

NTN

Read the Instruction
Manual to the last before use and
operate the machine correctly.

Instruction Manual

(With Warranty Card)

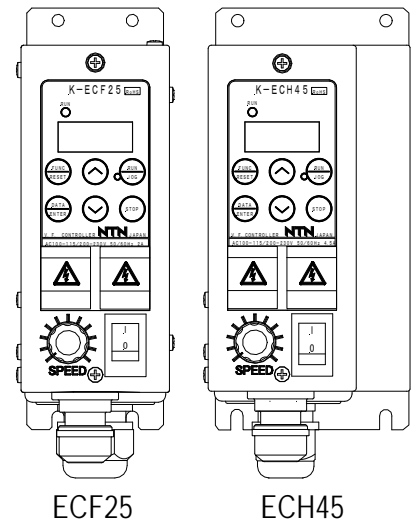
Small Sized Frequency Variable Controller

Basic Type

K-ECF25 (Control capacity 2A)

K-ECH45 (Control capacity 4.5A)

This Instruction Manual is applicable to Version 02.0 onward. Please use after confirming information displayed immediately after the power supply is turned ON. (Refer to P.22)



Introduction

Thank you for your purchase of NTN small sized frequency variable controller (basic type). In order to correctly and safely operate this controller, be sure to read through this instruction manual before using this device. This instruction manual with guarantee certificate shall be delivered to end users without fail. In addition, users shall keep this manual at the safe place where readily available whenever needed even after reading.

1. Before usage

In order for you to use this device correctly and safely and to make the most of its function, notes below and on the next page shall be observed.










- On receiving this device, please check if there is any failure due to the transportation. If you find any inconvenience such as a failure, do not hesitate to contact the nearest sales office.
- This controller is only for NTN electromagnetic parts feeder. Usage in other than this application or usage exceeding the specification range is prohibited. It may cause failures.
- The "parts feeder" described in this instruction manual is the generic names for the bowl feeder, the linear feeder and so on.

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2. Notes on Safety

As to the safety, users must have a great responsibility of their own. Be sure to begin any operation after reading through this operation manual. In addition, in order to use this controller with safe, be sure to obey the warning and caution labels of this device as well as to observe the following notes.

 Danger	<p>This description shows that not observing this remark and mishandling the device will cause the death or serious injury of human body with high probability.</p>
 Warning	<p>This description shows that not observing this remark and mishandling the device will cause the death or serious injury of human body.</p>
 Caution	<p>This description shows that not observing this remark and mishandling the device may cause an injury of human body or property damage.</p>
 Danger	
	<p>Please never work until the LED display of the operation panel turns. Please begin the work after two minutes or more pass after power supply OFF. There is fear of an electric shock.</p>
	<p>Please never drive with the panel opened (an emergency case is excluded). Moreover, please turn off the power supply when you open the panel. It gets an electric shock, short-circuited, and is likely to ignite.</p>
	<p>Please never do the wiring work without cutting off the primary side power supply or the main breaker. It gets an electric shock, short-circuited, and is likely to ignite.</p>
	<p>This controller is a controller only for the NTN parts feeder (electromagnetic type vibration part supply machine). It is not possible to use it for other usages such as a piezo-electric type parts feeders and the single phase motors. It gets short-circuited and is likely to ignite.</p>
 Warning	
	<p>Please ground the earth cables of the controller and the main body without fail. There is a fear of an electric shock if you do not ground it.</p>
	<p>Please never use it in the place with a gas or a liquid that explodes and ignites. It causes a fire.</p>
	<p>Please a person other than the repair engineer never performs disassembling, repairing nor remodeling this device. It may ignite, do abnormal motion to make him/her injured.</p>



Warning



It must not be used in a place where it exposes to water, oil or chemicals, or outdoors, or in a place of high temperature and humidity.
There is a fear of an electric shock, a fire or a failure.



Please do not scratch, pull or forcibly bend the wiring. Moreover, when a heavy thing is put on the wiring, or it is pinched, the wiring will be damaged. It causes a fire or an electric shock.

Please do not touch controller's output terminal during energizing the controller while even stopping.
There is a fear of an electric shock because the alternating current of maximum 200V is applied to the output terminal.

Please do not connect AC power to the output terminal (1 and 2).
It causes a fire or the breakdown.

Foreign objects such as paper, waste wood or oil must not be allowed to enter the controller, and the controller must not ruin its heat radiation by covering it with such as the cloth.
There is a fear of the burn or a fire, etc.

Please do not operate the switch by a wet hand.
There is a fear of an electric shock.

Please do not use it with other than the specified voltage.
It causes a fire or the breakdown.



Please turn off the power supply or the main breaker on the primary side when you replace fuses. There is a fear of an electric shock.



Caution



Temperature of heat dissipation fins and ambient of the controller box may become high (50~70°C). Please note that there is a fear of the burn. Moreover, please install a space for heat radiation in the surroundings. (Refer to P.7)



Please do not do "ON" and "OFF" of the power supply frequently.
The controller will break down.
(Please refer to the paragraph 7.-(4) **the wiring of external control input** in P.13)

Please do not repeat "ON" and "OFF" of the power supply in a short time.
A big inrush current flows and there is a possibility that the controller breaks down.



Caution

	<p>Please do not install it in the place where the vibration or the impact is acting. The controller breaks down.</p>
	<p>Please refer to the note of caution on the margin below when doing the dielectric breakdown test and megger test (measurement of the insulation resistance by the megohmmeter). The controller breaks down when making a mistake.</p>
	<p>Please do not do an operation such as switching of the displayed data or setting of the function etc. after power supply OFF (during the period from power supply OFF to LED turning off). When the subsequent power supply is turned on, it is likely to stop with Er2.</p>
	<p>There is a distinction between the ground phase and non-ground phase in the power supply. Please confirm the earth phase side of the power supply, and connect controller's specified terminal to the earth phase side. (Refer to 11). There is a possibility of causing a fire when the wiring is grounded.</p>
	<p>Please install the leak breaker or the leak detector on the primary side of power supply of the controller for the ground fault protection. Especially, please install it surely when it is not possible to connect it to the ground phase. There is a possibility of causing a fire when the wiring is grounded.</p>
	<p>Surely <u>connect the earth clip of the welding machine to the bowl</u> when welding to the bowl. An incorrect connection of the earth for the welding may burn the earth cable that connects the main body and the controller, and fears such as electric shock, leaks, and the burn of the controller exist.</p>
	<p>Please don't conduct the welding work without turning off the power supply or the main breaker on the primary side of the controller. There is a possibility of causing damage of the controller.</p>
	<p>Please select and use an appropriate cable according to the voltage used, the current, and the environment. There is a fear of a leak or a fire when a wrong cable is used.</p>
	<p>It doesn't stop immediately even if the power is cut off during the driving. Moreover, the run/stop key is effective only when the function is set. Therefore, when you urgently stop the machine when the driving is controlled from the outside, please stop it by using the external control signal.</p>
	<p>Please set the F/V curve and the current rating before driving the main body. When making a mistake in the setting, the magnet might be damaged by firing.</p>
	<p>Be sure not to install or drive a damaged controller or a controller which is lack in parts. There is a fear of an injury.</p>
	<p>The noise is generated from the controller or wiring and equipments connected to the controller. Please take care that neither a peripheral equipment nor the sensor will malfunction. There is a fear of an accident.</p>

*Note: Please execute the dielectric breakdown test with AC1500V or less between AC line and the earth, and DC500V or less between DC line and the earth. The leakage of current shall be 10mA or less. Moreover, during the test, the high pressure is charged in the internal capacitor. Be careful enough so as not to get an electric shock.

Terms appearing frequently in this Instruction Manual

1. "Parts feeder" means generic names of such as bowl feeders and linear feeders, and for NTN products only.
2. The one only written as main body indicates "Vibration main body of parts feeder".
3. The one only written as LED indicates the data display portion on the operation side (Refer to P.6).
4. Original NTN terms such as "air blow during driving" is used. Please inquire of NTN for details of the operation.

3. Function and Features

(1) High precision digital control with micro processor

As various settings and operations are controlled digitally, highly precise and highly stabilized control is achieved. At the same time, as a set value is displayed digitally, resetting of values is easy.

(2) Wide input "responding to wide voltage of power supply"

The input voltage ranges widely as AC100-115/200-230V \pm 10% (50/60Hz \pm 10%). The output voltage automatically changes to 100V output or 200V output according to the power-supply voltage. When the AC200V output is necessary for the AC100V input, please change to the type equipped with AC100V power source unit K-UE083.

(3) Overload protection (Refer to P.19, Function J01 in P.30)

When the current rating of the connected load is set, the output voltage is controlled automatically so as not to exceed this current value. While this function is operating, LED displays alternately the output voltage and OL for the attention to be drawn. When it is not possible to solve it even if the output voltage is lowered down to 20V or lower, the driving is stopped and an emergency warning (continuous lighting of OL) is issued. This function is applicable for a set value of the current rating over 0.2A, Setting is possible for 0.2A or less, but it becomes inaccurate.

(4) Multi-speed function (Refer to P.18, Function H11 to 17 in P.35, and P.37)

Three kinds of speed data can be memorized internally, and the speed can be changed by the switch signal from the outside. Moreover, non-step (1V unit) control of the output voltage by the analog voltage is possible.

(5) Enhancement of the protection function

Driving is stopped to protect the controller and peripheral equipments and the circuit arrangement when output short-circuit, earth fault*1, overload, decrease in power-supply voltage*2 etc. occur.

*1 The earth fault in this controller means the short-circuit with the earth on the output side. Please note that the protection against neither the earth fault in the internal circuit nor the leak is effective.

*2 When the power-supply voltage decreases, LV is displayed and the driving is stopped. When the power-supply voltage returns, the controller returns automatically too. Please note that the driving begins when the operating conditions are complete.

(6) Panel lock (Refer to P.36)

The operation from the operation panel can be prohibited if necessary. A wrong operation by an operator or unintended change of setting by his/her contact etc. can be excluded. Two kinds of locks, the operation lock and the knob lock, are installed according to the restricted range.

(7) Timer for air-blow and input/output terminal are equipped (Refer to P.15 to 17 and P.33 to 34)

Because the control circuit of the solenoid valve for the air blow is included as standard equipment, the control of air-blow during driving or two rows AND air-blow etc. can be easily used.

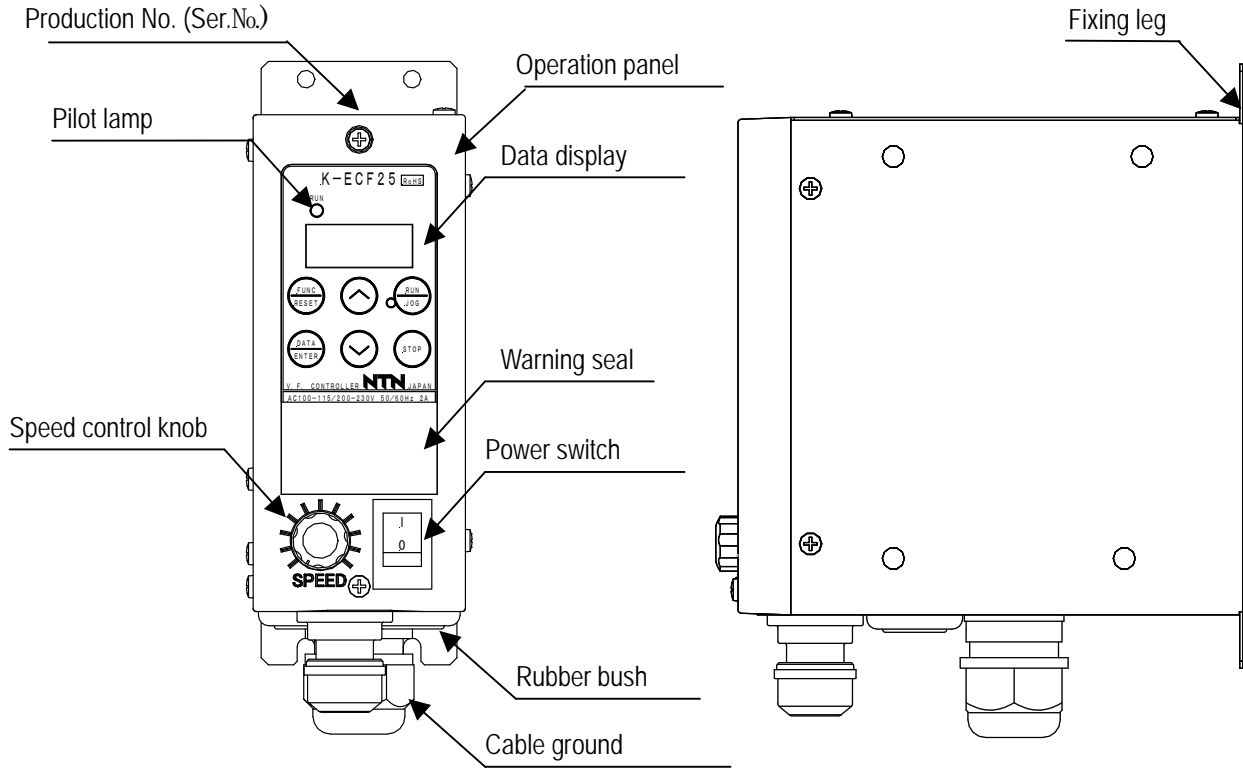
(8) Work shortage detection function (Refer to P.19, Function H08 to H10 in P.34 to 35)

The work shortage detection timer is installed.

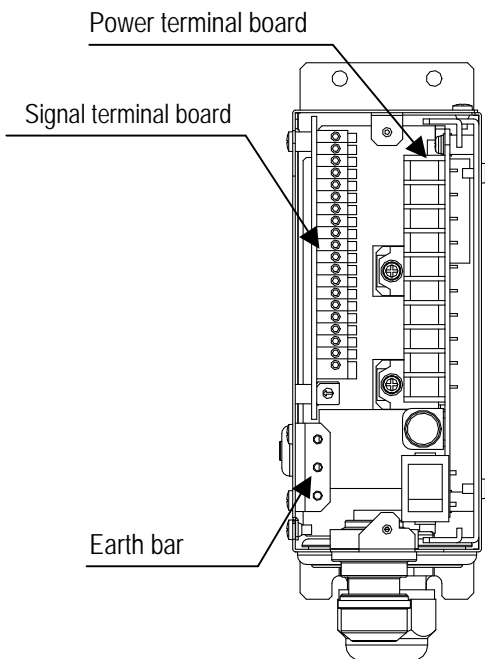
4. Appearance and Names of Portions

The following diagram is explained about K-ECF25. But the layout of parts is same with K-ECH45.

(1) Appearance diagram (Please refer to P.44 for dimensions)

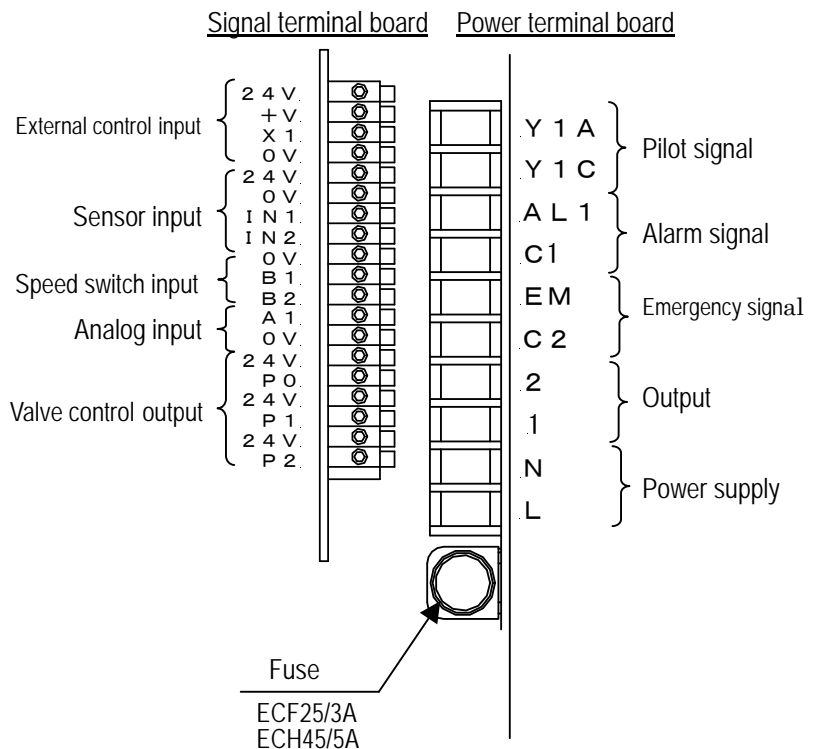


(2) Terminal board (the panel is open)



Terminal board layout (Magnified diagram)

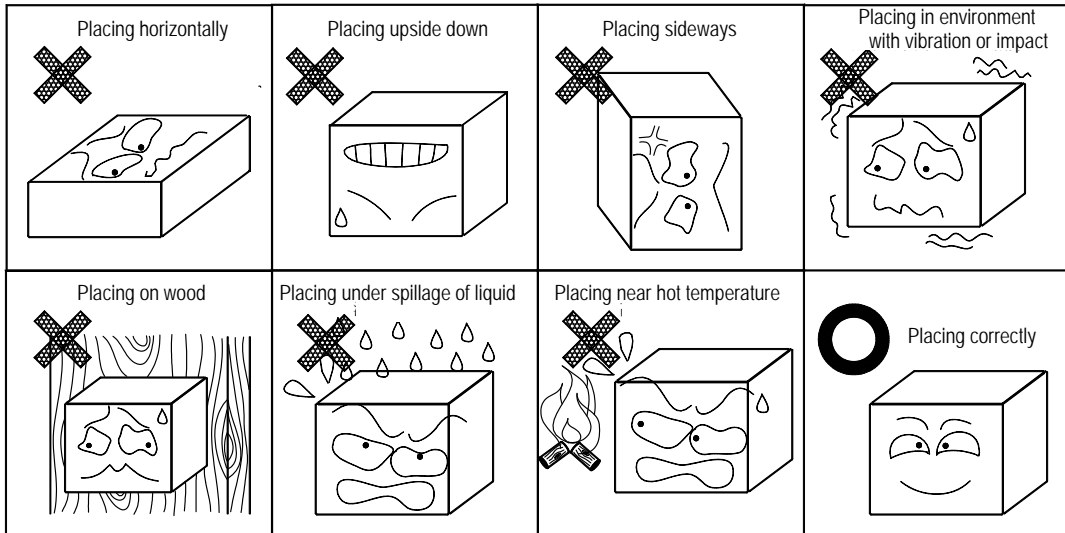
Terminal names are printed on the board.



