

インターフェイス BOX / Interface Box

# COMBOX

## 取扱説明書 / OPERATION MANUAL

日本語 : P1 - P37 / English : P39 - P77 OM-K0663 001



Thank you for purchasing the Communication Interface Box " COMBOX ". This COMBOX is designed to connect to the " iSpeed3 CONTROLLER or E3000 CONTROLLER " to " CNC Automatic lathes " specifically Cincom " of CITIZEN MACHINERY MIYANO CO., LTD ".

Read this and all the associated component Operation Manuals carefully before use.




Always keep this Operation Manual in a place where a user can referred to it for reference at any time.

## CONTENTS

1. CAUTIONS FOR HANDLING AND OPERATION .....	P39
2. BASIC PACKAGE .....	P41
3. LIMITED WARRANTY .....	P42
4. CONTACT US .....	P42
5. FEATURES .....	P42
6. SPECIFICATIONS AND DIMENSIONS .....	P43
7. SYSTEM (CONNECTIONS) .....	P46
8. CONNECTION TO THE CONTROLLER .....	P46
9. CONNECTION TO THE MACHINE .....	P49
10. OPERATIONAL PROCEDURES .....	P58
11. EXTERNAL ALARM SIGNAL 1 / ERROR INDICATORS .....	P68
12. SETTING OF OPERATING PARAMETERS .....	P70
13. ELECTRICAL SPECIFICATIONS .....	P75
14. TROUBLESHOOTING .....	P76
15. DISPOSAL OF THE COMBOX .....	P77

## 1. CAUTIONS FOR HANDLING AND OPERATION

- Read these warnings and cautions carefully and only use in the manner intended.
- These warnings and cautions are intended to avoid potential hazards that could result in personal injury to the operator or damage to the device. These are classified as follows in accordance with the seriousness of the risk.

Class	Degree of Risk
 <b>DANGER</b>	Existence of a hazard that could result in personal death or serious injury, if the safety precautions are not followed.
 <b>WARNING</b>	A safety hazard could result in bodily injury or damage to the device if the safety instructions are not properly followed.
 <b>CAUTION</b>	A hazard that could result in light or moderate bodily injury or damage to the device if the safety instructions are not followed.
<b>INFORMATION</b>	Be sure to keep the usage for your safety.

### **DANGER**

- ① Make sure the input power supply is OFF before wiring. If the incoming power supply is ON, it may cause risk that leads to death or serious injury by electric shock.
- ② When connecting / wiring the COMBOX to the machine, be sure to refer to the P49 " 9. CONNECTION TO THE MACHINE " section.  
Mis-wiring will cause damage to the COMBOX and / or the machine tool control.

## **WARNING**

- ① The COMBOX is designed to be used by connecting the iSpeed3 CONTROLLER or E3000 CONTROLLER to a CNC Automatic lathe " Cincom " of CITIZEN MACHINERY MIYANO CO., LTD. If the COMBOX is connected to the other machines, damage may result to the COMBOX or machine control.
- ② Before using the COMBOX, carefully read this Operation Manuals regarding the correct connection, operation and cautions.  
If the machine is operated with insufficient understanding and knowledge, damage and / or malfunction to the machine may occur.
- ③ Do not connect the cable connectors of the COMBOX to any other NSK equipment other than iSpeed3 CONTROLLER or E3000 CONTROLLER (NE273 / NE211). This will cause damage to the COMBOX.
- ④ When carrying the COMBOX, grasp the Unit body. Do not carry by suspending it from the cables. It may cause damage to the cables to or from the COMBOX.
- ⑤ Never touch the cable or body of the COMBOX with wet hands. This may cause an electric shock to the operator or damage to the COMBOX.
- ⑥ Do not handle the Cable Connectors of the COMBOX with wet or oily hands. This may cause malfunction due to a poor connection.
- ⑦ Never operate or handle the COMBOX, CONTROLLER or motor spindle until you have thoroughly read the Operation Manual for each component, and safe operation has been confirmed.
- ⑧ Before disconnecting the COMBOX, CONTROLLER or Motor Spindle, always turn the control power OFF and turn the compressed air supply to the CONTROLLER OFF. Then it is safe to remove the COMBOX, CONTROLLER and motor spindle.
- ⑨ Do not use in dangerous environments. Protect the COMBOX and CONTROLLER from moisture and other contaminants. Failure to protect COMBOX and CONTROLLER can result in damage to internal components and / or injury to the operator.
- ⑩ Before connecting the Cable Connector of the COMBOX, make sure the input power supply is OFF. If the incoming power supply is ON, damage to the COMBOX and / or CONTROLLER may occur.
- ⑪ When connecting the Cable's Round Terminal from the COMBOX to the Terminal Block of the machine, tighten the Terminal Screws securely (specified tightening torque). If the Terminal Screws are loose, arcing may occur causing damage and / or malfunction to the COMBOX or machine.
- ⑫ When connecting the Cable Connectors of the COMBOX to the CONTROLLER, securely tighten by the connector screws.  
If the Connector Screws are loose, a malfunction to the COMBOX or machine may occur.
- ⑬ When connecting the Cable's Round Terminals of the COMBOX to the Terminal Block of the machine, verify there is no power on the Terminal Block of the machine. Maintaining power on the Terminal Block of the machine may cause damage to the machine or COMBOX due to static electrical charge.
- ⑭ Be sure to connect the Cable's GROUND Round Terminal of the COMBOX to the machines' Terminal Block desinated as Earth Ground. Insufficient grounding can cause an electric shock or malfunction.

## **CAUTION**

- ① Be sure to refer to the " Maintenance, Operation and Electrical Manuals " of the machine that is being interfaced to the COMBOX.
- ② Do not hit, drop or subject COMBOX to any type of shock. This will cause damage to internal components and result in a malfunction.
- ③ If malfunction occurs to the COMBOX or CONTROLLER, the External Alarm Signal 1 is output from the COMBOX to the machine, and the machine will be stopped automatically.  
Re-start the operation after removing the cause of the problem.
- ④ Do not install the COMBOX next to RF noise sources, as malfunctions can occur.
- ⑤ When installing the CONTROLLER, never place it in areas where vibration and shock are present or possible. The COMBOX must be installed on a level surface.

## ⚠ CAUTION





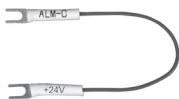








- ⑥ If smoke, noise or strange odors are emitted from the COMBOX, CONTROLLER or motor spindle, immediately turn OFF the Main Power Switch from the machine.
- ⑦ Do not place the COMBOX near any source of heat. The temperature inside the COMBOX will rise, resulting in a COMBOX or CONTROLLER unit failure.
- ⑧ Do not press the switches on the operation panel of the COMBOX with a sharp-pointed tool.
- ⑨ Wire the cables of the COMBOX to the machine away from the main power line.
- ⑩ DO NOT pull the Cables of the COMBOX with any excess force. Excessive force may result in damage to the Cable or the COMBOX.
- ⑪ When storing the COMBOX and its cables, disconnect the cables from the COMBOX and attach the supplied Connector Caps for protection.
- ⑫ Make sure to read the " CNC Automatic lathe Cincom of CITIZEN MACHINERY MIYANO CO., LTD " Operation Manual before using the COMBOX.
- ⑬ Do not disassemble, modify or attempt to repair the COMBOX as it will damage its internal components. If tampered with, NSK will not guarantee the performance and may refuse the request for repair.

## 2. BASIC PACKAGE

When opening the package, check if it includes all items listed in " Table.1 Packing List Contents ".

In the event of any shortage, please contact either NAKANISHI (see the " 4. CONTACT US " section) or your local dealer.

Table.1 Packing List Contents

COMBOX Main Body • • 1pc. 	I / F Cable (High density D - SUB 15 Connector) • • 1pc. 	Cable D (Yellow) • • 1pc. 	Cable E (Blue) • • 1pc. 
Cable F (Red) • • 1pc. 	Relay • • 1pc. 	Screw • • 2pcs. 	Nut • • 2pcs. 
Connector Cap (for Cable A) • • 1pc. 	Connector Cap (for Cable B) • • 1pc. 	Connector Cap (for Cable C) • • 1pc. 	Connector Cap (for I / F Cable (High density D - SUB 15 Connector)) • • 1pc. 
Operation Manual • • 1set 			

### 3. LIMITED WARRANTY

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We provide a limited warranty for our products. We will repair or replace the products if the cause of failure is due to the following manufacturers defects. Please contact us or your local distributor for the details.

- (1) Defect in manufacturing.
- (2) Any shortage of components in the package.
- (3) Where it is found any damage has occurred when opening the package.  
(This shall not apply if the damage was caused by the negligence of the end-user.)

### 4. CONTACT US

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For safe use / purchase of our products, we welcome your questions.

If you have any questions about operation, maintenance and repair of the product, please contact us.

#### Contact Us

##### ● For U.S. Market

Company Name	: <b>NSK America Corp.</b> Industrial Div.
Business Hours	: 8:00 to 17:00 (CST) (closed Saturday, Sunday and Public Holidays)
U.S. Toll Free No.	: +1 800 585 4675
Telephone No.	: +1 847 843 7664
Fax No.	: +1 847 843 7622
Website	: <a href="http://www.nskamericacorp.com">www.nskamericacorp.com</a>

##### ● For Other Markets

Company Name	: <b>NAKANISHI INC.</b> 
Business Hours	: 8:00 to 17:00 (JST) (closed Saturday, Sunday and Public Holidays)
Telephone No.	: +81 289 64 3520
e-mail	: <a href="mailto:webmaster-ie@nsk-nakanishi.co.jp">webmaster-ie@nsk-nakanishi.co.jp</a>

### 5. FEATURES

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- ① Using the " M Code Signals of the CNC Cincom of CITIZEN MACHINERY and MIYANO Lathes, the COMBOX interface enables easy communication between the CNC Control and the NSK CONTROLLER.
- ② Setting the M Code Signals at the COMBOX Control Panel enables multiple operations of the motor (EDIT Mode).
- ③ The " Current condition of the M Code Signal " and " Signal condition from machine " can be checked at the COMBOX Control Panel (MONITOR Mode).  
The Machine Malfunction Signal (ALM) or Door Operation Detection Signal (DOOR) input to the COMBOX can stop the motor safely.
- ④ The COMBOX is slim and compact. It requires less space for installation and complements the look of the CONTROLLER.
- ⑤ The control enclosure is designed to prevent debris / dust and splattered oil / water from entering it.

## 6. SPECIFICATIONS AND DIMENSIONS

### 6 - 1 Specifications

Product Name		COMBOX	
Model		NE309 CTZ	
Input Voltage		DC+24V (DC+23 - 25V)	
Rated Current Consumption		DC0.1Amp	
External Input / Output Signal	Machine Side	Input Signal	7 Photo Couplers (M Code 5, Door Operation 1, Machine Malfunction 1)
		Output Signal	2 MOS Relays (M Code Completion 1, External Alarm 1)
	CONTROLLER Side	Input Signal	6 Inputs (RUN, ERR, COIN, DIR - OUT, SELMT, POWON)
		Output Signal	6 Outputs (START, DIR - IN, SEL 0, SEL 1, MTSEL, EMG)
Weight		1.2kg	
Dimensions		W142 x D240 x H31mm	
Operation Environment		Temperature	0 - 40°C
		Humidity	MAX.75% (No condensation)
		Atmospheric Pressure	700 - 1,060hPa
Transportation and Storage Environment		Temperature	-10 - + 50°C
		Humidity	10 - 85 %
		Atmospheric Pressure	500 - 1,060hPa
Height above Sea Level		Less than 2,000m	

### 6 - 2 Compatibility

(1) The COMBOX is compatible with the following directives.

- EMC Directive\* EMS : EN61000 - 6 - 2
- EMI : EN61000 - 6 - 4

\* EMC Directive is defined by European Union (EU) regulating the products generating electromagnetic waves or affected by external electromagnetic waves.

(2) The COMBOX is \*RoHS Compliant.

\*RoHS : Restriction of Hazardous Substances by the European Union (EU).

## 6 - 3 Outside View

### (1) COMBOX

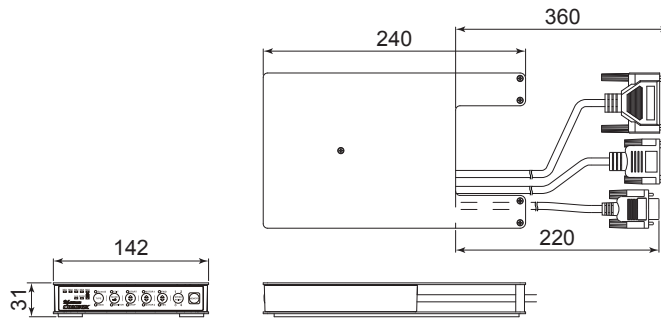


Fig. 1

### (2) Attached to the iSpeed3 CONTROLLER

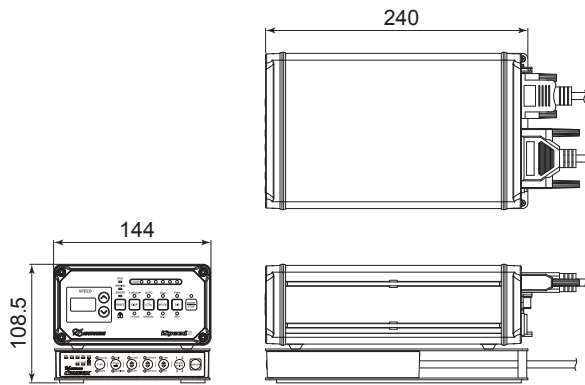


Fig. 2

### (3) Attached to the E3000 CONTROLLER

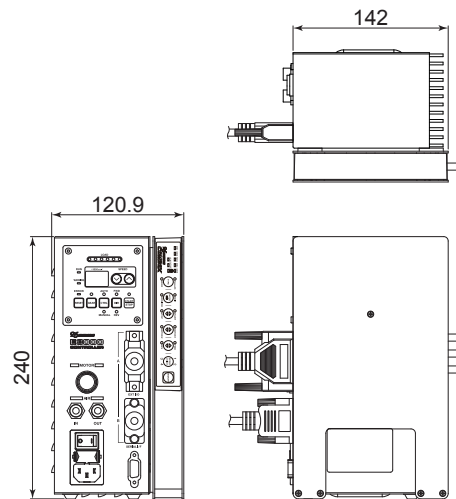


Fig. 3

## 6 - 4 Cables from the COMBOX body and cables are provided as standard accessories

### **CAUTION**

The Cable D, Cable E, Cable F, Screw and Nut in the Standard Accessories may not be used for some machine models. Refer to P54 " 9 - 5 « Machine Model Quick Terminal Connection Reference Matrix for Cincom » " section.

#### (1) Cable of the COMBOX body

- Cable A (D - SUB 25 Connector) : Connect to the External Input / Output Connector A of the machine.
- Cable B (D - SUB 15 Connector) : Connect to the External Input / Output Connector B of the machine.
- Cable C (High density D - SUB 15 Connector) : Connect the provided the I / F Cable (High Density D - SUB 15 Connector).

