Nidec Driver

Driver for AC motor

Instruction Manual *i Series*

日本電産グループ Nidec All for dreams

Document Number NTO-C120-2

Introduction

Thank you for your purchase of our products. This instruction manual provides handling information and precautions on use of this product. Please read this instruction manual before using this product. Incorrect handling may prevent proper operation, and may reduce the service life of the product or cause of the failure. Please forward this instruction manual to the end user.

This section is specifically about safety matters

Don't attempt to install, operate, maintain or inspect the driver until you have read through this instruction manual and appended documents carefully and can use the equipment correctly.

Don't use the driver until you have a full knowledge of the equipment, safety information and instructions.

The following conventions are used to indicate safety messages in this manual.

Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ WARNING	Incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

This product was not designed or manufactured for use in devices or systems that may directly affect or threaten human lives or health.

You can't use this product on the devices or systems if the failure or malfunction could directly threaten human life, or the human body. (For example, Military, nuclear power control, aerospace, transportation equipment, surgical equipment, life support and safety devices etc.)

If you will use this product for special purpose, please contact sales representative in advance

This product has been manufactured under strict quality-control guidelines. However, if this product is to be installed in any location where failure of this product could involve or result in a life-and-death situation or loss of human life or in a facility where failure may cause a serious accident or physical injury,

safety devices must be installed to minimize the likelihood of any accident.

The cover must be always reinstalled and the instruction in this instruction manual must be followed when operating the driver.

Electric Shock Prevention

⚠ WARNING

- While power is ON or when the driver is running, don't touch the terminal blocks.
  Otherwise you may access the non insulated terminal blocks and get an electric shock.
- While power is ON or when the driver is running, don't open the cover.
  Otherwise you may get an electric shock.
- Don't run the driver with the cover removed. Otherwise you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Even if power is off, don't remove the cover except for wiring or periodic inspection.
  You may accidentally touch the charged driver circuits and get an electric shock.
- Before wiring or inspection, power must be switched OFF. To confirm that, LED indication of the operation panel must be checked. (It must be OFF.) Any person who is involved in wiring or inspection shall wait for at least 5 minutes after the power supply has been switched OFF and check that there is no residual voltage using a tester or the like.
  The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The driver must be installed before wiring. Otherwise you may get an electric shock or be injured.
- Use the wire size specified. Otherwise you may get an electric shock or a fire.
- Be sure to connect the ground. Otherwise you may get an electric shock or a fire.
- Setting potentiometer and key operations must be performed with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Don't subject the cables to scratches, excessive stress, heavy loads or pinching.
  Otherwise you may get an electric shock.
- Don't touch the printed circuit board or handle the cables with wet hands.
  Otherwise you may get an electric shock.
- When measuring the main circuit capacitor capacity, the DC voltage is applied to the motor for 1 second at powering off. Never touch the motor terminal, etc.
  right after powering off to prevent an electric shock.

Fire Prevention

⚠ CAUTION

- Driver must be installed on a nonflammable wall without holes because nobody touches the driver heat sink on the rear side, etc. Mounting it to or near flammable material can cause a fire.
- Don’t use an improper voltage source.
  Failure to comply could result in death or serious injury by fire.
  Verify that the rated voltage of the drive matches the voltage of the incoming power supply before applying power.
- This product is a device to operate the motor. Before operating the motor, check carefully the model and kind and verify that the combination of the motor and the product is correct. The wrong combination can cause a fire or accident.
- If the driver has become faulty, the driver power must be switched OFF.
  A continuous flow of large current could cause a fire.
- When using a brake resistor, a sequence that will turn OFF power when a fault signal is output must be configured. Otherwise the brake resistor may overheat due to damage of the brake transistor and possibly cause a fire.

Injury Prevention

⚠ CAUTION

- The voltage applied to each terminal must be the ones specified in this instruction manual.
  Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- Polarity must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, don’t touch the driver since the driver will be extremely hot. Doing so can cause burns.
- In operation, don't touch the rotating part of the motor.
- If an abnormal occurs, turn off the power to stop the operation immediately. Otherwise the driver may be damaged or you may injury.

Transportation and installation

⚠ CAUTION

- The product must be installed to the position where withstands the weight of the product according to the information in this instruction manual.
- Don't install or operate the driver if it is damaged or has parts missing. This can result in breakdowns.
- When carrying the driver, always hold it by the case. Don't hold it by the cover or potentiometer; it may fall off or fail.
- Don't stand or rest heavy objects on the product.
- The driver mounting orientation must be correct.
- Conductive foreign objects must be prevented from entering the driver. That includes screws and metal fragments or other flammable substance such as oil.
- As the driver is a precision instrument, don't drop or subject it to impact.
- The driver must be used under the environment written on this instruction manual: Otherwise the driver may be damaged.

Wiring

⚠ CAUTION

- The connection orientation of the output cables U, V, W to the motor affects the rotation direction of the motor.
- Make the correct connection of terminals, etc.. The incorrect connection will cause driver failure or accident.
- Don't install a power factor correction capacitor, surge suppressor or capacitor type filter on the driver output side. These devices on the driver output side may be overheated or burn out.
- If you will power cycle, be sure to wait at least 60 seconds after turning off the power. There is a risk of malfunction.
- In the design, consider the input current to the circuit of this product.
- For additional safety, check and take measures in the actual equipment.
- Regenerative voltage from the motor side must not exceed 375V.
- If input power supply voltage is not within -10% from +10% of rated supply voltage, it could cause a fire or failure.

Test operation and adjustment

⚠ CAUTION

- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

Operation

⚠ WARNING

- Since pressing STOP key may not stop output depending on the function setting status, separate circuit and switch that make an emergency stop (power OFF, mechanical brake operation for emergency stop, etc.) must be provided.
- The driver must be used for three-phase induction motors.
  Connection of any other electrical equipment to the driver output may damage the equipment.
- Performing pre-excitation under torque control may start the motor running at a low speed even when the start command is not input.
  The motor may also run at a low speed when the speed limit value is 0 with a start command input.
  It must be confirmed that the motor running will not cause any safety problem before performing pre-excitation.
- Don't modify the equipment.
- Don't perform parts removal which is not instructed in this manual.
  Doing so may lead to fault or damage of the driver.

⚠ CAUTION

- In the over current protection function of the product may not be able to protect the motor from overheating.
  It is recommended to install both an external thermal and PTC thermistor for overheat protection.
- Don't use a magnetic contactor on the driver input for frequent starting/stopping of the driver.
  Otherwise the life of the driver decreases.
- The effect of electromagnetic interference must be reduced by using a noise filter or by other means. Otherwise nearby electronic equipment may be affected.
- Appropriate measures must be taken to suppress harmonics.
  Otherwise power supply harmonics from the driver may heat / damage the power factor correction capacitor and generator.
- When initialization of parameter is performed, the required parameters must be set again before starting operations because all parameters return to the initial value.
- The driver can be easily set for high-speed operation. Before changing its setting, the performances of the motor and machine must be fully examined.
- Before running an driver which had been stored for a long period, inspection and test operation must be performed.
- For prevention of damage due to static electricity, nearby metal must be touched before touching this product to eliminate static electricity from your body.
  During working, take measures such as static electricity to wear rubber gloves.

Emergency stop

⚠ CAUTION
・A safety backup such as an emergency brake must be provided to prevent hazardous condition to the machine and equipment in case of driver failure. ・When the breaker on the driver input side trips, the wiring must be checked for fault, and internal parts of the driver for a damage, etc. The cause of the trip must be identified and removed before turning ON the power of the breaker. ・When any protective function is activated, appropriate corrective action must be taken, and the driver must be reset by pressing the STOP key before resuming operation. ・If a fuse is blown or an earth leakage circuit breaker is tripped, check the wiring and the selection of the peripheral devices. Check the wiring and the selection of peripheral devices to identify the cause. Contact our company before restarting the drive or the peripheral devices if the cause cannot be identified. ・between the power supply and driver, make sure to install a fuse and an earth leakage circuit breaker considering the equipment located around the driver. Failure to comply may result in serious damage to the facilities in case the drive is defected.

Maintenance, inspection and parts replacement

⚠ CAUTION
・Don't carry out a insulation resistance on the control circuit of the driver. It will cause a failure.

Disposing of the driver

⚠ CAUTION
・The driver must be treated as industrial waste.

【Table of Contents】

1 .Warning Sign

Nidec Driver

危険

怪我、感電、火災の恐れあり
・設置、運転前に取扱説明書を読む事。
・通電中は端子台を扱わない事。
・電源遮断後、５分間は端子台を扱わない事。
・金属等の不燃物に設置する事。

Danger

Risk of injury, electric shock or fire.
・Read the instruction manual before earth connection and use.
・Do not touch the terminal block while power is applied.
・Do not touch the terminal block for 5 minutes after power has been removed.
・Mount the driver on a non-combustible surface.

2. Nameplate

MODEL:IDW200-401****

MAX MOTOR: 0.4kW
INPUT:1PH AC200-240V 50/60Hz 5.7A(4.5A)
INPUT:3PH AC200-240V 50/60Hz 3.5A(2.4A)
OUTPUT:3PH AC0-240V 0-120Hz 2.4A(2.0A)
******-*

R0804-***

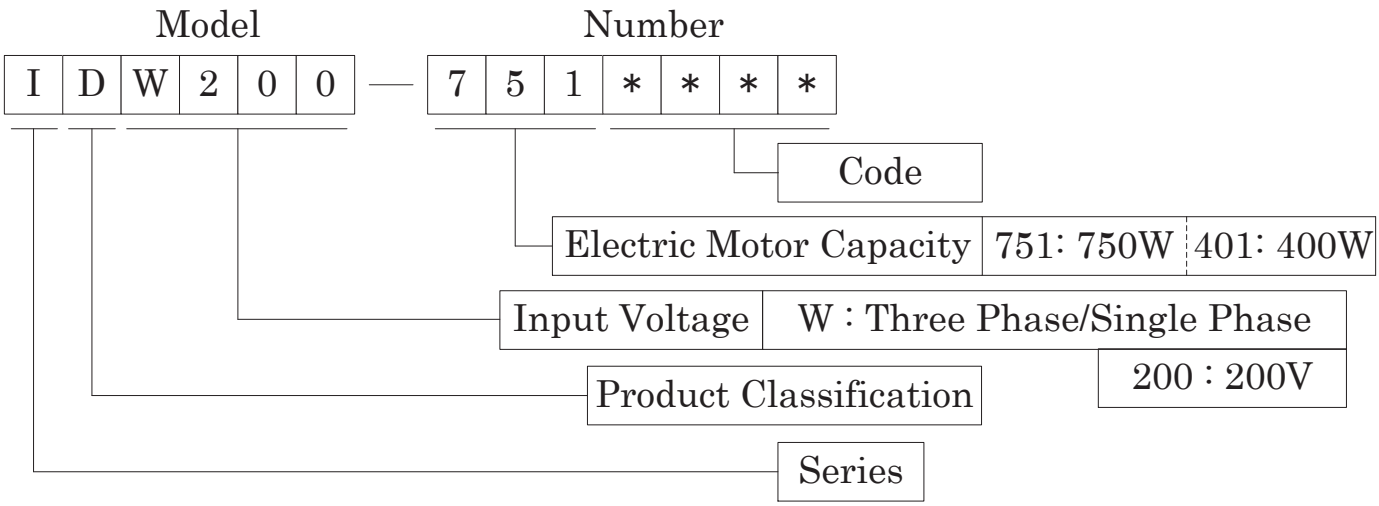
MADE IN JAPAN

Reference nameplate

3. Applicable Motor

Applicable Motor	Three Phase AC Induction Motor

4. Model Number



5. Specifications【0.75kW】

Model Number		IDW200-751****	
Applicable Motor Size ※1		0.75kW	
Input Power	Rated Power Voltage	Single Phase AC200～240V	Three PhaseAC200～240V
	Allowable Voltage	+10%,-10%	
	Power Frequency	50Hz/60Hz (±5%)	
	Input Current ※2	9.0A(8.0A)	5.0A(4.5A)
Maximum Output	Output Voltage	Proportional to Power Supply Voltage (Output voltage cannot be more than power supply voltage.)	
	Rated Capacity ※3	1.3kVA	1.3kVA
	Output Current ※4	3.3A(3.0A)	3.3A(3.0A)
Weight		690g	

※1: Rated current specification of the motor must be capable to the output current of this product.

※2: Input Current will be influenced by the conditions of using environment (Power Supply impedance).
The values of inside ( ) are the conditions of carrier frequency at equal or less than 10 kHz.

※3: Rated Capacity is calculated at 220V of Rated Output Voltage.

