation code.
Speed [%]	Speed information to be used for execution of the operation code.
Thrust	Thrust information to be used for execution of the operation code.
Information 1	Information to be used for execution of the operation code.
Information 2	Information to be used for execution of the operation code.
Information 3	Information to be used for execution of the operation code.
Information 4	Information to be used for execution of the operation code.
Information 5	Information to be used for execution of the operation code.

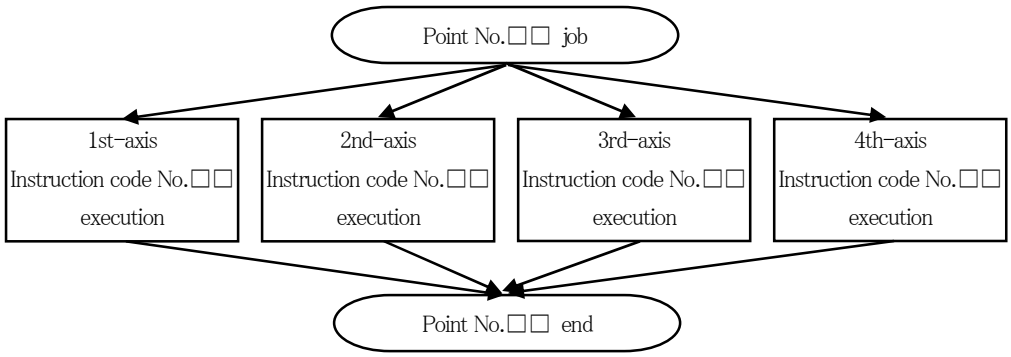
13.2 Instruction code execution flow

The machine controls each axis by executing instruction codes that have been set at each point, enabling complicated operation. With settings of the instruction codes that have been set for each axis, the machine executes required operations while ensuring synchronization between axes and synchronization with the sequence program (IO control).

1) Assignment of tightening operation control

- Instruction code : Axis control (Servo amplifier control)
- PLC ladder : Driver, feeder and pendant display control, Point control

2) Schematic diagram of instruction code execution



Note) At completion of instruction codes for all axes, tightening work at execution points is completed.

3) Assignment of instruction code Nos. to tightening points by standard model (Standard settings)

Controller model	model	Instruction code No.				Note
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis	
RC75-T1	FM513VZ	0				
RC75-T2	FM520VZZ	1	0			
RC75-T3	SR375Y θ	2	2			
RC755-T1	SR395DT Type-1	2	2			
RC755-T2	SR395DT Type-2	2	2	1		
RC755-T4	SR395DT Type-4	2	2	2		

4) Sub routine P0 【Servo control execution】

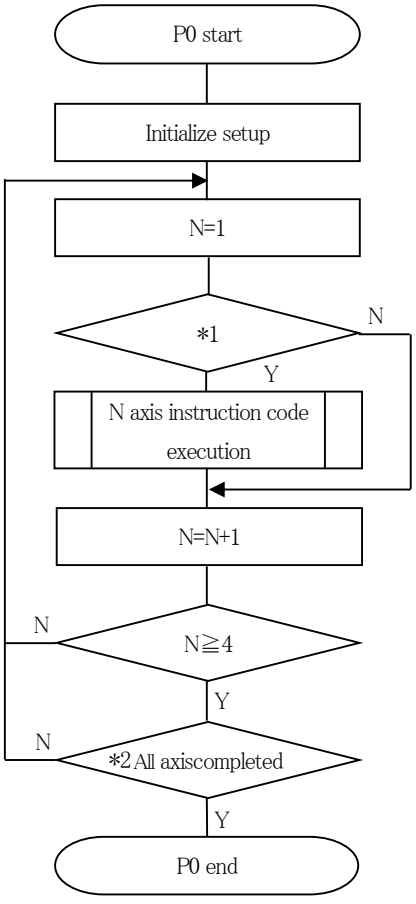
Servo axis move control is executed by calling sub routine P0 (servo control execution). Sub routine P0 moves the servo axis by executing preset instruction codes in sequence.

The following is operation flow of sub routine P0 (servo control execution).

Step	Description
1	Sub routine P0 start Sub routine P0 starts when any device memory of M1140 to M1147 is turned ON. However, for JOG and POINT MOVE operations, other device memories are used to start.

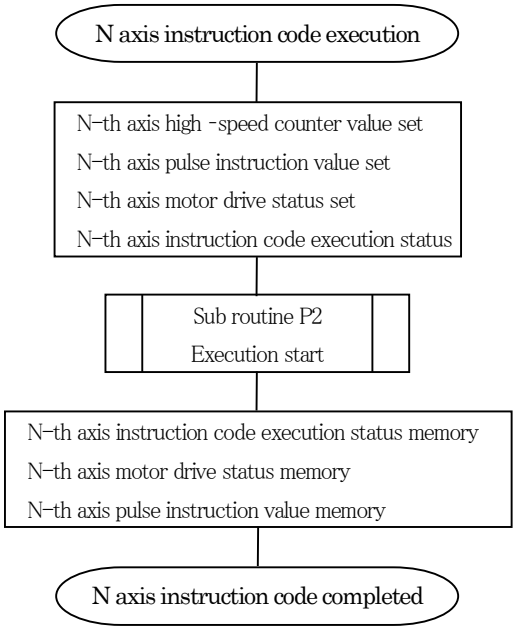
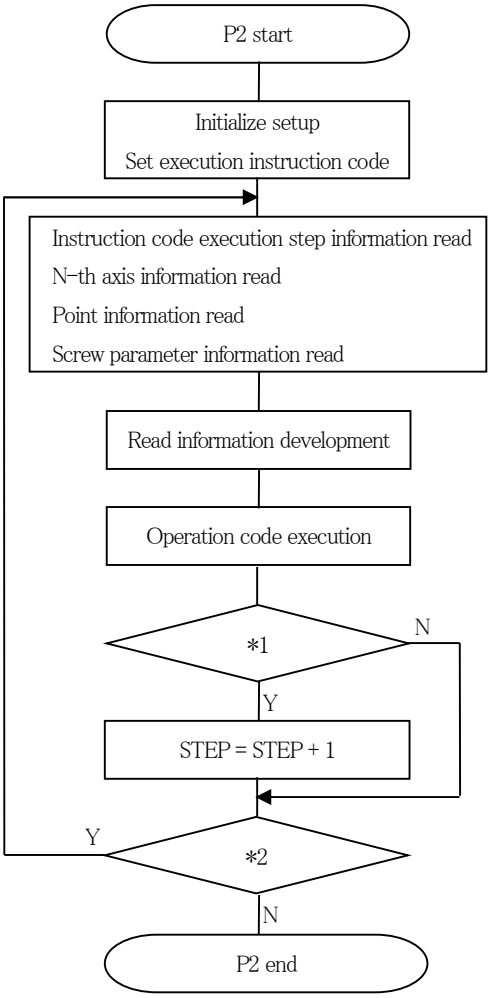
PLC Device	Movement.	Note
M1140	Origin return	Instruction code No.17 start
M1141	Move to standby position	Instruction code No.16 start
M1142	Move to standby position (Auto cycle)	Instruction code No.15 start
M1143	Move to all axis	Used for AUTO Mode Note: For manual bit replacement, instruction code No. 14 start.
M1144	Move to Up/Down axis	Manual driver adv./ret.
M1145	Move to other than Up/Down axis	Manual point move
M1146	(Spere)	
M1147	(Spere)	
S401,S40	JOG	Instruction code No.18 start
S436	Point moving	Instruction code No.19 start

2 Sub routine P0 (servo control execution) execution flow



*1 N−th axis enabled and Execution of N−th axis

*2 PLC scan update at this timing

Step	Description
3	N axis instruction code execution flow 
4	Sub routine P2 (Instruction code execution) execution flow  *1 Operation code execution completed *2 Operation code continuous processing

5) Assignment of instruction code execution (instruction/response) devices

・Execution request (20CH.)

CH.	Devide name	Description
0	Move axis	Drive axis designation (Indicates first, second, third and fourth axes from lowest order bit. When each bit is ON, it is defined as drive axis.)
+1	Auxiliary command 1	Instruction code No.18,19 JOG、Point MOVE : Move direction
+2	Auxiliary command 2	Instruction code No.18,19 JOG、Point MOVE : Move speed Operation code [0034] : Thrust change : Thrust
+3		
+4		
+5		
+6	PLSV stop request	0 : Disable Not 0 : Enable
+7	Instruction coordinate	Move target position designation (Teaching data)
+8	Instruction coordinate	Move target position designation (Teaching data)
+9		
+10	Dummy input 1st-axis	Operation code [0044～0047] : Set bit ON wait condition 1st-axis
+11	Dummy input 2nd-axis	Operation code [0044～0047] : Set bit ON wait condition 2nd-axis
+12	Dummy input 3rd-axis	Operation code [0044～0047] : Set bit ON wait condition 3rd-axis
+13	Dummy input 4th-axis	Operation code [0044～0047] : Set bit ON wait condition 4th-axis
+14	PLC synchronize pointer	Operation code 0080] : PLC sync. pointer value
+15		
+16		
+17		
+18		
+19		

・Execution response (20CH.)

CH.	Devide name	Description
0		
+1	Auxiliary response 1	(Unused)
+2	Auxiliary response 1	Operation code [0010～0047] A setting of information 2 in the instruction code step data area is output.
+3		
+4		
+5		
+6		
+7		
+8		
+9		
+10	Dummy output 1st-axis	Operation code [0042～0043] : Set bit 1st-axis
+11	Dummy output 2nd-axis	Operation code [0042～0043] : Set bit 2nd-axis
+12	Dummy output 3rd-axis	Operation code [0042～0043] : Set bit 3rd-axis
+13	Dummy output 4th-axis	Operation code [0042～0043] : Set bit 4th-axis
+14	PLC sync. pointer 1st-axis	Operation code [0080] : PLC sync. pointer 1st-axis
+15	PLC sync. pointer 2nd-axis	Operation code [0080] : PLC sync. pointer 2nd-axis
+16	PLC sync. pointer 3rd-axis	Operation code [0080] : PLC sync. pointer 3rd-axis
+17	PLC sync. pointer 4th-axis	Operation code [0080] : PLC sync. pointer 4th-axis
+18	PLC sync. pointer min.	Operation code [0080] : PLC sync. pointer minimam
+19	PLC sync. pointer max.	Operation code [0080] : PLC sync. pointer maximam

13.3 Operation code list

・ Operation code list (Available items)

Ope. code	Description	Pos.	Speed	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5
0000	End	■	■	■	■	■	■	■	■
0001	Pass (No processing)	■	■	■	■		■	■	■
0002	Instruction code step jump	■	■	■		■	■	■	■
0003	Instruction code step branch jump 1	■	■	■			■	■	■
0004	Instruction code step branch jump 2	■	■	■			■	■	■
0010	PLSV move (Speed change pulse output)	□	□	□			■		
0011	PLSV move stop 1	■	■	■	■		■	■	
0012	PLSV move stop 2	■	■	■			■	■	
0013	PLSV move target position arrival waiting	■	■	■	■		■	■	
0014	PLSV move target position change	□	■	■			■	■	
0015	PLSV move speed change	□	□	■			■	■	
0016	PLSV move thrust change	□	■	□			■	■	
0017	PLSV move speed/thrust change	□	□	□			■	■	
0018	PLSV move set position pass	□	■	■			■	■	
0019	PLSV move step stop	■	■	■	■	■	■	■	
0020	DRVA move (Absolute position setting)	□	□	□					
0022	DRVI move (Relative position setting)	□	□	□					
0030	Deviation clear	■	■	■	■		■		■
0032	JOG move (PLSV)	■	■		■		■		■
0034	Thrust change	■	■				■	■	■
0040	Set time wait	■	■	■			■	■	■
0042	Set bit ON	■	■	■			■	■	■
0043	Set bit OFF	■	■	■			■	■	■
0044	Set bit ON wait (OR condition)	■	■	■			■	■	■
0045	Set bit ON wait (AND condition)	■	■	■			■	■	■
0046	Set bit OFF wait (OR condition)	■	■	■			■	■	■
0047	Set bit OFF wait (AND condition)	■	■	■			■	■	■
0048	Origin sensor ON conform	■	■	■					■
0049	Origin sensor OFF conform	■	■	■					■
0080	PLC synchronize pointer	■	■	■		■	■	■	■
0082	Set axis synchronize pointer	■	■	■		■	■	■	■
0083	Axis synchronize wait	■	■	■					■
0090	Sub instruction code CALL	■	■	■		■	■	■	■

■ Unused information
□ Screw parameter changeable information

Note)

PLSV : Mitsubishi FX series instruction command, Instruction for speed change pulse output with rotating direction

DRVA : Mitsubishi FX series instruction command, Instruction for absolute position setting

DRVI : Mitsubishi FX series instruction command, Instruction for relative position setting

13.4 Details of operation codes

13.4.1 Operation code [0000]: End

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0000								

[Outline]

Ends execution of an instruction code.

Be sure to register this code as the operation code at the end of an instruction code.

[Detailed description]

None

[Internal processing step]

STEP	Description
0	No processing
9	END (Instruction code execution end)

13.4.2 Operation code [0001] : Pass

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0001								

[Outline]

Proceeds to the next instruction code without execution of the current instruction code. (No processing)

[Detailed description]

Item	Description
Info. 2	During execution of an instruction code, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	No processing
9	END

13.4.3 Operation code [0002] : Instruction code step jump

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0002								

[Outline]

Jumps to an instruction code step No. that has been specified in information 1.

[Detailed description]

Item	Description
Info. 1	Sets a jump destination instruction code step No. Setting range : 0 ～ Instruction code step maximum number

[Internal processing step]

STEP	Description
0	Jump to instruction code step No.

13.4.4 Operation code [0003] : Instruction code step branch jump 1

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0003								

[Outline]

Jumps to an instruction code step No. that has been set in information 1, if auxiliary command 1 is "0". Jumps to an instruction code step No. that has been set in information 2, if auxiliary command 1 is not "0".

[Detailed description]

Item	Description
Info. 1	Sets a jump destination instruction code step No. for the auxiliary command 1 setting of "0". Setting range : 0 ～ Instruction code step maximum number
Info. 2	Sets a jump destination instruction code step No. for the auxiliary command 1 setting of "not 0". Setting range : 0 ～ Instruction code step maximum number

[Internal processing step]

STEP	Description
0	Jump to instruction code step No.

13.4.5 Operation code [0004] : Instruction code step branch jump 2

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0004								

[Outline]

Jumps to an instruction code step No. that has been set in information 2, if the setting of auxiliary command 1 is matching with that of information 1. If the setting of auxiliary command 1 does not match with that of information 1, the system proceeds to the next instruction code step No., without execution of a jump.

[Detailed description]

Item	Description
Info. 1	Sets a value to be compared with auxiliary command 1. Setting range : 0 ～ 9999
Info. 2	Sets a jump destination instruction code step No. for matching of auxiliary command 1 and information 1. Setting range : 0 ～ Instruction code step maximum number

[Internal processing step]

STEP	Description
0	Jump to instruction code step No.

13.4.6 Operation code [0010] : PLSV move (Speed change pulse output)

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0010								

[Outline]

Specify a moving position, speed and thrust to start move operation.

After start of move operation, the system proceeds to the next instruction code, and speed/thrust change and position monitoring are enabled during the move operation.

[Detailed description]

Item	Description
Position	Sets a target position. The "PLSV move" code executes move stop processing only when a target position is reached. It does not execute positioning at the target position. If the target position setting is less than "0", or if it exceeds the stroke length, the move stop processing is disabled. Position > Stroke length : Move start only (Origin return operation in "+" direction) Stroke □ Position □ 0 : Move start + Stop at target position Position □ 0 : Move start only (Origin return operation in "□" direction) With the settings of the following special codes, the system acquires position information from other point registration coordinates or screw parameter information. 8000.** ～8999.** : Specified as indirect point, when the highest order digit is "8". [8□□□.00] : □□□ ⋯ Internal point No. designation (000 to 999) 9901.00 : "Approach offset coordinate" screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type) 9902.00 : "Tightening start coordinate" screw parameter is defined as position information. 9903.00 : "Final tightening change coordinate" screw parameter is defined as position information. 9904.00 : "Target offset coordinate" screw parameter is defined as position information. 9905.00 : "Return change coordinate" screw parameter is defined as position information. 9906.00 : "Approach offset coordinate" screw parameter is defined as position information.(For screw guide axis of 2-servo type)
Speed	Sets a moving speed as a ratio to the maximum speed. Setting range : 1 ～ 100 [%] With the settings of the following special codes, the system acquires speed information from screw parameter information. 901 : "Fast forward 1 speed" screw parameter is defined as speed information. 902 : "Fast forward 2 speed" screw parameter is defined as speed information. 903 : "Initial tightening speed" screw parameter is defined as speed information. 904 : "Final tightening speed" screw parameter is defined as speed information. 905 : "Return 1 speed" screw parameter is defined as speed information. 906 : "Return 2 speed" screw parameter is defined as speed information.

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Thrust</td><td>Selects one of the “current limit value” parameters that have been registered in the servo amplifier.
Setting range : 0 ～ 8
<table>
<tr><td>0</td><td>Current limit value 300[%] (Maximum output current value is fixed)</td></tr>
<tr><td>1</td><td>Current limit value 100[%] ← For origin return</td></tr>
<tr><td>2</td><td>Current limit value 30[%]</td></tr>
<tr><td>3</td><td>Current limit value 40[%]</td></tr>
<tr><td>4</td><td>Current limit value 50[%]</td></tr>
<tr><td>5</td><td>Current limit value 60[%]</td></tr>
<tr><td>6</td><td>Current limit value 70[%]</td></tr>
<tr><td>7</td><td>Current limit value 80[%]</td></tr>
<tr><td>8</td><td>Servo free</td></tr>
</table>
With the settings of the following special codes, the system acquires thrust information from screw parameter information.
Setting range : 0 ～ 8
<table>
<tr><td>91</td><td>“Fast forward 1 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>92</td><td>“Fast forward 2 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>93</td><td>“Initial tightening thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>94</td><td>“Final tightening thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>95</td><td>“Height detection thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>96</td><td>“Return 1 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>97</td><td>“Return 2 thrust” screw parameter is defined as thrust information.</td></tr>
</table></td></tr>
<tr><td>Info. 1</td><td>Specifies whether to use position information as command coordinates.
0 … Position information is not used as command coordinates.
Not 0 … Position information is used as command coordinates.</td></tr>
<tr><td>Info. 2</td><td>At start of instruction code execution, a setting of information 2 is written in auxiliary response 2.
Setting range : 0000 ～ 9999</td></tr>
<tr><td>Info. 4</td><td>To use the approximate point pass function, set this information. Setting any value (1 to 15) other than [0] adds each axis positioning completion confirmation to the move start condition. With this function, the machine confirms that the moving axis completes positioning when passing an approximate point, and then executes next axis move.
Description of setting is as follows:
The lowest order bit is ON: First axis positioning confirmation. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [3], the machine confirms the first and second axis positioning, and then starts to move.</td></tr>
<tr><td>Info. 5</td><td>Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step.
Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.
Description of setting is as follows:
The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [2], the second axis move is disabled.</td></tr>
</table>

[Internal processing step]

STEP	Description
0	Position / speed setup
1	Thrust setup
2	Drive command
9	END

Stops move on arrival at a target position.

(This code is used to stop a move instruction only. It does not execute positioning at a target position.)

13.4.7 Operation code [0011] : PLSV move stop 1

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0011								

[Outline]

This code is active only when PLSV move is in progress.

This code is used to stop PLSV move.

[Detailed description]

Item	Description
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 5	Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step. Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis. Description of setting is as follows: The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [2], the second axis move is disabled.

[Internal processing step]

STEP	Description
0	PLSV move stop (This instruction is not executed when PLSV move is not in progress.)
1	Deviation clear command
2	Deviation clear completion
9	END

13.4.8 Operation code [0012] : PLSV move stop 2

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0012								

[Outline]

This code is active only when PLSV move is in progress.

When PLSV stop request is ON, the system stops PLSV move, and then jumps to an instruction code step No. that has been set in information 1. This instruction is used to reserve a jump destination when PLSV stop request is ON, and proceed to the next instruction.

[Input item]

・PLSV stop request

Set a JOG move direction, and a command to stop JOG move operation.

0 : PLSV stop request is not to be executed.

Not 0 : PLSV stop request is to be executed.

[Detailed description]

Item	Description
Info. 1	Sets a jump destination instruction code step No. for the auxiliary command 1 setting of "0". Setting range : 0 ～ Instruction code step maximum number
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 5	Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step. Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis. Description of setting is as follows: The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [2], the second axis move is disabled.

[Internal processing step]

STEP	Description
0	PLSV move stop (This instruction is not executed when PLSV move is not in progress.)
9	END

13.4.9 Operation code [0013] : PLSV move target position arrival waiting

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0013								

[Outline]

This code is active only when PLSV move is in progress.

Execution of an instruction code is stopped until arrival at a target position.

[Detailed description]

Item	Description
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 5	Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step. Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis. Description of setting is as follows: The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [2], the second axis move is disabled.

[Internal processing step]

STEP	Description
0	Target position arrival confirmation
9	END

13.4.10 Operation code [0014] : PLSV move target position change

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0014								

[Outline]

This code is active only when PLSV move is in progress.

A position specified in position information is defined as PLSV move target position.

[Detailed description]

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Position</td><td>Sets a target position to be changed. The processing varies depending on the setting of information 1.
Information 1 = 0 : An absolute coordinate value is set for a speed change point.
Information 1 <> 0 : A relative coordinate value from a target position is set for a speed change point.
If the target position to be changed meets either of the following conditions, this instruction will not be executed.
(1) The moving direction is the “+” direction, and the target position coordinate value is smaller than that of the current position.
(2) The moving direction is the “□” direction, and the target position coordinate value is larger than that of the current position.
With the settings of the following special codes, the system acquires position information from other point registration coordinates or screw parameter information.
<table>
<tr><td>8000.**
～8999.**</td><td>Specified as indirect point, when the highest order digit is “8”.
[8□□□.00] : □□□ … Internal point No. designation (000 to 999)</td></tr>
<tr><td>9901.00</td><td>“Approach offset coordinate” screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type)</td></tr>
<tr><td>9902.00</td><td>“Tightening start coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9903.00</td><td>“Final tightening change coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9904.00</td><td>“Target offset coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9905.00</td><td>“Return change coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9906.00</td><td>“Approach offset coordinate” screw parameter is defined as position information.(For screw guide axis of 2-servo type)</td></tr>
</table></td></tr>
<tr><td>Info. 1</td><td>Changes a setting of position information.
0 : An absolute coordinate value is used for position information setting.
Not 0 : A relative coordinate value from a target position is used for position information setting.</td></tr>
<tr><td>Info. 2</td><td>At start of instruction code execution, a setting of information 2 is written in auxiliary response 2.
Setting range : 0000 ～ 9999</td></tr>
<tr><td>Info. 5</td><td>Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step.
Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.
Description of setting is as follows:
The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [2], the second axis move is disabled.</td></tr>
</table>

[Internal processing step]

STEP	Description
0	Position change
9	END

13.4.11 Operation code [0015] : PLSV move speed change

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0015								

[Outline]

This code is active only when PLSV move is in progress.

Changes a moving speed on arrival at a position specified in position information.

[Detailed description]

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Position</td><td>Sets a position to execute speed change. The processing varies depending on the setting of information 1.
Information 1 = 0 : An absolute coordinate value is set for a speed change position.
(Example) During move from “+10 mm” to “+50 mm”
Position setting is “20.00” □ Position change is executed at pass through “+20 mm”.
Information 1 <> 0 : A relative coordinate value from a target position is set for a speed change position.
(Example) During move from “+10 mm” to “+50 mm”
Position setting is “20.00” □ 50 + 20 = 70.00 mm. No position change is executed.
Position setting is “□20.00” □ 50 □ 20 = 30.00 mm. Position change is executed at pass through “+20 mm”.
If the position information meets either of the following conditions, this instruction will be immediately executed.
(1) The moving direction is the “+” direction, and the target position coordinate value is smaller than that of the current position.
(2) The moving direction is the “□” direction, and the target position coordinate value is larger than that of the current position.
With the settings of the following special codes, the system acquires position information from other point registration coordinates or screw parameter information
<table>
<tr><td>8000.**
～8999.**</td><td>Specified as indirect point, when the highest order digit is “8”.
[8□□□.00] : □□□ … Internal point No. designation (000 to 999)</td></tr>
<tr><td>9901.00</td><td>“ Approach offset coordinate” screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type)</td></tr>
<tr><td>9902.00</td><td>“ Tightening start coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9903.00</td><td>“Final tightening change coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9904.00</td><td>“Target offset coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9905.00</td><td>“ Return change coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9906.00</td><td>“ Approach offset coordinate” screw parameter is defined as position information.(For screw guide axis of 2-servo type)</td></tr>
</table></td></tr>
<tr><td>Speed</td><td>Sets a moving speed as a ratio to the maximum speed.
Setting range : 1 ～ 100 [%]
With the settings of the following special codes, the system acquires speed information from screw parameter information.
<table>
<tr><td>901</td><td>“Fast forward 1 speed” screw parameter is defined as speed information.</td></tr>
<tr><td>902</td><td>“Fast forward 2 speed” screw parameter is defined as speed information.</td></tr>
<tr><td>903</td><td>“Initial tightening speed” screw parameter is defined as speed information.</td></tr>
<tr><td>904</td><td>“Final tightening speed” screw parameter is defined as speed information.</td></tr>
<tr><td>905</td><td>“Return 1 speed” screw parameter is defined as speed information.</td></tr>
<tr><td>906</td><td>“Return 2 speed” screw parameter is defined as speed information.</td></tr>
</table></td></tr>
</table>

Item	Description
Info. 1	Changes a setting of position information. 0 : An absolute coordinate value is used for position information setting. Not 0 : A relative coordinate value from a target position is used for position information setting.
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 5	Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step. Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis. Description of setting is as follows: The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [2], the second axis move is disabled.

[Internal processing step]

STEP	Description
0	Position confirmation
1	Speed change
9	END

13.4.12 Operation code [0016] : PLSV move thrust change

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0016								

[Outline]

This code is active only when PLSV move is in progress.

Changes thrust on arrival at a position specified in position information.

[Detailed description]

Item	Description
Position	Sets a position to execute thrust change. The processing varies depending on the setting of information 1. Information 1 = 0 : An absolute coordinate value is set for a thrust change position. (Example) During move from "+10 mm" to "+50 mm" Position setting is "20.00" □ Position change is executed at pass through "+20 mm". Information 1 <> 0 : A relative coordinate value from a target position is set for a thrust change position (Example) During move from "+10 mm" to "+50 mm" Position setting is "20.00" □ 50 + 20 = 70.00 mm. No position change is executed. Position setting is "□20.00" □ 50 □ 20 = 30.00 mm. Position change is executed at pass through "+20 mm". If the position information meets either of the following conditions, this instruction will be immediately executed. (1) The moving direction is the "+" direction, and the target position coordinate value is smaller than that of the current position. (2) The moving direction is the "□" direction, and the target position coordinate value is larger than that of the current position. With the settings of the following special codes, the system acquires position information from other point registration coordinates or screw parameter information.
Thrust	Selects one of the "current limit value" parameters that have been registered in the servo amplifier. Setting range : 0 ～ 8

8000.** ～8999.**	Specified as indirect point, when the highest order digit is "8". [8□□□.00] : □□□ ⋯ Internal point No. designation (000 to 999)
9901.00	"Approach offset coordinate" screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type)
9902.00	"Tightening start coordinate" screw parameter is defined as position information.
9903.00	"Final tightening change coordinate" screw parameter is defined as position information.
9904.00	"Target offset coordinate" screw parameter is defined as position information.
9905.00	"Return change coordinate" screw parameter is defined as position information.
9906.00	"Approach offset coordinate" screw parameter is defined as position information.(For screw guide axis of 2-servo type)

0	Current limit value 300[%] (Maximum output current value is fixed)
1	Current limit value 100[%] ← For origin return
2	Current limit value 30[%]
3	Current limit value 40[%]
4	Current limit value 50[%]
5	Current limit value 60[%]
6	Current limit value 70[%]
7	Current limit value 80[%]
8	Servo free

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Thrust</td><td>With the settings of the following special codes, the system acquires thrust information from screw parameter information.
Setting range : 0 ～ 8
<table><tr><td>91</td><td>“Fast forward 1 thrust” screw parameter is defined as thrust information.</td></tr><tr><td>92</td><td>“Fast forward 2 thrust” screw parameter is defined as thrust information.</td></tr><tr><td>93</td><td>“Initial tightening thrust” screw parameter is defined as thrust information.</td></tr><tr><td>94</td><td>“Final tightening thrust” screw parameter is defined as thrust information.</td></tr><tr><td>95</td><td>“Height detection thrust” screw parameter is defined as thrust information.</td></tr><tr><td>96</td><td>“Return 1 thrust” screw parameter is defined as thrust information.</td></tr><tr><td>97</td><td>“Return 2 thrust” screw parameter is defined as thrust information.</td></tr></table></td></tr>
<tr><td>Info. 1</td><td>Changes a setting of position information.
0 : An absolute coordinate value is used for position information setting.
Not 0 : A relative coordinate value from a target position is used for position information setting.</td></tr>
<tr><td>Info. 2</td><td>At start of instruction code execution, a setting of information 2 is written in auxiliary response 2.
Setting range : 0000 ～ 9999</td></tr>
<tr><td>Info. 5</td><td>Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step.
Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.
Description of setting is as follows:
The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [2], the second axis move is disabled.</td></tr>
</table>

[Internal processing step]

STEP	Description
0	Position confirmation
1	Thrust change
2	Thrust change completion
9	END

13.4.13 Operation code [0017] : PLSV move speed/thrust change

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0017								

[Outline]

This code is active only when PLSV move is in progress.

Changes moving speed and thrust on arrival at a position specified in position information.

[Detailed description]

Item	Description
Position	Sets a position to execute speed change and thrust change simultaneously. The processing varies depending on the setting of information 1. Information 1 = 0 : An absolute coordinate value is set for a speed and thrust change position. (Example) During move from "+10 mm" to "+50 mm" Position setting is "20.00" □ Position change is executed at pass through "+20 mm". Information 1 <> 0 : A relative coordinate value from a target position is set for a speed and thrust change position. (Example) During move from "+10 mm" to "+50 mm" Position setting is "20.00" □ 50 + 20 = 70.00 mm. No position change is executed. Position setting is "□20.00" □ 50 □ 20 = 30.00 mm. Position change is executed at pass through "+20 mm". If the position information meets either of the following conditions, this instruction will be immediately executed. (1) The moving direction is the "+" direction, and the target position coordinate value is smaller than that of the current position. (2) The moving direction is the "□" direction, and the target position coordinate value is larger than that of the current position. With the settings of the following special codes, the system acquires position information from other point registration coordinates or screw parameter information. 8000.** ～8999.** : Specified as indirect point, when the highest order digit is "8". [8□□□.00] : □□□ ··· Internal point No. designation (000 to 999) 9901.00 : "Approach offset coordinate" screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type) 9902.00 : "Tightening start coordinate" screw parameter is defined as position information. 9903.00 : "Final tightening change coordinate" screw parameter is defined as position information. 9904.00 : "Target offset coordinate" screw parameter is defined as position information. 9905.00 : "Return change coordinate" screw parameter is defined as position information. 9906.00 : "Approach offset coordinate" screw parameter is defined as position information.(For screw guide axis of 2-servo type)
Speed	Sets a moving speed as a ratio to the maximum speed. Setting range : 1 ～ 100 [%] With the settings of the following special codes, the system acquires speed information from screw parameter information. 901 : "Fast forward 1 speed" screw parameter is defined as speed information. 902 : "Fast forward 2 speed" screw parameter is defined as speed information. 903 : "Initial tightening speed" screw parameter is defined as speed information. 904 : "Final tightening speed" screw parameter is defined as speed information. 905 : "Return 1 speed" screw parameter is defined as speed information. 906 : "Return 2 speed" screw parameter is defined as speed information.