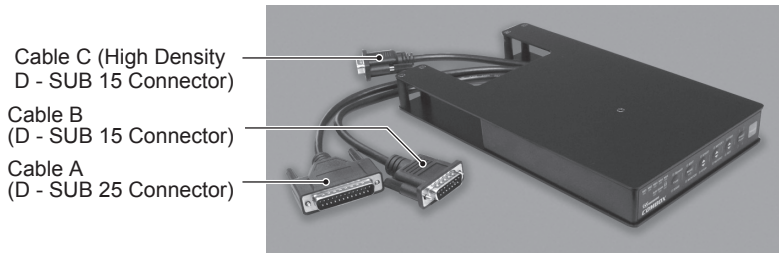



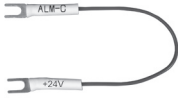




Fig. 4

#### (2) Cable included as Standard Accessories

Name	Use Application	Name	Use Application
I / F Cable (High density D - SUB 15 Connector) 	Connect the I / F Cable (High Density D - SUB 15 Connector) to the Cable C (High Density D - SUB 15 Connector) to the Terminal Block in the machine.	Cable D (Yellow) 	Use the (Yellow) Cable D when extending the length of the lead wire (Yellow) of the Cable C (High Density D - SUB Connector).
Cable E (Blue) 	Use the (Blue) Cable E when extending the length of the lead wire (Blue) of the Cable C (High Density D - SUB Connector).	Cable F (Red) 	Connect to the Terminal Block of the I / F board of the inside the machine.

## 6 - 5 Other Standard Accessories

Name	Use Application	Name	Use Application
Relay 	Relay for Revolving light (Red) output. Relay is used indicate a machine malfunction.	Screw / Nut 	Use the Screw and Nut when extending the length of the lead wires (Yellow and or Blue) of the Cable C (High density D - SUB Connector).



## 7. SYSTEM (CONNECTIONS)

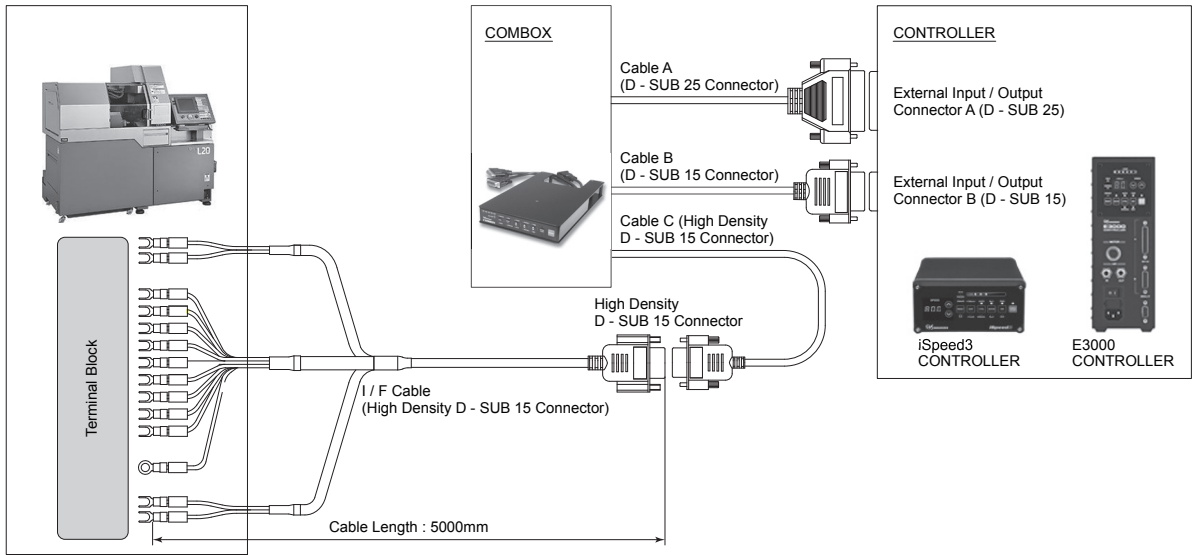


Fig. 5

## 8. CONNECTION TO THE CONTROLLER

### 8 - 1 Connection to the iSpeed3 CONTROLLER



#### CAUTION

**Make sure to turn OFF the Main Power Switch of the COMBOX and CONTROLLER before connecting the connector of the COMBOX and CONTROLLER.**

(1) Stacked CONTROLLER and COMBOX (Fig. 6).

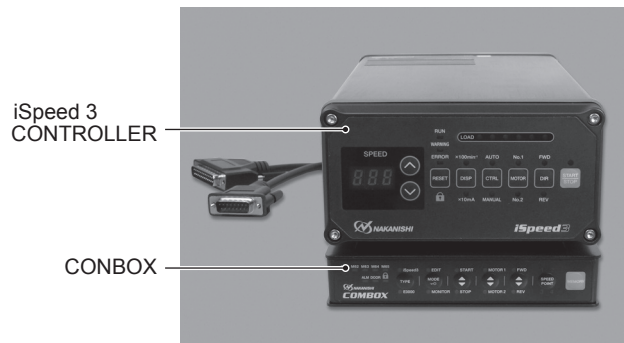


Fig. 6

- (2) Connect Cable A (D - SUB 25 Connector) of the COMBOX to the External Input / Output Connector A of the CONTROLLER.  
 Connect Cable B (D - SUB 15 Connector) of the COMBOX to the External Input / Output Connector B of the CONTROLLER.  
 After connecting the connector, securely tighten the connector mounting screws.

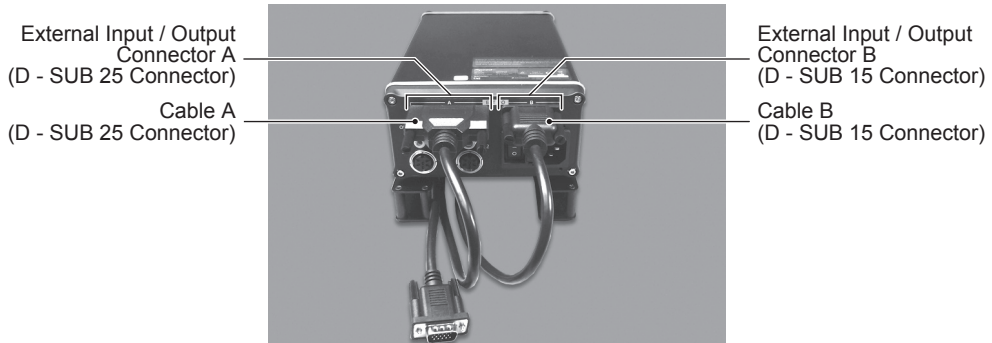


Fig. 7

- (3) Connect Cable C (High density D - SUB 15 Connector) of the COMBOX to the I / F Cable (High Density D - SUB 15 Connector).  
 After connecting the connector, securely tighten the connector mounting screws.

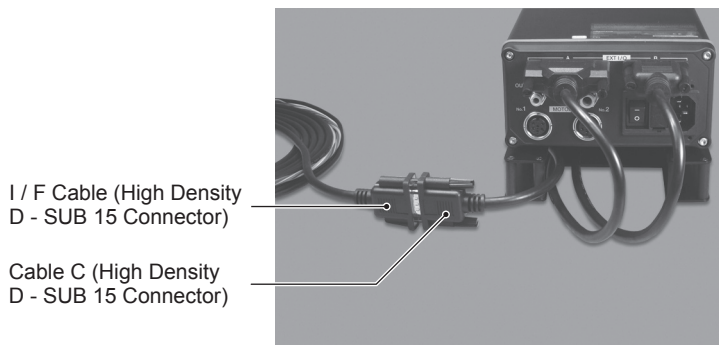


Fig. 8

## 8 - 2 Connection to the E3000 CONTROLLER

### ⚠ CAUTION

**Make sure to turned OFF the Main Power Switch of the COMBOX and CONTROLLER before connecting connector of the COMBOX and CONTROLLER.**

- (1) Pressing the stoppers (2 locations) on the bottom of the COMBOX at the same time and remove the COMBOX Body from the Case.

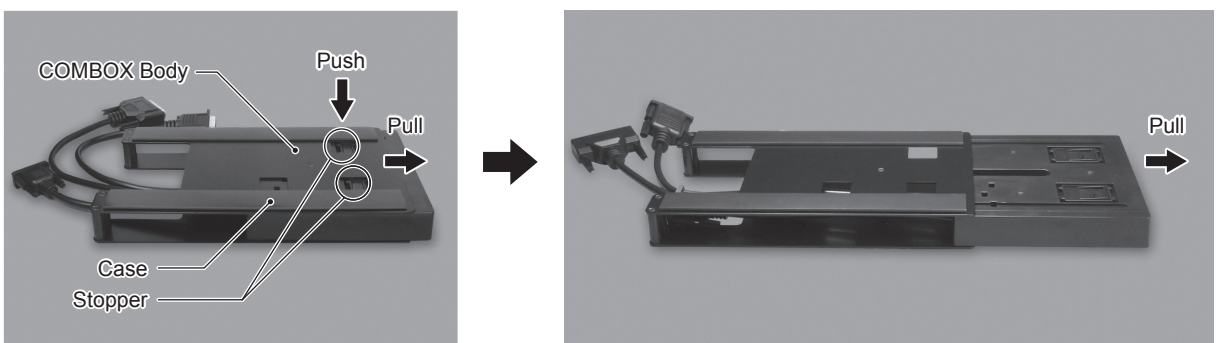


Fig. 9

- (2) Insert the COMBOX completely into the Case as shown in the Fig. 10.
- (3) After inserted, make sure that COMBOX Body is completely fixed to the Case.

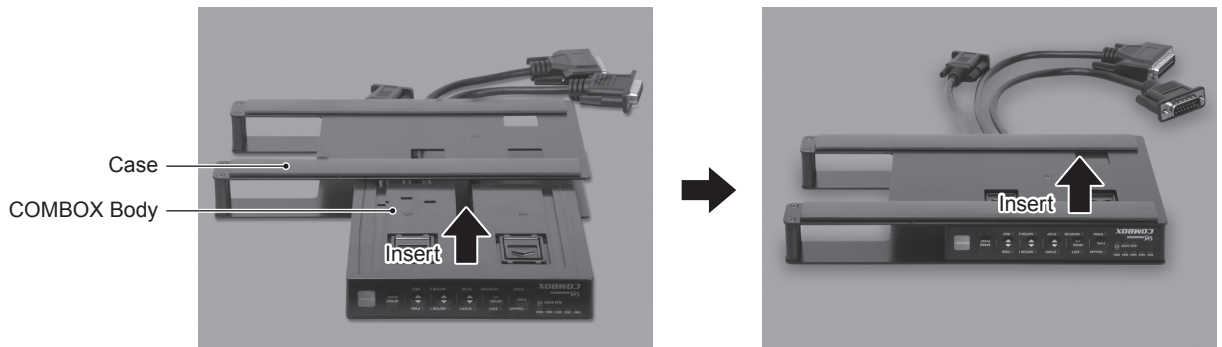


Fig. 10

- (4) Pass Cable A and Cable B of the COMBOX through the Control Panel side of the Case.

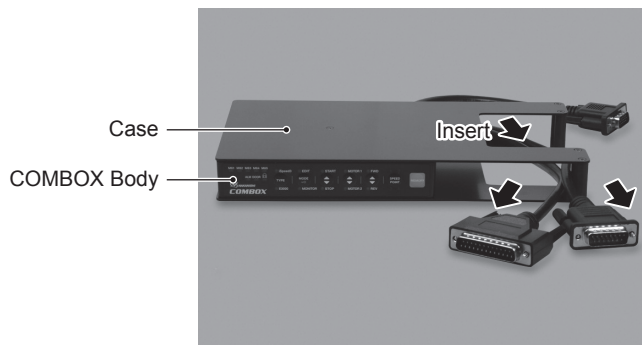


Fig. 11

- (5) Affix the (Rubber Magnet Sheet) to the bottom of the COMBOX towards the right side face of the CONTROLLER.

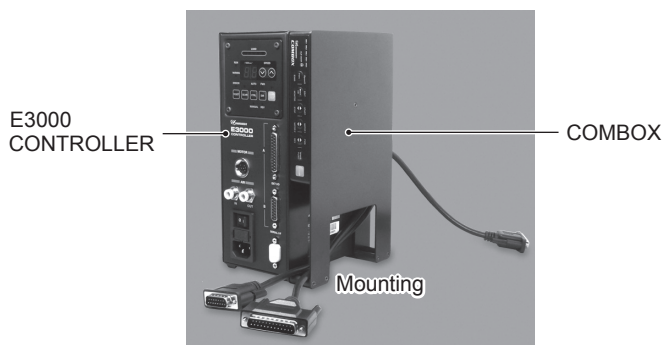


Fig. 12

- (6) Connect the Cable A (D - SUB 25 Connector) of the COMBOX to the External Input / Output Connector A of the CONTROLLER.  
 Connect the Cable B (D - SUB 15 Connector) of the COMBOX to the External Input / Output Connector B of the CONTROLLER.  
 After connecting the connector, securely tighten the connector mounting screws.

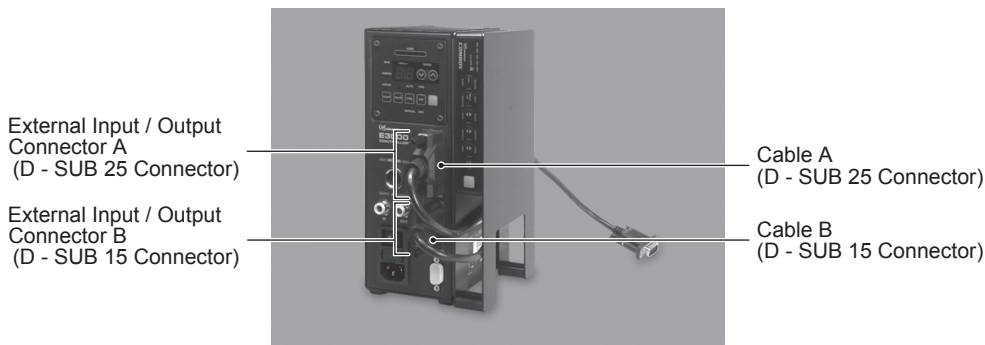


Fig. 13

- (7) Connect the Cable C (High density D - SUB 15 Connector) of the COMBOX and I / F Cable (High Density D - SUB 15 Connector) of the Standard Accessories.  
 After connecting the connector, securely tighten the screw of the connector.

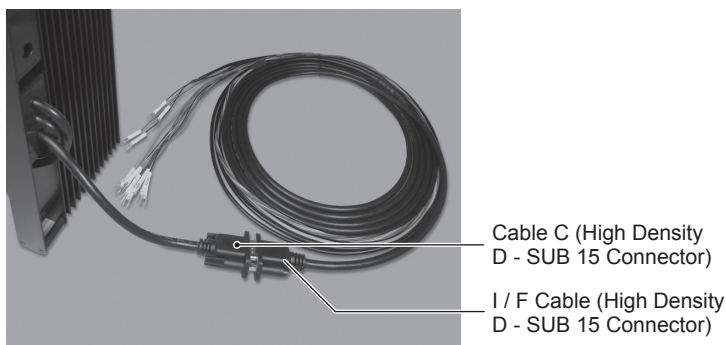


Fig. 14

## 9. CONNECTION TO THE MACHINE

### **⚠ DANGER**

**Make sure the input power supply is OFF before wiring. If the incoming power supply is ON, it may cause risk that leads to death or serious injury by electric shock.**

### **⚠ CAUTION**

- Before making connections to the machine, be sure to refer to this Operation Manual and the Electrical Diagram for the machine tool.
- To secure the terminal to the Terminal Block, use a Phillips screwdriver to firmly tighten the screws.