※4: indicates at Carrier Frequency 2 kHz.
The values of inside ( ) are the conditions of carrier frequency at equal or less than 10 kHz.
Current values indicated in ( ) is applied when product operates at ambient temperature more than 40 degree C

6. Specifications【0.4kW】

Model Number		IDW200-401****	
Applicable Motor Size ※5		0.4kW	
Input Power	Rated Power Voltage	Single Phase AC200～240V	Three Phase AC200～240V
	Allowable Voltage	+10%,-10%	
	Power Frequency	50Hz/60Hz (±5%)	
	Input Current ※6	5.7A(4.5A)	3.5A(2.4A)
Maximum Output	Output Voltage	Proportional to Power Supply Voltage (Output voltage cannot be more than power supply voltage.)	
	Rated Capacity ※7	0.9kVA	0.9kVA
	Output Current ※8	2.4A(2.0A)	2.4A(2.0A)
Weight		460g	

※5: Rated current specification of the motor must be capable to the output current of this product.

※6: Input Current will be influenced by the conditions of using environment (Power Supply impedance).

The values of inside () are the conditions of carrier frequency at equal or less than 10 kHz.

※7: Rated Capacity is calculated at 220V of Rated Output Voltage.

※8: indicates at Carrier Frequency 2 kHz.

The values of inside () are the conditions of carrier frequency at equal or less than 10 kHz.

Current values indicated in ( ) is applied when product operates at ambient temperature more than 40 degree C.

7. Driver Specifications【Common Item】

Driving Method	V/f Control Method (PWM Control)
Overloaded Current	150% (1minute)
Carrier Frequency	At factory shipping：2kHz
Protection Structure	IP20
Cooling Method	Natural Cooling,

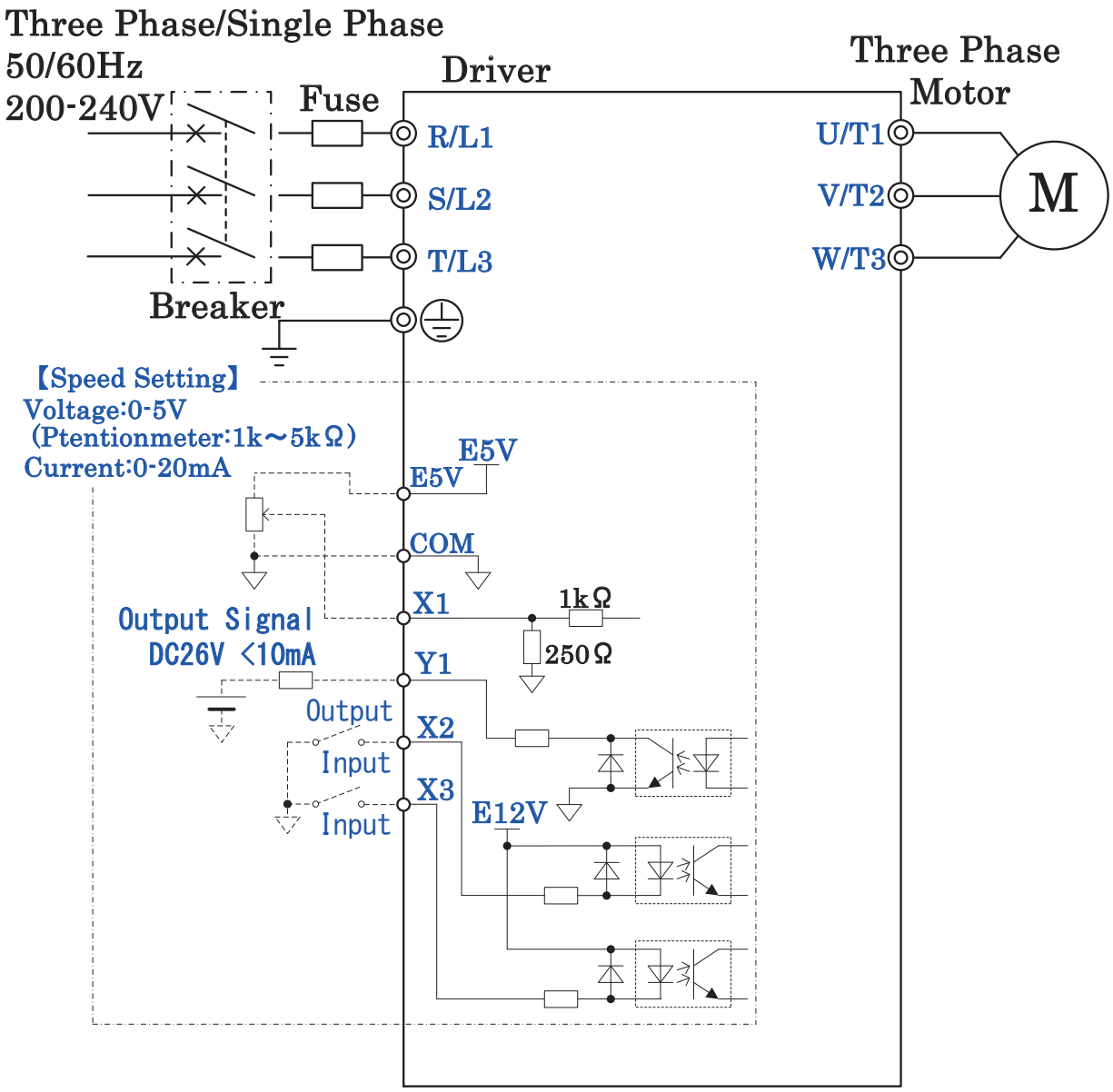
8 .Environment

Operating Temperature	－10℃～50℃(Open air conditions) (No freezing condition; Depends on actual loading conditions)
Storage Temperature	－10℃～60℃ (No freezing condition)
Humidity	Equal or less than 95% RH (without condensation)
Atmosphere	No excessive degree of dust, no flammable gases, no corrosive gases, or no steams
Altitude	Equal or less than 1,000 m above the sea level
Installation	Indoor
Vibration	10 to 20 Hz at 9.8m/s^2(less than 1G), 20 to 55Hz at 2m/s^2(less than 0.2G)

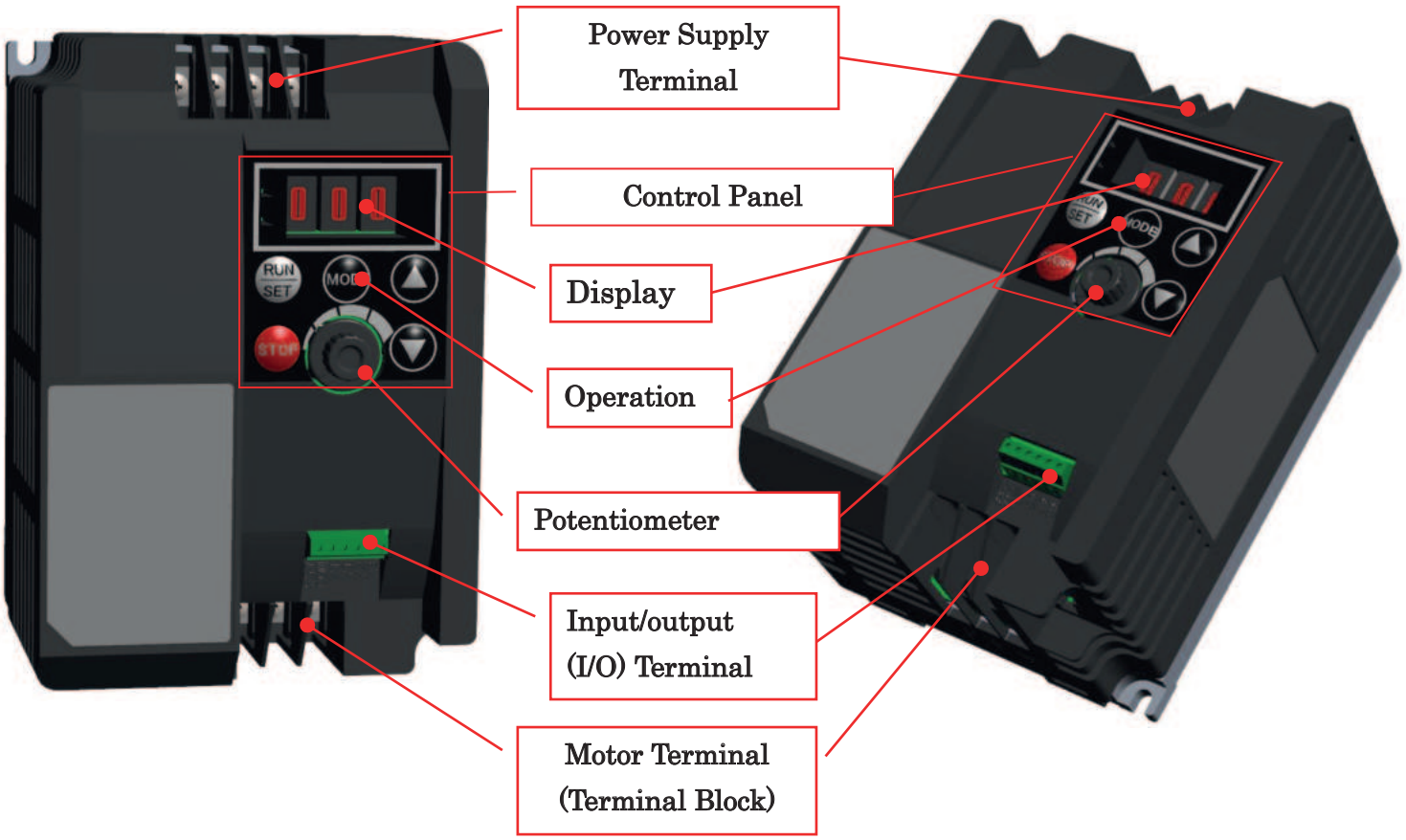
・Please do not put in places which are exposed to direct sunlight ,water and oil.
Product might break down.
・Please do not put in places which are many vibration, dust, corrosive gases and flammable.
Product might break down.
・Please do not sprinkle water to a motor and product.
Also, please take measures when you use it out of necessity.

9. Standard Wiring Connection

・The following picture indicates the standard wiring connection of this product, power supply and motor. Connect in accordance with the instruction for each terminal.



10. Part Names



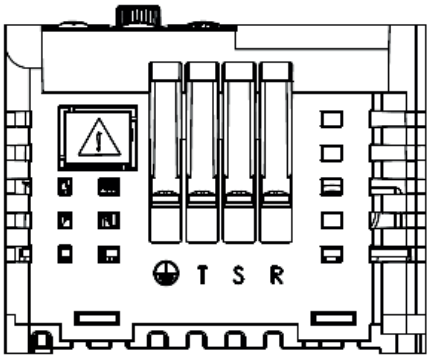
11. Interface

Power Supply Terminal

Connecting Terminal	symbol	I / O	Content
1	R	I	Power Supply
2	S	I	Power Supply
3	T	I	Power Supply
4	⏚	—	Ground terminal

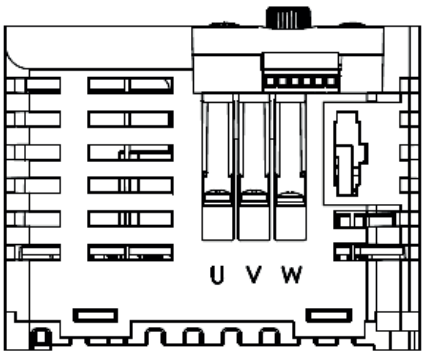
※ In case of single phase supply, connect R and S.

※ In case of three phase supply, connect R, S, and T.



Motor Terminal

Connecting Terminal	symbol	I / O	Content
1	U	O	U Phase Motor Driving
2	V	O	V Phase Motor Driving
3	W	O	W Phase Motor Driving



Input/output (I/O) Terminal

Connecting Terminals	symbol	I /O	Content
1	E5V	O	DC5V (Isolated Power Supply)
2	COM	-	Common
3	X1	I	Speed Adjustment (frequency・Voltage Setting)
4	Y1	O	Alarm
5	X2	I	RUN/STOP (Operation Setting)
6	X3	I	FWD/REV (Direction Setting)

※ Input/output Terminals are separated by strengthened insulation.

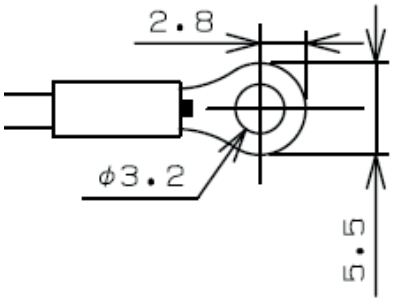
12. Power Supply Terminal

Connect breaker for wiring, circuit breaker, and fuse between power supply and Nidec Driver.