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Thrust</td><td>Selects one of the “current limit value” parameters that have been registered in the servo amplifier.
Setting range : 0 ～ 8
<table>
<tr><td>0</td><td>Current limit value 300[%] (Maximum output current value is fixed)</td></tr>
<tr><td>1</td><td>Current limit value 100[%] ← For origin return</td></tr>
<tr><td>2</td><td>Current limit value 30[%]</td></tr>
<tr><td>3</td><td>Current limit value 40[%]</td></tr>
<tr><td>4</td><td>Current limit value 50[%]</td></tr>
<tr><td>5</td><td>Current limit value 60[%]</td></tr>
<tr><td>6</td><td>Current limit value 70[%]</td></tr>
<tr><td>7</td><td>Current limit value 80[%]</td></tr>
<tr><td>8</td><td>Servo free</td></tr>
</table>
With the settings of the following special codes, the system acquires thrust information from screw parameter information.
Setting range : 0 ～ 8
<table>
<tr><td>91</td><td>“Fast forward 1 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>92</td><td>“Fast forward 2 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>93</td><td>“Initial tightening thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>94</td><td>“Final tightening thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>95</td><td>“Height detection thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>96</td><td>“Return 1 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>97</td><td>“Return 2 thrust” screw parameter is defined as thrust information.</td></tr>
</table></td></tr>
<tr><td>Info. 1</td><td>Changes a setting of position information.
0 : An absolute coordinate value is used for position information setting.
Not 0 : A relative coordinate value from a target position is used for position information setting.</td></tr>
<tr><td>Info. 2</td><td>At start of instruction code execution, a setting of information 2 is written in auxiliary response 2.
Setting range : 0000 ～ 9999</td></tr>
<tr><td>Info. 5</td><td>Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step.
Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.
Description of setting is as follows:
The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [2], the second axis move is disabled.</td></tr>
</table>

[Internal processing step]

STEP	Description
0	Position confirmation
1	Speed change
2	Thrust change
3	Thrust change completion
9	END

13.4.14 Operation code [0018] : PLSV move set position pass

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0018								

[Outline]

This code is active only when PLSV move is in progress.

When the tool passes through a position that has been specified in position information, a setting of information 2 is written in auxiliary response 2.

[Detailed description]

Item	Description
Position	Sets a position to output during pass. The processing varies depending on the setting of information 1. Information 1 = 0 : An absolute coordinate value is set for a pass position. (Example) During move from "+10 mm" to "+50 mm" Position setting is "20.00" □ Position change is executed at pass through "+20 mm". Information 1 : A relative coordinate value from a target position is set for a pass position. (Example) During move from "+10 mm" to "+50 mm" Position setting is "20.00" □ 50 + 20 = 70.00 mm. No position change is executed. Position setting is "□20.00" □ 50 □ 20 = 30.00 mm. Position change is executed at pass through "+20 mm". If the position information meets either of the following conditions, this instruction will be immediately executed. (1) The moving direction is the "+" direction, and the target position coordinate value is smaller than that of the current position. (2) The moving direction is the "□" direction, and the target position coordinate value is larger than that of the current position. With the settings of the following special codes, the system acquires position information from other point registration coordinates or screw parameter information.
Info. 1	Changes a setting of position information. 0 : An absolute coordinate value is used for position information setting. Not 0 : A relative coordinate value from a target position is used for position information setting.
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 5	Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step. Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis. Description of setting is as follows: The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [2], the second axis move is disabled.

8000.** ～8999.**	Specified as indirect point, when the highest order digit is "8". [8□□□.00] : □□□ ⋯ Internal point No. designation (000 to 999)
9901.00	"Approach offset coordinate" screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type)
9902.00	"Tightening start coordinate" screw parameter is defined as position information.
9903.00	"Final tightening change coordinate" screw parameter is defined as position information.
9904.00	"Target offset coordinate" screw parameter is defined as position information.
9905.00	"Return change coordinate" screw parameter is defined as position information.
9906.00	"Approach offset coordinate" screw parameter is defined as position information.(For screw guide axis of 2-servo type)

[Internal processing step]

STEP	Description
0	Position confirmation
1	Drive completion
9	END

13.4.15 Operation code [0019] : PLSV move step stop

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0019								

[Outline]

This code is active only when PLSV move is in progress.

This code is used to stop PLSV step control.

[Detailed description]

None

[Internal processing step]

STEP	Description
0	No processing (PLSV step stop)
9	END

13.4.16 Operation code [0020] : DRVA move (Absolute position setting)

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0020								

[Outline]

Specifies an absolute moving position, speed and thrust to start move operation.

After completion of move operation, the system proceeds to the next instruction code.

[Detailed description]

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Position</td><td>Sets an absolute target position.
Setting range : Stroke length ≧ Position ≧ 0
With the settings of the following special codes, the system acquires speed information from other point registration coordinates or screw parameter information.
<table>
<tr><td>8000.**
～8999.**</td><td>Specified as indirect point, when the highest order digit is “8”.
[8□□□.00] : □□□ … Internal point No. designation (000 to 999)</td></tr>
<tr><td>9901.00</td><td>“Approach offset coordinate” screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type)</td></tr>
<tr><td>9902.00</td><td>“Tightening start coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9903.00</td><td>“Final tightening change coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9904.00</td><td>“Target offset coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9905.00</td><td>“Return change coordinate” screw parameter is defined as position information.</td></tr>
<tr><td>9906.00</td><td>“Approach offset coordinate” screw parameter is defined as position information.(For screw guide axis of 2-servo type)</td></tr>
</table></td></tr>
<tr><td>Speed</td><td>Sets a moving speed as a ratio to the maximum speed.
Setting range : 1 ～ 100 [%]
With the settings of the following special codes, the system acquires speed information from screw parameter information.
<table>
<tr><td>901</td><td>“Fast forward 1 speed” screw parameter is defined as speed information.</td></tr>
<tr><td>902</td><td>“Fast forward 2 speed” screw parameter is defined as speed information.</td></tr>
<tr><td>903</td><td>“Initial tightening speed” screw parameter is defined as speed information.</td></tr>
<tr><td>904</td><td>“Final tightening speed” screw parameter is defined as speed information.</td></tr>
<tr><td>905</td><td>“Return 1 speed” screw parameter is defined as speed information.</td></tr>
<tr><td>906</td><td>“Return 2 speed” screw parameter is defined as speed information.</td></tr>
</table></td></tr>
<tr><td>Thrust</td><td>Selects one of the “current limit value” parameters that have been registered in the servo amplifier.
Setting range : 0 ～ 8
<table>
<tr><td>0</td><td>Current limit value 300[%] (Maximum output current value is fixed)</td></tr>
<tr><td>1</td><td>Current limit value 100[%] ← For origin return</td></tr>
<tr><td>2</td><td>Current limit value 30[%]</td></tr>
<tr><td>3</td><td>Current limit value 40[%]</td></tr>
<tr><td>4</td><td>Current limit value 50[%]</td></tr>
<tr><td>5</td><td>Current limit value 60[%]</td></tr>
<tr><td>6</td><td>Current limit value 70[%]</td></tr>
<tr><td>7</td><td>Current limit value 80[%]</td></tr>
<tr><td>8</td><td>Servo free</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Thrust</td><td>With the settings of the following special codes, the system acquires thrust information from screw parameter information.
Setting range : 0 ～ 8
<table><tr><td>91</td><td>“Fast forward 1 thrust” screw parameter is defined as thrust information.</td></tr><tr><td>92</td><td>“Fast forward 2 thrust” screw parameter is defined as thrust information.</td></tr><tr><td>93</td><td>“Initial tightening thrust” screw parameter is defined as thrust information.</td></tr><tr><td>94</td><td>“Final tightening thrust” screw parameter is defined as thrust information.</td></tr><tr><td>95</td><td>“Height detection thrust” screw parameter is defined as thrust information.</td></tr><tr><td>96</td><td>“Return 1 thrust” screw parameter is defined as thrust information.</td></tr><tr><td>97</td><td>“Return 2 thrust” screw parameter is defined as thrust information.</td></tr></table></td></tr>
<tr><td>Info. 1</td><td>Changes a setting of position information.
0 … An absolute coordinate value is used for position information setting.
Not 0 … A relative coordinate value from a target position is used for position information setting.</td></tr>
<tr><td>Info. 2</td><td>At start of instruction code execution, a setting of information 2 is written in auxiliary response 2.
Setting range : 0000 ～ 9999</td></tr>
<tr><td>Info. 3</td><td>To use the approximate point pass function, set this information. Setting any value (1 to 9999) other than [0] enables the approximate point pass function. Set an offset distance (mm) for approach to a target position to proceed to the next step.

(Example)
When the set value is [10], the machine proceeds to the next step at 10 mm offset distance to the target position.</td></tr>
<tr><td>Info. 4</td><td>To use the approximate point pass function, set this information. Setting any value (1 to 15) other than [0] adds each axis positioning completion confirmation to the move start condition. With this function, the machine confirms that the moving axis completes positioning when passing an approximate point, and then executes next axis move.
Description of setting is as follows:
The lowest order bit is ON: First axis positioning confirmation. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [3], the machine confirms the first and second axis positioning, and then starts to move.</td></tr>
<tr><td>Info. 5</td><td>Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step.
Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.
Description of setting is as follows:
The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [2], the second axis move is disabled.</td></tr>
</table>

[Internal processing step]

STEP	Description
0	Position/speed setup
1	Thrust setup
2	Drive command
3	Drive completion comform
9	END

13.4.17 Operation code [0022] : DRVI move (Relative position setting)

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0022								

[Outline]

Specifies a relative moving position, speed and thrust to start move operation.

After completion of move operation, the system proceeds to the next instruction code.

[Detailed description]

Item	Description
Position	Set a relative target position. Setting range : Stroke length ≧ Position ≧ 0 With the settings of the following special codes, the system acquires speed information from other point registration coordinates or screw parameter information.

8000.** ～8999.**	Specified as indirect point, when the highest order digit is "8". [8□□□.00] : □□□ ⋯ Internal point No. designation (000 to 999)
9901.00	" Approach offset coordinate" screw parameter is defined as position information.(Single axis type or for bit axis of 2-servo type)
9902.00	" Tightening start coordinate" screw parameter is defined as position information.
9903.00	"Final tightening change coordinate" screw parameter is defined as position information.
9904.00	"Target offset coordinate" screw parameter is defined as position information.
9905.00	" Return change coordinate" screw parameter is defined as position information.
9906.00	" Approach offset coordinate" screw parameter is defined as position information.(For screw guide axis of 2-servo type)

Speed	Sets a moving speed as a ratio to the maximum speed. Setting range : 1 ～ 100 [%] With the settings of the following special codes, the system acquires speed information from screw parameter information.

901	"Fast forward 1 speed" screw parameter is defined as speed information.
902	"Fast forward 2 speed" screw parameter is defined as speed information.
903	"Initial tightening speed" screw parameter is defined as speed information.
904	"Final tightening speed" screw parameter is defined as speed information.
905	"Return 1 speed" screw parameter is defined as speed information.
906	"Return 2 speed" screw parameter is defined as speed information.

Thrust	Selects one of the "current limit value" parameters that have been registered in the servo amplifier. Setting range : 0 ～ 8

0	Current limit value 300[%] (Maximum output current value is fixed)
1	Current limit value 100[%] ← For origin return
2	Current limit value 30[%]
3	Current limit value 40[%]
4	Current limit value 50[%]
5	Current limit value 60[%]
6	Current limit value 70[%]
7	Current limit value 80[%]
8	Servo free

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Thrust</td><td>With the settings of the following special codes, the system acquires thrust information from screw parameter information.
Setting range : 0 ～ 8
<table>
<tr><td>91</td><td>“Fast forward 1 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>92</td><td>“Fast forward 2 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>93</td><td>“Initial tightening thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>94</td><td>“Final tightening thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>95</td><td>“Height detection thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>96</td><td>“Return 1 thrust” screw parameter is defined as thrust information.</td></tr>
<tr><td>97</td><td>“Return 2 thrust” screw parameter is defined as thrust information.</td></tr>
</table></td></tr>
<tr><td>Info. 1</td><td>Changes a setting of position information.
0 … An absolute coordinate value is used for position information setting.
Not 0 … A relative coordinate value from a target position is used for position information setting.</td></tr>
<tr><td>Info. 2</td><td>At start of instruction code execution, a setting of information 2 is written in auxiliary response 2.
Setting range : 0000 ～ 9999</td></tr>
<tr><td>Info. 3</td><td>To use the approximate point pass function, set this information. Setting any value (1 to 9999) other than [0] enables the approximate point pass function. Set an offset distance (mm) for approach to a target position to proceed to the next step.

(Example)
When the set value is [10], the machine proceeds to the next step at 10 mm offset distance to the target position.</td></tr>
<tr><td>Info. 4</td><td>To use the approximate point pass function, set this information. Setting any value (1 to 15) other than [0] adds each axis positioning completion confirmation to the move start condition. With this function, the machine confirms that the moving axis completes positioning when passing an approximate point, and then executes next axis move.
Description of setting is as follows:
The lowest order bit is ON: First axis positioning confirmation. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [3], the machine confirms the first and second axis positioning, and then starts to move.</td></tr>
<tr><td>Info. 5</td><td>Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step.
Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.
Description of setting is as follows:
The lowest order bit is ON: First axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)
When the set value is [2], the second axis move is disabled.</td></tr>
</table>

[Internal processing step]

STEP	Description
0	Position/speed setup
1	Thrust setup
2	Drive command
3	Drive completion comform
9	END

13.4.18 Operation code [0030] : Deviation clear

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0030								

[Outline]

When the servo amplifier's stopper detection output is turned ON, deviation is cleared, and the current position is defined as the coordinate zero point.

[Detailed description]

Item	Description
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 4	To use the approximate point pass function, set this information. Setting any value (1 to 15) other than [0] adds each axis positioning completion confirmation to the move start condition. With this function, the machine confirms that the moving axis completes positioning when passing an approximate point, and then executes next axis move. Description of setting is as follows: The lowest order bit is ON: First axis positioning confirmation. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [3], the machine confirms the first and second axis positioning, and then starts to move.

[Internal processing step]

STEP	Description
0	Stopper detection check
1	Coordinate zero setting
2	Deviation clear command
3	Deviation clear completion → Current value zero communication command for SI servo only
4	Current value zero communication completion for SI servo only
9	END

13.4.19 Operation code [0032] : JOG move (PLSV)

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0030								

[Outline]

Specifies a moving direction, speed and thrust to execute JOG move operation.

[Input item]

・Auxiliary command 1

Sets JOG move direction, and a command to stop JOG move operation.

1 : JOG move in "+" direction

2 : JOG move in "–" direction

Other than the above "1" and "2": Stops move during JOG operation.

・Auxiliary command 2

Sets a JOG move speed as a ratio to the maximum speed.

Setting range : 1 ～ 100 [%] (Speed change cannot be executed during JOG move operation.)

[Detailed description]

Item	Description
Thrust	Selects one of the "current limit value" parameters that have been registered in the servo amplifier. Setting range : 0 ～ 8
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999
Info. 4	To use the approximate point pass function, set this information. Setting any value (1 to 15) other than [0] adds each axis positioning completion confirmation to the move start condition. With this function, the machine confirms that the moving axis completes positioning when passing an approximate point, and then executes next axis move. Description of setting is as follows: The lowest order bit is ON: First axis positioning confirmation. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively. (Example) When the set value is [3], the machine confirms the first and second axis positioning, and then starts to move.

0	Current limit value 300[%] (Maximum output current value is fixed)
1	Current limit value 100[%] ← For origin return
2	Current limit value 30[%]
3	Current limit value 40[%]
4	Current limit value 50[%]
5	Current limit value 60[%]
6	Current limit value 70[%]
7	Current limit value 80[%]
8	Servo free

[Internal processing step]

STEP	Description
0	Position/speed setup
1	Thrust setup
2	Drive command
3	JOG command continuous monitoring (Target position arrival confirmation or auxiliary command 1 OFF confirmation)
9	END

Move operation will stop on arrival at the stroke end.

13.4.20 Operation code [0034] : Thrust change

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0034								

[Outline]

Changes thrust to a specified thrust.

[Input item]

・Thrust or auxiliary command 2 (Select either item in information 1.)

For details of auxiliary command 2, refer to the description of "Thrust" in the next section.

[Detailed description]

Item	Description
Thrust	Selects one of the "current limit value" parameters that have been registered in the servo amplifier. Setting range : 0 ～ 8

0	Current limit value 300[%] (Maximum output current value is fixed)
1	Current limit value 100[%] ← For origin return
2	Current limit value 30[%]
3	Current limit value 40[%]
4	Current limit value 50[%]
5	Current limit value 60[%]
6	Current limit value 70[%]
7	Current limit value 80[%]
8	Servo free

With the settings of the following special codes, the system acquires thrust information from screw parameter information.
Setting range : 0 ～ 8

91	"Fast forward 1 thrust" screw parameter is defined as thrust information.
92	"Fast forward 2 thrust" screw parameter is defined as thrust information.
93	"Initial tightening thrust" screw parameter is defined as thrust information.
94	"Final tightening thrust" screw parameter is defined as thrust information.
95	"Height detection thrust" screw parameter is defined as thrust information.
96	"Return 1 thrust" screw parameter is defined as thrust information.
97	"Return 2 thrust" screw parameter is defined as thrust information.

Info. 1	Selects thrust information to be used. 0 : Thrust is changed to a setting of thrust information. Not 0 : Thrust is changed to a setting of auxiliary command 2.
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Information reading
1	Thrust setup
2	Thrust setup completion
9	END

13.4.21 Operation code [0040] : Set time wait

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0040								

[Outline]

After waiting for a time that has been specified in information 1, the system proceeds to the next processing.

Note1) Tighten with climbing instruction CODE, bit cushions built-in tools to use after detecting the height of rise wait if you choose 100 ms or more.

[Detailed description]

Item	Description
Info. 1	Sets a wait time in the unit of "ms". Setting range : 0.000 ~ 9.999 [sec]
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ~ 9999

[Internal processing step]

STEP	Description
0	Time setup
1	Wait time elapse confirmation
9	END

13.4.22 Operation code [0042] : Set bit ON

[Setting item table]

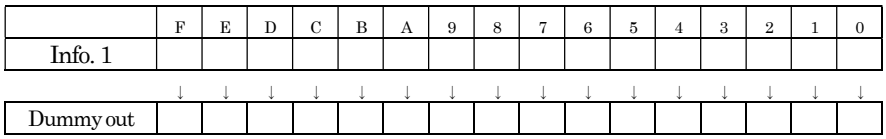
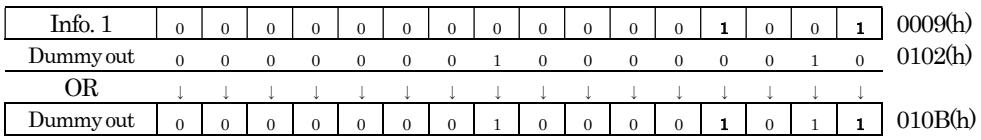
Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0042								

[Outline]

Turns ON a bit that has been specified in information 1.

The bit to be specified corresponds to the data memory bit of the execution response dummy output (16 bits) in axis.

[Detailed description]

Item	Description
Info. 1	Turns ON a specified bit. Several bits can be simultaneously turned ON. 1 : The bit turns ON. 0 : The bit does not turn ON. (No change)  Dummy output = Information 1 OR dummy output (Example) 
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Set bit ON
9	END

13.4.23 Operation code [0043] : Set bit OFF

[Setting item table]

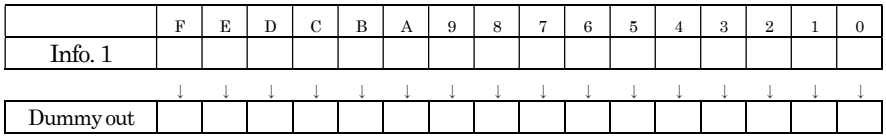
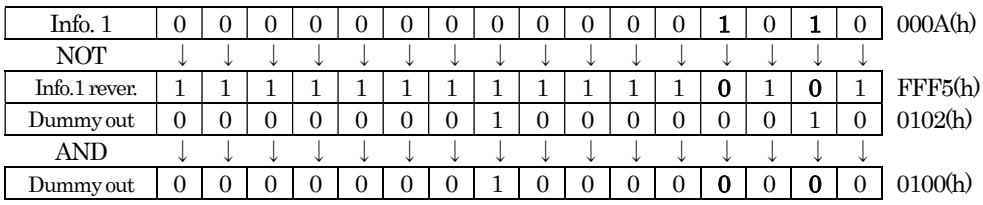
Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0043								

[Outline]

Turns OFF a bit that has been specified in information 1.

The bit to be specified corresponds to the data memory bit of the execution response dummy output (16 bits) in axis.

[Detailed description]

Item	Description
Info. 1	Turns OFF a specified bit. Several bits can be simultaneously turned OFF. 1 : The bit turns OFF. 0 : The bit does not turn OFF. (No change)  Dummy output = Information 1 AND dummy output (Example) 
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Set bit OFF
9	END

13.4.24 Operation code [0044] : Set bit ON wait (OR condition)

[Setting item table]

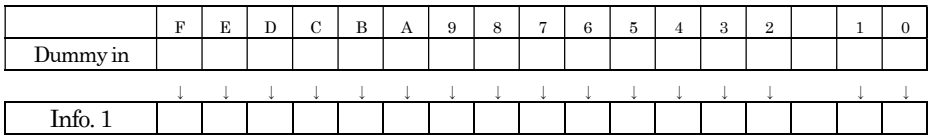
Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0044								

[Outline]

Waits for a bit specified in information 1 to turn ON. (OR condition)

The bit to be specified corresponds to the data memory bit of the execution response dummy input (16 bits) in axis.

[Detailed description]

Item	Description
Info. 1	Sets an ON wait condition bit. Several bits can be specified. 1 : Specified as ON wait condition bit. 0 : Not specified as ON wait condition bit. 
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Set bit ON wait (OR condition)
9	END

13.4.25 Operation code [0045] : Set bit ON wait (AND condition)

[Setting item table]

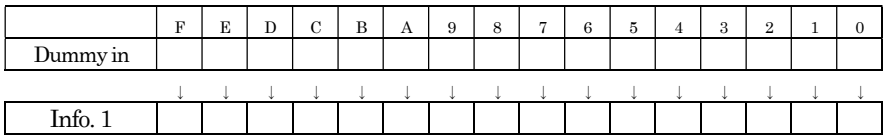
Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0045								

[Outline]

Waits for a bit specified in information 1 to turn ON. (AND condition)

The bit to be specified corresponds to the data memory bit of the execution response dummy input (16 bits) in axis.

[Detailed description]

Item	Description
Info. 1	Sets an ON wait condition bit. Several bits can be specified. 1 : Specified as ON wait condition bit. 0 : Not specified as ON wait condition bit. 
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Set bit ON wait (AND condition)
9	END

13.4.26 Operation code [0046] : Set bit OFF wait (OR condition)

[Setting item table]

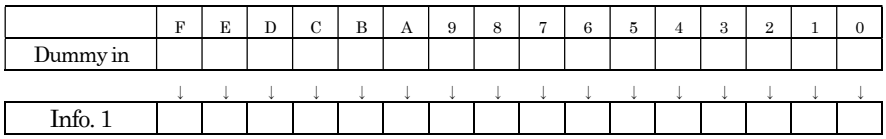
Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0046								

[Outline]

Waits for a bit specified in information 1 to turn OFF. (OR condition)

The bit to be specified corresponds to the data memory bit of the execution response dummy input (16 bits) in axis.

[Detailed description]

Item	Description
Info. 1	Sets an OFF wait condition bit. Several bits can be specified. 1 : Specified as OFF wait condition bit. 0 : Not specified as OFF wait condition bit. 
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Set bit OFF wait (OR condition)
9	END

13.4.27 Operation code [0047] : Set bit OFF wait (AND condition)

[Setting item table]

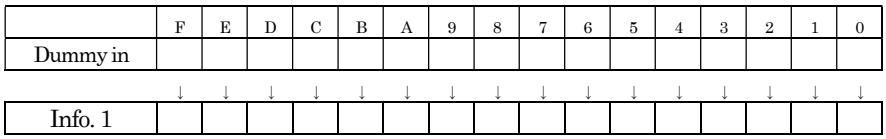
Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0047								

[Outline]

Waits for a bit specified in information 1 to turn OFF. (OR condition)

The bit to be specified corresponds to the data memory bit of the execution response dummy input (16 bits) in axis.

[Detailed description]

Item	Description
Info. 1	Sets an OFF wait condition bit. Several bits can be specified. 1 : Specified as OFF wait condition bit. 0 : Not specified as OFF wait condition bit. 
Info. 2	At start of instruction code execution, a setting of information 2 is written in auxiliary response 2. Setting range : 0000 ～ 9999

[Internal processing step]

STEP	Description
0	Set bit OFF wait (AND condition)
9	END

13.4.28 Operation code [0048] : Origin sensor ON conform

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0048								

[Outline]

Wait until designation input address turns ON. Designation input address can be set for each axis, which is used for origin sensor check during return to origin.

Operation code [0048] is active only when the setting of 5.SETUP → 2.SYSTEM PARAMETERS → 1.AXIS PARAMETERS → *.*AXIS PARAMETER → 9.ORIGIN SENSOR is ENABLE . When this setting is DISABLE , the machine proceeds to the next step without processing this code.

[Detailed description]

Item	Description
Info. 1	Registers the first axis origin confirmation sensor address as offset value from X00.
Info. 2	Registers the second axis origin confirmation sensor address as offset value from X00.
Info. 3	Registers the third axis origin confirmation sensor address as offset value from X00.
Info. 4	Registers the fourth axis origin confirmation sensor address as offset value from X00.

Example

When the set value is [8], "X10", the 8th input address from X00, is the origin confirmation sensor input address.

- Set value [16] … PLC input address "X20"
- Set value [24] … PLC input address "X30"
- Set value [32] … PLC input address "X40"

[Internal processing step]

STEP	Description
0	Wait ON origin sensor
9	END

13.4.29 Operation code [0049] : Origin sensor OFF conform

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0049								

[Outline]

Wait until the designation input address turns OFF. The designation input address can be set for each axis, which is used for origin sensor check during return to origin.

Operation code [0049] is active only when the setting of 5.SETUP → 2.SYSTEM PARAMETERS → 1.AXIS PARAMETERS → *.*AXIS PARAMETER → 9.ORIGIN SENSOR is ENABLE . When this setting is DISABLE , the machine proceeds to the next step without processing this code.

[Detailed description]

Item	Description
Info. 1	Registers the first axis origin confirmation sensor address as offset value from X00.
Info. 2	Registers the second axis origin confirmation sensor address as offset value from X00.
Info. 3	Registers the third axis origin confirmation sensor address as offset value from X00.
Info. 4	Registers the fourth axis origin confirmation sensor address as offset value from X00.

Example

When the set value is [8], "X10", the 8th input address from X00, is the origin confirmation sensor input address.

- Set value [16] … PLC input address "X20"
- Set value [24] … PLC input address "X30"
- Set value [32] … PLC input address "X40"

[Internal processing step]

STEP	Description
0	Wait OFF origin sensor
9	END

13.4.30 Operation code [0080] : PLC synchronize pointer

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0080								

[Outline]

Operation codes for sequence control synchronization with instruction codes. According to sequence control instructions, instruction code operation timing is controlled. Control flow can be executed with the instruction codes by using of the sequence synchronization pointer, resulting in simplified point control. Thus, simple and easy-to-understand sequence control is enabled.

[Detailed description]

Item	Description
Info. 1	Registered as sequence synchronization pointer for the axis under current processing. Registration value is 2 digits (1 to 99). Depending on the relation between the sequence control instruction value and Information 1 set value, operation is classified into the following two patterns: ・Sequence control operation instruction value < Information 1 set value Execution of the instruction code is stopped. The machine waits for start input from sequence control. ・Sequence control operation instruction value ≧ Information 1 set value Sequence synchronization pointer is registered, and the machine proceeds to the next step of the instruction code. The sequence control system specifies an operation instruction value based on the sequence synchronization pointer information specified with operation code [0080]. When the sequence control instruction value is specified in the instruction code as "9□□□" (highest order digit is "9"), STEP No. designation start is enabled (operation can be started from the specified position of the sequence synchronization pointer).

[Internal processing step]

STEP	Description
0	PLC synchronize pointer control
9	END

[Example for setting]

◎Example of use of additional operation code

For example, to execute move operation with the XY 2-axis machine, use instruction code No. 2 for both X and Y axes.

Instruction code No.2 Move operation (XY axes)

STEP No.	Ope. code	Pos. [mm]	Speed [%]	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	Note
0	0020	8001.00	100	0						Pickup position move
1	0082				1					Set axis sync. pointer
2	0080				11					
3	0080				20					
4	0020		100	0	1					Tightening position move
5	0082				2					Set axis sync. pointer
6	0080				21					
7	0080				30					
8	0020	8000.00	100	0						Standby position move
9	0080				31					
10	0000									End

(Example 1) X,Y axis pickup position move command

When the instruction code is started with sequence control operation instruction value of [0000], the machine executes the instruction code STEP No. 0 and subsequent steps, to move the axes to the pickup position.

(Example 2) X,Y axis pickup position move completed、After X,Y axis tightening position move command

After the axes move to the pickup position, set "11" to the sequence synchronization pointer with instruction code STEP No. 3. After confirming the sequence synchronization pointer's setting of "11" on the sequence control system, set sequence control operation instruction value [0020] to move the axes to the tightening position.

(Example 3) Move to tightening position without move to pick up position

When the instruction code is started with sequence control operation instruction value of [9020], the machine executes the instruction from the "0020" position of instruction code STEP No. 3 sequence synchronization pointer setting, to move the axes to the tightening position without moving to the pickup position.

◎Assignment of sequence synchronization pointer (Use of instruction code Nos. 0 to 2 for standard settings)

PLC synchronize pointer	Description	Note
0	X,Y axis pickup position move command	
11	X,Y axis pickup position move completed	
12	Z axis pickup position move command	
13	Z axis standby position move command	
14	Z axis standby position move completed	Only RC75-T1
20	X,Y axis tightening position move command	
21	X,Y axis tightening position move completed	
22	Z axis tightening position move command	
23	Z axis standby position move command	
24	Z axis standby position move completed	
30	X,Y axis standby position move command	
31	X,Y axis standby position move completed	

◎Example of use of actual sequence synchronization pointer

(Example 1) XYZ axis specification : Tightening operation → Normal completion of tightening

PLC side			Instruction caoed side			Operation
Operation command	X,Y-axis Sync. pointer minimum	Z-axis Sync. pointer minimum	X-axis Sync. pointer	Y-axis Sync. pointer	Z-axis Sync. pointer	
9020						X,Y axis tightening pos. move command
↑	21	0	21	21	0	X,Y axis tightening pos. move completed
0022						Z axis tightening pos. move command
↑	21	23	21	21	23	Z axis tightening pos. move completed
0023						Z axis standby pos. move command
↑	21	24	21	21	24	Z axis standby pos. move completed
9099						All axis instruction code execution
↑	31	31	31	31	24	All axis instruction code execution end

Operation instruction (red) is executed, and completion of the operation is confirmed by the change of the synchronization pointer value (red) for the moving axis or up/down axis.

(Example 2) XYZ axis specification : Tightening operation → Abnormal completion of tightening →
Move to standby position (Selection of operation) → Retry tightening → Normal completion of tightening

PLC side			Instruction caoed side			Operation
Operation command	X,Y-axis Sync. pointer minimum	Z-axis Sync. pointer minimum	X-axis Sync. pointer	Y-axis Sync. pointer	Z-axis Sync. pointer	
9020						X,Y axis tightening pos. move command
↑	21	0	21	21	0	X,Y axis tightening pos. move completed
0022						Z axis tightening pos. move command
↑	21	23	21	21	23	Z axis tightening pos. move completed
0023						Z axis standby pos. move command
↑	21	24	21	21	24	Z axis standby pos. move completed
0030						X,Y axis standby pos. move command
↑	31	31	31	31	31	X,Y axis standby pos. move completed
9020						X,Y axis tightening pos. move command
↑	21	0	21	21	0	X,Y axis tightening pos. move completed
0022						Z axis tightening pos. move command
↑	21	23	21	21	23	Z axis tightening pos. move completed
0023						Z axis standby pos. move command
↑	21	24	21	21	24	Z axis standby pos. move completed
9099						All axis instruction code execution
↑	31	31	31	31	31	All axis instruction code execution end

Operation instruction (red) is executed, and completion of the operation is confirmed by the change of the synchronization pointer value (red) for the moving axis or up/down axis.

(Example 3) XYZ axis specification : Pickup operation → Retry pickup → Tightening operation → Normal completion of tightening

PLC side			Instruction caoed side			Operation
Operation command	X,Y-axis Sync. pointer minimum	Z-axis Sync. pointer minimum	X-axis Sync. pointer	Y-axis Sync. pointer	Z-axis Sync. pointer	
0000						X,Y axis pickup pos. move command
↑	11	0	11	11	0	X,Y axis pickup pos. move completed
9012						Z axis pickup pos. move command
↑	11	13	11	11	13	Z axis pickup pos. move completed
0013						Z axis standby pos. move command
↑	11	22	11	11	22	Z axis standby pos. move completed
0020						X,Y axis tightening pos. move command
↑	21	0	21	21	0	X,Y axis tightening pos. move completed
0022						Z axis tightening pos. move command
↑	21	23	21	21	23	Z axis tightening pos. move completed
0023						Z axis standby pos. move command
↑	21	24	21	21	24	Z axis standby pos. move completed
9099						All axis instruction code execution
↑	31	31	31	31	31	All axis instruction code execution end

Operation instruction (red) is executed, and completion of the operation is confirmed by the change of the synchronization pointer value (red) for the moving axis or up/down axis.