### **INFORMATION**

The model name in « Machine Model Quick Terminal Connection Reference Matrix for Cincom » is the MFG No. on the nameplate attached to your machine.

## 9 - 1 I / F Cable (High density D - SUB 15 Connector)

### ⚠ CAUTION

- The signal wire numbers on the wire insulator tubes are installed on the I / F Cable's (High density D - SUB 15 Connector) terminal wires.  
Be sure to connect all (14) cable terminals on the I / F Cable (High density D - SUB 15 Connector) to the Terminal Block on the machine.
- When connecting the I / F Cable (High density D - SUB 15 connector) terminals, (refer to P56 Table. 5) confirm the label name to Terminal Block are correct.
- The I / F Cable (High density D - SUB 15 connector) is 5m long. After wiring connections are completed, organize the excess I / F Cable (High density D - SUB 15 connector) so as not to disturb other cables.

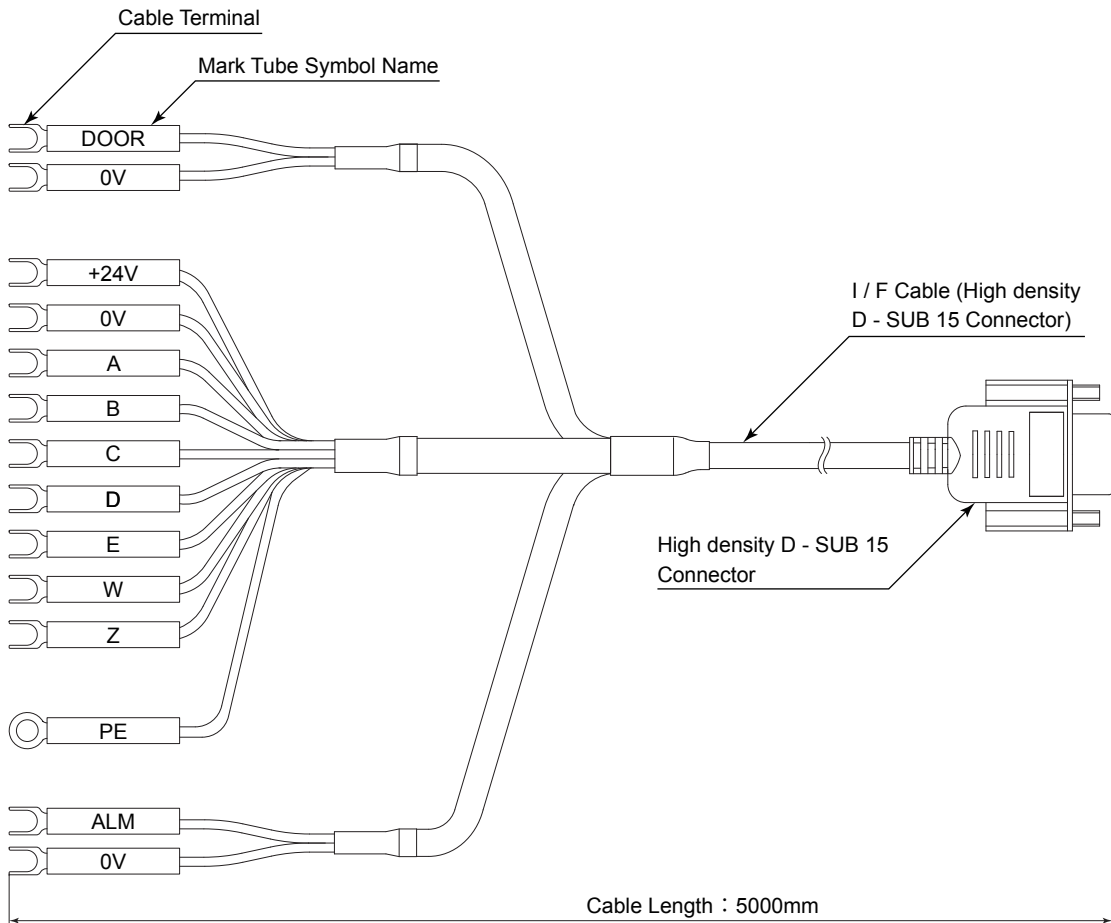


Fig. 15

## 9 - 2 Signal of I / F Cable (High Density D - SUB 15 Connector)

- Table 2 is a list of signals from the I / F Cable (High Density D - SUB 15 connector) terminals.
- I / F Cable (High density D - SUB 15 Connector) terminal signals consist of M Code Signals (M61 - M65) and other signals to detect the machines' condition.
- This COMBOX uses (DC+24V) provided by the machine tool.
- All I / F Cable (High density D - SUB 15 Connector) terminals (14 terminals) must be connected to Terminal Block of the machine tool.

Table. 2

Mark Tube Symbol Name	Signal / Description	Access Point
+24V	Input Power of the COMBOX (DC+24V)	Use the DC+24V power source from the machine tool.
0V	Input Power of the COMBOX (DC 0V)	
A	External M Code M61	A Maximum of five ( 5 ) M Code Signals are provided.
B	External M Code M62	
C	External M Code M63	
D	External M Code M64	
E	External M Code M65	
W	External Alarm Signal 1	External Alarm Signal 1 (Alarm from the COMBOX and CONTROLLER)
Z	External M Code Completion Signals (Finish Signal)	The completion signals (M61 - M65) are output to the machine, after completing the commanded M Code Signals (M61 - M65).
DOOR	Door Operation Detection Signal (DOOR)	" Door (Closed) to Door (Open) : Motor is stopped " or " Door (Open) to Door (Closed) : " Motor is re-started " operation can be select by parameter. Pair Wires " DOOR " terminal and " 0V " terminal.
0V	DC 0V Ground Wire for the Door Operation Detection Signal (DOOR).	Pair Wires " DOOR " terminal and " 0V " terminal.
ALM	Machine Malfunction Signal (ALM) Signal is output due to a malfunction of the machine. The motor will be in emergency stop state.	<p>Use a Revolving Warning Light (Red) Signal. The Revolving Warning Light (Red) Signal is output from the machine, The COMBOX determine that there is a machine malfunction and motor go to an emergency stop condition.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>⚠ CAUTION</b></p> <p>It is required that setting parameter of the CONTROLLER is set to <input type="text" value="07"/> (" Selection of Emergency Stop Function ").  <b>iSpeed3 CONTROLLER :</b>  <b>Set parameter <input type="text" value="P8"/>.</b>  <b>E3000 CONTROLLER :</b>  <b>Set parameter <input type="text" value="P9"/>.</b></p> </div> <p>Pair Wires " ALM " terminal and " 0V " terminal.</p>
0V	DC 0V Ground Wire for the Machine Malfunction Signal (ALM)	Pair Wires " ALM " terminal and " 0V " terminal.
PE	Protective ground terminal of the machine.	Connect the " PE " terminal to the Ground terminal of the machine.

## 9 - 3 Other Cables

### 9 - 3 - 1 Using Cable D (Yellow) and the Cable E (Blue)

- (1) As shown in Fig. 16, connect the terminal of Cable D (Yellow ) and the terminal " D " of I / F Cable (High Density D - SUB 15 connector) using the provided Screw and Nut. Firmly affix the Screw at the O-type terminal side of Cable D (Yellow) (Fig. 16).
- (2) As shown in Fig. 16, connect the terminal of Cable E (Blue) and the terminal " E " of I / F Cable (High Density D - SUB 15 Connector) using the provided Screw and Nut. Firmly affix the Screw at the O-type terminal side of Cable E (Blue) (Fig. 16).

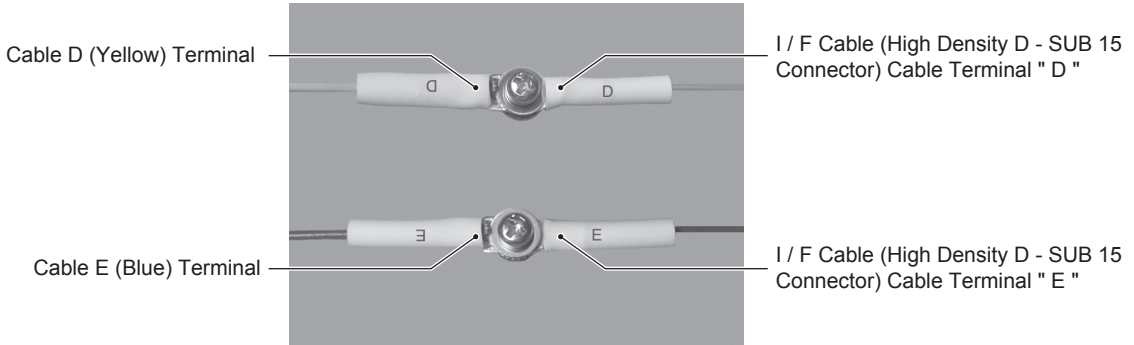


Fig. 16

- (3) Wrap the Screw and Nut with insulated (electrical) tape.



### CAUTION

Exposed (non-insulated) components will cause a short and malfunction of the machine or the COMBOX.

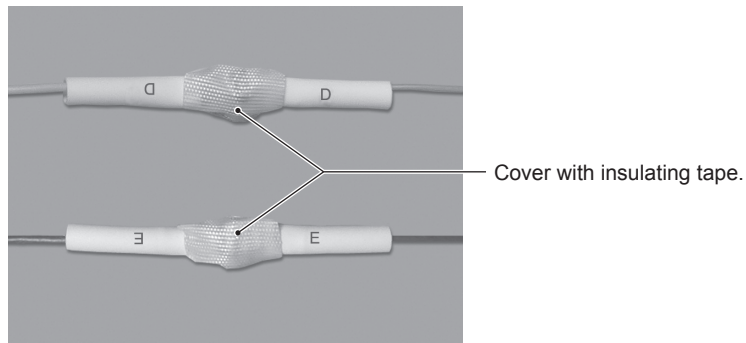


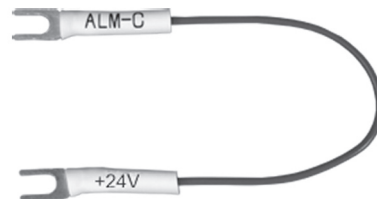
Fig. 17

### 9 - 3 - 2 Applicable Model and Connection Positions of the Cable F (Red)

Applicable model and connection positions of the Cable F (Red) are as shown in Table. A (For details, refer to Cable F (○ Mark) in Other Accessories of the Table. 5 « Machine Model Quick Terminal Connection Reference Matrix for Cincom » ).

Table. A

Cincom Machine Type Serial No.	Mark Tube	Cable F	
		+24V	ALM-C
C1216*/		+M24V	PATRC
		TBC2	TBC2
L20E*/ With TB5		+M24V	PATRC
		TBC1	TBC1
L71620*/		+M24V	PATRC
		TBC1	TBC1
MCL1216*/ MCL2032*/		+M24V	PATRC
		TBC2	TBC2



## 9 - 4 Connections to the Machine

Connect the I / F Cable (High Density D - SUB 15 Connector) terminals to the Terminal Block of the machine using the operation flow shown below.

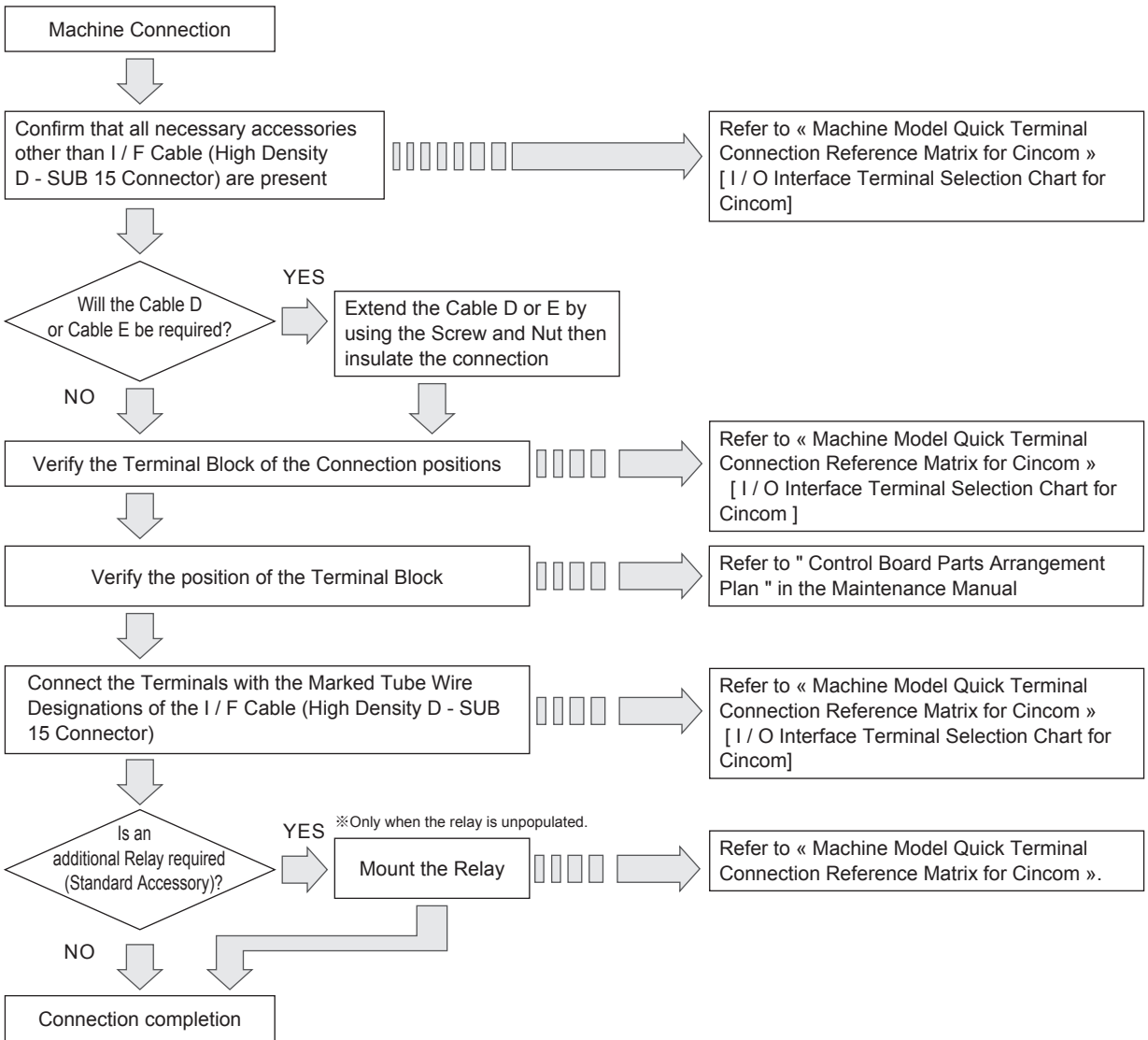


Fig. 18

### ⚠ CAUTION

- Position the I / F Cable (High Density D - SUB 15 Connector) away from any machine power lines.
- If an identical terminal has been used by the same terminal designation, join that wire its mating terminal.
- The Terminals used on the I / F Cable (High Density D - SUB 15 Connector) are Y Type terminals. Firmly tighten the terminal screws so they do not come loose.