Power Supply Terminals

Screw Size	Fastening Torque	Recommended Wire Size
M3	0.315Nm(3.21kgf･cm)	AWG14 (2.0mm²)

Recommended Terminal (Unit: mm)

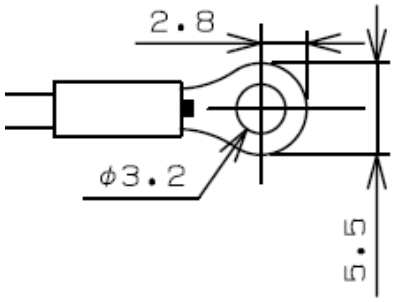


13. Motor Terminal

Motor Terminals

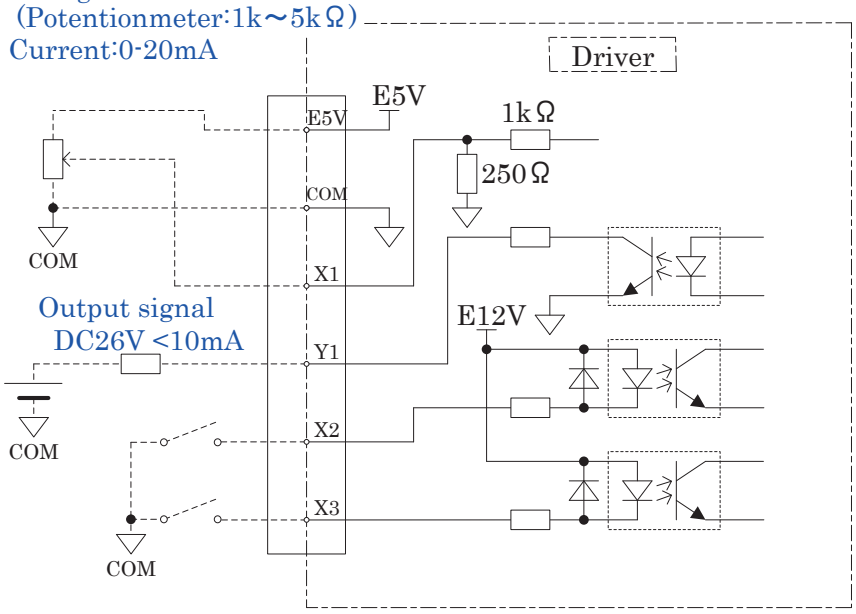
Screw Size	Fastening Torque	Recommended Wire Size
M3	0.315Nm(3.21kgf･cm)	AWG14 (2.0mm²)

Recommended Terminal (Unit: mm)



14. Input/output Terminal

【Speed Setting】
Voltage:0-5V
(Potentionmeter:1k～5kΩ)
Current:0-20mA



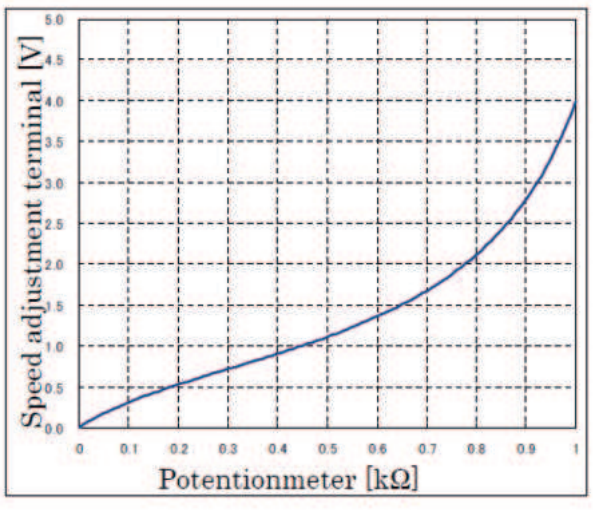
SINK MODE

Input/output (I/O) Terminal

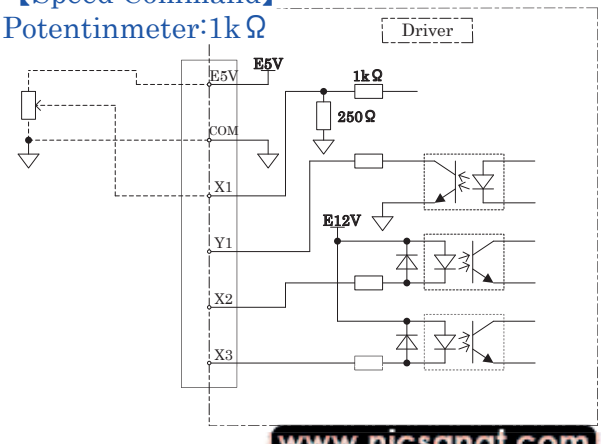
Screw Size	Fastening Torque	Recommended Wire Size	Coat Removal Length of Coated Wire
M2	0.1Nm	AWG18 (0.82mm²)	4.5mm

(Unit : mm)

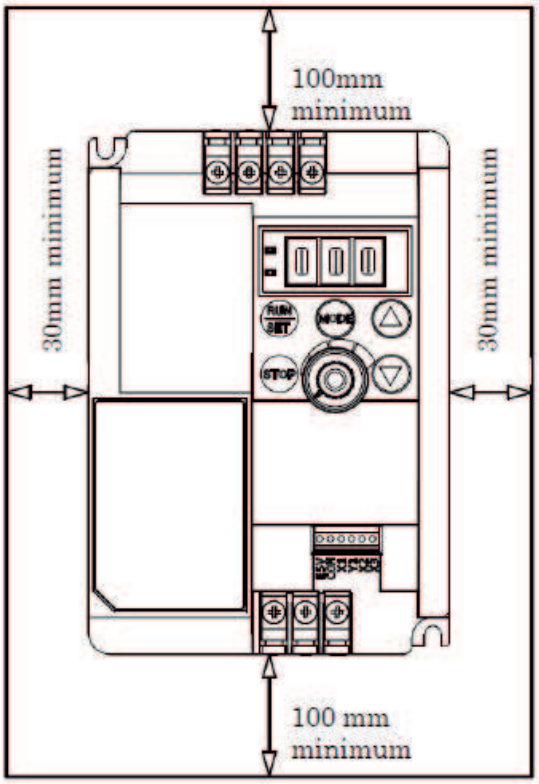
※ When you input 0-5V using Potentiometer from the outside, please set it in consideration of driver internal resistance (250 Ω).
Reference graph : When I use Potentiometer 1kΩ



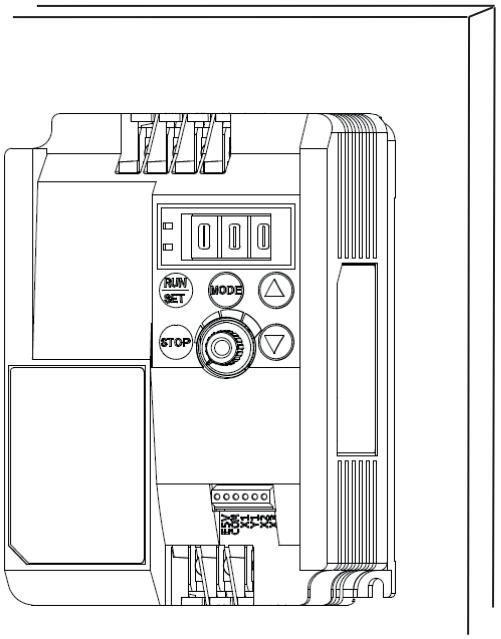
【Speed Command】
Potentinmeter:1kΩ



15. Installation



z

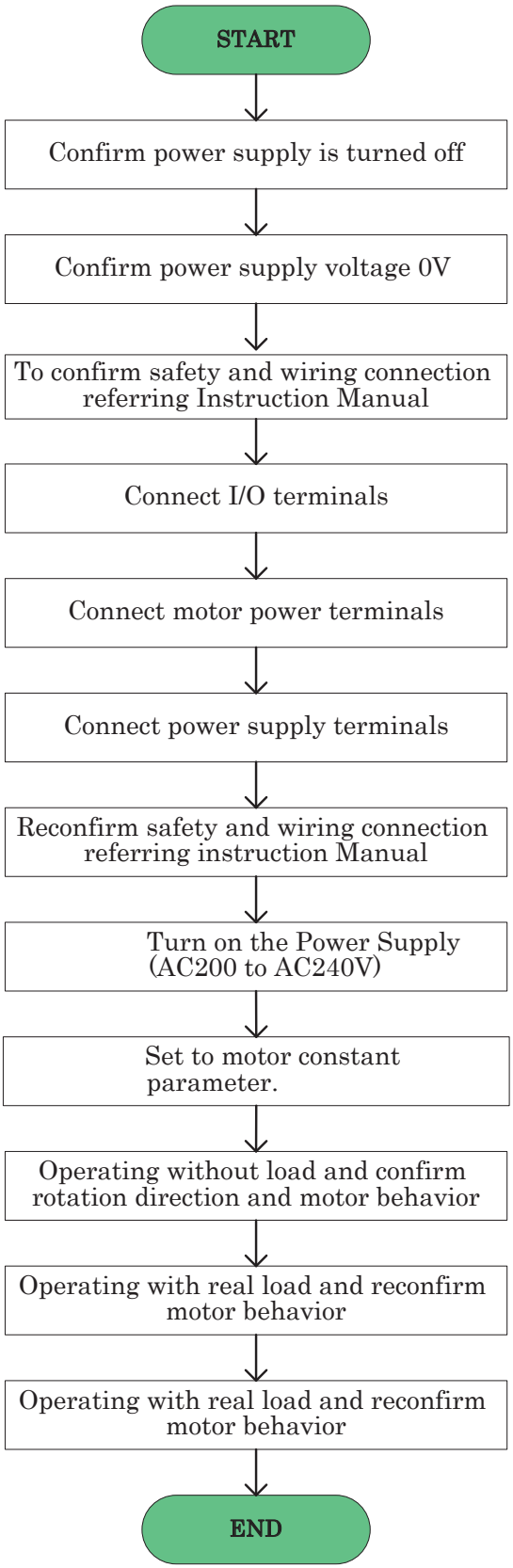


Install this product in vertical direction.

※ Secure the installing space as shown above.

In case of installation inside the control board box, air circulation must be considered to prevent high ambient temperature of the product.