5. Installation

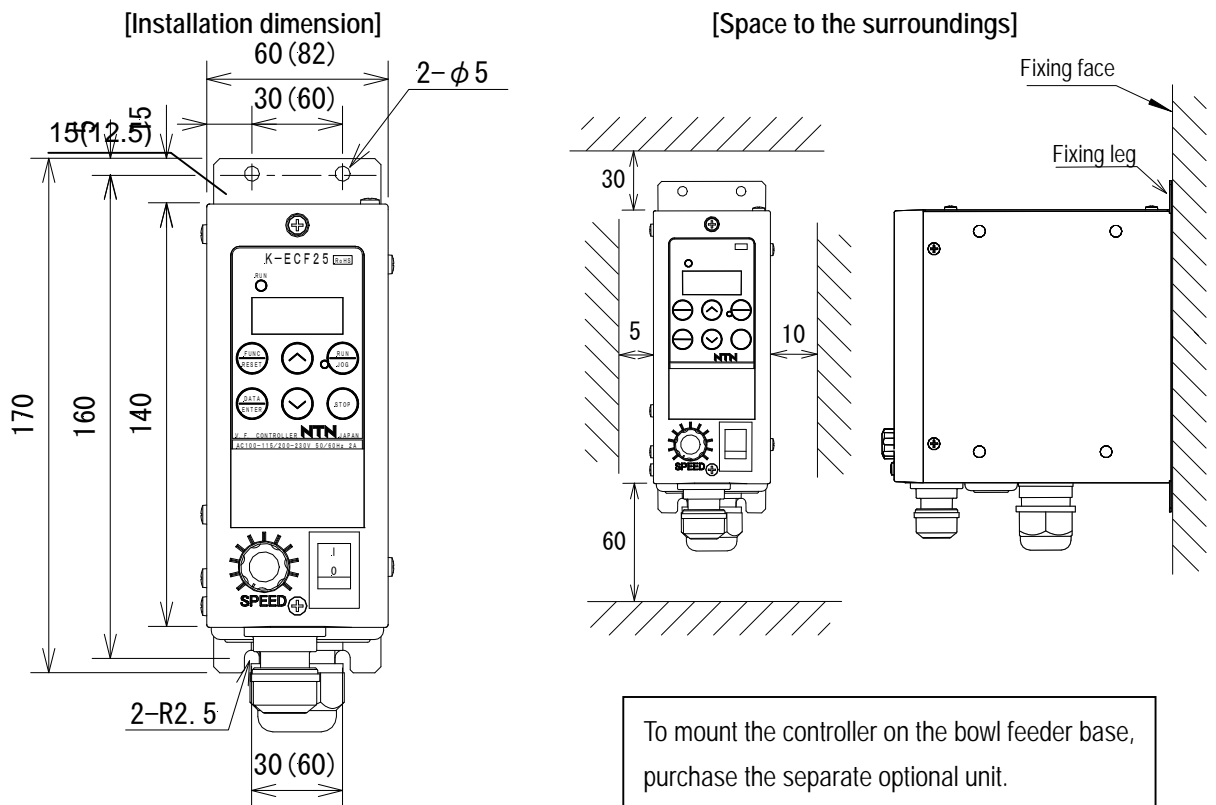
(1) Installation place

- ① Please install it on a firm material such as metals (nonflammable material) having no vibration.
- ② Please have a space in surroundings without fail so as not to ruin heat radiation and install it vertically.
- ③ Oils and fats and chemicals, etc. may hurt the resin, painting, and the cable of BOX. These liquid and mist must not splash directly on the controller.



(2) Installation hole and surrounding space

Please refer to the figure below for the size concerning controller's installation. Moreover, it is necessary to leave a space shown in the figure below in the surroundings of the controller for heat radiation (Unit: mm)



Figures in () are dimensions for ECH45

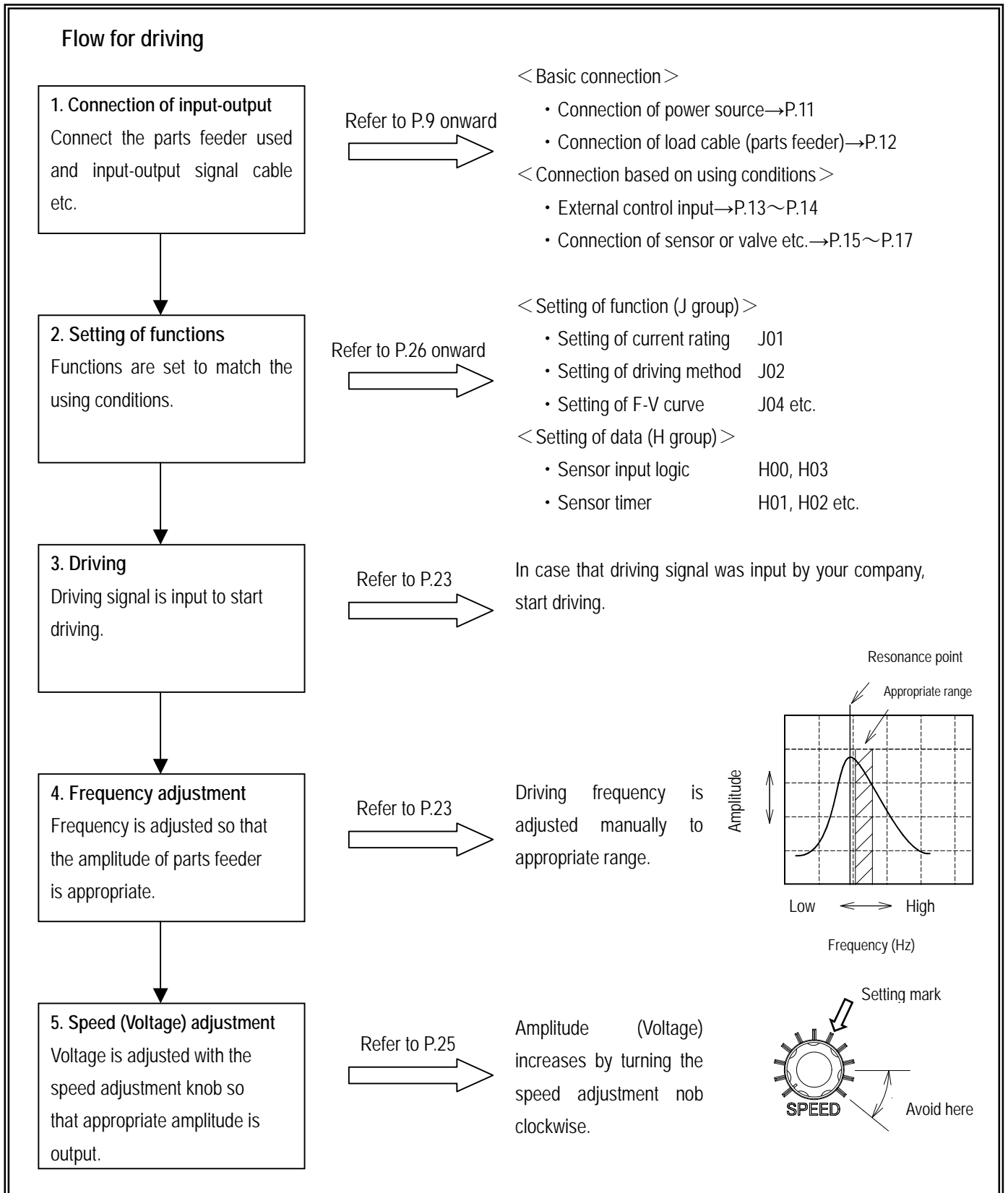
To mount the controller on the bowl feeder base, purchase the separate optional unit.

Base mounting bracket: K-PZ0466

For details, ask NTN.

6. For the first time use

When you use the controller first time after the purchase, please make connections of input-output, and set all kinds of functions according to the followings. In case that you purchase it as a completed product, setting etc. is not necessary. But please check connections and settings without fail before driving.



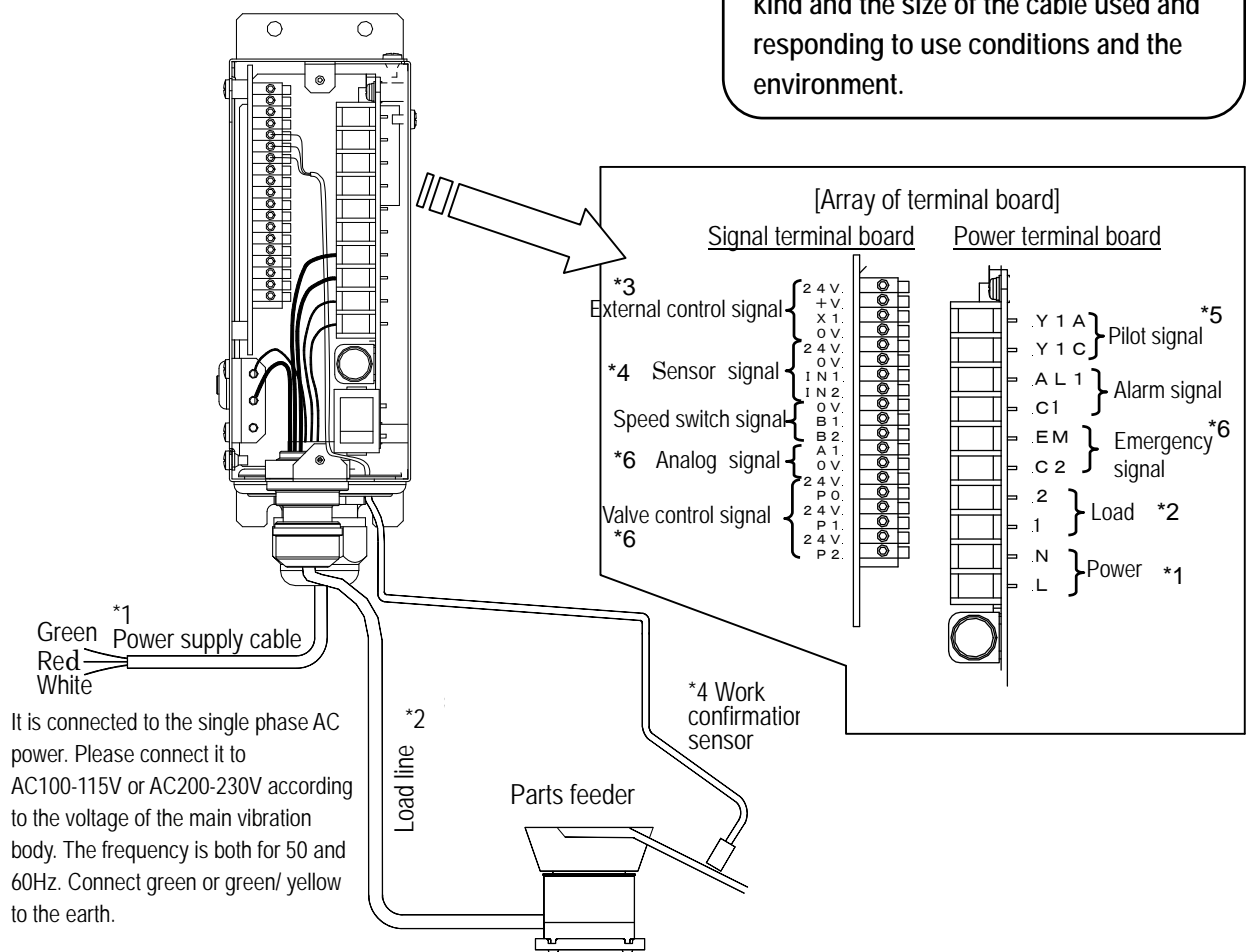
7. Connection of Input / Output

External connection diagram (Also refer to the block diagram in the next page)

(Details of each wiring are described in the page shown in the notes written below, therefore please refer to them.)

⚠ Danger
Do the wiring work after cutting off the main breaker without fail. It is likely to get an electric shock.

⚠ Caution
Please select an appropriate type to the kind and the size of the cable used and responding to use conditions and the environment.



Caution

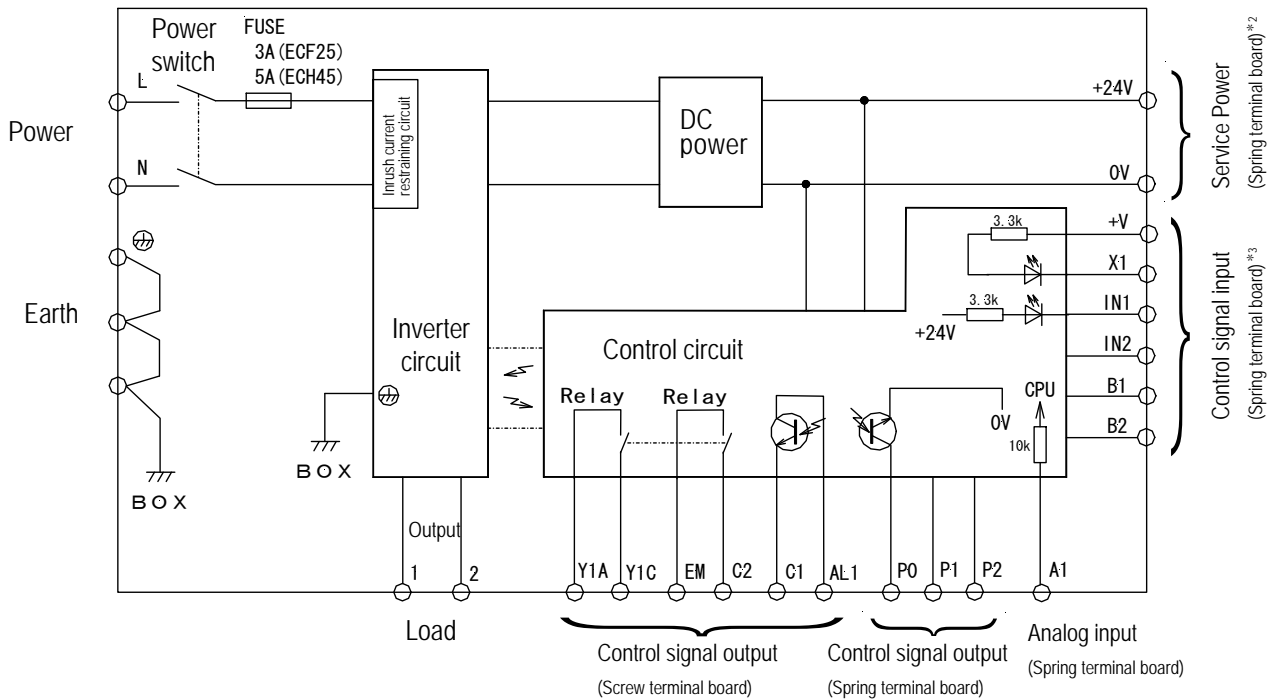
Please refer to the descriptions in caution for safety in P.2 to 4 and explanations for each item below for the wiring method and cautions when wiring.

- | | | |
|--------------------------------------|-----------------------------|--|
| *1 Wiring of power supply | P.11 | Refer to paragraph "Connection to power supply" |
| *2 Wiring of load | P.12 | Refer to paragraph "Connection to load line" |
| *3 Wiring of external control signal | P.13 to 14 | Refer to paragraph "Wiring of external control input" |
| *4 Wiring of overflow sensor | P.15 to 17 | Refer to paragraph "Connection of sensor/solenoid valve" |
| *5 Receiving of drive signal | P.19 | Refer to paragraph "Wiring of drive instruction output" |
| *6 Others | Multi-speed control P.18 | Refer to paragraph "Multi-speed function" |
| | Valve wiring P.16 to 17 | |
| | Alarm/emergency signal P.19 | |

※ Connecting method of input/output in the following pages is explained basically for ECF25, but the same specification is also applied to ECH45.

