



INDUSTRIAL SEWING MACHINE

MODEL

PLK-J-CU-20S

TECHNICAL MANUAL

Control Unit

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Thank you for purchasing the Mitsubishi industrial sewing machine PLK-J Series.
Please read this technical manual before starting to ensure correct and long-term use.

- * The contents of this manual may not be reproduced in part or whole.
- * The contents of this manual are subject to change without notice.
- * An utmost effort has been made to cover all points of operation in this manual. Contact Mitsubishi if you have any questions regarding the contents.

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[1] For safe use

■ For safe use

Always observe the following matters to safely use the Mitsubishi industrial electronic sewing machine PLK-J Series.

Before starting

Before using this control unit, read all of the technical manuals carefully, and correctly use the unit following the manual. Also read the “Mitsubishi Industrial Sewing Machine Technical Manual <Sewing Machine Head>” for details on the general configuration and sewing machine head.

Application and purpose

This control unit is designed to drive and control the Mitsubishi industrial electronic sewing machine PLK-J Series. Do not use this control unit for other applications or purposes. Do not use this control unit until it has been confirmed that safety measures have been accurately taken for the installed electronic sewing machine head section.

Working environment

Please use this control unit in the industrial setting only. And do not use this control unit in the following type of environment.

(1) Power voltage

- * Where the voltage fluctuation exceeds $\pm 10\%$ of the rated voltage.
- * Where the specified power capacity (Refer to page 4-2) cannot be ensured.

(2) Magnetic noise

- * Where strong fields or magnetic fields are generated, such as near a high-output high frequency oscillating machine or high frequency welder.

(3) Temperature and humidity

- * Please use the ambient temperature in more than 5°C and 35°C or less.
If it is used outside the above ambient temperature, the sewing machine will detect temperature abnormality and protection of the sewing machine may be applied so that operation can not be performed.
- * Where the unit will be subject to direct sunlight, or outdoors.
- * Near sources of heat, such as heating appliances.
- * Where the relative humidity is 45% or less, or 85% or more, and where dew may condense.

(4) Atmosphere

- * In an atmosphere containing dust or corrosive gases, etc.
- * In a flammable gas or explosive environment.

(5) Vibration

- * If excessive vibration could occur when installed on the sewing machine, separately install the control box.

■ Installation

Control box

Correctly install the control box according to this manual.

Accessories

Always disconnect the control unit from the main power supply before installing the accessories listed in this manual. “Turn the power switch OFF, and disconnect the plug from the socket (power supply line).”

Cable

- (1) Lay the connection cables so that excessive force will not be applied during operation. Do not excessively bend the cables.
- (2) Cables laid near operating machine sections must be separated by at least 25mm.
- (3) Before connecting the power cable to the control box, confirm that the power voltage matches the specifications given on the control box’s rating nameplate and factory shipment voltage nameplate. Connect the cable to the indicated positions, and then supply the power. When using a power unit, connect the cable to the power unit and supply the power. In addition, when using a power unit, confirm that the power voltage matches the specifications given on the power unit’s rating nameplate. Turn the power switch OFF before making any connections.

Grounding

Always ground the power cord’s grounding wire.

Enclosed units and accessories

Connect the electrical enclosed units and accessories only to the positions indicated in the manual.

Removal

- (1) Always turn the power switch OFF and disconnect the plug from the socket (power supply line) before removing the control box.
- (2) Do not pull out the cord when disconnecting the plug. Always hold the plug receptacle when disconnecting the plug.
- (3) Note that a high voltage is applied inside the control panel, **so always turn the power OFF and wait at least ten minutes before opening the control box cover.**

■ NOTICE CONCERNING CE MARKING

- (1) Electronic sewing machine PLK-J series are applied to CE conformity marking by installing the exclusive device [PLK-J-CE] and [PLK-J-ACR].
When the products are used in the EU region, these devices are necessary to be installed.
- (2) Electronic sewing machine should be use limited to the industrial areas even though above-mentioned countermeasure is done.
[Warning] Use in residential areas may cause interference.

■ Maintenance, inspection and repairs



- (1) Follow this manual when carrying out maintenance or inspections related to this control unit.
- (2) This unit must be repaired, serviced and inspected only by a worker that has received special training.
- (3) Always turn the power OFF before replacing the needle or bobbin, etc., on the head.
- (4) Use genuine replacement parts for repairs and maintenance.

■ Other safety measures






- (1) Keep fingers away from all moving machine parts (especially around the sewing machine needle, etc.).
- (2) Never drop the control unit, or place objects in the clearances.
- (3) Do not operate the sewing machine without the protective parts such as the cover, or protection devices such as the safety breaker.
- (4) If any damage is observed in the control unit, if the unit does not operate correctly, or if the operation is suspicious, always suspend operation. Only operate the machine after the supervisor has adjusted, repaired or inspected the machine.
- (5) The user must not make improvements or changes without instruction from Mitsubishi.

■ Caution displays and danger displays

- (1) In this manual, the dangers and danger levels that arise with incorrect handling are classified using the following displays.

| | |
|--|---|
|  Warning | The warning display shows that incorrect handling can lead to death or serious injuries. |
|  Caution | The caution display shows that incorrect handling can lead to injuries or damages to your house, household goods, and others. |

- (2) The meanings of these symbols are as follows.

| | | | |
|---|---|---|---|
|  | This symbol indicates that the instructions must be followed. |  | This symbol indicates an electrical hazard or caution (electric shock caution). |
|  | This symbol indicates hot temperature requiring caution. |  | This symbol indicates that ground wire connection is required. |
|  | This symbol indicates a prohibited action. | | |

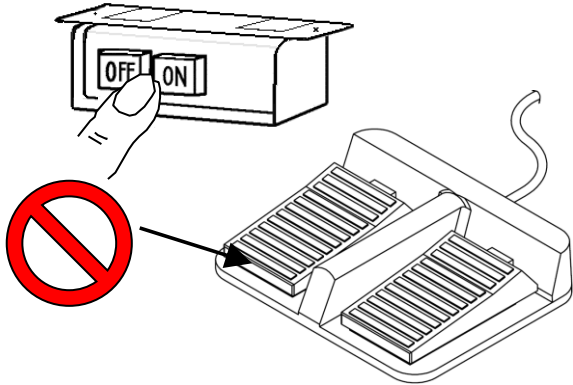
* Always deliver this manual to the end user.

* Store this manual nearby where it can be referred to when necessary.

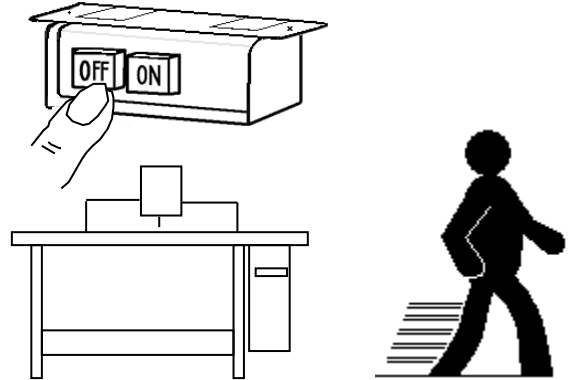
[2] Precautions for use

Warning

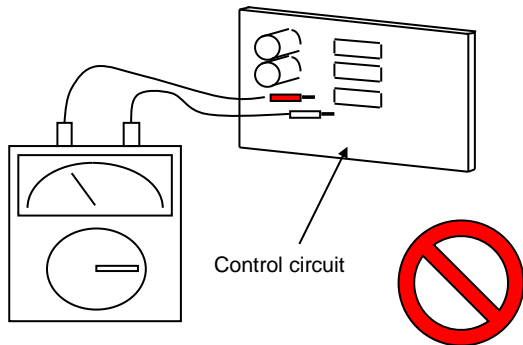
1. Do not place foot on the foot switch when turning the power ON.



2. Always turn the power OFF when leaving the sewing machine.

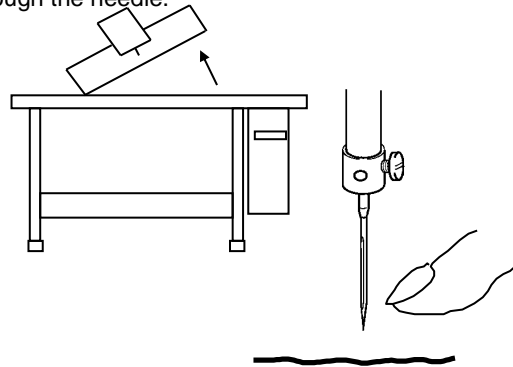


3. Do not inspect the control circuit with a tester.

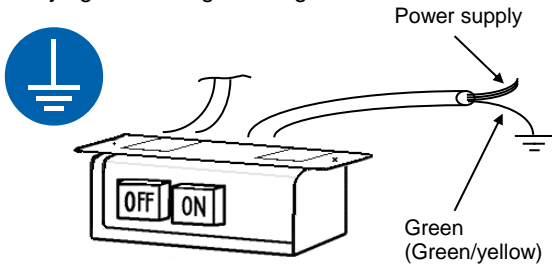


The tester voltage could be applied on the semiconductor parts, and cause damage.

4. Always turn the power switch OFF before tilting the sewing machine head, replacing the needle, or passing thread through the needle.

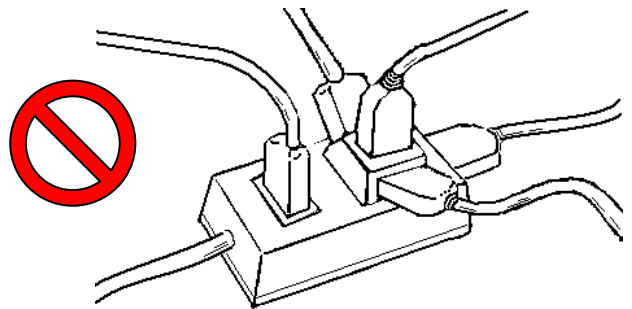


5. Always ground the grounding wire.

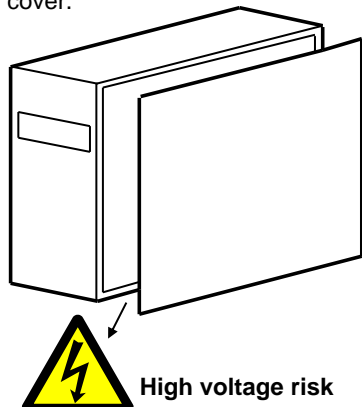


Always ground the provided grounding wire (green(green/yellow)).

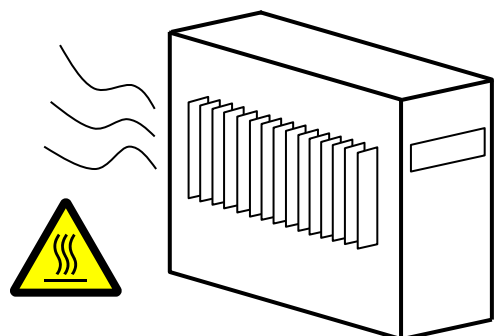
6. Do not use excessive wiring.



7. A high voltage is applied inside creating a hazardous state, so always turn the power OFF and wait ten minutes before opening the cover.

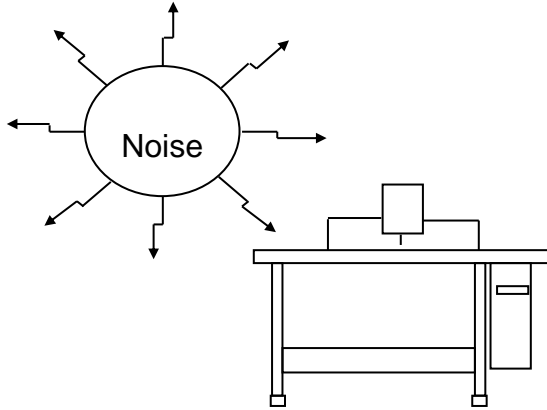


8. Radiation fins and other parts may be hot. Do not touch the parts.

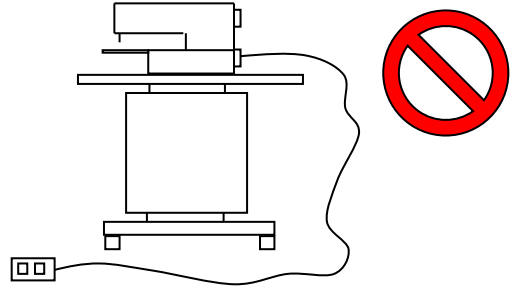


9. The sewing machine will coast to a stop when the power is turned OFF or a power failure occurs during sewing machine operation.
10. Always align the connector shape and direction, and securely insert the connector.
11. If the position detector's connector dislocates, or the sewing machine is completely locked, the motor will be turned OFF automatically for a set time to prevent burning. (Note that the motor may not turn OFF if there is incomplete locking or an overload.) When the fault has been recovered, turn the power OFF and ON once to resume normal operation. The same type of operation will take place if a detector fault or disconnection occurs.

12. Use the machine away from strong noise sources such as high frequency welders.

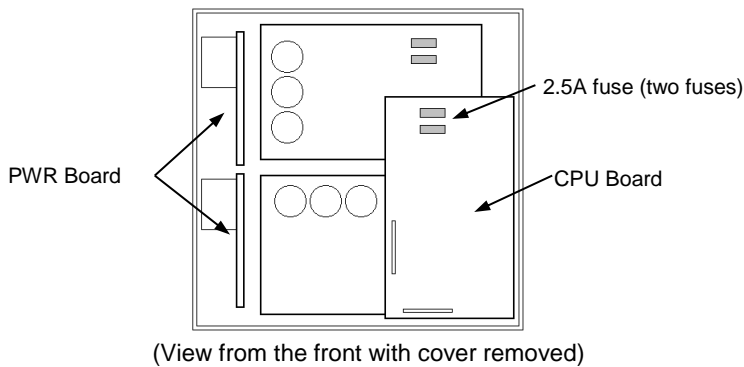


13. When connecting the external switch to an optional connector, etc., keep the signal wire as short as possible. A long wire could cause malfunctions.

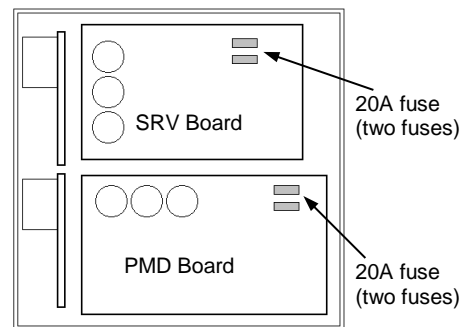


Use a shielded wire for the signal wire when possible.

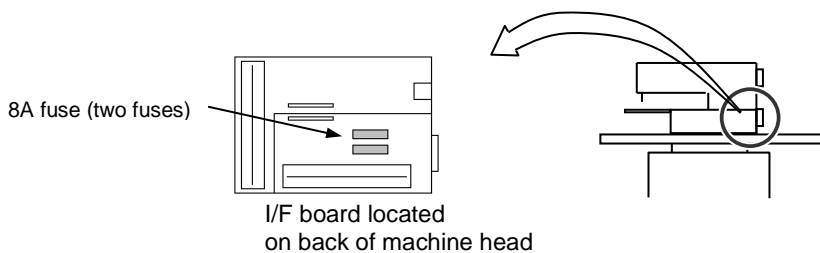
14. If the fuse blows, remove the cause, and replace the blown fuse with one having the same capacity.



(View from the front with cover removed)



(View from the front with the cover and CPU removed)

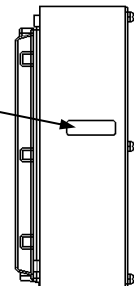


I/F board located on back of machine head

15. Attention when power supply is turned on again

Please make sure not to turn on the power supply switch until after the LED on the front panel of the control box has completely turned off.
(Please do not turn on the power supply again while displaying the screen of the operation panel.)

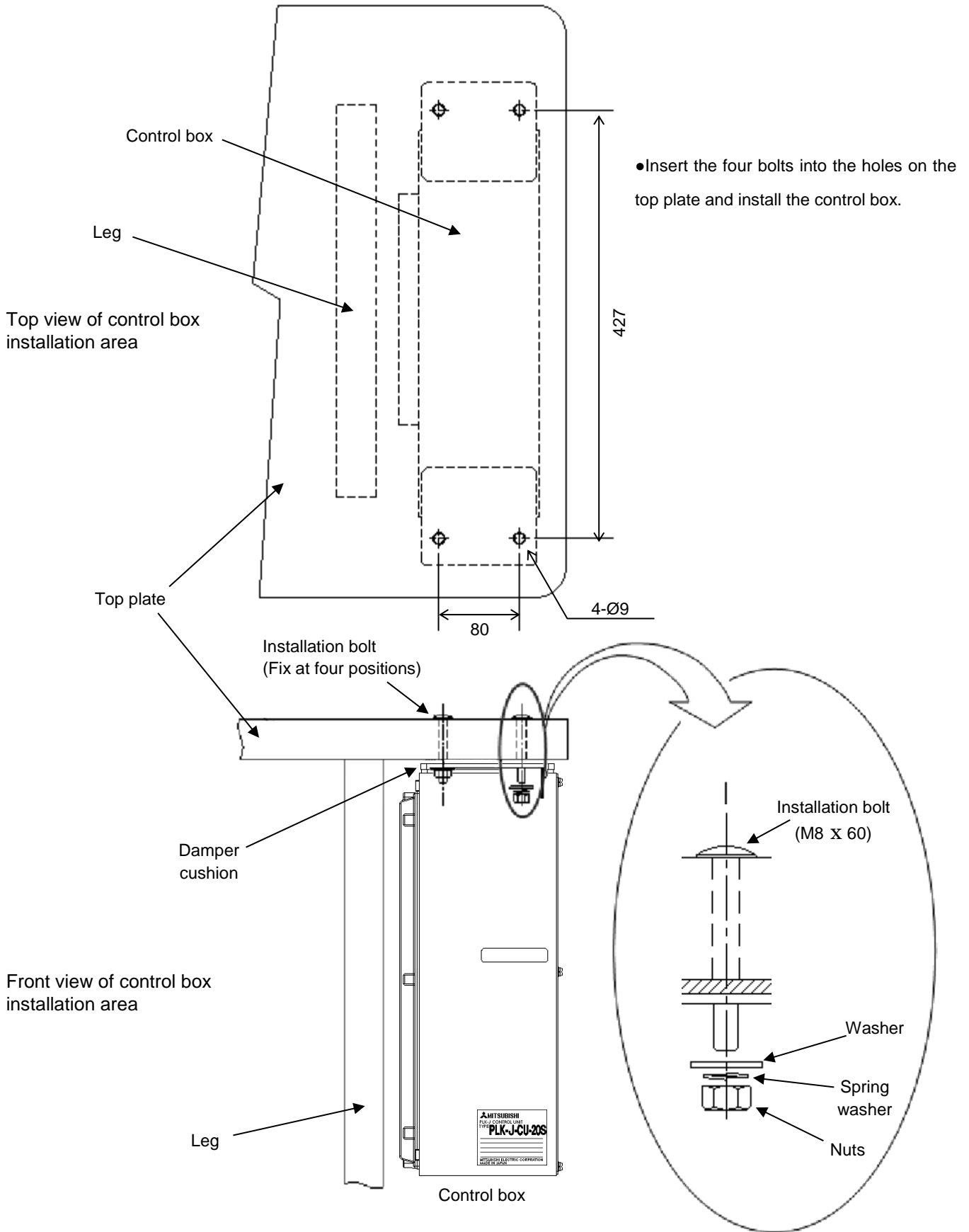
* If the above operation is not observed, the presser foot (O4 output) may move unexpectedly.



16. When the value of the sewing area limit is changed or the limit setting is deactivated, note the collision and take care safely.
Also when using it outside, it cannot assume the responsibility for all problems caused by it.