16. Operation

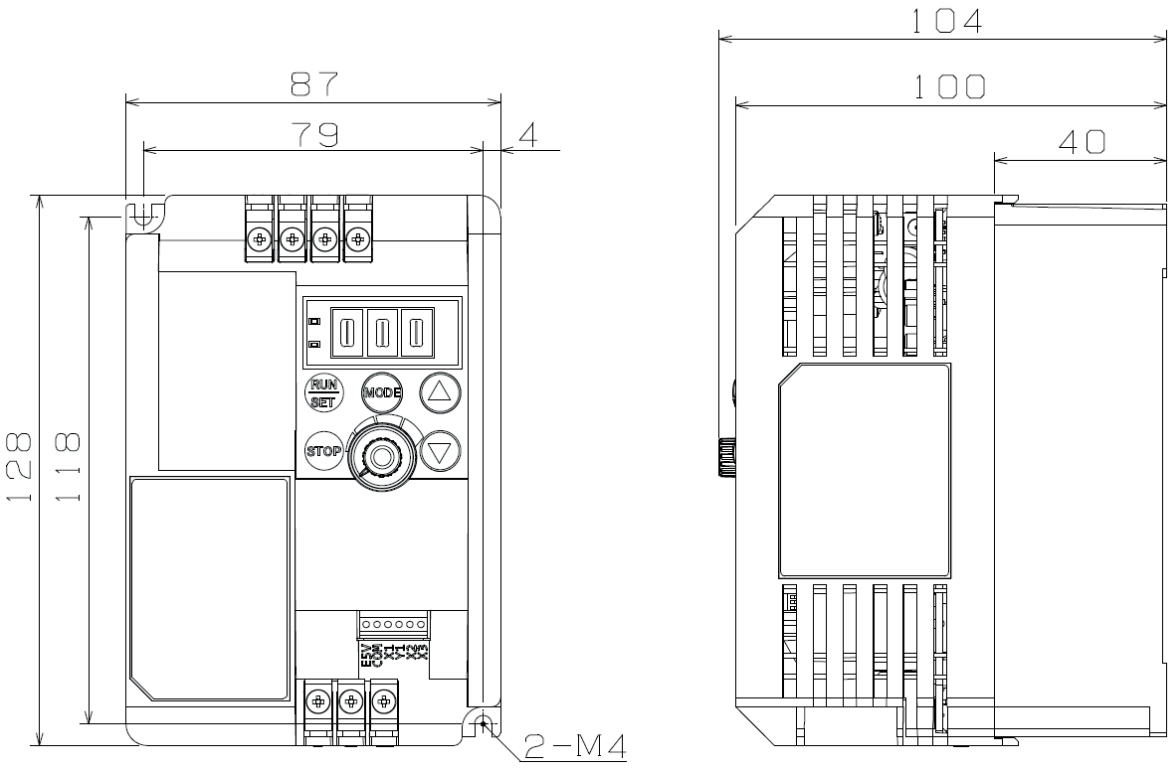


Please refer to P12～P16

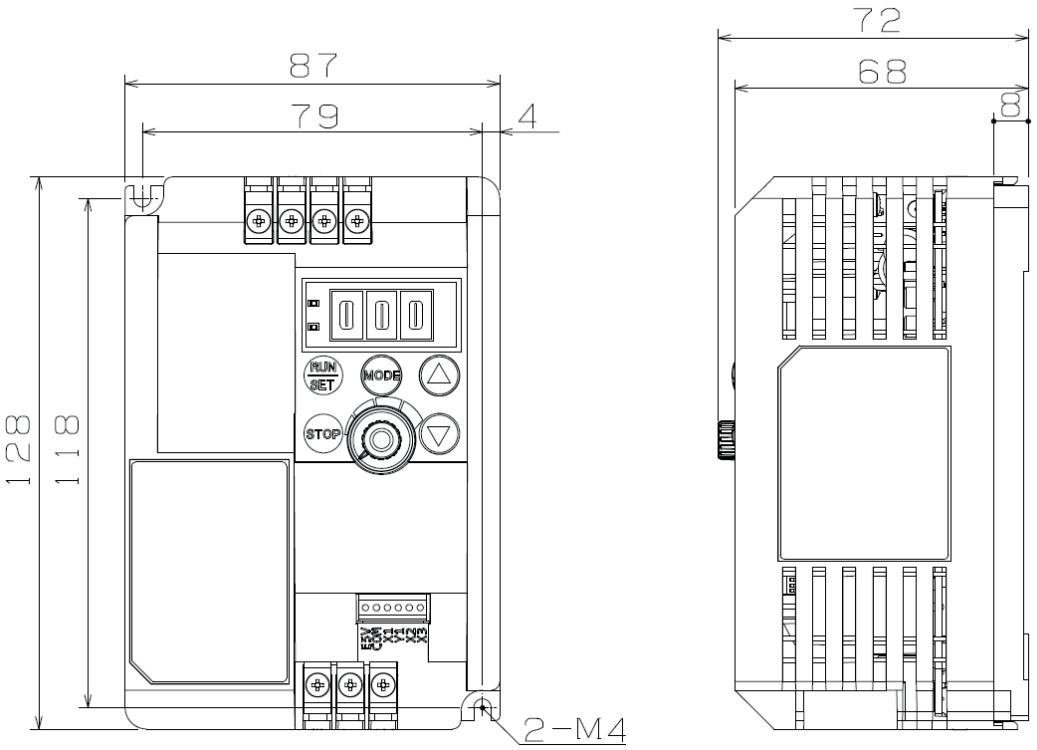
Please refer to P20～P39

17. Dimension

IDW200-751****



IDW200-401****



18. Display Specifications

【POWER Lamp】

Lighting when power is on

【RUN Lamp】

Lighting when motor is operating

【RUN/SET】

SW to start motor
(SW to set parameters)

【STOP】

SW to Stop Motor

【Potentiometer】

Adjusting motor speed

【Display】

[When Operating]
Display setting frequency of motor
[When Setting Parameters]
Display parameter figures
[When error occurs]
Display Alarm Number

【MODE】

Switch parameters and its ranges

【△】

Up SW

【▽】

Down SW

19. Parameter Setting

Parameter Number	Parameter Name	Content	Setting Range		Default Value
F01	Direction of Rotation	To select rotation direction Forward/ Reverse.	0	I/O Terminal	0
			1	Regular Rotation	
			2	Reverse Rotation	
F02	Switch of Speed Command Method	To select method for Speed setting.	0	I/O Terminal	0
			1	Potentiometer	
			2	Fixed Speed	
			3	Multiple Speed	
F03	Fixed Frequency	When Parameter F02 is set as "2," motor speed would be set by the Fixed Frequency.	0～120Hz (Digit shift)		40
F04	Accelerating Period	I set the acceleration time of the output frequency until the 0% and 100%. 100% is the highest output frequency.	0～99.9s (Digit shift)		5.0
F05	Decelerating Period	To set Decelerating Period when output frequency becomes from 100% to 0%. 100% is the maximum output frequency.	0～99.9s (Digit shift)		5.0
F06	Protection Level for overcurrent	To set the level of protection for overcurrent. Set the value in % based on the Base Current set with F08 as 100%.	0～150% (Digit shift)		120
F07	Torque Boost	To set the starting motor boost torque from the initial setting under the V/F control.	0～30% (Digit shift)		0
F08	Base Current	To set Base (Rated) Current of motor. Please check the motor specification for rated current.	0.10～5.00A (Digit shift)	0.75kW model	F08
				0.4kW model	

F09	Maximum Output Frequency	To set Maximum Output Frequency of V/F Pattern. Please refer to V/f Pattern Performance Charts for details.	40～120Hz (Digit Shift)		60
F10	Base Frequency	To set Base (Rated) Frequency of motor. Please check the motor's nameplate for rated frequency.	40～120Hz (Digit Shift*)		60
F11	Eco Output Frequency	To set Eco Output Frequency when using "Heavy Duty 2" in V/f Pattern. Please refer to V/f Pattern Performance Charts for details.	0～120Hz (Digit Shift)		1
F12	Minimum Output Frequency	To set Minimum Output Frequency of V/F Pattern. Please refer to V/f Pattern Performance Charts for details.	0～120Hz (Digit Shift)		1
F13	Base Voltage	To set Base (Rated) Voltage of motor. Please check the motor's nameplate for rated voltage.	AC180～240V (Digit Shift*)		200
F14	Ecological Output Voltage	To set Ecological Output Voltage when using "Heavy Duty 2" in V/f Pattern. Please refer to V/f Pattern Performance Charts for details.	AC10～240V (Digit Shift)		10
F15	Minimum Output Voltage	To set Minimum Output Voltage of V/F Pattern. Please refer to V/f Pattern Performance Charts for details.	AC10～240V (Digit Shift)		10
F16	V/f Pattern	To select V/f Pattern. Please refer to V/f Pattern Performance Charts for details.	0	Free setting	2
			1	Heavy Duty 2	
			2	Fixed Torque	
			3	Fixed Output Torque	
F17	Carrier Frequency	To select Carrier Frequency	2	2kHz	2
			4	4kHz	
			8	8kHz	
			10	10kHz	
			12	12kHz	
			15	15kHz	

F18	Alarm Cancellation Period	0s : No Automatic Alarm cancellation 1 ~ 999s: Automatic Alarm Cancellation (Reboot)	0～999s (Digit Shift)		0
F19	PID Control	To set PID Control mode for speed adjustment by I/O Terminal (X1).	0	No control	0
			1	Regular	
			2	Reverse	
F20	PID Control Target value	In case of setting 1 or 2 in Parameter F19, PID control would be done along the target value	0～100% (Digit Shift)		0
F21	PID Gain	To adjust PID Control Gain. ※ In case of setting 1 or 2 for Parameter F19, PID Gain would be applied to operation.	1～10 (Digit Shift)		1
F25	Multiple Speed 1	In case of setting Parameter F02 with "3," Multiple Speed functions. To set the frequency for X3(Open), X2(Close).	0～120Hz (Digit Shift)		40
F26	Multiple Speed 2	In case of setting Parameter F02 with "3," Multiple Speed functions. To set the frequency for X3(close), X2(open).	0～120Hz (Digit Shift)		50
F27	Multiple Speed 3	In case of setting Parameter F02 with "3," Multiple Speed functions. To set the frequency for X3(close), X2(close).	0～120Hz (Digit Shift)		60
F28	Upper Limit for Frequency	To set upper limit of Frequency	10～120Hz (Digit Shift)		120
F29	Lower Limit for Frequency	To set lower limit of Frequency.	0～110Hz (Digit Shift)		0
F30	Upper limit range of Speed Command	To set upper limit of Speed Command Range for Input/output Terminal (X1) and Potentiometer.	0～100% (Digit Shift)		100
F31	Lower limit range of Speed Command	To set lower limit of Speed Command Range for Input/output Terminal (X1) and Potentiometer.	0～100% (Digit Shift)		0

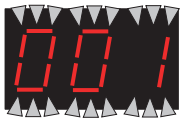
F32	Protection Period for Over Current	To set time period of protection for over current. To set the time period for the protection set by Parameter F06 (Protection Level for Over Current).	0.1～60.0s (Digit Shift)		60.0
F88	Display Switch	To set display information from Frequency only to Frequency, Voltage, and Current switchable.	0	Frequency Display Only	0
			1	Frequency, Voltage, Current Switchable	
F89	Software Version	To display software version.	—		—
F90	Reset to Default Values	To return to the Default Values (initial settings) of Parameters by inputting "1."	0	—	0
			1	Default Setting	

※The setting range that has been described as digit move, the value of the setting range is digit move. For more information, see an overview of the operating procedures of digit movement.

【Outline of Operation SW】

RUN SET	To start motor operations.
	To switch to Parameter Setting mode. To determine input data to Parameter.
STOP	To stop motor operations. To switch over from Irregular Status to Waiting Status.
	To make "Digit Shift" in display in setting Parameters and Ranges for faster setting operations.
MODE	To switch to Parameter mode.
	To switch display content while motor is operating.
△	To change Parameters and setting value.
▽	To change Parameters and setting value.

Explanation of Display Status

While setting Parameter Numbers	While setting Parameter Ranges
 Indicates two right digit are blinking.	 Indicates all three digit are blinking.

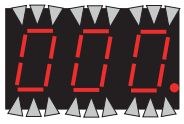
【Procedures of Parameter Setting】

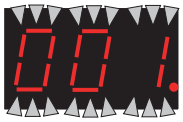
1. Turn on the Driver. (POWER Lamp : Green light is on.)
2. Press Mode button (MODE) to display Parameter screen. Display shows F01.
3. Press Up/Down SW (△) / (▽) to display desired Parameter Number.
4. Pressing (△) once, the first column number is increased by 1. (Pressing (△) for longer than 1 second, the second column number is increased by 1.)
5. Pressing (▽) once, the first column number is decreased by 1. (Pressing (▽) for longer than 1 second, the second column number is decreased by 1.)
6. Pressing (RUN/SET), Parameter Setting Range screen is displayed.
7. Press (△) / (▽) to display desired Value..
8. Pressing (△) once, the first column number is increased by 1. (Pressing (△) for longer than 1 second, the second column number is increased by 1.)
9. Pressing (▽) once, the first column number is decreased by 1. (Pressing (▽) for longer than 1 second, the second column number is decreased by 1.)
10. Pressing (RUN/SET) the value is determined and return to Parameter Mode.
11. Press (MODE) once and return to the Default Display.