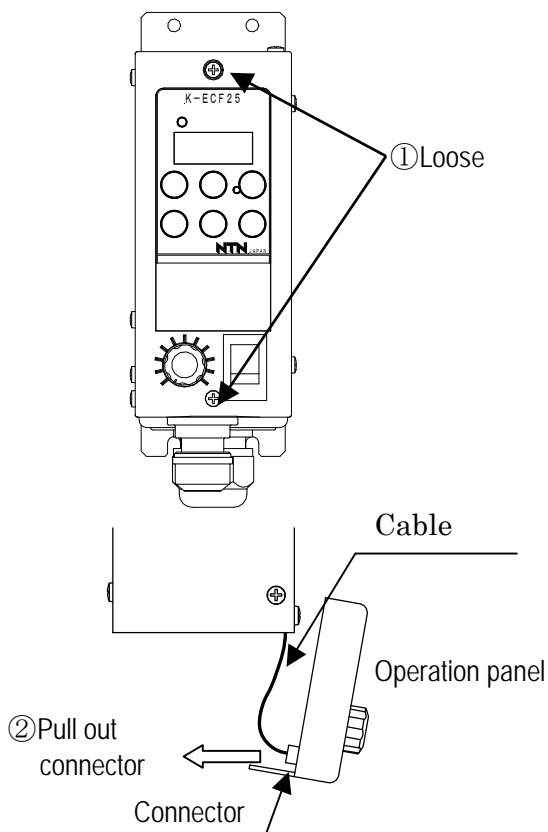
Controller block diagram (Refer to the previous page and the final page for wiring)

Controller K-ECF25 (ECH45)
(Sequence order is different from the actual terminal array)



- *1 The array of the terminal in the above figure is different in sequence order from the actual terminal array.
- *2 0V of the input circuit and 24V of the input/output circuit are all common.
- *3 The input circuit of IN1, IN2, B1 and B2, and the circuit configuration of the output circuit of P0, P1 and P2 are the same circuit configuration respectively.

(1) Remove the panel



⚠ Danger

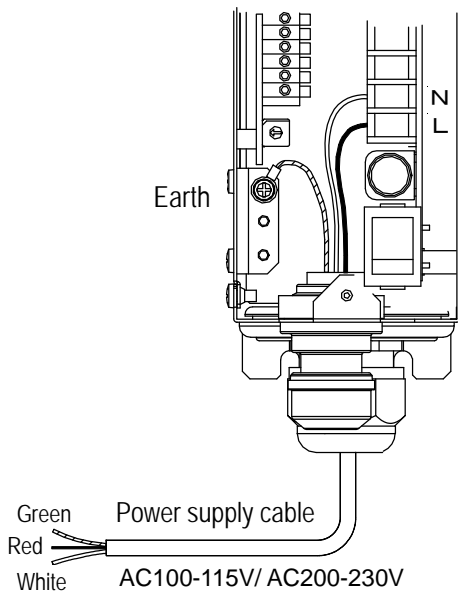
Do the wiring work after turning off the main breaker without fail.

- ① Loose two fixing M3-screws on operation panel and remove operation panel. They are drop-out protection types and if they are turned 3 to 4 times, they will come off. If they are turned excessively, they may drop out.
- ② Operation panel is connected to internal main circuit board with cable. Pull out connector of operation panel side, then remove operation panel.

Note) Wiring work while operation panel remains connected, may load to the connector of main circuit board side and result in loose connection. Be sure to perform wiring work after cable is removed from operation panel.

(2) Connection to power supply

For details of the terminal board layout, please refer to P.6 and P.9.



Warning

Connect the earth cable without fail. There is a fear of an electric shock if the earth is not connected.

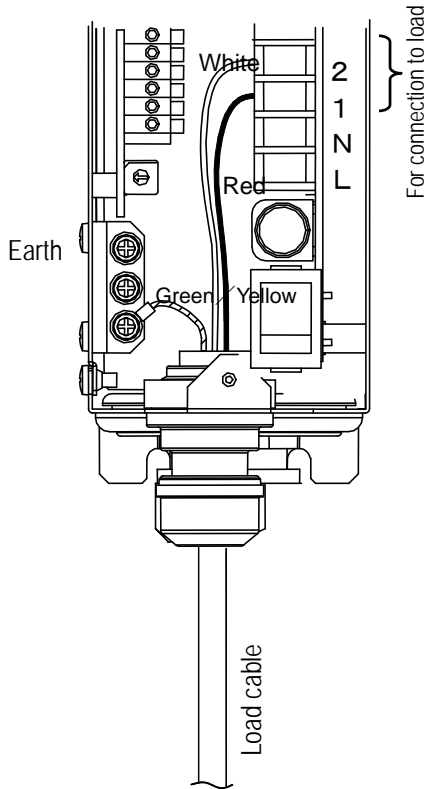
The power supply cable is connected to the single phase power supply. At this time, please connect the terminal N (color of the lead: white or black 2) to the earth phase side for protection against the earth fault without fail.

Please note that the output also becomes AC100V, when connecting it to the AC100V power supply. When you want to make it to the AC200V output by the AC100V input, change to the controller equipped with AC100V power supply unit is required. Please contact NTN for the details.

Name of terminal board	Color of lead	Remarks	
L	Red or Black 1	Non-earth side	} Single phase power
N	White or Black 2	Earth side	
Earth bar	Green of Green /Yellow	Earth	

- Note 1. The controller for the parts feeder must be connected to the power supply of the commercial power or the sine wave voltage output. Please do not connect it to the output side of the inverter that contains the harmonic component such as sine wave PWM inverters. The controller breaks down.
- Note 2. Please set up a leak detector or a leak breaker on the controller primary side for the protection of the earth faulty-accident. Refer to the paragraph of the specification in P.43 for the current rating.
- Note 3. Power supply cable length shall be 10m or less. Moreover, please use the cable of the size of 2.5mm² or more when extending it to 3m or more (The protection coordination with the primary side breaker is noted). Since it is necessary to remove the cover on the left side when you connect the power supply cable, the engineer who is familiar with controller's content shall do this operation. Additionally, the connection to the controller terminal board must be done by using the round type crimping terminal (The terminal screw: M3).
- Note 4. Please refer to "Notes for transfer usage" in the bottom column in the next page when you use the transformer.
- Note 5. Correct earth shall be checked by a protection continuity tester after the earth construction work ends. When the earth is imperfect, it is likely to get an electric shock.
- Note 6. There is a possibility that the noise is added in the power supply line. Please take measures such as separation of the power supply from equipments which dislike noise or insertion of noise filter. Moreover, please do not put the main circuit (power supply or load line) and the signal line in the same duct (protection tube).
- Note 7 It is possible to connect it to the three phase power supply. In this case, please use two phases (for example, R and S phases) out of three phases (R, S and T) for the power supply. In addition, please wire after confirming the phase grounded by a voltage detector etc. so that the terminal on N side is the earth phase. Please wire through a leak breaker when the earth phase is unknown.

(3) Connection of load line



Please connect the load line (load cable of the parts feeder attachment) to the terminal board through controller's cable ground. As the voltage of max AC200V applies to this terminal, be careful of the wiring enough. Please refer to the following note 1 when extending the line.

Name of terminal board	Color of wiring
1	Black 1 or Red
2	Black 2 or White
Earth bar	Green/Yellow, Green or Black

- *1 Please do not connect this to other than the parts feeder. It breaks down.
- *2 Please refer to P.14 when connecting the hopper separately placed as wiring of level switch is necessary.
- *3 The connection to the controller terminal board must be done by using the round type crimping terminal (The terminal screw: M3).

Note 1 Extension of cable length

Please use the size of 1.0mm² or more when you change the cable. Moreover, when extending it to 3m or more, please connect it to the main body cable by extending it to the vicinity of the main body by using the cable of the size of 2.5mm² or more, and using the relay BOX. Extension length shall be 10m or less.

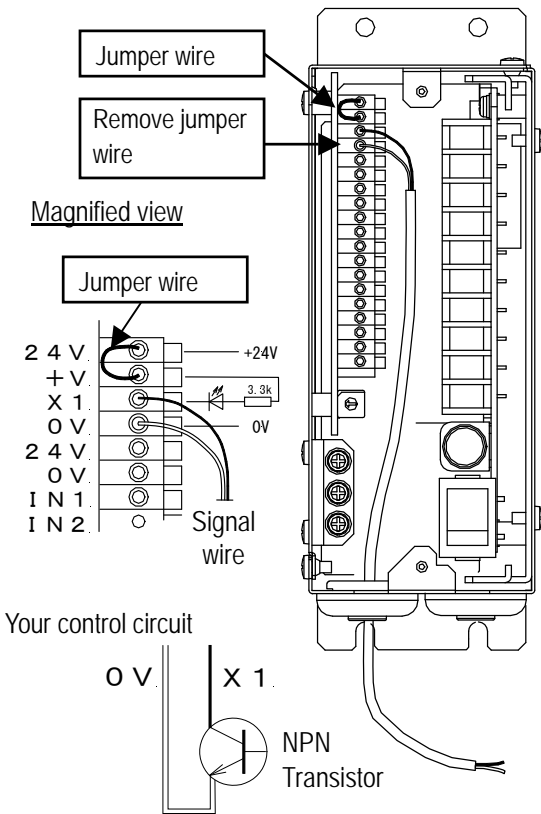
Note 2 There is a possibility that the noise is added in the power supply line. Please take measures such as separation of the power supply from equipment which dislike noise or insertion of noise filter. Moreover, please do not put the load line and the signal line in the same duct (protection tube).

Note 3 Correct earth shall be checked by protection continuity test machine after the earth construction work ends. When the earth is imperfect, it is likely to get an electric shock.

* Notes for transformer usage

Please note not only the current rating but also the voltage descent due to the inrush current, etc. when you supply power to the controller through the transformer. Please note enough the voltage descent at power supply ON and the trouble due to the noise especially when the transformer is set commonly with other equipment. Please consult the transformer maker about details of the problem when supplying the power to the controller (inverter). Please refer to the paragraph of the input in P.43 for controller's inrush current. Moreover, to reduce the influence by the noise, the use of the shielded wire or wiring of a distance as short as possible is recommended.

(4) Wiring of external control input



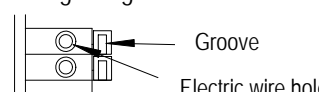
⚠ Caution
 24V, X1 and 0V terminals have polarity. Please be careful of wiring enough. In addition, please never connect it to AC power.

⚠ Caution
 Parts feeder's ON/OFF control must use the external control input terminal. ON/OFF control by the power supply is impossible.

Wiring method to control parts feeder's ON/OFF from outside when the function is a standard setting, is explained.

- ① The short circuit between terminals 24V-+V is confirmed. When there is neither jumper wire nor control wire etc. for the short circuit, short circuit shall be made.
- ② The jumper wire between terminals of X1 and 0V is removed, and the relay contact (or NPN transistor) is connected between these terminals. Use the IN input when the ON/OFF delay timer is used.

Cables used to control should be prepared in your company.

<p>Size of wire used for terminal board (spring type) for signal For strand wire: 0.14~1.0mm² Length of stripping: 10mm For use of sleeve type crimping terminal: 0.25~0.34mm² Example of sleeve type crimping terminal: AI0.25-12BU [Phoenix contact]: 0.25 mm²</p>	<p>Wiring to signal terminal board</p>  <p>While inserting the minus driver into the groove and pushing the electric wire deep, insert the wire into the electric wire hole. Release the driver, then the electric wire is fixed.</p>
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When function №. JO2 is set as 1 (standard), followings are resulted.

- With short-circuited state between X1 — 0V, parts feeder is driven (for NPN transistor output, it is Lo level)
- With open state between X1 — 0V, parts feeder is stopped (for NPN transistor output, it is High level)

When the logic is reversed (JO2 is set as 0) by the function, it is driven with open state. Please refer to P.31 for the setting of the function JO2.

Please refer to the next page when controlling by the PNP transistor output or using it for the hopper control.

Note 1 The current of DC24V 7mA flows between terminals X1-0V. Please be careful of the noise enough because it is a minute electric current.

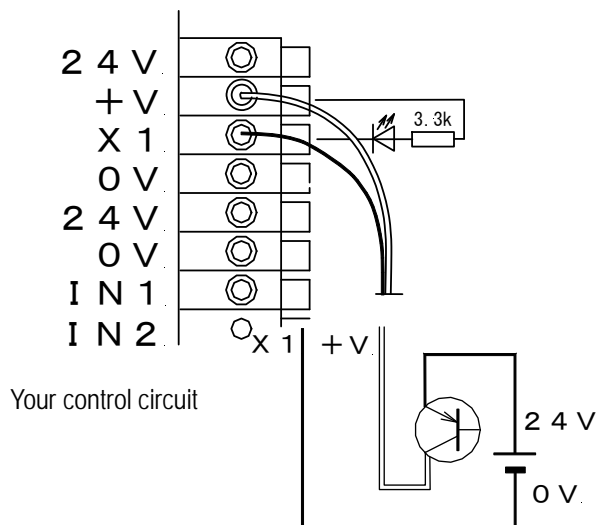
Note 2 The cable length of signal input line (24V, +V, X1, 0V) should be within 10m. Adopt a twist wiring if it is possible.

In case of no external control used

When the external control terminal is not used, make function JO2 setting as "1" and have the external control input terminal short-circuited (at two positions of 24V-+V and X1-0V). The controller drives continuously. Even if the setting of JO2 is made "0" and the external control input terminal is opened, it becomes a continuous driving.

***1 Wiring method when controlling with PNP transistor output**

For the electric wire size for wiring, refer to the boxed article in the middle of the previous page.



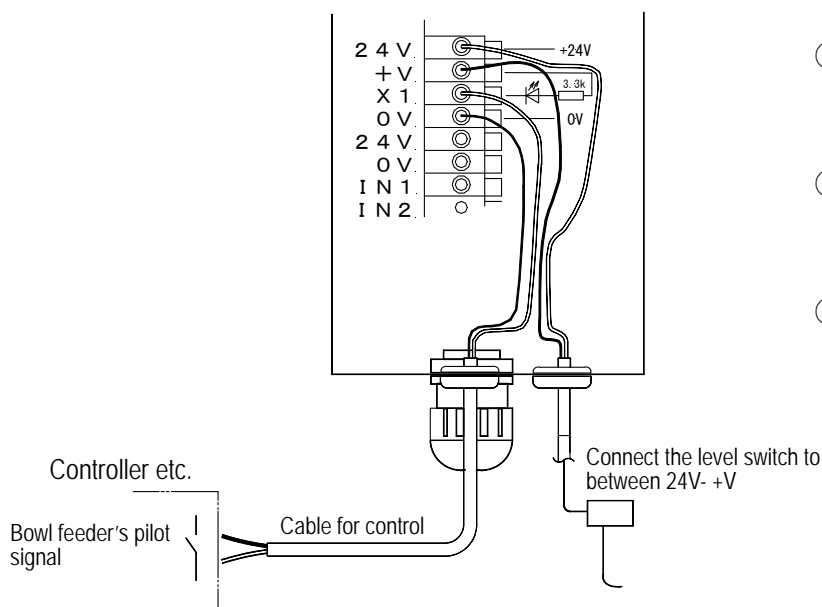
When controlling by the PNP transistor, please connect the output (collector) side of the PNP transistor to +V terminal, and the terminal X1 to the common line (0V) side of the controlling equipment. The current of about 7mA flows under the control with 24V because internal resistance of 3.3kΩ is connected.

Your 24V power supply is used in case of the PNP control.

It is possible to control similarly even by the relay contact instead of the transistor.

The selection of the logic of the driving or the stop at the short-circuit can be selected by the function J02.

***2 Wiring method when connecting to the hopper separately placed**



- ① Connect the hopper separately placed to the terminals of earth bar 1 and 2.
- ② Connect the level switch of the separately placed hopper to between the terminals 24V-+V.
- ③ Insert the pilot signal (Y1C, Y1A) of the controller for bowl feeder into between terminals X1-0V.
- ④ Use data of function J02 by setting it as 1 (between terminals X1-0V [ON when short-circuited]).

In the above-mentioned connection, the separately placed hopper drives only when the bowl feeder is driving and also the level switch is ON (short-circuited between terminals 24V-+V). The current of DC24V/7mA flows in the level switch.

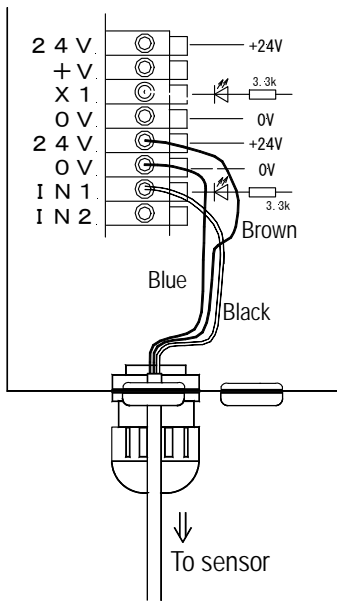
- *1 Please refer to the operation manual of the separately placed hopper.
- *2 Please refer to the previous page for the terminal X1-0V (external control).

(5) Connection of sensor/solenoid valve

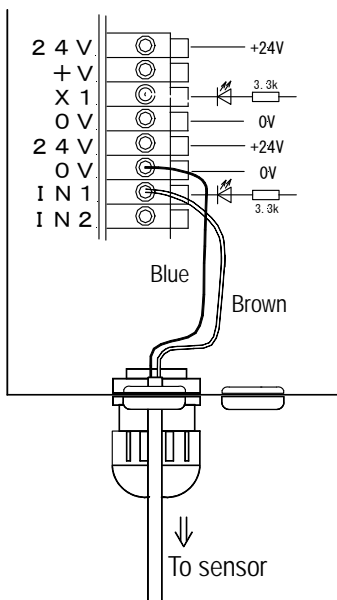
Basic method to use sensor and solenoid valve is explained as below.

1. Overflow control by sensor

Connection of 3 wire type sensor



Connection of 2 wire type sensor



About breeder resistance

When the pilot light of the sensor blinks but such a symptom as that the controller cannot capture the signal of the sensor comes out, insert the breeder resistance. Normally the wiring is not required.

Caution

Driving stops when the power supply (DC24V) for the sensor is short-circuited (the display also is turned off). Please be careful of the wiring work sufficiently.