13.4.31 Operation code [0082] : Set axis synchronize pointer

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0082								

[Outline]

Operation code to determine the axis moving sequence with the machine of several axis configuration. Axis moving sequence can be freely determined in the instruction code setting table.

This operation code is used in combination with Operation code [0083] “Axis synchronize wait”.

[Detailed description]

Item	Description
Info. 1	The set value of Info. 1 is registered as the axis synchronization pointer for the axis under current processing. The registration value is one digit (1 to 9). The registered synchronization pointer should be used for operation code [0083] “Axis synchronize wait” described later.

[Internal processing step]

STEP	Description
0	Set axis synchronize pointer
9	END

13.4.32 Operation code [0083] : Axis synchronize wait

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0083								

[Outline]

This code is an operation code to determine the axis moving sequence with the machine of several axis configuration. Axis moving sequence can be freely determined in the instruction code setting table.

This operation code is used in combination with operation code [0082] "Set axis synchronize pointer"

[Detailed description]

Item	Description
Info. 1	Halts execution of the instruction code until the condition specified in Operation code [0082] "Set axis synchronize pointer" is satisfied. For Info. 1, set the first axis synchronization pointer wait condition. For Info. 2, Info. 3 and Info. 4, set synchronization conditions for the second, third and fourth axes, respectively. Info. 1 to Info. 4 condition settings are as follows: [*1 *2 *3 *4] *1 : 4th digit…First axis synchronization pointer condition setting *2 : 3rd digit …Second axis synchronization pointer condition setting *3 : 2nd digit…Third axis synchronization pointer condition setting *4 : 1st digit…Fourth axis synchronization pointer condition setting When the axis synchronization pointers for all axes becomes equal to, or higher than the set values of the axis synchronization pointer wait conditions for the axes under current processing, the instruction code execute wait status is cancelled, and the next operation code is executed.

[Internal processing step]

STEP	Description
0	Axis synchronize wait
9	END

[Example for setting]

For example, for execution of return operation with the machine of XYZ 3-axis specification, the Z axis is moved up first, and then X and Y axes are moved.

The instruction codes for return operation are as listed below.

Instruction code No.17, Origin return (XYZ axis specification)

STEP No.	Ope. code	Pos. [mm]	Speed [%]	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	Note
0	0083				10	10	0	0		Axis sync.wait
1	0010	-99.00	5	1						Return
2	0030									Deviation clear
3	0020	2.00	5	0						Stopper return
4	0082				1					Set axis sync. pointer
5	0042				999					Origin bit setting
6	0000									End

For each axis of X, Y and Z, the same instruction code No. 17 is executed for origin return operation.

Instruction code No.17 Origin return operation sequence (XYZ axis specification)

Step No.	Axis synchronize pointer				Description
	1st Axis (X)	2nd Axis (Y)	3rd Axis (Z)	4th Axis (--)	
-	0	0	0	0	At start of instruction code execution, the axis operation code default value is "0".
1	0	0	0	0	Wait axis synchronize pointer X axis : [0000] ≧ Info. 1 [0010] condition is not satisfied. Waiting Y axis : [0000] ≧ Info. 2 [0010] condition is not satisfied. Waiting Z axis : [0000] ≧ Info. 3 [0000] condition is OK →Execution of next operation
2	0	0	0	0	Z axis return
3	0	0	1	0	Z axis Axis synchronize pointer setup → Z axis proceeds to STEP No.6, and end.
4	0	0	1	0	Wait axis synchronize pointer X axis : [0010] ≧ Info. 1 [0010] condition is OK →Execution of next operation Y axis : [0010] ≧ Info. 2 [0010] condition is OK →Execution of next operation
5	0	0	1	0	X,Y axis return
6	1	1	1	0	X,Y axis Axis synchronize pointer setup
7	1	1	1	0	All axis operation completed

XYZ axis move sequence can be freely set depending on the setting of STEP No.0 operation code 0083.

(Example 1) Setting to move Z, Y and X axes in this sequence (Z → Y → X)

STEP No.	Ope. code	Pos. [mm]	Speed [%]	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	Note
0	0083				110	10	0	0		Axis synchronize wait

(Example 2) Setting to X, Y and Z axes simultaneously

STEP No.	Ope. code	Pos. [mm]	Speed [%]	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	Note
0	0083				0	0	0	0		Axis synchronize wait

13.4.33 Operation code [0090] : Sub instruction code CALL

[Setting item table]

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0090								

[Outline]

When several point operations are executed by using sequence synchronization pointers in one instruction code, all operations may not be described with the maximum allowable number of steps per instruction code (20 steps). In this case, this function allows jump to other instruction code. After execution of the jump destination instruction code, the system returns to the original instruction code to continue processing. Thus, the machine can execute operations of steps more than the maximum allowable number of steps.

[Detailed description]

Item	Description
Info. 1	Jumps to a specified instruction code No. , and executes the instruction code at the jump destination. After completion of the jump destination instruction code No., the system returns to the jump source instruction code No. Multiple CALL (nesting) is disabled.

[Internal processing step]

STEP	Description
0	Sub instruction code CALL

[Example for setting]

Instruction code No.0, X,Y axis moving

STEP No.	Ope. code	Pos. [mm]	Speed [%]	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	Note
0	0020	50.00	100	0						Move to 50 mm position
1	0090				1					Instruction code No.1 CALL
2	0020	8000.00	100	0						Standby position move
3	0000									End

Instruction code No.1, X,Y axis moving

STEP No.	Ope. code	Pos. [mm]	Speed [%]	Thrust	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	Note
0	0020	80.00	100	0						Move to 80 mm position
1	0000									End

(Example) Operation of execution of the above instruction code No. 0

Instruction code No.	STEP No.	Operation
0	0	Move to 50 mm position
0	1	Jump to instruction code No. 1
1	0	Move to 80 mm position
1	1	End of instruction code No. 1, Returns to jump source
0	2	Standby position move
0	3	End

13.5 Instruction code settings (Example)

13.5.1 Approximate point passage function

Normally, continuous move operation is executed according to the following process:
[1. Move] → [2. Positioning completion] → [3. Preparation for next move] → [4. Move] → [5. Positioning completion]

In this case, since the [3. Preparation for next move] processing should be conducted between [2. Positioning completion] and [4. Move], continuous move operation cannot be smoothly conducted, which may affect the machine tact time because of increased moving time. To prevent this problem, the approximate point pass function is added so as to activate the [2. Positioning completion] control output earlier than the actual axis positioning completion timing, resulting in execution of the [3. Preparation for next move] processing before actual completion of axis positioning. The approximate point pass function can be set for each move point depending on the setting of the instruction code. Using this function, the machine enables smooth continuous move operation. Also, in case of multiple axis control, pseudo arch motion can reduce the moving time (as compared with our conventional model).

[Operation code applied]

(1) Move operation code Info. 3

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0020 0022								

Description : When using the move operation code [0020] or [0022], setting any value (1 to 9999) other than [0] in Info. 3 enables the approximate point pass function. The set value defines an offset distance (mm) for approach to a target position to proceed to the next step.

(Example)

When the set value is [10], the machine proceeds to the next step at 10 mm offset distance to the target position.

(2) Move operation code Info. 4

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0010 0020 0022 0032 0034								

Description : By setting any value (1 to 15) other than [0] in Info. 4 with an move operation code, each axis positioning completion is added to move start condition. This function enables control so that the machine confirms positioning completion of the currently moving axis when it passes through the approximate point, and then proceeds to the next axis move.

This setting is used in combination of the setting of the above Info. 3. Description of setting is as follows: Lowest order bit ON indicates first axis positioning confirmation. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)

With a setting of [3], the machine confirms the first and second axis positioning, and then starts to move.

(3) Move operation code Info. 5

Ope. code	Pos.[mm]	Speed[%]	Thrust	Info.1	Info.2	Info.3	Info.4	Info.5
0010 ～ 0018 0022 0032								

Description : Setting any value (1 to 15) other than [0] disables the specified axis move, and proceeds to the next step. Use this information to move the X axis at the pickup position of table-top tightening machine, without moving the Y axis.

Description of setting is as follows:

Lowest order bit ON indicates that first axis move is disabled. The second, third and fourth lower bits correspond to the second, third and fourth axes, respectively.

(Example)

When the set value is [2], the second axis move is disabled.

[Example (1)]

By using the approximate point pass function for the single axis specification, the machine enables smooth continuous move operation.

Instruction code No.0 Move operation (Z-axis, standard type)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					
1	83				0	0	0	0		
2	20	9901.00	901	91			9999			Move to approach offset position
3	20	9902.00	902	92			9999			Move to tightening start position
4	10	9904.00	903	93						Move to target position
5	12				8					
6	17	9903.00	904	94						Tightening speed/thrust change
7	19									PLSV move step stop
8	34			95						Height detection thrust change
9	40				30					Wait for 30 ms
10	11									
11	80				23					
12	20	9905.00	905	96			9999			Move to return position
13	20	8000.00	906	97						Standby position move
14	42				9999					Origin bit SET
15	0									End
16										
17										
18										
19										

Info. 3 (red) for approximate point pass function

(1) STEP No. 2 Info. 3: [9999] Move to approach offset position

Info. 3: [9999] 9999 mm offset distance for approach to the target position → Immediately after start of move, the machine prepares for execution of next STEP No. 3. In STEP No.3, positioning completion is checked with the move start condition of Info. 4 not included. In this case, the next STEP No. 3 command pulse output is activated at the time of completion of the STEP NO. 2 command pulse output.

(2) STEP No.3 Info. 3: [9999] Move to tightening start position

As per the description of above (1)

(3) STEP No.12 Info. 3: [9999] Move to return position

As per the description of above (1)

[Example (2)]

When the approximate point pass function is used for the XYZ axis specification, pseudo arch motion is enabled.

Instruction code No.2 Move operation (Table-top screw tightening robot with XYZ axis specification)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8001.00	100	0			50		2	Move to screw pickup position
1	82									Set axis sync. pointer
2	80				11					
3	80				20					
4	20		100	0	1		50			Move to tightening position
5	82				2					Set axis sync. pointer
6	80				21					
7	80				30					
8	20	8000.00	100	0						Standby position move
9	80				31					
10	0									End
11										

Info. 3 (red) for approximate point pass function

Instruction code No.1 Up/down operation (Table-top screw tightening robot with XYZ axis specification)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	1100	0		
1	80				12					
2	20	30.00	100	0						Move to screw pickup offset position
3	20	8001.00	10	0				1		Move to screw pickup position
4	80				13					
5	20	8000.00	100	0			30			Standby position move
6	42				9999					
7	80				22					
8	90				0					Instruction code No.0 CALL
9	80				24					
10	80				31					
11	0									End

Info. 3 (red) for approximate point pass function

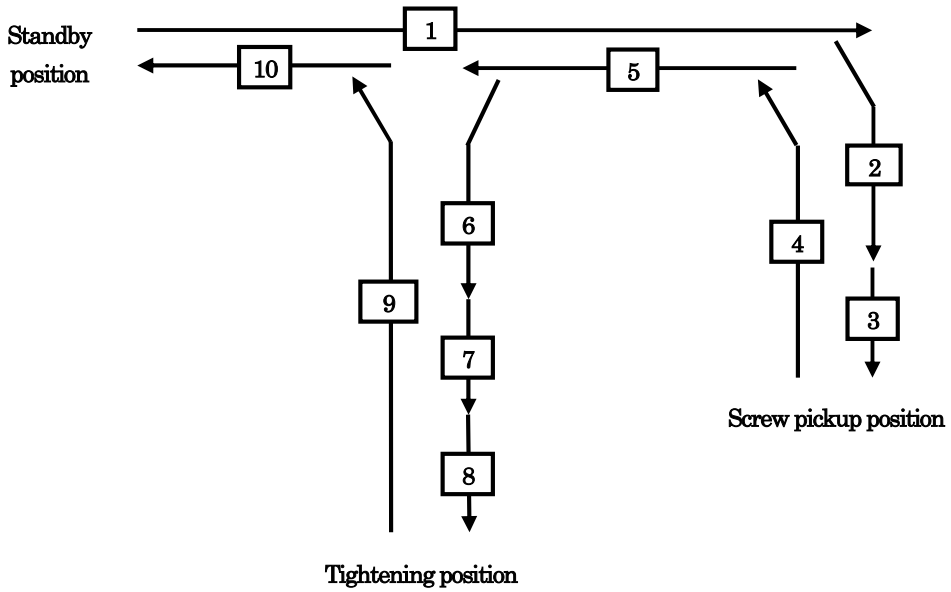
Instruction code No.0 Tightening up/down operation
(Table-top screw tightening robot with XYZ axis specification)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	2000	0		
1	20	9901.00	901	91			9999			Move to approach offset position
2	20	9902.00	902	92			9999	1		Move to tightening start position
3	10	9904.00	903	93						Move to target position
4	12				7					
5	17	9903.00	904	94						Tightening speed/thrust change
6	19									PLSV move step stop
7	34			95						Height detection thrust change
8	40				30					Wait for 30 ms
9	11									
10	80				23					
11	20	9905.00	905	96			9999			Move to return position
12	20	8000.00	906	97			30			Standby position move
13	42				9999					Origin bit SET
14	0									End

Info. 3 (red) for approximate point pass function

XYZ axis pseudo arch motion during screw pickup and tightening operations

・Point move transition chart



・Point movement matrix

Move order	Instruc code No.	STEP No.	Move axis	Operatin
1	2	0	X	Move to screw pickup position ・Info.3 [50] … On arrival at 50 mm distance to target position, start of next move.
2	1	2	Z	Move to screw pickup offset position
3	1	3	Z	Move to screw pickup position ・Info.4 [1] … After completion of X axis positioning, start of move.
4	1	5	Z	Move to standby position ・Info.3 [30] … On arrival at 30 mm distance to target position, start of next move.
5	2	4	XY	Move to tightening position ・Info.3 [50] … On arrival at 50 mm distance to target position, start of next move.
6	0	1	Z	Move to approach offset position ・Info.3 [9999] … At start of move, preparation for next move At completion of command pulse output, start of next move (move of the same axis).
7	0	2	Z	Move to tightening start position ・Info.3 [9999] … At start of move, preparation for next move. At completion of command pulse output, start of next move (move of the same axis). ↓ (For start of move, the following condition should be satisfied.) ・Info.4 [3] … After completion of X, Y axis positioning, start of move
8	0	3～9	Z	Move to target position
9	0	12	Z	Move to standby position ・Info.3 [30] … On arrival at 30 mm distance to target position, start of next move.
10	15	0	XY	Move to standby position, or move to next screw pickup position

13.5.2 Tightening operation Z-axis (RC75-T1)

This section describes the up/down axis operating instruction codes for tightening operation. The up/down axis means the tightening up/down operation of Z-axis.
For RC75-T1 (with up/down axis only), the machine uses instruction code No. 0 only.

[Example for setting]

Instruction code No.0, Standard settings, RC75-T1

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					PLC sync. pointer
1	83				0	0	0	0		Axis sync.wait
2	20	9901.00	901	91			9999			DRVA move
3	20	9902.00	902	92			9999			DRVA move
4	10	9904.00	903	93						PLSV move
5	12				8					PLSV move stop 2
6	17	9903.00	904	94						PLSV move spd/thr. change
7	19									PLSV move step stop
8	34			95						Thrust change
9	40				30					Set time wait
10	11									PLSV move stop 1
11	80				23					PLC sync. pointer
12	20	9905.00	905	96			9999			DRVA move
13	20	8000.00	906	97			0			DRVA move
14	42				9999					Set bit ON
15	0									End
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	0	0	80	Waiting for tightening start enable sequence synchronization pointer. ・Info.1 … Set value [22] Wait PLC synchronize pointer
2	0	1	83	Set the axis move sequence. The setting varies depending on axis configuration. (This item is not used for the controller type as shown in this example.)
3	0	2	20	Specify a position, speed and thrust to move the screw guide until it almost touches a workpiece. ・Pos. … Set value [9901.00] Approach offset on the workpiece as a target position ・Speed … Set value [901] Screw parameter "Fast forward 1 speed" ・Thrust … Set value [91] Screw parameter "Fast forward 1 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move
4	0	3	20	Specifies a position, speed and thrust to move the screw guide until a screw almost touches a workpiece tap. ・Pos. … Set value [9902.00] Tightening start coordinate as a target position ・Speed … Set value [902] Screw parameter "Fast forward 2 speed" ・Thrust … Set value [92] Screw parameter "Fast forward 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move

No.	Instruc CODE	STEP No.	Ope. CODE	Description
5	0	4	10	Specifies a position, speed and thrust to move a target offset position. ・Pos. … Set value [9904.00] Target offset coordinate as a target position. ・Speed … Set value [903] Screw parameter "Initial speed" ・Thrust … Set value [93] Screw parameter "Initial thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate.
6	0	5	12	Set an instruction code STEP No. to be executed when PLSV interrupt request is ON. When target offset coordinate cannot be reached at tightening completion or tightening time over, PLSV interrupt request command is turned ON. ・Info.1 … Set value [7] STEP No. to be executed when PLSV interrupt request is ON
7	0	6	17	Move speed and thrust are changed when the tightening change position specified in position information is reached. ・Pos. … Set value [9903.00] Tightening change coordinate of screw parameter ・Speed … Set value [904] Screw parameter "Final speed" ・Thrust … Set value [94] Screw parameter "Final thrust
8	0	7	19	This code is used to stop PLSV step control.(Waitng for stop PLSV move.).
9	0	8	34	Change to specified screw rise detection thrust ・Thrust … Set value [95] Screw parameter "Height detect thrust"
10	0	9	40	After waiting for a time specified in Info. 1, the machine proceeds to the next processing. Stabilizing time during tightening operation stop ・Info.1 … Set value [30] Delay 30msec
11	0	10	11	This code is used to stop PLSV move.
12	0	11	80	Waiting for up/down axis return sequence synchronization pointer ・Info.1 … Set value [23] Wait PLC synchronize pointer
13	0	12	20	Specifies a position, speed and thrust to execute move to a return change point. ・Pos. … Set value [9905.00] Return change coordinate of screw parameter ・Speed … Set value [905] Screw parameter "Return 1 speed" ・Thrust … Set value [96] Screw parameter "Return 1 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move
14	0	13	20	Specifies a position, speed and thrust to move a target standby position. ・Pos. … Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed … Set value [906] Screw parameter "Return 2 speed" ・Thrust … Set value [97] Screw parameter "Return 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [0] After completion of move, the machine prepares for next operation code.
15	0	14	42	Set the standby flag used for sequence ladder program as up/down return completion axis. ・Info.1 … Set value [9999] Operating axis standby set
16	0	15	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.3 Tightening operation Z-axis (RC75-T2)

Up/down axis instruction codes for tightening operation.
For RC75-T2 (bit up/down axis + screw guide up/down axis), instruction code No. 0 and No. 1 are assigned to each operating axis, to execute one tightening operation.

[Example for setting (For bit up/down)]

Instruction code No.0, Standard settings, RC75-T2 (For bit up/down)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					PLC sync. pointer
1	20	9902.00	902	92			9999			DRVA move
2	83				0	1000	0	0		Axis sync.wait
3	10	9904.00	903	93						PLSV move
4	12				7					PLSV move stop 2
5	17	9903.00	904	94						PLSV move spd/thr. change
6	19									PLSV move step stop
7	34			95						Thrust change
8	40				30					Set time wait
9	11									PLSV move stop 1
10	80				23					PLC sync. pointer
11	20	9905.00	905	96			9999			DRVA move
12	20	8000.00	906	97						DRVA move
13	42				9999					Set bit ON
14	0									End
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description (For bit up/down)]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	0	0	80	Waiting for tightening start enable sequence synchronization pointer. ・Info.1 … Set value [22] Wait PLC synchronize pointer
2	0	1	20	Specifies a position, speed and thrust to move the screw guide until a screw almost touches a workpiece tap. ・Pos. … Set value [9902.00] Tightening start coordinate as a target position ・Speed … Set value [902] Screw parameter "Fast forward 2 speed" ・Thrust … Set value [92] Screw parameter "Fast forward 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move
3	0	2	83	Set the axis moving sequence. After waiting for first axis (screw guide up/down axis) advance completion, the machine restarts operation of the second axis (bit up/down axis). ・Info.1 … Set value [0] The first axis unconditionally moves to the next step ・Info.2 … Set value [1000] The second axis moves to the next step when the first axis synchronization pointer = "1". ・Info.3 … Set value [0] The third axis unconditionally moves to the next step. ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step.

No.	Instruc CODE	STEP No.	Ope. CODE	Description
4	0	3	10	Specifies a position, speed and thrust to move a target offset position. ・Pos. … Set value [9904.00] Target offset coordinate as a target position. ・Speed … Set value [903] Screw parameter "Initial speed" ・Thrust … Set value [93] Screw parameter "Initial thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate.
5	0	4	12	Set an instruction code STEP No. to be executed when PLSV interrupt request is ON. When target offset coordinate cannot be reached at tightening completion or tightening time over, PLSV interrupt request command is turned ON. ・Info.1 … Set value [6] STEP No. to be executed when PLSV interrupt request is ON
6	0	5	17	Move speed and thrust are changed when the tightening change position specified in position information is reached. ・Pos. … Set value [9903.00] Tightening change coordinate of screw parameter ・Speed … Set value [904] Screw parameter "Final speed" ・Thrust … Set value [94] Screw parameter "Final thrust
7	0	6	19	This code is used to stop PLSV step control.(Waitng for stop PLSV move.).
8	0	7	34	Change to specified screw rise detection thrust ・Thrust … Set value [95] Screw parameter "Height detect thrust"
9	0	8	40	After waiting for a time specified in Info. 1, the machine proceeds to the next processing. Stabilizing time during tightening operation stop ・Info.1 … Set value [30] Delay 30msec
10	0	9	11	This code is used to stop PLSV move.
11	0	10	80	Waiting for up/down axis return sequence synchronization pointer ・Info.1 … Set value [23] Wait PLC synchronize pointer
12	0	11	20	Specifies a position, speed and thrust to execute move to a return change point. ・Pos. … Set value [9905.00] Return change coordinate of screw parameter ・Speed … Set value [905] Screw parameter "Return 1 speed" ・Thrust … Set value [96] Screw parameter "Return 1 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move
13	0	12	20	Specifies a position, speed and thrust to move a target standby position. ・Pos. … Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed … Set value [906] Screw parameter "Return 2 speed" ・Thrust … Set value [97] Screw parameter "Return 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [0] After completion of move, the machine prepares for next operation code.
14	0	13	42	Set the standby flag used for sequence ladder program as up/down return completion axis. ・Info.1 … Set value [9999] Operating axis standby set
15	0	14	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

[Example for setting (For screw guide up/down)]

Instruction code No.1, Standard settings, RC75-T2(For screw guide up/down)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					PLC sync. pointer
1	20	9906.00	901	91						DRVA move
2	82				1					Set axis sync. pointer
3	80				23					PLC sync. pointer
4	20	8000.00	906	97			0			DRVA move
5	42				9999					Set bit ON
6	0									End
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description (For screw guide up/down)]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	1	0	80	Waiting for tightening start enable sequence synchronization pointer. ・Info.1 … Set value [22] Wait PLC synchronize pointer
2	1	1	20	Specify a position, speed and thrust to move the screw guide until it almost touches a workpiece. ・Pos. … Set value [9906.00] Approach offset on the workpiece as a target position (Screw guide up/down axis for 2-servo specification) ・Speed … Set value [901] Screw parameter "Fast forward 1 speed" ・Thrust … Set value [91] Screw parameter "Fast forward 1 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [0] After completion of move, the machine prepares for next operation code.
3	1	2	82	Set the axis synchronization pointer for screw guide axis advance completion. ・Info.1 … Set value [1] Axis synchronize pointer setup
4	1	3	80	Waiting for up/down axis return sequence synchronization pointer ・Info.1 … Set value [23] Wait PLC synchronize pointer
5	1	4	20	Specifies a position, speed and thrust to move a target standby position. ・Pos. … Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed … Set value [906] Screw parameter "Return 2 speed" ・Thrust … Set value [97] Screw parameter "Return 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [0] After completion of move, the machine prepares for next operation code.

[Detailed description (For screw guide up/down)]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
6	1	5	42	Set the standby flag used for sequence ladder program as up/down return completion axis. ・Info.1 … Set value [9999] Operating axis standby set
7	1	6	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.4 Tightening operation Z-axis (RC755-T2)

Up/down axis instruction codes for tightening operation.

For RC755-T2 (up/down axis + move axis), instruction code No. 0 and No. 1 are used. Set instruction code No. 1 for point information. As sub instruction code, instruction code No. 0 is called from instruction code No. 1.

[Example for setting]

Instruction code No.0, Standard settings, RC755-T2

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	2200	0		Axis sync.wait
1	20	9901.00	901	91			9999			DRVA move
2	20	9902.00	902	92			9999	3		DRVA move
3	10	9904.00	903	93						PLSV move
4	12				6					PLSV move stop 2
5	17	9903.00	904	94						PLSV move spd/thr. change
6	19									PLSV move step stop
7	34			95						Thrust change
8	40				30					Set time wait
9	11									PLSV move stop 1
10	80				23					PLC sync. pointer
11	20	9905.00	905	96			9999			DRVA move
12	20	8000.00	906	97			30			DRVA move
13	42				9999					Set bit ON
14	0									End
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.1, Standard settings, RC755-T2

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	1100	0		Axis sync.wait
1	80				12					PLC sync. pointer
2	20	30.00	100	0						DRVA move
3	20	8001.00	10	0				1		DRVA move
4	80				13					PLC sync. pointer
5	20	8000.00	100	0			30			DRVA move
6	42				9999					Set bit ON
7	80				22					PLC sync. pointer
8	90				0					Instruction code CALL
9	80				24					PLC sync. pointer
10	80				31					PLC sync. pointer
11	0									End
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	1	0	83	Set the axis moving sequence. After waiting for completion of move of the first and second axis to the screw pickup position, the machine starts screw pickup advance operation of the third axis. ・Info.1 … Set value [0] The first axis unconditionally moves to the next step. ・Info.2 … Set value [0] The second axis unconditionally moves to the next step. ・Info.3 … Set value [1100] The third axis moves to the next step when the first and second axis synchronization pointers = "1". ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step.
2	1	1	80	Used as sequence synchronization pointer to specify an instruction code STEP No. after screw pickup advance. ・Info.1 … Set value [12] PLC synchronize pointer setup Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.
3	1	2	20	Designation of position, speed and thrust to move to screw pickup offset position ・Pos. … 30mm (Set value change is required depending on machine configuration.) ・Speed … 100% ・Thrust … Set value [0] Current limit value 300% ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.
4	1	3	20	Designation of position, speed and thrust to move to screw pickup offset position ・Pos. … Set value [8001.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [001], position information is taken from internal point No. 1. ・Speed … 10% ・Thrust … Set value [0] Current limit value 300% ・Info.4 … Set value [1] Starts moving after first axis (move axis X) positioning is confirmed. Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.
5	1	4	80	Set the sequence synchronization pointer for up/down axis screw pickup position move completion. ・Info.1 … Set value [13] PLC synchronize pointer setup Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.

No.	Instruc CODE	STEP No.	Ope. CODE	Description
6	1	5	20	Designation of position, speed and thrust to move to screw pickup return position ・Pos. … Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed … 100% ・Thrust … Set value [0] Current limit value 300% ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [30] Prepares for next operation code without waiting for move completion, when 30 mm offset distance to standby position is reached. Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.
7	1	6	42	Set the standby flag used for sequence ladder program as up/down return completion axis. ・Info.1 … Set value [9999] Operating axis standby set
8	1	7	80	Waiting for tightening start enable sequence synchronization pointer. ・Info.1 … Set value [22] Wait PLC synchronize pointer
9	1	8	90	Execution of sub instruction code No. 0 ・Info.1 … Set value [0] Sub instruction code CALL No.
10	0	0	83	Set the axis moving sequence. After waiting for completion of move of the first and second axis to the tightening position, the machine starts tightening bit advance operation of the third axis. ・Info.1 … Set value [0] The first axis unconditionally moves to the next step. ・Info.2 … Set value [0] The second axis unconditionally moves to the next step. ・Info.3 … Set value [1100] The third axis moves to the next step when the first and second axis synchronization pointers = "2". ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step.
11	0	1	20	Specify a position, speed and thrust to move the screw guide until it almost touches a workpiece. ・Pos. … Set value [9901.00] Approach offset on the workpiece as a target position ・Speed … Set value [901] Screw parameter "Fast forward 1 speed" ・Thrust … Set value [91] Screw parameter "Fast forward 1 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move
12	0	2	20	Specifies a position, speed and thrust to move the screw guide until a screw almost touches a workpiece tap. ・Pos. … Set value [9902.00] Tightening start coordinate as a target position ・Speed … Set value [902] Screw parameter "Fast forward 2 speed" ・Thrust … Set value [92] Screw parameter "Fast forward 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move ・Info.4 … Set value [3] Starts moving after confirmation of positioning of the first and second axes (move axes X and Y).
13	0	3	10	Specifies a position, speed and thrust to move a target offset position. ・Pos. … Set value [9904.00] Target offset coordinate as a target position. ・Speed … Set value [903] Screw parameter "Initial speed" ・Thrust … Set value [93] Screw parameter "Initial thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate.

No.	Instruc CODE	STEP No.	Ope. CODE	Description
14	0	4	12	Set an instruction code STEP No. to be executed when PLSV interrupt request is ON. When target offset coordinate cannot be reached at tightening completion or tightening time over, PLSV interrupt request command is turned ON. ・Info.1 … Set value [6] STEP No. to be executed when PLSV interrupt request is ON
15	0	5	17	Move speed and thrust are changed when the tightening change position specified in position information is reached. ・Pos. … Set value [9903.00] Tightening change coordinate of screw parameter ・Speed … Set value [904] Screw parameter "Final speed" ・Thrust … Set value [94] Screw parameter "Final thrust
16	0	6	19	This code is used to stop PLSV step control.(Waitng for stop PLSV move.).
17	0	7	34	Change to specified screw rise detection thrust ・Thrust … Set value [95] Screw parameter "Height detect thrust"
18	0	8	40	After waiting for a time specified in Info. 1, the machine proceeds to the next processing. Stabilizing time during tightening operation stop ・Info.1 … Set value [30] Delay 30msec
19	0	9	11	This code is used to stop PLSV move.
20	0	10	80	Waiting for up/down axis return sequence synchronization pointer ・Info.1 … Set value [23] Wait PLC synchronize pointer
21	0	11	20	Specifies a position, speed and thrust to execute move to a return change point. ・Pos. … Set value [9905.00] Return change coordinate of screw parameter ・Speed … Set value [905] Screw parameter "Return 1 speed" ・Thrust … Set value [96] Screw parameter "Return 1 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [9999] Preparation for next operation code without waiting for completion of move
22	0	12	20	Specifies a position, speed and thrust to move a target standby position. ・Pos. … Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed … Set value [906] Screw parameter "Return 2 speed" ・Thrust … Set value [97] Screw parameter "Return 2 thrust" ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. ・Info.3 … Set value [0] After completion of move, the machine prepares for next operation code.
23	0	13	42	Set the standby flag used for sequence ladder program as up/down return completion axis. ・Info.1 … Set value [9999] Operating axis standby set
24	0	14	0	End of sub instruction code execution, and return to instruction code No. 1. Be sure to register this code as final operation code in the sub instruction code.
25	1	9	80	Set the sequence synchronization pointer for up/down axis tightening completion. ・Info.1 … Set value [24] PLC synchronize pointer setup
26	1	10	80	Set the sequence synchronization pointer for move axis standby position return completion in case of tightening fault. ・Info.1 … Set value [31] PLC synchronize pointer setup
27	1	11	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.5 Tightening operation X,Y-axis

This section describes instruction codes for move axis tightening operation. Move axis means an axis that is not involved in tightening up/down operation (e.g. X axis, Y axis).