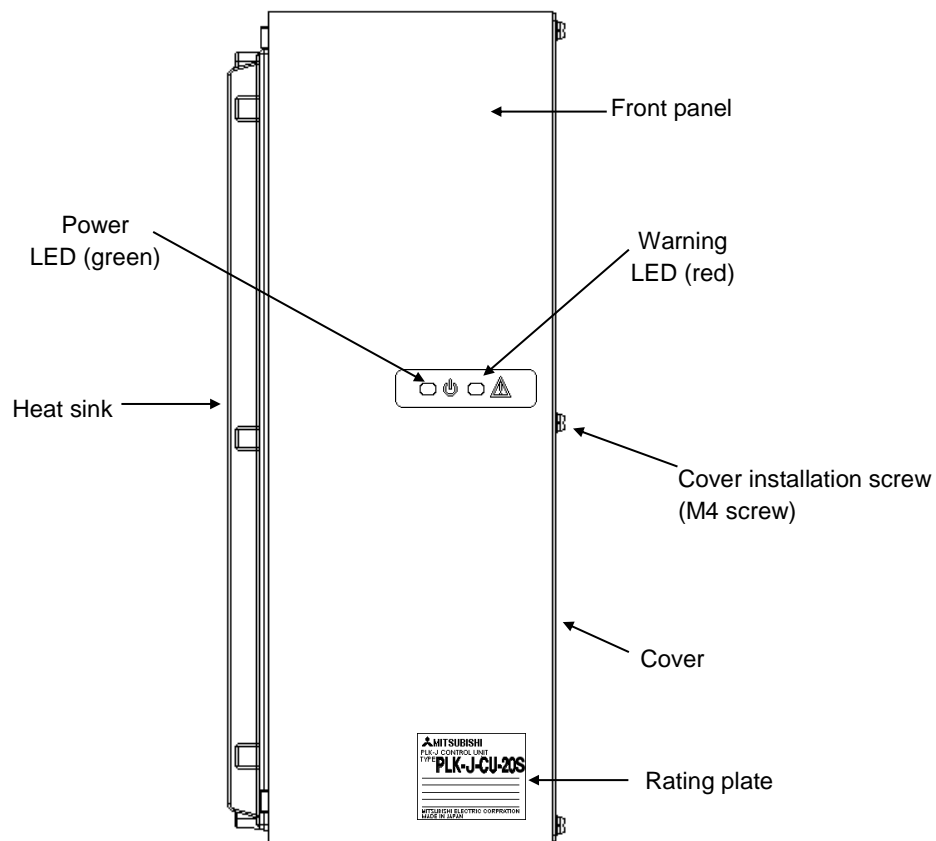
[3] Installation

1. Installing the control box

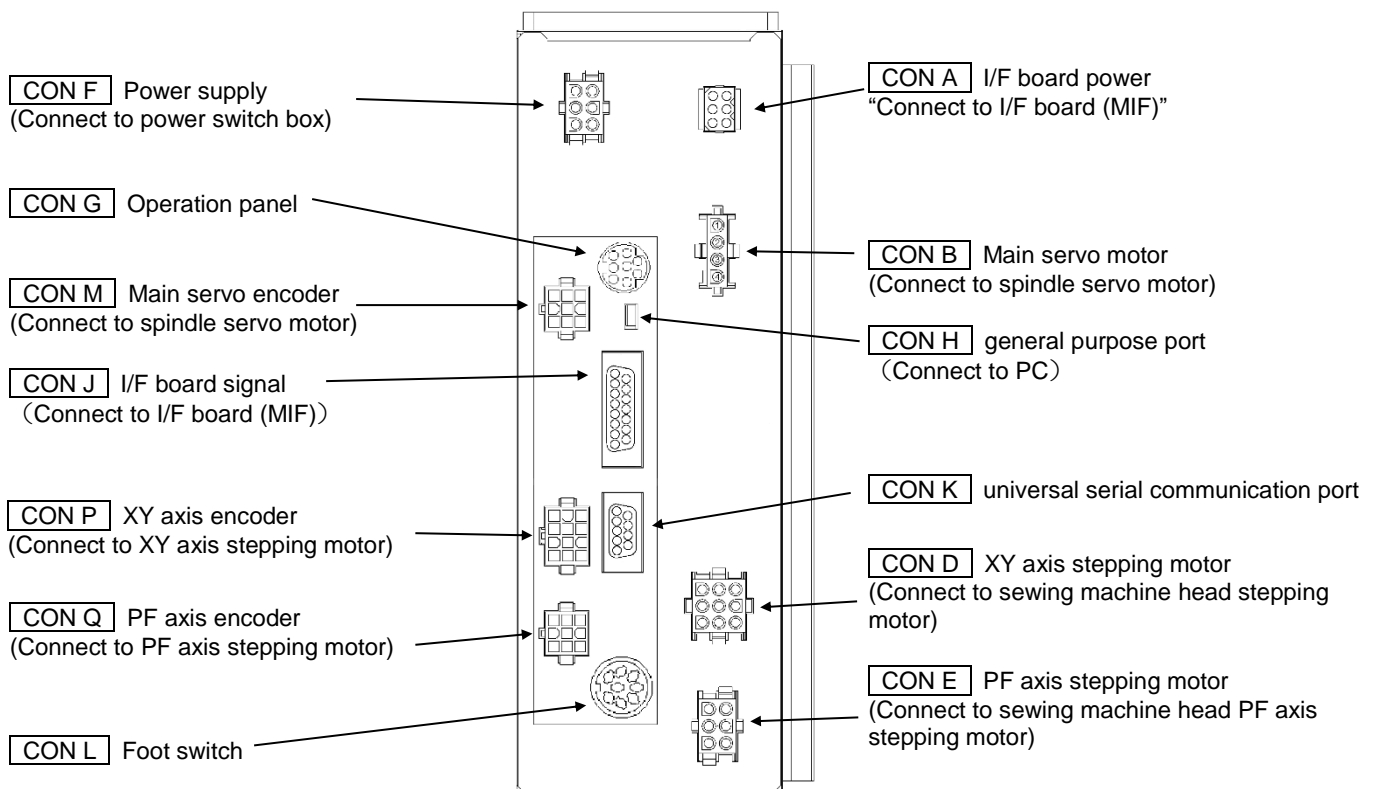


[4] Names of each part, wiring and grounding

1. Front side

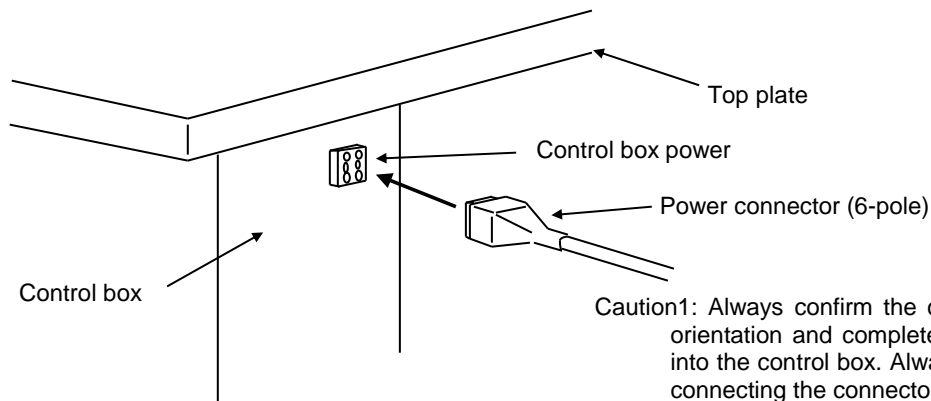


2. Back side



Caution: Be sure to connect all connectors before turning ON the power. Connect each connector fully to ensure sufficient contact. Refer to "section [13]."

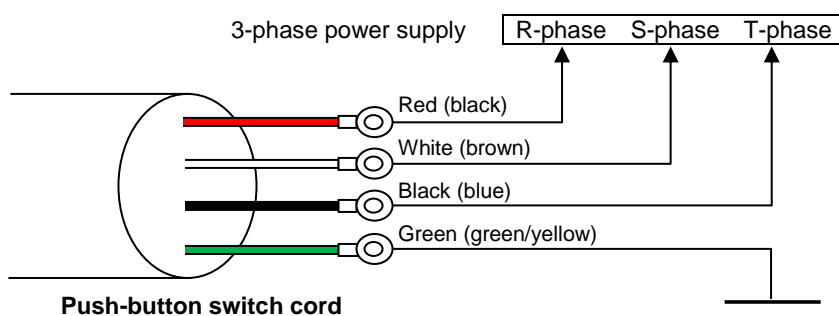
3. Connecting the power connector



Caution1: Always confirm the connector shape and insertion orientation and completely insert the power connector into the control box. Always turn the power OFF before connecting the connector.

Caution2: Please do not bundle the power cable and other cables together. It may cause of malfunction by the influence of the power supply noise etc.

4. Connecting the 3-phase power supply



Warning

Always connect the green wire to the grounding terminal. Consult with your electrician for details on the grounding wire.



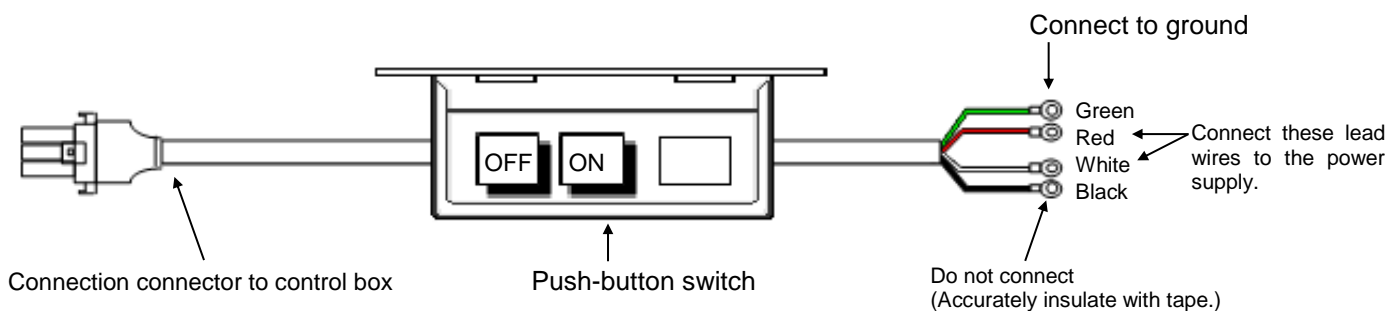
5. Power capacity

Use a fuse or safety breaker on the power supply.

| Power supply | Recommended current capacity value |
|--------------|------------------------------------|
| 3-phase 200V | 10A |

6. Using the 3-phase 200V control box with single-phase 200 to 220V

Connect power supply to the “red” and “white” lead wires for the push-button switch. The black wire is not used, so insulate it by wrapping insulation tape, etc., around it. Always ground the green grounding wire.



[5] Confirmation

1. Before turning the switch ON

(1) Are the power and capacity correct?

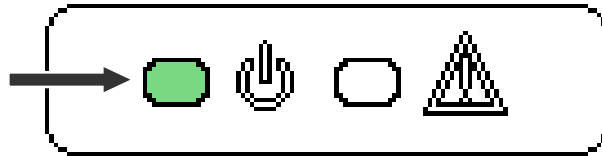
(2) Are the connectors correctly inserted? (Refer to “section [13]”.)

- * Power connector from push-button switch
- * Connector for connection with sewing machine
- * Operation panel connector
- * Foot switch connector
- * Other connectors “I/F board (MIF), etc.”

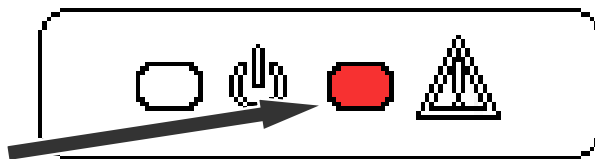
(3) Does the hand pulley turn easily?

2. After turning the switch ON

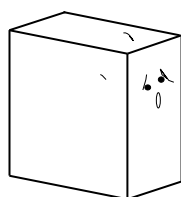
(1) Is the front panel power LED (green) on?



(2) Is the front panel warning LED (red) on or flickering?



(3) Is there any heating, odors or abnormal noise from the motor or control box?



Turn the sewing machine OFF and contact your dealer if there is any heating, odors or abnormal noise.

- When you turn ON the power, a click noise comes from inside the control box.
This noises are not abnormal.

[6] Set up

In the control unit “PLK-J-20S”, after installing the control unit on the side of the sewing machine, please perform the setup in the following order.

1. Installing
2. The motor axis and machine position setting.
3. Language setting
4. Confirm version information

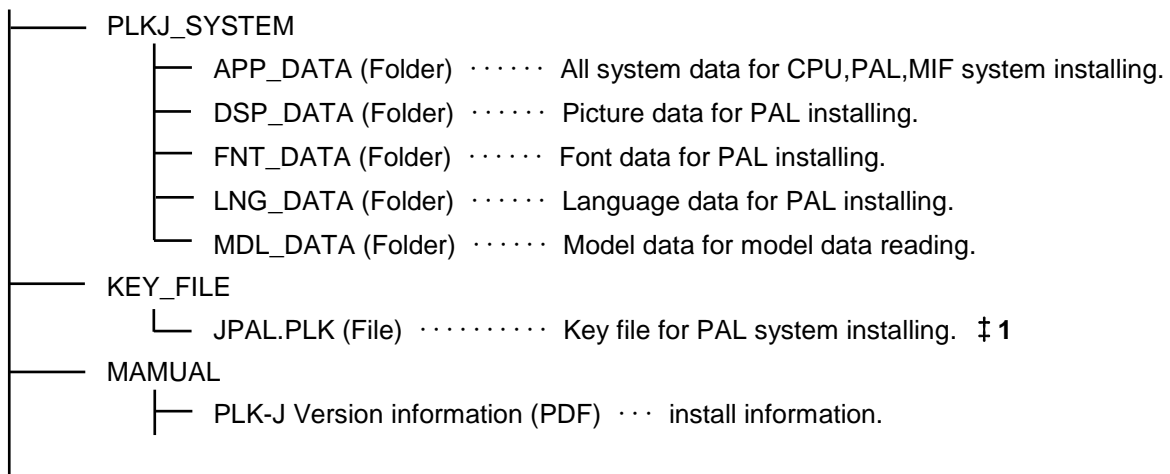
Note If the power is turned on in the state not set up, the sewing machine will not start up as shown on the right figure, but it is not a malfunction.



1. Installing

It is necessary [PLKJ_SYSTEM] folder in the USB flash drive for installing. Please check the following folder in the USB flash drive.

USB flash drive



Device and installation place

| Device | Version up | USB flash drive connection | Operation |
|-----------------|---|----------------------------|---|
| Control box | System data · MAIN SYSTEM · DRIVE SYSTEM · FPGA MAIN · FPGA MIF | CON W (PAL) | Install button + Turn ON |
| | Model data “Setting of sewing machine for each model” | CON W (PAL) | Install button + Turn ON ‡ 2 |
| PAL | System data · LCD SYSTEM | CON W (PAL) | Key file ‡ 1 + Turn ON |
| | Display data · LANGUAGE · LCD PICTURE · LCD FONT | CON W (PAL) | Press the Mitsubishi logo after Turn ON |
| I/F board (MIF) | System data · MIF SYSTEM · FPGA MIF | CON U (MIF) | Turn ON |

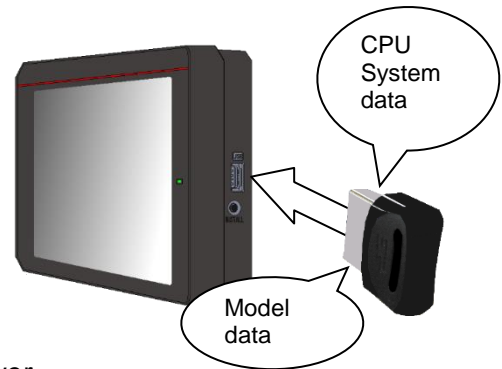
‡ 1: The “JPAL.PLK” key file will be deleted from the “PLKJ_SYSTEM” folder as the installation is completed, so copy it from the “KEY_FILE” folder and use it.

‡ 2: You can also initialize the sewing machine’s settings without using USB flash drive. Refer to “section [11]”.

1-1. Control box install

CPU system data install

(1) Please insert USB flash drive to CON W connector on the operation panel.



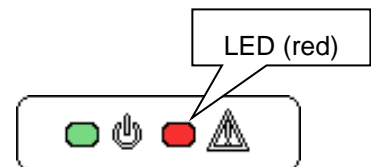
(2) Please hold down the install button and turn on the power.



Press the install button until the red LED on the front of the control panel lights up.



(3) It will start to install, please wait a while still complete installing.


The red LED on the front of the control panel will be displayed during installation.



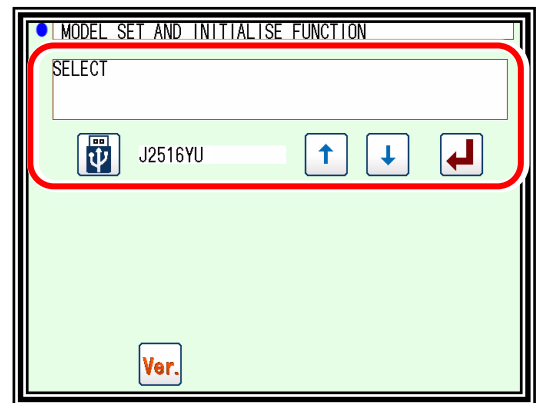
‡ If the red LED is blinking, the installation has failed. Check the “PLKJ_SYSTEM” folder inside the USB flash drive and try again.

(4) After the installation is completed, the “model set initialize function” screen will be displayed. If “SELECT”, select model data from USB flash drive.

► Please select the model name by   key.

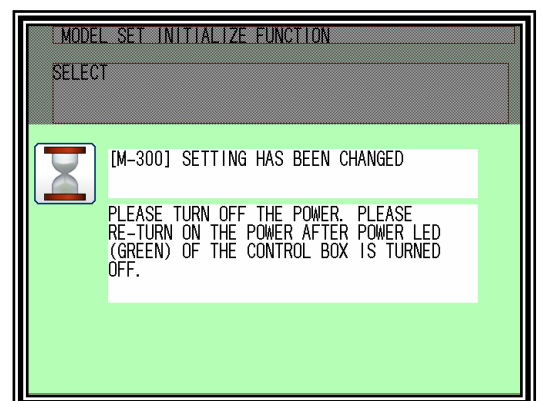
And it is decided by press the  key.

*Please correctly select the model to be used.



► Message is displayed.

Please turn off the power according to the message.



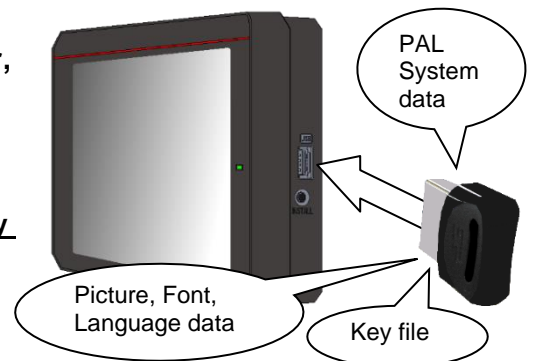
1-2. PAL install

① PAL system data install

(1) Please put the key file [JPAL.PLK] into “PLKJ_SYSTEM” folder in USB flash drive.

Note ‡ If there is not the key file in “PLKJ_SYSTEM” folder, it is impossible to upgrade.

Notice ‡ The “JPAL.PLK” key file will be deleted as the installation is completed. To install again please copy from the “KEY_FILE” folder and use it.

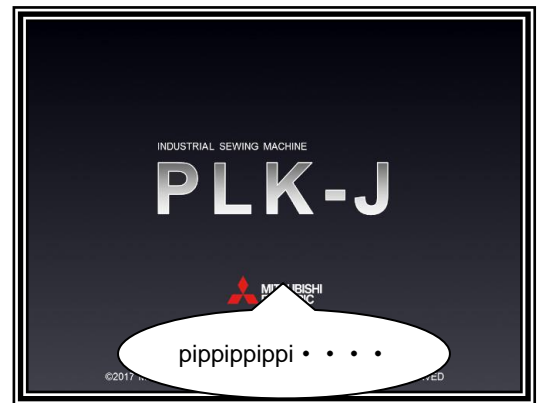


(2) Please insert USB flash drive to CON W connector on PAL.

(3) Turn the power on.

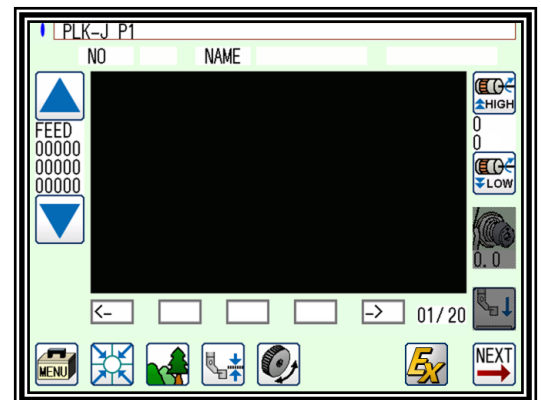
▶ The buzzer sounds eight times.
(If the buzzer does not sound, it will not install
Please check the key file.)

▶ Startup screen will appear after a while.