① The work confirmation sensor that detects the overflow on the chute is connected to terminals of 24V, 0V and IN1.

*1 The sensor that can be connected is limited to the one whose current consumption is 50mA or less and the NPN transistor output type that can be operated at the voltage of DC24V or the non-voltage contact output type.

*2 Please connect +side of the sensor to IN1 and -side to 0V when you use the two wire type DC sensor. Please use the sensor of leakage current 1mA or less and residual voltage 3V or less. Turning off of the input signal may not be detected according to the kind of sensor. In this case, please connect the bleeder resistance to between terminals 24V-IN1 (tightened together with the sensor lead).

Bleeder resistance: 7~5.1kΩ, 1/2~1/4w

*3 Wiring of the non-voltage contact type is the same as that of the DC two wire type sensor. Bleeder resistance is not necessary.

② Please make the terminal IN1 open, and set the function H00 to 0 when you do not use the sensor. As the terminal IN1 is always monitored, if the setting is mistaken, there is a possibility that driving is not executed (The rightmost decimal point of the data display portion turns on a light when there is a signal of logic that instructs work existence in the sensor input) (Refer to the figure below).

③ The signal logic of the sensor (normally open/normally close) can be changed by the function H00 (Refer to P.33).

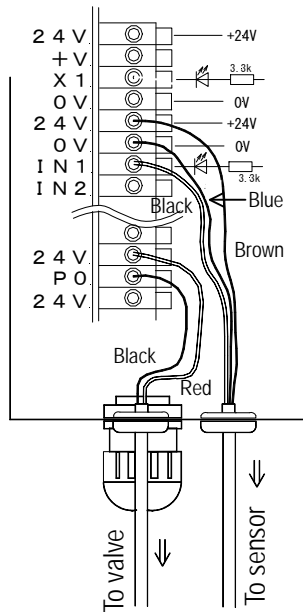
Display of sensor signal by LED (Also refer to P.36)



The decimal point lights when the signal of sensor 1 indicates the state of work existence. The state of sensor 2 is expressed by the third digit from the right (white small circle in the above figure). Only when the use of the sensor is set, it is displayed. Please do not mistake it for the decimal point.

2. Air blow control during driving

For the electric wire size for wiring, refer to the boxed article in the middle of P.13.

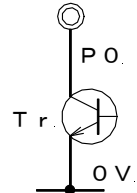


When connecting the solenoid valve for DC24V to between 24V-P0, the solenoid valve can be turned on during driving the load (being linked with driving). Please use it when you want to turn ON/OFF the air for tooling auxiliary in time along with parts feeder's driving.

The solenoid valve that can be connected is for DC24V. Use the one with the surge killer of 0.5W or less.

<Internal circuit of valve driving>

The transistor is turned on when conditions are satisfied, and the terminals P0 and 0V are in continuity. Terminals P1 and I P2 are also similar.

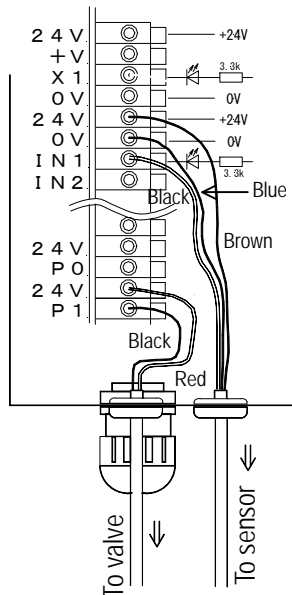


Switching capacity: DC30V, up to 0.1A

Note

The length of the cable connected to the output lines of 24V, P0, P1, P2 and 0V, etc. should be within 10m. Please wire the device to which a noise suppression element is attached.

3. Air overflow control by sensor



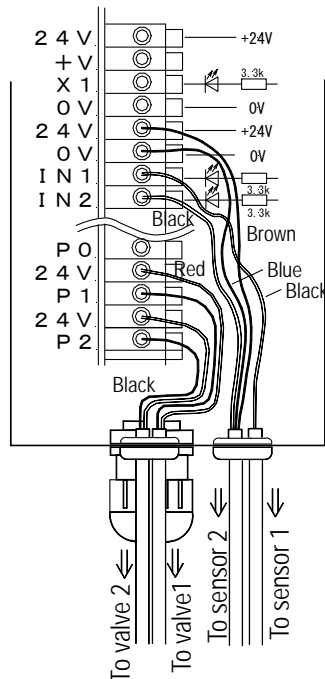
When you control the overflow control with air by using the sensor signal on the chute, please select 2 or 3 by the function H00, and connect it as shown in the left figure. When 2 or 3 is selected by function H00, parts feeder's control becomes only by an external control with the use of the terminal X1 and after being processed by the timer, the sensor signal drives the valve control terminal P1. P1 becomes ON (OFF) in the state of full work and P1 becomes OFF (ON) in the state of work shortage. ON/OFF is decided by selecting 2 or 3 (Refer to P.33. It is the same as a logical reversing of the sensor signal). The terminal P1 doesn't operate when driving stops.

Take care that the current consumption of the sensor and the solenoid valve does not exceed the capacity of controller's service power supply. The terminal P0 can be used for ON/OFF of the supplementary air during driving while using the terminal P1.

The configuration and the switching capacity of the drive circuit are the same as those of the terminal P0. Other notes for the connection are also the same as for the terminal P0.

4. Two rows AND air overflow control by two sensors

(In case that overflow is controlled by air)



When discharging with two rows by the parts feeder, in case of using the air for discharging the work due to overflowing, the overflow control for each row with use of air becomes possible by installing two sensors for overflow and setting the function H00 to 4 or 5.

The signal of sensor 1 is processed at set time of ON/OFF delay timer 1, and output to the terminal P1, and the work is discharged by the air at the time of full work. The signal of sensor 2 is processed at set time of ON/OFF delay timer 2, and output to the terminal P2, and the work is discharged by the air at the time of full work. The parts feeder is stopped, and the air is turned off for the case of both sensor 1 side and sensor side 2 being full.

Be careful that the total current consumption of the sensor and the solenoid valve does not exceed the capacity (200mA) of controller's service power supply. The terminal P0 can be used for ON/OFF of supplementary air during driving while using the terminals P1 and P2.

The configuration and the switching capacity of the drive circuit of P1 and P2 terminals are the same as those of the terminal P0 (Refer to P.16).

Other notes for the connection are also the same as for the terminal P0.

When the solenoid valve is not connected, it is possible to use it as two rows AND overflow control in the paragraph 5 (1) below. In this case, although a logic reversing of each input becomes possible, because the timer is added for each, it is necessary to set the time of timer for both 1 and 2 of ON/OFF Delay.

5. Other controls by sensor and solenoid valve

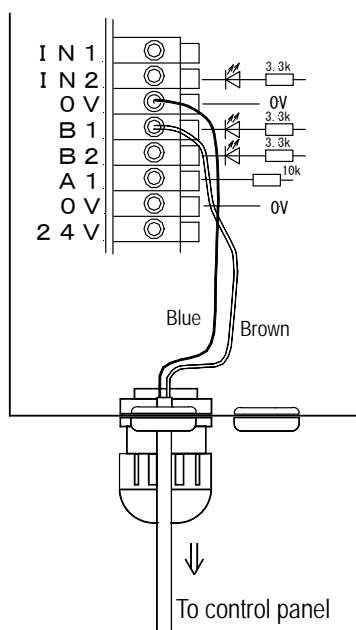
In addition to 1~4 explained above, the following controls are possible.

- (1) To stop the parts feeder with the two rows AND overflow by using two sensors in case of discharging two rows by the parts feeder. (In case that air is not used for the overflow control)
- (2) In case that one row is discharged on the chute, overflow sensor is fitted respectively to chute inlet and outlet, then when the work exists, the sensor at the chute inlet turns the parts feeder OFF, and when the work does not exist, the sensor at the chute outlet turns the parts feeder ON.
- (3) The overflow sensor on the chute outputs this sensor signal to the terminal P2 as well as controlling the normal overflow (branching of signal).
- (4) The overflow sensor controls the normal overflow and also outputs the jam signal to the terminal P2 when the work is not detected for a certain time. It can be used for jam air blow control of NTN spring separate feeder.

※ As for the air overflow control (NTN internal nominal designation) explained on P.16~17, the behavior becomes rather complicated. When you are already well aware of the content, it is possible to cover the wide range control by using these functions. Please contact NTN for the detail or obtain separately the control manual for confirmation.

(6) Multi-speed function

(6) - 1. In case that memorized speed data is used



Control signal must be either NPN transistor output type or no-voltage contact output type.

It is possible to drive at the speed data (frequency and voltage value) memorized inside of the controller by using terminals B1 and B2.

Speed 1 is attained by short-circuiting the terminal B1 to 0V, speed 2 by short-circuiting the terminal B2 to 0V, speed 3 by short-circuiting both terminals B1 and B2 to 0V, and in case of both terminals being open, the speed is set by the panel (also refer to "Note on wiring" below).

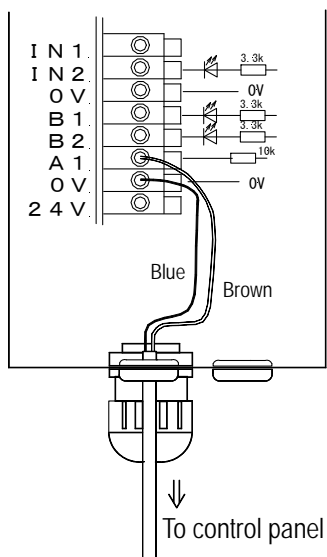
The setting of each speed can be done by writing the data directly in the function H12 to H17 or by transferring the present value at which the machine is driven to the specified speed (Refer to P.35 and P.37).

	Speed 0	Speed1	Speed 2	Speed 3	Analog
	Panel	Digital memory			Outside
Function H11	0	0	0	0	1
Terminal B1	OFF	ON	OFF	ON	
Terminal B2	OFF	OFF	ON	ON	
Terminal A1	Invalid	Invalid	Invalid	Invalid	Valid

Note on wiring

The length of the cable connected to output lines such as B1, B2 and 0V shall be within 10m, and be careful of the noise sufficiently.

(6) - 2. In case that the remote control is made by analog voltage



When the function H11 is set to 1, the output voltage can be controlled directly from the outside by the analog voltage value. The size of the output voltage is controlled by the analog voltage added between terminals 0V-A1. It can be used in stead of the speed control knob.

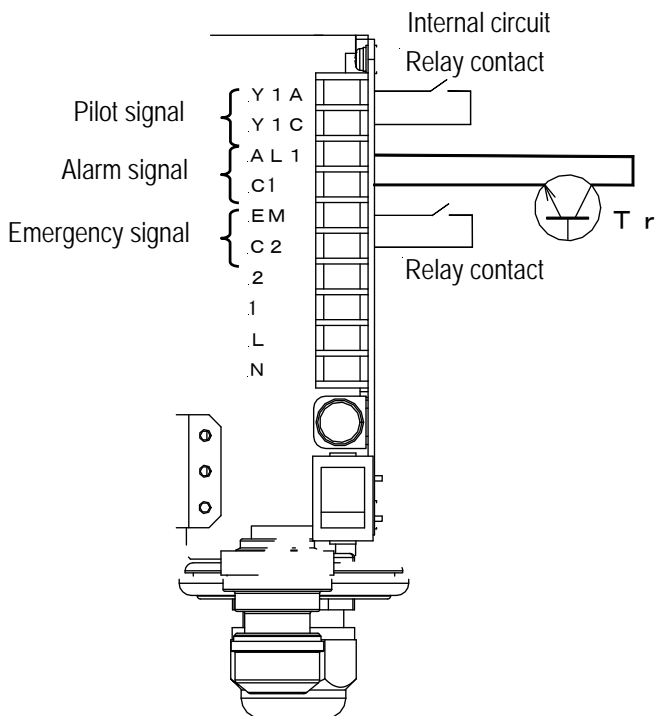
The maximum voltage is 5Vdc. This terminal is connected directly to the microcomputer chip (CPU) and if the excess voltage is applied to it, it may break. Therefore be careful of it sufficiently.

The standard is that the output voltage is 0V for the terminal A1 voltage of 0.05V or less and AC200(100)V for 4.86V or more. The output voltage changes by 1V when the input voltage changes by about 22mV (in case of 100V, it changes by 1V for the change of about 44mV). Input has $\pm 5\%$ error (individual difference). Please confirm the set voltage on the actual equipment at setting.

Note on wiring

Analog signal line (A1,0V) treats a minute voltage. Therefore take care for the wiring such as that the length shall be within 5m and the shielded wire is used. The noise becomes the change of set value directly and therefore when wiring is bad, the display and the output voltage become unstable.

(7) Wiring of drive instruction output



The contact signal that is linked with parts feeder's driving comes out between terminals of Y1C-Y1A. It is "Close" for driving and "Open" for the stop. This signal is used to output the driving signal to the separately placed hopper and other external instruments.

Note 1 Specification of contact:

Non-voltage contact a

Contact rating:

AC250V, 0.1A ($\cos \varphi=1$)

Note on wiring

When you connect the cable to C2, EM, C1, AL1, Y1C and Y1A, the length shall be within 10m, and if driving the solenoid valve and the relay, etc., please install a noise suppression element. The terminals C1 and AL1 are opened and shut with the transistor.

(8) Wiring of alarm/emergency signal

Please refer to the above figure and also P.45 for wiring.

Alarm signal (warning signal) \Longrightarrow Between C1-AL1 terminals

Work shortage signal / Over load warning signal / Driving instruction output

Any or combination of above signals are output according to the setting of the function J08. When a signal comes out, the space between the terminal C1 and the terminal AL1 is short-circuited. The alarm signal is a transistor output. The alternating voltage cannot open or shut at the same time when the withstand pressure is low, therefore take care of the wiring enough. Please refer to the above figure for the polarity of transistor.

Switching capacity: DC30V, up to 0.1A

Emergency signal \Longrightarrow Between C2-EM terminals

Over current abnormality / Overload abnormality / CPU abnormality / Memory abnormality / Driving instruction output / Driving preparation completion signal

As an abnormal signal, any of above signals outputs according to the setting of the function J12.

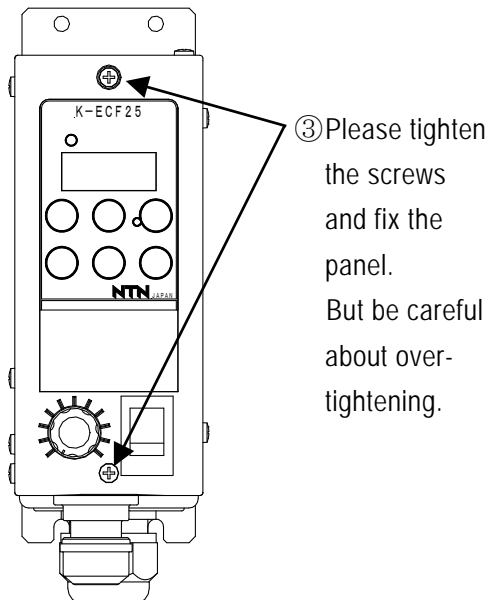
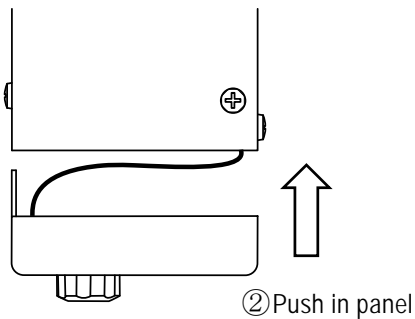
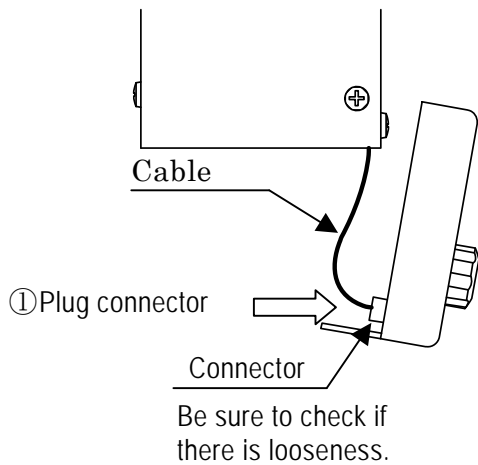
Driving is stopped and an emergency signal is output when the abnormality detection circuit or the CPU detects the above four abnormalities (the space between C2 and EM is short-circuited in abnormal circumstances). An abnormal signal continues to come out until the abnormality is released. An abnormal content of this time is displayed in LED.

Moreover, abnormal signals can be used also as driving instruction output (the same behavior as Y1A-Y1C) or driving preparation completion signal.

Note 1 Specification of contact: Non-voltage relay contact a

Contact rating: AC250V, 0.1A ($\cos \varphi=1$)

(9) Close the panel



Please check whether there is a mistake in the connection of wiring.

Content to be checked

- Isn't there any mistake in the connection destination?
- Isn't there any mistake in the polarity?
- Isn't there possibility of short-circuit and earth fault?
- Is the earth surely connected? Was the protection continuity test executed?
- Isn't there looseness in connector of operation panel?
Please take care not to pull out the cable of the box connection side at the time of checking.

① Plug the connector to operation panel.