[Example for setting]

Instruction code No.2, Standard settings, RC75-T3

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8001.00	100	0			0		0	DRVA move
1	82				1					Set axis sync. pointer
2	80				11					PLC sync. pointer
3	80				20					PLC sync. pointer
4	20		100	0	1		0			DRVA move
5	82				2					Set axis sync. pointer
6	80				21					PLC sync. pointer
7	80				30					PLC sync. pointer
8	20	8000.00	100	0						DRVA move
9	80				31					PLC sync. pointer
10	0									End
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	2	0	20	Designation of position, speed and thrust to move to screw pickup position ・Pos. … Set value [8001.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [001], position information is taken from internal point No. 1. ・Speed … 100% ・Thrust … Set value [0] Current limit value 300% ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate. Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.
2	2	1	82	Set the axis synchronization pointer for screw pickup position move completion axis. ・Info.1 … Set value [1] Axis synchronize pointer setup
3	2	2	80	Set the sequence synchronization pointer for move axis screw pickup position move completion. ・Info.1 … Set value [11] PLC synchronize pointer setup
4	2	3	80	Set the sequence synchronization pointer for move axis screw pickup position move completion. ・Info.1 … Set value [20] Wait PLC synchronize pointer

No.	Instruc CODE	STEP No.	Ope. CODE	Description
5	2	4	20	Designation of position, speed and thrust to move to currently selected tightening position teaching point ・Pos. ⋯ Teaching target position ・Speed ⋯ 100% ・Thrust ⋯ Set value [0] Current limit value 300% ・Info.1 ⋯ Set value [1] Teaching point target position information is defined as instruction coordinate.
6	2	5	82	Set the axis synchronization pointer for tightening position move completion axis. ・Info.1 ⋯ Set value [2] Axis synchronize pointer setup
7	2	6	80	Set the sequence synchronization pointer for move axis tightening position move completion. ・Info.1 ⋯ Set value [21] PLC synchronize pointer setup
8	2	7	80	Waiting for the sequence synchronization pointer for up/down axis tightening position operation completion. ・Info.1 ⋯ Set value [30] Wait PLC synchronize pointer
9	2	8	20	Designation of position, speed and thrust to move to standby position in case of tightening fault ・Pos. ⋯ Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed ⋯ 100% ・Thrust ⋯ Set value [0] Current limit value 300% ・Info.1 ⋯ Set value [0] Instruction code position information is defined as instruction coordinate. Note) With the sequence ladder execution request sequence synchronization signal instruction code STEP No. designation start function, this operation code may not be executed.
10	2	9	80	Set the sequence synchronization pointer for move axis standby position move completion in case of tightening fault ・Info.1 ⋯ Set value [31] PLC synchronize pointer setup
11	2	10	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.6 Bit change

This section describes bit replacement instruction codes used in MANUAL mode.

[Example for setting]

Instruction code No.14, Standard settings, RC75-T1

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	20	8002.00	10	1						DRVA move
2	82				1					Set axis sync. pointer
3	0									End
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	14	0	83	Set the axis moving sequence for move to bit replacement position. The setting varies depending on axis configuration. <u>Move axis only, or up/down axis only</u> All axes simultaneously move. ・Info.1 … Set value [0] The first axis unconditionally moves to the next step. ・Info.2 … Set value [0] The second axis unconditionally moves to the next step. ・Info.3 … Set value [0] The third axis unconditionally moves to the next step. <u>Move axis + Up/down axis</u> The move axes (first and second axes) move after completion of up/down axis (third axis) move. ・Info.1 … Set value [0] The first axis unconditionally moves to the next step. ・Info.2 … Set value [0] The second axis unconditionally moves to the next step. ・Info.3 … Set value [1100] The third axis moves to the next step when the first and second axis synchronization pointers = "1".
2	14	1	20	Specifies a position, speed and thrust to move a target standby position. ・Pos. … Set value [8002.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [002], position information is taken from internal point No. 2. ・Speed … 10% ・Thrust … Set value [1] Current limit value 100% ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate.

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
3	14	2	82	Set the axis synchronization pointer for bit replacement position move completion axis. ・Info.1 … Set value [1] Axis synchronize pointer setup
4	14	3	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.7 Move to standby position (For automatic cycle)

This section describes standby position move operation instruction codes used in the AUTO mode.

[Example for setting]

Instruction code No.15, Standard settings, All type

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8000.00	100	0						DRVA move
1	42				9999					Set bit ON
2	0									End
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	15	0	20	Specifies a position, speed and thrust to move a target standby position. ・Pos. … Set value [8002.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [002], position information is taken from internal point No. 2. ・Speed … 100% ・Thrust … Set value [0] Current limit value 300% ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate.
2	15	1	42	Set the standby flag used for sequence ladder program as standby position move completion axis. ・Info.1 … Set value [9999] Operating axis standby position setting
3	15	2	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.8 Move to standby position (For return)

This section describes instruction codes for standby position move operation.

[Example for setting]

Instruction code No.16, Standard settings, RC75-T1

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	11									PLSV move stop 1
2	34			0						Thrust change
3	40				30					Set time wait
4	20	8000.00	10	0						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	16	0	83	Set the axis move sequence for standby position move. The setting varies depending on axis configuration. <u>Move axis only, or up/down axis only</u> All axes simultaneously move. ・Info.1 … Set value [0] The first axis unconditionally moves to the next step ・Info.2 … Set value [0] The second axis unconditionally moves to the next step. ・Info.3 … Set value [0] The third axis unconditionally moves to the next step. ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step. <u>Move axis + Up/down axis</u> The move axes (first and second axes) move after completion of up/down axis (third axis) move. ・Info.1 … Set value [10] The first axis moves to the next step when the third axis synchronization pointer = "1". ・Info.2 … Set value [10] The second axis moves to the next step when the third axis synchronization pointer = "1". ・Info.3 … Set value [0] The third axis unconditionally moves to the next step. ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step.
2	16	1	11	This code is used to stop PLSV move. At start of move to standby position, the current deviation pulse is cleared. (Corresponding to the return operation stop)

No.	Instruc CODE	STEP No.	Ope. CODE	Description
3	16	2	34	Change to standby position moving thrust ・Thrust ⋯ Set value [0] Current limit value 300% ・Info.1 ⋯ Set value [0] Instruction code thrust information is defined as instruction thrust.
4	16	3	40	Waiting for a time specified in Info. 1, before execution of next processing. High thrust reset wait time ・Info.1 ⋯ Set value [30] Delay 30msec
5	16	4	20	Designation of position, speed and thrust to move to standby position ・Pos. ⋯ Set value [8000.00] Since the highest order digit is [8], indirect point coordinate reading is executed. Since the indirect point No. is [000], position information is taken from internal point No. 0. ・Speed ⋯ 10% ・Thrust ⋯ Set value [0] Current limit value 300% ・Info.1 ⋯ Set value [0] Instruction code position information is defined as instruction coordinate.
6	16	5	82	Set the axis synchronization pointer for standby position move completion axis. ・Info.1 ⋯ Set value [1] Axis synchronize pointer setup
7	16	6	42	Set the standby flag used for sequence ladder program as standby position move completion axis. ・Info.1 ⋯ Set value [9999] Operating axis standby position set
8	16	7	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.9 Origin return

[Example for setting]

Instruction code No.17, Standard settings, RC75-T1

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	10	-99.00	5	1						PLSV move
2	30									Deviation clear
3	48				99	99	99	99		Origin sensor ON confirm
4	20	2.00	5	1						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	17	0	83	Set the axis move sequence for origin return. The setting varies depending on axis configuration. <u>Move axis only, or up/down axis only</u> All axes simultaneously move. ・Info.1 … Set value [0] The first axis unconditionally moves to the next step ・Info.2 … Set value [0] The second axis unconditionally moves to the next step. ・Info.3 … Set value [0] The third axis unconditionally moves to the next step. ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step. <u>Move axis + Up/down axis</u> The move axes (first and second axes) move after completion of up/down axis (third axis) move. ・Info.1 … Set value [10] The first axis moves to the next step when the third axis synchronization pointer = "1". ・Info.2 … Set value [10] The second axis moves to the next step when the third axis synchronization pointer = "1". ・Info.3 … Set value [0] The third axis unconditionally moves to the next step. ・Info.4 … Set value [0] The fourth axis unconditionally moves to the next step.
2	17	1	10	Starts moving to stopper origin. ・Pos. … Setting a value less than "0" executes origin return operation in minus direction. ・Speed … 5% ・Thrust … Set value [1] Current limit value 100%

v	命令 CODE	STEP No.	動作 CODE	説明
3	17	2	30	When servo amplifier stopper detection signal turns ON, deviation clear is executed. → Origin setting The deviation clear position is defined as coordinate "0.00".
4	17	3	48	When the origin check sensor is enabled, the machine does not move to the next step until the origin sensor turns ON. When the origin check sensor is disabled, the machine unconditionally moves to the next step. ・Info.1 … Set value [**] The first axis origin check sensor's address is registered as an offset value from X00. ・Info.2 … Set value [**] The second axis origin check sensor's address is registered as an offset value from X00. ・Info.3 … Set value [**] The third axis origin check sensor's address is registered as an offset value from X00. ・Info.4 … Set value [**] The fourth axis origin check sensor's address is registered as an offset value from X00. <u>Example</u> When the set value is [8], "X10", the 8th input address of X00 is the origin check sensor's input address. ・Set value [16] … PLC input adress "X20" ・Set value [24] … PLC input adress "X30" ・Set value [32] … PLC input adress "X40"
5	17	4	20	Designation of position, speed and thrust to move to currently selected teaching point. ・Pos. … Absolute coordinate position 2 mm returned from origin return stopper position ・Speed … 5% ・Thrust … Set value [1] Current limit value 100% ・Info.1 … Set value [0] Instruction code position information is defined as instruction coordinate.
6	17	5	82	Set the axis synchronization pointer as return completion axis. ・Info.1 … Set value [1] Axis synchronize pointer setup
7	17	6	42	Set the standby position flag used for sequence ladder program as return completion axis. ・Info.1 … Set value [9999] Operating axis standby position set
8	17	7	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.10 JOG operation (For teaching)

This section describes JOG operation instruction codes used for TEACH mode.

[Example for setting]

Instruction code No.18, Standard settings, All type

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	4				2	3				Step branch jump 2
1	22	0.01	1	1						DRVI move
2	2				4					Step jump
3	22	-0.01	1	1						DRVI move
4	40				300					Set time wait
5	3				7	6				Step branch jump 1
6	32			1						JOG move (PLSV)
7	11									PLSV move stop 1
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Other settings required for operations

- Auxiliary command 1 … Sets JOG move direction
  1 : JOG+
  2 : JOG−
- Auxiliary command 2 … Sets a JOG move speed

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	18	0	4	Select an operation code to be executed depending on JOG move direction. ・Aux. command 1= Info. 1 … Jump to the STEP No. of the instruction code specified in Info. 2. ・Aux. command 1 <> Info. 1 … Proceeds to next step without jump
2	18	1	22	Executes 1-push 1-pulse JOG move operation in plus direction. ・Pos. … Move by 0.01 mm on relative coordinate ・Speed … 1% ・Thrust … Set value [1] Current limit value 100%
3	18	2	2	Jump to the STEP No. of the instruction code specified in Info. 1.
4	18	3	22	Executes 1-push 1-pulse JOG move operation in minus direction. ・Pos. … Move by - 0.01 mm on relative coordinate ・Speed … 1% ・Thrust … Set value [1] Current limit value 100%
5	18	4	40	Proceeds to next step without jump after waiting for a time specified in Info. 1 This code defines the time to judge whether JOG button push operation is one push or continuous push. ・Info.1 … Set value [300] Delay 300msec

No.	Instruc CODE	STEP No.	Ope. CODE	Description
6	18	5	3	When JOG button push operation is one push, JOG move operation will end. ・Aux. command 1 = 0 … Jump to the STEP No. of the instruction code specified in Info. 1 ・Aux. command 1 <> 0 … Jump to the STEP No. of the instruction code specified in Info. 2
7	18	6	32	Designation of position, speed and thrust for JOG move operation Even if JOG move is continued, it will end at the stroke limit. ・Auxiliary command 1 … J Sets JOG move direction, and a command to stop JOG move operation. 1 : JOG move in "+" direction 2 : JOG move in "—" direction Other than the above "1" and "2": Stops move during JOG operation. ・Auxiliary command 2 … Sets a JOG move speed as a ratio to the maximum speed. 1～100 [%] Speed change cannot be executed during JOG move operation. ・Thrust … Set value [1] Current limit value 100%
8	18	7	11	This code is used to stop PLSV move.
9	18	8	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

13.5.11 Point moving operation (For teaching)

This section describes point move instruction codes used for TEACH mode.

[Example for setting]

Instruction code No.19, Standard settings, All type

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20			1	1					DRVA move
1	0									End
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Other settings required for operations

・Auxiliary command 2 … Set a point move speed.

[Detailed description]

No.	Instruc CODE	STEP No.	Ope. CODE	Description
1	19	0	20	Designation of position, speed and thrust to move to currently selected teaching point. ・Pos. … Teaching target position ・Speed … Teaching pendant selection value ・Thrust … Set value [1] Current limit value 100% ・Info.1 … Set value [1] Teaching point target position information is defined as instruction coordinate.
2	19	1	0	Ends execution of an instruction code. Be sure to register this code as the operation code at the end of an instruction code.

14. Servo Amplifier

For the RC75 or RC755 controller, two types of servo are available depending on the controller type.

・Servo assignment by controller type

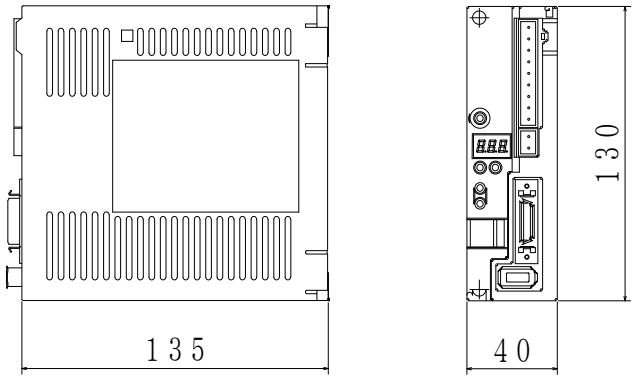
Controller model	model	Instruction code No.				Note
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis	
RC75-T1	FM513VZ	JN				
RC75-T2	FM520VZZ	JN	JN			
RC75-T3	SR375Y θ	JN	JN			
RC755-T1	SR395DT Type-1	SI	SI			
RC755-T2	SR395DT Type-2	SI	SI	JN		

Description of parameter settings by the servo type is as follows:

14.1 Servo type JN Outside drawing

Servo type "JN" indicates general-purpose AC MELSERVO-JN series (Mitsubishi Electric).

1) 200Vseries 50～200W
100Vseries 50～200W



2) Combinations of servo amplifiers and motors

200Vseries

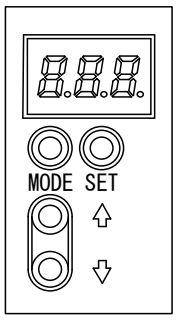
Capacity [W]	Servo amplifier	Servo motor (with brake)	Servo motor (without brake)
50	MR-JN-10A	HF-KN053B	HF-KN053
100	MR-JN-10A	HF-KN13B	HF-KN13
200	MR-JN-20A	HF-KN23B	HF-KN23

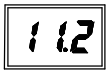
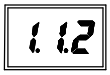
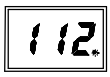
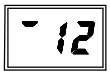
100Vseries

Capacity [W]	Servo amplifier	Servo motor (with brake)	Servo motor (without brake)
50	MR-JN-10A1	HF-KN053B	HF-KN053
100	MR-JN-10A1	HF-KN13B	HF-KN13
200	MR-JN-20A1	HF-KN23B	HF-KN23

14.2 Servo type JN display and operation

14.2.1 Servo type JN overview



3-digit LED	Displays data.
Decimal LED	Displays the decimal points, alarm presence/absence, etc.
	Lit to indicate the decimal point.
	Lit to indicate the negative value.
	Flickers to indicate alarm occurrence.
	Flickers to indicate the test operation mode.
	the upper 3 digits of the parameter or the upper 3 digits of the point table. (If there is no number in the second digit, the same symbol will be displayed in the second digit.) However, when the position data of the point table is "100000" or higher, or "-100000" or less, a number will be displayed in the third digit.
	Lit decimal point of the first digit indicates the lower 3 digits of the parameter or the lower 3 digits of the point table.
MODE	Display mode change. upper/lower switching.
↑UP	Display/data scrolling
↓DOWN	Display/data scrolling
SET	Display/data determination. Data clear.

14.2.2 Servo type JN mode selection

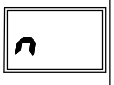
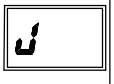
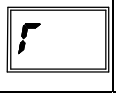
Each mode can be selected with the MODE button. Press the "MODE" button once to shift to the next display mode.

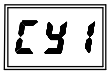
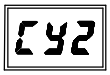
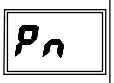
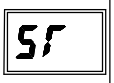
To refer to or set the gain/filter parameters, extension setting parameters, I/O setting parameters and positioning setting parameters, make them valid with parameter No. PA19 (parameter writing inhibit).

No.	Display mode transition (Pressing the MODE button displays Nos.1 to 9 in sequence.)	Initial screen	Function
1	Status display		Servo status display. "CL" appears at power-on.
2	Diagnosis		Sequence display, external signal display, forced output of signal (DO), test operation, software version display, servo motor series ID display, servo motor type ID display, servo motor encoder ID display.
3	Alarm		Current alarm display, alarm history display, the number of tough drive display, parameter error No. display.
4	Point table		Display and setting of point table data.
5	Basic setting parameters		Display and setting of basic setting parameters.
6	Gain/filter parameters		Display and setting of gain/filter parameters.
7	Extension setting parameters		Display and setting of extension setting parameters.
8	I/O setting parameters		Display and setting of I/O setting parameters.
9	Positioning setting parameters		Display and setting of positioning setting parameters.

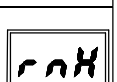
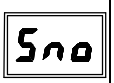
14.2.3 Servo type JN status display

Press "MODE" to switch to the status display screen. Running servo status can be viewed on the 3-digit 7-segment LED display. The display item can be freely changed with the UP or DOWN button. When an item is selected, the relevant symbol is displayed. Pressing the SET button displays data on the selected item.

No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 26 in sequence.)	Display	Description
1	Cumulative feedback pulses in pulse unit		Feedback pulses from the servo motor encoder are counted and displayed. Press the "SET" button to reset the display value to zero. Negative values are indicated by the lit decimal points in the upper two digits.
2	Cumulative feedback pulses in 1000 pulse unit		
3	Servo motor speed in 10r/min unit		The servo motor speed is displayed in 10r/min unit.
4	Servo motor speed in r/min unit		The servo motor speed is displayed in r/min unit.
5	Droop pulses in pulse unit		The number of droop pulses in the deviation counter is displayed. When the servo motor is rotating in the reverse direction, the decimal points in the upper two digits are lit. The displayed number of pulses is in the same pulse unit as the servo motor encoder resolution.
6	Droop pulses in 1000 pulse unit		
7	Cumulative command pulses in pulse unit		The position command input pulses are counted and displayed. As the value displayed is not yet multiplied by the electronic gear (CMX/CDV), it may not match the indication of the cumulative feedback pulses. Press the "SET" button to reset the display value to zero. Reverse rotation is indicated by the lit decimal points in the upper two digits.
8	Cumulative command pulses in 1000 pulse unit		
9	Command pulse frequency		The frequency of the position command input pulses is displayed. The value displayed is not multiplied by the electronic gear (CMX/CDV). The value in excess of ±999 can be counted up to ±1500. However, the counter shows only the lower three digits since the servo amplifier display is three digits.
10	Regenerative load ratio		The ratio of regenerative power to permissible regenerative power is displayed in %.
11	Effective load ratio		The continuous effective load current is displayed. The effective value in the past 15[s] is displayed relative to the rated current of 100%.
12	Peak load ratio		The maximum current is displayed. The highest value in the past 15[s] is displayed relative to the rated current of 100%.
13	Instantaneous torque		Torque that occurred instantaneously is displayed. The value of the torque that occurred is displayed in real time relative tothe rate torque of 100%.

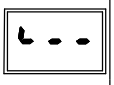
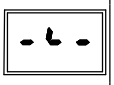
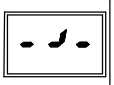
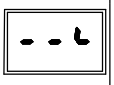
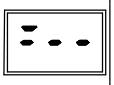
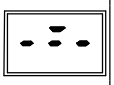
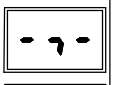
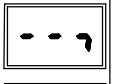
No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 26 in sequence.)	Display	Description
14	Within one-revolution position in pulse unit		Position within one revolution is displayed in encoder pulses. The value returns to 0 when it exceeds the maximum number of pulses. The value is incremented in the CCW direction of rotation. The value is decremented in the CW direction of rotation.
15	Within one-revolution position in 1000 pulse unit		
16	Load to motor inertia moment ratio		The estimation value of load to motor inertia moment ratio to the servo motor shaft inertia moment is displayed.
17	Bus voltage		Status of the bus voltage is displayed in five steps. 5: Overvoltage (About 400V or more) 4: High voltage (About 375V or more) 3: Normal 2: Low voltage (About 200V or less) 1: Undervoltage (About 160V or less)
18	Settling time		Settling time is displayed. The value in excess of 999 can be counted. However, the counter shows only the lower three digits since the servo amplifier display is three digits.

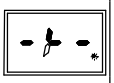
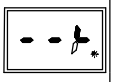
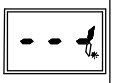
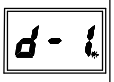
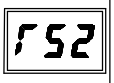
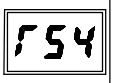
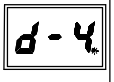
The following items are enabled for the positioning mode only.
(If these items are disabled, pressing the MODE button in No. 18 returns the display to No. 1.)

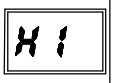
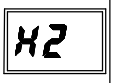
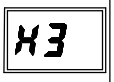
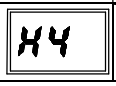
19	Current position in 10^{STM} μm unit		The current position is displayed based on the machine home position being regarded as "0". Negative values are indicated by the lit decimal points in the upper two digits.
20	Current position in 1000×10^{STM} μm unit		
21	Command position in 10^{STM} μm unit		The internal command position is displayed. Negative values are indicated by the lit decimal points in the upper two digits.
22	Command position in 1000×10^{STM} μm unit		
23	Command remaining distance in 10^{STM} μm unit		The remaining distance to the command position specified by the selected point table is displayed. The value in excess of 999999 can be counted. However, the counter shows only the lower or higher three digits since the servo amplifier display is three digits.
24	Command remaining distance in 1000×10^{STM} μm unit		
25	Point table No./ Program No.		The point table No./Program No. which is being performed is displayed. During automatic operation or temporary stop : Displays the No. being performed. During stop : Displays the selected No. During manual operation : Displays 0.
26	Step No.		The step No. of the program which is being performed is displayed. 0: During stop 1 to 120: Step No. of the program which is being performed.

14.2.3 Servo type JN Diagnostic

Press "MODE" to switch to the diagnostic display screen.

No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 16 in sequence.)	Display	Description
1	Sequence		Not ready. Indicates that the servo amplifier is being initialized or an alarm has occurred.
			Ready. Indicates that the servo was switched on after completion of initialization and the servo amplifier is ready to operate.
2	External I/O signal display		Indicates the ON-OFF states of the external I/O signals. The upper segments correspond to the input signals and the lower segments to the output signals. Lit: ON Extinguished: OFF
			Input signals CN1connector pin No.3
			Input signals CN1connector pin No.4
			Input signals CN1connector pin No.5
			Input signals CN1connector pin No.6
			Input signals CN1connector pin No.7
			Input signals CN1connector pin No.8
			Input signals CN1connector pin No.23
			Input signals CN1connector pin No.25
			Output signals CN1connector pin No.9
			Output signals CN1connector pin No.10
			Output signals CN1connector pin No.11
			Output signals CN1connector pin No.12
			Output signals CN1connector pin No.21
3	Drive recorder valid / invalid display		Drive recorder is valid. (During operation)
			Drive recorder is invalid. (During stop)

No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 16 in sequence.)	Display	Description
4	Output signal (DO) forced output	 ↓SET    	The digital output signal can be forced on/off. Press "SET" button for 2s or more to shift to the Output signal (DO) forced output screen. To exit from the forced output screen, keep pressing the SET button for 2 sec. or longer. "MODE" button : Forced output signal change "UP","DOWN" button : Forced output ON/OFF Above: Output signal CN1connector pin No.9 Select Below:Output signal CN1connector pin No.9 ON/OFF Above: Output signal CN1connector pin No.10 Select Below:Output signal CN1connector pin No.10 ON/OFF Above: Output signal CN1connector pin No.11 Select Below:Output signal CN1connector pin No.11 ON/OFF Above: Output signal CN1connector pin No.12 Select Below:Output signal CN1connector pin No.12 ON/OFF
5	Test operation mode JOG operation	 ↓SET 	JOG operation can be performed when there is no command from the external command device. Press "SET" button for 2s or more to shift to the JOG operation screen. To return from the JOG operation screen, press the MODE button to select the status monitor screen, and then keep pressing the SET button for 2 sec. or longer. "UP" button : CCW rotation. "DOWN" button : CW rotation.
6	Test operation mode Positioning operation		With no command given from the external command device, positioning operation can be executed once. MR Configurator is required for positioning operation.
7	Test operation mode Motor-less operation		Without connection of the servo motor, the servo amplifier provides output signals and displays the status as if the servo motor is running actually in response to the input device.
8	Test operation mode Forced tough drive operation	 ↓SET 	Overload tough drive can be forced even in the normal status. Press "SET" button for 2s or more to shift to the Forced tough drive operation screen. To return from the forced tough drive operation screen, press the MODE button to select the "d-4" monitor screen, and then keep pressing the SET button for 2 sec. or longer.
9	Test operation mode		
10	Test operation mode Single-step feed		Indicates the operation following the set point table No. MR Configurator is required for single-step feed.

No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 16 in sequence.)	Display	Description
11	Software version low		Indicates the version of the software.
12	Software version high		Indicates the lower two digits of the system number of the software. Three digits are displayed by pressing the "SET" button.
13	Servo motor series ID		Series ID of the servo motor currently connected will be displayed by pressing the "SET" button. For details, refer to App. 2.
14	Servo motor type ID		Type ID of the servo motor currently connected will be displayed by pressing the "SET" button. For details, refer to App. 2.
15	Servo motor Encoder ID		Encoder ID of the servo motor currently connected will be displayed by pressing the "SET" button. For details, refer to App. 2.
16	For manufacturer setting		

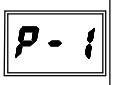
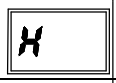
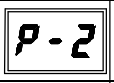
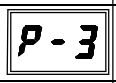
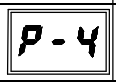
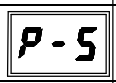
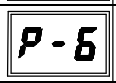
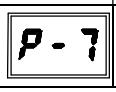
14.2.4 Servo type JN Alarm

Press "MODE" to switch to the alarm display screen.

No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 20 in sequence.)	Display	Description
1	Current alarm	A--	Indicates no occurrence of an alarm.
		A33	Indicates the occurrence of alarm Refer to the description of alarm and warning Nos. in this section.
2	Alarm history (before a time)	A0	Indicates the last alarm. Alarm No. is displayed while holding down the "SET" button.
3	Alarm history (before 2 times)	A1	Indicates the alarm before 2 times alarm. Alarm No. is displayed while holding down the "SET" button.
4	Alarm history (before 3 times)	A2	Indicates the alarm before 3 times alarm. Alarm No. is displayed while holding down the "SET" button.
5	Alarm history (before 4 times)	A3	Indicates the alarm before 4 times alarm. Alarm No. is displayed while holding down the "SET" button.
6	Alarm history (before 5 times)	A4	Indicates the alarm before 5 times alarm. Alarm No. is displayed while holding down the "SET" button.
7	Alarm history (before 6 times)	A5	Indicates the alarm before 6 times alarm. Alarm No. is displayed while holding down the "SET" button.
8	Alarm history (before 7 times)	A6	Indicates the alarm before 7 times alarm. Alarm No. is displayed while holding down the "SET" button.
9	Alarm history (before 8 times)	A7	Indicates the alarm before 8 times alarm. Alarm No. is displayed while holding down the "SET" button.
10	Alarm history (before 9 times)	A8	Indicates the alarm before 9 times alarm. Alarm No. is displayed while holding down the "SET" button.
11	Alarm history (before 10 times)	A9	Indicates the alarm before 10 times alarm. Alarm No. is displayed while holding down the "SET" button.
12	Alarm history (before 11 times)	AA	Indicates the alarm before 11 times alarm. Alarm No. is displayed while holding down the "SET" button.
13	Alarm history (before 12 times)	Ab	Indicates the alarm before 12 times alarm. Alarm No. is displayed while holding down the "SET" button.
14	Alarm history (before 13 times)	AC	Indicates the alarm before 13 times alarm. Alarm No. is displayed while holding down the "SET" button.
15	Alarm history (before 14 times)	Ad	Indicates the alarm before 14 times alarm. Alarm No. is displayed while holding down the "SET" button.
16	Alarm history (before 15 times)	AE	Indicates the alarm before 15 times alarm. Alarm No. is displayed while holding down the "SET" button.
17	Alarm history (before 16 times)	AF	Indicates the alarm before 16 times alarm. Alarm No. is displayed while holding down the "SET" button.
18	The number of tough drive	=00	Indicates the number of tough drive from 0 to 99.
19	The number of drive recorder record times	Hon	Indicates the number of drive recorder record times. The number of times is displayed while holding down the "SET" button.
20	Parameter error No.	E--	Indicates the parameter error No. "E—" : Indicates no occurrence of alarm

14.2.5 Servo type JN point table

Press "MODE" to switch to the point table display screen.

No.	Display mode transition (Pressing the UP or DOWN button displays Nos.1 to 7 in sequence.)	Display	Description
1	Point table No.1		In the point table mode, pressing the "SET" button changes the screen as shown below. Press the "UP" or the "DOWN" button to move to the next screen.
			Position data
			Servo motor speed
			Acceleration time constant
			Deceleration time constant
			Dwell
			Auxiliary function
2	Point table No.2		The same description (Point table No.1)
3	Point table No.3		The same description (Point table No.1)
4	Point table No.4		The same description (Point table No.1)
5	Point table No.5		The same description (Point table No.1)
6	Point table No.6		The same description (Point table No.1)
7	Point table No.7		The same description (Point table No.1)

14.2.6 Servo type JN parameter

Press "MODE" to switch to the basic setting parameter screen.

The parameter display mode comprises the following five modes.

- 「A**」: Basic setting parameters
- 「B**」: Gain/filter parameters
- 「C**」: Extension setting parameters
- 「D**」: I/O setting parameters
- 「E**」: Positioning setting parameters

To shift to the next parameter, press the "UP" or the "DOWN" button.

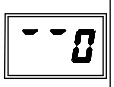
[Setting for parameters]

・Parameter of 3 or less digits

No.	Operation step	Display	Description
1	The parameter number is displayed.		Press “UP” or “DOWN” button to change the number, Then press “SET” button.
2	Value displayed		Press “SET” button.
3	Value setting		The set value of the specified parameter number flickers. Press “UP” or “DOWN” button to change the value. (change 3 digits)
4	Value entering		Press “SET” button.
5	To next parameter		To proceed to the next parameter, press the “UP” or “DOWN” button.

The set value can be cancelled by pressing the "MODE" button for 2[s] or longer immediately after entering the value. Then, the previous

・Parameter of 4 or more digits

No.	Operation step	Display	Description
1	The parameter number is displayed.		Press “UP” or “DOWN” button to change the number, Then press “SET” button.
2	Lower 3 digits Value displayed		Press “SET” button.
3	Lower 3 digits Value setting		The set value of the specified parameter number flickers. Press “UP” or “DOWN” button to change the value. (change 3 digits)
4	Lower 3 digits Value entering		Press “SET” button.
5	Upper 2 digits Value displayed		Press “MODE” button.
6	Upper 2 digits Value setting		The set value of the specified parameter number flickers. Press “UP” or “DOWN” button to change the value. (change 3 digits)
7	Upper 2 digits Value entering		Press “SET” button.
8	To next parameter		To proceed to the next parameter, press the “UP” or “DOWN” button.

The set value can be cancelled by pressing the "MODE" button for 2[s] or longer immediately after entering the value. Then, the previous

14.3 Servo type JN Alarms and warning

When an error occurs during the operation, the corresponding alarm or warning is displayed.

For example, when alarm 33 (Overvoltage: Detail 1) is activated, "A.33" (alarm No.) and "33.1" (alarm No. + detail No.) are alternately displayed at 2-second interval.

Some of the alarms cannot be reset unless the controller power supply is turned OFF.