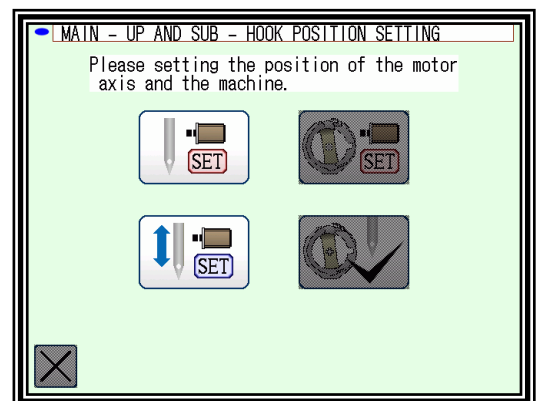
(4) Installing complete.

▶ Display is switched to standard screen after installing complete.



Note When setting up for the first time, the setting screen is always displayed.

Refer to “The motor axis and machine position setting.” described later.

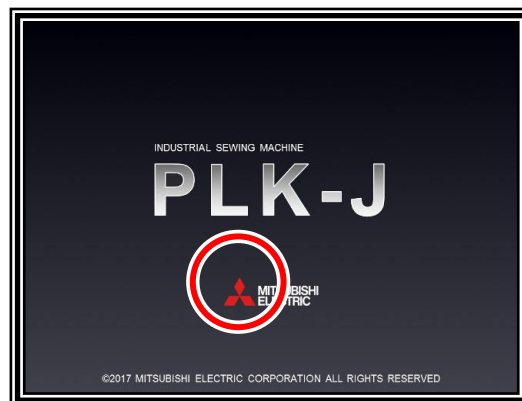


② Upgrade for Picture, Font, Language display data

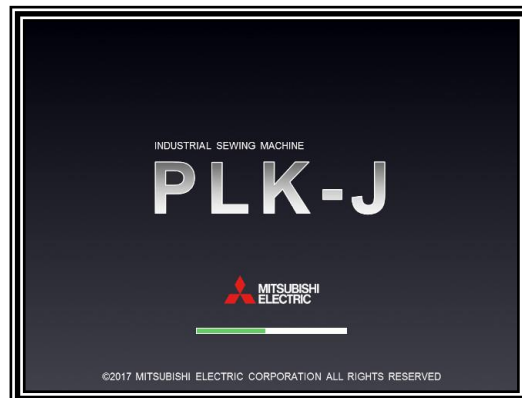
(1) Please insert USB flash drive to CON W connector on PAL.

(2) Turn the power on.

- ▶ Please press the Mitsubishi logo on the screen soon after display the startup screen.

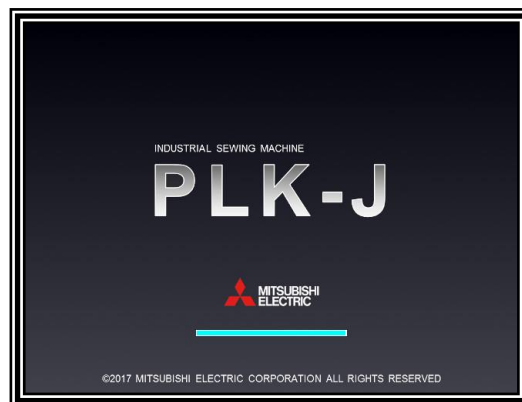


- ▶ It is appeared the install bar after sounds buzzer.



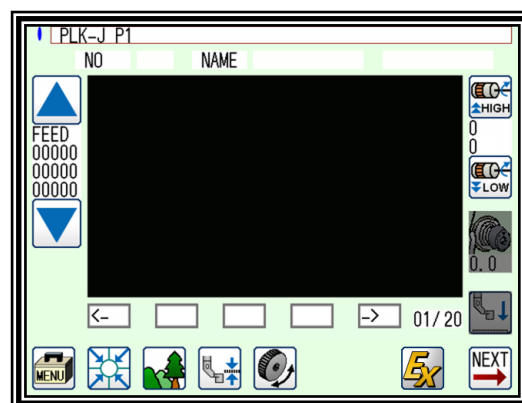
- ▶ In the case of a Successful installation, the install bar will turn blue.

Note If the red LED is blinking, the installation has failed. Check the "PLKJ_SYSTEM" folder inside the USB flash drive and try again.



(3) Installing complete

- ▶ The buzzer beeps once and the installation is completed.
- ▶ Display is switched to standard screen after installing complete. (When the motor axis and machine position has already been set)

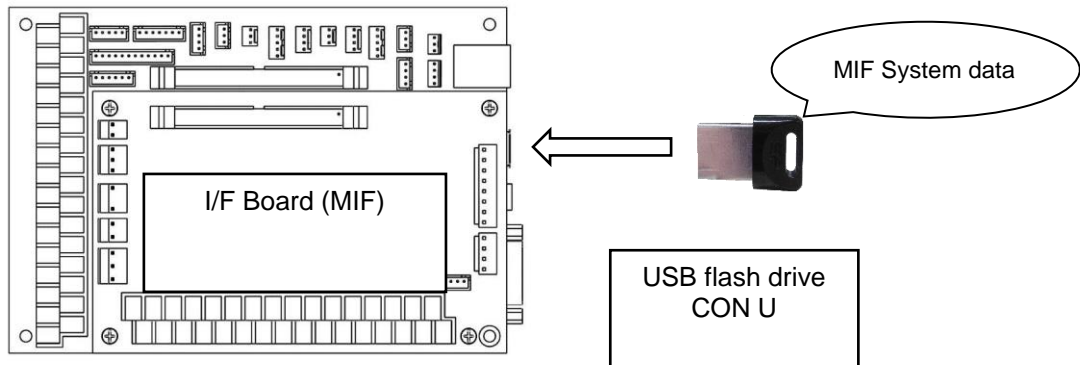


Note When setting up for the first time, the setting screen is always displayed. Refer to "The motor axis and machine position setting." described later.

1-3. I/F board (MIF) Install

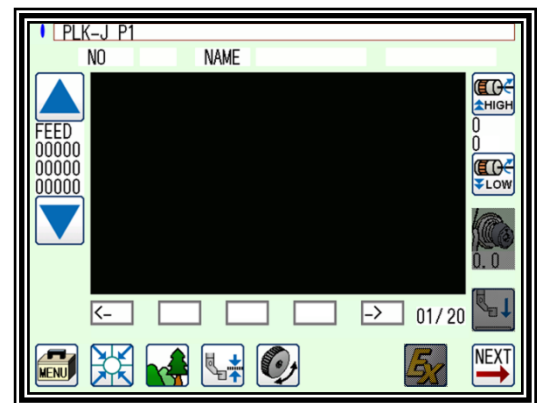
MIF system data upgrade

(1) Please insert USB flash drive to CON U connector on PAL.



(2) Turn the power on.

- ▶ It is started to install automatically, please wait a while at the startup screen.
- ▶ When the display is switched to standard screen, it become installing complete. (When the motor axis and machine position has already been set)



Note When setting up for the first time, the setting screen is always displayed. Refer to "The motor axis and machine position setting." described later.


2. The motor axis and machine position setting.


(1) Motor axis and machine alignment

Here, align the upper position of the needle bar.

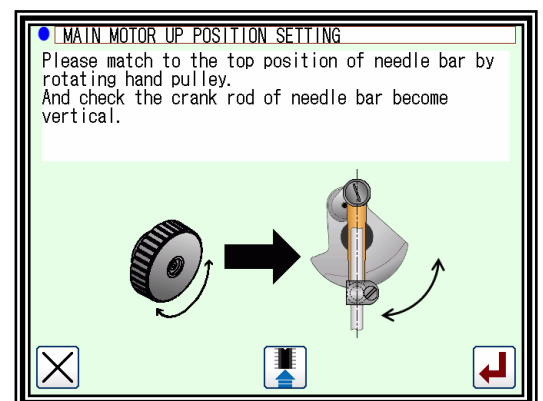
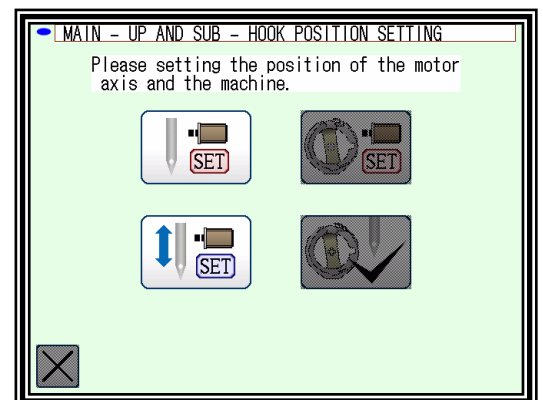
(2) press .

- ▶ Please set the upper position according to the contents of the screen.

- ▶ When the position is decided, please press  to save the position.

- ▶ Press  to exit the screen.

(3) Please turn off the power of the sewing machine after completion of setting.




3. Language setting

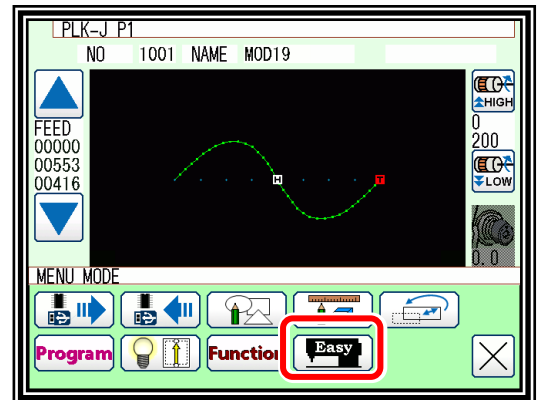
Just by selecting the language, you can switch.

Operation details

(1) Selection of Easy setting

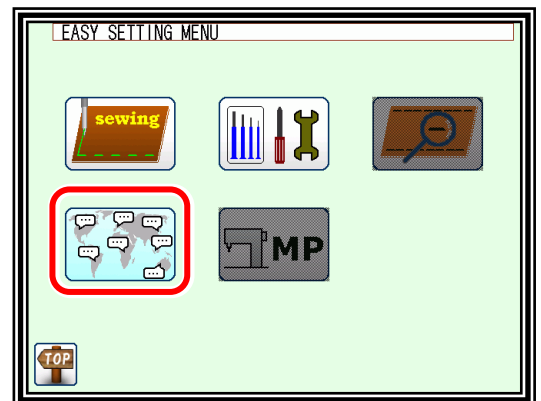
▶ Press  on the standard screen, and open the menu mode

▶ Press .



(2) Select Language setting

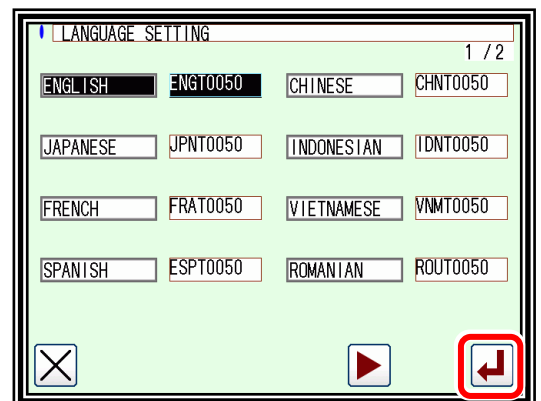
▶ Press .



(3) Select language

▶ Select the language to set.

▶ Press .



(4) Language switching complete

▶ Message will be displayed, please press .




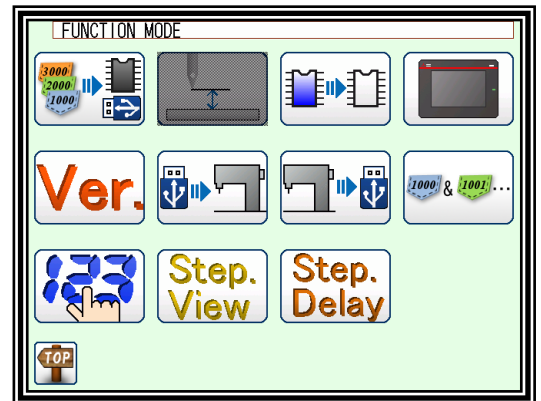
4. Confirm version information

Make sure the installed version is correct.


(1) Select function from PAL menu


▶ Press  to **Function**

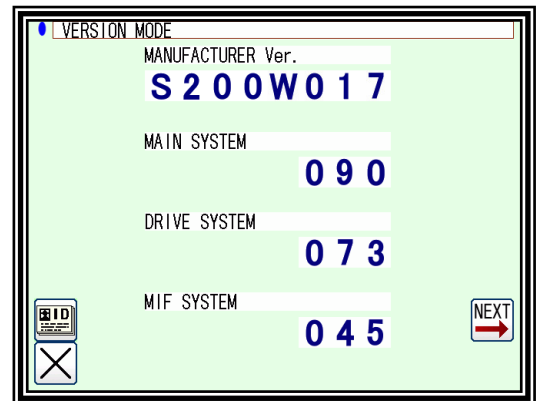
▶ Press  to display the version mode screen.




(2) Simple display of version mode screen


▶ When  is pressed, the version mode screen is displayed in detail.

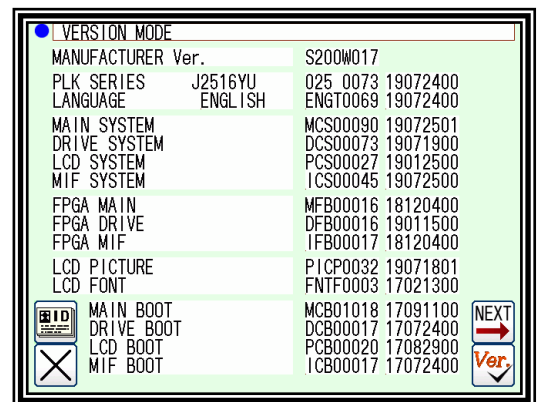
▶ Press  to display the password screen. ‡ 3



(3) Detailed display of version mode screen

▶ When  is pressed, the version mode screen is displayed in simple.


▶ Press  to display the password screen. ‡ 3




(4) Confirmation by the check function

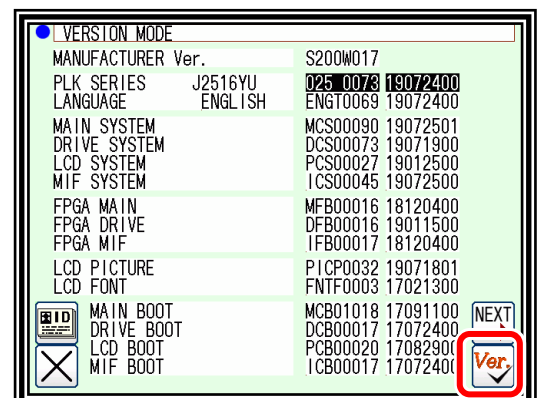
Insert the USB flash drive containing the "PLKJ_SYSTEM" folder used for installation.

Compare the file in the USB flash drive with the software version inside the sewing machine.

▶ Press  to check the version.

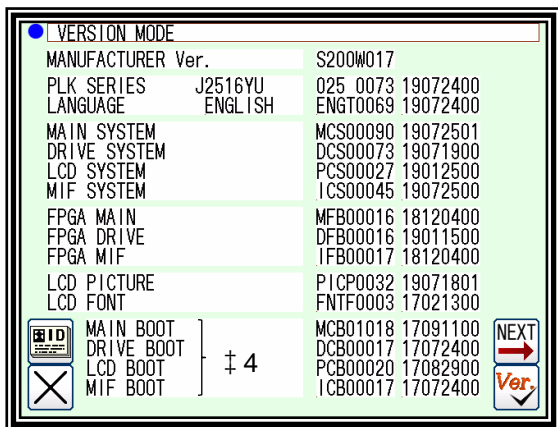
If the software version is different, it will be displayed in reverse.

* When USB flash drive is unconnected and pushes the  button, it is made all reversing display.

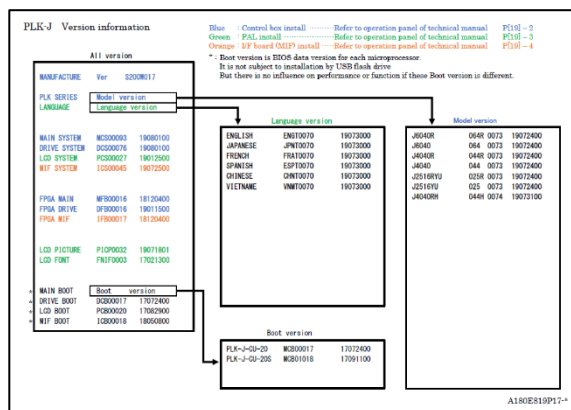


(5) Check with the **PLK-J Version information (PDF)** in the USB memory against the version mode screen.

* PLK-J Version information (PDF) contains the software version at the time of shipment.



PAL screen



PLK-J Version information

(6) If there is a part that does not match the software version, please re-install the part.

Please refer to the table of page 6-1 for the location updated by installation.

‡ 3: After entering the password, you can go to the network setting screen and set the IP address, Subnet mask, Default gateway.

For use / setting method, please consult your dealer.

‡ 4: Boot version is BIOS data version for each microprocessor.

It is not subject to installation by USB flash drive

But there is no influence on performance or function if these Boot version is different.

[7] Timing chart

1. Thread trimming timing chart

· Timing for thread trimming output [T] :

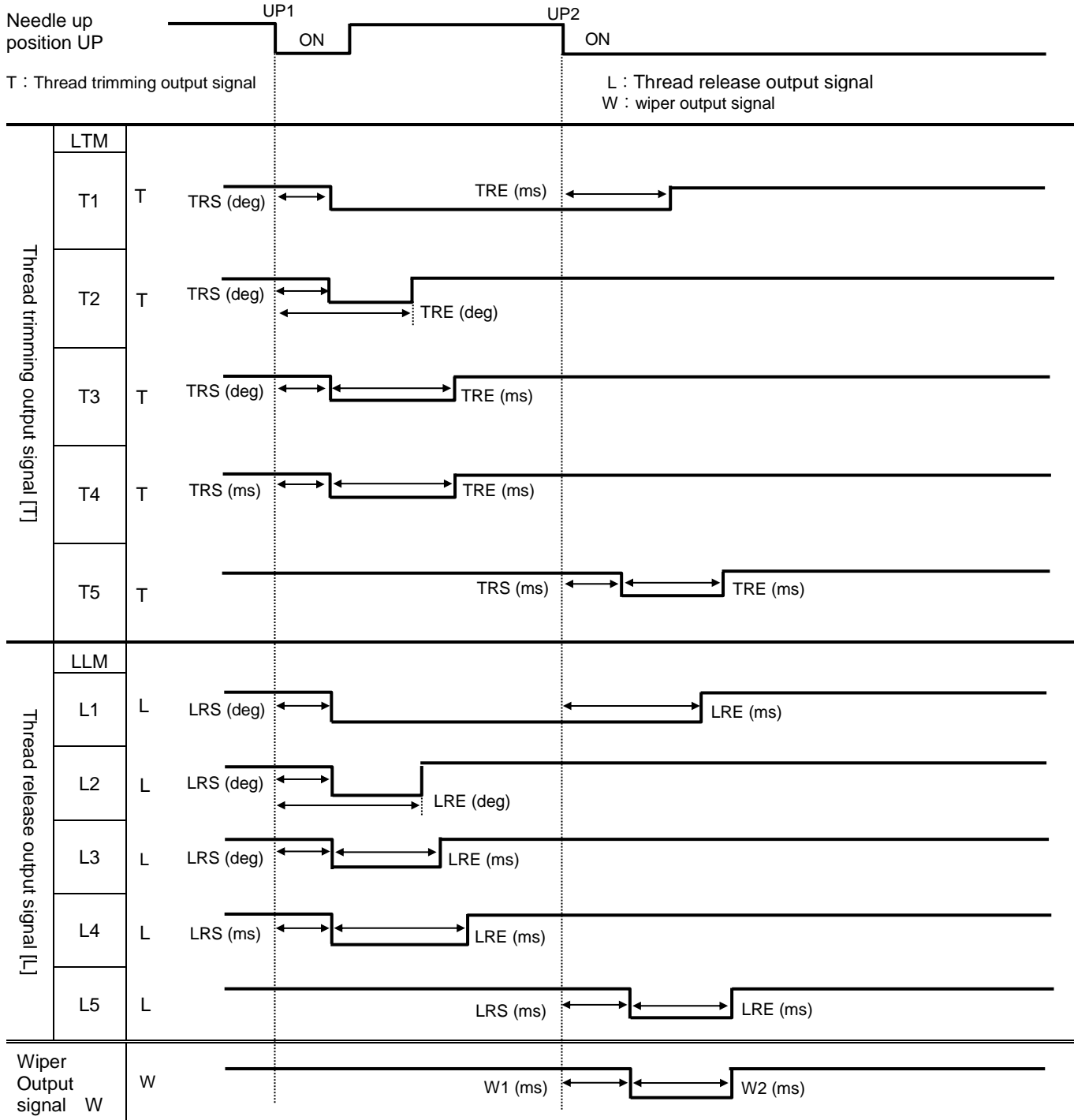
Program mode [Thread trimming/release timing] -- [LTM] T1~T5
 Program mode [Thread trimming/release timing] -- [TRS] msec / deg
 Program mode [Thread trimming/release timing] -- [TRE] msec / deg