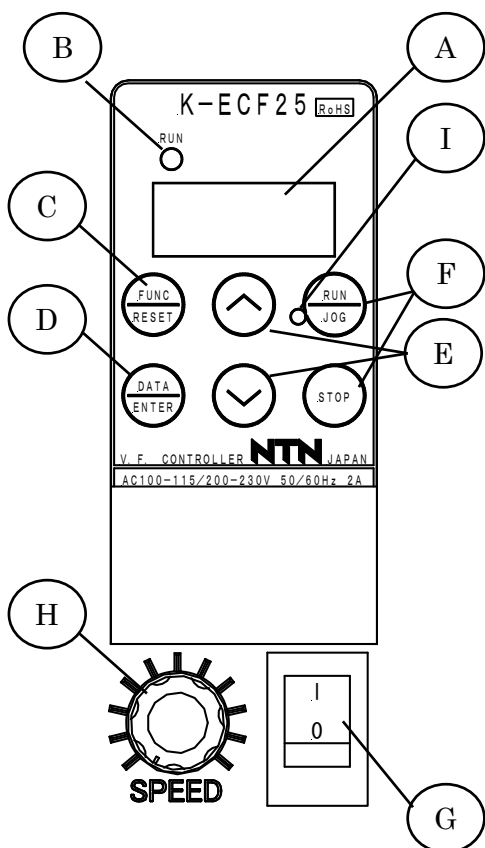
② Push in panel straight, taking care not to clip cable. When installing, a little gap is made between panel and box, but if they are tighten with screw, they are attached firmly.

③ Please tighten the attached screw to fix the panel. Because the panel is made of the resin, it may crack if tightened excessively. Please refrain from using an electric driver or use it with torque of 0.7Nm or less. Handle carefully so that there happens neither an impact, a fall nor a clash, etc.

Then the wiring work is completed.

8. Driving and adjustment

Description of the operation panel



Caution

Only when 2 or 3 (both are on the operation panel) is selected by the function J02, the RUN/STOP key can be used.

No	Name of each portion	Description
A	Data display portion (LED)	LED of 7 seg 4 digits. Monitoring of various kinds of data, display of setting, warning etc.
B	Pilot lamp	Pilot lamp lights when controller is in outputting (driving) state.
C	Function key (Reset key)	Switching to function setting mode and return, reset of emergency
D	Data key (Enter key)	Setting of data, switching of monitor content, setting of knob lock function
E	UP/DN key (Up/Down key)	Up/Down of function and data when data setting
F	RUN/STOP key	Drive/stop is operated when panel operation is selected.
G	Power supply switch	ON/OFF of main power supply of controller
H	Speed adjusting knob	Setting of the value of output voltage
I	JOG display lamp	It lights when JOG can drive.

Outline of key operation

Key (Nominal name)	Short press (less than 2 seconds)	Long press (2 seconds or longer)
FUNC/RESET (Function)	Return from various modes to normal mode (normal screen). Reset of emergency signal at abnormal state.	Shift from normal mode (normal screen) to function mode
DATA/ENTER (Data)	Shift and return from normal mode (normal screen) or operation lock mode to data display mode. When data is changed, data is decided.	Shift from normal mode (normal screen) to knob lock mode and return
UP [Upward arrow] (UP)	Increment of each function and data (sending in order)	—
DOWN [downward arrow] (DN or Down)	Decrement of each function and data (sending backward)	—
RUN /JOG (Run)	Instruction of beginning of driving when selected on the operation panel. When the JOG function is selected, driving continues while it is pressing.	—
STOP (Stop)	Instruction of stopping of driving when selected on the operation panel.	—
STOP + UP (DN)	In case when the data of J00 and J10 are changed	—
UP + DN	It shifts to the data transfer mode.	—

(1) Specification check and preparation of driving

Please check again whether neither the form, the specification nor the power-supply voltage of the controller are wrong before turning on power.

- ① The form etc. is displayed on the controller operation side.
- ② Please make the speed adjustment switch "0" (turn completely counterclockwise).

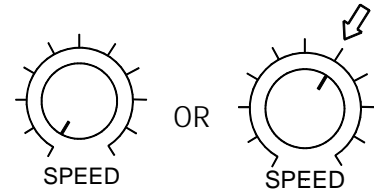
The adjustment of items of the above-mentioned ② and the following (5) and (6) is unnecessary for pre-adjusted cases such as purchase of finished products.



Caution

Confirm certainly the setting of the function before driving. When the setting is mistaken, the magnet may burn.

Adjustment has done.



(2) Power supply ON

- ① Please make the power switch "ON", and confirm lighting or blinking of LED on the operation panel. When the power supply is ON, it turns to the normal display after soft version was displayed for about two seconds Please note that no operation is accepted during the display of version information.

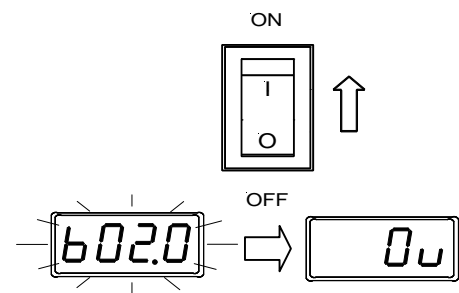
When external control input terminal is short-circuited (when the function J02 is under standard setting, it becomes operation command), operation starts and RUN pilot lamp lights up, and LED changes from blinking to lighting condition.

When operation is at stop, LED becomes blinking and RUN pilot lamp turns off.



Caution

Turn neither power on/off switch nor the power supply on and off frequently. The controller may break down.



First figure b is model code and second to forth figures show version information.

When knob is fully turned to left.

(3) Check of function setting content

- ① It changes into the function setting mode if the function key is pressed for two seconds or more. As J or H is displayed, select the function group that you want to change with the UP/DN key and enter it with the data key. When function No is displayed, select function No to be confirmed with the UP/DN key. Here, present data is displayed when the data key is pressed, then confirm a set content. Please refer to P.26-35 for the confirmation of the concrete content and details of the setting method. Please return to the normal screen pressing the function key twice when the confirmation ends. The display automatically returns to the normal screen when the non-operating state continues for 20 seconds.
- ② There are some functions which prohibit the data change during driving. Moreover, please note that the controller might not operate when the setting is mistaken. (Refer to P.28-29.)



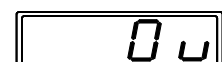
Function group display



Function No. display



Normal screen
(Voltage display)



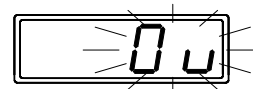
(4) Driving

① Please set the external control terminal to the driving side (short-circuit when function J02 is 1). Moreover, please press the RUN key when you have set the driving control method to the panel control (2 or 3) with the function J02.

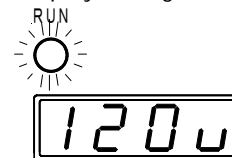
* Please refer to P.28 and P.31 for the selection of the driving method.

② The data display changes from blinking "0" to lighting, and the voltage value set with the speed adjustment knob is displayed and the voltage is output at the same time. Also the RUN pilot light lights.

Display during stop



Display during driving



(5) Frequency adjustment

Please adjust the frequency while the parts feeder is driving.

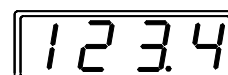
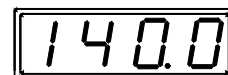
① Set the speed adjustment knob to scale 6-7 for full wave system and scale 4-5 for half wave system.

② Press the data key to display the frequency.

③ Press the down key to adjust to the required amplitude while gradually lowering the frequency.

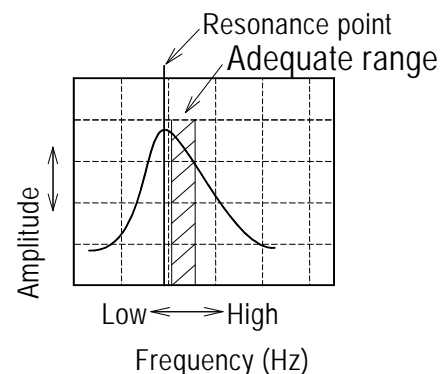
*1 Initial value of controller's frequency at the time of shipment from plant is 140Hz for ECF25 and 70.0Hz (frequency description) for ECH45.

*2 The display automatically returns to the normal screen at the time of constant voltage mode when the non-operating state continues for 20 seconds.



Points for frequency adjustment

- Please adjust the frequency after works in the bowl are emptied.
- Please note that it becomes fast-forwarding if the key is kept pressed, and passes the resonance point (point of maximum amplitude) at a dash. It turns to a usual speed when sometimes releasing the hand from the key. When the resonance point has been passed, raise the frequency with the UP key over the resonance point once, and return to the operation of (5) -③.
- The vibration becomes steady when driving at a little higher frequency (3-10Hz) than the resonance point.
- There is no distinction between half wave and full wave. Please make a set frequency half when you drive the main body of half wave.
(Ex.) Half wave → Adjust between 45~70Hz.
- According to conditions such as the material of work, a necessary speed and the accuracy of array etc., the adjustment of the leaf spring might become necessary.
- Due to aging of leaf spring for parts feeder main body, the spring constant may drop and the amplitude may decrease. In such a case, the amplitude may recover by re-adjusting the frequency.



- ④ Please press the data key twice and return to the voltage display when the adjustment ends.

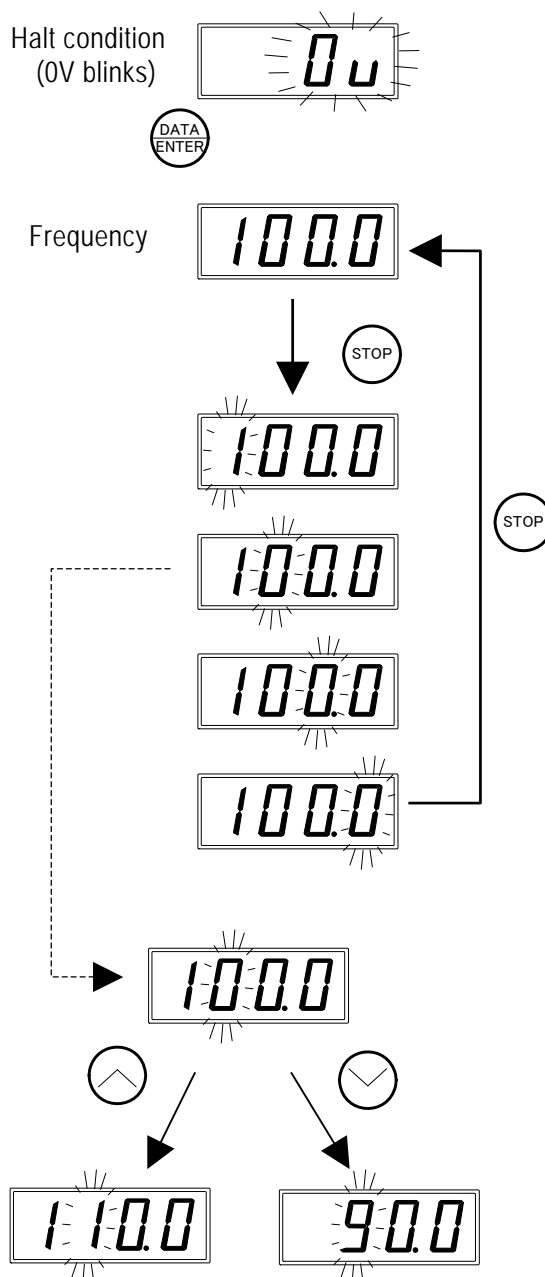


Fast-forward operation of frequency

When you want to change the frequency to a large degree, usage of the fast-forward operation makes the frequency change in a short time possible. But, please make the change while the parts feeder is vibrating, referring to (5)-③ of the previous page for the final minor frequency adjustment.

< Operating method >

- ① Stop the driving of the controller.
In case of external control (J02 is 0 or 1), please turn the driving signal OFF from outside. In case of panel control (J02 is 2 or 3), please press the "STOP" key.
This operation is not possible during the driving of controller.
- ② Display the frequency by pressing the "DATA" key.
- ③ When the "STOP" key is pressed, the digit (1st digit) at the left end blinks. This blinking part is a changed digit.
- ④ Every one press of the "STOP" key moves one digit each to right direction.
- ⑤ If the "STOP" key is pressed at the right end (4th digit), it turns to normal frequency display of all digits.
- ⑥ If the "UP" or the "DOWN" key is pressed at blinking position, frequency data of applicable digits can be changed.
- ⑦ If the "FUNC" key is pressed during change of frequency, it returns to display of the stopped condition. If the condition without any operation continues for 20 seconds, it automatically returns to display of the stopped condition. In such an event, if data was being changed, the changed data is reflected.
- ⑧ Usage of the frequency fast-forward operation is also possible for frequency H12, H14 and H16 of function by the same manner. But, it is limited only at the time when the controller is under stopped condition.

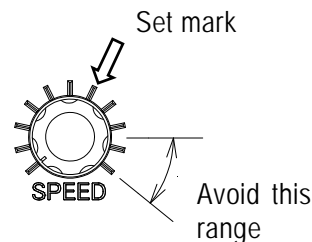


※ Up-and-down of digit can be done automatically. But, in case that it is outside the adjustment range, the up-and-down of digit is not possible.

(6) Speed (voltage) adjustment

- ① Please turn the speed adjustment knob gradually clockwise, and set it to the position at which a necessary amplitude is obtained.

When an instruction of a proper position exists, please follow the instruction. Usually it is used between scales 4-7 (6-7 for full wave system and 4-5 for half wave system).




- *1 Please do not use the scale of 9 or larger. The voltage stability worsens when used.
- *2 Please note that the parts feeder doesn't operate when the sensor is confirming the work.

(7) Frequency monitor

- ① The set frequency can be monitored by pressing the data key. The set frequency can be changed by pressing UP or DN key when the frequency is being displayed.
- ② It becomes a current display if the data key is pressed again during frequency being displayed, and it returns to the voltage display when pressing again. It automatically returns to the voltage display if the key operation is not done for 20 seconds or more.

Voltage display (normal display) 



Frequency display 



Current display 



Voltage display (normal display) 

(8) Current monitoring

- ① Present output current is displayed by pressing the data key during the frequency is being displayed. It can be a guide to know if there is any room in the operation state of load. Please note that error is large in the region of very small current (less than 0.2A for ECF25 and less than 0.5A for ECH45).
- ② It returns to the voltage display when the data key is pressed again while displaying the current. It automatically returns to the voltage display if the key operation is not done for 20 seconds or more.

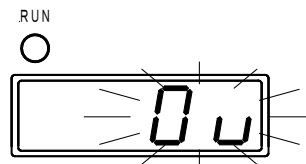
(9) Stop

- ① Please cut the driving signal from the outside (Make it to the stop side). Please press the STOP key when the selection of the driving method is "Panel control."

The data display becomes blinking of "0", and the RUN pilot lamp is turned off.

* Please note that the driving does not stop immediately even if controller's power supply is turned off while driving.

* We recommend that the driving method is an external control in a usual situation of use. Using the panel control is convenient when manufacturing or adjusting. Please refer to P.28 and 31 for the selection of the driving method.

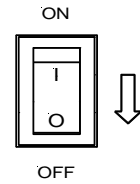


(10) Power supply OFF

- ① Please turn off the power after confirming that the driving has stopped.

When LED is turned off, "LV" is displayed once. This is not abnormal though. Moreover, it is likely to take more than five seconds for LED to go out.

- ② The electric charge remains in the internal circuit although LED goes out. Please do not open the operation panel until the internal electric power condenser is discharged. (The estimate of the electrical discharge is about two minutes after LED of the operation panel went out.)

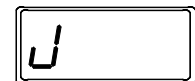


- *1 Never touch the charged part (terminal board and internal electric parts, etc.) for 2 minutes after the power supply OFF. There is a fear of an electric shock. The power supply terminal remains in charged state unless the main breaker is cut. Please cut the main breaker before opening the cover.
- *2 Please do the operation of neither switching of the displayed data nor setting of the function etc. after switching OFF of the power supply. When doing this, there is a possibility of displaying "Er2" when subsequently the power supply is turned on. Please reset it according to the resetting method in P.40 (3), when "Er2" is displayed by any chance.
- *3 Driving is continued until the internal charge is discharged even if this controller's power supply is intercepted by the emergency stop etc. Please put the driving stop instruction (driving signal OFF) separately by the external control signal to stop driving.

9. Setting of functions

(1) Setting of the function

- ① The function key is pressed for more than two seconds to change it to the function group selection mode.



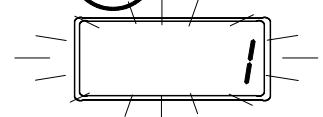
- ② When the function group (J or H) that you want to change is changed with UP/DOWN key and the data key is pressed, the function No is displayed.



- ③ The function No that you want to change is displayed with UP/DOWN key.



- ④ When the data key is pressed, the present data is displayed. The display is blinked when the data can be changed.



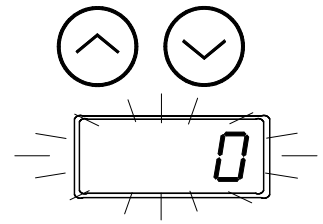
⑤ Data is changed with UP/DOWN key.

Note: The data of J00, J01, J04, J10, J11 (only ECH45), J12 and H11 in the function can be changed only when the driving is stopping.

When you want to confirm data only, press the data key again or press the function key. It returns to the function display.

If the state of not pressing key continues for 20 seconds after data change, it returns to the normal screen without changing data.

The changed data becomes valid at the time when the data key is pressed. Function that the driving data changes immediately corresponding to change of partial data such as driving frequency and gain, is also available. In this case, the change is fixed even if the data key is not pressed.



⑥ Press the data key, and write the data.

It returns to the function No. display.*¹

※When 1 is selected by the function J10, it returns the normal screen. (Refer to the boxed article below) *²

※Please return to ③ when you want to change other functions in the same group.

Please press the function key when you change other function groups. The function group selection screen appears, then operate from ② again.