【Default Display/Standby Mode】

【Switch to Parameter Mode】

【Switch to Parameter Setting Range Mode】





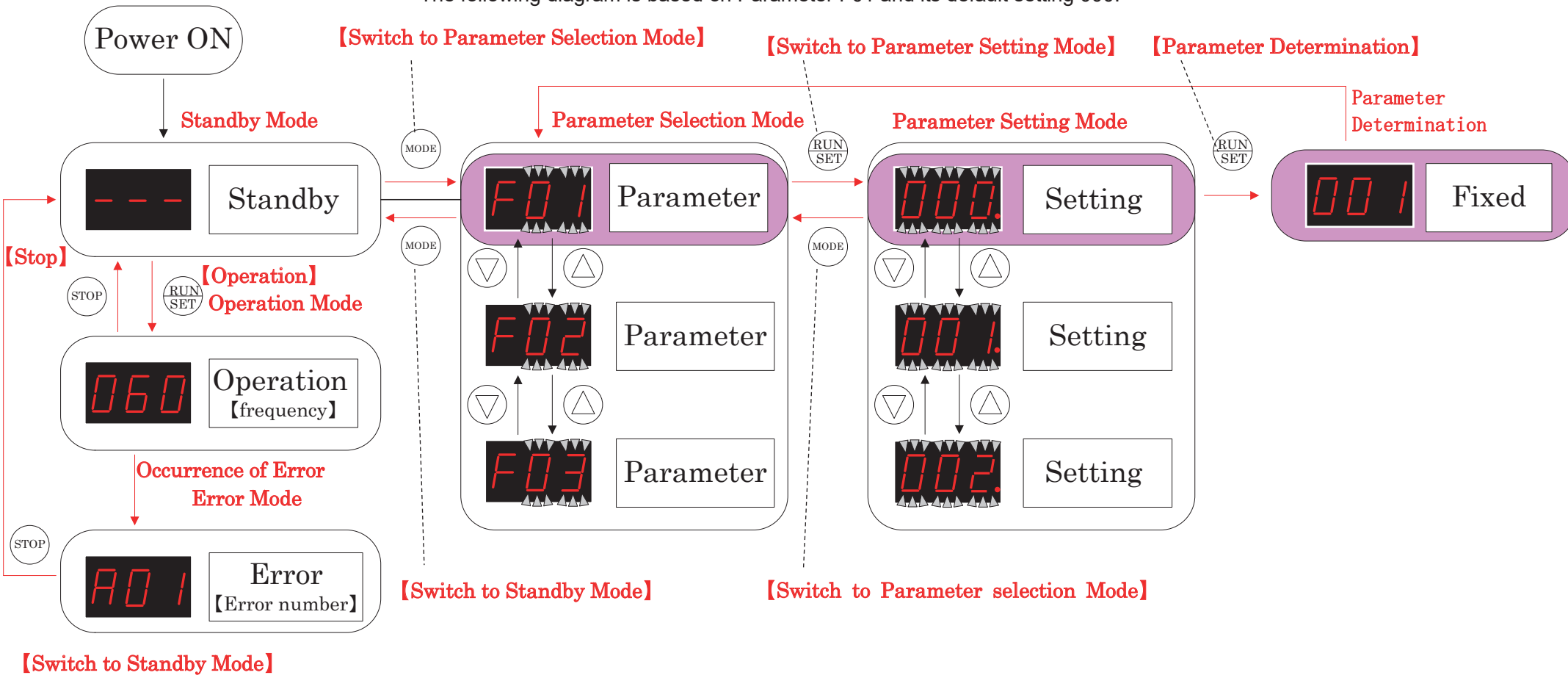
Display changes 000, 001, 000 as pressing Up SW and Down SW

【Switch to Parameter Mode】

【Default Display/Standby Mode】

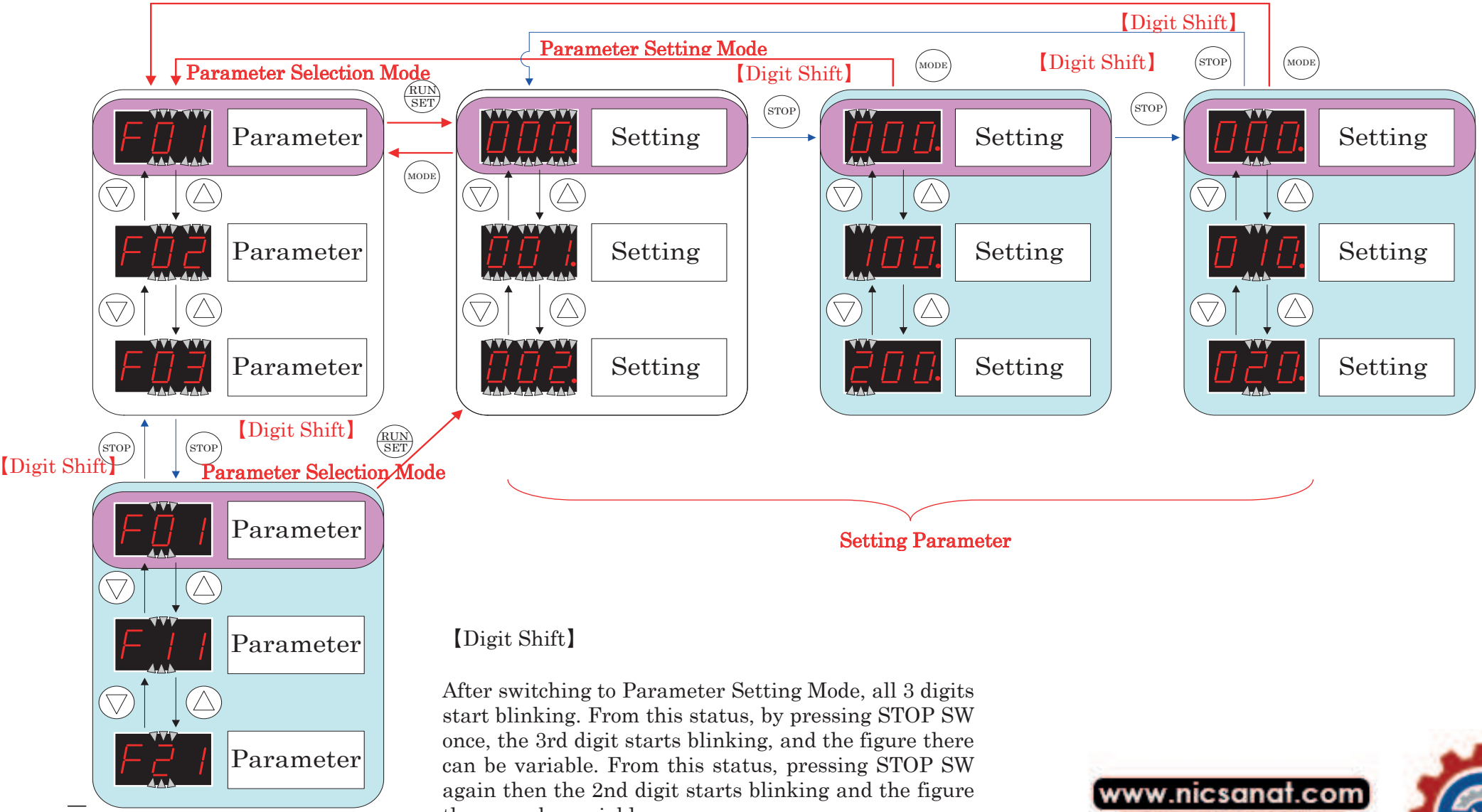
【Outline of Operation SW and Each Mode】

The following diagram is based on Parameter F01 and its default setting 000.



【Outlined Procedures of "Digit Shift"】

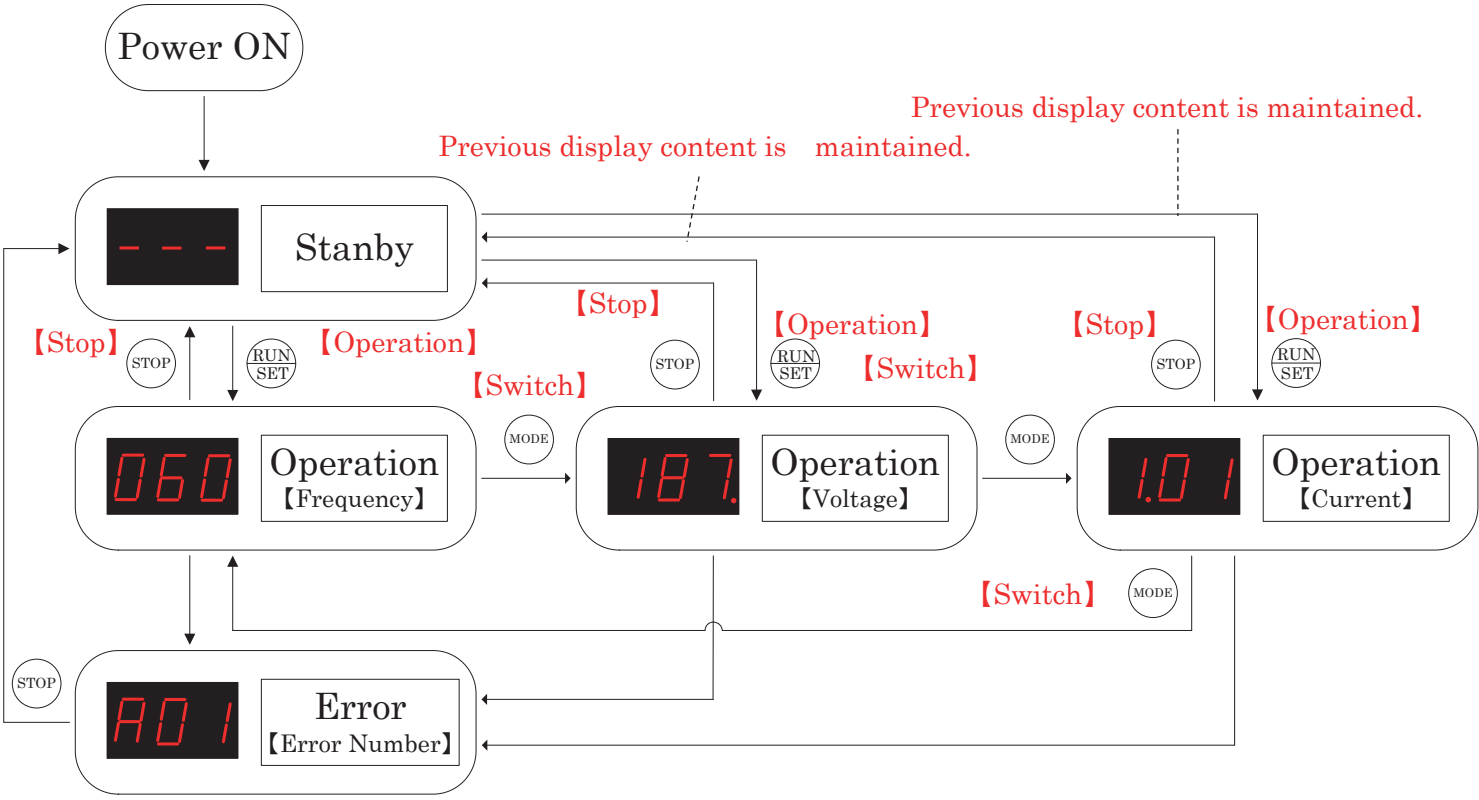
The following diagram is based on Parameter F01 and its default setting is 000.
During the Parameter Selection Mode and Parameter Setting Mode, you can move to the second or third digit directly for faster setting of the parameter by pressing STOP SW. Please refer to the following procedures.



【Digit Shift】

After switching to Parameter Setting Mode, all 3 digits start blinking. From this status, by pressing STOP SW once, the 3rd digit starts blinking, and the figure there can be variable. From this status, pressing STOP SW again then the 2nd digit starts blinking and the figure there can be variable.

【Outline of SW Operations in case of Changing Display Content】



Explanation of Display Content:

【Frequency Display】 No Dismal Point

【Voltage Display】

Dismal Point

【Current Displa

Dismal Point

※ Voltage and Current can be displayed only when Parameter F88 of Display Switch is set to (1) for Frequency, Voltage and Current switchable.

※ The frequency, voltage, and current displayed are approximate Value.

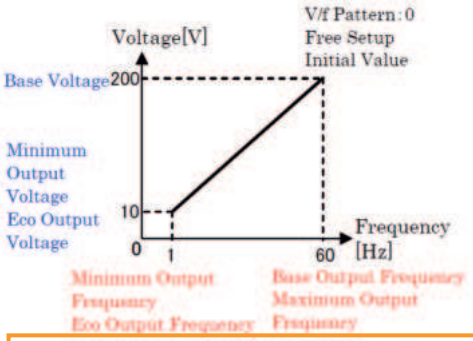
※ Driver never outputs higher voltage than power supply voltage even if display may show such higher value.

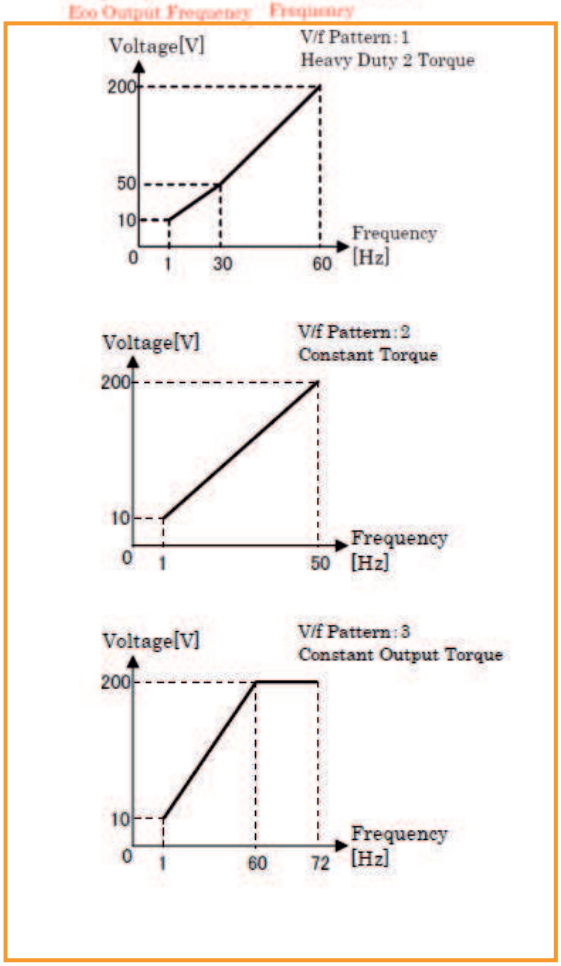
※ When motor operation under either of Frequency Display, Voltage Display, or Current Display is stopped to the standby mode, the previous display status is maintained and the same display content will appear when motor operation is resumed.