· Timing for thread release output [L] :

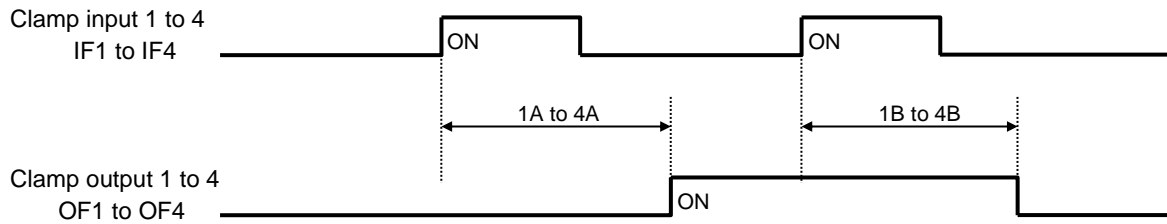
Program mode [Thread trimming/release timing] -- [LLM] L1~L5
 Program mode [Thread trimming/release timing] -- [LRS] msec / deg
 Program mode [Thread trimming/release timing] -- [LRE] msec / deg

· Timing for wiper output [W] :

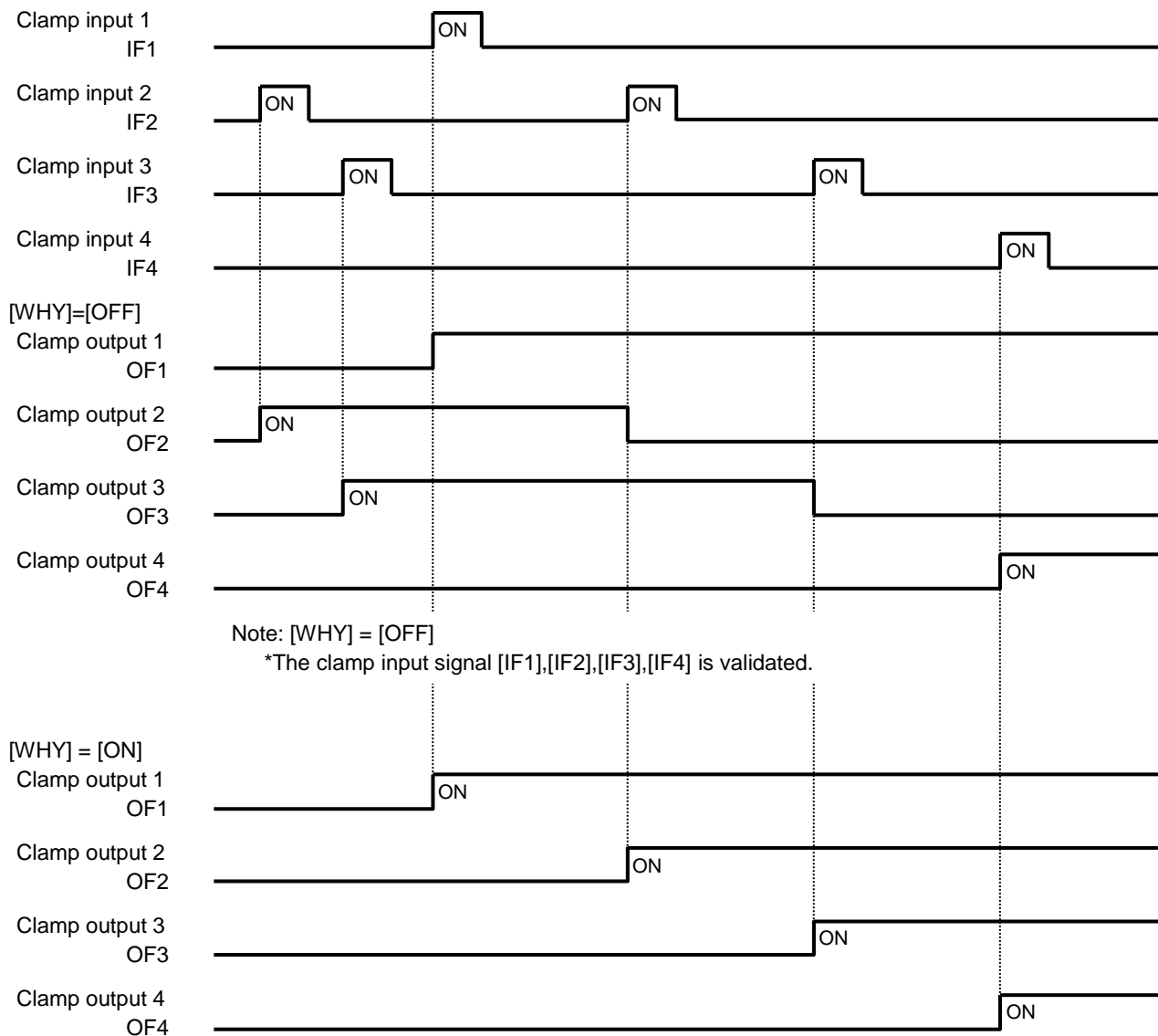
Program mode [Wiper] -- [W1] msec
 Program mode [Wiper] -- [W2] msec



2. Timing chart for [Clamp of output ON/OFF delay setting]



3. Timing chart for [Priority of clamp]

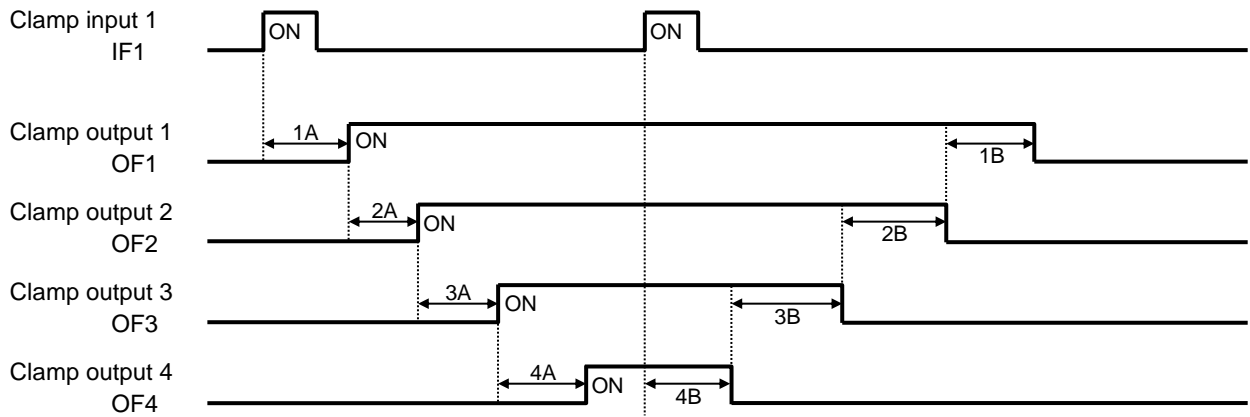


Note: [WHY]=[ON]

The clamp input signal [IF2],[IF3],[IF4] is invalidated when clamp output 1 is not ON.
The clamp input signal [IF2] is validated when clamp output 1 is ON.
The clamp input signal [IF3] is validated when clamp output 2 is ON.
The clamp input signal [IF4] is validated when clamp output 3 is ON.

4. Timing chart for

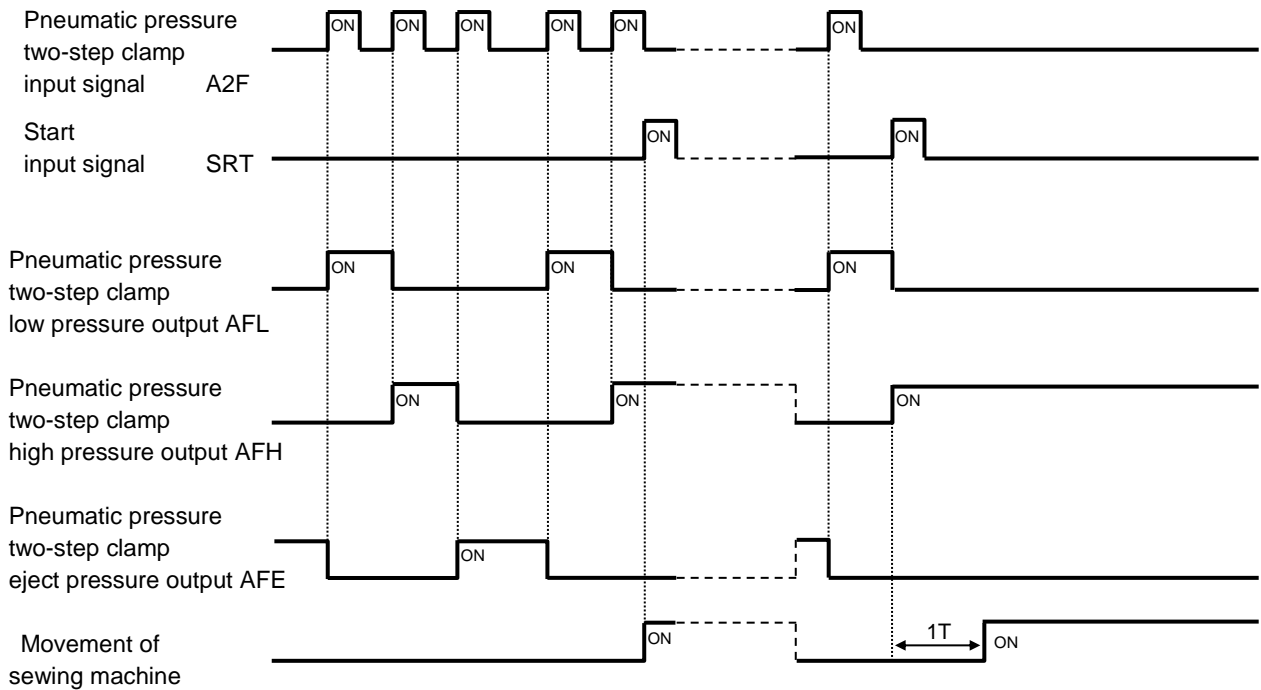
[Clamp link setting (CF)] = ON, [Valid Number of clamp setting (FN)] = 4



Note: Halt switch is validated.

5. Timing chart for [Selection of pneumatic pressure two-step (AF2)] = ON

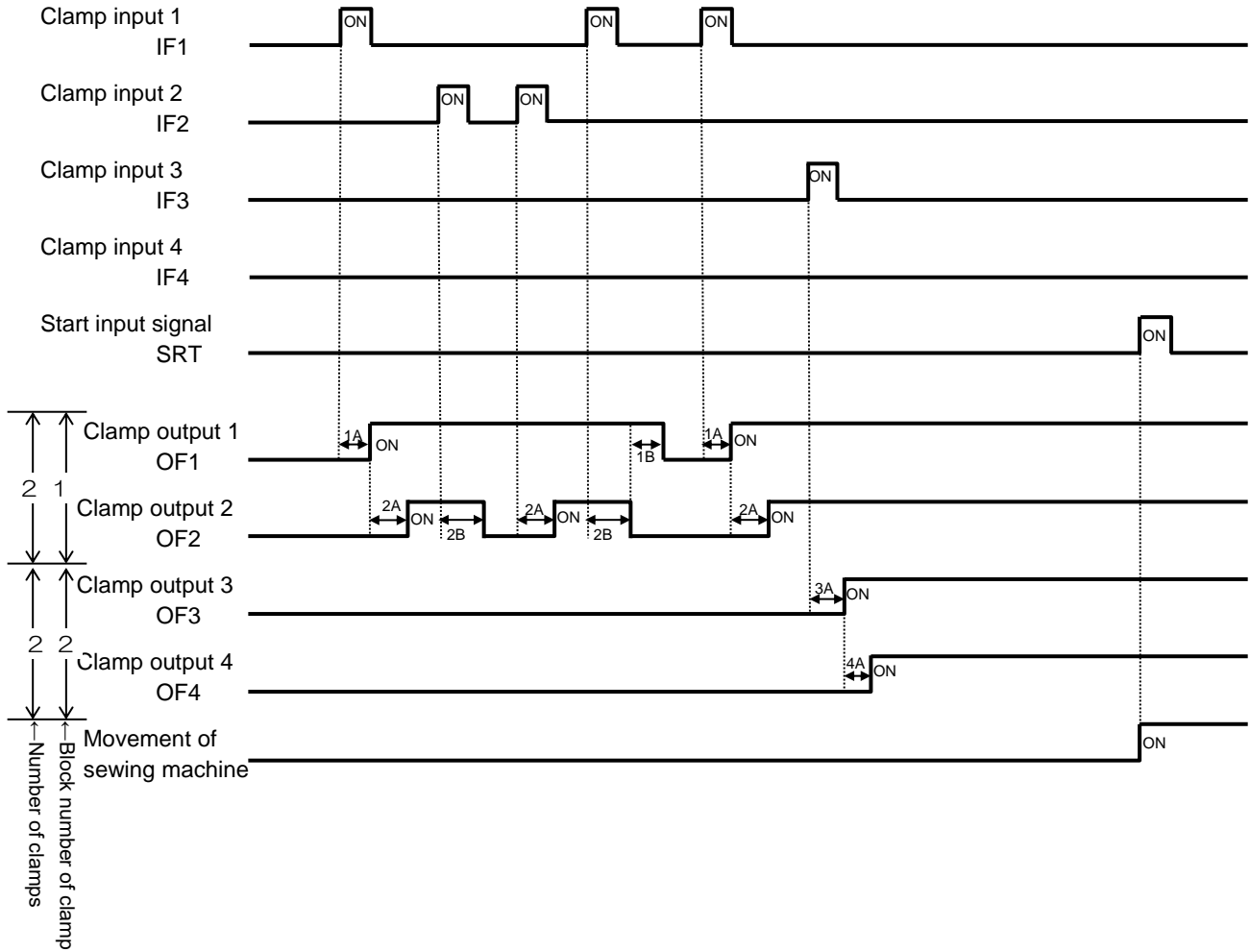
Can not use other function in "Work holder" mode.



6. The divisions of clamp setting [OFB] = 4

Setting of [FN],[CF] is invalidated when above setting.
 Clamp(O1,O2),(O3,O4) is link movement when above setting.
 The presser block to be used is [F2BN] and can be set.

[WHY] = OF,[OFB] = 4,[F2BN] = 2
 When not using the clamp step input.



7. The divisions of clamp setting [OFB] = 4 (When using the clamp step input.)

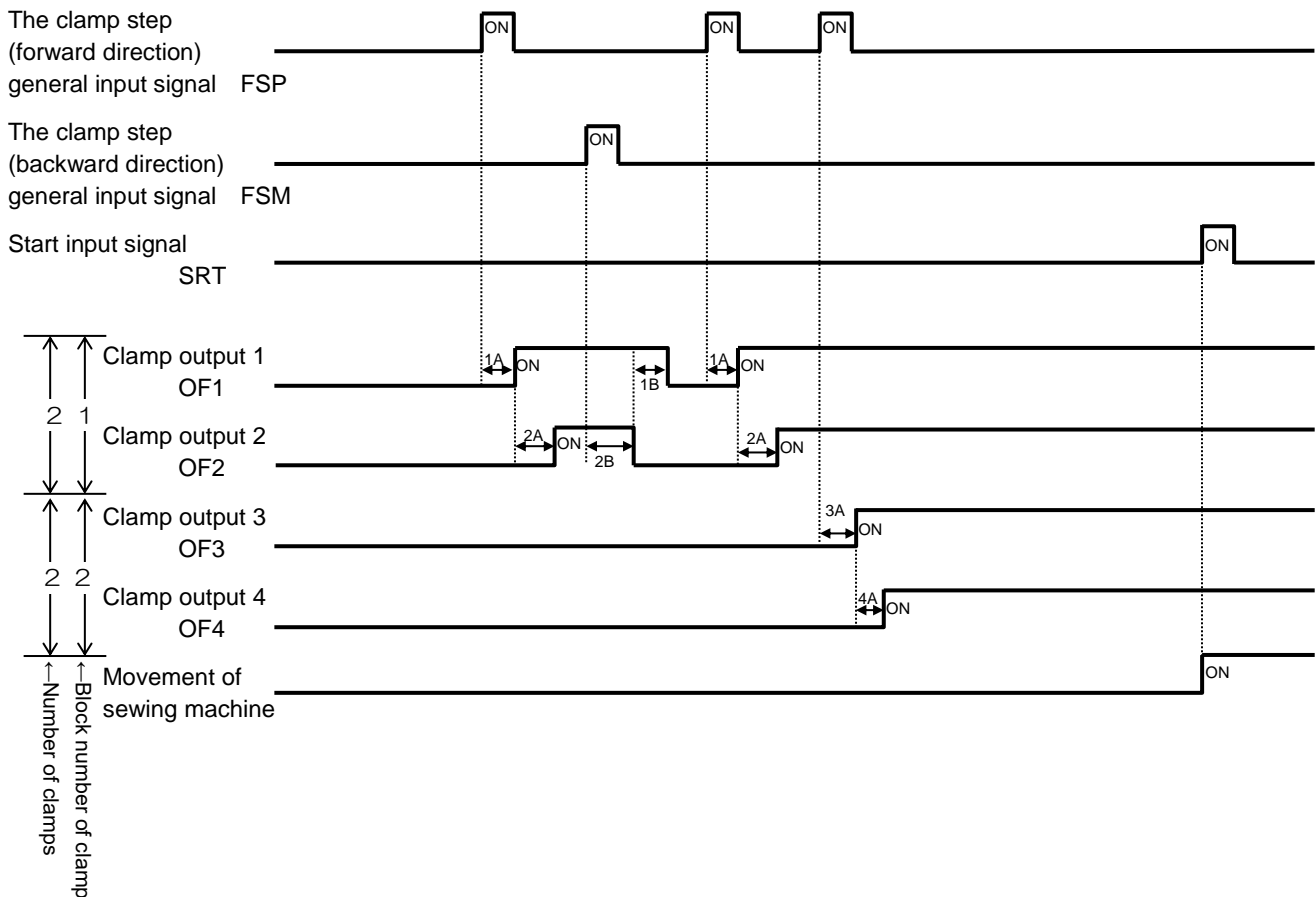
Setting of [FN],[CF] is invalidated when above setting.

Clamp(O1,O2),(O3,O4) is link movement when above setting

The presser block to be used is [F2BN] and can be set.

The holding block that makes the clamp step motion can be set with [F2SN].

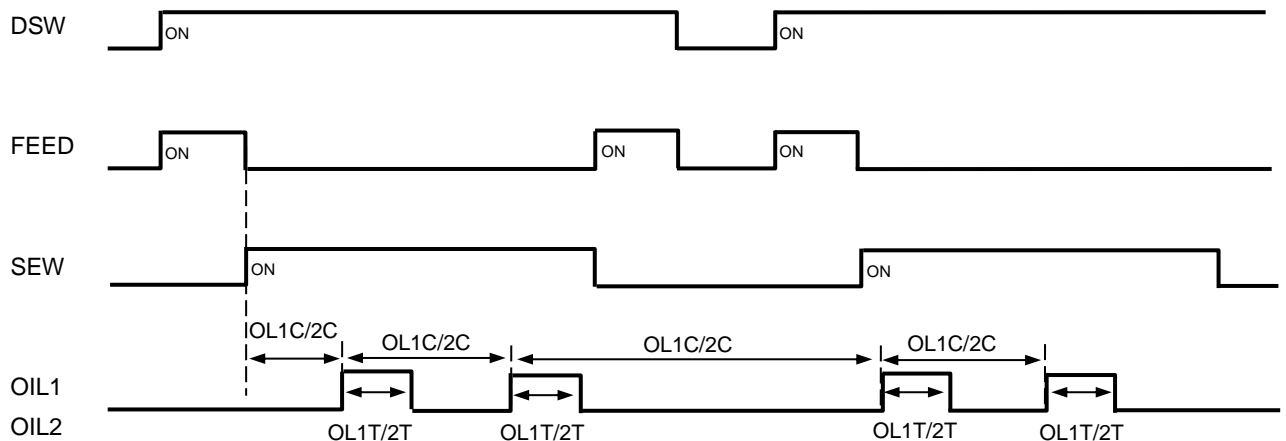
[WHY] = OF,[OFB] = 4,[F2BN] = 2,[F2SN] = 2
When not using the clamp step input.