⑦ Please return to the normal screen by pressing the function key twice (once for the function group selection screen) when the change ended.



*1 Please note that it returns to the normal mode without changing data when you press the function key without pressing the data key after the data has changed at ⑤.

*2 Only when the function J10 is set to 1, It returns to the normal mode at the same time with resetting all data to the values at factory shipment. At this time, there is a possibility of beginning driving if there is a driving signal from the outside by any chance. Therefore turn OFF the control signal from the outside before resetting it. Moreover, when you rewrite the data of the functions J00 and J10, please press the stop key and UP or Down keys simultaneously. It cannot be changed with one key pressed.

Stop key and UP key: Data up (0 => 1)

Stop key and Down key: Data down (1 => 0)

*3 When you want to change the data of the function which cannot be changed while driving, if it is difficult to cut the external control input, please select the panel control (Data 2 or 3) with the driving method selection J02, and stop it with a stop key.

(2) List of functions

There are two kinds of functions, J group that mainly sets functions and H group that mainly sets the data. Please refer to "Contents of functions" of P. 30~ for the detail of each function.

Underlined figures are initial values for ECF25/ECH45. But own initial value only for ECH45 exists partly. The initial values are shown with broken line. J11 is a function of only ECH45.

<List of J group functions>

J No	Name & Set range (Initial value is underlined)	Change during driving	Record of set value	J No.	Name & Set range (Initial value is underlined)	Change during driving	Record of set value
J00	Operation lock <u>0: Operation lock OFF</u> 1: Operation lock ON	Can not					
J01	Setting of current rating For ECF25 0.10~2.50(A) Use range: 0.20~2.00(A) <u>Initial value: 2.00</u> For ECH45 0.10~5.00(A) Use range:0.50~4.50(A) <u>Initial value: 4.00</u> *	Can not		J08	Selection of function of AL1 terminal <u>0:Outputting work shortage signal</u> 1:Outputting overload signal 2:Outputting of OR for work shortage signal and overload signal 3:Selection is not possible 4:Selection is not possible 5:Selection is not possible 6:Outputting of driving signal on AL1 terminal	Can	
J02	Selection of driving method 0: External control + Sensor <u>1:Reverse of external control + Sensor</u> 2: Panel control 3: Panel control + Sensor	Can		J09	Display of error history Displaying latest error data (Content of protection function behaviors) up to three	—	
J03	Selection of JOG driving method <u>0: Do not make JOG operation</u> 1: Accept JOG operation	Can		J10	Setting of initial value (All clear of memory) <u>0:Normal operation mode</u> 1:Rewriting the memory into the initial value	Can not	
J04	Setting of F-V curve <u>F:N25 and others (Full wave system)</u> <u>H:N40 and others (Half wave system)</u> C:HF10 and others (High frequency system) 0-17 (Others)	Can not		J11*	Change of carrier frequency* <u>0:20kHz</u> 1:14kHz 2:10kHz	Can not	
J05	Not used	—	—				
J06	Not used	—	—	J12	Selection of functions of EM terminal <u>0:Contact point is "Close" at the time of problem</u> 1:Contact point is "Open" at the time of problem 2:Selection is not possible 3:Selection is not possible 4:Contact point is "Close" during driving 5:Contact point is "Close" when driving preparation is completed	Can not	
J07	Not used	—	—				

* Function of only ECH45, or initial value of ECH45.

<List of H group functions>

H №	Name & Set range (Initial value is underlined)	Change during driving	Record of set value	H №	Name & Set range (Initial value is underlined)	Change during driving	Record of set value
H00	Selection of functions of IN1 input <u>0:Driving with High input</u> 1:Driving with Low input (reverse) 2:Separate IN1 (reverse) from driving condition 3:Separate IN1 from driving condition 4:Control P1 with IN1 (reverse) 5:Control P1 with IN1 6:Use IN1 as ON delay timer 1 input and use IN2 as OFF delay timer 1 input 7: Use IN1 (reverse) as ON delay timer 1 input and use IN2 as OFF delay timer 1 input	Can		H06	Soft start time 0.0~5.0(Sec.) <u>Initial value 0.5</u>	Can	
				H07	Soft stop time 0.0~5.0(Sec.) <u>Initial value 0.3</u>	Can	
				H08	Use of work shortage timer <u>0: Not used</u> 1:Detected by IN1 signal 2:Detected by IN2 signal	Can	
				H09	Work shortage detection time 1.0~120.0(Sec.) <u>Initial value 10.0</u>	Can	
				H10	Work shortage reset time 0.1~30.0(Sec.) <u>Initial value 1.0</u>	Can	
				H11	Multi speed input switching <u>0:Switching with signals of B1 and B2 terminals</u> 1:Control speed with A1 input	Can not	
				H12	Frequency of speed 1 30.0~500.0(Hz) <u>Initial value 140.0(70.0)*</u>	Can	
H03	Selection of functions of IN2 input Selection of functions of IN1 input <u>0:Timer 2 operates with Low input</u> 1: Timer 2 operates with High input 2: Operate timer 2 with IN1 input, and output the result on P2 3: Operate timer 2 with reverse signal of IN1 input, and output the result on P2 4: Control timer 2 with IN1 input, and output the result on P2. Use timer 2 as one shot timer.	Can		H13	Voltage of speed 1 0~200(V) <u>Initial value 100</u>	Can	
				H14	Frequency of speed 2 30.0~500.0(Hz) <u>Initial value 140.0(70.0)*</u>	Can	
				H15	Voltage of speed 2 0~200(V) <u>Initial value 100</u>	Can	
				H16	Frequency of speed 3 30.0~500.0(Hz) <u>Initial value 140.0(70.0)*</u>	Can	
				H17	Voltage of speed 3 0~200(V) <u>Initial value 100</u>	Can	
	H01	ON delay timer 1 <u>0.0</u> ~60.0 (Sec.)	Can				
	H02	OFF delay timer 1 <u>0.0</u> ~30.0(Sec.)	Can				
H04	ON delay timer 2 <u>0.0</u> ~60.0(Sec.)	Can					
H05	OFF delay timer 2 <u>0.0</u> ~30.0(sec.)	Can					

* Initial value of ECH45.

(3) Contents of the function (details)

J Group (Related to function setting)

Display	Name	Content
J00	Operation lock Initial value: 0 Unchangeable during driving	<p>To prevent the operational error, operations by other than a specified key can be made unacceptable. <u>The data of J00 can be changed only by pressing the stop key and UP or Down keys at the same time for the operational error prevention.</u></p> <p>0 : Do not lock 1 : Lock</p> <p>When locked, the data change of other than a specific function (J00 and J10) is prohibited (The RUN/STOP key is effective when the panel operation is specified). The access to the function data is possible though the data cannot be changed.</p> <p>When the data change operation is done during the operation lock, the characters of Loc are displayed with blinking. Moreover, when the lock is released when the knob lock (Refer to P.36) is set, the knob lock is also released because the operation lock is given priority. Please set it again when the knob lock is necessary.</p>
J01	Setting of current rating Initial value: ECF25⇒2.00(A) ECH45⇒4.00(A) Unchangeable during driving * Current value without notes is that of ECF25 Use range: ECF25: 0.20~2.00A ECH45: 0.50~4.50A Set range: ECF25: 0.10~2.50A ECH45: 0:10~5.00A	<p>The current rating of the connected main body of the vibration is set. So as not to exceed this current value, the controller automatically adjusts the output voltage of the load. The initial value is set to 2.00A (4.00A for ECH45). If this value is not set, the overload protection function doesn't operate normally. Therefore set it for the parts feeder whose current rating is 0.2A (0.5A for ECH45) or more before driving. Possible set range is 0.10~2.50A (0.10~5.00A for ECH45) but the use range is 0.20~2.00A (0.50~4.50A for ECH45). <u>For the parts feeder of less than 0.2A (0.5A for ECH45), the overload warning function may not operate normally because it cannot measure the load current accurately. For the parts feeder of less than 0.2A (0.5A for ECH45), set to 0.2A (0.5A for ECH45) to use in order not for the overload warning function to operate.</u> If setting at less than 0.20A (0.5A for ECH45), it is necessary to set correcting the error of instruction value by the electric power meter for inverter.</p> <p><u>For ECH45, normal driving of only N40 half wave main body is possible even at setting of 4.5A. Please limit the setting of exceeding 2.00A (4.50A for ECH45) only to the short-time operation such as for the adjustment.</u> Driving for more than 30 minutes exceeding 2.00A (4.50A for ECH45) makes the life of controller extremely shorter.</p>
Note on limit of current rating The maximum value to be able to set the output voltage is limited first by the F/V curve (Refer to P.38), and even within the set range of the F/V curve, when it exceeds the set current, the controller automatically lowers the output voltage to make load current within the set value (Driving continues). At this time, the output voltage and the OL are alternately displayed (OL blinks). This condition means that the vibration is insufficient even main body of the vibration is in the state of full load. Please check whether no abnormality exists. The warning signal comes out in AL1 while the OL is blinking (when the setting of J08 is 1 or 2). Moreover, when the output voltage becomes 20V or less but load current does not drop less than the set value, driving is stopped by an overload abnormality (OL lights). In this case, an emergency signal is output to the terminal EM. (Refer to P.39)		

Display	Name	Content
J02	Selection of driving method Initial value: 1	The input condition of the driving ON/OFF signal is switched. External control terminal: X1 terminal Overflow detection sensor input: IN1 or IN2 terminal 0: Driving by AND with the external control terminal signal and the overflow detection sensor (Both conditions must be on the driving sides). (X1 open: Driving) 1: Driving by AND with the reversed logic of the external control terminal signal and the overflow detection sensor (Both conditions must be on the driving sides). (X1 open: Stopping) 2: Driving/stopping by RUN/STOP keys of the operation panel 3: Driving by AND with the operation panel RUN/STOP keys and the overflow detection sensor. Even during panel locking, the RUN/STOP key is effective when the panel control has been selected. It is not possible to get the ON/OFF delay timer to work with the external control terminal signal.
J03	Selection of JOG driving Initial value: 0	Even when the driving is stopping by the external control (J02 is 0 or 1), <u>it is possible to drive compulsorily only while the RUN button of the operation panel is being pressed</u> . Please use it at the initial supply of the work or discharging or at the time of adjustment. The JOG lamp (green) on the side of the RUN button lights when JOG drive can be done. 0 : JOG driving function is not used 1 : JOG (compulsory single) driving function is used. Even if a knob lock or the operation lock is set, the JOG driving is effective.
J04	Setting of F-V curve Initial value: ECF25⇒F ECH45⇒H Unchangeable during driving	The F/V curve is set according to the main body used. <u>Data can be changed only while driving is stopping</u> . Please surely <u>confirm the setting before driving</u> . When the setting is mistaken, the accident such as burning of the magnet will occur. As the data setting changes with the main body used, <u>set it to an appropriate value with surely reading P.38</u> , when you change the data of the F/V curve. F: Selection of curves of full wave system such as N25 H: Selection of curves of half wave system such as S30 C: Selection of curves of high frequency system such as HF10 0~17: Specifying directly of curve № *When you use № 0-17, please examine the characteristic of the load current and set it after investigations not so as to get overloaded. *When a special specification such as S10, S20, N25-1 is driven by half wave, please select also the full wave for the F/V curb.
J05	Not used	This function cannot be used.
J06	Not used	This function cannot be used.
J07	Not used	This function cannot be used.
J08	Selection of terminal AL1 function Initial value: 0	The signal given to the output terminal AL1 is selected. 0: When the work shortage warning comes out, the output is turned ON. 1: When the overload warning (OL blinking) comes out, the output is turned ON. 2: When either of the work shortage warning or the overload warning comes out, the output is turned ON. 3: Selection is not possible 4. Selection is not possible 5. Selection is not possible 6. In-operation signal interlocking to driving of parts feeder outputs on terminal AL1-C1. (Becomes the same behavior as terminal board Y1A-Y1C) When the output is ON, the space between the terminal AL1 and the terminal C1 is short-circuited at the internal Tr.

Display	Name	Content
J09	Display of error history Initial value: Non	Because the latest error data (protection function operation content) are memorized up to three, the memorized content can be displayed with UP key and DOWN key. The content of an error that actually occurs at maintenance etc. can be confirmed afterwards. Because data is automatically overwritten, data cannot be changed or cleared by operation.
J10	Return to initial value (All clear) Initial value: 0 Unchangeable during driving	When data is set to 1, it rewrites all data and frequency of the function into the initial values at shipping from NTN. It is used when resetting from the beginning or clearing data content for return from error. All the values are substituted into the initial values, therefore record the present values first. The data change can be effected only by pressing STOP key and Up key or DOWN key simultaneously because of the operational error prevention. It automatically returns to a normal mode after rewriting the data. Therefore leave the external control signal in the state of "Stop."
J11	Change of carrier frequency Initial value: 0 Unchangeable during driving (Function installed only in ECH45)	<p>This changes carrier frequency to control the output. When it was driven at initial value of 0 (carrier frequency 20kHz) and indication from the measuring device outputs error due to noise etc., please try to change setting. Output method of high-frequency noise changes and the influence may be decreased. If it was judged to be usable, please drive changing the carrier frequency.</p> <p>0: 20kHz 1: 14kHz 2: 10kHz</p> <p>[Note]</p> <p>① When carrier frequency is set to other than 0 (Initial value), variable range of driving frequency becomes narrow to 30.0~200.0Hz.</p> <p>② When carrier frequency is set to other than 0 (Initial value), modulation frequency becomes audible range and noise (high frequency sound) generates from the part feeder. When there are workers around, there may be a case that it is unusable.</p>
J12	Selection of terminal EM function Initial value: 0 Unchangeable during driving	<p>Signal output to terminal EM is selected.</p> <p>0: In case protection function works, contact point "Close" signal outputs between terminals EM-C2.</p> <p>1: In case protection function works, contact point "Open" signal outputs between terminals EM-C2</p> <p>2: Selection is not possible</p> <p>3: Selection is not possible</p> <p>4: In-operation signal interlocking to driving of parts feeder outputs on terminal EM-C2. (Becomes the same behavior as terminal board Y1A-Y1C)</p> <p>5: When driving preparation completes (case that the external control (0 or 1) is selected with function J02 under the condition that protection function is not working), contact point "Close" signal outputs between terminals EM-C2.</p>

H group (Related to data setting)

Display	Name	Description
H00	Selection of IN1 input function Initial value: 0 (Refer to P.36 for display of input state of IN1)	Reversion and operation of signal logic of sensor input 1 (IN1) are set. Time until actual operation changes depending on setting times of ON delay timer 1 and the OFF delay timer 1. 0: When the terminal IN1 is connected to 0V (Low level), the OFF delay timer 1 works to stop the driving. The ON delay timer 1 works at the High level to start the driving. 1: When the terminal IN1 is connected to 0V, the ON delay timer 1 works to start the driving. The OFF delay timer 1 works at the High level to stop the driving. 2: The terminal IN1 is used only to control the terminal P1. When connecting it to 0V, the ON delay timer 1 works to turn on the terminal P1. The OFF delay timer 1 works at the High level to turn off the terminal P1. 3: The terminal IN1 is used only to control the terminal P1. When connecting it to 0V, the OFF delay timer 1 works to turn off the terminal P1 (The signal of IN1 is reversed in logic and used for setting 2). 4: The terminal IN1 is used to control the terminal P1, and it stops with AND with the terminal IN2. When connecting it to 0V, the ON delay timer 1 works to turn on the terminal P1. The OFF delay timer 1 works at the High level to turn off the terminal P1. (Refer to the sign *.) 5: The terminal IN1 is used to control the terminal P1, and it stops with AND with the terminal IN2. When connecting it to 0V, the OFF delay timer 1 works to turn off the terminal P1 (The signal of IN1 is reversed in logic and used for setting 4). (Refer to the sign *.) *For the above 4 or 5, when both ON delay timers 1 and 2 are turned on, driving is stopped, P0 is made OFF (High), in addition, P1 and P2 are turned OFF. When either IN1 or IN2 is ON (the input of one or both turned OFF), the OFF delay timer works, makes P0 ON (Low) at the same time with the drive starting, and turns ON the corresponding P1 and P2. Please inquire of NTN for the detailed operation. 6: When terminal IN2 is connected to 0V, OFF delay timer 1 works and stops driving. When terminal IN1 is at High level, ON delay timer 1 works and starts driving. 7: When terminal IN2 is connected to 0V, OFF delay timer 1 works and stops driving. When terminal IN1 is connected to 0V, ON delay timer 1 works and starts driving.
H01	ON delay timer 1 Initial value: 0.0 (second) Set range: 0.0~60.0seconds	When data of H00 is 0 or 1, the time between when sensor 1 (IN1) stops to confirm the work and when parts feeder starts driving is set. When data of H00 is 2~5, the time between when sensor 1 (IN1) starts to confirm the work and when terminal P1 turns ON is set. When data of H00 is 6 or 7, the time between when sensor 1 (IN1) stops to confirm the work and when parts feeder starts driving is set. Note) It is effective only when the data selection (J02) of the driving method is 0, 1 or 3 (the use of the overflow detection sensor is selected).
H02	OFF delay timer 1 Initial value: 0.0 (second) Set range: 0.0~30.0seconds	When data of H00 is 0 or 1, the time between when sensor 1 (IN1) stops to confirm the work and when parts feeder starts driving is set. When data of H00 is 2~5, the time between when sensor 1 (IN1) starts to confirm the work and when terminal P1 turns ON is set. When data of H00 is 6 or 7, the time between when sensor 1 (IN1) stops to confirm the work and when parts feeder starts driving is set. Note) It is effective only when the data selection (J02) of the driving method is 0, 1 or 3 (the use of the overflow detection sensor is selected).