(The display function is released when power is turned off.)

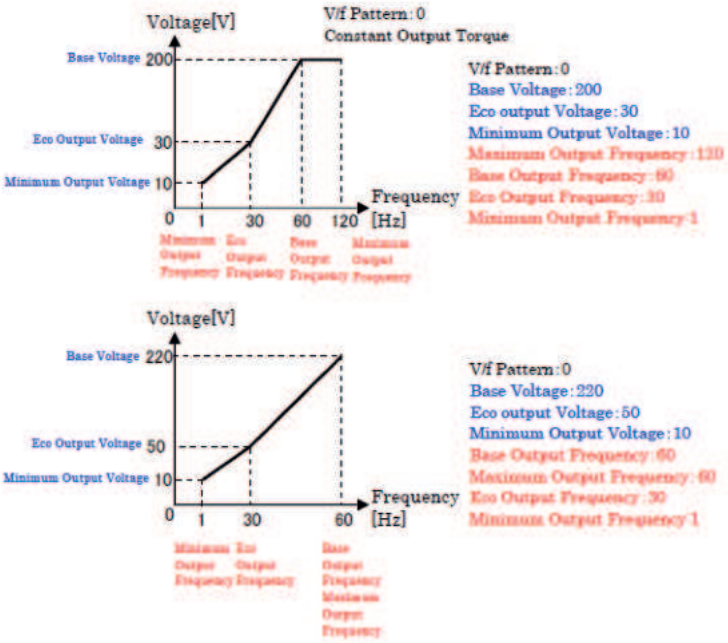
【V/f Pattern Performance Chart】

【Setting Example】
Various patterns are available by changing parameter settings.





Parameter Number	Parameter Name	Default Value
F13	Base Voltage	200
F14	Ecological Output Voltage	10
F15	Minimum Output Voltage	10
F10	Base Frequency	60
F09	Maximum Output Frequency	60
F11	Ecological Output Frequency	1
F12	Minimum Output Frequency	1

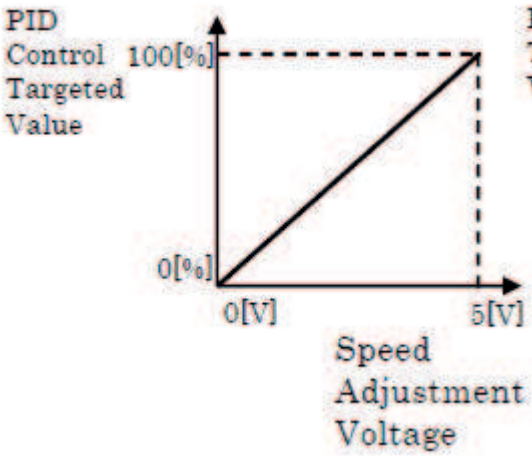


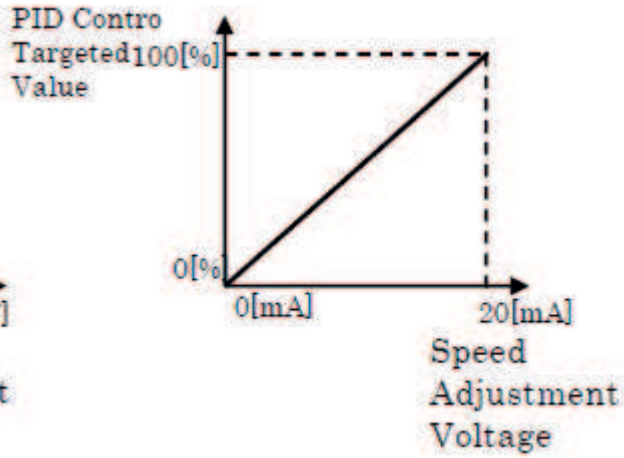
V/f pattern 1, 2 and 3 have fixed values; therefore, no changes of the voltage and frequency values are available.

【PID Control】

1. Move to Parameter setting screen and then select F19 for PID Control.
   Set PID Control by setting “1” for Regular Performance or “2” for Reverse Performance
   Regular Performance (1): In case of I/O Terminal (X1) has smaller value than the target value, this increases output.
   Inverted Performance (2): In case of I/O Terminal (X1) has bigger value than the target value, this increases output.
2. Set PID target value at F20 PID Control Target Value screen.
3. Nidec Driver will start PID Control in accordance with the PID Control Target Value.

※ In case that external input devices (temperature sensor, etc,) are connected to I/O Terminal (X1) and that PID Control Target Value is set at 50%, Nidec Driver will adjust its output so that speed adjust voltage would become 2.5V, which is 50% of the speed adjust Voltage.





20. Protection Specifications

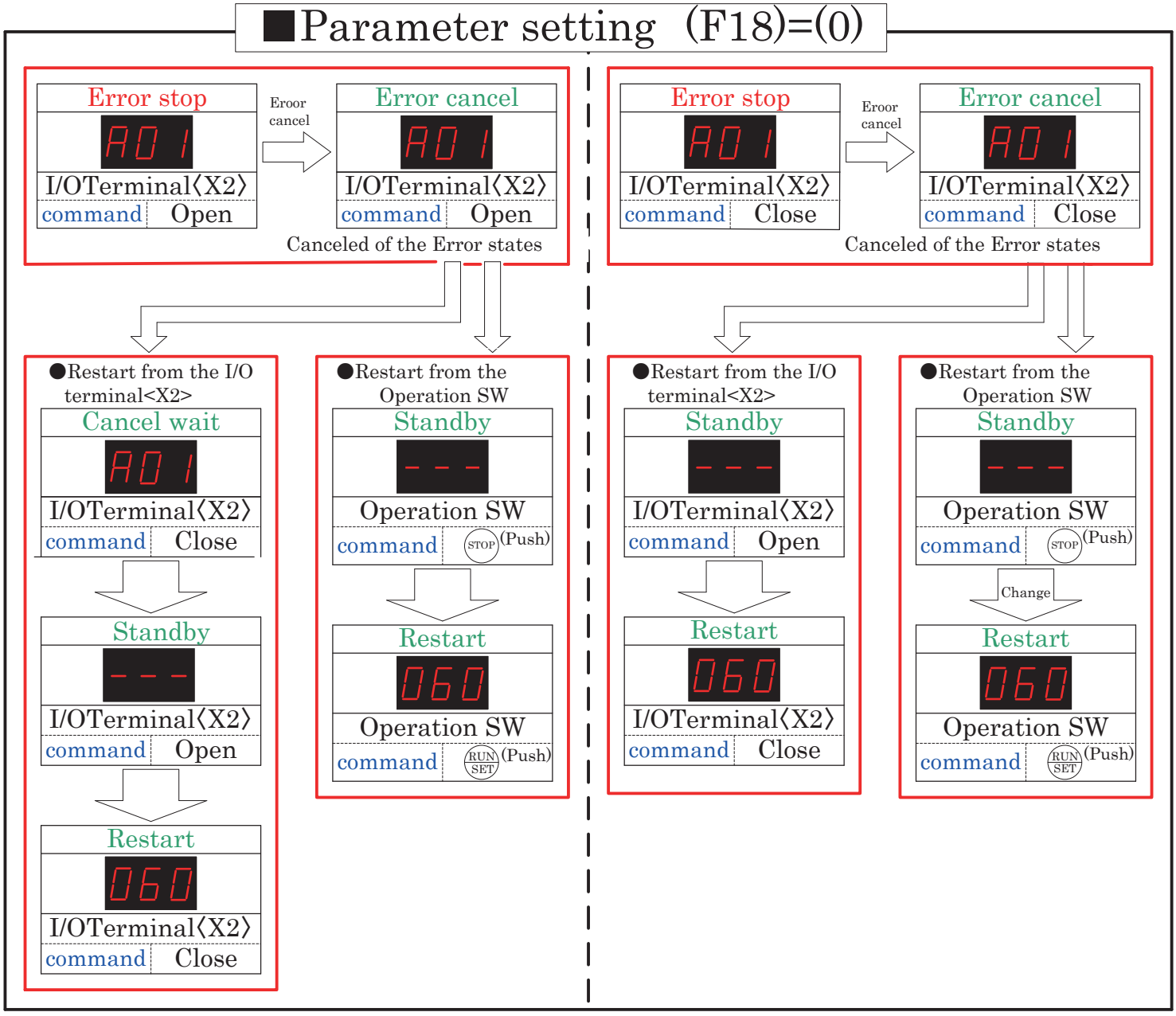
In case of the occurrence of protection functions, Nidec Driver stops motor and displays the Alarm Number.

Alarm Display Number	Alarm Name	Content	Setting Value	Cancelling Value
A00	Driver Temperature Protection	In case that Driver temperature becomes more than Setting Value, motor stops. When the temperature becomes lower than the Cancelling Value, motor restarts rotation in accordance to the conditions for operation resumption.	80℃	70℃
A01	Over Current Protection (Motor Current)	In case that motor current (secondary current) becomes more than the Setting Value, motor stops. Motor resumes operations in accordance to the conditions for operation resumption.	Up to the Parameter setting of F06 and F32	0A
A02	Lower Voltage Protection	In case that power supply voltage to Driver becomes lower than the Setting Value, motor stops. When the voltage becomes more than the Cancelling Value, motor restarts in accordance to the conditions for operation resumption.	AC160V	AC170V
A03	Over Voltage Protection	In case that power supply voltage to Driver becomes more than the Setting Value, motor stops. When the voltage becomes lower than the Cancelling Value, motor restarts in accordance to the conditions for operation resumption.	AC265V	AC255V
A04	Power Module Protection	In case that motor current (secondary current) becomes more than the Setting Value, motor stops. When the current becomes lower than the Cancelling Value, motor restarts in accordance to the conditions for operation resumption.	15A	14.9A
A10	Over Current Protection (Output Current)	In case that output current becomes more than 200% for 0.5 seconds, motor stops. Motor restarts in accordance to the conditions for operation resumption.	200%	0A
A11	Driver's Self Diagnostic Protection	In case that Self Diagnostic Protection senses irregularity at parts inside Nidec Driver, motor stops. When Driver senses below the Cancelling Value, motor restarts in accordance to the conditions for operation resumption.	Occurrence of irregularity	Elimination of irregularity

A12	Function Protection	In case that irregularity occurs with microprocessors etc., motor stops. When the Driver senses the elimination of the irregularity, motor restarts in accordance to the conditions for operation resumption.	Occurrence of irregularity	Elimination of irregularity

【Conditions for Operation Resumption from Protection Stops】

In case of no automatic Alarm cancellation (Speed setting other than Multiple Speed Mode):



In case of no automatic alarm cancellation (Speed setting under Multiple Speed Mode):

■Parameter (F18)=(0)

Operation set to 'close' the I/O terminals <X3/X2>
If motor stopped abnormal.