8. Oil lubrication output setting [OILV] = ON.

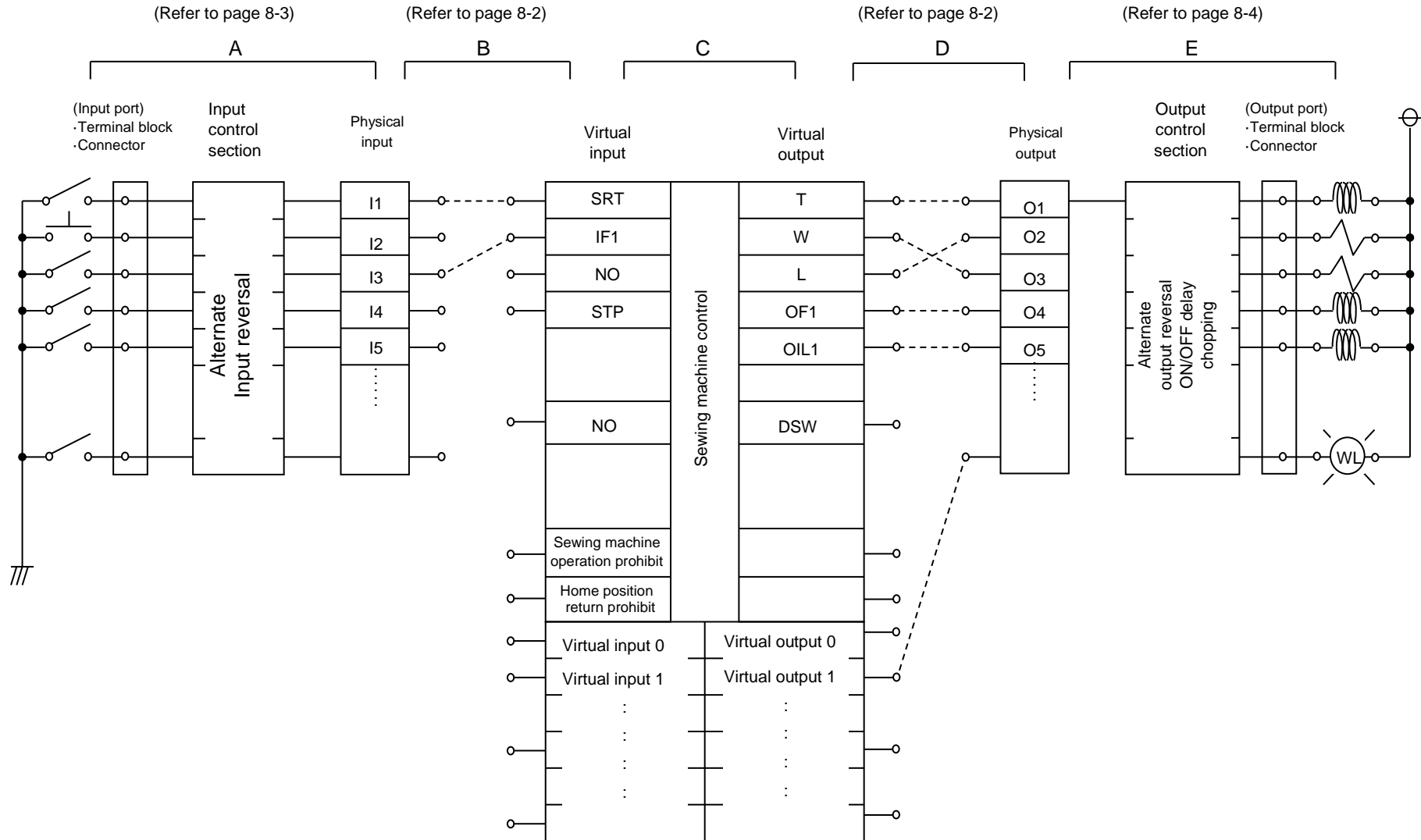
Oil lubricate timing set by [OL1C/2C] and [OL1T/2T].

[OL1C/2C] is not clear by after next sewing, this number is accumulate.



[8] Customized input/output

1. Customized input/output configuration diagram



8-1

2. Outline of customized input/output mode

(A to E below correspond to A to E on the previous page.)

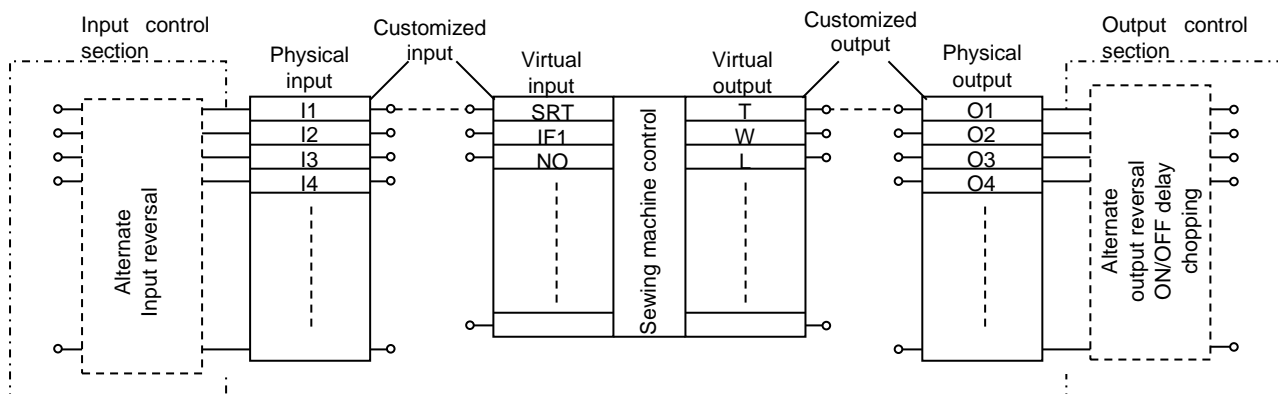
(1) Customizing the input signal

- A. The ON/OFF signal input from the input port passes through the input control section (no operation, alternate operation, signal reversal), and is then stored in the physical input area corresponding to the input port.
(Refer to page 8-3)
- B. Each signal stored in the physical input area is connected to a desired position in the sewing machine control virtual input port. (Refer to page 8-2)
- C. The sewing machine carries out control based on the function assigned to the virtual input area.

(2) Customizing the output signal

- D. As opposed to the customized input, the virtual output area port, assigned the function, can be connected and set to a desired position in the physical output area port. (Refer to page 8-2)
- E. The signal for each port in the physical output area passes through the output control section (no operation, delay circuit, alternate, etc.), and is then output to the output port. (Refer to page 8-4)

3. Customizing the virtual input/output



Selection and connection of physical input/output port and virtual input/output port

For example, to connect the physical input port [I1] and virtual input port [SRT] (start) and to connect the physical output port [O1] and virtual output port [T] as shown in the diagram, set as follows.

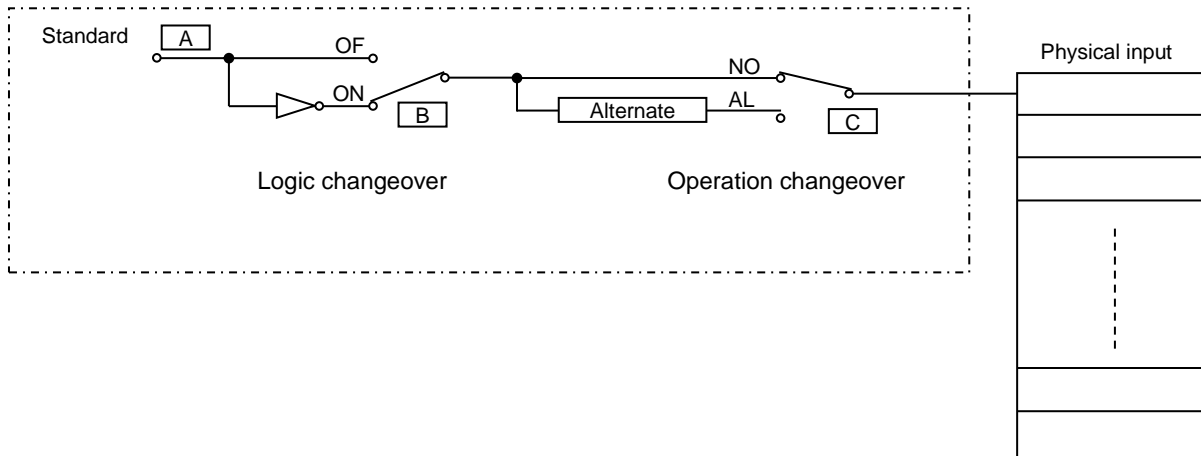
1. Using customized input, select the [I1] input functions, and set SRT.
2. Using customized output, select the [O1] input functions, and set SRT.

With the above settings, [I1] and [SRT], and [O1] and [T] will be connected.

One port from the virtual input ports can be selected for the [I*] port by changing the setting.

One port from the virtual output ports can be selected for the [O*] port by changing the setting.

4. Block diagram (input control section)



5. Explanation of operations (input control section)

The input signal passes through the A point, B point and C point of the input port, and finally is connected to the physical input

A point Inputs the signal to the input port from an external source.

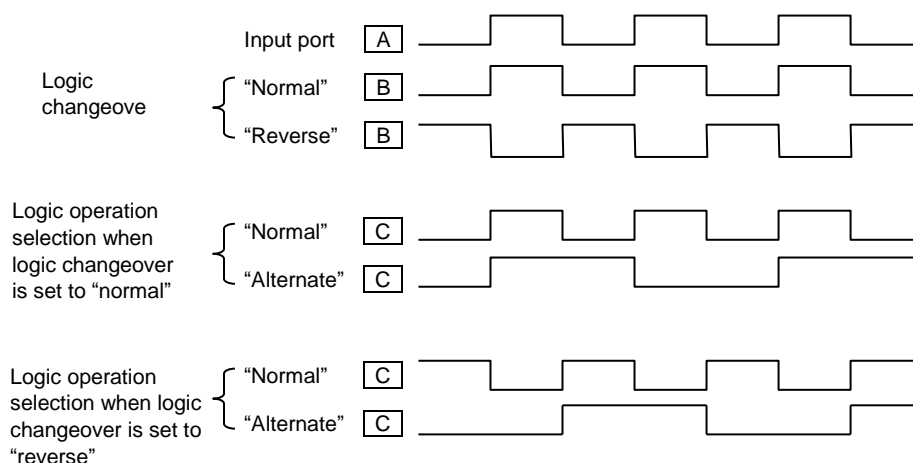
B point (1) When the logic setting is set to “normal”(OF), the operation will be the same as the input signal A point.

(2) When the logic setting is set to “reverse”(ON), the operation will be the reverse of the input signal A point.

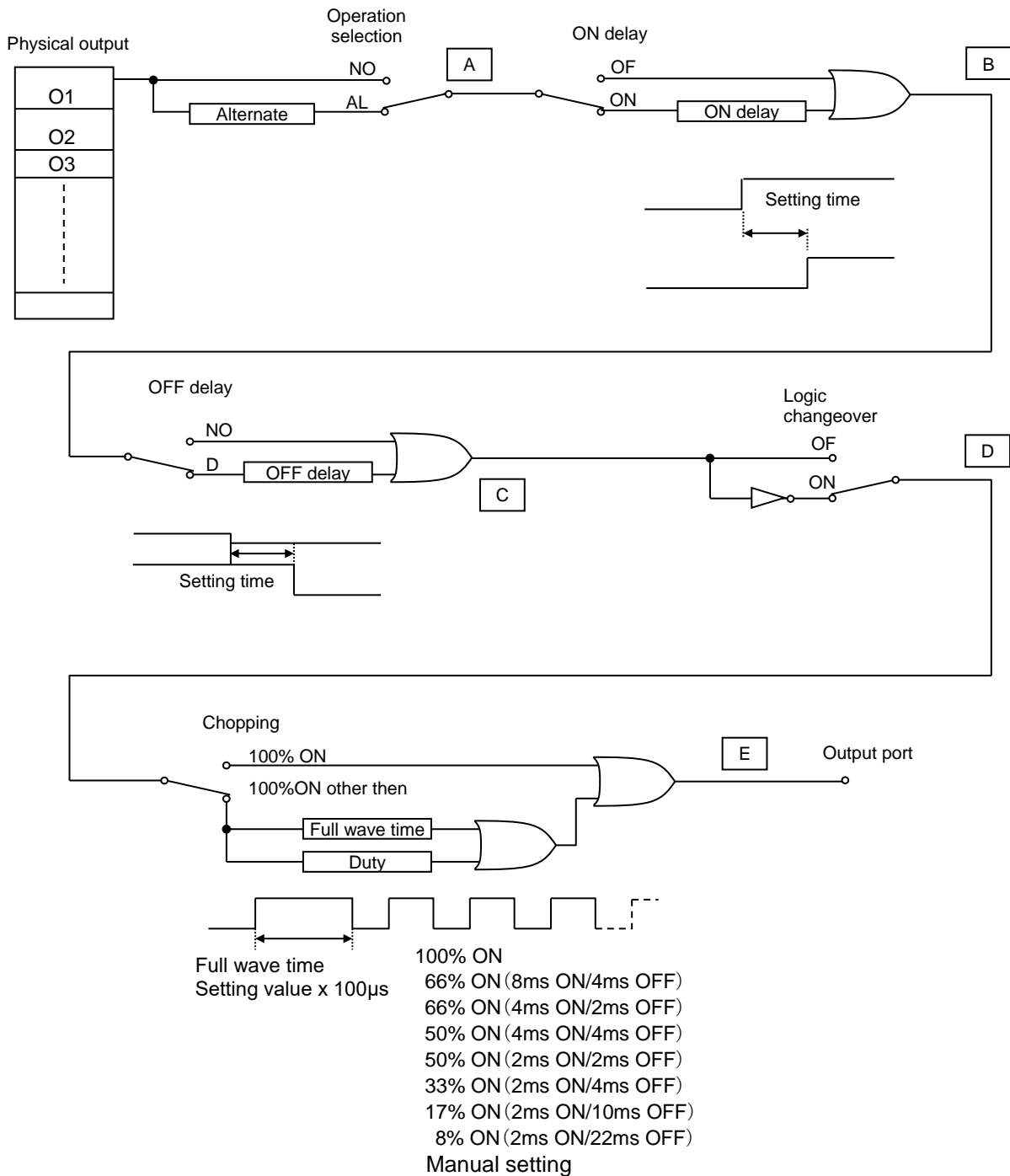
C point (1) When the operation selection is set to “normal”(NO), the operation will be the same as the input signal B point.

(2) When the operation selection is set to “alternate”(AL), the signal will turn ON at the first rising edge, turn OFF at the second rising edge, and will turn ON at the third rising edge. The signal waveform will repeatedly turn ON and OFF at the input rising edge.

The C point signal input and controlled in the above manner is input into the physical input port.



6. Block diagram (output control section)

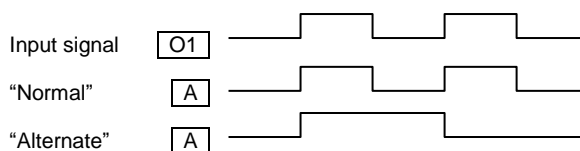


7. Explanation of operation (output control section)

The operation of the signal output from the physical output is selected and then the signal is connected to the output port E point.

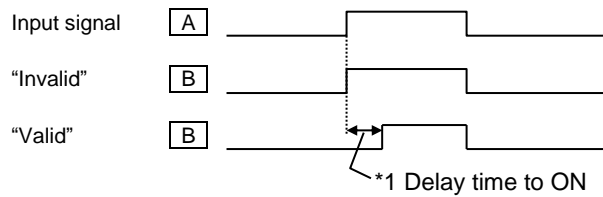
A point Logic operation selection

- (1) When "normal"(NO) is selected, the input waveform is connected.
- (2) When "alternate"(AL) is selected, the signal will alternately turn ON and OFF, turning ON at the first rising edge and OFF at the next rising edge.



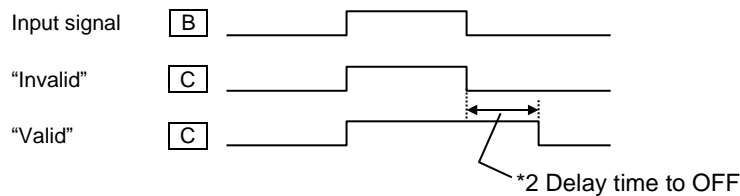
B point ON delay setting

- (1) When "invalid" is selected, the same signal as the A point will be output to the B point.
- (2) When "valid" is selected, the waveform will rise after the {set value x 100µs} time (*1) set with the A point input waveform. (ON delay)



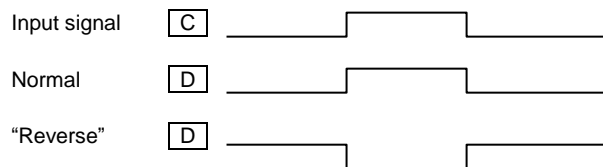
C point OFF delay setting

- (1) When "invalid" is selected, the same signal as the B point will be output to the C point.
- (2) When "valid" is selected, the ON time will be delayed by the {set value x 100µs} time (*2) set with the B point input waveform.



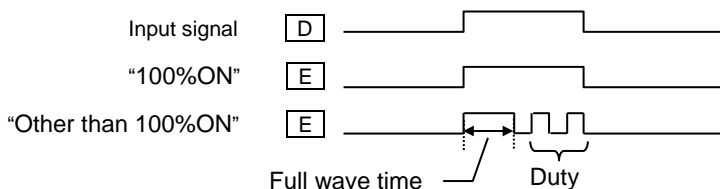
D point Logic setting

- (1) When "normal" is selected, the C point signal will be output to the D point without any changes.
- (2) When "reverse" is selected, D point signal will be reversing signal of the C point signal.



E point Chopping setting

- (1) When [100%ON] is set, there is no change, and input signal of D point is output to E point.
- (2) When other than [100%ON] is set, output of E point is on while {setting time x 100us}. Afterwards the output becomes square wave according to duty ratio setting.