#### < Connection of the PE terminal >

- The I / F Cable (High Density D - SUB 15 Connector) has a PE terminal for connecting to the Ground (PE) of the machine.
- Multiple ground wires (green : PE) can be mounted in the same location. PE terminal must be connected to an unused fixed location (1 PE terminal : 1 connection).



## 9 - 5 «Machine Model Quick Terminal Connection Reference Matrix for Cincom » [ I / O Interface Terminal Selection Chart for Cincom ]



### CAUTION

It is necessary to utilize the " Maintenance Manual " of the machine « Machine Model Quick Terminal Connection Reference Matrix for Cincom ».

Step 1) Confirm the model of Cincom machine.

- Always confirm the machine model name « Machine Model Quick Terminal Connection Reference Matrix for Cincom » before beginning the interface process .
- The serial No. of the machine noted after " \*/ " of the MFG No. in the « Machine Model Quick Terminal Connection Reference Matrix for Cincom ».
- Depending on the model, connection terminals may be different even if MFG No. is same.
- Confirm the Machine Model by referring to the cautions in « Machine Model Quick Terminal Connection Reference Matrix for Cincom ».

Step 2) Confirm connection location

- Confirm the terminal symbol name locations ( " +24V ", " 0V ", " A ", " B ", " C ", " D ", " E ", " W ", " DOOR ", " ALM " ) that are labled on the tubes of the I / F Cable (High density D - SUB 15 Connector).

Ex.) " Model : A1216\*/ Mark tube symbol connects to A"

Table. 3  part → " Terminal Block : TBC1 Signal name : Y22 "

Table. 3

		Mark Tube Symbol Name	+24V	0V	A	
		Signal Name	+24V	0V	M61	
Model	A1216*/		+24V	0V	Y22	← Upper : Signal name of the Terminal Block to be connected.
			TBC1	TBC1	TBC1	← Lower : Name of the Terminal Block to be connected.

- Confirm the position of the terminals by referring to the " Control Board Parts Arrangement Plan " in the " Machine Maintenance Manual ".

Step 3) Confirm the use of other accessories

- Confirm if other accessories (Cable D, Cable E, Cable F, Screw, Nut, Relay) of « Machine Model Quick Terminal Connection Reference Matrix for Cincom » are necessary (Refer to Table. 5).
- To use Cable D and Cable E extension wires, use the supplied Screw and Nut.
- If the relay is marked ○ in « Machine Model Quick Terminal Connection Reference Matrix for Cincom », install the supplied relay to the one specified in « Machine Model Quick Terminal Connection Reference Matrix for Cincom ». In case of " △ ", confirm whether or not the relay is attached to the machine (Refer to Table. 5).

The relay is not installed to the machine : The relay must be installed.  
Attach the supplied Relay.

\*Installing the relay



### CAUTION

The relay needs to be installed in the certain direction. Installing in incorrectly may break the terminal of the Relay.  
Be sure to align the Relay properly to install.

Ex) In case of " Machine Type : A232\*/ " (Refer to Table. 4)

The Cable D, Cable E, Screw / Nut are necessary.

Confirm if the relay is mounted to the machine. If not, mount the supplied Relay.

Table. 4

Machine Name	A232*/	Cable D	Cable E	Cable F	Screw / Nut	Relay	Relay's Connection Point Name
		○	○	×	○	△	Ry214

○ : Necessary      × : Unnecessary

△ : Confirm the mounted the relay to the machine. If not mounted the relay to the machine, mount the Relay of the Standard Accessories to the " Ry214 " of the Relay Connecting Position of the machne.

## ⚠ CAUTION

- Be sure to have " Machine Maintenance Manual " of the machine on hand to install correctly.
- The Terminal Blocks of the Mark Tube Symbol Name " +24V " and " 0V " are assigned in « Machine Model Quick Terminal Connection Reference Matrix for Cincom ». Sometimes the assigned Terminal Blocks are already in use depending on the spec. of the machine. In such cases, connect to the other Terminal Block with the same Mark Tube Symbol Name.

Ex) Connect the Mark Tube Symbol Name " +24V " and " 0V " to the machine " L20E\*/ "

" +24V "	:	" +M24V " of the Terminal Block " TBC3 " is already in use.	→	Connect " +M24V " of the Terminal Block " TBC1 "
" 0V "	:	" 0V " of the Terminal Block " TBC3 " is already in use.	→	Connect " 0V " of the Terminal Block " TBC1 "

Table. 5 « Machine Model Quick Terminal Connection Reference Matrix for Cincom »  
[ I / O Interface Terminal Selection Chart for Cincom ]

		I / F Cable							
		Mark Tube Symbol Name	+24V	0V	A	B	C	D	E
		Signal Name	+24V	0V	M61	M62	M63	M64	M65
Cincom Machine Type Serial No.	A1216*/		24V	0V	Y22	Y23	Y24	Y25	Y26
			TBC1	TBC1	TBC1	TBC1	TBC1	TBC1	TBC1
	A1216N*/		24V	0V	Y22	Y23	Y24	Y25	Y26
			TBC1	TBC1	TBC1	TBC1	TBC1	TBC1	TBC1
	A20*/		24M	0V	Y02	Y03	Y04	Y05	Y06
			TB5	TB4	TB3	TB3	TB3	TB3	TB3
	A220*/	TB2 with DL	24M	0V	Y02	Y03	Y04	Y05	Y06
		TB2 with X62 / TB2 with X71A	TB5	TB4	TB3	TB3	TB3	TB3	TB3
	A32*/	The TB2 is two - tier Terminal Block	+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E
		TB2 with DL / TB2 with DLA	TB1	TB1	TBC3	TBC3	TBS1	TBS1	TBC1
		The TB2 is two - tier Terminal Block	+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E
		TB2 without DL / TB2 without DLA	TB1	TB1	TBC3	TBC3	TBS1	TBS1	TBC1
		The TB2 is one - tier Terminal Block	+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E
			TB1	TB1	TBC3	TBC3	TBS1	TBS1	TBC1
	A232*/		+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E
			TB1	TB1	TBC3	TBC3	TBS1	TBS1	TBC1
	B312*/		24M	0V	Y02	Y03	Y04	Y05	X
			TB4	TB4	TB3	TB3	TB3	TB3	—
	B1216E*/		24M	0V	Y22	Y23	Y24	Y25	Y26
			TB1	TB1	TBC2	TBC2	TBC2	TBC2	TBC2
	BL2025*/		24M	0V	Y02	Y03	Y04	Y05	Y06
			TB4	TB4	TB3	TB3	TB3	TB3	TB3
	C1216*/		+M24V	0V	M61	M62	M63	M64	M65
			TB1	TB1	TB1	TB1	TB1	TB1	TB1
	K1216*/		24M	0V	Y02	Y03	Y04	Y05	Y06
			TB5	TB4	TB3	TB3	TB3	TB3	TB3
K1216E*/		+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E	
		TBC3	TBC3	TBC3	TBC3	TBS1	TBS1	TBC2	
L12*/		+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E	
		TBC3	TBC3	TBC3	TBC3	TBS1	TBS1	TBC2	
L20E*/	No TB5	+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E	
		TBC3	TBC3	TBC3	TBC3	TBS1	TBS1	TBC2	
	With TB5	+M24V	0V	M61	M62	M63	M64	M65	
		TBC2	TBC2	TB5	TB5	TB5	TB5	TB5	
L71620*/		+M24V	0V	M61	M62	M63	M64	M65	
		TBC2	TBC2	TB5	TB5	TB5	TB5	TB5	
MCL1216*/		+M24V	0V	M61	M62	M63	M64	M65	
MCL2032*/		TB1	TB1	TB1	TB1	TB1	TB1	TB1	
M416*/		+M24V	0V	Y22B	Y22C	Y22D	Y22E	Y0E	
M432*/		TB3	TB3	TBC3	TBC3	TBS1	TBS1	TBC2	
R302W*/		24M	0V	Y02	Y03	Y04	Y05	Y06	
		TB5	TB4	TB3	TB3	TB3	TB3	TB3	
R40407*/		24M	0V	Y22	Y23	Y24	Y25	Y26	
		TB1	TB1	TBC2	TBC2	TBC2	TBC2	TBC2	

## ⚠ Utilization Precautions « Machine Model Quick Terminal Connection Reference Matrix for Cincom » [ I / O Interface Terminal Selection Chart for Cincom ]

\*1 ~ \*4 explain  parts of « Machine Model Quick Terminal Connection Reference Matrix for Cincom ».

- \*1 For model " A220\*/ ", the name of connecting destination of the Door Operation Detection Signal (DOOR) changes depending on when the machine was manufactured. Please check the terminal name for the actual machine.
- \*2 For model " A32\*/ ", the name of connecting destination of the Door Operation Detection Signal (DOOR) changes depending on when the machine was manufactured. Please check the number of tiers of " TB2 " Terminal Block and the terminal name.
- \*3 For model " B312\*/ ", the Mark Tube Symbol Name " E " (signal name : external M Code " M65 ") cannot be connected.
- \*4 For model " L20E\*/ ", the connection may change depending on whether or not there is a " TB5 ". Please check if there is " TB5 " Terminal Block in the machine. Open the electrical control cabinet and locate the Terminal Block close to the bottom of the cabinet.

I / F Cable						Other Accessories						remarks column
Z	W	DOOR	0V	ALM	0V	Cable D	Cable E	Cable F	Screw / Nut	Relay	Relay Connection Point Name	
External Completion	EXTERNAL ALAM	Door Operation Detection Signal	DC 0V Ground for the Door	Machine Malfunction Signal	DC 0V Ground for the ALM							
X103	X104	X71	0V	PATR	0V	×	×	×	×	△	Ry110	
TBC3	TBC3	TB1	TB1	TBC1	TBC1							
X103	X104	X71	0V	PATR	0V	×	×	×	×	△	Ry110	
TBC3	TBC3	TB1	TB1	TBC1	TBC1							
X223	X224	X211	0V	Y116	0V	×	×	×	×	×	—	
TB4	TB4	TB2	TB2	TB4	TB4							
X223	X224	DL	0V	Y116	0V	×	×	×	×	×	—	
TB4	TB4	TB2	TB2	TB4	TB4						*1	
X223	X224	X62 / X71A	0V	Y116	0V	×	×	×	×	×	—	
TB4	TB4	TB2	TB2	TB4	TB4						*1	
X25	X23	DL	0V	Y22R	0V	○	○	×	○	△	Ry214	
TBC1	TBC1	TB1	TB1	TBC2	TBC2						*2	
X25	X23	DSCAV1	0V	Y22R	0V	○	○	×	○	△	Ry214	
TBC1	TBC1	TB1	TB1	TBC2	TBC2						*2	
X25	X23	X0B	0V	Y22R	0V	○	○	×	○	△	Ry214	
TBC1	TBC1	TB1	TB1	TBC2	TBC2						*2	
X25	X23	DL	0V	Y22R	0V	○	○	×	○	△	Ry214	
TBC1	TBC1	TB1	TB1	TBC2	TBC2							
X223	X224	X211	0V	PATR	0V	×	×	×	×	△	Ry111	
TB4	TB4	TB2	TB2	TB3	TB3						*3	
X103	X104	DL3	0V	Y76	0V	×	×	×	×	×	—	
TBC2	TBC2	TB1	TB1	TBC3	TBC3							
X223	X224	X211	0V	PATR	0V	×	×	×	×	△	Ry111	
TB4	TB4	TB4	TB4	TB3	TB3							
EXMFIN	EXAL1	DS1	0V	PATR	0V	×	×	○	×	△	Ry205	
TB1	TB1	TBP2	TBP2	TBC2	TBC2							
X223	X224	X211	0V	Y116	0V	×	×	×	×	×	—	
TB4	TB4	TB2	TB2	TB4	TB4							
X25	X23	X0E	0V	Y22R	0V	○	○	×	○	△	Ry211	
TBC1	TBC1	TB2	TB2	TBC2	TBC2							
X25	X23	DS3A	0V	Y22R	0V	○	○	×	○	△	Ry211	
TBC1	TBC1	TB3	TB3	TBC2	TBC2							
X25	X23	X0E	0V	Y22R	0V	○	○	×	○	△	Ry211	
TBC1	TBC1	TB2	TB2	TBC2	TBC2						*4	
MFIN	X23	DS1	0V	PATR	0V	×	×	○	×	△	Ry207	
TB5	TBC2	TBC2	TBC2	TBC1	TBC1						*4	
MFIN	X23	DS1	0V	PATR	0V	×	×	○	×	△	Ry207	
TB5	TBC2	TBC2	TBC2	TBC1	TBC1							
EXMFIN	EXAL1	DS1	0V	PATR	0V	×	×	○	×	△	Ry205	
TB1	TB1	TBP2	TBP2	TBC2	TBC2							
X25	X23	X0E	0V	Y22R	0V	○	○	×	○	△	Ry211	
TBC1	TBC1	TB3	TB3	TBC2	TBC2							
X223	X224	X211	0V	Y116	0V	×	×	×	×	×	—	
TB4	TB4	TB1	TB1	TB4	TB4							
X103	X104	DS1	0V	Y76	0V	×	×	×	×	×	—	
TBC2	TBC2	TB1	TB1	TBC3	TBC3							

# 10. OPERATIONAL PROCEDURES

## 10 - 1 Button and LED Features of the Control Panel

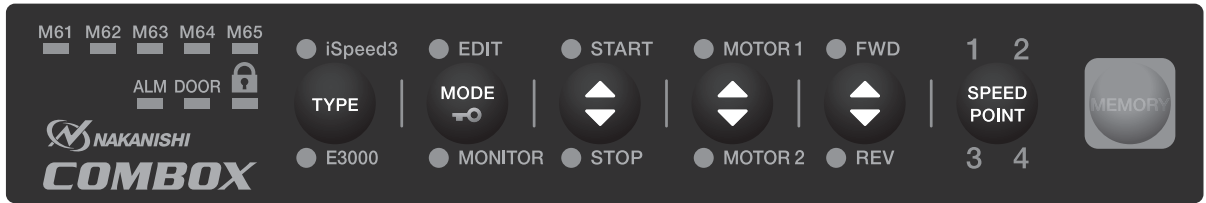


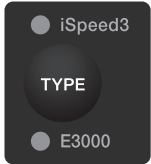
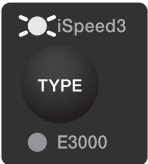
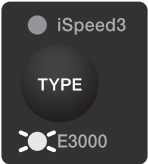

Fig. 19








This Operation Manual indicates the LED status as shown below.