・Alarm list

Alarm No.	Alarm name	Detail No.	Detailed name
A.10	Undervoltage	1	Control circuit power supply voltage dropped
		2	Main circuit power supply voltage dropped
		3	Main circuit power supply failure (instantaneous power failure)
A.12	Memory error 1 (RAM)	1	CPU built-in RAM fault
A.13	Clock error	1	Clock error
A.15	Memory error 2 (EEP-ROM)	1	EEP-ROM error at power-on
		2	EEP-ROM error during operation
A.16	Encoder initial communication error 1	0	Encoder transmission data error
		1	Encoder transmission data error 1 (Servo amplifier receive error)
		2	Encoder transmission data error 2 (Frame error)
		3	Encoder transmission data error 3 (The servo amplifier not receiving)
		5	Encoder receive data error 1 (Parity error)
		6	Encoder receive data error 2 (Frame error)
		7	Encoder receive data error 3 (Request discrepancy)
A.17	Board error	1	AD converter error
		2	Current feedback data error
		3	Custom IC error
		4	Servo amplifier identification signal error
A.19	Memory error 3 (Flash ROM)	1	Flash-ROM error1
		2	Flash-ROM error2
A.1A	Motor combination error	1	Motor combination error
A.1C	Software combination error	1	Software combination error
A.1E	Encoder initial communication error 2	1	Encoder fault
A.1F	Encoder initial communication error 3	1	Incompatible encoder
A.20	Encoder normal communication error 1	1	Encoder transmission data error (Servo amplifier receive error)
		5	Encoder receive data error 1 (Frame error)
		7	Encoder receive data error2 (Request discrepancy)
A.21	Encoder normal communication error 2	1	Encoder data error
		2	Encoder data updating error
		3	Encoder waveform error
A.24	Main circuit error	1	Ground fault detected by the hardware detection circuit
		2	Ground fault detected by the software detection
A.30	Regenerative error	1	Regenerative heat generation error
		2	Regenerative transistor fault
		3	Regenerative transistor feedback data error
A.31	Overspeed	1	Motor speed error
A.32	Overcurrent	1	Overcurrent was detected by the hardware detection circuit (during operation)
		2	Overcurrent was detected by the software detection (during operation)
		3	Overcurrent was detected by the hardware detection circuit (during a stop)
		4	Overcurrent was detected by the software detection (during a stop)
A.33	Overvoltage	1	Main circuit voltage error
A.35	Command frequency error	1	Command frequency error

Alarm No.	Alarm name	Detail No.	Detailed name
A.37	Parameter error	1	Parameter setting range error
		2	Parameter combination error
A.39	Program error	1	Program error
		2	Command argument range error
		3	Incompatible command
A.45	Main circuit device overheat	1	Board temperature error
A.46	Servo motor overheat	1	Servo motor temperature error
A.50	Overload 1	1	Overload thermal 1 error during operation (Continuous operation protection)
		2	Overload thermal 2 error during operation (Short-time operation protection)
		4	Overload thermal 1 error at a stop (Continuous operation protection)
		5	Overload thermal 2 error at a stop (Short-time operation protection)
A.51	Overload 2	1	Overload thermal 3 error during operation
		2	Overload thermal 3 error at a stop
A.52	Error excessive	3	Droop pulses excessive
		4	Error excessive at torque limit value zero
A.61	Operation alarm	1	Auxiliary function setting error
A.8E	USB communication error	1	USB communication receive error
		2	USB communication checksum error
		3	USB communication character error
		4	USB communication command error
		5	USB communication data No. error
888	Watchdog		

・Warning list

Warning No.	Warning name	Detail No.	Detailed name
A.90	Home positioning incomplete warning	1	Home position return incompletion
		2	Home position return abnormal completion
A.91	Servo amplifier overheat error	1	Servo amplifier inside overheat warning
A.96	Home position setting error	1	In-position not reached
		2	Speed command not converged
A.97	Program operation disabled	1	Program operation disabled
A.98	Software limit warning	1	Reached the software limit at the forward rotation
		2	Reached the software limit at the reverse rotation side
A.99	Stroke limit warning	1	Forward rotation stroke end: OFF
		2	Reverse rotation stroke end: OFF
A.E0	Excessive regenerative warning	1	Excessive regenerative warning
A.E1	Overload warning 1	1	The overload thermal 1 warning while motor rotating
		2	The overload thermal 2 warning while motor rotating
		3	The overload thermal 3 warning while motor rotating
		5	The overload thermal 1 warning while motor not rotating
		6	The overload thermal warning 2 while motor not rotating
		7	The overload thermal warning 3 while motor not rotating
A.E6	Servo forced stop warning	1	Servo forced stop warning
A.E9	Main circuit off warning	1	Servo-on (SON) ON when the main circuit is OFF.
		2	Bus voltage drop at lowspeed rotation
		3	Main circuit power supply Failure
A.EC	Overload warning 2	1	Overload warning 2
A.ED	Output watt excess warning	1	Output wattage over
A.F0	Tough drive warning	1	Instantaneous power failure tough drive warning
		2	Overload tough drive warning
		3	Vibration tough drive warning

14.4 Servo type JN parameter setup

・PA** : Basic setting parameters

No.	Symbol	Name	Unit	Setting range	Set value	Note
PA01	*STY	Control mode		000-117	000	*3 One-touch tuning function selection : Valid *1 Selection of control mode : Position control mode
PA02	*REG	Regenerative option		000-0FF -	000	*2,1 Selection of regenerative option : Regenerative option is not used
PA03		For manufacturer setting		000-377		
PA04	*AOP1	Tough drive function selection		0-0 / 100-500	000	*3 Instantaneous power failure tough drive function selection : Invalid *2 Vibration tough drive function selection : Invalid *1 Overload tough drive function selection : Invalid
PA05	*FBP	Number of command input pulses per revolution	100 pulse/rev	1-65535	120	To be adjusted depending on machine configuration (Lead pich = PA05 / PA06)
PA06	CMX	Electronic gear numerator (Command pulse multiplying factor numerator)		1-65535	10	To be adjusted depending on machine configuration (Lead pich = PA05 / PA06)
PA07	CDV	Electronic gear denominator (Command pulse multiplying factor denominator)		000-003	1	
PA08	ATU	Auto tuning mode		1-16	001	*1 Tuning mode setting : Auto tuning mode 1
PA09	RSP	Auto tuning response		0-65535	6	
PA10	INP	In-position range	pulse	0-100	100	
PA11	TLP	Forward torque limit	%	0-100	100	
PA12	TLN	Reverse torque limit	%	000-377	100	
PA13	*PLSS	Command input pulse form		000-712	201	*3 Pulse train input filter selection : 200kpps or less *2 Pulse train logic selection : Positive logic *1 Selection of command input pulse form : Signed pulse train
PA14	*POL	Rotation direction selection		0-1	0	To be adjusted depending on machine configuration
PA15	*ENR	Encoder output pulses	pulse/rev	1-65535	2400	To be adjusted depending on machine configuration (Lead pich × 200)
PA16	*ENR2	Encoder output pulse electronic gear		0-65535	0	
PA17	*MSR	For manufacturer setting		000-0FF	000	
PA18	*MTY	For manufacturer setting		000-0FF	000	
PA19	*BLK	Parameter write inhibit		000-0FF	00E	servo amplifier allows to change all the setting parameters

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PB** : Gain/filter parameters (1/2)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PB01	FILT	Adaptive tuning mode (Adaptive filter)		000-002	000	*1 ア Selection of adaptive tuning mode : Filter OFF
PB02	VRFT	Vibration suppression control tuning mode (Advanced vibration suppression control)		000-002	000	*1 Vibration suppression control tuning mode : Vibration suppression control OFF
PB03	PST	Position command acceleration/deceleration time constant (Position smoothing)	ms	0-20000	3	
PB04	FFC	Feed forward gain	%	0-100	0	
PB05	FFCF	For manufacturer setting	rad/s	10-4500	500	
PB06	GD2	Load to motor inertia moment ratio	Multi-plier	0.0-300.0	7.0	(Auto tuning : this parameter is automatically set.)
PB07	PG1	Model loop gain	rad/s	1-2000	24	(Auto tuning : this parameter is automatically set.)
PB08	PG2	Position loop gain	rad/s	1-1000	37	(Auto tuning : this parameter is automatically set.)
PB09	VG2	Speed loop gain	rad/s	20-50000	823	(Auto tuning : this parameter is automatically set.)
PB10	VIC	Speed integral compensation	ms	0.1-1000.0	33.7	(Auto tuning : this parameter is automatically set.)
PB11	VDC	Speed differential compensation		0-1000	980	
PB12	OVA	Overshoot amount compensation	%	0-100	0	(One-touch tuning)
PB13	NH1	Machine resonance suppression filter 1	Hz	30-4500	4500	(One-touch tuning)
PB14	NHQ1	Notch shape selection 1		000-330	000	(One-touch tuning) *3 Notch width selection : α2 *2 Notch depth selection : Gain -40dB
PB15	NH2	Machine resonance suppression filter 2	Hz	30-4500	4500	(One-touch tuning)
PB16	NHQ2	Notch shape selection 2		000-331	000	(One-touch tuning) *3 Notch width selection : α2 *2 Notch depth selection : Gain -40dB
PB17	NHF	Automatic setting parameter		000-31F	004	(This parameter is automatically set.)
PB18	LPF	Low-pass filter setting	rad/s	100-9000	3141	(This parameter is automatically set.)
PB19	VRF1	Vibration suppression control vibration frequency setting	Hz	0.1-100.0	100.0	
PB20	VRF2	Vibration suppression control resonance frequency setting	Hz	0.1-100.0	100.0	
PB21	VRF3	For manufacturer setting		0.00-1.00	0.00	
PB22	VRF4	For manufacturer setting		0.00-1.00	0.00	
PB23	VFBF	Low-pass filter selection		000-011	000	*2 Low-pass filter selection : Automatic setting
PB24	*MVS	For manufacturer setting		000-031	000	
PB25	*BOP1	Function selection B-1		000-F12	000	*2 Control of position command acceleration/deceleration time constant : Primary delay
PB26	*CDP	Gain changing selection		000		*2 Gain changing condition : Valid when the input device (gain changing (CDP)) is ON, *1 Gain changing selection : Invalid

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PB** : Gain/filter parameters (2/2)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PB27	CDL	Gain changing condition		10	000	
PB28	CDT	Gain changing time constant	ms	0-100	1	
PB29	GD2B	Gain changing load to motor inertia moment ratio	Multi-plier	0.0-300.0	7.0	(Auto tuning mode is invalid)
PB30	PG2B	Gain changing position loop gain	rad/s	1-2000	37	(Auto tuning mode is invalid)
PB31	VG2B	Gain changing speed loop gain	rad/s	20-50000	823	(Auto tuning mode is invalid)
PB32	VICB	Gain changing speed integral compe	ms	0.1-5000.0	33.7	(Auto tuning mode is invalid)
PB33	VRF1B	Gain changing vibration suppression control vibration frequency setting	Hz	0.1-100.0	100.0	
PB34	VRF2B	Gain changing vibration suppression control resonance frequency setting	Hz	0.1-100.0	100.0	
PB35	VRF3B	For manufacturer setting	0.00-1.00		0.00	
PB36	VRF4B	For manufacturer setting	0.00-1.00		0.00	
PB37	VPI	For manufacturer setting	pulse	0-32767	100	
PB38	NH3	Machine resonance suppression filter 3	Hz	30-4500	4500	
PB39	NHQ3	Notch shape selection 3		000-331	000	*3 Notch width selection : α2 *2 Notch depth selection : Gain -40dB *1 Machine resonance suppression filter 3 selection : Invalid
PB40	MV1	For manufacturer setting		000-333	111	
PB41	MV2	For manufacturer setting	ms	0-1000	20	
PB42		For manufacturer setting		000-FFF	000	
PB43		For manufacturer setting		000-FFF	000	
PB44		For manufacturer setting		000-FFF	000	
PB45		For manufacturer setting		000-FFF	000	
PB46		For manufacturer setting		000-FFF	000	
PB47		For manufacturer setting		000-FFF	000	
PB48		For manufacturer setting		000-FFF	000	
PB49		For manufacturer setting		000-FFF	000	
PB50		For manufacturer setting		000-FFF	000	

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PC** : Extension setting parameters (1/3)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PC01	STA	Acceleration time constant	ms	0-50000	0	
PC02	STB	Deceleration time constant	ms	0-50000	0	
PC03	STC	S-pattern acceleration/deceleration time constant	ms	0-1000	0	
PC04	TQC	Torque command time constant	ms	0-20000	0	
PC05	SC0	Internal speed command 0 / Internal speed limit 0	r/min	0-65535	0	
PC06	SC1	Internal speed command 1 / Internal speed limit 1	r/min	0-65535	100	
PC07	SC2	Internal speed command 2 / Internal speed limit 2	r/min	0-65535	500	
PC08	SC3	Internal speed command 3 / Internal speed limit 3	r/min	0-65535	1000	
PC09	MBR	Electromagnetic brake sequence output	ms	0-1000	100	
PC10	ZSP	Zero speed	r/min	0-10000	50	
PC11	*BPS	Alarm history clear		000-111	000	*3 Presence or absence of drive recorder selection : Valid (drive recorder execution) *1 Alarm history clear : nvalid
PC12	TC	Internal torque command	%	0.0-100.0	0.0	
PC13	*ENRS	Encoder output pulses selection		00-131	001	*3 Encoder output pulse cycle setting : 444 μs cycle *2 Encoder output pulse setting selection : Output pulse setting *1 Encoder pulse output phase changing : CW advances phase A by 90°. To be adjusted depending on machine configuration. (Accordingly, PA14 *1 should be also changed.)
PC14	TL2	Internal torque limit 2	%	0-100	100	
PC15	ERZL	Error excessive alarm detection level	rev	0.1-99.9	99.9	Maximum value to cope with position deviation excess fault
PC16	ERZ2	For manufacturer setting	rev	0.1-99.9	3.0	
PC17	*OSL	Overspeed alarm detection level	r/min	0-20000	0	
PC18	RSBR	For manufacturer setting	ms	0-9999	1000	
PC19	RSBS	For manufacturer setting	ms	0-1000	0	
PC20	MOD1	For manufacturer setting		000-40F	000	
PC21	MOD2	For manufacturer setting		000-40F	001	
PC22	*COP1	Function selection C-1		000-112	000	*3 Encoder cable communication system : Two-wire type
PC23	*COP2	Function selection C-2		000-511	000	*1 Selection of servo lock while the servo motor stops in internal speed control mode. : Valid (Servo-locked)
PC24	*COP3	Function selection C-3		000-261	000	*1 In-position range unit selection : Command input unit
PC25	*COP4	Function selection C-4		000-111	000	*3 Tough drive warning (F0. □) alarm history write selection : Writing to alarm history: Yes *1 Stroke limit warning (99. □) selection : Valid

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PC** : Extension setting parameters (2/3)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PC26	ALDT	Detailed setting of overload tough drive	10ms	0-999	200	
PC27	OSCL	Detailed setting of vibration tough drive	%	0-100	50	
PC28	CVAT	Detailed setting of instantaneous power failure tough drive	10ms	3-200	3	
PC29	*COP5	Function selection C-5		000-011	000	*2 Select the detection method of the main circuit power undervoltage alarm (10.2) Undervoltage alarm (10.2) is detected regardless of the servo motor speed
PC30	*COP6	Function selection C-6		000-001	000	*1 Selection of the speed command input unit (setting unit of internal speed command 0 to 7) : In unit of 1r/min
PC31	SC4	Internal speed command 4 / Internal speed limit 4	r/min	0-65535	200	
PC32	SC5	Internal speed command 5 / Internal speed limit 5	r/min	0-65535	300	
PC33	SC6	Internal speed command 6 / Internal speed limit 6	r/min	0-65535	500	
PC34	SC7	Internal speed command 7 / Internal speed limit 7	r/min	0-65535	800	
PC35	*DMD	For manufacturer setting		000-11F	000	
PC36	VCO	For manufacturer setting	mV	-999-999	0	
PC37	TPO	For manufacturer setting	mV	-999-999	0	
PC38	MO1	For manufacturer setting	mV	-999-999	0	
PC39	MO2	For manufacturer setting	mV	-999-999	0	
PC40	*SNO	For manufacturer setting	局	0-31	0	
PC41	*COP7	For manufacturer setting		000-FFF	000	
PC42	SIC	For manufacturer setting	s	0-60	0	
PC43	*MSTE	For manufacturer setting		000-020	000	
PC44	RECT	Drive recorder alarm specifying		000-FFF	000	*2,1 Specification of alarm No. : No specification
PC45	RECT2	For manufacturer setting		000-FFF	000	
PC46		Internal torque limit 1	0.1%	000-FFF	3E8	100.0% [Thrust pattern 0] → Maximum thrust (Rating 320%)
PC47		Internal torque limit 2	0.1%	000-FFF	12C	30.0% [Thrust pattern 1] → For origin return (Rating 96%)
PC48		Internal torque limit 3	0.1%	000-FFF	064	10.0% [Thrust pattern 2] → Rating 32.0%
PC49		Internal torque limit 4	0.1%	000-FFF	082	13.0% [Thrust pattern 3] → Rating 41.6%
PC50		Internal torque limit 5	0.1%	000-FFF	0AD	16.0% [Thrust pattern 4] → Rating 51.2%
PC51		Internal torque limit 6	0.1%	000-FFF	0BE	19.0% [Thrust pattern 5] → Rating 60.8%
PC52		Internal torque limit 7	0.1%	000-FFF	0DC	22.0% [Thrust pattern 6] → Rating 70.4%
PC53		Internal torque limit 8	0.1%	000-FFF	0FA	25.0% [Thrust pattern 7] → Rating 80.0%

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PC** : Extension setting parameters (3/3)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PC54		For manufacturer setting		000-FFF	000	
PC55		For manufacturer setting		000-FFF	000	
PC56		For manufacturer setting		000-FFF	000	
PC57		For manufacturer setting		000-FFF	000	
PC58		For manufacturer setting		000-FFF	000	
PC59		For manufacturer setting		000-FFF	000	
PC60		For manufacturer setting		000-FFF	000	
PC61		For manufacturer setting		000-FFF	000	
PC62		For manufacturer setting		000-FFF	000	
PC63		For manufacturer setting		000-FFF	000	
PC64		For manufacturer setting		000-FFF	000	

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PD** : I/O setting parameters (1/2)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PD01	*DIA1	Input signal automatic ON selection 1		0000-FFFF	0C20	*4 Point table No./Program No. selection 1, 2, 3 : Used as external input signal *3 Stroke end : Forward rotation stroke end (LSP) ・ Reverse rotation stroke end (LSN) *2 Forced stop (EM1) *1 Automatic/manual selection (MD0)
PD02	*DI0	Input signal device selection 0 (CN1-23, CN1-25)		0000-3F3F	262D	*4,3 Input signal device of CN1-23 pin (PP) selection : PP *2,1 Input signal device of CN1-25 pin (NP) selection : NP
PD03	*DI1-1	Input signal device selection 1L(CN1-3)		0000-3F3F	0306	*4,3 Internal speed control mode, Select the input device of the CN1-3 pin. : RES *2,1 Position control mode, Select the input device of the CN1-3 pin. : CR
PD04	*DI1-2	Input signal device selection 1H(CN1-3)		0000-3F3F	2003	*4,3 Internal torque control mode, Select the input device of the CN1-3 pin. : MD0 *2,1 Positioning mode, Select the input device of the CN1-3 pin. : RES
PD05	*DI2-1	Input signal device selection 2L(CN1-4)		0000-3F3F	0202	*4,3 Internal speed control mode, Select the input device of the CN1-4 pin. : SON *2,1 Position control mode, Select the input device of the CN1-4 pin. : SON
PD06	*DI2-2	Input signal device selection 2H(CN1-4)		0000-3F3F	0202	*4,3 Internal torque control mode, Select the input device of the CN1-4 pin. : SON *2,1 Positioning mode, Select the input device of the CN1-4 pin. : SON
PD07	*DI3-1	Input signal device selection 3L(CN1-5)		0000-3F3F	0D19	*4,3 Internal speed control mode, Select the input device of the CN1-5 pin. : SP1 *2,1 Position control mode, Select the input device of the CN1-5 pin. : TL2
PD08	*DI3-2	Input signal device selection 3H(CN1-5)		0000-3F3F	2C0D	*4,3 Internal torque control mode, Select the input device of the CN1-5 pin. : DI0 *2,1 Positioning mode, Select the input device of the CN1-5 pin. : SP1
PD09	*DI4-1	Input signal device selection 4L(CN1-6)		0000-3F3F	071A	*4,3 Internal speed control mode, Select the input device of the CN1-6 pin. : ST1 *2,1 Position control mode, Select the input device of the CN1-6 pin. : TL3
PD10	*DI4-2	Input signal device selection 4H(CN1-6)		0000-3F3F	0707	*4,3 Internal torque control mode, Select the input device of the CN1-6 pin. : ST1 *2,1 Positioning mode, Select the input device of the CN1-6 pin. : RS2
PD11	*DI5-1	Input signal device selection 5L(CN1-7)		0000-3F3F	081B	*4,3 Internal speed control mode, Select the input device of the CN1-7 pin. : ST2 *2,1 Position control mode, Select the input device of the CN1-7 pin. : TL4

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PD** : I/O setting parameters (2/2)

No.	Symbol	Name	Unit	Setting range	Set value	Note
PD12	*DI5-2	Input signal device selection 5H(CN1-7)		0000-3F3F	0808	*4,3 Internal torque control mode, Select the input device of the CN1-7 pin. : ST2 *2,1 Positioning mode, Select the input device of the CN1-7 pin. : RS1
PD13	*DI6-1	Input signal device selection 6L(CN1-8)		0000-3F3F	0505	*4,3 Internal speed control mode, Select the input device of the CN1-8 pin. : EM1 *2,1 Position control mode, Select the input device of the CN1-8 pin. : EM1
PD14	*DI6-2	Input signal device selection 6H(CN1-8)		0000-3F3F	0505	*4,3 Internal torque control mode, Select the input device of the CN1-8 pin. : EM1 *2,1 Positioning mode, Select the input device of the CN1-8 pin. : EM1
PD15	*DO1	Output signal device selection 1(CN1-9)		0000-003F	0003	*2,1 Select the output device of the CN1-9 pin.: ALM
PD16	*DO2	Output signal device selection 2(CN1-10)		0000-003F	0002	*2,1 Select the output device of the CN1-10 pin.: RD
PD17	*DO3	Output signal device selection 3(CN1-11)		0000-003F	0004	*2,1 Select the output device of the CN1-11 pin. : INP
PD18	*DO4	Output signal device selection 4(CN1-12)		0000-003F	0007	*2,1 Select the output device of the CN1-12 pin.: TLC
PD19	*DIF	Input filter setting		0000-0113	0002	*3 Clear (CR) dedicated filter selection : Invalid *2 Reset (RES) dedicated filter selection : Invalid *1 Input filter : 3.555[ms]
PD20	*DOP1	Function selection D-1		0000-0113	0000	*3 Operation selection during tough drive (MTTR) : MTTR turns ON during the instantaneous power failure tough drive. *2 Selection of base circuit status at reset (RES) ON : Base circuit switched off *1 How to make a stop when forward rotation stroke end (LSP)/reverse rotation stroke end (LSN) : Sudden stop
PD21	*DOP2	For manufacturer setting		0000-0011	0000	
PD22	*DOP3	Function selection D-3		0000-0001	0000	*1 Clear (CR) selection : Droop pulses are cleared on the leading edge.
PD23	*DOP4	For manufacturer setting		0000-0020	0000	
PD24	*DOP5	Function selection D-5		0000-0011	0000	*1 Selection of output device at warning occurrence :
PD25		For manufacturer setting		0000-FFFF	0000	
PD26		For manufacturer setting		0000-FFFF	0000	

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PE** : Positioning setting parameters (1/2) : positioning mode exclusive

No.	Symbol	Name	Unit	Setting range	Set value	Note
PE01	*CTY	Command mode selection		0000-1111	0000	*1 Selection of command system : Absolute value command system
PE02	*FTY	Feeding function selection		0000-0123	0000	*2 Manual pulse generator multiplication : 1 time *1 Feed length multiplication : Disable
PE03	*ZTY	Home position return type		0000-011A	0010	*3 Proximity dog input polarity : OFF indicates detection of the dog *2 Home position return direction : Address increasing direction *1 Home position return type : Dog type
PE04	ZRF	Home position return speed	r/min	0-65535	500	
PE05	CRF	Creep speed	r/min	0-65535	10	
PE06	ZST	Home position shift distance	μm	0-65535	0	
PE07	FTS	Home position return/JOG operation acceleration/deceleration time constants	ms	0-20000	100	
PE08	*ZPS	Home position return position data	10^ST Mμm	0-65535	0	
PE09	DCT	Travel distance after proximity dog	10^ST Mμm	0-65535	1000	
PE10	ZTM	Stopper type home position return stopper time	ms	0-1000	100	
PE11	ZTT	Stopper type home position return torque limit value	%	0-100	15	
PE12	CRP	Rough match output range	10^ST Mμm	0-65535	0	
PE13	JOG	JOG speed	r/min	0-65535	100	
PE14	OUT1	OUT1 output time selection This parameter is used only for the program method. This is not used in the point table method.	ms	0-20000	0	
PE15	*BKC	Backlash compensation	pulse	0-32000	0	
PE16	*LMPL	Software limit + (Under 3 digits)	10^ST Mμm	-999-999	0	
PE17	*LMPH	Software limit + (Upper 3 digits)	10^ST Mμm	-999-999	0	
PE18	*LMNL	Software limit - (Under 3 digits)	10^ST Mμm	-999-999	0	
PE19	*LMNH	Software limit - (Upper 3 digits)	10^ST Mμm	-999-999	0	
PE20	*LPPL	Position range output address+ (Under 3 digits)	10^ST Mμm	-999-999	0	
PE21	*LPPH	Position range output address - (Upper 3 digits)	10^ST Mμm	-999-999	0	
PE22	*LNPL	Position range output address - (Under 3 digits)	10^ST Mμm	-999-999	0	
PE23	*LNPH	Position range output address+ (Upper 3 digits)	10^ST Mμm	-999-999	0	

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

・PE** : Positioning setting parameters (1/2) : positioning mode exclusive

No.	Symbol	Name	Unit	Setting range	Set value	Note
PE24	*EOP1	Function selection E-1		0000-1101	0000	*3 Polarity selection of program input 1 (PI1) : Positive logic *1 Point table/program edit : Permit
PE25	PCRF	For manufacturer setting	r/min	0-65535	10	
PE26	PJTM	For manufacturer setting	ms	0-60000	100	
PE27		For manufacturer setting		0000-FFFF	0000	
PE28		For manufacturer setting		0000-FFFF	0000	

Parameter not to use

* Set value is enable in power supply OFF.

*1～*4 : The number of display a last digits

For details on the servo amplifier operating procedure, refer to
"General-Purpose AC Servo MELSERVO-JN Series General-Purpose Interface Servo Amplifier
MODEL (Servo Amplifier) MR-JN-□A、
MODEL (Servo Motor) HF-KN□、HF-KP□G1/G5/G7
INSTRUCTION MANUAL"
(manufactured by Mitsubishi Electric)

14.5 Servo type SI model

Servo type "SI" indicates Servo Si servo series (Sanmei Electronics).
The servo model is as follows:

Capacity	Servo amplifier	Servo motor
0.9N·m	Si-02DE	TS3653N324S04

14.6 Servo type SI alarm

Alarms are identified by servo driver's output signal ON/OFF repetition status. Currently activated alarms are output in the order of the alarm No. (The smaller alarm No. is output first.)

When the number of alarm output signal ON/OFF repetitions is "5", it indicates that Alarm No. 5 is activated. Some of the alarms cannot be reset unless the controller power supply is turned OFF.

・Alarm list

Alarm No.	Alarm name
1	Driver EEPROM alarm
2	Motor EEPROM alarm
3	Encoder alarm
4	System alarm
5	Positioning deviation count overflow alarm
6	A-phase pulse overcurrent
7	B-phase pulse overcurrent
8	Operating temperature, Motor power cable alarm
9	Overload
10	Acceleration and deceleration region shortage
11	Communication alarm
12	Motot power supply overvoltage
13	Motot power supply undervoltage
14	Control power supply overvoltage
15	Control power supply undervoltage

14.7 Servo type SI parameter setup

・Parameter set value

No.	Setting item	Unit	Setting range	Set value (X)	Set value (Y)	Note
0	Axis Address (*)	—	0~14	1	2	Axis Address
1	Control Input Preset Setup (*)	—	0~2	0	0	Resolution 1pls=0.01mm
2	Resolution Numerator (*)	pulse	1~65535	4500	4500	Resolution 1pls=0.01mm
3	Resolution Denominator (*)	pulse	1~65535	1	1	
4	Reference Pulse Multiplier (*)	—	1~65535	1	1	
5						
6	Forward Software OT	pulse	-99999999 ~99999999	0	0	
7	Reverse Software OT	pulse	-99999999 ~99999999	0	0	
8	Save Current	mA	0~8000	2000	2000	
9	Current Save Time	ms	0~999999	100	100	
10	Preset Servo Tuning	—	0~15	**11**	**11**	
11	Position Loop P Gain	—	0~9999	250	250	For gain adjustment PRM (To be changed first during gain adjustment)
12	Position Loop FFD Gain	—	0~9999	100	100	For gain adjustment PRM (To be adjusted when the value of PRM 11 is large.)
13	Speed Loop P Gain	—	0~9999	25	25	For gain adjustment PRM (To be adjusted when the value of PRM 11 is large.)
14	Speed Loop D Gain	—	0~9999	40	35	For gain adjustment PRM (To be adjusted when the value of PRM 11 is large.)
15	Speed Loop I Gain	—	0~9999	130	110	For gain adjustment PRM (To be adjusted when the value of PRM 11 is large.)
16	Hold State IG Enable	—	0~1	1	1	
17	Maximum Position Error	pulse	0~9999	50000	50000	
18	In-Position Area	pulse	0~9999	1000	1000	
19	TFIN/VZR Output Range	rpm	0~4500	0	0	
20	Reference Pulse Train Form (*)	—	0~2	**1**	**1**	PULSE/SIGN input
21	JOG Speed	rpm	1~4500	300	300	
22	JOG Accel/Decel Time Const.	ms	1~999999	10	10	
23	STEP Pulse 0	pulse	-99999999 ~99999999	0	0	
24	STEP Pulse 1	pulse	-99999999 ~99999999	0	0	
25	STEP Pulse 2	pulse	-99999999 ~99999999	0	0	
26	STEP Pulse 3	pulse	-99999999 ~99999999	0	0	
27	Zero-Point-Return Form (*)	—	0~7	7	7	

A change is necessary by user specifications

(*) Set value is enable in power supply OFF.

No.	Setting item	Unit	Setting range	Set value (X)	Set value (Y)	Note
28	ZRTN Direction (*)	—	0~1	1	1	
29	ZRTN High Speed	rpm	0~4500	20	20	
30	ZRTN Low Speed	rpm	0~4500	40	40	
31	ZRTN Accel Time Const.	ms	1~999999	200	200	
32	ZRTN Offset Pulse	pulse	-99999999 ~99999999	200	200	
33	ZRTN Press Torque	%	0~300	50	50	
34	Press Mode Speed Limit	rpm	1~4500	4500	4500	
35	Press Escape Speed. Limit	rpm	1~4500	4500	4500	
36	Press Mode Speed Limit ATC	ms	1~999999	10	10	
37	Press Trq Inc/Dec TC	ms	1~999999	100	100	
38	Operation Mode (*)	—	0~1	0	0	
39	Alarm Output Time Const.	ms	0~1000	100	100	
40	Z Pulse Output Time	ms	1~1000	10	10	
41	Input Filter Time Const.	ms	0~999	5	5	
42	Pulse Smoothing TC	ms	0~9999	0	0	
43	COM Format (*)	—	0h~1Fh	2	2	
44	COM Reply Wait Time	ms	0~999	0	0	
45	Input Method Select	—	0h~FFFFh	0	0	
46						
47	ServoFree Delay Time	ms	0~9999	0	0	
48	Rotation Direction (*)	—	0~1	0	0	Rotation command for + direction is intended for CCW rotation when viewed from motor shaft side.
49	Main Circuit Voltage (*)	V	24~36	24	24	
50	Open-Loop Max. Speed	rpm	0~4500	15	15	
51	Open-Loop Drive Area	pulse	0~999	16	16	For gain adjustment PRM (To be changed first during gain adjustment)
52	INP-Out Sample Time	ms	0~9999	100	100	
53	Startup Hold Time	ms	500 ~999999	500	500	
54	PointNumber Multiplier	-	0~63	0	0	
55	VCMP Output Range	rpm	0~4500	10	10	
56	Auto Tuning	-	0~1	0	0	
57	Rotating System Pulse	pulse	0 ~99999999	0	0	
58	Machine Edge Detection Sequence	-	0~1	1	1	All axis are enable.

A change is necessary by user specifications

(*) Set value is enable in power supply OFF.

No.	Setting item	Unit	Setting range	Set value (X)	Set value (Y)	Note
59	Grid-Mask Pulse	pulse	0 ~99999999	0	0	
60	Extended Input Setup 1 (*)	-	0h~FFFF FFFFh	3A3901 27	3A3901 27	IN 0 :ERST IN1:SVON IN2:TSEL0 IN3:TSEL1
61	Extended Input Setup 2 (*)	-	0h~FFFF FFFFh	3B	3B	IN3:TSEL2
62						
63	Extended Output Setup (*)	-	0h~FFFF FFFFh	1D0103	1D0103	OUT0:ALM OUT1:RDY OUT2:FIN+T
64						
65	Control Input Logic Setup (*)	-	0h~1Fh	0	0	
66	Control Output Logic Setup (*)	-	0h~7h	0	0	
67						
68	Alarm Output Protect Setup	-	0h~Fh	8	8	
69						
70	Torque Select 0	%	0~300	100	100	For origin return operation
71	Torque Select 1	%	0~300	100	100	
72	Torque Select 2	%	0~300	100	100	
73	Torque Select 3	%	0~300	100	100	
74	Torque Select 4	%	0~300	100	100	
75	Forward Torque Limit	%	0~300	0	0	
76	Reverse Torque Limit	%	0~300	0	0	

A change is necessary by user specifications

15. CC-Link (Option)

When the CC-Link function (option) is used, the RC75,RC755 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.