- 100% ON
- 66% ON (8ms ON/4ms OFF)
- 66% ON (4ms ON/2ms OFF)
- 50% ON (4ms ON/4ms OFF)
- 50% ON (2ms ON/2ms OFF)
- 33% ON (2ms ON/4ms OFF)
- 17% ON (2ms ON/10ms OFF)
- 8% ON (2ms ON/22ms OFF)
- Manual setting

[9] Input / Output signal

1. Input signal setting table

| Code | Function | Specifications |
|------------|--|--|
| FSP | Clamp all step ON signal | Whenever FSP input is on, clamp output [1],[2],[3],[4] turned on one by one. However, when [Program mode > Clamp output > number of effective clamp (FN)] is set to 1, FSP input is ineffective. |
| FSM | Clamp all step OFF signal | Whenever FSM input is on, clamp output [4],[3],[2],[1] turned off one by one. However, when [Program mode > Clamp output > number of effective clamp (FN)] is set to 1, FSM input is ineffective. |
| IFR | All clamp output clear signal | If IFR signal is on, all clamp outputs are turned off. |
| A2F | Pneumatic two-step clamp switch input signal | Whenever A2F input is on, following operation (1), (2), (3) is repeated. This signal is effective when [Program mode > Setting for Pneumatic two-step clamp (AF2)] is on. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> (1) When A2F input is on first time, AFL output is turned on. (2) When A2F input is on second time, AFH output is turned on. (3) When A2F input is on third time, AFE output is turned on. </div> |
| IF1 to IF4 | Clamp input signal 1 to 4 | When IF1 input is on, OF1 output is turned on. When IF1 input is on again, OF1 output is turned off. (same from IF2 to IF4) |
| F1C to F4C | Clamp output prohibition signal 1 to 4 | When F1C input is on, OF1 output is prohibited. (same from F2C to F4C) |
| OFC | All clamp output cancel signal | When OFC input is on, OF1 to OF4 outputs are prohibited. |
| WC | Wiper output cancel signal | When WC input is on, W output is prohibited. |
| TC | Trimmer output cancel signal | When TC input is on, Thread trimmer sequence output T, L and W is prohibited. |
| S6 | Thread trimming protection signal | When S6 input is on while machine is driving, the machine is stopped and when S6 input is off, the machine start driving again. When S6 input is on while thread trimming operation, machine is stopped after trimming. |
| HPC | Home positioning prohibition signal | When HPC is ON, home returning operation by the home positioning key or HP signal is prohibited. |
| THS | Upper thread sensor input signal | When setting of [Program mode > Needle thread breaking sensor ON/OFF] is on, the signal can be used for thread breakage detection input. |
| ARS | Less pressure detection signal | When ARS input is on, all operation is interrupted, and error [E-3108] is displayed. (Returns by power supply re-turning on) |
| IO0 to IOF | General purpose input 0 to F | When IO0 input is on, OT0 output is turned on at the same time. (same from IO1 to IOF) |
| NO | No operation signal | Anything does not operate, if NO input is turned on. |
| SRT | Start signal | When SRT input is on, sewing operation is started. However, when clamp output is turned off, this signal is invalid. |
| HP | Home position returning signal | When HP input is on, home position returning operation is executed. However, please note there is a timing that becomes invalid, for example while machine is running. |
| PF | Presser foot signal | When PF input is on, The presser foot will return to home position. When PF input is on again, presser foot goes to down position. |
| JGP | JOG plus signal | When JGP input is on, XY table is moved in positive direction according to the pattern. |
| JGM | JOG minus signal | When JGM input is on, XY table is moved in negative direction according to the pattern. |
| JGC | JOG cancel signal | During JGC input is ON, XY table can not move by JOG [+/-] icons. *JGC is invalid in Input/Modification/Conversion mode. |
| STP | Halt signal | When STP input is on, machine is stopped. |
| BC | Fixed angle (rotation/reverse rotation) signal | To confirm the needle thrust position, the needle is stopped just before the sewing material. Whenever BC input is ON, operation of [rotation] -> [reverse rotation] -> [rotation] is repeated. When the start switch is on afterwards, following sewing operation is started. However, if the following data is non stitch feed, the message [M-020] is appeared, in this case please move the needle to up position and re-turning on the start switch. |

< sequel to INPUT SIGNAL >

| Code | Function | Specifications |
|------|--|---|
| CCL | Counter clear signal | When CCL input is on, UP/DOWN counter is cleared. |
| SRC | Start cancel signal | When SRC input is on, sewing operation with Stringhalt is prohibited. |
| CCU | Up counter clear signal | When CCU input is on, UP counter is cleared. |
| CCD | Down counter clear signal | When CCD input is on, DOWN counter is cleared. |
| UAD | Up counter addition signal | When UAD input is on, 1 is added to UP counter |
| UDC | Up counter subtraction signal | When UDC input is on, 1 is subtracted from UP counter |
| DAD | Down counter addition signal | When DAD input is on, 1 is added to DOWN counter |
| DDC | Down counter subtraction signal | When DDC input is on, 1 is subtracted from DOWN counter |
| KNK | Signal that invalidates MENU key | When KNK is on, "MENU" key becomes invalid. |
| RNK | Signal that invalidates "pattern read" key | When RNK is on, "pattern read" key becomes invalid. |
| WNK | Signal that invalidates "pattern write" key | When WNK is on, "pattern write" key becomes invalid. |
| INK | Signal that invalidates "teaching input" key | When INK is on, "teaching input" key becomes invalid. |
| MNK | Signal that invalidates "teaching modification" key | When MNK is on, "teaching modification" key becomes invalid. |
| CNK | Signal that invalidates "teaching conversion" key | When CNK is on, "teaching conversion" key becomes invalid. |
| PNK | Signal that invalidates "program mode" key | When PNK is on, "program mode" key becomes invalid. |
| NNK | Signal that invalidates "IN/OUT setting" key | When NNK is on, "IN/OUT setting" key becomes invalid. |
| FNK | Signal that invalidates "function mode" key | When FNK is on, "function mode" key becomes invalid. |
| SNK | Signal that invalidates "speed" key | When SNK is on, "speed" key becomes invalid. |
| HNK | Signal that invalidates "PF height setting" icon | When HNK is on, "PF height setting" key becomes invalid. |
| DHK | Signal that invalidates "digital tension gauge" icon | When DKK is on, "digital tension gauge" key becomes invalid. |
| ENK | Signal that invalidates "easy setting" icon | When ENK is on, "easy setting" key becomes invalid. |
| P3NK | Signal that invalidates "standard screen 3" icon | When P3NK is on, "standard screen 3" (FF-stitch) key becomes invalid. |
| P01 | Pattern number switch signal +1 | When P01 is on, pattern data number is switch to 1001 (1000 + 1). |
| P02 | Pattern number switch signal +2 | When P02 is on, pattern data number is switch to 1002 (1000 + 2). |
| P04 | Pattern number switch signal +4 | When P04 is on, pattern data number is switch to 1004 (1000 + 4). |
| P08 | Pattern number switch signal +8 | When P08 is on, pattern data number is switch to 1008 (1000 + 8). |
| P16 | Pattern number switch signal +16 | When P16 is on, pattern data number is switch to 1016 (1000 + 16). |
| P32 | Pattern number switch signal +32 | <p>When P32 is on, pattern data number is switch to 1032 (1000 + 32).</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>< When you want to change to other patterned numbers ></p> <p>ex.1) pattern number to 1003 turns on P01 input and P02 input $P01(+1) + P02(+2) + 1000 = 1003$</p> <p>ex.1) pattern number to 1011 turns on P01, P02 and P08 input $P01(+1) + P02(+2) + P08(+8) + 1000 = 1011$</p> </div> <p>*Pattern number can be changed within the range from 1000 to 1063. *P01, P02, P04, P08, P16, P32 is effective when [Pattern select function by external signal (APC)] has been set to ON. *Pattern number is able to set to 1000,2000,3000,4000 by program mode "POF".</p> |

< sequel to INPUT SIGNAL >

| Code | Function | Specifications |
|------------|--|--|
| HES | Machine head tilting detection signal | When HES input is on, message [M-038] is displayed. |
| SP0 to SP9 | Speed dial signal | Speed dial value is switched to 0 to 9. |
| SPU | Speed up signal | Speed dial value is increased +1. |
| SPD | Speed down signal | Speed dial value is decreased -1. |
| CK1 | Cassette jig sensor 1 signal | When CK1 and CK2 inputs is on, OF1 output turn on. |
| CK2 | Cassette jig sensor 2 signal | *CK1 and CK2 is effective when [Cassette jig function ON/OFF (CHK)] and [Cassette jig sensor ON/OFF (CSN)] has been sets to ON. |
| BCDR | Barcode reading input signal | When input BCDR is turned ON, the pattern can be read with a barcode. This signal is effective when Program mode [Communication (UBCT)] is OFF. |
| DFCR | Input signal of material Thickness detection clear | Material thickness detection OK Output signal (DFOK), material thickness detection NG output signal (DPNG, DNNG) are turned OFF. |
| SKCR | Input signal of abnormal stitch detection clear | Turn off abnormality stitch detection OK output signal (SKOK) and abnormality stitch detection NG output signal (SKNG). |
| S2CR | Input signal of abnormal stitch detection 2 clear | Turn off abnormality stitch detection 2 OK output signal (S2OK) and abnormality stitch detection 2 NG output signal (S2NG). |

2. Output signal setting table

| Code | Function | Specifications |
|------------|--|---|
| OT0 to OTF | Virtual output 0 to F | When IO0 is on, OT0 output at the same time (same from OT1 to OTF) |
| FN1 to FNH | Function code output 1 to H | When FUN1 code is read while sewing operation, FN1 output is reversed. (same from FN2 to FNH) |
| OF1 to OF4 | Clamp output 1 to 4 | When IF1 is on, OF1 output is reversed (same OF2 to OF4) |
| NO | [NO]output | Nothing is done |
| T | Trimmer output | Trimming operation is done |
| L | Thread tension release output | Thread tension release operation is done |
| W | Wiper output | Wiper operation is done |
| PF | Presser foot output | Presser foot operation is done |
| AFL | Pneumatic two-step switch clamp low pressure output | When A2F input is on first time, AFL output is turned on. Setting is effective when [Program mode > Clamp > Pneumatic two-step switch clamp ON/OFF (AF2)] is on. |
| AFH | Pneumatic two-step switch clamp high pressure output | When A2F input is on second time, AFH output is turned on. Setting is effective when [Program mode > Clamp > Pneumatic two-step switch clamp ON/OFF (AF2)] is on. |
| AFE | Pneumatic two-step switch clamp excess pressure release output | When A2F input is on third time, AFE output is turned on. Setting is effective when [Program mode > Clamp > Pneumatic two-step switch clamp ON/OFF (AF2)] is on. |
| DHP | Home position output | When XY table is stopped on the home position, DHP output is turned on. |
| D2H | Second home position output | When XY table is stopped on the second home position, D2H output is turned on. |
| RED | Preparation ready output | When the machine is ready state (when clamp output is on), RED output is turned on. When machine is start sewing, RED is turned off. |
| DSW | Sewing in progress output | When the machine is sewing, DSW output is turned on. When machine is stopping on the home position, DSW output is turned off. |
| SP | Sewing machine rotation start output | After non stitch feed, when the sewing machine start to rotate, SP output is turned on. When home positioning is executed, SP output is turned off. |
| TSE | Trimming start output | When trimming sequence (down position) is started, TSE output is turned on. When trimming sequence is finished (when all the outputs of T, L and W are turned off), TSE output is turned off. |
| END | Sewing completion output | When a sewing pattern operation is finished, END output is turned on. When the next sewing is started, END output is turned off. |
| DCS | Halt code output | When the halt code data (USTP, DSTP) is read while sewing, DCS output is turned on. When the machine restarts DCS output is turned off. |
| DST | Halt in progress output | When the machine is on halt state, DST output is turned on. When the machine restarts DST output is turned off. However, it is not output while stopping by the USTP code or the DSTP code. |
| HPO | Home returning in progress output | While the operation of home returning by the home positioning key or HP signal, HPO output is turned on. |
| ERR | Error output | When the error or message is displayed on the operation panel, ERR output is turned on. |
| CUE | Count up completion output | When the current value of up counter is reached at counter set value, CUE output signal is turned on. When the current value is cleared, CUE output is turned off. |
| CDE | Countdown completion output | When the current value of down counter is reached at 0, CDE output signal is turned on. When the current value is initialized, CDE output is turned off. |
| DTS | Halt in progress output after upper thread sensor detection | When the machine is on halt state with thread breakage, DTS output is turned on. When the machine restarts, DTS output is turned off. |
| DRT | Sewing machine rotation in progress output | While the machine is rotating, DRT output is turned on. (includes rotation in winding mode) |
| DN | Down position output | When the needle is down position, DN output is turned on. |
| CB | Buzzer output | While the buzzer in the operation panel is on, CB output is turned on. (including count up/countdown message display) |
| UP | Up position output | When the needle is up position, UP output is turned on. |
| PWR | Power on output | While power supply is on, PWR output signal is turned on. |
| PUS | Presser hoot home position output | While presser foot is on the home position, PUS output is turned on. |

< sequel to OUTPUT SIGNAL >

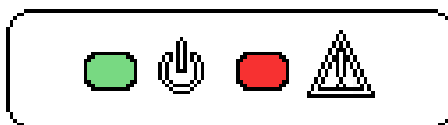
| Code | Function | Specifications |
|------|---|---|
| MSG | Message display output | When the message is displayed on the operation panel, MSG output is turned on. |
| OP1 | Option output 1 | Do not use |
| OP2 | Option output 2 | Do not use |
| SSW | Halt signal being on output | SSW is turned on during power supply is on. However, input signal STP turns on SSW is turned on with blinking. |
| MOV | Sending table's moving output signal | Turn on during XY table is moving. |
| OIL1 | Oil lubrication output 1 | When [OILV] setting is ON, OIL1 is output. Oil lubricate timing set by [OL1C] and [OL1T]. |
| OIL2 | Oil lubrication output 2 | When [OILV] setting is ON, OIL2 is output. Oil lubricate timing set by [OL2C] and [OL2T]. |
| SKAR | Air output for the abnormal stitch detection sensor | During automatic sewing, air for stitch abnormality detection is output. This signal is effective when Program mode [the stitch abnormality detection (SKCF)] or [the stitch abnormality detection 2 (S2CF)] is on. |
| SKCH | Output that is judging the abnormal stitch detection | SKCH output turns ON when operating checking about abnormality stitch. This signal is effective when Program mode [the stitch abnormality detection (SKCF)] is on. |
| SKTS | Test output of the abnormal stitch detection | When the sensor turns ON at the angle at which the stitch abnormality is judged, a test signal is output. This signal is effective when Program mode [the stitch abnormality detection (SKCF)] is on. |
| BDRD | Output where barcode pattern reading is completed | When reading the pattern number with the barcode it will be output. When sewing is started, the output turns OFF. |
| PKYC | Output where barcode pattern reading is waiting | When the bar code is ready to read the pattern number, it will be output. (PKY = ON and Pattern update incomplete) |
| SKNG | Abnormal stitch detection NG output | SKNG output turns ON when there are suspect of abnormality stitch. This signal is effective when Program mode [the stitch abnormality detection (SKCF)] is on. |
| SKOK | Abnormal stitch detection OK output | SKOK output turns ON When sewing is completed with no suspected abnormal stitch detected. This signal is effective when Program mode [the stitch abnormality detection (SKCF)] is on. |
| DPNG | Thickness detection NG(+side) output | DPNG output turns ON when material thickness is thicker than "Thickness setting parameter" at the thickness detection (DFTH) of sewing material. |
| DNNG | Thickness detection NG(-side) output | DNNG output turns ON when material thickness is thinner than "thickness setting parameter" at the thickness detection (DFTH) of sewing material. |
| DFOK | Thickness detection OK output | DFOK output turns ON when material thickness is within margin of error about "thickness setting parameter" at the thickness detection (DFTH) of sewing material. |
| ANT0 | Analog input 0 judgement output | ANT 0 output turns ON when the input voltage of CON 10 "analog input 0" on the I / F board is greater than or equal to the program mode ANT 0 [threshold value setting of analog input 0] setting value |
| ANT1 | Analog input 1 judgement output | ANT 1 output turns ON when the input voltage of CON 10 "analog input 1" on the I / F board is greater than or equal to the program mode ANT 1 [threshold value setting of analog input 1] setting value |
| S2NG | Abnormal stitch detection 2 NG output | S2NG output turns ON when there are suspect of abnormality stitch 2. This signal is effective when Program mode [the stitch abnormality detection 2 (S2CF)] is on. |
| S2OK | Abnormal stitch detection 2 OK output | S2OK output turns ON When sewing is completed with no suspected abnormal stitch 2 detected. This signal is effective when Program mode [the stitch abnormality detection 2 (S2CF)] is on. |
| S2CH | Angle for judgement on Abnormal stitch detection 2 output | S2CH output turns ON when operating checking about abnormality stitch 2. This signal is effective when Program mode [the stitch abnormality detection 2 (S2CF)] is on. |
| THP | Trimming axis home position output | When the trimming axis is at the home position (within ± 10 degrees), the THP output is ON. |

[10] What happened? Could it be an error?

When an error occurs, the error code and corresponding message appear on the operation panel. Take a corrective action in accordance with the message. This section describes the errors and others that do not appear on the operation panel.

[Case1]

Nothing appears on the operation panel when you turn the power switch ON. “Both the front panel green (power) and red (warning) LEDs are off.”



[Checking Items and Corrective Actions]

Is the power switch definitely turned ON?

- Check the power supply connection and turn ON the power switch again.

Is the power supply connector fully connected?

- Check the power supply connector connection, contact state and others, and then turn ON the power switch again.

Refer to “section [13].”

Is there a blown fuse in the control box?

- Replace the blown fuse with a fuse of identical capacity.

Refer to page 2-2.

Is a harness inside the control box disconnected?

- Check the connections of the harnesses inside the control box, and turn ON the power switch again.

Refer to “section [16].”

- Be sure to turn off the power when checking.

[Case2]

Though you turn the power switch ON and a screen appears on the operation panel, the screen display is incorrect.

[Checking Items and Corrective Actions]

Is the problem solved when you switch the screen or turn the power switch OFF and then ON again?

- Reinstall the system.

Refer to “[6] Set up”

- If you take a corrective action but no improvement is made, consult with your local representative.

[Case 3]

I press the foot pedal, but the machine does not run.

The message “MACHINE HEAD TILT WAS DETECTED” appears.

Or the message “START PROHIBIT SIGNAL BEING DETECTED” appears.

[Checking Items and Corrective Actions]

Is the machine tilted?

- Return the machine back to its proper state and try again.

- Check if the tilting sensor switch is damaged or disconnected.

Is the signal HES among the input signals changed?

- Check input customization.

[Case 4]

No screen appears on the operation panel when you turn the power switch ON. “The front panel red (warning) LED is off.”

[Checking Items and Corrective Actions]

The operation panel may be defective.

- Consult with your local representative.

[Case 5]

Error indication.

(The red LED on the front panel of the control unit is blinking)



[Red LED] Blink pattern

| | ☀ : ON - : OFF |
|-----------------|--|
| Blink pattern 1 | ☀ - ☀ - ☀ - ☀ - ☀ - ☀ - ☀ - ☀ - ☀ - ☀ - |
| Blink pattern 2 | ☀ - - - ☀ - - - ☀ - - - ☀ - - - ☀ - - - |
| Blink pattern 3 | ☀ - ☀ - ☀ - - - Repeat the next ☀ - ☀ - ☀ - - - ☀ - ☀ - ☀ - ☀ - ☀ - - - |

Fig1

[Checking Items and Corrective Actions]

Is the front panel red (warning) LED showing Blink pattern 1? (Fig1)

- Installation error of control panel.

Please check the file and try again.

If the situation does not improve even after coping, there is a possibility that the CPU board is broken. Consult with your local representative.

Is the front panel red (warning) LED showing Blink pattern 2? (Fig1)

- PAL communication error.

Please make sure that PAL is connected.

If you take a corrective action but no improvement is made, consult with your local representative.

Is the front panel red (warning) LED showing Blink pattern 3? (Fig1)

- It is a 12V error on the CPU board.

Is fuse 2.5A on the CPU board blown?

Replace the blown fuse with a fuse of identical capacity. (Refer to page 2-2.)

Please be sure to replace the power supply in a disconnected state.

If you take a corrective action but no improvement is made, consult with your local representative.

[11] Initialize settings

When reinstalling with upgrading etc., use USB flash drive and do it in the same way as setup.
(Refer to “[6] Set up”) Here we show how to enter the initialization screen.

Initialize settings

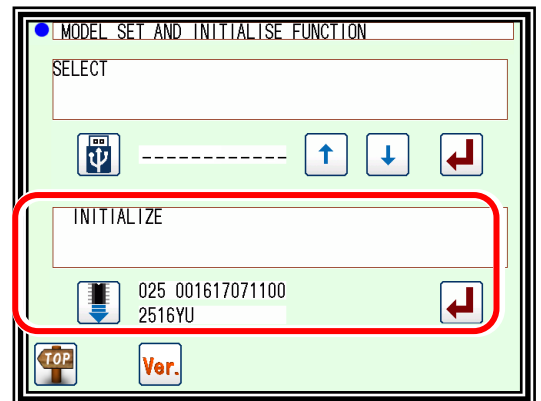
It also enters the “model set initialize function” screen as follows.

Please hold down the install button and turn on the power.


Reset the setting of the sewing machine you are using to
“Initialize” to the initial value.
“Initial setting value in internal memory”


▶ It decide by  key

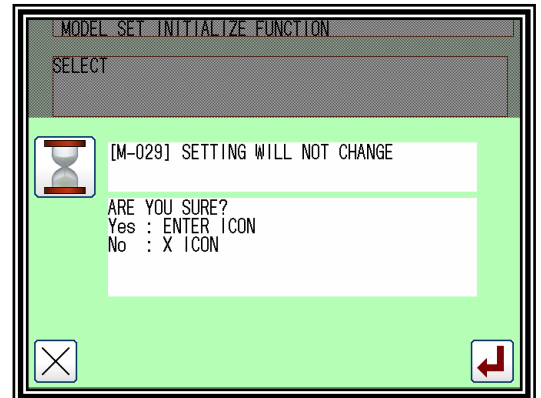
▶ A message will be displayed, so please operate according to the message.



Note When returning to the standard screen without changing the initial value

When you press the  key, a message like the one on the right appears.

If you press  key, it is possible to move standard screen without initialize.

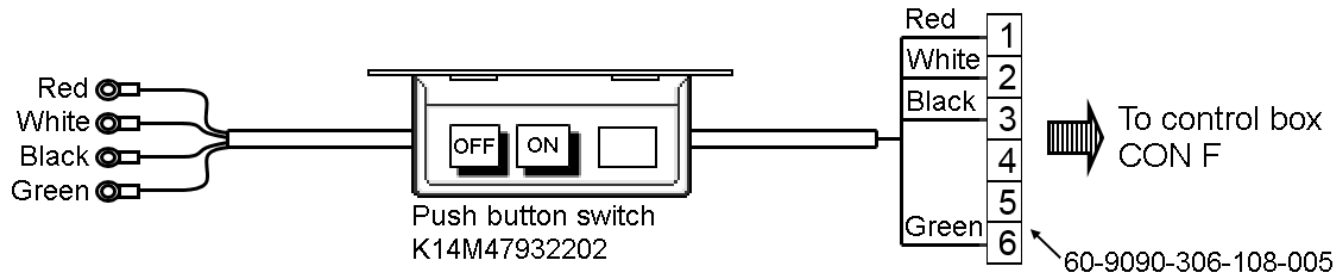


Note To erase internal memory, please use format.