O:Open
C:Close

Error stop

I/O Terminal〈X2/X3〉

		X2	X3
Command	Multi speed 1	O	C
	Multi speed 2	C	O
	Multi speed 3	C	C

Error Cancel

Error cancel

I/O Terminal〈X2/X3〉

		X2	X3
Command	Multi speed 1	O	C
	Multi speed 2	C	O
	Multi speed 3	C	C

Canceled of the error states

Change with an I/O terminal Change

Change
Push the operation SW

●Reboot method from an I/O terminal〈X2〉

Standby

I/O Terminal〈〈X2/X3〉

		X2	X3
Command	Multi speed	O	O

Change with an I/O terminal

Resume operation

I/O Terminal〈X2〉

		X2	X3
Command	Multi speed 1	O	C
	Multi speed 2	C	O
	Multi speed 3	C	C

●Reboot method from an operation SW

Standby

Operation SW

Command (STOP) (Push)

State of the I/O Terminal		X2	X3
	Multi speed 1	O	C
	Multi speed 2	C	O
	Multi speed 3	C	C

Push the operation SW

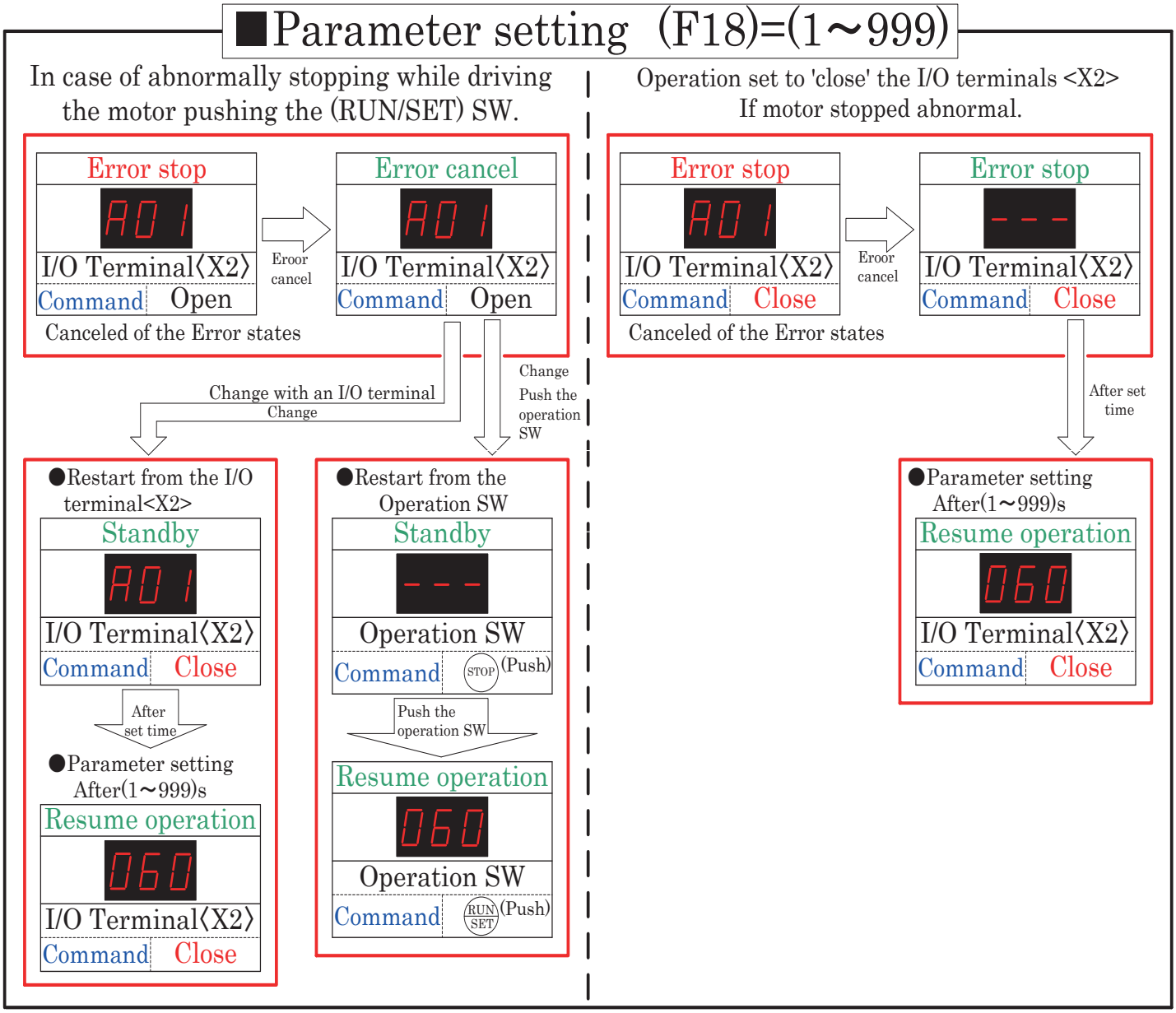
Resume operation

Operation SW

Command (RUN SET) (Push)

State of the I/O Terminal		X2	X3
	Multi speed 1	O	C
	Multi speed 2	C	O
	Multi speed 3	C	C

In case of automatic alarm cancellation (Speed setting other than Multiple Speed Mode):



In case of automatic alarm cancellation (Speed setting under Multiple Speed Mode):

■Parameter setting (F18)=(1～999)

Operation set to 'close' the I/O terminals <X3/X2>
If motor stopped abnormal.

O:Open
C:Close

Error stop

I/O Terminal〈X3/X2〉

		X3	X2
Command	Multi speed 1	C	O
	Multi speed 2	O	C
	Multi speed 3	C	C

Error cancel

Error cancel

I/O Terminal〈X3/X2〉

		X3	X2
Command	Multi speed 1	C	O
	Multi speed 2	O	C
	Multi speed 3	C	C

Canceled of the Error states

After set time

●Parameter setting
After(1～999)s

Resume operation

		X3	X2
State of the I/O Terminal	Multi speed 1	C	O
	Multi speed 2	O	C
	Multi speed 3	C	C

21. Speed Setting

【Analog Speed Command】

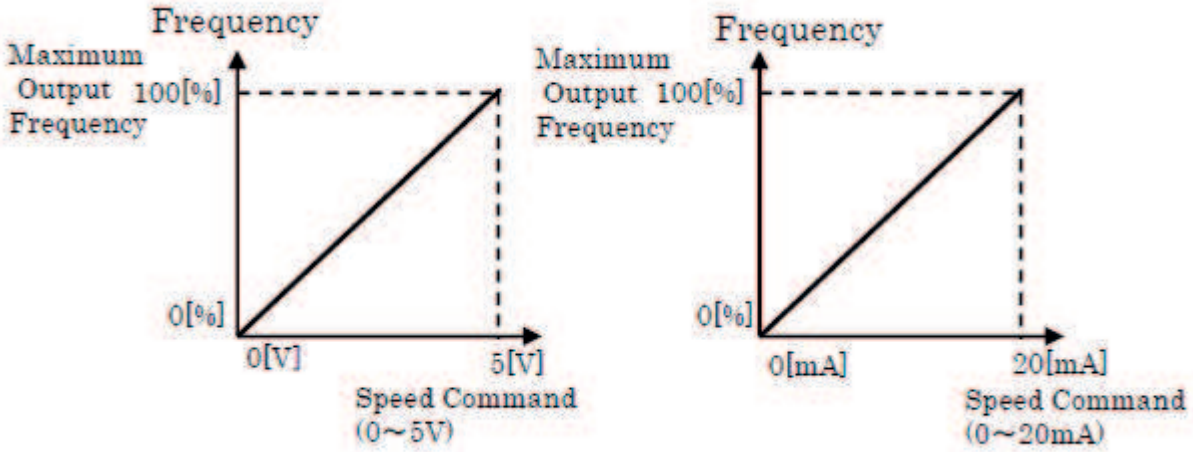
Speed setting could be done be made by either of I/O Terminal (X1) or Potentiometer on the control panel.

※ In case of external speed adjustment by using I/O Terminal (X1), set Parameter F02 for "Switch of Speed Command Method" to I/O Terminal (0) and arrange a switching pin to the described position. Then I/O Terminal (X1) starts functioning.

※ In case of speed adjustment by Potentiometer on the control panel, set Parameter F02 for "Switch of Speed Command Method" to Potentiometer (1). Then Potentiometer starts functioning.

	I/O Terminal : X1
External DC Voltage	0 ― 5V
Speed	Slow―Fast

	I/O Terminal : X1
External DC Current	0 ― 20mA
Speed	Slow―Fast



【Fixed Speed Setting】

Fixed Speed setting becomes available.

※ In case of fixing Speed Setting, set Parameter F02 for "Switch of Speed Setting Method" to Fixed Speed (2).

【Multiple Speed Setting 】

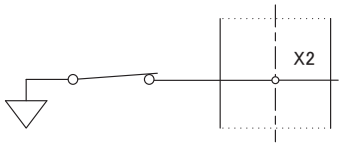
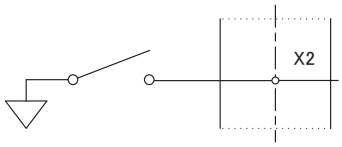
Multiple Speed setting is enable.

It is possible to adjust multiple speeds by switching I/O Terminals (X2/X3).

※ In case of using Multiple Speed Adjustment Command, set Parameter F02 for “Switch of Speed Setting Method” to Multiple Speed (3).

		I/O Terminal X3	I/O Terminal X2
Stop		Open	Open
Multiple Speed 1	F25	Open	Close
Multiple Speed 2	F26	Close	Open
Multiple Speed 3	F27	Close	Close

※ Set Parameters F25 of “Multiple Speed 1”through F27 of “Multiple Speed 3” with your desired frequency.

I/O Terminal : X2/X3		
Close	0V	
Open	E12V or Open	

※ In case of setting Multiple Speed, it is not possible to switch the direction of the rotation by I/O Terminal.

From Direction of Rotation (F01) of the parameter setting, please set one of Forward Rotation (1)/ Reverse Rotation (2).

From Direction of Rotation (F01) of the parameter setting, If you set a (0) I/O terminals, it is Forward Rotation..

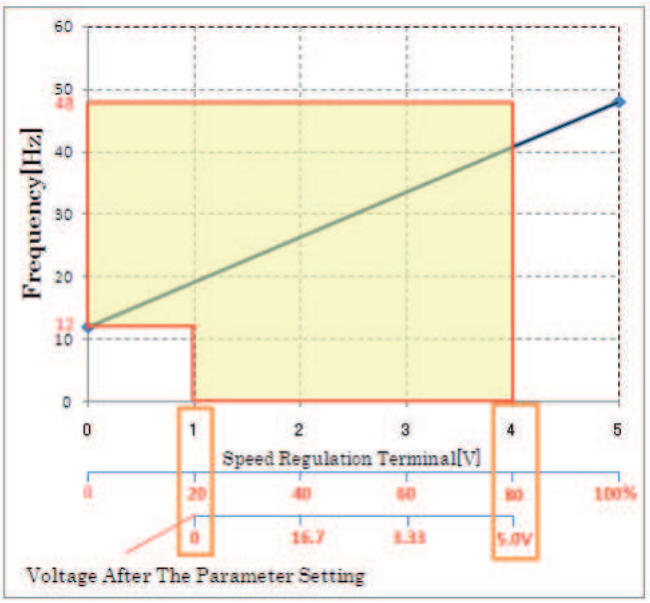
【Setting Frequency Limit and Speed Command Range】

Setting of frequency limit and speed range is available.

Frequency limit values could be set at Parameters F28 and F29 and speed range could be set at Parameters F30 and F31.

※ Frequency limit is determined by the frequency / maximum output frequency.

The following examples are initial values: It becomes a case for maximum output frequency (F09) to be set to (60), and for frequency (F10) of the base to be set to (60).



【Setting Example】

Parameter Setting

F28(Frequency Upper Limit) : 48Hz

F29(Frequency Lower Limit) : 12Hz

F30(Speed Command Upper Range) : 80%

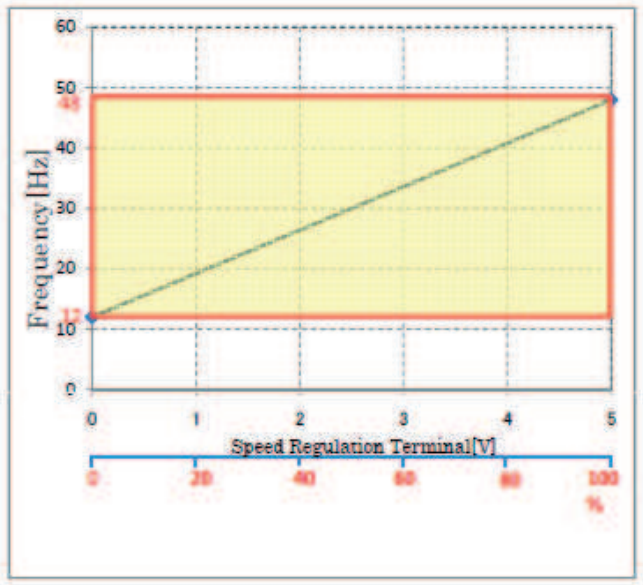
F31(Speed Command Lower Range) : 20%

Frequency Upper Limit : 120Hz ⇒ 48Hz

Frequency Lower Limit : 0Hz ⇒ 12Hz

Speed Command Upper Range : 100% ⇒ 80%

Speed Command Lower Range : 0% ⇒ 20%



【Setting Example】

Parameter Setting

F28(Frequency Upper Limit) : 48Hz

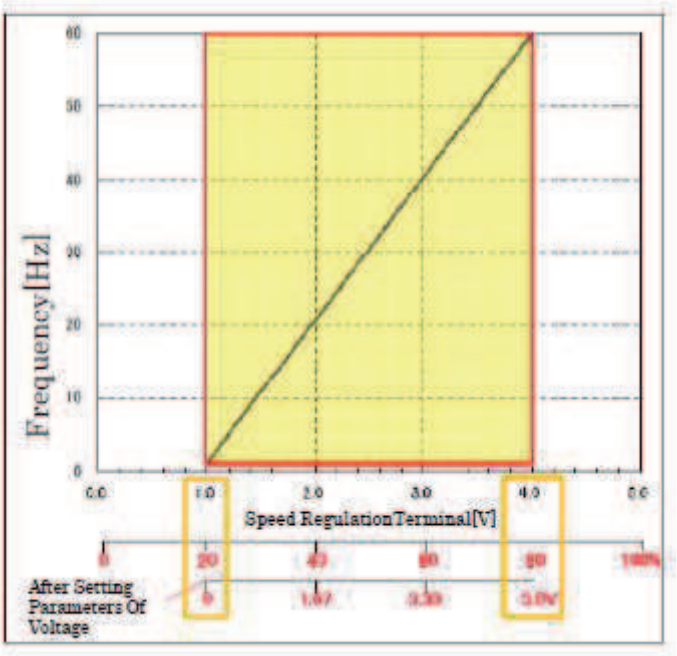
F29(Frequency Lower Limit) : 12Hz

F30(Speed Command Upper Range) : Default Value

F31(Speed Command Lower Range) : Default Value

Frequency Upper Limit : 120Hz ⇒ 48Hz

Frequency Lower Limit : 0Hz ⇒ 12Hz



【Setting Example】

Parameter Setting

F28(Frequency Upper Limit) : Default Value

F29(Frequency Lower limit) : Default Value

F30(Speed Command Upper Range) : 80%

F31(Speed Command Lower Range) : 20%

Speed Command Upper Range : 100% ⇒80%

Speed Command Lower Range : 0% ⇒ 20%

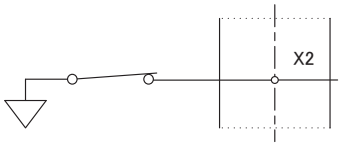
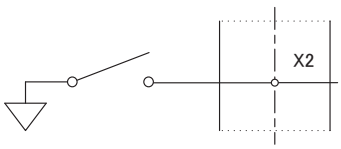
22. Alarm Setting

	I/O Terminal : Y1
Normal	ON
Protection Outbreak	OFF

I/O Terminal : Y1 is the open collector output between COM.