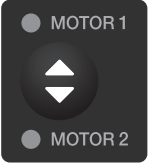
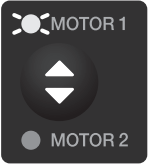
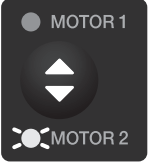











 : LED lights
 
 : LED blink

Table. 6

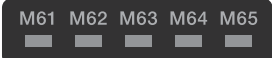
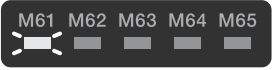








Button / LED	Description
Model Selection Button (TYPE) 	The Model Selection Button (TYPE) is to select the NSK CONTROLLER Model. Applicable CONTROLLERS : iSpeed3 CONTROLLER or E3000 CONTROLLER When selecting the type of the CONTROLLER, hold the Model Selection Button (TYPE) for 3 seconds. The selected CONTROLLER's LED will light. When the selected CONTROLLER's LED lights, the setting will be memorized. (There is no need to press the Memory Button (MEMORY).) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>CAUTION</b></p> <p><b>If selected CONTROLLER's LED, a system error has occurred. Refer to P68 " 11. EXTERNAL ALARM SIGNAL 1 / ERROR INDICATORS " section.</b></p> </div>
iSpeed3 LED (iSpeed3) lights 	Select the iSpeed3 CONTROLLER.
E3000 LED (E3000) lights 	Select the E3000 CONTROLLER.
Mode Selection Button (MODE) 	This button selects the Mode. There are 3 different modes. <ul style="list-style-type: none"> <li>• EDIT Mode</li> <li>• MONITOR Mode</li> <li>• Key - Lock Mode</li> </ul> Push the Mode Selection Button (MODE) M61 → M62 → M63 → M64 → M65 → M61 → ..... The LED's will lights in the above order. If " M61 ", " M62 ", " M63 ", " M64 " or " M65 " are lit, this indicates EDIT Mode, and the EDIT LED (EDIT) will light.







Button / LED	Description	
<p>Mode Selection Button (MODE)</p> 	<p>EDIT Mode EDIT LED (EDIT) lights</p> 	<p>Set by selecting the operation of the CONTROLLER corresponding to M Code Signals (M61 - M65) of the machine.</p> <p>Set any of the following four items to the selected M Code Signals (M61 - M65).</p> <ul style="list-style-type: none"> <li>- Selection of the Motor Start / Stop</li> <li>- Selection of Motor 1 or Motor 2</li> <li>- Selection of the Motor Rotating Direction</li> <li>- Selection of the Motor Speed Point (1, 2, 3, 4)</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>CAUTION</b></p> <p>The EDIT Mode cannot be used while the motor is in motion. When motor is rotating, the COMBOX is in the MONITOR Mode.</p> </div>
	<p>MONITOR Mode MONITOR LED (MONITOR) lights</p> 	<p>The input condition of the M Code Signals (M61 - M65), Machine Malfunction Signal (ALM) and Door Operation Detection Signal (DOOR) indicated by this LED.</p>
	<p>Key - Lock Mode (Key - Lock LED (🔒) lights)</p> 	<p>All button operations, other than Mode Selection Button (MODE) of the Control Panel will be disabled.</p> <p>Key - Lock : Press and hold the Mode Selection Button (MODE) for 3 seconds.</p> <p>Unlock : Press and hold the Mode Selection Button (MODE) for 3 seconds.</p>
<p>Start / Stop Button (START / STOP)</p> 	<p>Set the motor start or motor stop function, corresponding to M Code Signals (M61 - M65) from the machine.</p> <p>Set to invalidate the M Code Signals (M61 - M65) from the machine.</p>	
	<p>START LED (START) lights</p> 	<p>The Motor will start rotating.</p>
	<p>STOP LED (STOP) lights</p> 	<p>The Motor will stop rotating.</p>

Button / LED	Description	
<p>Start / Stop Button (START / STOP)</p> 	<p>START LED (START) and STOP LED (STOP) goes out (not lit)</p> 	<p>Selected M Code Signals (M61 - M65) are disabled.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>⚠ WARNING</b></p> <p><b>The M Code Signals (M61 - M65) need to be set disabled if used in applications other than those used for the COMBOX (Refer to P63 " 10 - 2 - 2 Setting to disable the use of the M Code Signals (M61 - M65) (Fig. 20) ". Failing to do so may cause accidental or improper Motor operation.</b></p> </div>
<p>Motor Selection Button (MOTOR 1 / MOTOR 2) : This is used only for the iSpeed3 CONTROLLER.</p> 	<p>Select the motor to be used. Select Motor 1 or Motor 2.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>⚠ CAUTION</b></p> <p><b>If the E3000 CONTROLLER is connected, the motor select feature is not available.</b></p> </div>	
	<p>MOTOR 1 LED (MOTOR 1) lights</p> 	<p>Select the Motor 1.</p>
	<p>MOTOR 2 LED (MOTOR 2) lights</p> 	<p>Select the Motor 2.</p>
<p>Rotation Direction Button (FWD / REV)</p> 	<p>Select the Motor Rotation Direction. Press the Motor Rotation Direction Button (FWD / REV).</p>	
	<p>Forward LED (FWD) lights</p> 	<p>Motor executes FWD. rotation.</p>
	<p>Revers LED (REV) lights</p> 	<p>Motor executes REV. rotation.</p>

Button / LED	Description	
<p data-bbox="76 131 336 193">Speed Point Selection Button (SPEED POINT)</p> 	<p data-bbox="381 131 1292 227">Select the CONTROLLER's setting Speed Point. Press the Speed Point Selection Button (SPEED POINT) to select the Speed Point (1, 2, 3 or 4). When using the Speed Point, set parameter <math>P5</math> of the CONTROLLER (Refer to " SETTING OF OPERATING PARAMETERS " of the CONTROLLER Operation Manual).</p>	
	<p data-bbox="381 340 555 369">1 LED (1) lights</p> 	<p data-bbox="724 340 1029 369">Selected the Speed Point 1.</p>
	<p data-bbox="381 571 555 600">2 LED (2) lights</p> 	<p data-bbox="724 571 1029 600">Selected the Speed Point 2.</p>
	<p data-bbox="381 803 555 832">3 LED (3) lights</p> 	<p data-bbox="724 803 1029 832">Selected the Speed Point 3.</p>
	<p data-bbox="381 1035 555 1064">4 LED (4) lights</p> 	<p data-bbox="724 1035 1029 1064">Selected the Speed Point 4.</p>
<p data-bbox="76 1261 374 1290">Memory Button (MEMORY)</p> 	<p data-bbox="381 1261 1012 1290">Store the setting for selected M Code Signals (M61 - M65).</p> <p data-bbox="381 1296 806 1325">There are 4 different functions possible.</p> <ul data-bbox="381 1331 1112 1483" style="list-style-type: none"> <li>- Selection of the Motor Start / Stop</li> <li>- Selection of the Motor 1 or Motor 2</li> <li>- Selection of the Motor Rotation Direction</li> <li>- Selection of the Motor Speed Point (1, 2, 3 or 4)</li> <li>- Disabling the settings of the M Code Signals (M61 - M65) selected.</li> </ul> <div data-bbox="399 1503 1277 1599" style="border: 1px solid black; padding: 5px;"> <p data-bbox="426 1503 628 1537"><b>⚠ CAUTION</b></p> <p data-bbox="412 1551 1037 1580"><b>Memory Button (MEMORY) is enabled in EDIT Mode.</b></p> </div>	



Button / LED	Description	
<p>M Code Signal LEDs (M61 - M65)</p> 	<p>When in EDIT Mode, the LED of the selected M Code Signals (M61 - M65) is lit. These are the LEDs to indicate the input condition of M Code Signals (M61 - M65) from the machine at MONITOR Mode.</p>	
	<p>M Code Signal LEDs (M61 - M65) light</p> 	<p>When in EDIT Mode, LED of the selected M Code Signals (M61 - M65) light.</p>
	<p>M Code Signals LEDs (M61 - M65) blink</p>  <p style="text-align: center;">↓</p> 	<p>M Code Signal LEDs (M61 - M65) blink when the processing of M Code Signals (M61 - M65) output from the machine is incomplete at the COMBOX.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>⚠ CAUTION</b></p> <p><b>If the M Code Signal LEDs (M61 - M65) continues blinking for more than 5 seconds, COMBOX is in abnormal operation.</b></p> </div>
<p>Machine Malfunction Signal LED (ALM)</p> 	<p>The Machine Malfunction Signal LED (ALM) is to monitor whether there is an abnormality on the machine side.</p>	
	<p>Machine Malfunction Signal LED (ALM) goes out (not lit).</p> 	<p>Normal Operation</p>
	<p>Machine Malfunction Signal LED (ALM) blinks.</p> 	<p>A problem has occurred on the machine side. In that case, the motor will stop in an emergency condition.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>⚠ CAUTION</b></p> <p><b>It is required to set the parameter for " Emergency Stop Function " in the CONTROLLER to <input type="text" value="07"/>. (If connected to the iSpeed3 CONTROLLER, parameter <input type="text" value="P8"/> " Setting Emergency Stop Feature " must be set to <input type="text" value="07"/>. If connected to the E3000 CONTROLLER, parameter " <input type="text" value="P9"/> Selection of Emergency Stop function " must be set to <input type="text" value="07"/> .)</b></p> </div>
<p>Door Operation Detection Signal LED (DOOR)</p> 	<p>The Door Operation Detection Signal LED (DOOR) is to monitor Door Open / Closed condition of the machine.</p>	
	<p>Door Operation Detection Signal LED (DOOR) lights</p> 	<p>The machine's door is closed.</p>
	<p>Door Operation Detection Signal LED (DOOR) blink.</p> 	<p>The machine's door is open.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>⚠ CAUTION</b></p> <p><b>If the machine Door is open, with motor will be stopped.</b></p> </div>

Button / LED	Description	
Key Hold LED (  ) 	Key Hold is feature to prevent erroneous operation from occurring by mistakenly touching the Control Panel. The operation buttons other than Mode Selection Button (MODE) of the Control Panel are disabled.	
	Key Hold LED (  ) lights 	This condition is Key Hold. The operation button other than the Mode Selection Button (MODE) of the Control Panel cannot be operated.
	Key Hold LED (  ) goes out (not lit). 	The Control Panel can be operated normally.

## 10 - 2 Operation Procedure of the Control Panel

### 10 - 2 - 1 Selection of the CONTROLLER

- (1) Select the CONTROLLER to be used in connection of the COMBOX.
- (2) Press and hold the Model Selection Button (TYPE) for 3 seconds. Select the CONTROLLER (iSpeed3 or E3000) by holding the Model Selection Button (TYPE) for 3 seconds.

### 10 - 2 - 2 Settings to disable the use of the M Code Signals (M61 - M65) (Fig. 20)

#### WARNING

The M Code Signals (M61 - M65) must be disabled if used for applications other than the COMBOX. Failing to do so may cause accidental Motor operation.

Disable the selected the M Code Signals (M61 - M65) that will be used for applications other than the COMBOX.

- Ex) If disabling the M Code Signal (M65).
- (1) Press the Mode Selection Button (MODE). The mode will be EDIT Mode. Select the M Code Signal (M65) by pressing the Mode Selection Button (MODE).
  - (2) Press the Start / Stop Button (START / STOP). The START LED (START) (motor activation) and STOP LED (STOP) (motor stop) will blink at the same time. (The motor will not stop.)
  - (3) Store the setting by pressing the Memory Button (MEMORY) as shown in Fig . 20.



\*Selected CONTROLLER : iSpeed3 CONTROLLER

Fig. 20

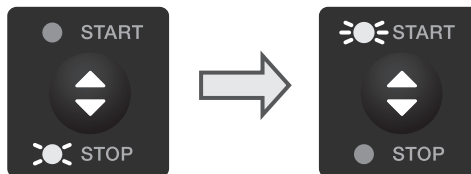
## 10 - 2 - 3 Setting of the M Code Signals (M61 - M65)

### ⚠ CAUTION

- If Speed Point is used, set parameter in the CONTROLLER. (If the iSpeed CONTROLLER is used : Refer to P32 " 20 - 3 - 5 Setting External Speed Control Mode (P5) " section of the iSpeed CONTROLLER Operation Manual. If the E3000 CONTROLLER is used : Refer to P85 " 15 - 4 (P5) Selection of External Speed Control Mode " section of the E3000 CONTROLLER Operation Manual.)
- If the Speed Point is not set, rotation speed will be set by Analog Signal (Motor Speed Control Voltage) or Pulse Signal.
- Make sure that the Control Mode of the CONTROLLER is in AUTO Mode (Control Panel : AUTO LED lights).  
If Control Mode of the CONTROLLER is in the MANUAL mode, the motor cannot be started using the COMBOX (Control Panel : MANUAL LED lights).

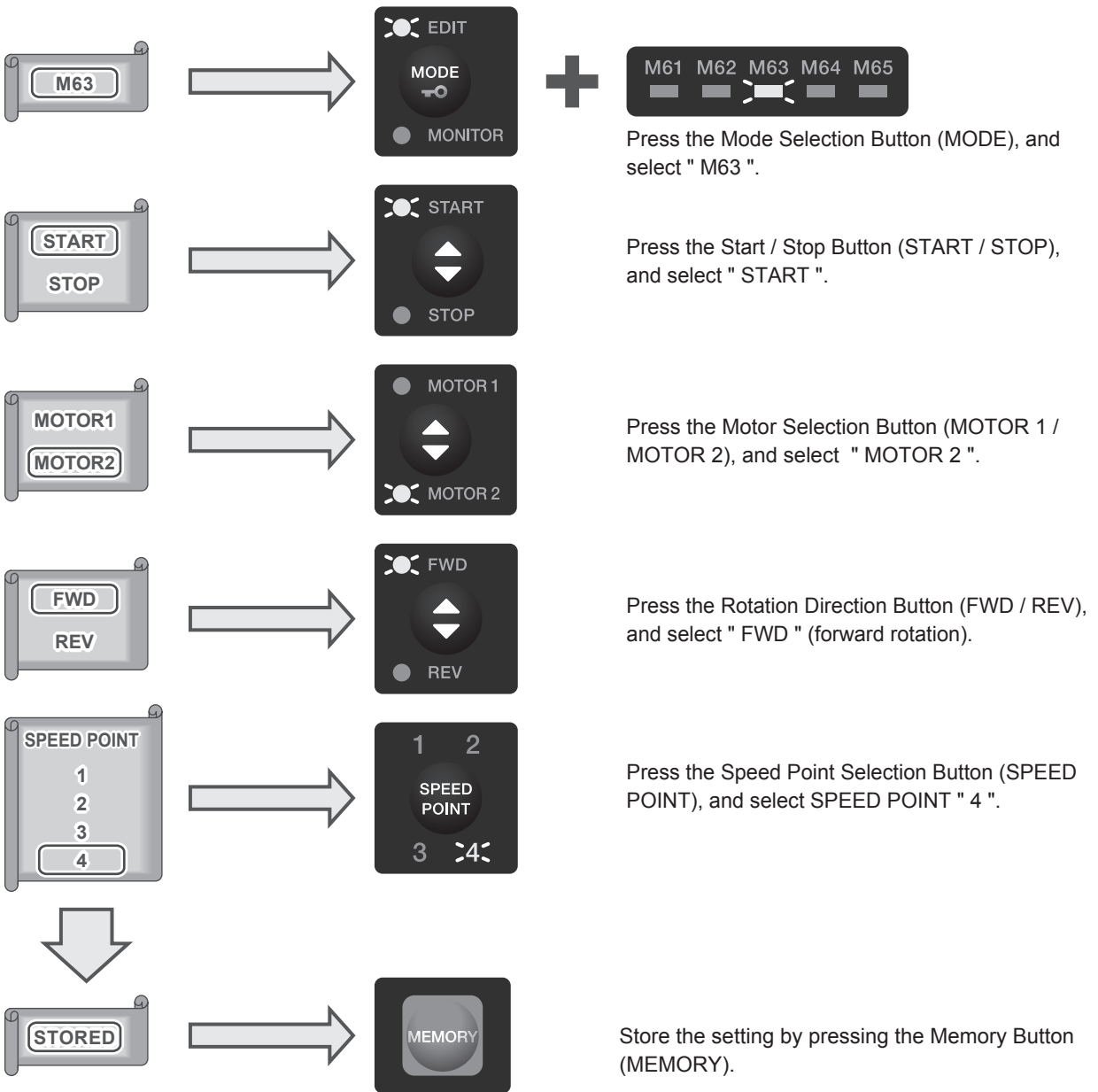
All M Code Signals (M61 - M65) are set to " motor stop " at the time of shipment.