15.1 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

- For wiring, dismount the cover of the RC75 controller, or remove the R755 controller from the main unit, and directly connect the controller to the internal CC-Link interface block (FX2N-32CCL).
- 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.

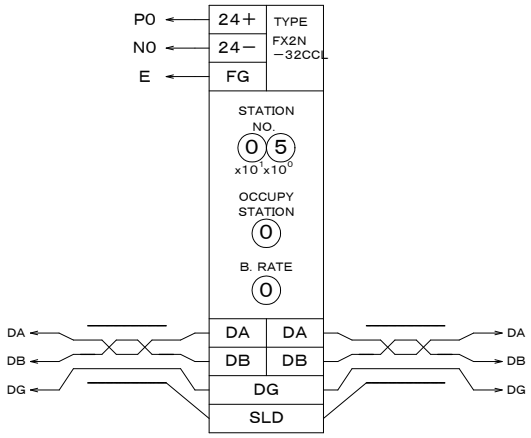
PLC Device	CC-Link	Signal
M2100	RY00	EXE input RETURN
M2101	RY01	EXE input RESET
M2102	RY02	EXE input CYCLE START
M2103	RY03	EXE input SCREW FEED
M2104	RY04	EXE input TABLE SELECTION 1
M2105	RY05	EXE input TABLE SELECTION 2
M2106	RY06	EXE input TABLE SELECTION 4
M2107	RY07	EXE input TABLE SELECTION 8
M2108	RY08	EXE input TABLE SELECTION 16
M2109	RY09	EXE input TABLE SELECTION 321
M2110	RY0A	EXE input TABLE SELECTION 64
M2111	RY0B	EXE input TABLE SELECTION 128
M2112	RY0C	EXE input FAULT OK CONTINUD
M2113	RY0D	EXE input FAULT NG CONTINUD
M2114	RY0E	EXE input FAULT RETRY
M2115	RY0F	EXE input FAULT BREAK
M2300	RX00	EXE output READY(START POSSIBLE)
M2301	RX01	EXE output HOME POSITION
M2302	RX02	EXE output ALARM
M2303	RX03	EXE output DURING RUNNING
M2304	RX04	EXE output CYCLE COMPLETION
M2305	RX05	EXE output DURING FEEDING
M2306	RX06	EXE output SCREW SHORTAGE
M2307	RX07	EXE output TIGHTENING TORQUE FAULT
M2308	RX08	EXE output TIGHTENING HEIGHT FAULT
M2309	RX09	EXE output SCREW FEED FAULT/SCREW PICKUP FAULT
M2310	RX0A	EXE output BUZZER ON（ALARM、CYCLE COMPLETION）
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 RC75, RC755 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 RC75, RC755 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.

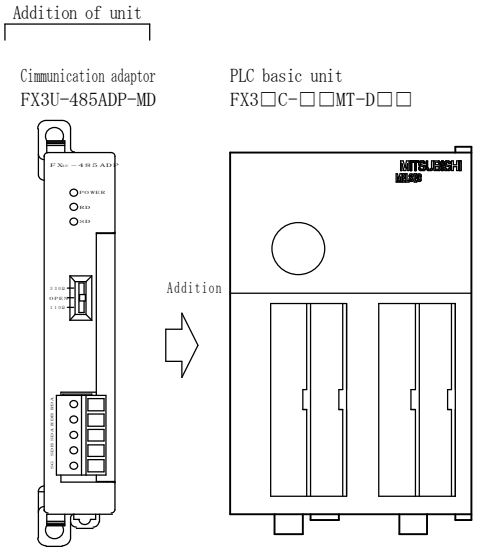
Number of stations	Remote address	PLC address
Remote Input (PLC -> Remote)	RX00~6F (112 points)	M2300~2411 (112 points)
Remote Output (PLC <- Remote)	RY00~6F (112 points)	M2100~2211 (112 points)
Remote register for write	RWr0~F (16 points)	D7930~7945 (16 points)
Remote register for read	RWw0~F (16 points)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

16. 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 RC75 teaching pendant.

16.1 Connection with the SD550 controller

To use the SD550 communication function, add the RS485 communication unit to the PLC in the RC75, RC755 controller. To enable communication, connect the added communication unit to the RS485 interface port of the SD550 controller.



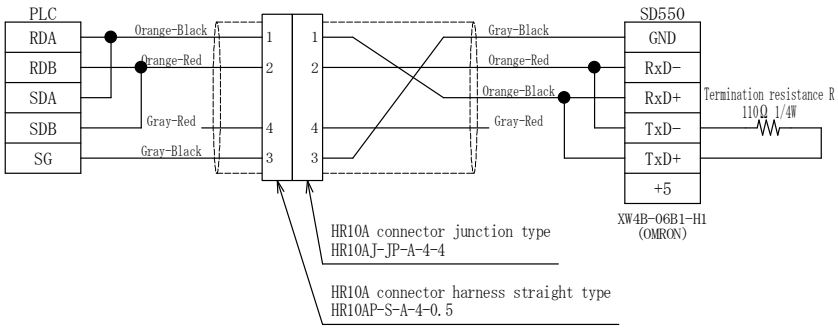
[Setting]

・Termination resistance selector switch.

330Ω / OPEN / (110Ω)

[Connection diagram]

・Connection with SD550-485 connector

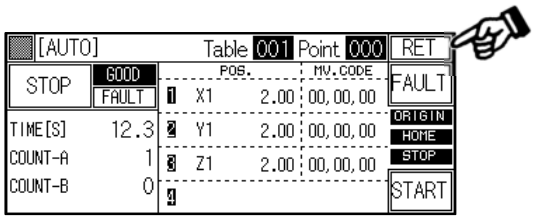
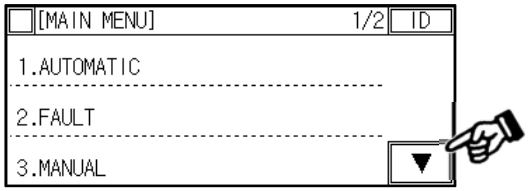
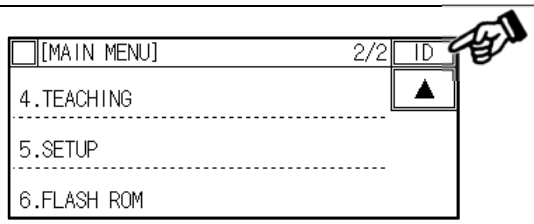
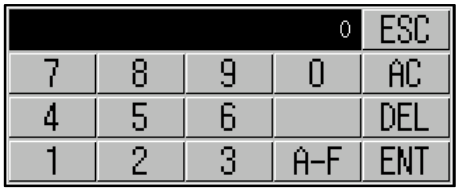
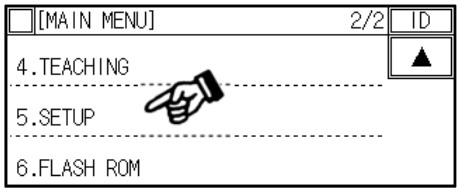
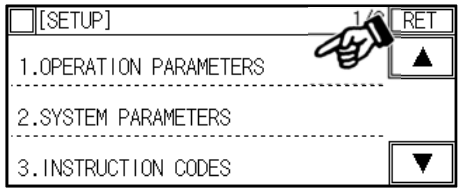


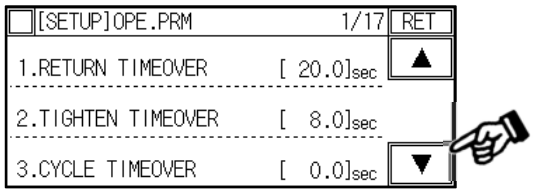
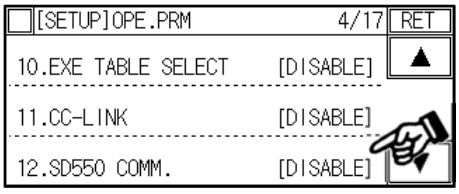
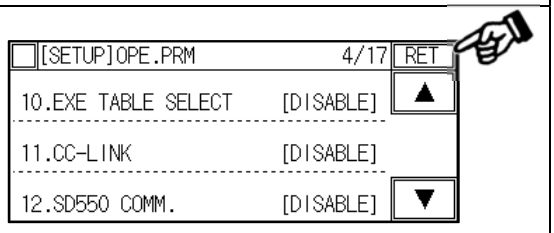
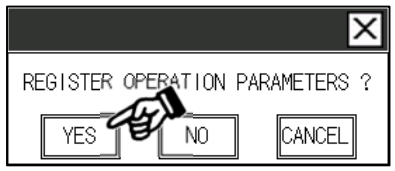
(Note)
The connector pin names are those viewed from the front of the unit.

16.2 Operation for enabling SD550 communication

16.2.1 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.

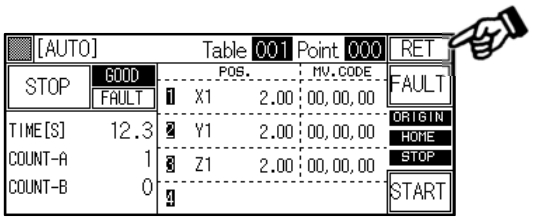
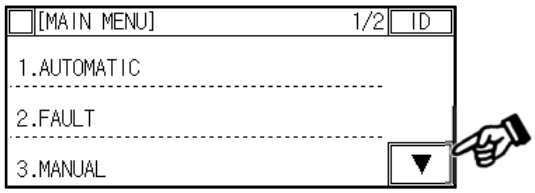
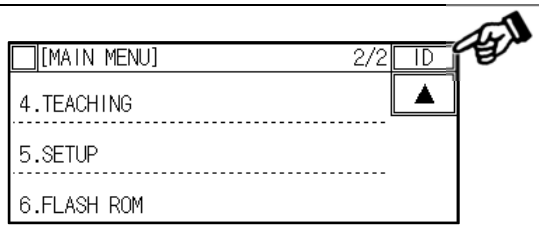
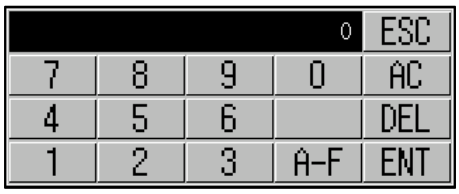
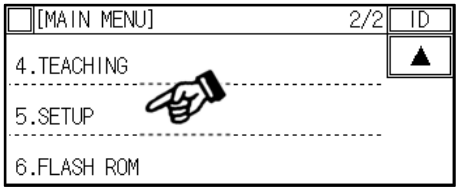
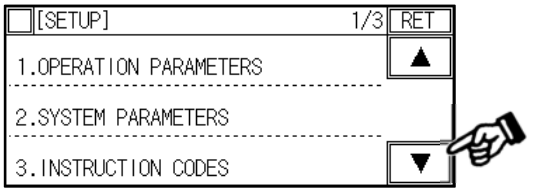
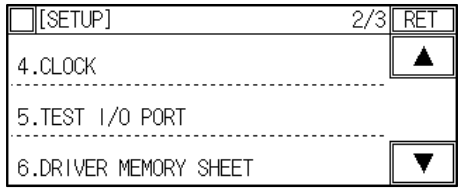
	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press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

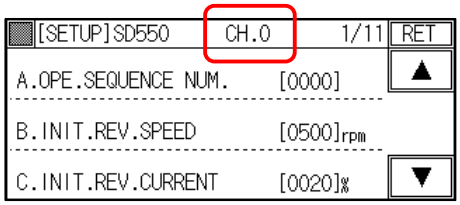
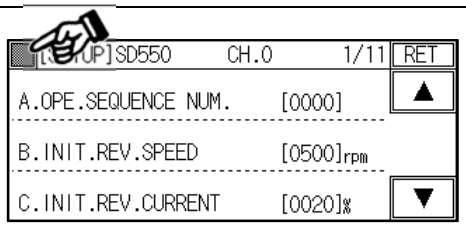
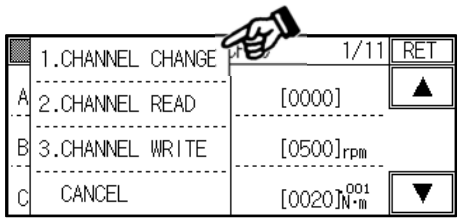
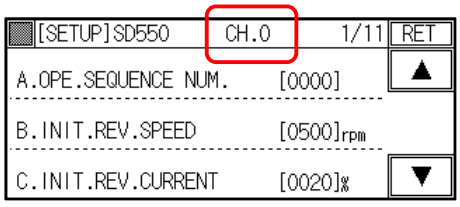
	Operating procedure	Display/Status
7	Press the [▼] switch three times.	 Three times
8	You can change the current setting by pressing the [ ] field in the "12. SD550 COMM" information line to be changed. [DISABLE] … The SD550 communication function is not used. [550] … The SD550 communication function 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.	

To change data, execute flash ROM writing operation.

16.2.2 Reading data from the memory sheet

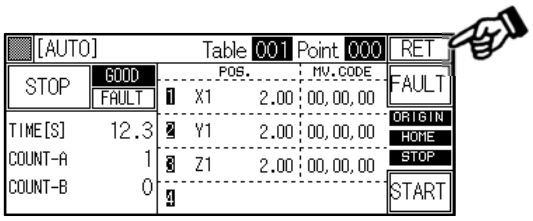
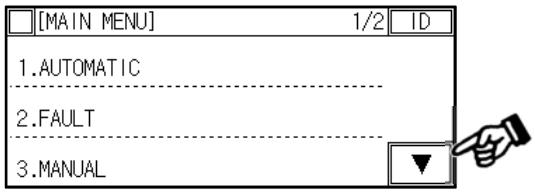
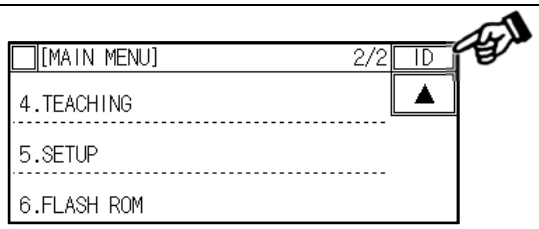
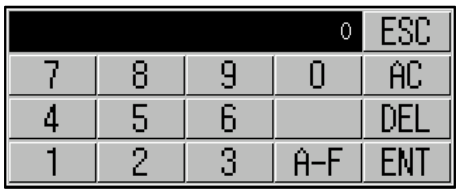
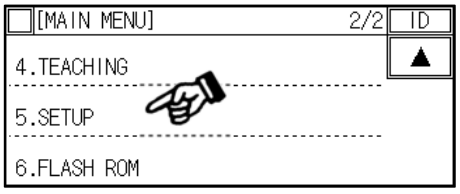
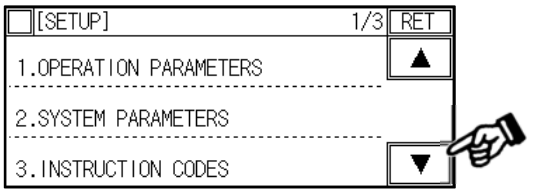
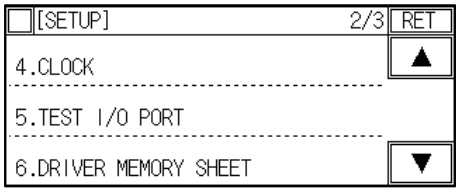
When the SD550 communication function is set to "ENABLE", 6.DRIVER MEMORY SHEET is displayed in the SETUP menu, enabling edition of the driver memory sheet through operation of the RC75 teaching pendant.

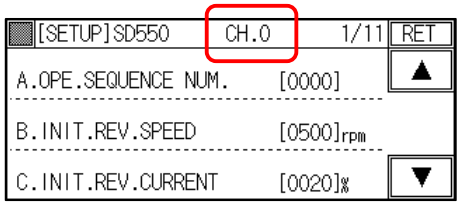
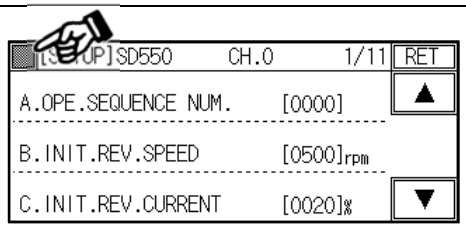
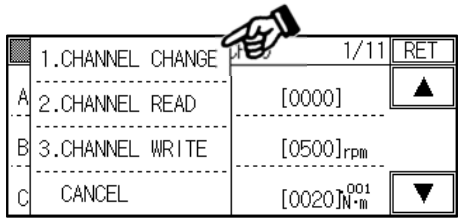
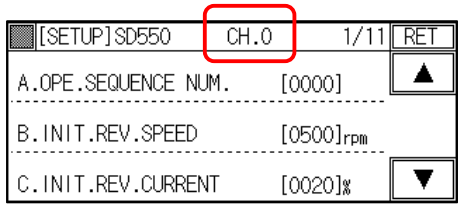
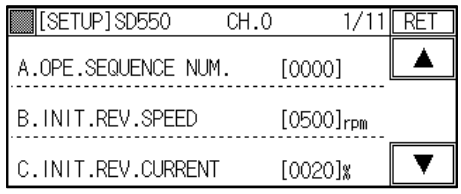
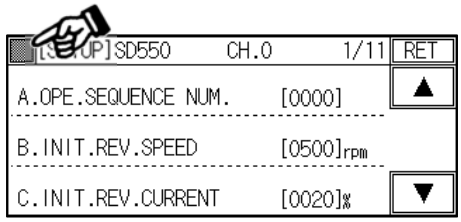
	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press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

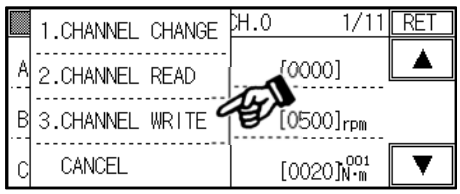
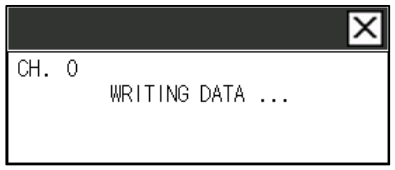
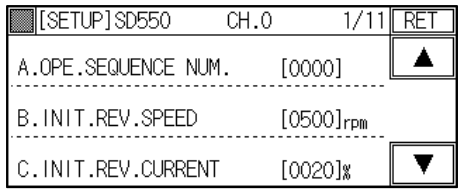
	Operating procedure	Display/Status
8	When the display is changed to the driver memory sheet edit screen, data on the currently selected driver channel (indicated in the red frame) is automatically read.	
9	If you intend to read data on a different driver channel, press the ▣ button at the left top of 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.	

16.2.3 Writing data into the memory sheet

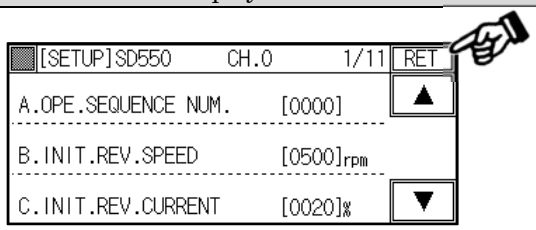
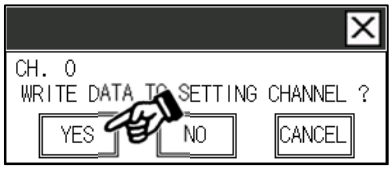
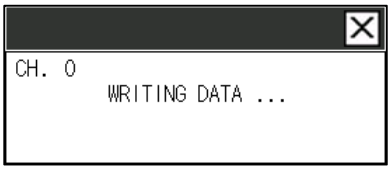
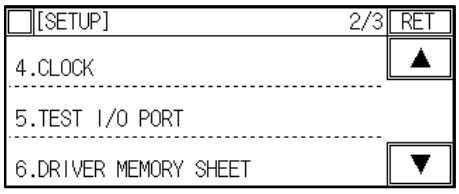
When the SD550 communication function is set to "ENABLE", 6.DRIVER MEMORY SHEET is displayed in the SETUP menu, enabling edition of the driver memory sheet through operation of the RC75 teaching pendant.

	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 5.SETUP . The screen changes to the SETUP mode.	
6	Press the ▼ switch.	
7	Press 6.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.	

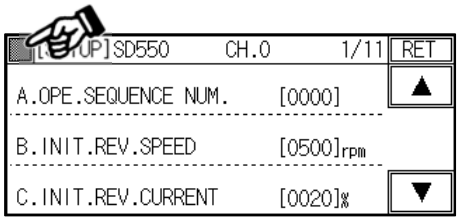
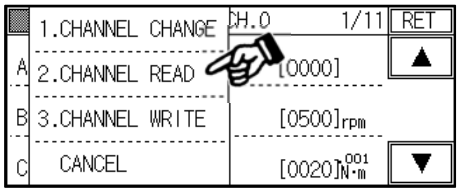
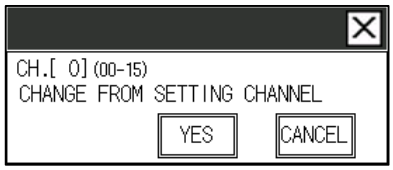
	Operating procedure	Display/Status
15	Press 3.CHANNEL WRITE in the displayed window.	
16	Press the YES swith in the displayed window.	
17	The edited data is written in the driver.	
18	When the "WRITING DATA" window disappears, writing data into the driver is completed.	

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.	

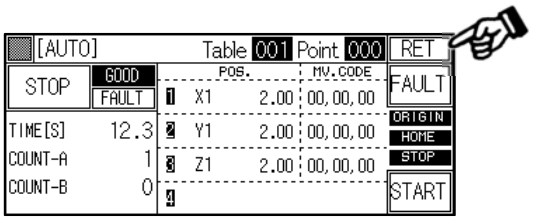
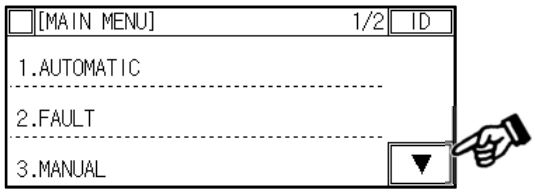
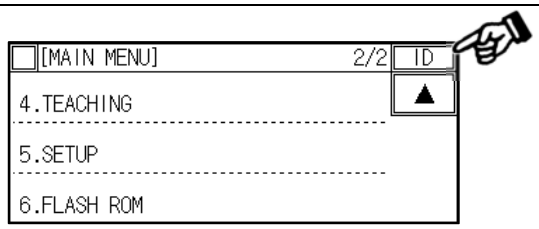
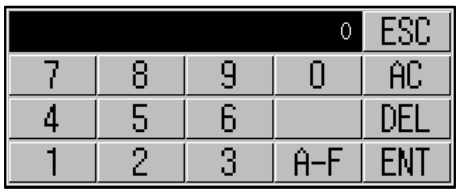
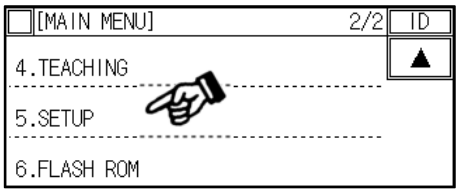
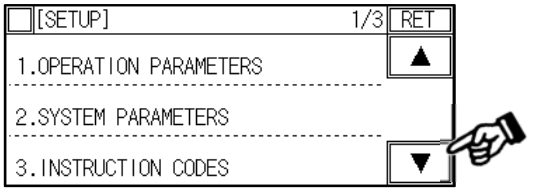
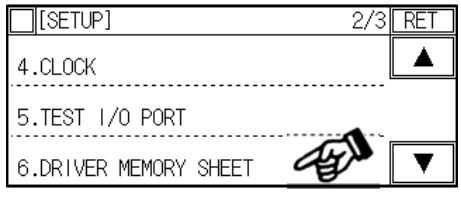
16.2.4 Copying the memory sheet

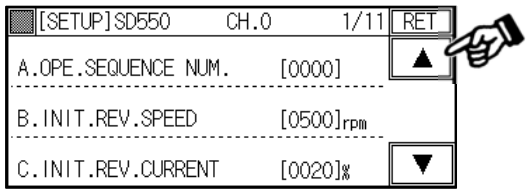
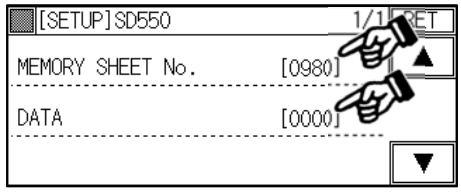
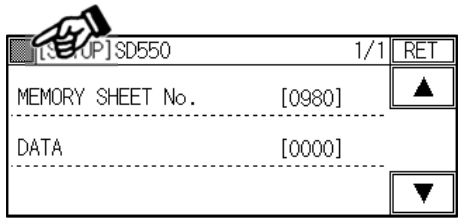
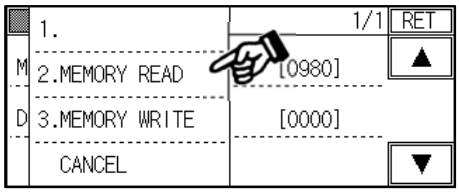
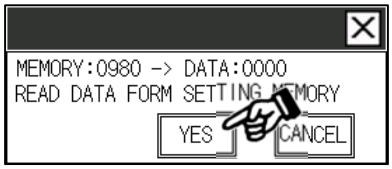
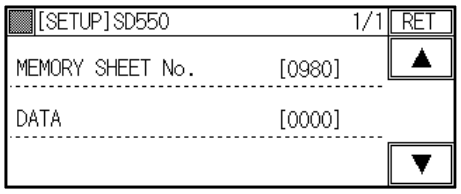
When the SD550 communication function is set to "ENABLE", 6.DRIVER MEMORY SHEET is displayed in the SETUP menu, enabling edition of the driver memory sheet through operation of the RC75 teaching pendant.

	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.	

16.2.5 Reading single specified memory

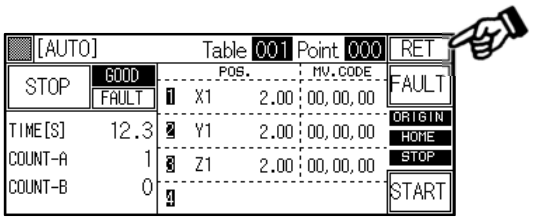
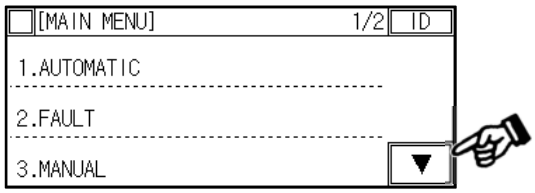
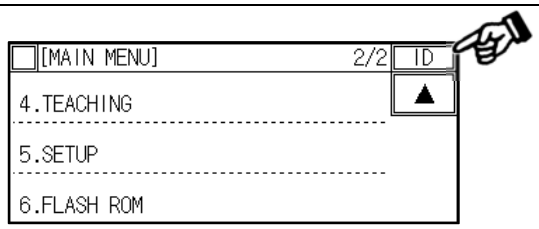
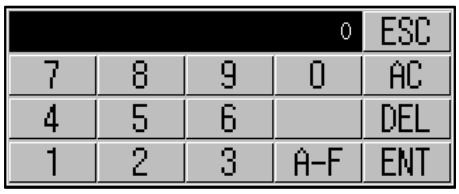
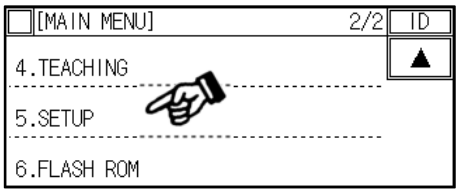
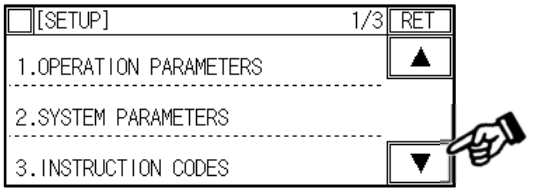
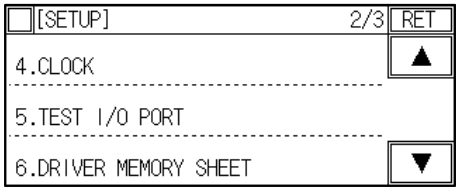
If you intend to change only a specified memory, or to change a memory other than the driver standard program (e.g. for edition of a user program memory sheet), you can use the single specified memory reading/writing function.

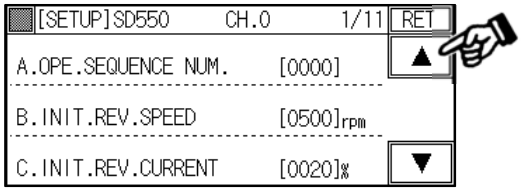
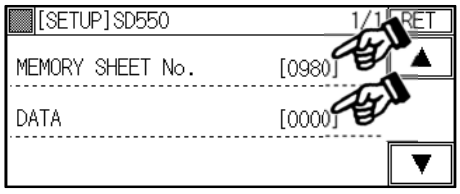
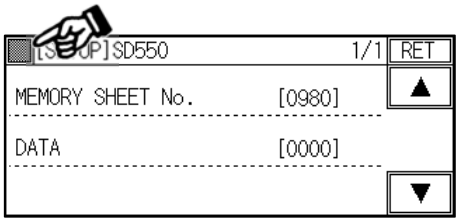
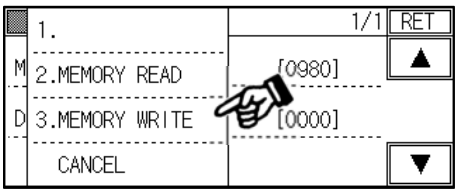
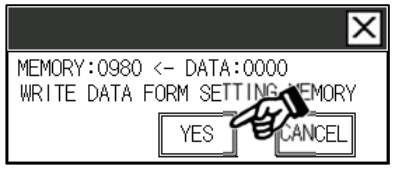
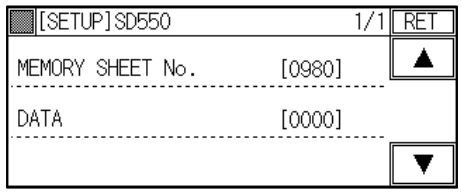
	Operating procedure	Display/Status
1	Press the RET switch.	
2	Press the ▼ switch.	
3	Press the ID switch. To execute teaching operation, the password for LEVEL 3 or higher authorized level is required.	
4	Enter the password for LEVEL 3 or higher authorized level with the displayed numeric keys, and press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

16.2.6 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 5.SETUP . The screen changes to the SETUP mode.	
6	Press the ▼ switch.	
7	Press 6.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.	

16.3 Pendant functions available when SD550 communication is enabled

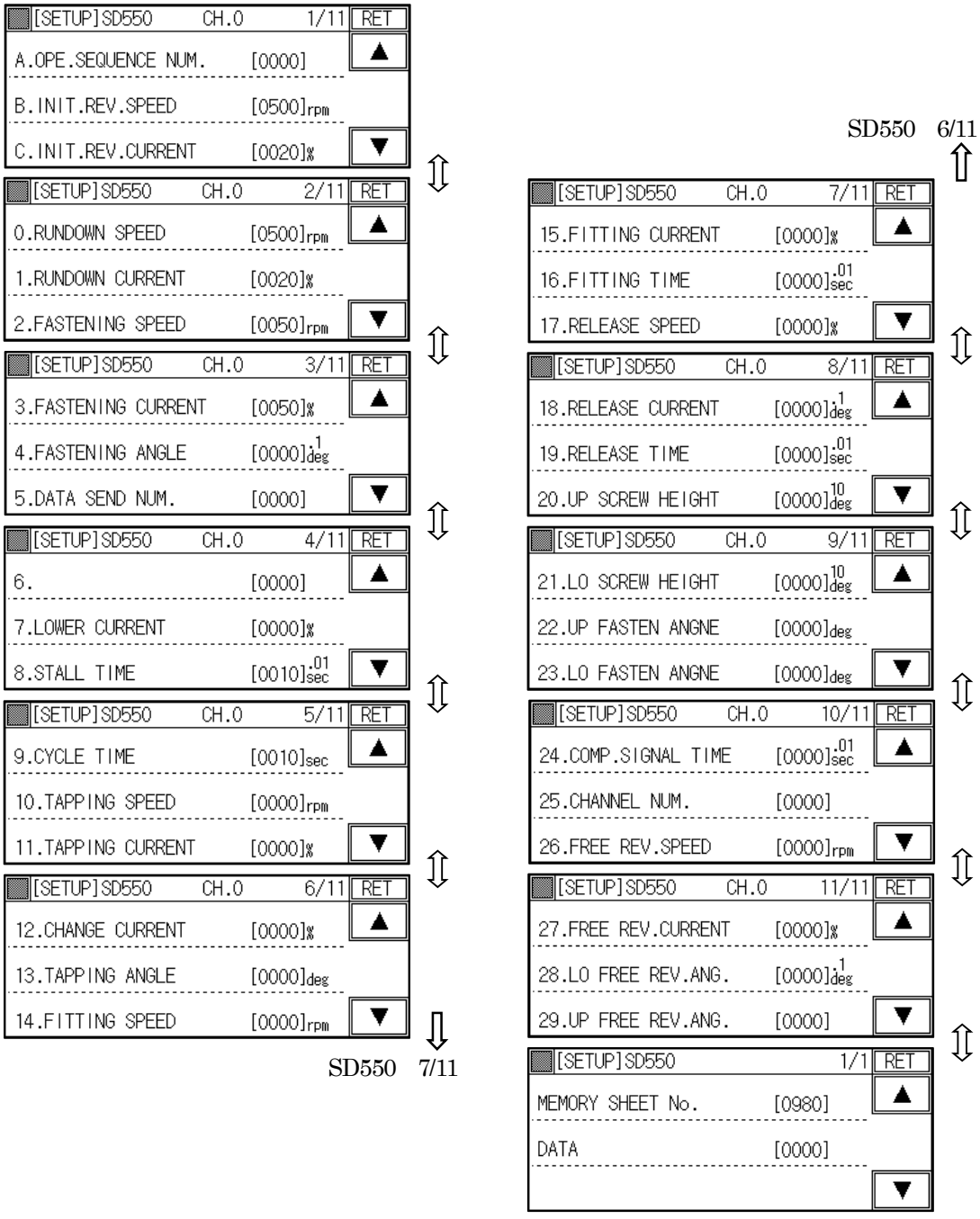
When the SD550 communication function is set to "ENABLE", the following functions can be used with the teaching pendant.