Display	Name	Description
H03	Selection of IN2 input function Selection of IN1 input function Initial value: 0 (Refer to P.36 for display of input state of IN1 and IN2)	In case H03 is 0 or 1, terminal IN2 is effective when H00 is 4 or 7, or when H08 is 2. In case H03 is 2 or 3, it is effective when H00 is 0-3. In case H03 is 4, it is effective when H00 is 0-1. 0: When the terminal IN2 is at High level, the ON delay timer 2 works to turn the terminal P2 ON. At 0V (Low level), the OFF delay timer 2 works to turn the terminal P2 OFF. Otherwise, the work shortage timer works at 0V, and is reset at High level. 1: When the terminal IN2 is 0V, the ON delay timer 2 works to turn the terminal P2 ON. (The signal of IN2 is reversed in logic and used for setting 0.) 2: When the terminal IN2 is 0V, the ON delay timer 2 works to turn the terminal P2 ON. At High level, the OFF delay timer 2 works to turn the terminal P2 OFF. 3: When the terminal IN1 is at High level, the ON delay timer 2 works to turn the terminal P2 ON. (The signal of IN1 is reversed in logic and used for setting 2.) 4: With input signal of the terminal IN1, the ON delay timer works to turn the terminal P2 ON. The terminal P2 turns OFF after the setting time of the OFF delay timer 2. When H03 is 2 or 3, in case the timer 2 is 0 second, signal of sensor 1 outputs to the terminal P2 directly. When H03 is 4, the terminal P2 does not turn ON unless the OFF delay timer 2 (H05) is set. Input logic of the terminal IN1 selects 0 or 1 at H00.
H04	ON delay timer 2 Initial value: 0.0 (second) Set range: 0.0-60.0seconds	In case that the data of H03 is 0 or 1, the time between when the sensor 2(IN2) start confirming the work and when the terminal P2 turns ON is set. In case that the data of H03 is 2 or 3, the time between the sensor 1 (IN1) start confirming the work and when the terminal P" turns ON is set. In case that the data of H03 is 4, the time between when the sensor 1 (IN1) stops confirming the work and when the terminal P2 turns ON is set. Note) It is effective only when the data of selection (J02) of the driving method is 0, 1 or 3 (the use of the overflow detection sensor is selected).
H05	OFF delay timer 2 Initial value: 0.0 (second) Set range: 0.0-30.0seconds	In case that the data of H03 is 0 or 1, the time between when the sensor 2 (IN2) stops confirming the work and when the terminal P2 turns OFF is set. In case that the data of H03 is 2 or 3, the time between when the sensor 1 (IN1) stops confirming the work and when the terminal P2 turns OFF is set. In case that the data of H03 is 4, the time between when the terminal P2 turns ON and when the terminal P2 turns OFF is set. Note) It is effective only when the data of selection (J02) of the driving method is 0, 1 or 3 (the use of the overflow detection sensor is selected).
H06	Soft start time Initial value: 0.5 (second) Set range: 0.0-5.0 seconds	Set the soft start time. The output voltage is gradually raised from 0V until it reaches the set value. The time of the raising is set. The minimum set time is 0.0 second, but actually it is about 50msec.
H07	Soft stop time Initial value: 0.3 (second) Set range: 0.0-5.0seconds	Set the soft stop time. The output voltage is gradually lowered from the set value until it reaches 0V. The time of the lowering is set. The minimum set time is 0.0 second, but actually it is about 50msec.
H08	Use of work shortage timer Initial value: 0	Whether doing the work shortage detection is set. When doing it, the sensor used is selected (IN1 or IN2). 0: Does not use 1: Uses the signal IN1(Work shortage is detected with overflow sensor.) 2: Uses the signal IN2(Work shortage is detected with different sensor from overflow sensor.) The signal selected by 1 or 2 is sent to the work shortage timer (H09) and the work shortage reset timer (H10). When 4 to 7 is selected with H00, it is not possible to use (it becomes H08=0).

Display	Name	Description
H09	Work shortage timer Initial value: 10.0 (second) Set range: 1.0~120.0seconds	Set the time of the timer that detects the work shortage. When the signal continues for a set duration, the work shortage signal is set. The logic with which the timer works depends on H00 or H03, and the timer works when the input selected with H08 during driving (output ON) is Low (the reverse-operation is also possible by H00 or H03). At time-up, NoP is displayed on LED as a work shortage signal, and terminal AL1 turns ON (selected with J08).
H10	Work shortage reset timer Initial value: 1.0 (second) Set range: 0.1~30.0seconds	Set the time of the timer that resets the work shortage signal. When the signal continues for a set duration, the work shortage signal (timer) is reset. The logic with which the timer works depends on H00 or H03, and is the same operation as the OFF delay timer (the work shortage signal is reset). The noP display disappears by resetting, and AL1 also turns OFF.
H11	Selection of multispeed switching signal Initial value: 0 Unchangeable during driving	The signal that switches the multispeed data is selected. 0: Switching by terminal board B1 and B2 The values of the internal memory (voltage and frequency) are read by combining the B1 and B2 signals, and it is assumed as the present driving data. 1: Analog instruction by terminal A1 The voltage value input to the terminal A1 is set as the present voltage instruction data (the frequency is fixed to the value specified from the panel). Even when the operation lock and the knob lock are effectively set, the switching of the multispeed velocity and the data change by an analog instruction are possible.
H12	Frequency data of speed 1 Initial value: 140.0(Hz) (ECH45: 70.0)	It is an area where the frequency data of the speed 1 for the multispeed driving is memorized. Setting range: 30.0-500.0Hz 【30.0~200.0Hz】 *1
H13	Voltage data of speed 1 Initial value: 100(V)	It is an area where the voltage data of the speed 1 for the multispeed driving is memorized. Setting range: 0-200V (even when the power-supply voltage is 100V, the value that exceeds 100V can be set, but the output is limited to 100V or less.)
H14	Frequency data of speed 2 Initial value: 140.0(Hz) (ECH45: 70.0)	It is an area where the frequency data of the speed 2 for the multispeed driving is memorized. Setting range: 30.0-500.0Hz 【30.0~200.0Hz】 *1
H15	Voltage data of speed 2 Initial value: 100(V)	It is an area where the voltage data of the speed 2 for the multispeed driving is memorized. Setting range: 0-200V (even when the power-supply voltage is 100V, the value that exceeds 100V can be set, but the output is limited to 100V or less.)
H16	Frequency data of speed 3 Initial value: 140.0(Hz) (ECH45: 70.0)	It is an area where the frequency data of the speed 3 for the multispeed driving is memorized. Setting range: 30.0-500.0Hz 【30.0~200.0Hz】 *1
H17	Voltage data of speed 3 Initial value: 100(V)	It is an area where the voltage data of the speed 3 for the multispeed driving is memorized. Setting range: 0-200V (even when the power-supply voltage is 100V, the value that exceeds 100V can be set, but the output is limited to 100V or less.)



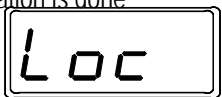
* 1 Value in 【 】 is for the case that the J11 carrier frequency of ECH45 is set to other than initial value.

Panel lock

In order not to have the set value changed even if an operator touches the knob by mistake, it is recommended to turn on the panel lock during the automatic operation. There are two kinds of panel locks, an operation lock set by the function and a simple knob lock.

- The operation lock can turn the function on and off by the function J00, and prohibits all the operations and changes in data, excluding minimum necessary functions.
- The knob lock is a function that locks the data simply, and locks only the data of the voltage value and the frequency. Other operations and changes in data are possible. This lock is not a mechanical lock but it is the one to prohibit the operation of changing data electrically.

Operation of knob lock

Operation and display	Description
Setting 	A long pressing on the data key for three seconds or more on the normal screen turns ON the knob lock. The characters of Loc blink for two seconds. Such as the change in the data of the function is not locked. The operation lock is given priority when the operation lock is set.
Release 	A long pressing on the data key for three seconds or more during the knob lock turns the knob lock OFF (release). The characters of CLS blink for two seconds. When the operation lock is released, the knob lock is also released.
In case when a prohibited operation is done 	When the prohibited operation is done while locking, the characters of Loc blink for two seconds, showing that the operation is prohibited. It returns to the normal screen after blinking. The display blinks similarly when operated while locking.

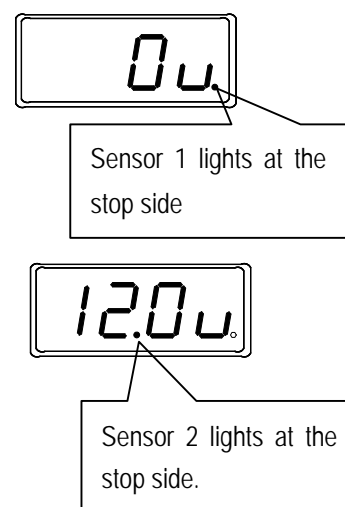
Notes related to LED display

The decimal point on the extreme right of 7seg LED displays the input state of sensor 1 (IN1). Because the dot lights when the input of the sensor is in the condition side of the drive stopping (stop of work supply), the signal state of the sensor can be confirmed.

The second dot from the left of 7seg LED displays the input state of sensor 2 (IN2). The dot lights under the condition side of the drive stopping (stop of work supply), and displays how the input condition of sensor 2 is going, same as sensor 1.

*Please note that the second dot from the left used in displaying IN2 is not a decimal point.

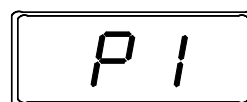
*When the driving is stopping with the sensor signal, "RUN" ramp blinks.



Display at multi-speed driving

When the multi-speedy driving is selected, the selected speed mark P1 etc. is displayed preferentially. When you want to confirm the set voltage and the frequency of driving, please press the data key. The display changes in order of speed No display => voltage display=> frequency display =>current display => speed No display at every time the key is pressed. If the key is not pressed for more than 20 seconds, it returns to the speed No display.

Speed No. display



Analog command display



Data setting of multi-speed driving

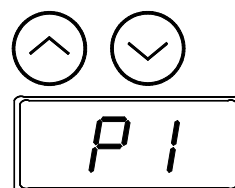
The data for the multi-speed driving has two methods, the method to write data directly in the function and the method to transfer the present driving data. The method to write directly is a method to examine the frequency and the voltage data due to driving in advance and write the value as the data of the corresponding function No.

The method to transfer the driving data is a method to transfer the data that is driving the machine now to the directly corresponding function. Setting is done as follows. Please transfer the data while driving. When the data is transferred while stopping, vibration will stop because the output voltage of 0V is transferred.

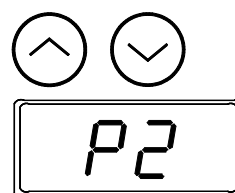
- ① The parts feeder is driven by the driving data to be memorized.
(To memorize the data of the slow driving, drive at an actually slow speed.)



- ② The UP key and the DN key are pressed at the same time while driving.
Speed number P1 is displayed in LED.



- ③ The speed number which you want to be memorized is selected with the UP/DN key.
P1-P3 is selected.



- ④ Press the data key
The present driving data is written in a function (H12-H17) of the specified speed (both the frequency and the voltage data are written). After writing, the display returns to the original state.



F/V curve

To protect the magnet for driving the part feeder, the frequency-voltage recession curve is installed. Please switch to the F/V curve to be used according to the main body and the drive system used. The F/V curve can be switched by the function J04. The line of the set F/V curve is the upper boundary value for a set voltage in each frequency. It is independent of the overload protection function by the current rating, and the output voltage is limited when it reaches the upper boundary value of the F/V curve even if it is not an overloading state.

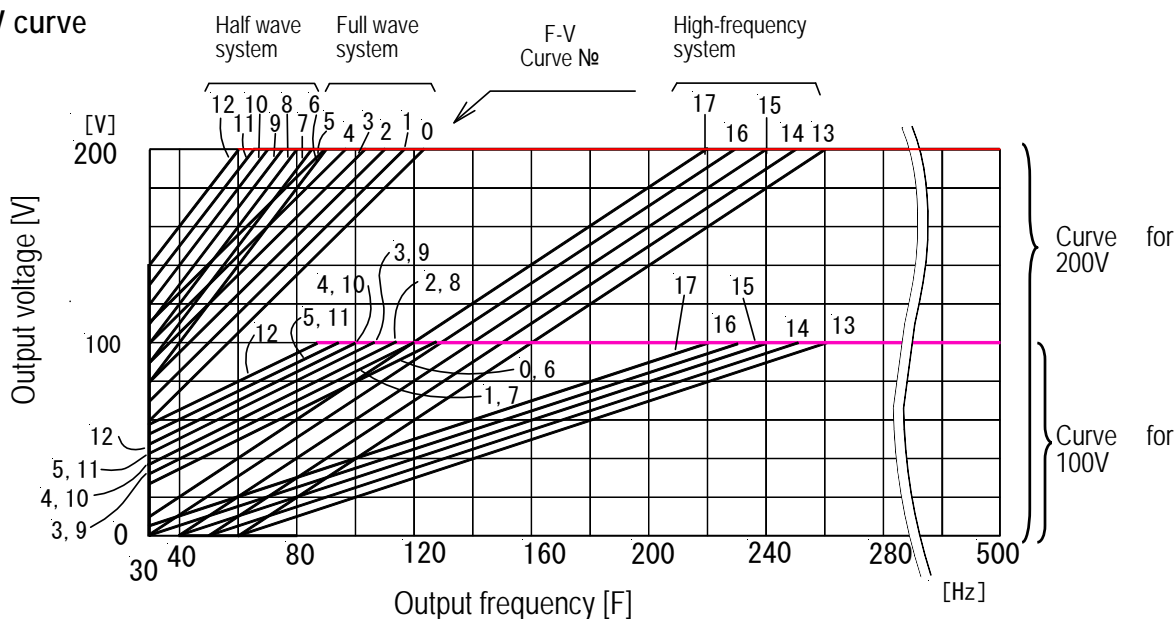
Selection of F/V curve

Function J04	Full wave driving main body	Half wave driving main body	High frequency main body
F (F-V curve №3)	S05~S20, L20, MD10~MD20 K10~K20 ^{*2} , N25~N40 ^{*2}	[S20] ^{*1} [N25·1] ^{*1} Refer to P.28 and 31 also.	—
H (F-V curve №9)	—	K20, N32~N40 ^{*2} , G50·1 ^{*2} SV01~SV06, SV1~SV3 S30, V01~V12 ^{*2} , MD30	—
C (F-V curve №15)	—	—	HF10, HF14 HS05, HS07
0~17	[Special use] ^{*1}		

*1 The main body inside of [] is a special specification. Please consult NTN when setting it.

*2 For the main body of 100V full wave drive of K20, the 100V main body of N25 and V01~V08, and the main body of N32~N40 and G50/1, K-ECH45 is an applicable controller.

F-V curve



*1 Number of F/V curves installed in this controller is 18 in total, but usually select the one from the three of F/H/C. When you use № 0-17, examine the characteristic of the load current and set it after investigation if it leads to overloading.

*2 Please do the overload protection of the magnet by the setting function of the current rating. However, when it is not possible to protect it by the setting function of the current rating of such as minute current load, the protection by the F/V curve is the alternate.




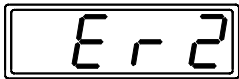
*3 When the parts feeder made by other company is used or a curve other than for F/H/C is selected, there is the case that protection by the F / V curve is impossible. Please note that NTN is not responsible for the trouble that originates from these circumstances.

*4 When the power supply voltage is 100V, the upper limit value is also 100V. Curves for 100V and 200V automatically change according to the power supply voltage.

10. Protection/Warning function



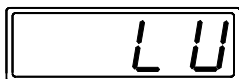
(1) Protection function

The protection function is an important function to protect a controller or peripheral equipments. When the protection function operates, it is short-circuited between terminals C2-EM. The reset work is necessary when stopping due to the protection function. Please reset it after investigating the cause that made the protection function to operate and executing the countermeasure (Refer to the next page for reset).

Protection function	Content	Display
Overcurrent/earth protection OC lighting (Hardware detection)	When the output current of 1.5 times more than the controller current rating flows, it stops controller's driving and protects the internal circuit and wiring. (Refer to P. 42) When detected by hardware, the subsequent operation accepts only power off.	
Overload abnormality OL lighting	When the output current exceeding the current rating set by the function flows and it cannot be improved by decreasing the output voltage, it stops the controller's driving to protect the load.	
CPU abnormality Er1 lighting	When operation time abnormality of CPU is detected, it stops the controller's driving. When it can not be reset by power supply OFF, it is very likely to be breakdown.	
Memory abnormality Er2 lighting	The controller's driving is stopped by detecting the memory abnormality (abnormal value is found in the set data). (Refer to ⑤ of the next page)	

(2) Warning function

The warning function is a convenient function to transmit a state of driving or various kinds of information. When "Overload warning" and "Work shortage" of the warning function operated, the signal of the content set by the function is output to between terminals C1-AL1 (transistor output). When the warning action is released, warning is also reset automatically.

Warning function	Content	Display
Overload warning OL blinking	When the output current exceeding the current rating value set by the function flows, entering the limiting action that lowers the output voltage, it blinks OL to arouse the attention. If the limiting action is cut, it is automatically reset.	
Work shortage noP blinking	When the work shortage timer is set up, noP is displayed. It is reset with the reset timer.	
Voltage shortage or excess voltage LV lighting	<ul style="list-style-type: none"> When the shortage voltage or the excess voltage of the direct current middle circuit is detected, it stops the controller's driving. It is automatically reset when the voltage returns to the normal value. When switching to 200V without turning off the power supply while using it with 100V power supply, the LV display appears and the output stops. 	