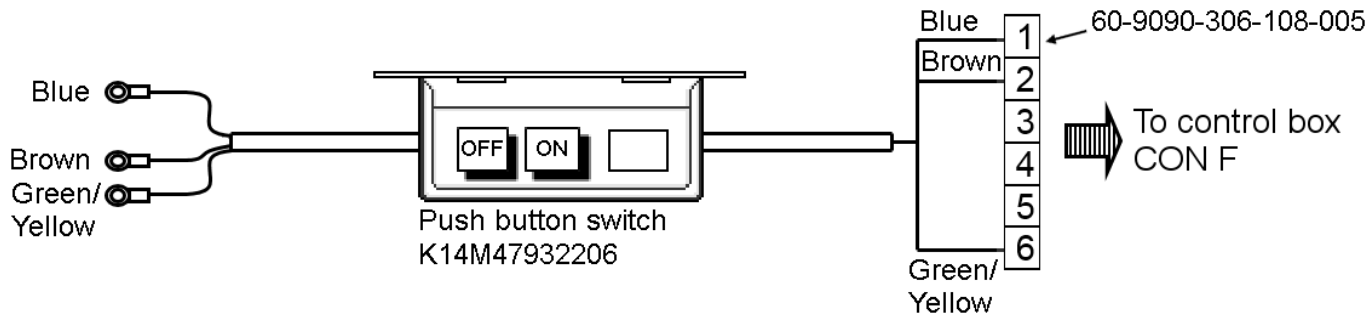
Refer to the technical document for operation panel page 15-3 “Format”.

[12] Several power supply

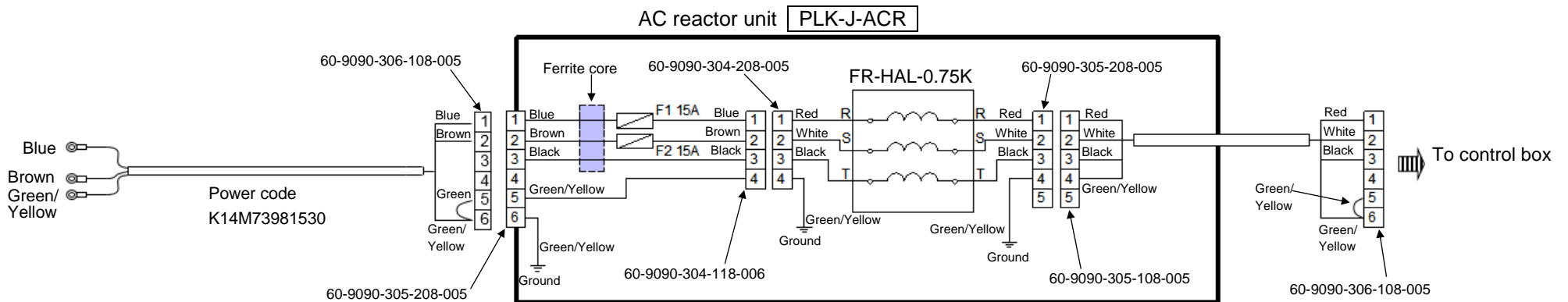
1. 3Ø AC200V - 240V 50/60Hz



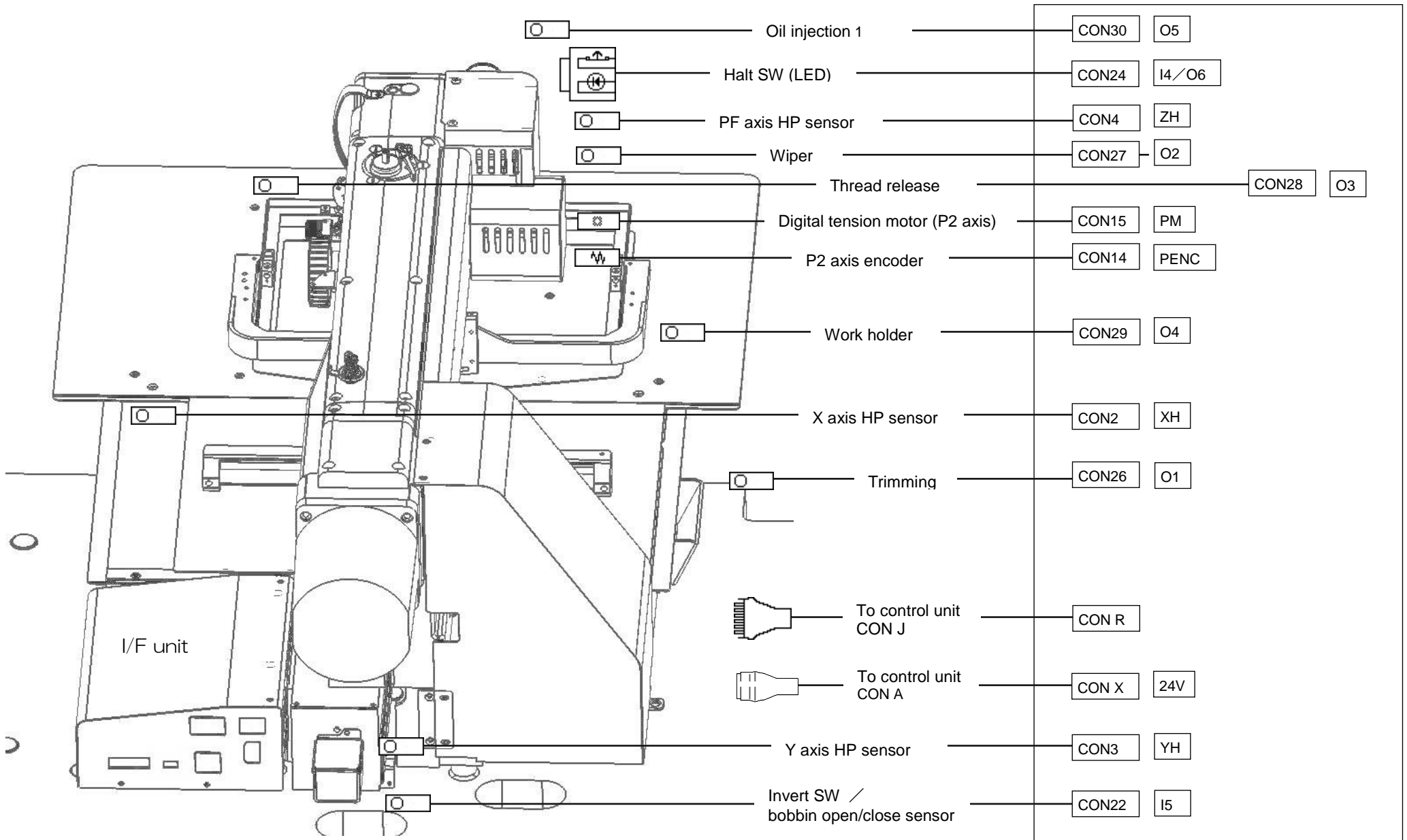
2. 1Ø AC200V - 240V 50/60Hz (Except Europe)



3. 1Ø AC200V - 240V 50/60Hz (Europe)

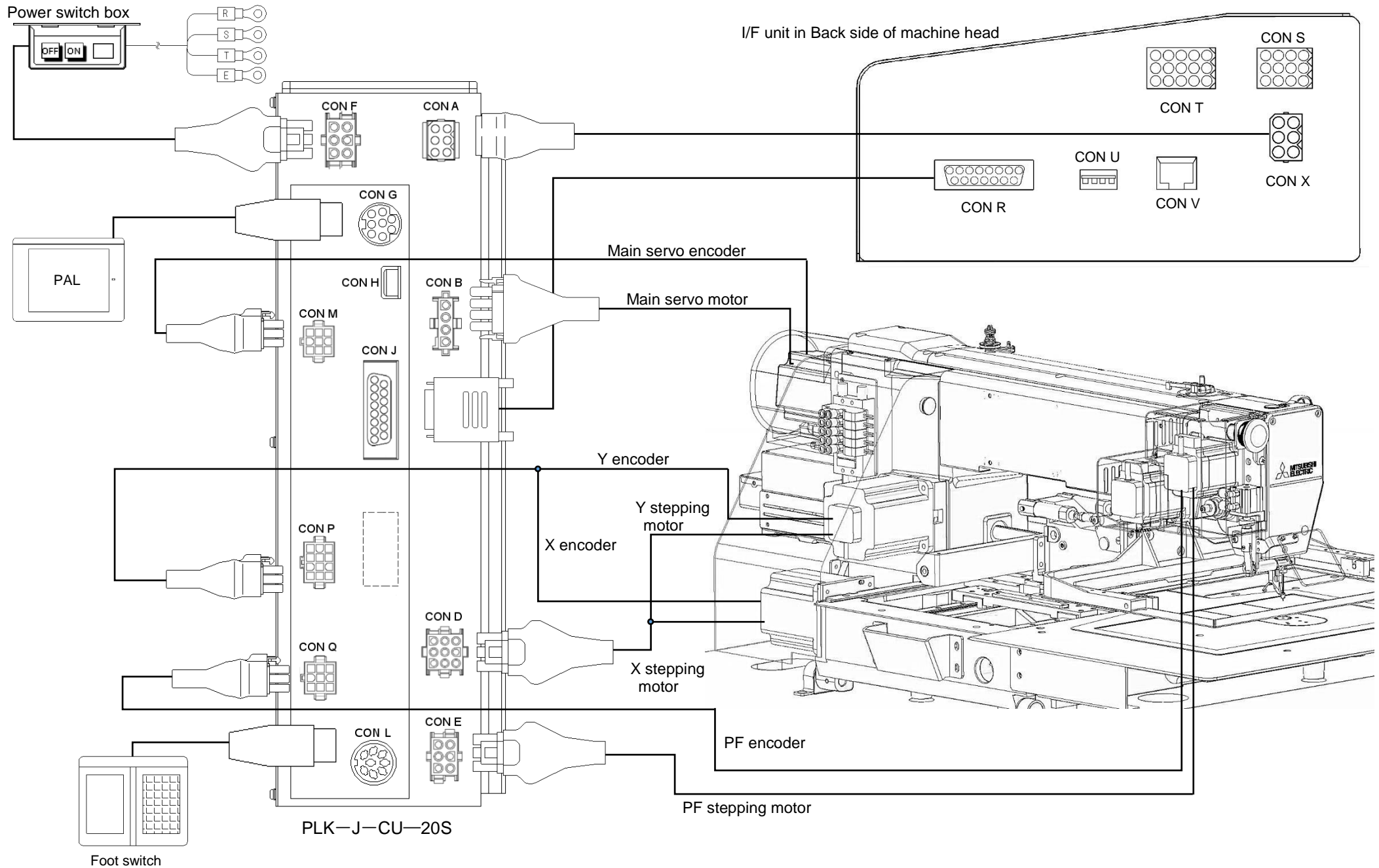


[13] Unit wiring diagram



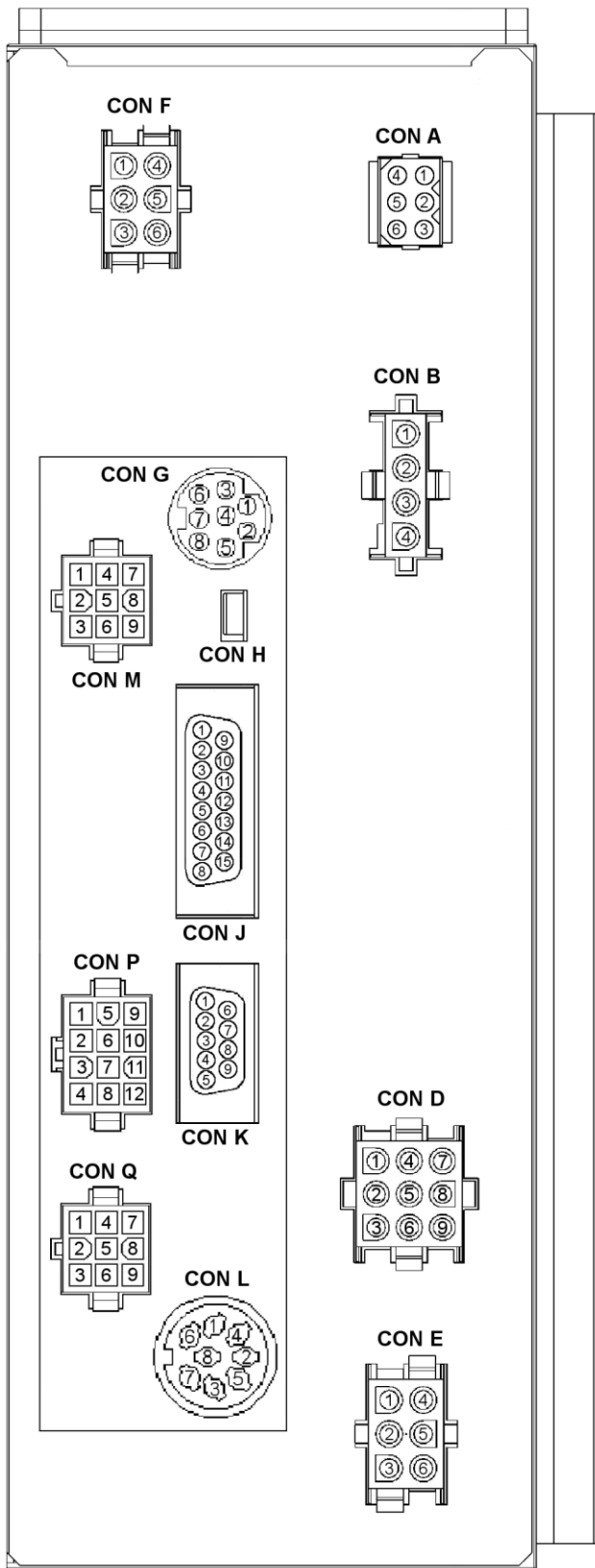
■ For connector pin details, refer to "section [14]" and "section [15]".

I/F board (MIF)



13-2

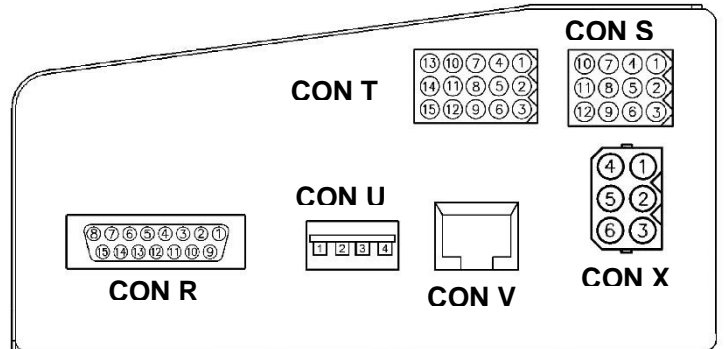
[14] Connectors layout



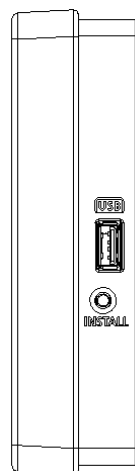
[front panel of the control box]

About CON H

Please only connect PC



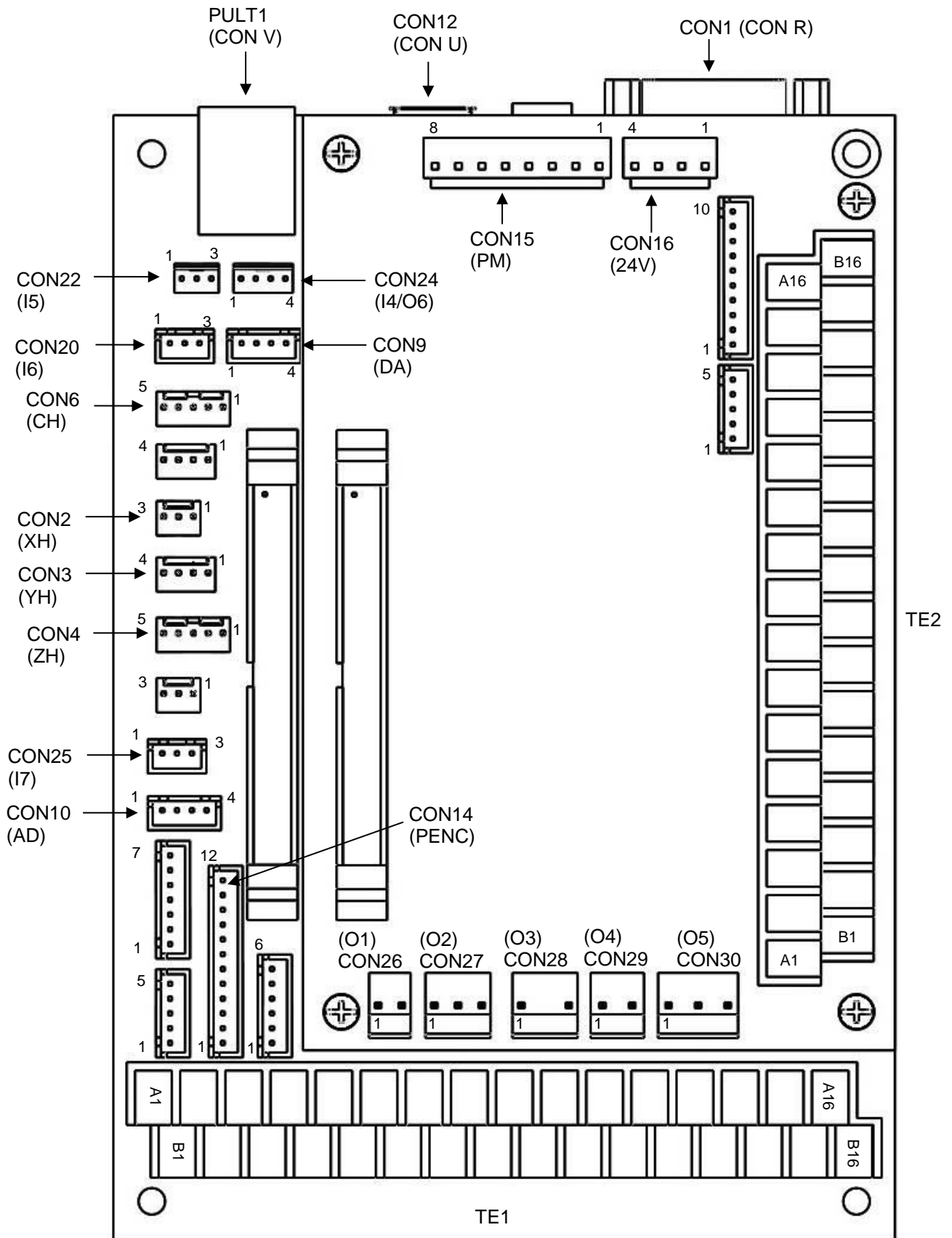
[I/F unit in Back side of machine head]



CON W (USB connector)

INSTALL Button

[PAL]



[I/F board (MIF)]

[15] Pin number of connectors

1. Back side of control box/sewing machine

CON A (I/F BOARD (power supply))
(same for CON X)

| Signal | Pin No. |
|--------|---------|
| +24V | 1 |
| +24V | 2 |
| NC | 3 |
| GND | 4 |
| GND | 5 |
| FG | 6 |

CON B (MAIN SERVO MOTOR)

| signal | Pin No. |
|--------|---------|
| U | 1 |
| V | 2 |
| W | 3 |
| FG | 4 |

CON D (XY STEPPING MOTOR)

| Signal | Pin No. |
|--------|---------|
| XA1 | 1 |
| XA2 | 2 |
| XB1 | 3 |
| YA1 | 4 |
| FG | 5 |
| XB2 | 6 |
| YA2 | 7 |
| YB1 | 8 |
| YB2 | 9 |

CON E (PF STEPPING MOTOR)

| Signal | Pin No. |
|--------|---------|
| ZA1 | 1 |
| ZA2 | 2 |
| NC | 3 |
| ZB1 | 4 |
| ZB2 | 5 |
| FG | 6 |

CON F (POWER SUPPLY)

| Signal | Pin No. |
|--------|---------|
| R | 1 |
| S | 2 |
| T | 3 |
| NC | 4 |
| FG | 5 |
| FG | 6 |

CON G (LCD PANEL)

| Signal | Pin No. |
|---------|---------|
| +12V | 1 |
| GND | 2 |
| TXD0 | 3 |
| RXD0 | 4 |
| INSTALL | 5 |
| VBUS | 6 |
| DP | 7 |
| DM | 8 |

CON H (OPTION PORT (PC connection))

| Signal | Pin No. |
|--------|---------|
| VBUS | 1 |
| DM | 2 |
| DP | 3 |
| NC | 4 |
| GND | 5 |