- (1) Press the Mode Selection Button (MODE) to light up the M Code Signal (M61 - M65) to be set.
- (2) Select the Motor START / STOP.  
Select the motor start (START LED (START) lights up) or the motor stop (STOP LED (STOP) lights up) by pressing the Start / Stop Button (START / STOP).
- (3) Select a motor to be activated.  
Select Motor 1 (MOTOR 1 LED (MOTOR 1) lights up) or Motor 2 (MOTOR 2 LED (MOTOR 2) lights up) by pressing the Motor Selection Button (MOTOR 1 / MOTOR 2).  
\* If the E3000 CONTROLLER is used, a motor cannot be selected.
- (4) Set the motor rotation direction.  
Select the forward rotation (Forward LED (FWD) lights up) or reverse rotation (Reverse LED (REV) lights up) by pressing the Rotation Direction Button (FWD / REV).
- (5) Select the Speed Point.  
Select the Speed Point 1 (1 LED (1) lights up), Speed Point 2 (2 LED (2) lights up), Speed Point 3 (3 LED (3) lights up) or Speed Point 4 (4 LED (4) lights up) by pressing the Speed Point Selection Button (SPEED POINT).
- (6) Save the selected settings.  
Press the Memory Button (MEMORY). The LEDs of selected settings will blink 3 times.  
\* If the machine's main power source turn OFF, setting contents will be memorized.  
\* If the setting has changed, the LED for the changed setting will blink.  
Ex) In case of changing the setting from " stop " to " start " by pressing Start / Stop Button (START / STOP), START LED (START) will blink.



## 10 - 2 - 4 Example of Configuration (Connected CONTROLLER : iSpeed3 CONTROLLER)

Procedure to set the following to the M Code Signal <M63>.



As shown in Fig. 21 after setting.

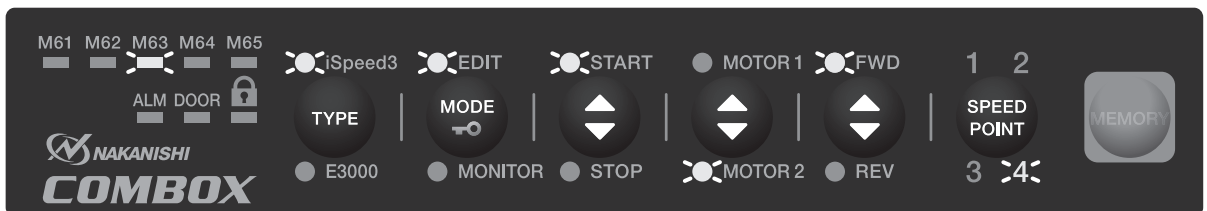


Fig. 21

## 10 - 2 - 5 Example of the Monitor

Fig. 22 explains the condition of each LED.

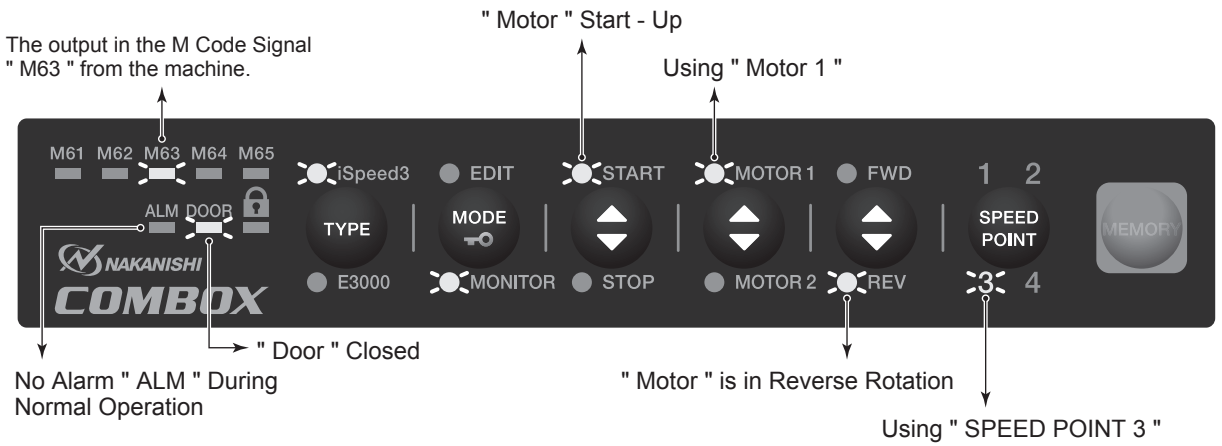


Fig. 22

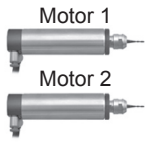
## 10 - 2 - 6 Illustrations of Operation

Ex) When switching between the Motor 1 and Motor 2 when connected to iSpeed3 CONTROLLER

iSpeed3 CONTROLLER



COMBOX



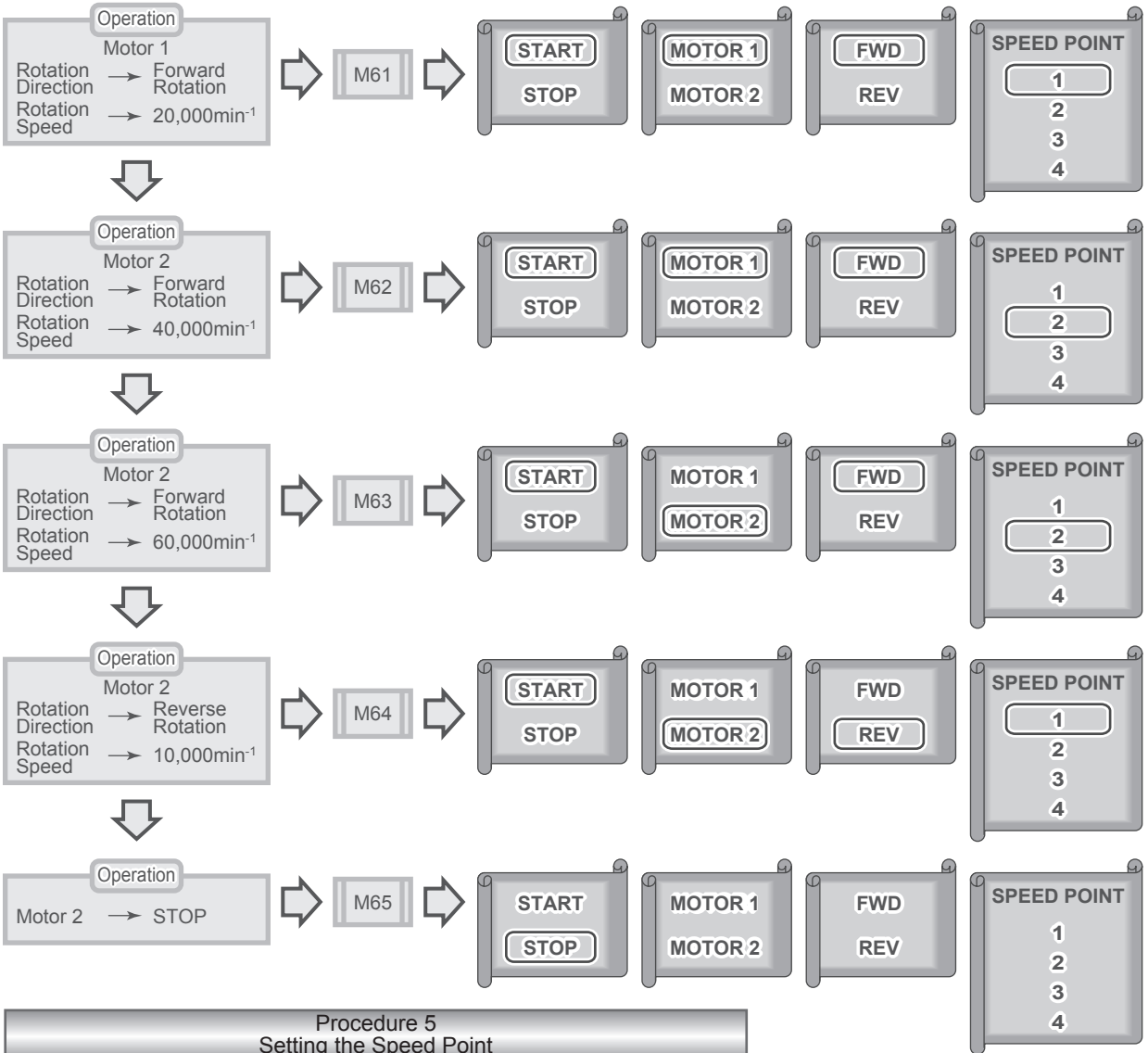
Procedure 1) Press the Model Selection Button (TYPE), select " iSpeed3 ".

Procedure 2) Decide the order of operation.

Procedure 3) Setting the order of operation for each M Code Signal (M61 - M65).

Procedure 4) Setting parameter  $P5$  (Setting External Speed Control Mode) of the iSpeed3 CONTROLLER to  $P0$ .

Procedure 5) Setting the Speed Point for Motor 1 and Motor 2.



Setting Motor 1 Speed Point

Speed Point 1	20,000min <sup>-1</sup>
Speed Point 2	40,000min <sup>-1</sup>
Speed Point 3	-
Speed Point 4	-

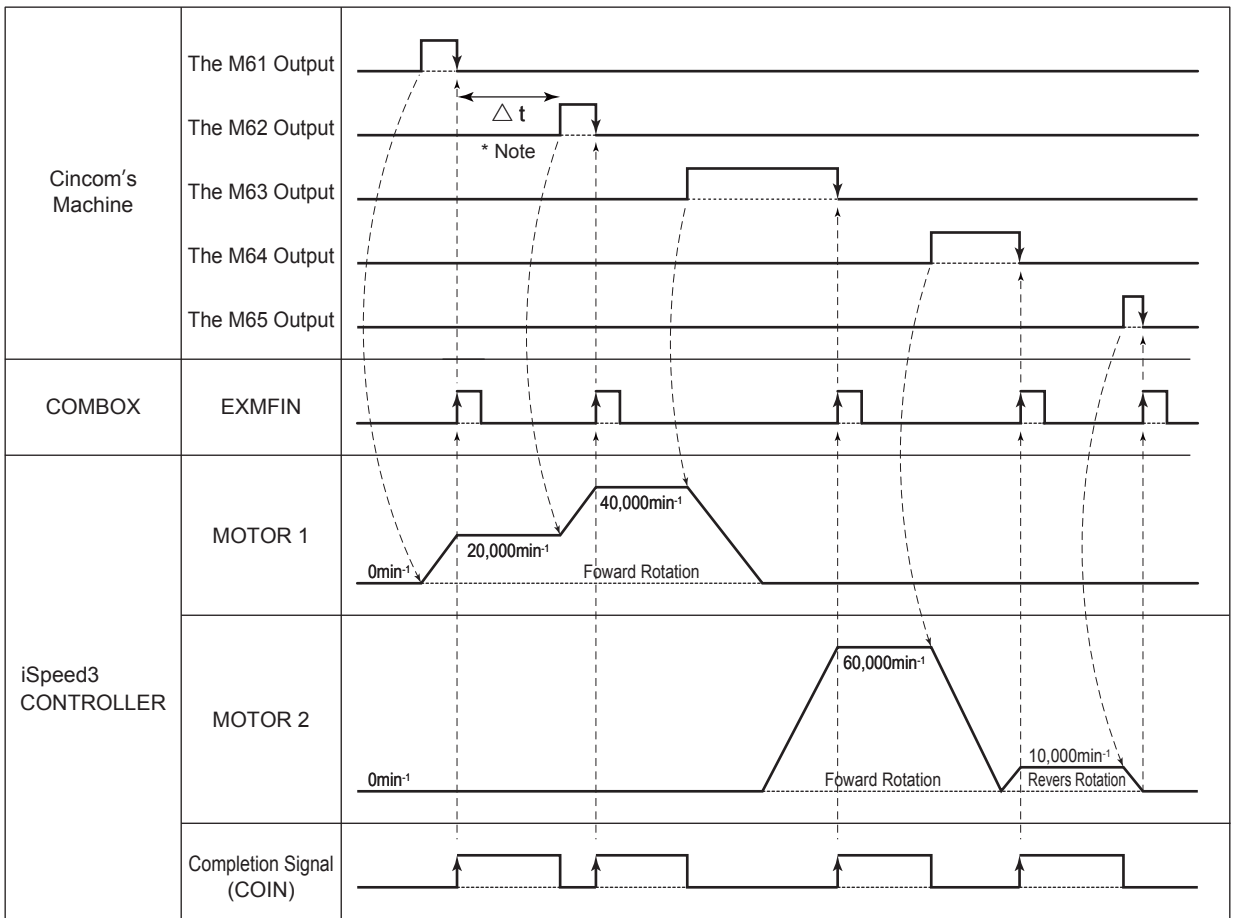
Setting Motor 2 Speed Point

Speed Point 1	10,000min <sup>-1</sup>
Speed Point 2	60,000min <sup>-1</sup>
Speed Point 3	-
Speed Point 4	-

Fig. 23

Parameter  $P5$  (Speed Point) must be set in the CONTROLLER in advance.

Time chart when M code signals " M61 - M65 " are executed as shown in Fig. 24.



\*Note : M Code Signal Output Interval :  $\Delta t \geq 100\text{mSec}$

Fig. 24

## 11. EXTERNAL ALARM SIGNAL 1 / ERROR INDICATORS

- When the system malfunctions, the COMBOX outputs an EXTERNAL ALARM SIGNAL 1 (" EXAL1 ") to the machine.  
The machine is forced into a shutdown once the EXTERNAL ALARM SIGNAL 1 (" EXAL1 ") is output to the machine.
- If a system malfunction occurs, the Machine Malfunction Signal LED (ALM) will blink.
- The LED to indicates a malfunction for either the iSpeed3 or the E3000 CONTROLLER.  
iSpeed3 LED (iSpeed3) or E3000 LED (E3000) will blink depending on the details of the malfunction.  
If a Door OPEN state of the machine, the Door Operation Detection Signal LED (DOOR) will blink.  
If a Door OPEN / CLOSE abnormality should occur, the Door Operation Detection Signal LED (DOOR) will blink to indicate a malfunction.  
If there is an abnormality in the machine, the Machine Malfunction Signal LED (ALM) blinks to indicate a malfunction.