16.3.1 Memory sheet

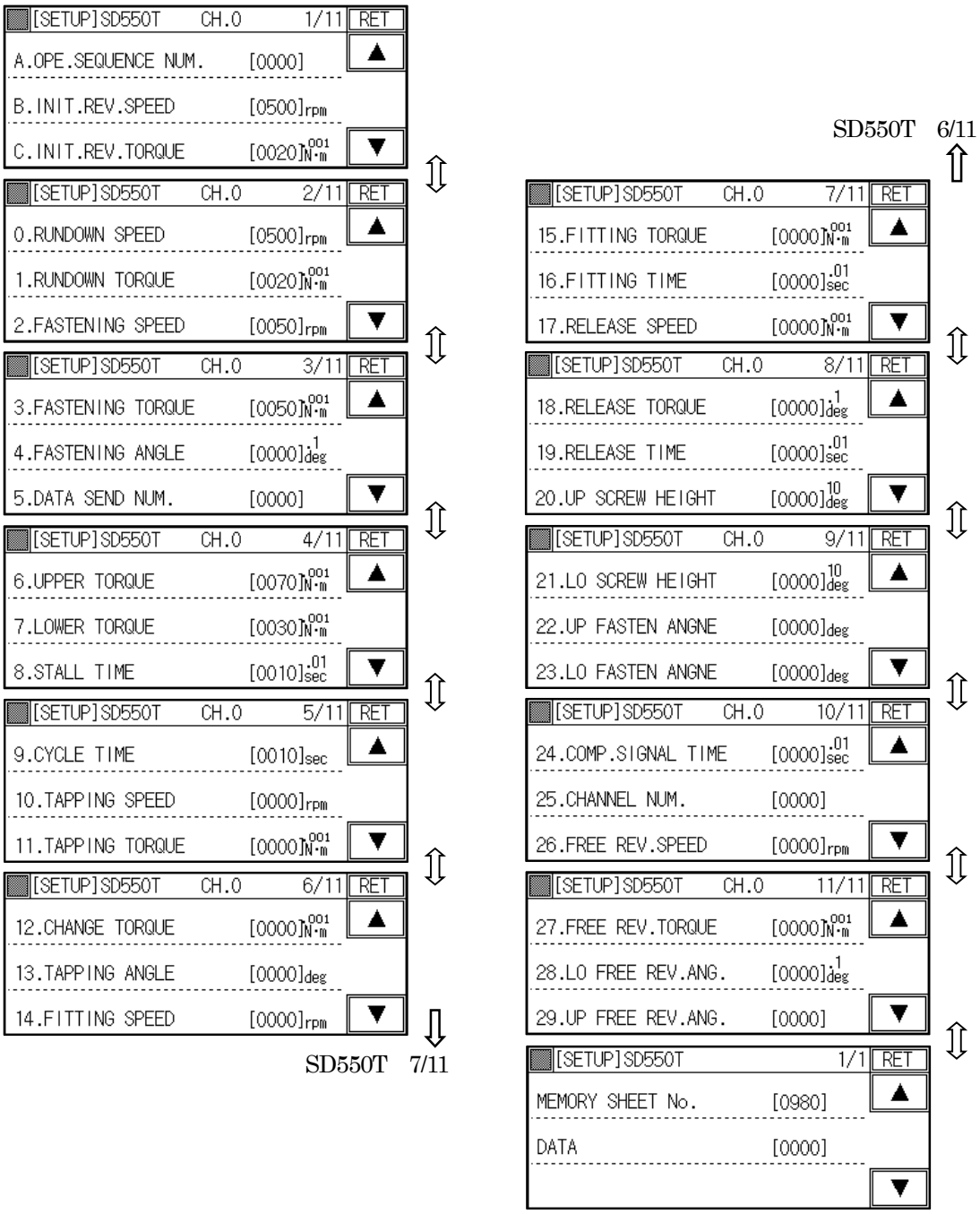
Edition of the SD550 controller memory sheet is enabled through operation of the RC75 teaching pendant.

[Screen configuration]

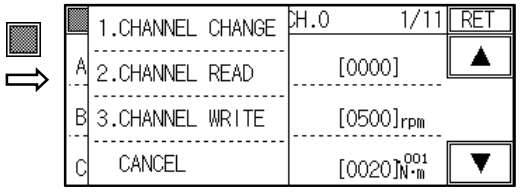
・Screen displayed when 550 is selected for operation parameter "12. SD550 COMM"



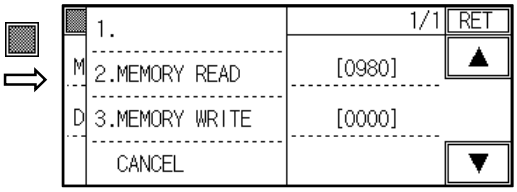
・Screen displayed when 550T is selected for operation parameter "12. SD550 COMM"



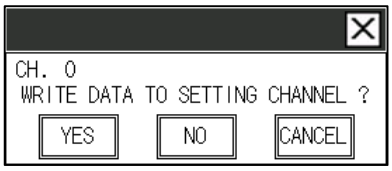
・When sub menu is displayed
(CH edition: 1/11～11/11)



・When sub menu is displayed
(Single memory edition)



[Description on screen]

RET	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 1/11～11/11

1.CHANNEL CHANGE	Changes a driver channel subject to edition. Driver data on the channel selected with the [CHANNEL CHANGE] operation will be automatically acquired.
2.CHANNEL READ	Reads all data on an arbitrary channel.
3.CHANNEL 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)

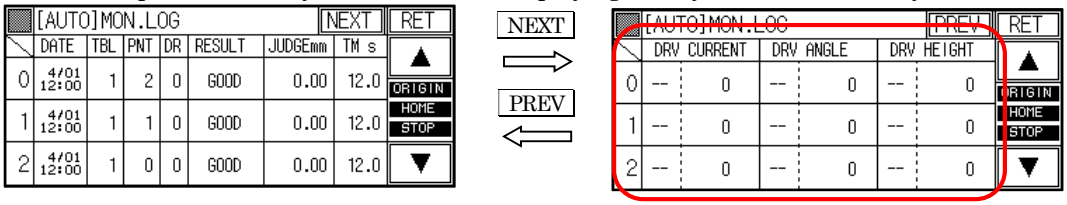
2.MEMORY READ	Reads a set value from a specified memory.
3.MEMORY WRITE	Writes a set value into a specified memory.
CANCEL	Closes sub menu display window.

16.3.2 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 100 cycles.

[Screen configuration]

・Automatic operation history monitor screen (Displaying history of 100 automatic cycles)



[Description on screen]

DRV CURRENT ・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 ANGLE	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 HEIGHT	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

16.3.3 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 …

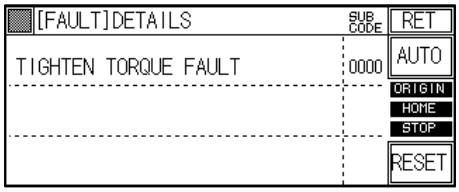
When the driver OUT3 (system alarm) signal turns ON, the alarm No. is read, which is indicated in a sub code.

・DRIVER COMM. FAULT …

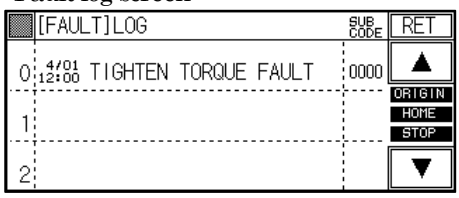
When a communication fault occurs, the alarm code is read, which is indicated in a sub code.

[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	

17. Appendix

17.1 PLC address assignment list

1) List of devices used for PLC (FX3UC)

Device		Description	Application	Power failre backup	User setting
X	X000～X057	Input relay	X000～X037 : For system		
			X040～X057 : For general purpose (external signal)		○
Y	Y000～Y057	Output relay	Y000～Y037 : For system		
			Y040～Y057 : For general purpose (external signal)		○
M	M0～M499	For general	M0～M99 : For system		
			M100～M499 : For screw tightening circuit		
	M500～M1023	For general (No keeping)	M500～M799 : For manual operation		
			M800～M999 : For fault		
			M1000～M1023 : For TP control		
	M1024～M7679	For keeping (battery)	M1024～M1279 : For TP control	○	
			M1280～M1999 : For system	○	
			M2000～M2999 : For CC-Link	○	
			M3000～M7679 : (Reserve)	○	○
	M8000～M8511	For special		－	－
S	S0～S9	Initial state			
	S10～S499	For general	S10～S499 : For system		
	S500～S899	For general (No keeping)	S500～S899 : For system		
	S900～S999	For annunciator	S900～S999 : For system	○	
	S1000～S4095	For keeping (battery)	S1000～S2099 : For system	○	
			S2100～S4095 : (Reserve)	○	○
T	T0～T199	100ms	T0～T99 : For system		
			T100～T199 : (Reserve)		○
	T200～T245	10ms	T200～T219 : For system		
			T220～T245 : (Reserve)		○
	T246～T249	1ms accumulating type		○	○
	T250～T255	100ms accumulating type		○	○
	T256～T511	1ms	T256～T279 : (Reserve)		○
			T280～T329 : For positioning circuit		
			T300～T511 : (Reserve)		○
C	C0～C99	For general 16 bits			○
	C100～C199	For keeping 16 bits		○	○
	C200～C219	For general 32 bits			○
	C220～C234	For keeping 32 bits		○	○
	C235～C255	High-speed counter	C251～C254 : For positioning circuit		

Device		Description	Application	Power failre backup	User setting
D	D0～D199	For general	D0～D9 : For system		
			D10～D199 : (Reserve)		
	D200～D511	For keeping (battery)	D200～D399 : For system	○	
			D400～D499 : (Reserve)	○	
			D500～D511 : For system	○	
	D512～D7999	For keeping (battery)	D512～D799 : For system	○	
			D800～D899 : For operation parameter	○	
			D900～D1049 : For system parameter	○	
			D1050～D1099 : Screw parameter information	○	
			D1100～D1499 : For positioning circuit	○	
			D1500～D5999 : For TP control	○	
			D6000～D7899 : For communication control	○	
			D7900～D7999 : For CC-Link	○	
	D8000～D8511	For special		—	—
R	R0～R32767	For keeping of battery	R0～R399 : Screw parameter information	○	
			R400～R999 : (Reserve)	○	
			R1000～R1099 : For operation parameter	○	
			R1100～R1199 : For system parameter	○	
			R1200～R1499 : (Reserve)	○	
			R1500～R5999 : Positioning instruction data	○	
			R6000～R25999 : Positioning control data	○	
			R26000～R32767 : (Reserve)	○	
ER	ER0～ER9999	Extension file register (Flash ROM)	ER0～ER399 : Screw parameter information	○	
			ER400～ER999 : (Reserve)	○	
			ER1000～ER1099 : For operation parameter	○	
			ER1100～ER1199 : For system parameter	○	
			ER1200～ER1499 : (Reserve)	○	
			ER1500～ER5999 : Positioning instruction data	○	
			ER6000～ER25999 : Positioning control data	○	
			ER26000～ER32767 : (Reserve)	○	
Z	Z0～Z7	For index	Z0～Z7 : For system		
P	P0～P62	For branching of call	P0～P62 : For system		
	P63	For branching of jump			
	P64～P4095	For branching of call			○
I	I0□□～I5□□	Input interruption and input delay interruption			
	I6□□～I8□□	Timer interruption interruption			
	I010～I060	Counter interruption			

17.2 Standard setting list

17.2.1 RC75-T1 (FM513VZ) setting infomation

1) Operation parameters (Standard settings)

No.	Setting item	Set value
1	RETURN TIMEOVER [sec]	20.0
2	TIGHTEN TIMEOVER [sec]	8.0
3	CYCLE TIMEOVER [sec]	0.0
4	SCREW SHORTAGE [sec]	10.0
5	SCREW FEED [sec]	0.5
6	SCREW FEED DETECT	DISABLE
7	TORQUE CHECK	ENABLE
8	HEIGHT CHECK	ENABLE
9	FEED TIMMING	BEFORE
10	EXE TABLE SELECT	DISABLE
11	CC-LINK	DISABLE
12	SD550 COMM.	DISABLE
13	PICKUP COUNT [sec]	0.5
14	PICKUP RETRY	0
15	AFTER TIGHTEN FAIL	CONTINUE
16	COUNT-A	OK
17	COUNT-B	NG
18	DELAY TIME [sec]	0.0
19	BUZZER OUTPUT	1
20	BIT CUSHION [mm]	0.0
21	OVERRIDE AXIS-1 [%]	100
22	OVERRIDE AXIS-2 [%]	100
23	OVERRIDE AXIS-3 [%]	100
24	OVERRIDE AXIS-4 [%]	100
25	JOG HIGH SPEED [%]	10
26	JOG MIDDLE SPEED [%]	5
27	JOG LOW SPEED [%]	1
28	POW ON LOAD ROM	DISABLE
29		
30	SCREW PARAMETERS No.0	Screw parameter information is described on the next page.
31	SCREW PARAMETERS No.1	
32	SCREW PARAMETERS No.2	
33	SCREW PARAMETERS No.3	
34	SCREW PARAMETERS No.4	
35	SCREW PARAMETERS No.5	
36	SCREW PARAMETERS No.6	
37	SCREW PARAMETERS No.7	
38	SCREW PARAMETERS No.8	
39	SCREW PARAMETERS No.9	
40		
41		
42		
43		
44		
45		
46	MAKER ADJUST	0
47	MAKER ADJUST	0
48	MAKER ADJUST	0
49	MAKER ADJUST	0
50	MAKER ADJUST	0
51	MAKER ADJUST	0

2) Screw parameters (Simplified settings)

No.	Screw parameters	0	1	2	3	4
1	SCREW LENGTH [mm]	8.0 (*1)				
2	WORK THICKNESS [mm]	0.0 (*1)				
3	APPROACH OFFSET [mm]	20.0 (*1)				
4	VACUUM CUT [mm]	2.0				
5	FINAL TRQ CHANGE [mm]	1.0				
6	TARGET OFFSET [mm]	5.0				
7	HEIGHT DETECT [mm]	2.0				
8	TIGHTEN COMPLETED [mm]	(*1)				
9	NORMATIVE POS. [mm]	(*1)				
10	FAST FORWARD THRUST	0				
11	INITIAL THRUST	3				
12	FINAL THRUST	4				
13	FAST FORWARD SPD [%]	100				
14	TIGHTENING SPEED [%]	20				
15						

(*1) The set value varies depending on system configuration.

(Remarks)

The screw parameter simplified settings can be developed to detailed settings after completion of input. Through development, the following simplified setup parameters are developed to detailed setup parameters.

Screw parameter detailed settings	Information under development
HEIGHT DETECT + [mm]	A simplified setting of height detection width [mm] is transferred.
HEIGHT DETECT - [mm]	A simplified setting of height detection width [mm] is transferred.
RETURN CHANGE [mm]	0.0 [mm]
FAST FORWARD 2 THRUST	A simplified setting of temporary tightening thrust is transferred.
HEIGHT DETECT THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 1 THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 2 THRUST	0 (Maximum thrust setting)
FAST FORWARD 2 SPD [%]	A simplified setting of tightening speed [%] is transferred.
FINAL SPD [%]	A simplified setting of tightening speed [%] is transferred.
RETURN 1 SPD [%]	100 [%]
RETURN 2 SPD [%]	100 [%]

3) Screw parameters (Detailed settings)

No.	Screw parameters	0	1	2	3	4
1	SCREW LENGTH [mm]	8.0 (*1)				
2	WORK THICKNESS [mm]	0.0 (*1)				
3	APPROACH OFFSET [mm]	20.0 (*1)				
4	VACUUM CUT [mm]	2.0				
5	FINAL TRQ CHANGE [mm]	1.0				
6	TARGET OFFSET [mm]	5.0				
7	HEIGHT DETECT + [mm]	2.0				
8	HEIGHT DETECT− [mm]	2.0				
9	RETURN CHANGE [mm]	0.0				
10	TIGHTEN COMPLETED [mm]	(*1)				
11	NORMATIVE POS. [mm]	(*1)				
12						
13	FAST FORWARD 1 THRUST	0				
14	FAST FORWARD 2 THRUST	3				
15	INITIAL THRUST	3				
16	FINAL THRUST	4				
17	HEIGHT DETECT THRUST	2(*1)				
18	RETURN 1 THRUST	0				
19	RETURN 2 THRUST	0				
20						
21						
22	FAST FORWARD 1 SPD [%]	100				
23	FAST FORWARD 2 SPD [%]	20				
24	INITIAL SPD [%]	20				
25	FINAL SPD [%]	20				
26	RETURN 1 SPD [%]	100				
27	RETURN 2 SPD [%]	100				
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

(*1) The set value varies depending on system configuration.

4) System parameters (Standard settings)

1. AXIS CONFIG

No.	Setting item	Set value
1	1st-AXIS USED	Z1
2	2nd-AXIS USED	DISABLE
3	3rd-AXIS USED	DISABLE
4	4th-AXIS USED	DISABLE
5	UP/DOWN AXIS1	Z1
6	UP/DOWN AXIS2	DISABLE
7	2-SERVO SPEC.	DISABLE
8	PNP SPEC.	DISABLE

2. PROGRAM CONFIG

No.	Setting item	Set value
1	TABLE RECORD NUMBER	1000

3. AXIS PARAMETERS

No.	Setting item	1.1st-Axis	2.2nd-Axis	3.3rd-Axis	4.4th-Axis
1	STROKE LENGHT [mm]	170.00 (*1)			
2	MAX SPEED [Hz]	60000			
3	RET.PULSE IN POS. [pls]	30			
4	COORDINATE +/-	(+)RANGE			
5	JOG DIRECTION	(+)ADV.			
6					
7	ACC TIME [msec]	50			
8	DCC TIME [msec]	50			
9	ORIGIN SENSOR	DISABLE			
10	SOFT LMT+	170.00 (*1)			
11	SOFT LMT-	-2.00			
12	UNIT	mm			
13	HARD AXIS No.	1			
14	SERVO TYPE	JN			
15					

(*1) The set value varies depending on system configuration.
Specifications stroke +20mm is a standard set value.

4. LANGUAGE

No.	Setting item	Set value
1	LANGUAGE	ENGLISH

5) Table, Poinr infomation (Standard settings)

Table setting …

[2.SYSTEM PARAMETER] – [2.PROGRAM CONFIG] – [1. TABLE RECORD NUMBER] Set value:1000

Table No.	Point No.	Internal point No	Note
0	0	0	Standby position
1	0	1	Screw pickup
2	0	2	Bit change position
3	0	3	
4	0	4	
5	0	5	
997	0	997	
998	0	998	
999	0	998	

Table No. [0～2] Point No. [0] … For fixed point

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**			
2	C1 INST.CODE NO.	0			
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	PASS			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

Table No. [3～] Point No. [0] … For operation position

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**			
2	C1 INST.CODE NO.	0			
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	FEED			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

6) Instruction code (Standard settings)

Instruction code No.[0] … Z-Axis Tightening

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					PLC sync. pointer
1	83				0	0	0	0		Axis sync.wait
2	20	9901.00	901	91			9999			DRVA move
3	20	9902.00	902	92			9999			DRVA move
4	10	9904.00	903	93						PLSV move
5	12				8					PLSV move stop 2
6	17	9903.00	904	94						PLSV move spd/thr. change
7	19									PLSV move step stop
8	34			95						Thrust change
9	40				30					Set time wait
10	11									PLSV move stop 1
11	80				23					PLC sync. pointer
12	20	9905.00	905	96			9999			DRVA move
13	20	8000.00	906	97			0			DRVA move
14	42				9999					Set bit ON
15	0									End
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[1] … Z-Axis screw pickup

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	80				12					PLC sync. pointer
2	20	30.00	100	0						DRVA move
3	20	8001.00	10	0				1		DRVA move
4	80				13					PLC sync. pointer
5	20	8000.00	100	0			30			DRVA move
6	42				9999					Set bit ON
7	80				14					PLC sync. pointer
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[14] … Z-Axis Bit change

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	20	8002.00	10	1						DRVA move
2	82				1					Set axis sync. pointer
3	0									End
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[15] … Move to standby position (For automatic cycle)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8000.00	100	0						DRVA move
1	42				9999					Set bit ON
2	0									End
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[16] … Move to standby position (For return)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	11									PLSV move stop 1
2	34			0						Thrust change
3	40				30					Set time wait
4	20	8000.00	10	0						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[17] … Origin return

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	10	-99.00	5	1						PLSV move
2	30									Deviation clear
3	48				99	99	99	99		Origin sensor ON confirm
4	20	2.00	5	1						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[18] … JOG operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	4				2	3				Step branch jump 2
1	22	0.01	1	1						DRVI move
2	2				4					Step jump
3	22	-0.01	1	1						DRVI move
4	40				300					Set time wait
5	3				7	6				Step branch jump 1
6	32			1						JOG move (PLSV)
7	11									PLSV move stop 1
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[19] … Point moving operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20			1	1					DRVA move
1	0									End
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

17.2.2 RC75-T2（FM520VZZ）setting infomation

1）Operation parameters (Standard settings)

No.	Setting item	Set value
1	RETURN TIMEOVER [sec]	20.0
2	TIGHTEN TIMEOVER [sec]	8.0
3	CYCLE TIMEOVER [sec]	0.0
4	SCREW SHORTAGE [sec]	10.0
5	SCREW FEED [sec]	0.5
6	SCREW FEED DETECT	DISABLE
7	TORQUE CHECK	ENABLE
8	HEIGHT CHECK	ENABLE
9	FEED TIMMING	BEFORE
10	EXE TABLE SELECT	DISABLE
11	CC-LINK	DISABLE
12	SD550 COMM.	DISABLE
13	PICKUP COUNT [sec]	0.5
14	PICKUP RETRY	0
15	AFTER TIGHTEN FAIL	CONTINUE
16	COUNT-A	OK
17	COUNT-B	NG
18	DELAY TIME [sec]	0.0
19	BUZZER OUTPUT	1
20	BIT CUSHION [mm]	0.0
21	OVERRIDE AXIS-1 [%]	100
22	OVERRIDE AXIS-2 [%]	100
23	OVERRIDE AXIS-3 [%]	100
24	OVERRIDE AXIS-4 [%]	100
25	JOG HIGH SPEED [%]	10
26	JOG MIDDLE SPEED [%]	5
27	JOG LOW SPEED [%]	1
28	POW ON LOAD ROM	DISABLE
29		
30	SCREW PARAMETERS No.0	Screw parameter information is described on the next page.
31	SCREW PARAMETERS No.1	
32	SCREW PARAMETERS No.2	
33	SCREW PARAMETERS No.3	
34	SCREW PARAMETERS No.4	
35	SCREW PARAMETERS No.5	
36	SCREW PARAMETERS No.6	
37	SCREW PARAMETERS No.7	
38	SCREW PARAMETERS No.8	
39	SCREW PARAMETERS No.9	
40		
41		
42		
43		
44		
45		
46	MAKER ADJUST	0
47	MAKER ADJUST	0
48	MAKER ADJUST	0
49	MAKER ADJUST	0
50	MAKER ADJUST	0
51	MAKER ADJUST	0

2) Screw parameters (Simplified settings)

No.	Screw parameters	0	1	2	3	4
1	SCREW LENGTH [mm]	8.0 (*1)				
2	WORK THICKNESS [mm]	0.0 (*1)				
3	APPROACH OFFSET [mm]	20.0 (*1)				
4	VACUUM CUT [mm]	2.0				
5	FINAL TRQ CHANGE [mm]	1.0				
6	TARGET OFFSET [mm]	5.0				
7	HEIGHT DETECT [mm]	2.0				
8	TIGHTEN COMPLETED [mm]	(*1)				
9	NORMATIVE POS. [mm]	(*1)				
10	FAST FORWARD THRUST	0				
11	INITIAL THRUST	3				
12	FINAL THRUST	4				
13	FAST FORWARD SPD [%]	100				
14	TIGHTENING SPEED [%]	20				
15						

(*1) The set value varies depending on system configuration.

(Remarks)

The screw parameter simplified settings can be developed to detailed settings after completion of input. Through development, the following simplified setup parameters are developed to detailed setup

Screw parameter detailed settings	Information under development
HEIGHT DETECT + [mm]	A simplified setting of height detection width [mm] is transferred.
HEIGHT DETECT - [mm]	A simplified setting of height detection width [mm] is transferred.
RETURN CHANGE [mm]	0.0 [mm]
FAST FORWARD 2 THRUST	A simplified setting of temporary tightening thrust is transferred.
HEIGHT DETECT THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 1 THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 2 THRUST	0 (Maximum thrust setting)
FAST FORWARD 2 SPD [%]	A simplified setting of tightening speed [%] is transferred.
FINAL SPD [%]	A simplified setting of tightening speed [%] is transferred.
RETURN 1 SPD [%]	100 [%]
RETURN 2 SPD [%]	100 [%]

3) Screw parameters (Detailed settings)

No.	Screw parameters	0	1	2	3	4
1	SCREW LENGTH [mm]	8.0 (*1)				
2	WORK THICKNESS [mm]	0.0 (*1)				
3	APPROACH OFFSET [mm]	2.0 (*1)				
4	VACUUM CUT [mm]	2.0				
5	FINAL TRQ CHANGE [mm]	1.0				
6	TARGET OFFSET [mm]	5.0				
7	HEIGHT DETECT + [mm]	2.0				
8	HEIGHT DETECT− [mm]	2.0				
9	RETURN CHANGE [mm]	0.0				
10	TIGHTEN COMPLETED [mm]	(*1)				
11	NORMATIVE POS. [mm]	(*1)				
12						
13	FAST FORWARD 1 THRUST	0				
14	FAST FORWARD 2 THRUST	3				
15	INITIAL THRUST	3				
16	FINAL THRUST	4				
17	HEIGHT DETECT THRUST	2(*1)				
18	RETURN 1 THRUST	0				
19	RETURN 2 THRUST	0				
20						
21						
22	FAST FORWARD 1 SPD [%]	100				
23	FAST FORWARD 2 SPD [%]	20				
24	INITIAL SPD [%]	20				
25	FINAL SPD [%]	20				
26	RETURN 1 SPD [%]	100				
27	RETURN 2 SPD [%]	100				
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

(*1) The set value varies depending on system configuration.

4) System parameters (Standard settings)

1. AXIS CONFIG

No.	Setting item	Set value
1	1st-AXIS USED	Z1
2	2nd-AXIS USED	Z2
3	3rd-AXIS USED	DISABLE
4	4th-AXIS USED	DISABLE
5	UP/DOWN AXIS1	Z1
6	UP/DOWN AXIS2	Z2
7	2-SERVO SPEC.	ENABLE
8	PNP SPEC.	DISABLE

2. PROGRAM CONFIG

No.	Setting item	Set value
1	TABLE RECORD NUMBER	1000

3. AXIS PARAMETERS

No.	Setting item	1.1st-Axis	2.2nd-Axis	3.3rd-Axis	4.4th-Axis
1	STROKE LENGHT [mm]	170.00 (*1)	27.00 (*1)		
2	MAX SPEED [Hz]	60000	60000		
3	RET.PULSE IN POS. [pls]	30	30		
4	COORDINATE +/-	(+)RANGE	(+)RANGE		
5	JOG DIRECTION	(+)ADV.	(+)ADV.		
6					
7	ACC TIME [msec]	50	50		
8	DCC TIME [msec]	50	50		
9	ORIGIN SENSOR	DISABLE	DISABLE		
10	SOFT LMT+	170.00 (*1)	27.00 (*1)		
11	SOFT LMT-	-2.00	-2.00		
12	UNIT	mm	mm		
13	HARD AXIS No.	1	2		
14	SERVO TYPE	JN	JN		
15					

(*1) The set value varies depending on system configuration.
Specifications stroke +20mm is a standard set value.

4. LANGUAGE

No.	Setting item	Set value
1	LANGUAGE	ENGLISH

5) Table, Poinr infomation (Standard settings)

Table setting …

[2.SYSTEM PARAMETER] – [2.PROGRAM CONFIG] – [1. TABLE RECORD NUMBER] Set value:1000

Table No.	Point No.	Internal point No	Note
0	0	0	Standby position
1	0	1	
2	0	2	Bit change position
3	0	3	
4	0	4	
5	0	5	
997	0	997	
998	0	998	
999	0	998	

Table No. [0～2] Point No. [0] … For fixed point

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**		
2	C1 INST.CODE NO.	0	0		
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	PASS			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

Table No. [3～] Point No. [0] … For operation position

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**		
2	C1 INST.CODE NO.	1	0		
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	FEED			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

6) Instruction code (Standard settings)

Instruction code No.[0] … Z2-Axis (For bit) Tightening

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					PLC sync. pointer
1	20	9902.00	902	92			9999			DRVA move
2	83				0	1000	0	0		Axis sync.wait
3	10	9904.00	903	93						PLSV move
4	12				7					PLSV move stop 2
5	17	9903.00	904	94						PLSV move spd/thr. change
6	19									PLSV move step stop
7	34			95						Thrust change
8	40				30					Set time wait
9	11									PLSV move stop 1
10	80				23					PLC sync. pointer
11	20	9905.00	905	96			9999			DRVA move
12	20	8000.00	906	97						DRVA move
13	42				9999					Set bit ON
14	0									End
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”

Instruction code No.[1] … Z1-Axis (For screw guide) Tightening

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	80				22					PLC sync. pointer
1	20	9906.00	901	91						DRVA move
2	82				1					Set axis sync. pointer
3	80				23					PLC sync. pointer
4	20	8000.00	906	97			0			DRVA move
5	42				9999					Set bit ON
6	0									End
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”

Instruction code No.[14] … Z-Axis Bit change

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	20	8002.00	10	1						DRVA move
2	82				1					Set axis sync. pointer
3	0									End
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0"

Instruction code No.[15] … Move to standby position (For automatic cycle)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8000.00	100	0						DRVA move
1	42				9999					Set bit ON
2	0									End
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0"

Instruction code No.[16] … Move to standby position (For return)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	11									PLSV move stop 1
2	34			0						Thrust change
3	40				30					Set time wait
4	20	8000.00	10	0						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0"

Instruction code No.[17] … Origin return

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	10	-99.00	5	1						PLSV move
2	30									Deviation clear
3	48				99	99	99	99		Origin sensor ON confirm
4	20	2.00	5	1						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0"

Instruction code No.[18] … JOG operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	4				2	3				Step branch jump 2
1	22	0.01	1	1						DRVI move
2	2				4					Step jump
3	22	-0.01	1	1						DRVI move
4	40				300					Set time wait
5	3				7	6				Step branch jump 1
6	32			1						JOG move (PLSV)
7	11									PLSV move stop 1
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0"

Instruction code No.[19] … Point moving operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20			1	1					DRVA move
1	0									End
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0"

17.2.3 RC75-T3（SR375Yθ）setting infomation

1）Operation parameters (Standard settings)

No.	Setting item	Set value
1	RETURN TIMEOVER [sec]	20.0
2	TIGHTEN TIMEOVER [sec]	8.0
3	CYCLE TIMEOVER [sec]	0.0
4	SCREW SHORTAGE [sec]	10.0
5	SCREW FEED [sec]	0.5
6	SCREW FEED DETECT	DISABLE
7	TORQUE CHECK	ENABLE
8	HEIGHT CHECK	ENABLE
9	FEED TIMMING	BEFORE
10	EXE TABLE SELECT	DISABLE
11	CC-LINK	DISABLE
12	SD550 COMM.	DISABLE
13	PICKUP COUNT [sec]	0.5
14	PICKUP RETRY	0
15	AFTER TIGHTEN FAIL	CONTINUE
16	COUNT-A	OK
17	COUNT-B	NG
18	DELAY TIME [sec]	0.0
19	BUZZER OUTPUT	1
20	BIT CUSHION [mm]	0.0
21	OVERRIDE AXIS-1 [%]	100
22	OVERRIDE AXIS-2 [%]	100
23	OVERRIDE AXIS-3 [%]	100
24	OVERRIDE AXIS-4 [%]	100
25	JOG HIGH SPEED [%]	10
26	JOG MIDDLE SPEED [%]	5
27	JOG LOW SPEED [%]	1
28	POW ON LOAD ROM	DISABLE
29		
30	SCREW PARAMETERS No.0	Screw parameter information is described on the next page.
31	SCREW PARAMETERS No.1	
32	SCREW PARAMETERS No.2	
33	SCREW PARAMETERS No.3	
34	SCREW PARAMETERS No.4	
35	SCREW PARAMETERS No.5	
36	SCREW PARAMETERS No.6	
37	SCREW PARAMETERS No.7	
38	SCREW PARAMETERS No.8	
39	SCREW PARAMETERS No.9	
40		
41		
42		
43		
44		
45		
46	MAKER ADJUST	0
47	MAKER ADJUST	0
48	MAKER ADJUST	0
49	MAKER ADJUST	0
50	MAKER ADJUST	0
51	MAKER ADJUST	0

2) System parameters (Standard settings)

1. AXIS CONFIG

No.	Setting item	Set value
1	1st-AXIS USED	Y1
2	2nd-AXIS USED	A1
3	3rd-AXIS USED	DISABLE
4	4th-AXIS USED	DISABLE
5	UP/DOWN AXIS1	DISABLE
6	UP/DOWN AXIS2	DISABLE
7	2-SERVO SPEC.	DISABLE
8	PNP SPEC.	DISABLE

2. PROGRAM CONFIG

No.	Setting item	Set value
1	TABLE RECORD NUMBER	100

3. AXIS PARAMETERS

No.	Setting item	1.1st-Axis	2.2nd-Axis	3.3rd-Axis	4.4th-Axis
1	STROKE LENGHT [mm]	200.00 (*1)	180.00 (*1)		
2	MAX SPEED [Hz]	50000	36000		
3	RET.PULSE IN POS. [pls]	30	30		
4	COORDINATE +/-	(+)RANGE	(+)RANGE		
5	JOG DIRECTION	(+)ADV.	(+)ADV.		
6					
7	ACC TIME [msec]	50	50		
8	DCC TIME [msec]	50	50		
9	ORIGIN SENSOR	DISABLE	DISABLE		
10	SOFT LMT+	200.00 (*1)	180.00 (*1)		
11	SOFT LMT-	-2.00	-2.00		
12	UNIT	mm	deg		
13	HARD AXIS No.	1	2		
14	SERVO TYPE	JN	JN		
15					

(*1) The set value varies depending on system configuration.
Specifications stroke +20mm is a standard set value.