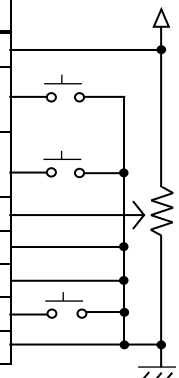
‡ Please only connect PC

CON J (I/F BOARD (signal)) (same for CON R)

| Signal | Pin No. |
|--------|---------|
| +12V | 1 |
| RXD0 | 2 |
| TXD0 | 3 |
| GND | 4 |
| +12V | 5 |
| RXD1 | 6 |
| TXD1 | 7 |
| GND | 8 |
| XHOME | 9 |
| YHOME | 10 |
| ZHOME | 11 |
| STP | 12 |
| UP | 13 |
| DN | 14 |
| CH | 15 |

CON L (FOOT SWITCH)

| Signal | Initial setting | Pin No. |
|--------|---------------------------------|---------|
| +12V | +12V | 1 |
| I1 | [SRT] Start input | 2 |
| I2 | [IF1] Work holder output 1 | 3 |
| VC1 | Do not use | 4 |
| GND | GND | 5 |
| GND | GND | 6 |
| I3 | [NO] Do not | 7 |
| GND | GND | 8 |



CON M (MAIN SERVO ENCODER)

| Signal | Pin No. |
|--------|---------|
| 1MR | 1 |
| 1MRR | 2 |
| NC | 3 |
| 1MX | 4 |
| 1MXR | 5 |
| GND | 6 |
| +5V | 7 |
| GND | 8 |
| FG | 9 |

CON P (XY ENCODER)

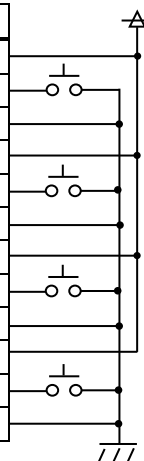
| Signal | Pin No. |
|--------|---------|
| GND | 1 |
| +5V | 2 |
| GND | 3 |
| FG | 4 |
| XAN | 5 |
| XBN | 6 |
| YAN | 7 |
| YBN | 8 |
| XAP | 9 |
| XBP | 10 |
| YAP | 11 |
| YBP | 12 |

CON Q (PF ENCODER)

| Signal | Pin No. |
|--------|---------|
| ZAP | 1 |
| ZBP | 2 |
| +5V | 3 |
| ZAN | 4 |
| ZBN | 5 |
| GND | 6 |
| NC | 7 |
| NC | 8 |
| FG | 9 |

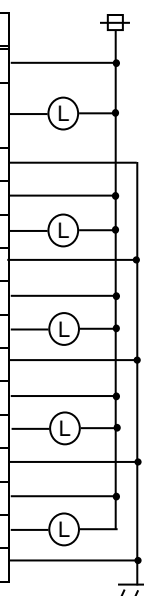
CON S (OPTION INPUT)

| Signal | Initial setting | Pin No. |
|--------|-----------------|---------|
| +12V | +12V | 1 |
| I8 | [NO] Do not | 2 |
| GND | GND | 3 |
| +12V | +12V | 4 |
| I9 | [NO] Do not | 5 |
| GND | GND | 6 |
| +12V | +12V | 7 |
| IA | [NO] Do not | 8 |
| GND | GND | 9 |
| +12V | +12V | 10 |
| IB | [NO] Do not | 11 |
| GND | GND | 12 |



CON T (OPTION OUTPUT) (output for solenoid valve)

| Signal | Initial setting | Pin No. |
|--------|------------------------------------|---------|
| +24V | +24V | 1 |
| O7 | [DSW] Sewing in progress output | 2 |
| GND | GND | 3 |
| +24V | +24V | 4 |
| O8 | [NO] Do not | 5 |
| GND | GND | 6 |
| +24V | +24V | 7 |
| O9 | [NO] Do not | 8 |
| GND | GND | 9 |
| +24V | +24V | 10 |
| OA | [NO] Do not | 11 |
| GND | GND | 12 |
| +24V | +24V | 13 |
| OB | [NO] Do not | 14 |
| GND | GND | 15 |



*Refer to page 15-7 for the ratings of solenoid valve

CON U ((USB connector) barcode reader)

| Signal | Pin No. |
|--------|---------|
| VBUS | 1 |
| DP | 2 |
| DM | 3 |
| GND | 4 |

‡ Please do not use to charge for the battery of electronic device.

CON V (LAN)

| Signal | Pin No. |
|--------|---------|
| TD+ | 1 |
| TD- | 2 |
| CT | 3 |
| GND | 4 |
| GND | 5 |
| CT | 6 |
| RD+ | 7 |
| RD- | 8 |

2. I/F BOARD (MIF)

(1) INPUT

CON2

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------------------|---------|
| XH | GND | Ground | 1 |
| | XH | X axis home position detection | 2 |
| | D12V | DC12V Power supply | 3 |

CON3

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------------------|---------|
| YH | GND | Ground | 1 |
| | GND | Ground | 2 |
| | YH | Y axis home position detection | 3 |
| | D12V | DC12V Power supply | 4 |

CON4

| Printed character | Signal | | Pin No. |
|-------------------|--------|---------------------------------|---------|
| ZH | GND | Ground | 1 |
| | GND | Ground | 2 |
| | GND | Ground | 3 |
| | ZH | PF axis home position detection | 4 |
| | D12V | DC12V Power supply | 5 |

CON6

| Printed character | Signal | | Pin No. |
|-------------------|--------|----------------------------------|---------|
| CH | GND | Ground | 1 |
| | GND | Ground | 2 |
| | GND | Ground | 3 |
| | CH | Abnormal stitch detection sensor | 4 |
| | D12V | DC12V Power supply | 5 |

CON10

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------|---------|
| AD | DC12V | DC12V Power supply | 1 |
| | AN0 | Analog input 0 | 2 |
| | AN1 | Analog input 1 | 3 |
| | GND | Ground | 4 |

CON14

| Printed character | Signal | | Pin No. |
|-------------------|--------|-------------------|---------|
| PENC | +5V | DC5V power supply | 1 |
| | +5V | DC5V power supply | 2 |
| | - | - | 3 |
| | - | - | 4 |
| | - | - | 5 |
| | - | - | 6 |
| | P2_AP | P2 axis encoder A | 7 |
| | P2_AN | P2 axis encoder A | 8 |
| | P2_BP | P2 axis encoder B | 9 |
| | P2_BN | P2 axis encoder B | 10 |
| | GND | Ground | 11 |
| | GND | Ground | 12 |

CON16

| Printed character | Signal | | Pin No. |
|-------------------|--------|-------------------------|---------|
| 24V | +24V | DC24V power supply | 1 |
| | PGND | Ground | 2 |
| | A24V | Analog 24V Power supply | 3 |
| | AGND | Analog ground | 4 |

CON20

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------|---------|
| I6 | 12V | DC12V Power supply | 1 |
| | I6 | [NO] Do not | 2 |
| | GND | Ground | 3 |

CON22

| Printed character | Signal | | Pin No. |
|-------------------|--------|---------------------------------------|---------|
| I5 | 12V | DC12V Power supply | 1 |
| | I5 | [HES] machine tilting detection input | 2 |
| | GND | Ground | 3 |

CON24

| Printed character | Signal | | Pin No. |
|-------------------|--------|-----------------------|---------|
| I4/O6 | I4 | [STP] Halt Switch | 1 |
| | GND | Ground | 2 |
| | 12V | DC12V Power supply | 3 |
| | O6 | [SSW]Halt stop output | 4 |

CON25

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------|---------|
| I7 | 12V | DC12V Power supply | 1 |
| | I7 | [NO] Do not | 2 |
| | GND | Ground | 3 |

TE1

| Printed character | Signal | | Pin No. |
|-------------------|--------|---------------|---------|
| TE1 | IC | [NO] Do not | A1 |
| | ID | [NO] Do not | A2 |
| | IE | [NO] Do not | A3 |
| | IF | [NO] Do not | A4 |
| | IG | [NO] Do not | A5 |
| | IH | [NO] Do not | A6 |
| | II | [NO] Do not | A7 |
| | IJ | [NO] Do not | A8 |
| | IK | [NO] Do not | A9 |
| | IL | [NO] Do not | A10 |
| | IM | [NO] Do not | A11 |
| | IN | [NO] Do not | A12 |
| | IO | [NO] Do not | A13 |
| | IP | [NO] Do not | A14 |
| | IQ | [NO] Do not | A15 |
| | IR | [NO] Do not | A16 |
| TE1 | 12V | DC12V | B1 |
| | GND | Ground | B2 |
| | 12V | DC12V | B3 |
| | GND | Ground | B4 |
| | 12V | DC12V | B5 |
| | GND | Ground | B6 |
| | 12V | DC12V | B7 |
| | GND | Ground | B8 |
| | 12V | DC12V | B9 |
| | GND | Ground | B10 |
| | 12V | DC12V | B11 |
| | GND | Ground | B12 |
| | 12V | DC12V | B13 |
| | GND | Ground | B14 |
| | 12V | DC12V | B15 |
| | GND | Ground | B16 |

(2) OUTPUT

CON9

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------|---------|
| DA | D12V | DC12V Power supply | 1 |
| | DA0 | DA output 0 | 2 |
| | DA1 | DA output 1 | 3 |
| | GND | Ground | 4 |

CON15

| Printed character | Signal | | Pin No. |
|-------------------|--------|-----------------------|---------|
| PM | P2B1 | P2 axis motor power B | 1 |
| | P2B2 | P2 axis motor power B | 2 |
| | P2A1 | P2 axis motor power A | 3 |
| | - | - | 4 |
| | - | - | 5 |
| | P2A2 | P2 axis motor power A | 6 |
| | - | - | 7 |
| | - | - | 8 |

CON26

| Printed character | Signal | | Pin No. |
|-------------------|--------|---------------------|---------|
| O1 | O1 | [T] Trimming output | 1 |
| | 24V | DC24V Power supply | 2 |

CON27

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------|---------|
| O2 | O2 | [W] Wiper output | 1 |
| | NC | — | 2 |
| | 24V | DC24V Power supply | 3 |

CON28

| Printed character | Signal | | Pin No. |
|-------------------|--------|--------------------|---------|
| O3 | O3 | [L] Thread release | 1 |
| | 24V | DC24V Power supply | 2 |

CON29

| Printed character | Signal | | Pin No. |
|-------------------|--------|----------------------------|---------|
| O4 | O4 | [OF1] work holder output 1 | 1 |
| | 24V | DC24V Power supply | 2 |

CON30

| Printed character | Signal | | Pin No. |
|-------------------|--------|---------------------------------|---------|
| O5 | O5 | [OIL1] Oil lubrication output 1 | 1 |
| | NC | — | 2 |
| | 24V | DC24V Power supply | 3 |

TE2

| Printed character | Signal | | Pin No. |
|-------------------|--------|---------------|---------|
| TE2 | OC | [NO] Do not | A1 |
| | OD | [NO] Do not | A2 |
| | OE | [NO] Do not | A3 |
| | OF | [NO] Do not | A4 |
| | OG | [NO] Do not | A5 |
| | OH | [NO] Do not | A6 |
| | OI | [NO] Do not | A7 |
| | OJ | [NO] Do not | A8 |
| | OK | [NO] Do not | A9 |
| | OL | [NO] Do not | A10 |
| | OM | [NO] Do not | A11 |
| | ON | [NO] Do not | A12 |
| | OO | [NO] Do not | A13 |
| | OP | [NO] Do not | A14 |
| | OQ | [NO] Do not | A15 |
| | OR | [NO] Do not | A16 |
| TE2 | 24V | DC24V | B1 |
| | GND | Ground | B2 |
| | 24V | DC24V | B3 |
| | GND | Ground | B4 |
| | 24V | DC24V | B5 |
| | GND | Ground | B6 |
| | 24V | DC24V | B7 |
| | GND | Ground | B8 |
| | 24V | DC24V | B9 |
| | GND | Ground | B10 |
| | 24V | DC24V | B11 |
| | GND | Ground | B12 |
| | 24V | DC24V | B13 |
| | GND | Ground | B14 |
| | 24V | DC24V | B15 |
| | GND | Ground | B16 |

* When the error occurs, outputs are turned off. However, "O4" outputs. Do not turned off except overcurrent error situation.

(3) PAL (CON W) and MIF board (CON U) USB connector

Conditions of application

- USB flash drive • • • • USB1.1 or USB2.0 or USB3.0 compatible USB flash drive
- Barcode reader (HID type)
- **We recommend using the attached USB flash drive. If you use a USB flash drive other than included, you may not be able to save or read normally.**

Inapplicable devices

- USB device requiring an external power supply (including Computer devices)
- USB hard disk drive, keyboard, mouse
- USB flash drive with fingerprint authentication function or with security function
- USB flash drive with hub function
- Media reader
- USB device without data storage function

USB connecting device

| | PAL CON W | MIF board CON U | Control box CON H |
|--|--------------|--------------------|----------------------|
| USB flash drive Standard 1.1、 2.0、 3.0 only | Yes | Yes | No |
| Barcode reader(HID type) | No | Yes | No |
| PC | No | No | Yes |
| Other USB device | No | No | No |

3. Ratings value of input /output

(1) Rated value of solenoid

| Power supply | Output | Resistance value | Usage rating |
|--------------|--------|------------------|--------------|
| DC24V | O1 | 6 Ω or more | A short time |

(2) Ratings value of the solenoid valve output

| Power supply | Output | maximum ratings current (Note 1) |
|--------------|----------------------|----------------------------------|
| DC24V | O2 | 1 total 0.5A or less (Note 1) |
| DC24V | O3 to O5 O7 to OB | 8 total 0.5A or less (Note 1) |
| DC24V | OC to OJ | 8 total 0.5A or less (Note 1) |
| DC24V | OK to OR | 8 total 0.5A or less (Note 1) |

(Note 1) Total maximum ratings current for solenoid and solenoid valves is 3.0A

(3) Output for display light or buzzer

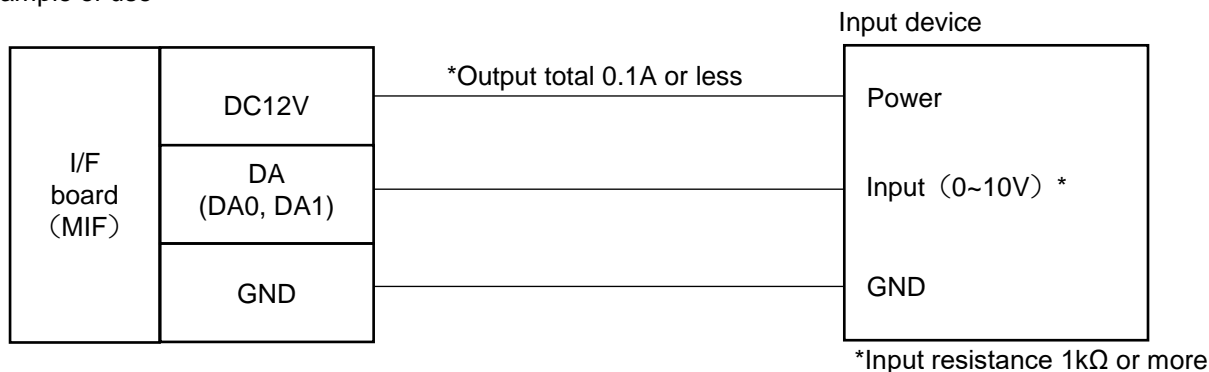
| Output | Printed character | Power | Maximum ratings current |
|--------|-------------------|-------|-------------------------|
| O6 | I4/O6 | DC12V | 0.1A or less |

(4) Analog output

| Output | Printed character | Power | Output voltage | Maximum ratings current |
|--------|-------------------|-------|----------------|-------------------------|
| DA0 | DA | DC12V | DC 0 to 10V | 0.01A or less |
| DA1 | DA | DC12V | DC 0 to 10V | 0.01A or less |

*Use the input resistance of the connection destination at 1kΩ or more.

Example of use



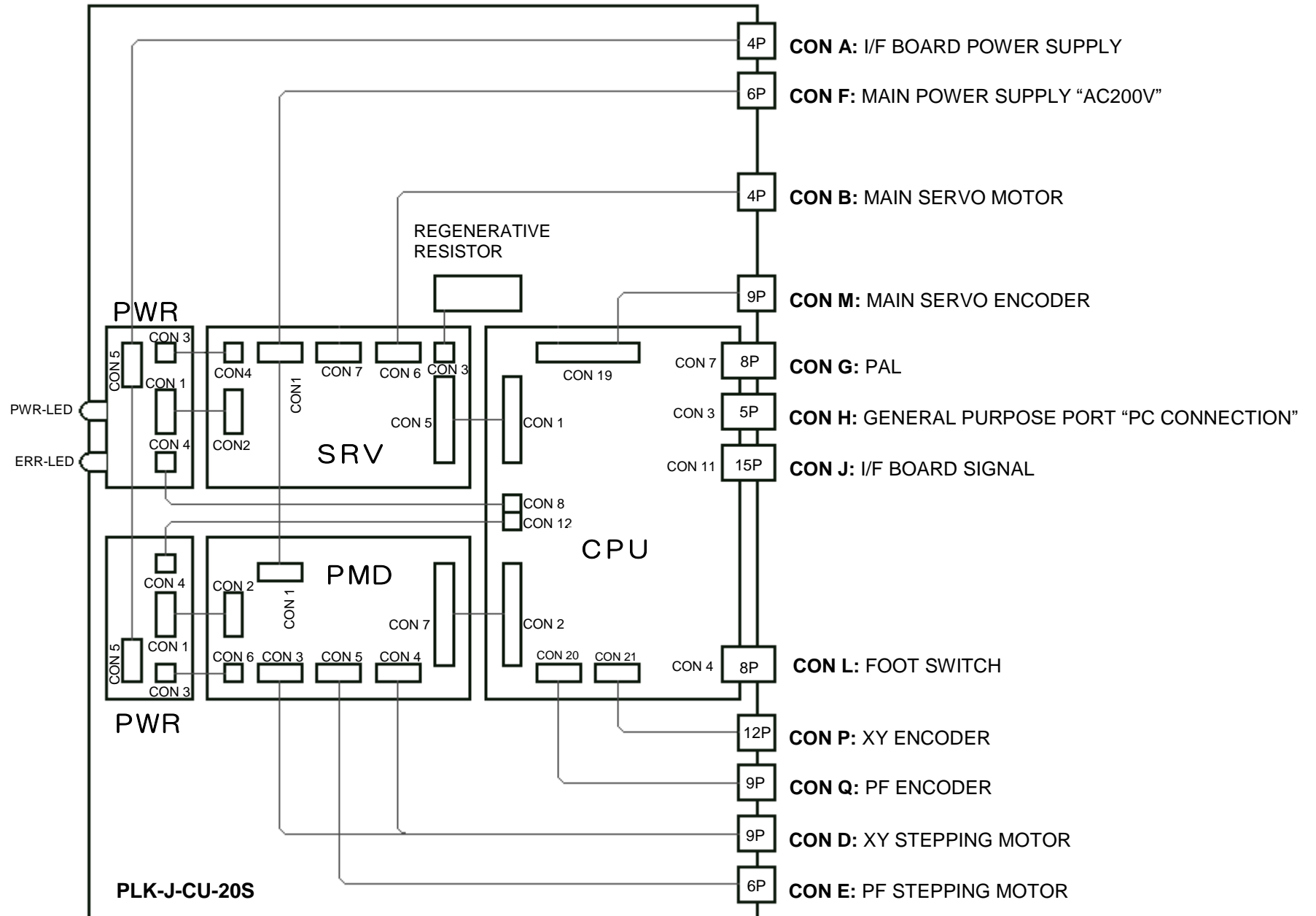
(5) Analog input

| Input | Printed character | Power | Input voltage |
|-------|-------------------|-------|---------------|
| AN0 | AD | DC12V | DC 0 to 12V |
| AN1 | AD | DC12V | DC 0 to 12V |

Example of use



[16] Wiring diagram inside control box



16-1

[17] Specifications

| Specifications | | Power source | 200 to 240V 50/60Hz Single phase or 3-phase | 200 to 240V 50/60Hz Single phase (Europe) |
|-------------------|-------------------------|--------------|--|---|
| | | Power unit | | - |
| Noise filter unit | | - | PLK-J-CE PLK-J-ACR | |
| Main servo motor | Rated output | 750W | | |
| | Rated speed | 3,000rpm | | |
| Control box | Model name | PLK-J-CU-20S | | |
| | Rated output | DC 24V | | |
| Condition | Power source | 1KVA | | |
| | Range of rating voltage | ±10% | | |
| | Ambient temperature | 5°C to 35°C | | |
| | Ambient humidity | 45% to 85% | | |

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