Table. 6 Relationship of External Alarm Signal (" EXAL1 ") and LED at the Time of System Malfunction

No.	System Error	Malfunction Detail	External Alarm Signal 1 (" EXAL1 ") output ON	Blinking LED of iSpeed3 / E3000 LED
1	M Code Signal (M61 - M65) Completion Error	Completion signal is not output from the CONTROLLER even after 60 seconds have passed after M Code Signal (M61 - M65) was output to the CONTROLLER.	LED blinks for 3 seconds after malfunction occurs.	LED of iSpeed3 / E3000 blinks twice.
2	CONTROLLER Power Shutdown	The power to the CONTROLLER was shut down while the motor was rotating.	LED blinks for 3 seconds after malfunction occurs.	LED of iSpeed3 / E3000 blinks twice.
3	CONTROLLER Error	The error signal is output from the CONTROLLER.	LED blinks until the error signal from the CONTROLLER is turned OFF.	LED of iSpeed3 / E3000 blinks twice.
4	CONTROLLER not Ready	The power to the CONTROLLER was turned off when rotation instruction to the CONTROLLER was output.	①LED blinks until the power of the CONTROLLER is turned on.	LED of iSpeed3 / E3000 blinks twice.
			②LED blinks until the M Code Signal (M61 - M65) output from the machine is turned OFF.	
5	M Code Signal (M61 - M65) OFF Error	Outputting M Code Signal (M61 - M65) completion signal to the machine does not turn OFF the M Code Signal (M61 - M65) from the machine.	LED blinks for 3 seconds after malfunction occurs.	LED of iSpeed3 / E3000 blinks three times.
6	M Code Signal (M61 - M65) Multiple Output	More than two M Code Signals (M61 - M65) were output from the machine.	LED blinks for 3 seconds after malfunction occurs.	LED of iSpeed3 / E3000 blinks four times.
7	Door Malfunction When Parameter " P3 " is Set to " START " the LED Lights	The Door has opened during rotation.	Output is not turned ON.	Door Operation Detection Signal LED (DOOR) blink.
	Door Malfunction When Parameter " P3 " is Set to "STOP" the LED Lights		LED blinks for 3 seconds after the malfunction occurs.	



No.	System Error	Malfunction Detail	External Alarm Signal 1 (" EXAL1 ") output ON	Blinking LED of iSpeed3 / E3000 LED
8	Machine Malfunction	Machine Malfunction Signal LED (ALM) was output from the machine.	LED blinks until the CONTROLLER error (emergency stop error " EE ") goes out (not lit). Press the Error Reset Button (RESET) for on the CONTROLLER to turn off the LED.	Machine Malfunction Signal LED (ALM) illuminates.

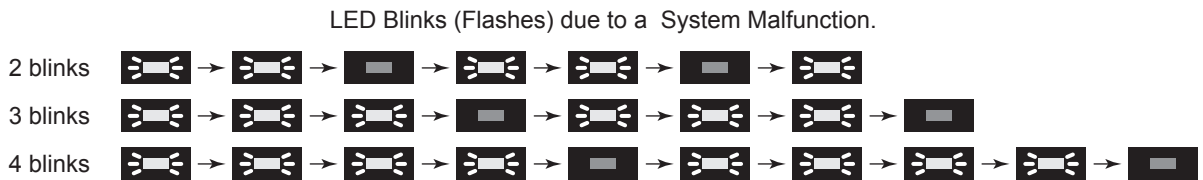


Fig. 25

## 12. SETTING OF OPERATING PARAMETERS

### 12 - 1 Entering Parameter Setting Mode

#### ⚠ CAUTION

When in the parameter mode, M Code Signals (M61 - M65) from the machine cannot be read. If you want to change from the Parameter Mode to the normal operation mode, press the Mode Selection Button (MODE) which will switch from the Parameter Mode to the MONITOR Mode.

- (1) Hold the Speed Point Selection Button (SPEED POINT) down for 3 seconds.

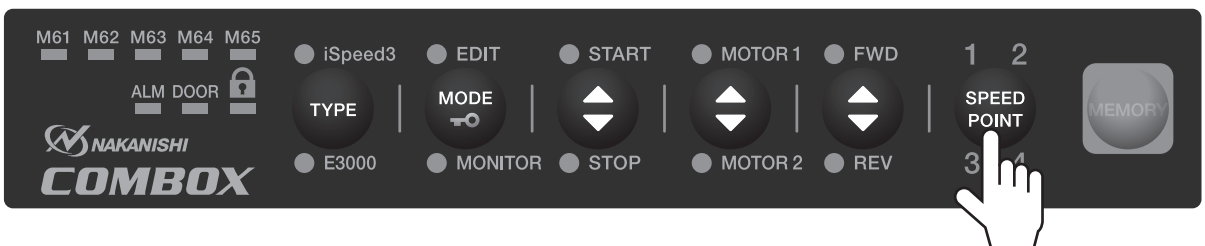


Fig. 26

- (2) The COMBOX will 'BEEP' 3 times, then release the Speed Point Selection Button (SPEED POINT), and you will be in the Parameter Setting Mode. Speed Point 1 LED (1) lights and START LED (START) blinks.

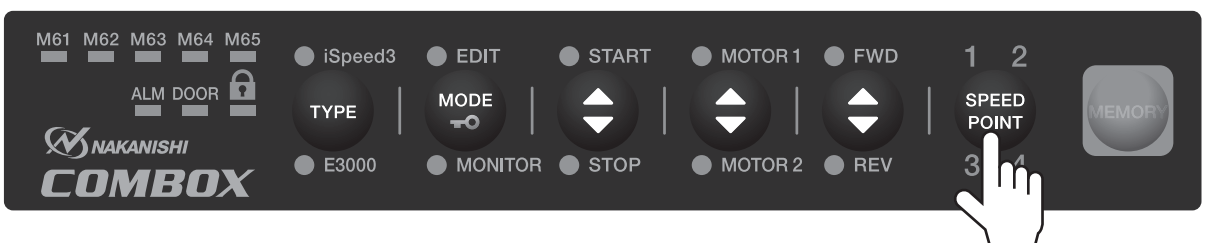


Fig. 27

## 12 - 2 Contents of Parameters

The following parameters can be set.

Table. 7

No.	Type	Contents	Default
" P1 "	Initialize the M Code Signal (M61 - M65) setting.	<p>Able to initialize the settings of all M Code Signals (M61 - M65). Initialization brings M Code Signals (M61 - M65) back to the default at the time of shipment.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>⚠ CAUTION</b></p> <p><b>When initialized, motor stop → motor start changes the setting as below.</b></p> </div> <ul style="list-style-type: none"> <li>· MOTOR 1 / MOTOR 2 → MOTOR 1</li> <li>· Rotation Direction → Forward Rotation</li> <li>· Speed Point → SPEED POINT 1</li> </ul>	M Code Signals (M61 - M65) START / STOP → set to START
" P2 "	Select completion condition of M Code Signal (M61 - M65)	<p>Select the completion conditions of M Code Signal (M61 - M65)</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>⚠ CAUTION</b></p> <p><b>A M Code Signal (M61-M65) is output from the machine and the COMBOX completes the execution of M Code Signal (M61 - M65). The COMBOX outputs the completion signal to the machine. Without outputting completion signal, the NC program cannot move on to the next block of program code.</b></p> </div> <ul style="list-style-type: none"> <li>· Completion condition: Rotation achievement When the external output signal (Rotation achievement " COIN ") of the CONTROLLER is output, completion signal is output to the machine.</li> <li>· Completion condition: during rotation After motor rotation, completion signal is output to the machine.</li> </ul>	" Achievement Signal "
" P3 "	Sets the motor condition when the door of the machine switched from Open to Close.	<p>The motor stops in the event the Door of the machine is opened while the motor is rotating. The motor stops in the event the Door of the machine is closed while the motor is rotating.</p> <ul style="list-style-type: none"> <li>· Door Open → Close : Motor stop continues. Door Close → Open outputs the External Alarm Signal 1 (" EXAL1 ") to the machine and the Door Operation Detection Signal LED (DOOR) blink.</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <p><b>⚠ CAUTION</b></p> <p><b>If the External Alarm Signal 1 (" EXAL1 ") is output to the machine, NC program of the machine has to be reset before continuing.</b></p> </div> <ul style="list-style-type: none"> <li>· Door Open → Close : Motor resumes rotation. Rotating state before the stop.</li> </ul>	Door open → close (" Motor stop continues ")

## 12 - 3 Setting Procedure

(1) Parameter " P1 " Initializes the M Code Signal (M61 - M65) setting.

«Function»

Initialize all settings (START / STOP, MOTOR 1 / MOTOR 2, FWD / REV, SPEED POINT) of M Code Signal (M61 - M65).

1. Enter the Parameter Mode by pressing and holding the Speed Point Selection Button (SPEED POINT) for 3 seconds.
2. Speed Point 1 LED (1) lights up and the START LED (START) blinks.  
To initialize, press the Start / Stop Button (START / STOP).

Setting parameter " P1 " : 1 LED (1) lights.

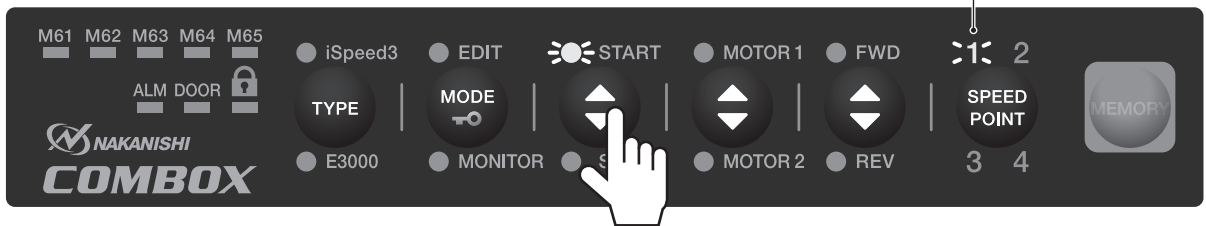


Fig. 28

3. Initialization causes all LED's to blink three times (Fig. 29).

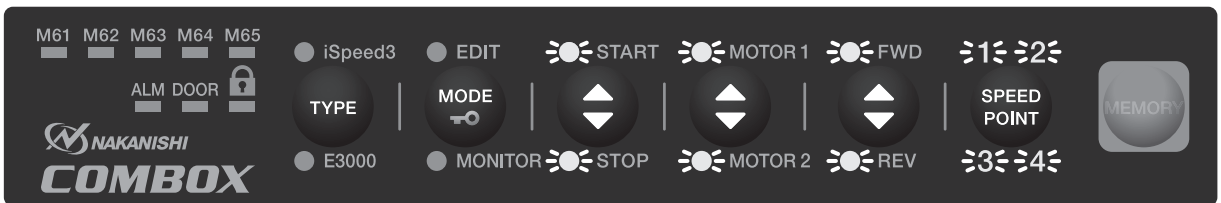


Fig. 29

4. Once initialization is completed, the parameter mode ends and the mode changes to the MONITOR Mode.
5. To set the next parameter without memorization, press the Speed Point Selection Button (SPEED POINT) and select Speed Point " 2 ". Continue the same procedure for Speed Point " 3 " and Speed Point " 4 ".
6. To exit the Parameter Mode, press and hold the Speed Point Selection Button (SPEED POINT) for 3 seconds.  
This will end the Parameter mode and switch to the MONITOR Mode.

(2) Parameter " P2 " Selects completion conditions of M Code Signals (M61 - M65)

«Function»

Select completion condition of M Code Signals (M61 - M65).

1. Enter the Parameter Mode by pressing the Speed Point Selection Button (SPEED POINT) for 3 seconds.
2. Select the Speed Point " 2 " by pressing the Speed Point Selection Button (SPEED POINT).

Setting parameter " P2 " : 2 LED (2) lights.

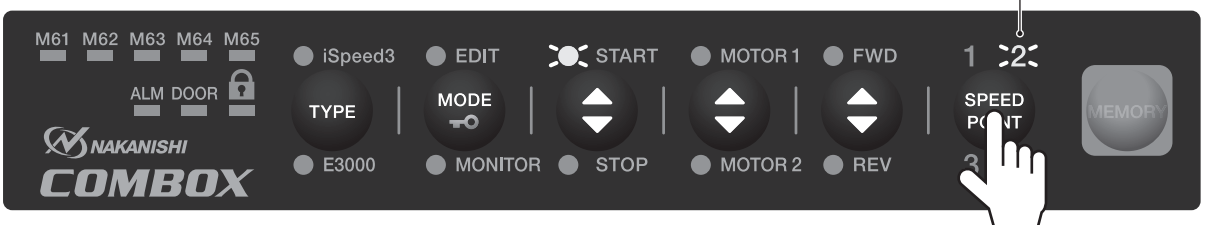


Fig. 30

- To set the completion condition to " Rotation Started ", press the Memory Button (MEMORY) while the START LED (START) is on.

Once the setting is completed, the Parameter Mode ends and the mode is switched to the MONITOR Mode.

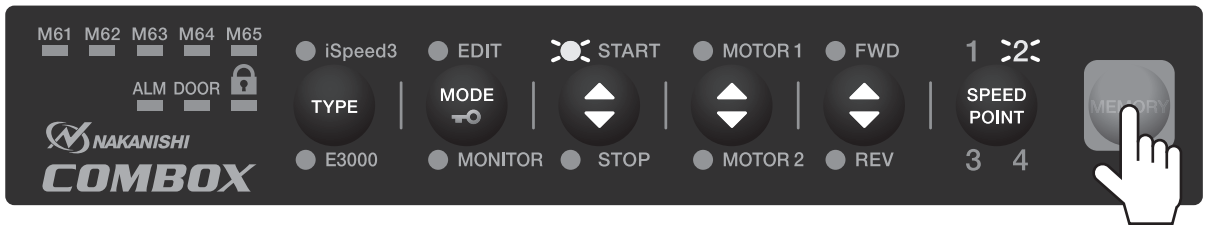


Fig. 31

- To set the completion condition to " Rotational Speed Achievement ", press Start / Stop Button (START / STOP) so the STOP LED (STOP) lights (reference A).

Press the Memory Button (MEMORY) while the STOP LED (STOP) is on (reference B).

Once the setting is completed, the Parameter Mode ends and the mode is switched to the MONITOR Mode.