4. LANGUAGE

No.	Setting item	Set value
1	LANGUAGE	ENGLISH

3) Table, Poinr infomation (Standard settings)

Table setting …

[2.SYSTEM PARAMETER] – [2.PROGRAM CONFIG] – [1. TABLE RECORD NUMBER]　Set value:100

Table No.	Point No.	Internal point No	Note
0	0 ～ 9	0 ～ 9	Point No. [0] … Standby position Point No. [1] … Pickup position Point No. [2] … Bit change position
1	0 ～ 9	10 ～ 19	
2	0 ～ 9	20 ～ 29	
3	0 ～ 9	30 ～ 39	
4	0 ～ 9	40 ～ 49	
5	0 ～ 9	50 ～ 59	
997	0 ～ 9	970 ～ 979	
998	0 ～ 9	980 ～ 989	
999	0 ～ 9	990 ～ 999	

Table No. [0]　Point No. [0～]　… For fixed point

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**		
2	C1 INST.CODE NO.	0	0		
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	PASS			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

Table No. [1～]　Point No. [0～]　… For operation position

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**		
2	C1 INST.CODE NO.	2	2		
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	FEED			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

4) Instruction code (Standard settings)

Instruction code No.[2] … X,Y-Axis move

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8001.00	100	0			0		0	DRVA move
1	82				1					Set axis sync. pointer
2	80				11					PLC sync. pointer
3	80				20					PLC sync. pointer
4	20		100	0	1		0			DRVA move
5	82				2					Set axis sync. pointer
6	80				21					PLC sync. pointer
7	80				30					PLC sync. pointer
8	20	8000.00	100	0						DRVA move
9	80				31					PLC sync. pointer
10	0									End
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[14] … Z-Axis Bit change

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	20	8002.00	10	1						DRVA move
2	82				1					Set axis sync. pointer
3	0									End
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[15] … Move to standby position (For automatic cycle)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8000.00	100	0						DRVA move
1	42				9999					Set bit ON
2	0									End
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[16] … Move to standby position (For return)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	11									PLSV move stop 1
2	34			0						Thrust change
3	40				30					Set time wait
4	20	8000.00	10	0						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[17] … Origin return

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	10	-99.00	5	1						PLSV move
2	30									Deviation clear
3	48				99	99	99	99		Origin sensor ON confirm
4	20	2.00	5	1						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[18] … JOG operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	4				2	3				Step branch jump 2
1	22	0.01	1	1						DRVI move
2	2				4					Step jump
3	22	-0.01	1	1						DRVI move
4	40				300					Set time wait
5	3				7	6				Step branch jump 1
6	32			1						JOG move (PLSV)
7	11									PLSV move stop 1
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[19] … Point moving operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20			1	1					DRVA move
1	0									End
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

17.2.4 RC755-T1（SR395DT Type-1）setting infomation

1）Operation parameters (Standard settings)

No.	Setting item	Set value
1	RETURN TIMEOVER [sec]	20.0
2	TIGHTEN TIMEOVER [sec]	8.0
3	CYCLE TIMEOVER [sec]	0.0
4	SCREW SHORTAGE [sec]	10.0
5	SCREW FEED [sec]	0.5
6	SCREW FEED DETECT	DISABLE
7	TORQUE CHECK	ENABLE
8	HEIGHT CHECK	ENABLE
9	FEED TIMMING	BEFORE
10	EXE TABLE SELECT	DISABLE
11	CC-LINK	DISABLE
12	SD550 COMM.	DISABLE
13	PICKUP COUNT [sec]	0.5
14	PICKUP RETRY	0
15	AFTER TIGHTEN FAIL	CONTINUE
16	COUNT-A	OK
17	COUNT-B	NG
18	DELAY TIME [sec]	0.0
19	BUZZER OUTPUT	1
20	BIT CUSHION [mm]	0.0
21	OVERRIDE AXIS-1 [%]	100
22	OVERRIDE AXIS-2 [%]	100
23	OVERRIDE AXIS-3 [%]	100
24	OVERRIDE AXIS-4 [%]	100
25	JOG HIGH SPEED [%]	10
26	JOG MIDDLE SPEED [%]	5
27	JOG LOW SPEED [%]	1
28	POW ON LOAD ROM	DISABLE
29		
30	SCREW PARAMETERS No.0	Screw parameter information is described on the next page.
31	SCREW PARAMETERS No.1	
32	SCREW PARAMETERS No.2	
33	SCREW PARAMETERS No.3	
34	SCREW PARAMETERS No.4	
35	SCREW PARAMETERS No.5	
36	SCREW PARAMETERS No.6	
37	SCREW PARAMETERS No.7	
38	SCREW PARAMETERS No.8	
39	SCREW PARAMETERS No.9	
40		
41		
42		
43		
44		
45		
46	MAKER ADJUST	0
47	MAKER ADJUST	0
48	MAKER ADJUST	0
49	MAKER ADJUST	0
50	MAKER ADJUST	0
51	MAKER ADJUST	0

2) System parameters (Standard settings)

1. AXIS CONFIG

No.	Setting item	Set value
1	1st-AXIS USED	X1
2	2nd-AXIS USED	Y1
3	3rd-AXIS USED	DISABLE
4	4th-AXIS USED	DISABLE
5	UP/DOWN AXIS1	DISABLE
6	UP/DOWN AXIS2	DISABLE
7	2-SERVO SPEC.	DISABLE
8	PNP SPEC.	DISABLE

2. PROGRAM CONFIG

No.	Setting item	Set value
1	TABLE RECORD NUMBER	100

3. AXIS PARAMETERS

No.	Setting item	1.1st-Axis	2.2nd-Axis	3.3rd-Axis	4.4th-Axis
1	STROKE LENGHT [mm]	300.00 (*1)	180.00 (*1)		
2	MAX SPEED [Hz]	60000	36000		
3	RET.PULSE IN POS. [pls]	30	30		
4	COORDINATE +/-	(+)RANGE	(+)RANGE		
5	JOG DIRECTION	(+)ADV.	(+)ADV.		
6					
7	ACC TIME [msec]	100	50		
8	DCC TIME [msec]	100	50		
9	ORIGIN SENSOR	DISABLE	DISABLE		
10	SOFT LMT+	300.00 (*1)	180.00 (*1)		
11	SOFT LMT-	-2.00	-2.00		
12	UNIT	mm	deg		
13	HARD AXIS No.	1	2		
14	SERVO TYPE	Si	JN		
15					

(*1) The set value varies depending on system configuration.
Specifications stroke +20mm is a standard set value.

4. LANGUAGE

No.	Setting item	Set value
1	LANGUAGE	ENGLISH

3) Table, Poinr infomation (Standard settings)

Table setting …

[2.SYSTEM PARAMETER] – [2.PROGRAM CONFIG] – [1. TABLE RECORD NUMBER] Set value:100

Table No.	Point No.	Internal point No	Note
0	0 ～ 9	0 ～ 9	Point No. [0] … Standby position Point No. [1] … Pickup position Point No. [2] … Bit change position
1	0 ～ 9	10 ～ 19	
2	0 ～ 9	20 ～ 29	
3	0 ～ 9	30 ～ 39	
4	0 ～ 9	40 ～ 49	
5	0 ～ 9	50 ～ 59	
997	0 ～ 9	970 ～ 979	
998	0 ～ 9	980 ～ 989	
999	0 ～ 9	990 ～ 999	

Table No. [0] Point No. [0～] … For fixed point

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**		
2	C1 INST.CODE NO.	0	0		
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	PASS			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

Table No. [1～] Point No. [0～] … For operation position

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**		
2	C1 INST.CODE NO.	2	2		
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	FEED			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

4) Instruction code (Standard settings)

Instruction code No.[2] ··· X,Y-Axis move

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8001.00	100	0			0		2	DRVA move
1	82				1					Set axis sync. pointer
2	80				11					PLC sync. pointer
3	80				20					PLC sync. pointer
4	20		100	0	1		0			DRVA move
5	82				2					Set axis sync. pointer
6	80				21					PLC sync. pointer
7	80				30					PLC sync. pointer
8	20	8000.00	100	0						DRVA move
9	80				31					PLC sync. pointer
10	0									End
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[14] ··· Z-Axis Bit change

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	20	8002.00	10	1						DRVA move
2	82				1					Set axis sync. pointer
3	0									End
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[15] … Move to standby position (For automatic cycle)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8000.00	100	0						DRVA move
1	42				9999					Set bit ON
2	0									End
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[16] … Move to standby position (For return)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	11									PLSV move stop 1
2	34			0						Thrust change
3	40				30					Set time wait
4	20	8000.00	10	0						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[17] … Origin return

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	0	0		Axis sync.wait
1	10	-99.00	5	1						PLSV move
2	30									Deviation clear
3	48				99	99	99	99		Origin sensor ON confirm
4	20	2.00	5	1						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[18] … JOG operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	4				2	3				Step branch jump 2
1	22	0.01	1	1						DRVI move
2	2				4					Step jump
3	22	-0.01	1	1						DRVI move
4	40				300					Set time wait
5	3				7	6				Step branch jump 1
6	32			1						JOG move (PLSV)
7	11									PLSV move stop 1
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[19] … Point moving operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20			1	1					DRVA move
1	0									End
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

17.2.5 RC755-T2（SR395DT Type-2）setting infomation

1）Operation parameters (Standard settings)

No.	Setting item	Set value
1	RETURN TIMEOVER [sec]	20.0
2	TIGHTEN TIMEOVER [sec]	8.0
3	CYCLE TIMEOVER [sec]	0.0
4	SCREW SHORTAGE [sec]	10.0
5	SCREW FEED [sec]	0.5
6	SCREW FEED DETECT	DISABLE
7	TORQUE CHECK	ENABLE
8	HEIGHT CHECK	ENABLE
9	FEED TIMMING	BEFORE
10	EXE TABLE SELECT	DISABLE
11	CC-LINK	DISABLE
12	SD550 COMM.	DISABLE
13	PICKUP COUNT [sec]	0.5
14	PICKUP RETRY	0
15	AFTER TIGHTEN FAIL	CONTINUE
16	COUNT-A	OK
17	COUNT-B	NG
18	DELAY TIME [sec]	0.0
19	BUZZER OUTPUT	1
20	BIT CUSHION [mm]	0.0
21	OVERRIDE AXIS-1 [%]	100
22	OVERRIDE AXIS-2 [%]	100
23	OVERRIDE AXIS-3 [%]	100
24	OVERRIDE AXIS-4 [%]	100
25	JOG HIGH SPEED [%]	10
26	JOG MIDDLE SPEED [%]	5
27	JOG LOW SPEED [%]	1
28	POW ON LOAD ROM	DISABLE
29		
30	SCREW PARAMETERS No.0	Screw parameter information is described on the next page.
31	SCREW PARAMETERS No.1	
32	SCREW PARAMETERS No.2	
33	SCREW PARAMETERS No.3	
34	SCREW PARAMETERS No.4	
35	SCREW PARAMETERS No.5	
36	SCREW PARAMETERS No.6	
37	SCREW PARAMETERS No.7	
38	SCREW PARAMETERS No.8	
39	SCREW PARAMETERS No.9	
40		
41		
42		
43		
44		
45		
46	MAKER ADJUST	0
47	MAKER ADJUST	0
48	MAKER ADJUST	0
49	MAKER ADJUST	0
50	MAKER ADJUST	0
51	MAKER ADJUST	0

2) Screw parameters (Simplified settings)

No.	Screw parameters	0	1	2	3	4
1	SCREW LENGTH [mm]	8.0 (*1)				
2	WORK THICKNESS [mm]	0.0 (*1)				
3	APPROACH OFFSET [mm]	20.0 (*1)				
4	VACUUM CUT [mm]	2.0				
5	FINAL TRQ CHANGE [mm]	1.0				
6	TARGET OFFSET [mm]	5.0				
7	HEIGHT DETECT [mm]	2.0				
8	TIGHTEN COMPLETED [mm]	(*1)				
9	NORMATIVE POS. [mm]	(*1)				
10	FAST FORWARD THRUST	0				
11	INITIAL THRUST	3				
12	FINAL THRUST	4				
13	FAST FORWARD SPD [%]	100				
14	TIGHTENING SPEED [%]	20				
15						

(*1) The set value varies depending on system configuration.

(Remarks)

The screw parameter simplified settings can be developed to detailed settings after completion of input. Through development, the following simplified setup parameters are developed to detailed setup parameters.

Screw parameter detailed settings	Information under development
HEIGHT DETECT + [mm]	A simplified setting of height detection width [mm] is transferred.
HEIGHT DETECT - [mm]	A simplified setting of height detection width [mm] is transferred.
RETURN CHANGE [mm]	0.0 [mm]
FAST FORWARD 2 THRUST	A simplified setting of temporary tightening thrust is transferred.
HEIGHT DETECT THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 1 THRUST	2 * However, depending on the equipment configuration to set the appropriate thrust No.
RETURN 2 THRUST	0 (Maximum thrust setting)
FAST FORWARD 2 SPD [%]	A simplified setting of tightening speed [%] is transferred.
FINAL SPD [%]	A simplified setting of tightening speed [%] is transferred.
RETURN 1 SPD [%]	100 [%]
RETURN 2 SPD [%]	100 [%]

3) Screw parameters (Detailed settings)

No.	Screw parameters	0	1	2	3	4
1	SCREW LENGTH [mm]	8.0 (*1)				
2	WORK THICKNESS [mm]	0.0 (*1)				
3	APPROACH OFFSET [mm]	20.0 (*1)				
4	VACUUM CUT [mm]	2.0				
5	FINAL TRQ CHANGE [mm]	1.0				
6	TARGET OFFSET [mm]	5.0				
7	HEIGHT DETECT + [mm]	2.0				
8	HEIGHT DETECT− [mm]	2.0				
9	RETURN CHANGE [mm]	0.0				
10	TIGHTEN COMPLETED [mm]	(*1)				
11	NORMATIVE POS. [mm]	(*1)				
12						
13	FAST FORWARD 1 THRUST	0				
14	FAST FORWARD 2 THRUST	3				
15	INITIAL THRUST	3				
16	FINAL THRUST	4				
17	HEIGHT DETECT THRUST	2(*1)				
18	RETURN 1 THRUST	0				
19	RETURN 2 THRUST	0				
20						
21						
22	FAST FORWARD 1 SPD [%]	100				
23	FAST FORWARD 2 SPD [%]	20				
24	INITIAL SPD [%]	20				
25	FINAL SPD [%]	20				
26	RETURN 1 SPD [%]	100				
27	RETURN 2 SPD [%]	100				
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						

(*1) The set value varies depending on system configuration.

4) System parameters (Standard settings)

1. AXIS CONFIG

No.	Setting item	Set value
1	1st-AXIS USED	X1
2	2nd-AXIS USED	Y1
3	3rd-AXIS USED	Z1
4	4th-AXIS USED	DISABLE
5	UP/DOWN AXIS1	Z1
6	UP/DOWN AXIS2	DISABLE
7	2-SERVO SPEC.	DISABLE
8	PNP SPEC.	DISABLE

2. PROGRAM CONFIG

No.	Setting item	Set value
1	TABLE RECORD NUMBER	100

3. AXIS PARAMETERS

No.	Setting item	1.1st-Axis	2.2nd-Axis	3.3rd-Axis	4.4th-Axis
1	STROKE LENGHT [mm]	300.00 (*1)	300.00 (*1)	170.00 (*1)	
2	MAX SPEED [Hz]	60000	60000	60000	
3	RET.PULSE IN POS. [pls]	30	30	30	
4	COORDINATE +/-	(+)RANGE	(+)RANGE	(+)RANGE	
5	JOG DIRECTION	(+)ADV.	(+)ADV.	(+)ADV.	
6					
7	ACC TIME [msec]	100	100	50	
8	DCC TIME [msec]	100	100	50	
9	ORIGIN SENSOR	DISABLE	DISABLE	DISABLE	
10	SOFT LMT+	300.00 (*1)	300.00 (*1)	170.00 (*1)	
11	SOFT LMT-	-2.00	-2.00	-2.00	
12	UNIT	mm	mm	mm	
13	HARD AXIS No.	2	3	1	
14	SERVO TYPE	Si	Si	JN	
15					

(*1) The set value varies depending on system configuration.
Specifications stroke +20mm is a standard set value.

4. LANGUAGE

No.	Setting item	Set value
1	LANGUAGE	ENGLISH

5) Table, Poinr infomation (Standard settings)

Table setting …

[2.SYSTEM PARAMETER] – [2.PROGRAM CONFIG] – [1. TABLE RECORD NUMBER] Set value:100

Table No.	Point No.	Internal point No	Note
0	0 ～ 9	0 ～ 9	Point No. [0] … Standby position Point No. [1] … Pickup position Point No. [2] … Bit change position
1	0 ～ 9	10 ～ 19	
2	0 ～ 9	20 ～ 29	
3	0 ～ 9	30 ～ 39	
4	0 ～ 9	40 ～ 49	
5	0 ～ 9	50 ～ 59	
997	0 ～ 9	970 ～ 979	
998	0 ～ 9	980 ～ 989	
999	0 ～ 9	990 ～ 999	

Table No. [0] Point No. [0～] … For fixed point

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**	***.**	
2	C1 INST.CODE NO.	0	0	0	
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	PASS			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

Table No. [1～] Point No. [0～] … For operation position

No.	Setting item	Set value			
		1st-Axis	2nd-Axis	3rd-Axis	4th-Axis
1	TARGET POSITION	***.**	***.**	***.**	
2	C1 INST.CODE NO.	2	2	1	
3	C2 SCREW PRM.	0			
4	C3 DRIVER CH.	0			
5	C4 JOB SELECT	FEED			
6	C5	0			
7	C6	0			
8	C7	0			
9	C8	0			
10	C9	0			

6) Instruction code (Standard settings)

Instruction code No.[0] ··· Z-Axis tightening (Sub routine)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	2200	0		Axis sync.wait
1	20	9901.00	901	91			9999			DRVA move
2	20	9902.00	902	92			9999	3		DRVA move
3	10	9904.00	903	93						PLSV move
4	12				7					PLSV move stop 2
5	17	9903.00	904	94						PLSV move spd/thr. change
6	19									PLSV move step stop
7	34			95						Thrust change
8	40				30					Set time wait
9	11									PLSV move stop 1
10	80				23					PLC sync. pointer
11	20	9905.00	905	96			9999			DRVA move
12	20	8000.00	906	97			30			DRVA move
13	42				9999					Set bit ON
14	0									End
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[1] ··· Z-Axis tightening (Main routine)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	1100	0		Axis sync.wait
1	80				12					PLC sync. pointer
2	20	30.00	100	0						DRVA move
3	20	8001.00	10	0				1		DRVA move
4	80				13					PLC sync. pointer
5	20	8000.00	100	0			30			DRVA move
6	42				9999					Set bit ON
7	80				22					PLC sync. pointer
8	90				0					Instruction code CALL
9	80				24					PLC sync. pointer
10	80				31					PLC sync. pointer
11	0									End
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[2] … X,Y-Axis move

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8001.00	100	0			50		2	DRVA move
1	82				1					Set axis sync. pointer
2	80				11					PLC sync. pointer
3	80				20					PLC sync. pointer
4	20		100	0	1		50			DRVA move
5	82				2					Set axis sync. pointer
6	80				21					PLC sync. pointer
7	80				30					PLC sync. pointer
8	20	8000.00	100	0						DRVA move
9	80				31					PLC sync. pointer
10	0									End
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[14] … Z-Axis Bit change

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-s t	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				0	0	1100	0		Axis sync.wait
1	20	8002.00	10	1						DRVA move
2	82				1					Set axis sync. pointer
3	0									End
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[15] … Move to standby position (For automatic cycle)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20	8000.00	100	0						DRVA move
1	42				9999					Set bit ON
2	0									End
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[16] … Move to standby position (For return)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				10	10	0	0		Axis sync.wait
1	11									PLSV move stop 1
2	34			0						Thrust change
3	40				30					Set time wait
4	20	8000.00	10	0						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

Instruction code No.[17] … Origin return

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	83				10	10	0	0		Axis sync.wait
1	10	-99.00	5	1						PLSV move
2	30									Deviation clear
3	48				99	99	99	99		Origin sensor ON confirm
4	20	2.00	5	1						DRVA move
5	82				1					Set axis sync. pointer
6	42				9999					Set bit ON
7	0									End
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[18] … JOG operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	4				2	3				Step branch jump 2
1	22	0.01	1	1						DRVI move
2	2				4					Step jump
3	22	-0.01	1	1						DRVI move
4	40				300					Set time wait
5	3				7	6				Step branch jump 1
6	32			1						JOG move (PLSV)
7	11									PLSV move stop 1
8	0									End
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are "0".

Instruction code No.[19] … Point moving operation (For teaching)

No.	Ope. code	Pos. [mm]	Speed [%]	Thru-st	Info. 1	Info. 2	Info. 3	Info. 4	Info. 5	
0	20			1	1					DRVA move
1	0									End
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Note) Settings in the blank fields are “0”.

17.3 Thrust value conversion table

Tightening thrust settings should be registered in thrust patterns 0 to 7. Actual thrust values (for standard) are listed in the table below.

The thrust value varies depending on a factor specific to the tightening tool being used, as well as on the thrust pattern set value. Therefore, you should identify the tightening tool being used, and see the corresponding thrust conversion table. The conversion table shows ball thread output calculation values, instead of thrust actually applied to a product.

- Motor capacity — For standard tightening tool : 100 [w]
- Up/down axis ball thread lead — For standard tightening tool : 12 [mm]
- Tightening tool's own weight — For standard tightening tool : Approx. 15 [N] (In the case of vertical mounting and downward tightening)

Thrust is calculated with the following calculation formula:

$$\text{Thrust F [N]} = \frac{\text{Rated motor thrust [N·m]} \times \text{Motor current limit value [\%]} \times 2\pi}{\text{Lead of ball thread [mm]} \div 10} \times \text{Transmission efficiency} + \text{Tool own weight [N]}$$

Transmission efficiency = 0.9

1) Thrust F [N] for motor with 50 W capacity (Tightening tool's own weight is not included.)

Lead of ball thread [mm]	6	10	12	20	
Rated thrust [N·m]	0.159				
10%	14.99	8.99	7.49	4.50	
20%	29.97	17.98	14.99	8.99	
30%	44.96	26.97	22.48	13.49	Thrust pattern 2
40%	59.94	35.97	29.97	17.98	Thrust pattern 3
50%	74.93	44.96	37.46	22.48	Thrust pattern 4
60%	89.91	53.95	44.96	26.97	Thrust pattern 5
70%	104.90	62.94	52.45	31.47	Thrust pattern 6
80%	119.88	71.93	59.94	35.97	Thrust pattern 7
90%	134.87	80.92	67.43	40.46	
100%	149.85	89.91	74.93	44.96	Thrust pattern 1
200%	299.71	179.83	149.85	89.91	
300%	449.56	269.74	224.78	134.87	Thrust pattern 0

2) Thrust F [N] for motor with 100 W capacity (Tightening tool's own weight is not included.)

Lead of ball thread [mm]	6	10	12	20	
Rated thrust [N·m]	0.318				
10%	29.97	17.98	14.99	8.99	
20%	59.94	35.97	29.97	17.98	
30%	89.91	53.95	44.96	26.97	Thrust pattern 2
40%	119.88	71.93	59.94	35.97	Thrust pattern 3
50%	149.85	89.91	74.93	44.96	Thrust pattern 4
60%	179.83	107.90	89.91	53.95	Thrust pattern 5
70%	209.80	125.88	104.90	62.94	Thrust pattern 6
80%	239.77	143.86	119.88	71.93	Thrust pattern 7
90%	269.74	161.84	134.87	80.92	
100%	299.71	179.83	149.85	89.91	Thrust pattern 1
200%	599.42	359.65	299.71	179.83	
300%	899.13	539.48	449.56	269.74	Thrust pattern 0

3) Thrust F [N] for motor with 200 W capacity (Tightening tool's own weight is not included.)

Lead of ball thread [mm]	6	10	12	20	
Rated thrust [N·m]	0.637				
10%	60.04	36.02	30.02	18.01	
20%	120.07	72.04	60.04	36.02	
30%	180.11	108.06	90.05	54.03	Thrust pattern 2
40%	240.14	144.09	120.07	72.04	Thrust pattern 3
50%	300.18	180.11	150.09	90.05	Thrust pattern 4
60%	360.22	216.13	180.11	108.06	Thrust pattern 5
70%	420.25	252.15	210.13	126.08	Thrust pattern 6
80%	480.29	288.17	240.14	144.09	Thrust pattern 7
90%	540.32	324.19	270.16	162.10	
100%	600.36	360.22	300.18	180.11	Thrust pattern 1
200%	1200.72	720.43	600.36	360.22	
300%	1801.08	1080.65	900.54	540.32	Thrust pattern 0

4) Thrust F [N] for motor with 400 W capacity (Tightening tool's own weight is not included.)

Lead of ball thread [mm]	6	10	12	20	
Rated thrust [N·m]	1.27				
10%	119.69	71.82	59.85	35.91	
20%	239.39	143.63	119.69	71.82	
30%	359.08	215.45	179.54	107.73	Thrust pattern 2
40%	478.78	287.27	239.39	143.63	Thrust pattern 3
50%	598.47	359.08	299.24	179.54	Thrust pattern 4
60%	718.17	430.90	359.08	215.45	Thrust pattern 5
70%	837.86	502.72	418.93	251.36	Thrust pattern 6
80%	957.56	574.54	478.78	287.27	Thrust pattern 7
90%	1077.25	646.35	538.63	323.18	
100%	1196.95	718.17	598.47	359.08	Thrust pattern 1
200%	2393.90	1436.34	1196.95	718.17	
300%	3590.85	2154.51	1795.42	1077.25	Thrust pattern 0

17.4 Moving time conversion table

For up/down axis moving speed setting (1 to 100%), approximate moving time can be calculated with the following calculation formula. The following calculation is based on the assumption that the up/down axis moving operation is intended for positioning, and that the thrust setting is 300% (maximum setting).

$$\text{Moving time [ms]} = \frac{\text{Moving distance [mm]} \times 10^7}{\text{Maximum frequency [Hz]} \times \text{Moving speed setting [\%]}} + \frac{\text{Acceleration time [ms]} + \text{Deceleration time [ms]}}{2}$$

Basic data on standard settings for the standard tightening tool are as follows:

- Maximum frequency 60000 [Hz]
- Acceleration time 50 [ms]
- Deceleration time 50 [ms]

The following table shows moving speed settings (1 to 100%) for the standard tightening tool, and an approximate moving time by moving distance (assuming that the up/down axis moving operation is intended for positioning, and that the thrust setting is 300% (maximum setting)).

	Moving distance [mm]					
Moving speed	50	100	150	200	250	300
10%	883	1717	2550	3383	4217	5050
20%	467	883	1300	1717	2133	2550
30%	328	606	883	1161	1439	1717
40%	258	467	675	883	1092	1300
50%	217	383	550	717	883	1050
60%	189	328	467	606	744	883
70%	169	288	407	526	645	764
80%	154	258	363	467	571	675
90%	143	235	328	420	513	606
100%	133	217	300	383	467	550

[msec]

17.5 Speed vs. Thrust table

The controller executes thrust control by limiting motor output thrust, so that the screw pressing force is kept constant. However, when output thrust is limited, thrust required for motor rotation is also limited. This causes overshoot, if a high-speed operation under low thrust is specified. This also results in a longer positioning/setting time, and may cause a positioning failure depending on the setting.

As the thrust value is reduced, a speed that enables normal operation will lower.The following table shows relationship between speed and thrust.

・Z-Axis Speed vs. Thrust table

	Thrust [%]									
Moving speed	10	20	30	40	50	60	70	80	90	100
10%	×	△	○	○	○	○	○	○	○	○
20%	×	×	○	○	○	○	○	○	○	○
30%	×	×	△	○	○	○	○	○	○	○
40%	×	×	△	○	○	○	○	○	○	○
50%	×	×	△	△	○	○	○	○	○	○
60%	×	×	△	△	○	○	○	○	○	○
70%	×	×	△	△	△	○	○	○	○	○
80%	×	×	△	△	△	○	○	○	○	○
90%	×	×	△	△	△	△	○	○	○	○
100%	×	×	△	△	△	△	○	○	○	○

・Z-Axis (bit) Speed vs. Thrust table （FM520VZZ：Screw guide stop type tightening machine）

	Thrust [%]									
Moving speed	10	20	30	40	50	60	70	80	90	100
10%	○	○	○	○	○	○	○	○	○	○
20%	○	○	○	○	○	○	○	○	○	○
30%	○	○	○	○	○	○	○	○	○	○
40%	△	○	○	○	○	○	○	○	○	○
50%	△	○	○	○	○	○	○	○	○	○
60%	△	○	○	○	○	○	○	○	○	○
70%	△	△	○	○	○	○	○	○	○	○
80%	△	△	○	○	○	○	○	○	○	○
90%	△	△	○	○	○	○	○	○	○	○
100%	△	△	○	○	○	○	○	○	○	○

○ : Enables normal operation.

△ : Overshoot occurs, and the machine takes a longer time for positioning.

× : Thrust shortage occurs during moving operation. Improper combinations for moving operation

(Reference)

Current limit value by thrust pattern (standard setting)

・Thrust pattern 0 : 300%
・Thrust pattern 1 : 100% (For origin return)
・Thrust pattern 2 : 30%
・Thrust pattern 3 : 40%
・Thrust pattern 4 : 50%
・Thrust pattern 5 : 60%
・Thrust pattern 6 : 70%
・Thrust pattern 7 : 80%

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Controller for Servo type screw driving unit

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