(3) Resetting

Please reset it according to the following instructions when the protection function operates and the driving is stopped. The warning function for such as work shortage is an automatic reset.

- ① Please certainly make the external control signal "Stop." When it is on driving side, there is a possibility of becoming abnormal again according to circumstances because it begins to move simultaneously with the return.
- ② Please make the knob of speed adjustment to "0: turn completely counterclockwise."
- ③ It is possible to reset it by pressing the function key or turning off the power supply switch once (LED turning off + five seconds). However, abnormality of the hardware detection (over current etc.) can be reset only by "turning off power supply switch." Please turn off the power when it is not possible to reset it even if the function key is pressed.
- ④ Please investigate the cause according to the content of the operating protection function, and take actions such as checking of the wiring and the load, or replacement if necessary. Please work after turning off the main power supply without fail when there is a possibility to touch the energized part when wiring etc. is confirmed.
- ⑤ Please clear all data by the function J10 after resetting when an memory abnormality (Er2) comes out. However, all data returns to the default value when the data is all cleared, therefore set data again without fail before driving (Please inquire of the document submitted or the vendor about the data before it is cleared). Even under the condition that memory abnormality comes out, it is possible to enter the function mode by long pressing the function key. Please refer to P.21-35 for the modification method of the function and the frequency. Additionally, we recommend that the external control signal is made "Stop" because there is a possibility that the parts feeder begins moving at the same time with the return when all cleared.

*Please contact NTN when it is not possible to reset it.

Danger

Please do inspection after turning off the power supply without fail.

Caution

Please do not reset it while the driving signal is on. There is a possibility to begin moving suddenly.

Caution

The drive stopping with the RUN/STOP key is effective only when the panel control is selected by the driving method selection.

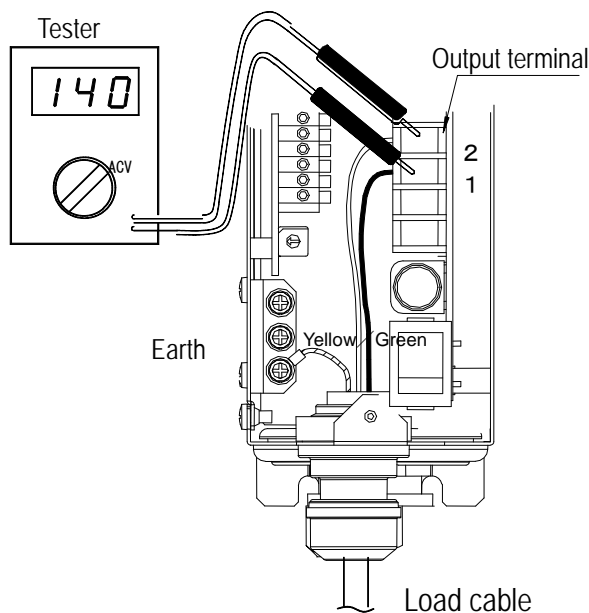
11. Trouble shooting

Please investigate the following points if a trouble occurs by any chance. In addition, check the output voltage (Refer to P.42) for the case of paragraphs of (2) and (3). When the cause is not clear and it needs to consult **NTN** on the troubling state, please inform of the content in detail and concretely with referring the followings in order to be able to take measures as soon as possible.

Contents of troubles	Estimated causes	Reference pages/documents/measures
(1) It doesn't vibrate.	• Wrong connection of power supply or specification	Check it referring to the paragraph of the specification in P.43.
	• Wrong Wiring	Refer to I/O connection method in P.9.
	• Broken fuse	Checks it referring to the paragraph of the specification in P.43.
	• Short-circuit between X1-0V and 24V+V or they are not opened.	Check the external control signal ON, referring to the paragraph of the wiring for outside control input in P.13
	• The sensor is confirming the work.	Remove works in the chute.
(2) The vibration doesn't increase.	• Wrong connection of power supply or specification	Check it referring to the paragraph of the specification in P.43.
	• Wrong adjustment of frequency	Refer to the paragraph of the method of driving and adjustment in P.21.
	• Broken leaf spring	Refer to the manual for the main body.
	• It is fixed with metal fittings for transportation.	Refer to the manual for the main body.
	• Loose leaf spring	Refer to the manual for the main body.
	• Overweight of bowl/chute	Refer to the parts feeder guide book.
(3) The vibration fluctuates.	• The power-supply voltage exceeds the permissible value of the controller and fluctuates.	Check voltages of the power supply and the output, and remove the cause of the voltage fluctuation.
	• It is in the resonance state.	Refer to the paragraph of the method of driving and adjustment in P.21. Refer to the manual for the main body.
	• The amount of works in the bowl changes greatly.	The amount of works charged is made uniform.
(4) The control from the outside is not effective.	• Wrong wiring	Check the connection of wiring, referring to the paragraph of the wiring for the external control input in P.13 and after.
	• The polarity of wiring is different.	Check the connection of wiring, referring to the paragraph of the wiring for the external control input in P.13 and after.
	• The sensor is confirming the work.	Remove works in the chute.
	• Wrong setting of function	Refer to the paragraph of the setting method of the function in P.26 and after.
(5) The control of the sensor is not effective.	• Wrong setting of function	Refer to the paragraph of the setting method of the function in P.26 and after Check the driving method, logic switching of sensor etc.
	• Mistaking because of long time of ON/OFF delay timer	Check the timer setting value, and check it in a short time.
(6) The voltage and the frequency cannot be set.	• Isn't the operation lock or the knob lock turning on?	Refer to the function in P.26 and after or the paragraph of panel lock in P.36. Release the operation lock or the knob lock.

Contents of troubles	Estimated causes	Reference pages/documents/measures
(7) Reset is not effective.	<ul style="list-style-type: none"> There is a signal of the driving instruction. 	Press the reset key after the controller is stopped (Refer to P.40).
(8) The output voltage doesn't go up.	<ul style="list-style-type: none"> The limiter by the F-V curve operates. 	The setting of the F-V curve is confirmed (Refer to P.38).
(9) The beat sound is generated.	<ul style="list-style-type: none"> Plural parts feeders are driven with driving frequencies that are approximate with each other. 	Separate the driving frequencies by 5Hz or more, or drive by the same frequency. Adjustment of a leaf spring may be needed for some case.
(10) OL blinks immediately.	<ul style="list-style-type: none"> The setting of the current rating is wrong. 	Refer to the paragraph of the setting method of the function in P.26 and after. Set the correct current rating.
(11) Driving cannot be controlled by the sensor signal.	<ul style="list-style-type: none"> 2~7 is selected by sensor function selection (H00) 	Set the sensor input logic of the function to 0 or 1.
(12) OC lights.	<ul style="list-style-type: none"> Short-circuit of the load side. Setting error of controller. 	Please check vibration main body and wiring etc. If there is no abnormality at the load side, there is a possibility of the controller's breakage. Please check if there is any mistake on setting of frequency etc.

*Measuring method of output voltage



Warning

Be careful that a human body and an unnecessary object must not touch the charged part. It causes an electric shock and a fire.

- 1) As for the measurement of the PWM wave shape, the instruction value is different according to the measuring instrument used. Please regard the indicated value on the controller's operation panel to be main, and treat the instrument reading as a reference value.
- 2) All the measurement ranges are basically "AC", but there are some equipments which have "DC" selected. Please examine the setting for the case of measuring the sine wave PWM wave profile of the inverter from the instruction manual of the measuring device or the manufacturer's document..
- 3) Please open the panel after turning off the power supply without fail.

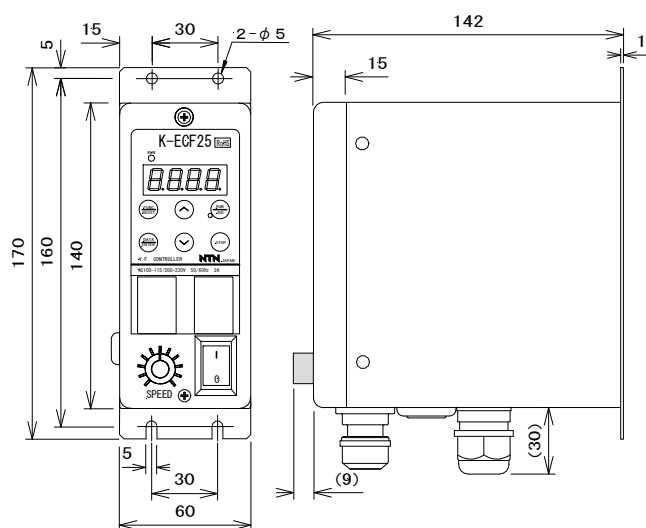
12. Specification

Part number		K-ECF25	K-ECH45
Input	Power supply	AC100V to 115V/AC200V to 230V±10% 50/60Hz (Automatic switching)	
		Inrush current 50A or less (For initial 1 cycle) *1	
Output	Control method	Sine wave PWM control	
	Capacity of control rating	2.0A (For continuous driving. Rating for short time driving of 30 min or less is 2.5A)	4.5A (For continuous driving. Rating for short time driving of 30 min or less is 5.0A)
	Frequency setting	30.0~500.0Hz*2 (When the carrier frequency is 20kHz)	
	Voltage setting range	0 to 100V/0 to 200V*3 (Automatic switching according to power supply voltage)	
Service power supply		DC24V 200mA (MAX)	
Adaptive function*5	Constant voltage function	Fluctuation of output voltage ±3% or less for the fluctuation of power supply voltage of ±10%*4	
	External control input	Drive and stop are possible by external signal (NPN/PNP open collector can be connected)	
	Overflow control	Driving/Stopping by sensor signal is possible. (With timer function: ON 0.0~60.0 sec, OFF 0.0~30.0 sec)	
	Drive instruction output	Non-voltage contact (linked to parts feeder) open/close capacity: AC250V 0.1A or less	
	Overload protection	Derating function of output voltage by setting current rating of load	
	Others	Various protection functions such as soft start, soft stop, short-circuit are installed.	
Fuse	3A or 3.15A		5A
	[Fuji Terminal Industry Co., Ltd. FGMB φ5.2×20 or the equivalent]		
Noise immunity	1000Vp (Pulse width 1μsec, by noise simulator)		
Ambient temperature, humidity	0 to +40°C, 35~85%RH (No condensation allowed)		
Protection structure	IP 20		
Ambient atmosphere (Contamination level)	Contamination level II, Height: 1000m or less However, there must not be corrosive gas. The substances giving trouble to electronic parts, resins, and sheet metals such as awful dust, water, oil and solvents must not splash.		
Mass	Approx. 1.1kg		Approx. 1.7kg
Applicable vibration main body	HF10, HF14, K10-K16, K20 (except 100V full wave), N25 (200V), S05-S30, L20, HS05, HS07, V07, V12, V01-V08 (200V), SV1, SV3, SV01-SV06, MD10-MD30		K20 (100V full wave), N25 (100V), N32, N40, G50/1, V01-V08 (100V)

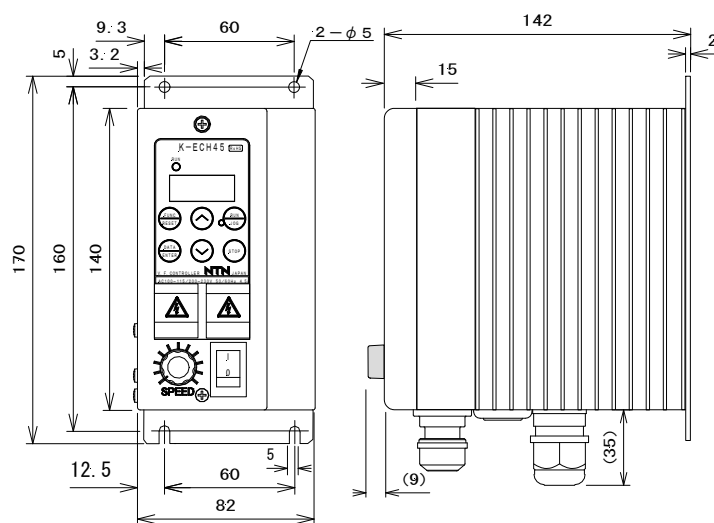
- *1 Please note controller's inrush current when you install a protection equipment such as an earth breakage breaker. Please select the one of an appropriate current rating from the characteristic graph of the breaker so that the breaker does not work with the inrush current. Moreover, when plural controllers are connected, the inrush current also becomes larger. When number of controllers increase, please devise measures such as using plural breakers or turning on the power source staggering the time. When you install an earth leakage breaker, please select the one of 200mA or more for the sensible current. It is because there is a leakage current of a high harmonic wave to the earth in the controller of the inverter method. Although the leakage current of the controller during driving is about 1mA, the vibration main body changes depending on the driving condition. Therefore it should be about 10mA/unit as a standard.
- *2 It corresponds to 15.0 to 250.0Hz of the outdated microcomputer type controller (K-EC646 etc.).
- *3 It is for the power supply voltage of 200V (100V) or more. When the power supply voltage falls, the maximum output voltage is limited by the power supply voltage.
- *4 The output voltage stability level is a value when the setting of the output voltage is 60-170V (200V power supply) and 30-80V (100V power supply).
- *5 Various adaptive functions are installed besides the items shown. Please refer to P.5 for details.

[Outside dimension diagram]

K-ECF25



K-ECH45



※ The cable gland etc. are omitted on the front view so that the mounting holes are visible.

Please refer to P.7 for the details of installation.

*Replacement method of fuses

Refer to P.43 for the applicable fuses.

1. The main power supply (main breaker) to which the controller is connected is turned off, and energizing to the controller is stopped.
2. The cause due to which the fuse is cut is investigated, and proper measures are given.
3. The panel fixing screw is loosened, and the panel is opened. (Refer to P. 10)
4. The cap comes out a little forward when twisting the cap of the fuse holder (Refer to P. 6) under the power terminal board counterclockwise by 90° while lightly pushing it to the interior, and pull out the cap as it is.
5. The fuse (cartridge) comes out with the cap too, then remove the fuse from the cap.
6. Please push a new fuse of the same rating as the broken fuse (confirm the current rating/voltage etc.) into the cap. Please dispose of the broken fuse in an appropriate manner.
7. Insert the cap and the cartridge into the fuse holder, and twist the cap clockwise by 90 degrees with pushing it to the interior to lock. Since the position (direction of the rotation) in which the cap enters is decided, do not push it forcibly.)
8. Close the panel as before, and fix it with the machine screw.
9. After safety is confirmed, the main power supply (main breaker) is turned on.

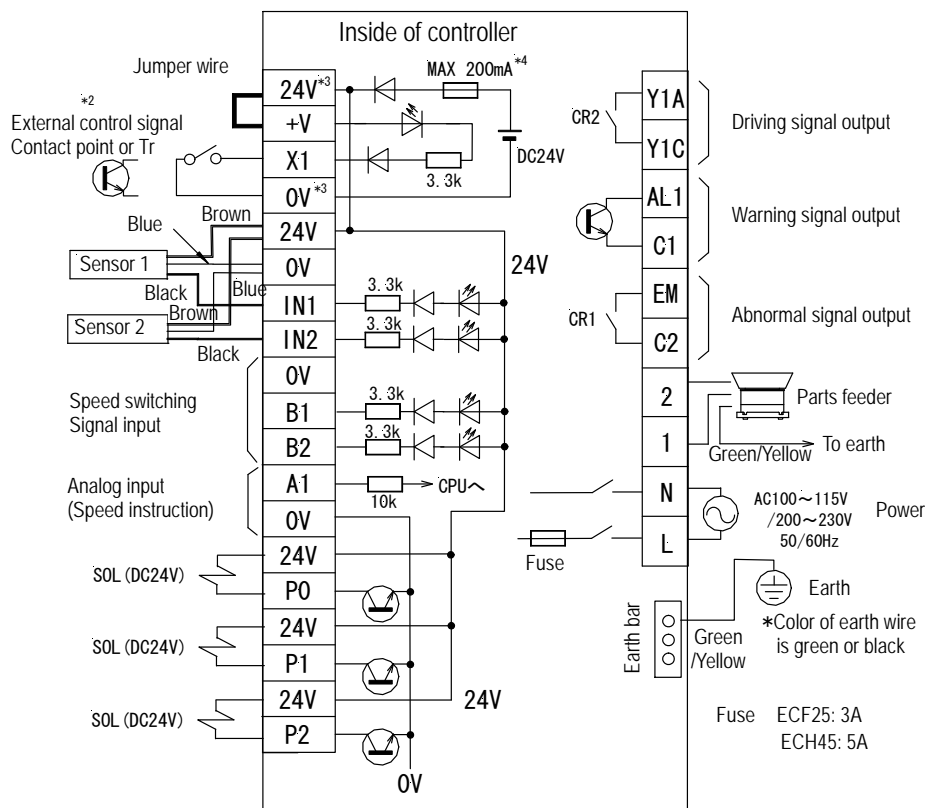
⚠ Warning

The power supply must always be turned off and the engineer must work when replacing fuses.

[Reference diagram of wiring]

The following diagram is a simplified diagram with focusing on the input-output terminals connected to the outside.

ECF25/ECH45 connection diagram



- *1 Read the operation manual in doing wiring construction and other various adjustments. Error may cause failure and accident.
- *2 When you do not use a remote terminal, connect a jumper wire instead of contact.
- *3 Terminals 24V and 0V are all connected in the inside.
- *4 Current limiter: When total figure including current in input circuit comes close to 200mA, voltage starts to drop.

- This manual might be changed without notice for the function improvement etc.

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NTN

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