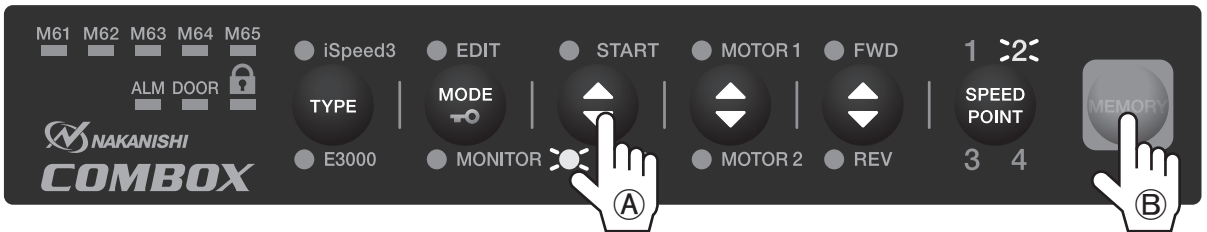


Fig. 32

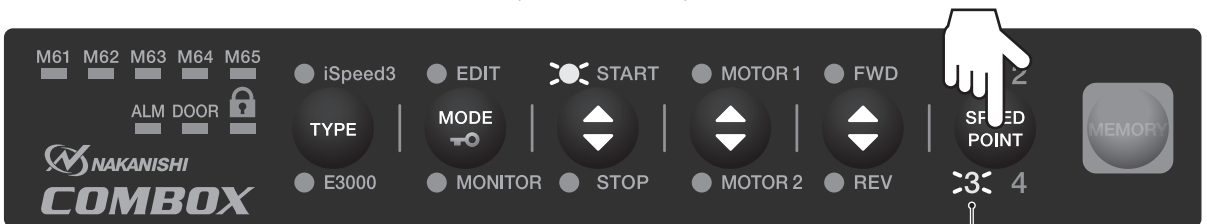
- To exit the selection of completion condition, switch from the Parameter Mode to the MONITOR Mode.
- To set the next parameter without selecting the completion condition, press the Speed Point Selection Button (SPEED POINT) and select the Speed Point " 3 ".
- To exit the Parameter Mode, press the Speed Point Selection Button (SPEED POINT) and select Speed Point " 4 ".

The parameter mode ends and the mode is switched to the MONITOR Mode.

- Parameter " P3 " Set the motor condition when the Door of the machine is switched from Open to Close. «Function»

The motor will stop if the machine Door is opened while the motor is rotating. Re-start the motor when the machine Door is closed.

- Press and hold the Speed Point Selection Button (SPEED POINT) for 3 seconds to enter the Parameter Mode.
- Press the Speed Point Selection Button (SPEED POINT) and select Speed Point " 3 ".



Setting parameter " P3 " : 3 LED (3) lights.

Fig. 33

- To set the motor rotate condition to " Motor Re-start " when the machine Door is closed, press Start / Stop Button (START / STOP) and light the START LED (START) is on (reference ①). Press the Memory Button (MEMORY) while the START LED (START) is on (reference ②). Once the setting is completed, the Parameter Mode ends and the COMBOX mode is switched to the MONITOR Mode.

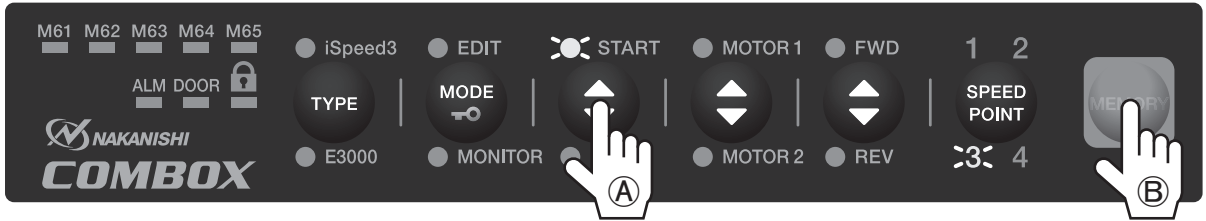


Fig. 34

- To set the motor behavior to " Motor stop continues " when the machine Door is closed, press Start / Stop Button (START / STOP) to light the STOP LED (STOP) (reference ①). Press the Memory Button (MEMORY) while the STOP LED (STOP) is on (reference ②). Once the setting is completed, the Parameter Mode ends and the COMBOX mode is switched to the MONITOR Mode.
- If "Motor Stop " is set, the motor stops and the External Alarm Signal 1 (" EXAL1 ") is output to the machine control. To re-start the motor, the NC program must be reset to clear the alarm.

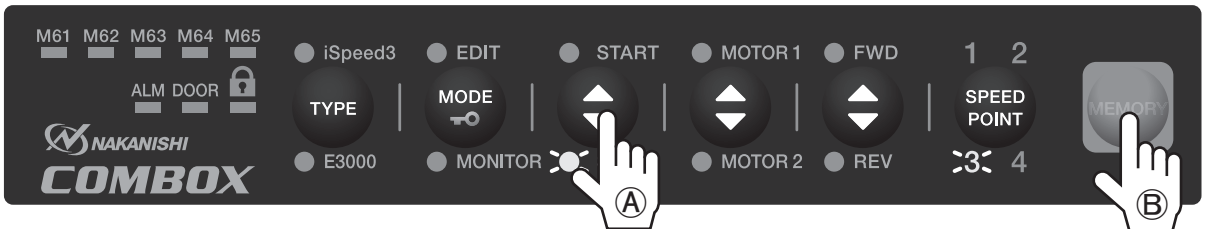


Fig. 35

- If the motor behavior does not need to be set when the machine door is either opened or closed, press the Speed Point Selection Button (SPEED POINT) and select the Speed Point " 4 ".
- The Parameter Mode ends and the COMBOX is switched to the MONITOR Mode.

# 13. ELECTRICAL SPECIFICATIONS

## External Input / Output Signals

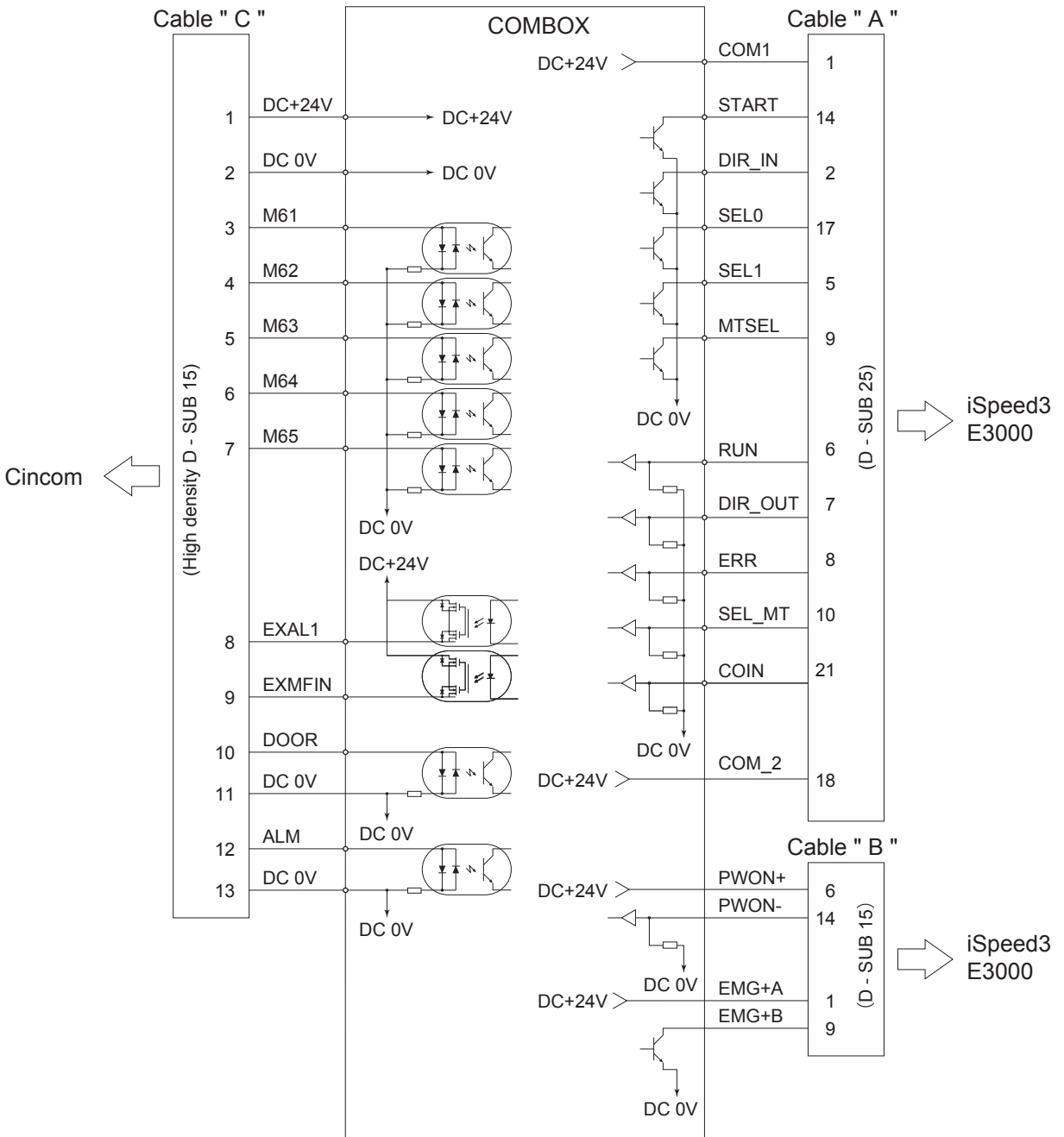
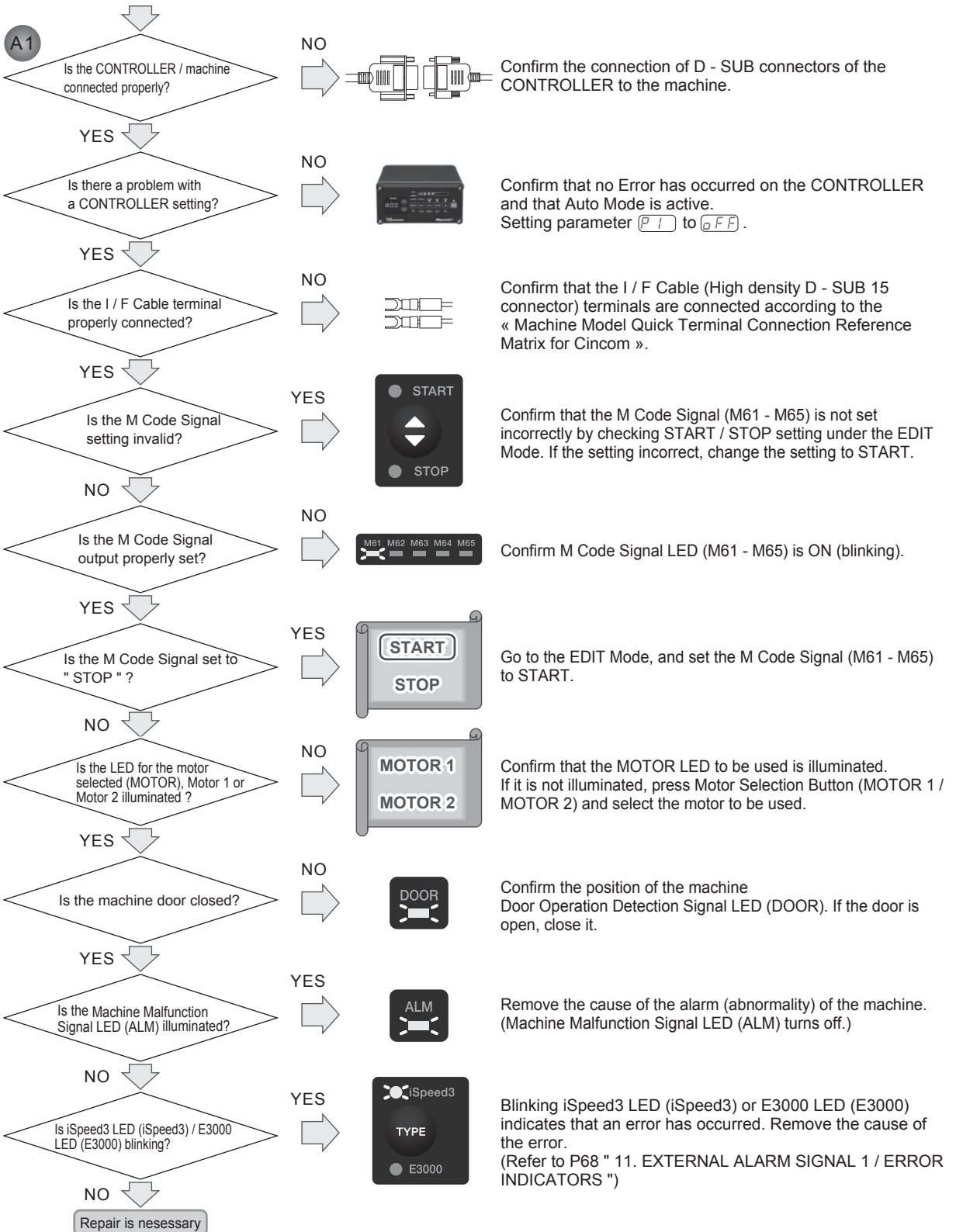


Fig. 36

# 14. TROUBLESHOOTING

If a problem or concern occurs, please check the following items prior to consulting your dealer.

## Q1 Spindle does not start after outputting the M Code Signal (M61 - M65).



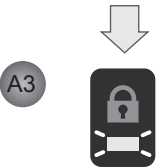
Q2 Rotation speed does not change even after setting the Speed Points 1, 2, 3 or 4.



Set Parameter  $\text{P5}$  of the NSK Spindle CONTROLLER to  $\text{P0}$ .  
Set the desired rotation speed of motors Speed Point.

- When the iSpeed3 CONTROLLER : Refer to iSpeed CONTROLLER Operation Manual is connected " 20 - 3 - 5 Setting External Speed Control Mode  $\text{P5}$  ".
- When the E3000 CONTROLLER is : Refer to E3000 CONTROLLER Operation Manual connected " 15 - 4 ⑤  $\text{P5}$  Selection of External Speed Control Mode ".

Q3 The buttons on the COMBOX Control Panel cannot be operated.



The Key - Lock LED (  ) is blinking.

- Key lock is set. You cannot use the COMBOX operation buttons while the COMBOX is locked.



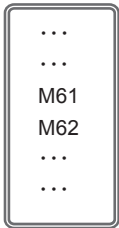
Cancel the Key - Lock state by pressing and holding the Mode Selection Button (MODE) for 3 seconds.

Q4 Continuous output commands of the M Code Signals (M61 - M65) from the NC program will not execute one after the other.

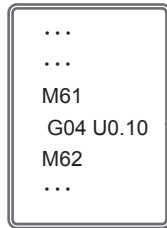


A4 For continuous output of M Code Signals (M61 - M65) from the NC program, allow at least 100 milliseconds between M Code Signal commands (100 mSec Dwell).

Ex) NG output



OK output



Allow at least 100 mSec between M Code Signals (M61) and (M62) commands (100 mSec Dwell).

Q5 The motor does not stop in an emergency when the machine malfunctions occurs (Machine Malfunction Signal LED (ALM) illuminates).



A5 Set the parameter for " Emergency Stop Function " of the NSK CONTROLLER to  $\text{0n}$ .

- When connecting to an iSpeed 3 CONTROLLER : Refer to iSpeed3 CONTROLLER Operation Manual " 20 - 3 - 8 Setting Emergency Stop Feature  $\text{PB}$  ".
- When connecting to an E3000 CONTROLLER : Refer to E3000 CONTROLLER Operation Manual " 15 - 4 ⑨  $\text{P9}$  Selection of Emergency Stop Function ".

## 15. DISPOSAL OF THE COMBOX

When disposal of the COMBOX is necessary, follow the instructions of your local government agency for proper disposal of electrical components, appliances, computers or electrical industrial components.



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