23. Operation Setting

【Operation Setting by I/O Terminal】

	I/O Terminal : X2		
Start	Close	0V	
Stop	Open	E12V or Open	

※ Start/Stop setting by I/O Terminal is available in case of selecting (0) of I/O Terminal, (1) of Potentiometer, or (2) of Fixed Speed at Parameter F02 of Switch of Speed Setting Method.

※ In case of selecting (3) of Multiple Speed at Parameter F02 of Switch of Speed Setting Method, please refer to 21.Speed Setting【Multiple Speed Setting】.

【Speed Setting by Operation Key】

【RUN/SET】

Start SW for Motor
(Parameter Setting SW)

【STOP】

Stop SW for Motor

	Control Panel
Start	RUN / SET
Stop	STOP

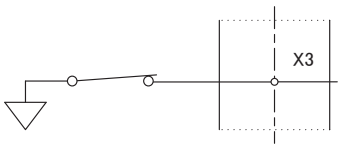
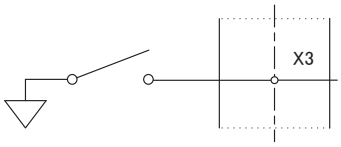
※ Unless either one of (0), (1), or (2), which correspond to I/O Terminal, Potentiometer or Fixed Speed is selected at Parameter F02 of Switch of Speed Setting Method, RUN/SET SW on the Control Panel does not function.

※ STOP SW on the Control Panel can stop motor even if I/O Terminal (X2) is in operation mode, which means (Close) status.

In order to restart motor, please switch I/O Terminal from Operation Mode (Close) ⇒ Stop Mode (Open) ⇒ Operation Mode (Close) or press RUN/SET SW on the Control Panel.

24. Rotation Setting

【Forward / Reverse Rotation Setting by I/O Terminal】

	I/O Terminal (X3)		
Reverse Rotation	Close	0V	
Forward Rotation	Open	E12V or Open	

※ Unless (0) of I/O Terminal is selected at Parameter F01 of Direction of Rotation, The rotation direction is not controllable from the outside.

※ Please select (1) for Forward Rotation or (2) for Reverse Rotation at Parameter F01 of Direction of Rotation in case of using fixed direction of rotation.

25. Selection of Breaker and Fuse

In order to protect from accidents caused by short circuits, connect fuse on the part of input side.

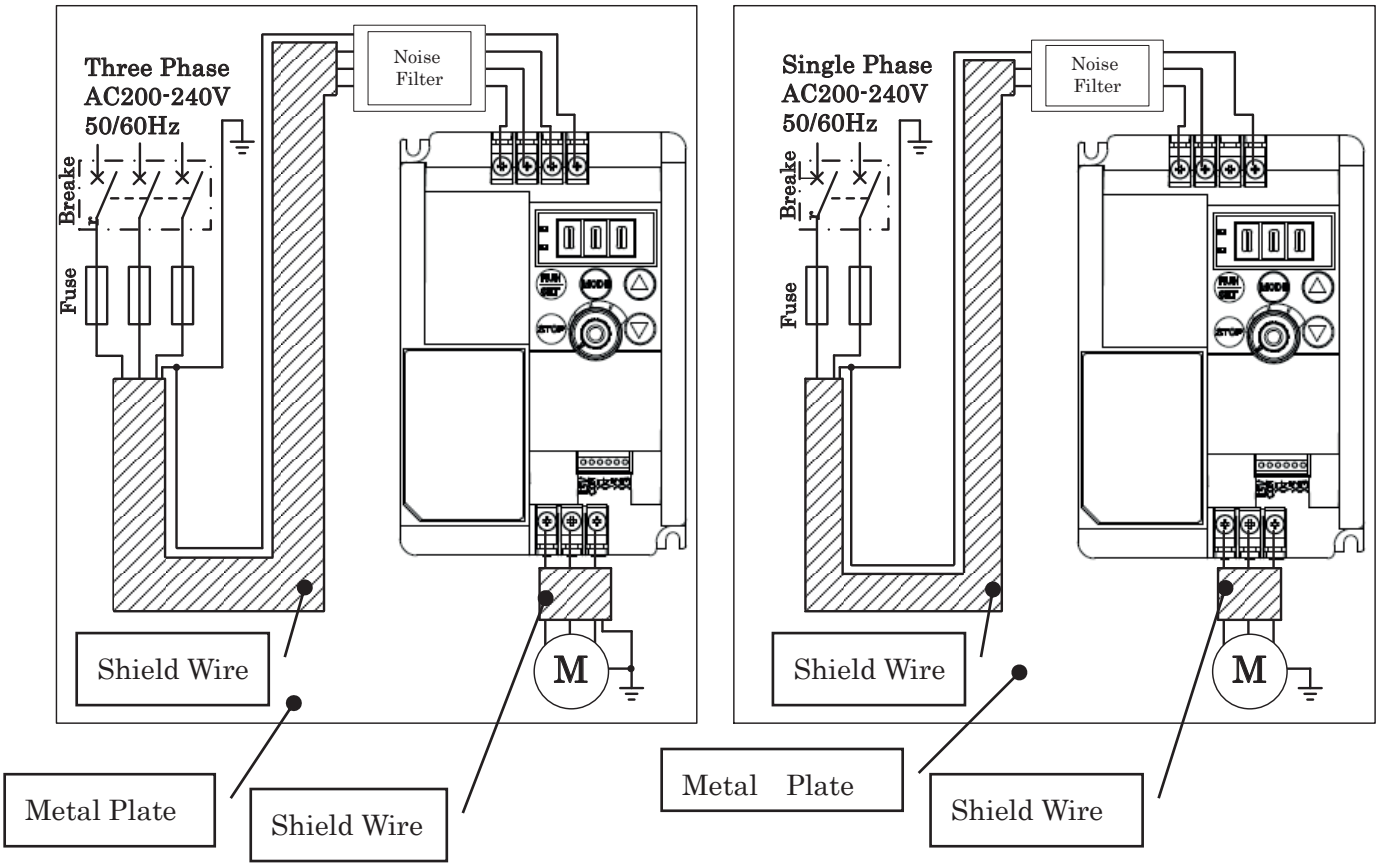
	Driver's Model Number	Breaker (Recommended Value)	Fuse (Recommended Value) ※
Three Phase 200V 750W	IDW200-751****	10A	15A/25A
Single Phase200V 750W	IDW200-751****	15A	20A/40A
Three Phase 200V 400W	IDW200-401****	5A	6A/25A
Single Phase 200V 400W	IDW200-401****	10A	10A/25A

※ In case that fast-blow fuse is used, use the fuse with 300% of the rated input current of the Driver.
In case that slow-blow fuse is used, use the fuse with 175% of the rated input current of the Driver.
The above values are just recommendation and please determine the capacity of breaker and/or fuse considering the overall environments including breaker in the facilities, wiring connections and so on.

26. EMC Measure

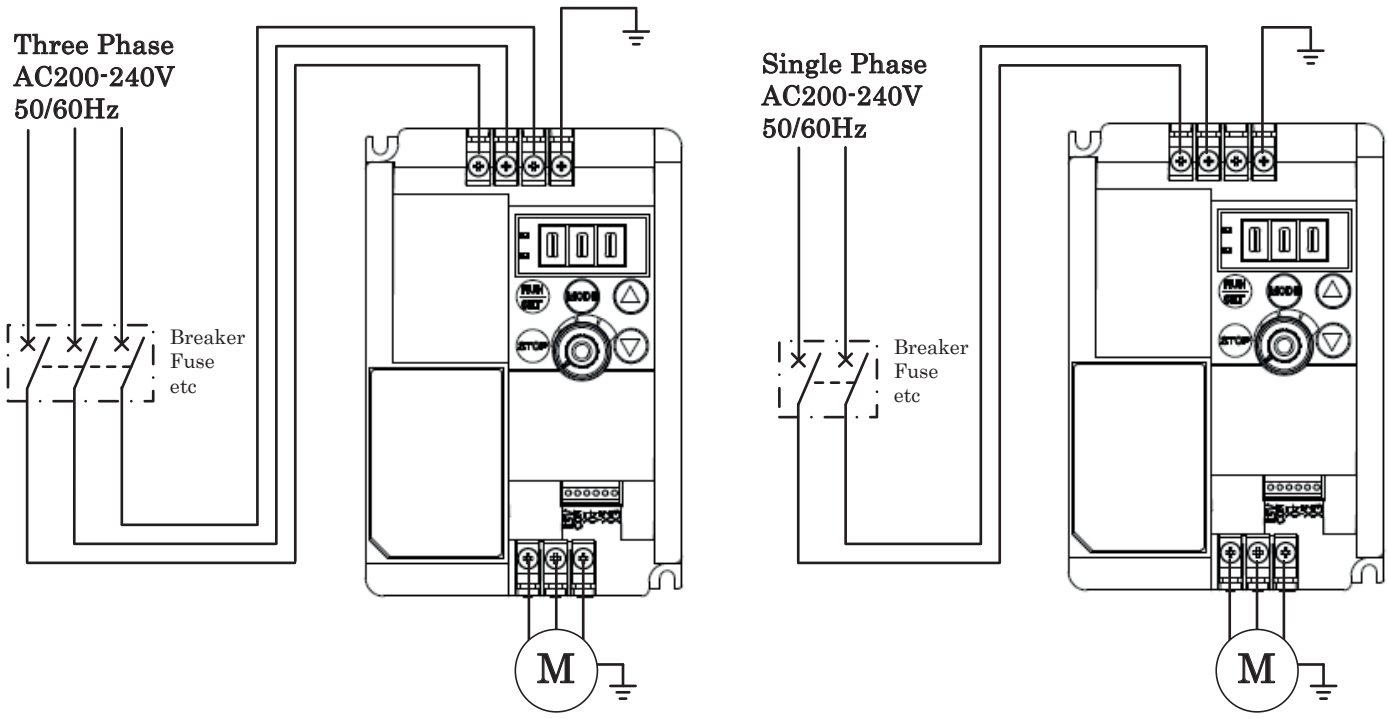
Please install a Driver as an EMC measure as follows:

- Please connect EMC noise filter to the input side (the primary side).
- Please install noise filter and EMC noise filter on the same metal plate.
- Please use shield cable for the connecting wires between a Driver and a motor.
- Use shield cable for the connecting wires between the input side and a noise filter.



27. Simple Setting

The following illustration indicates a simple setting for operation as an example.



28. Product Warranty

◆ warranty period

This product is warranted for 1 year from the date of delivery to the customer or 18 months from the date of shipment from the Nidec factory, whichever comes first.

However, due to the use environment, conditions and the frequency, this warranty may not be applied.

In addition, the warranty period of the repaired portion where our service department has done, is limited to 6 months after the completion of repairing.

◆ scope of warranty

○ repairs

When the product breaks down within the product guaranteed period, repairing or replacement would be applied. However, it might be for a fee if situation corresponds to following.

●Problems due to an improper condition at your side including your company and your customer, environment, storage, handling, usage, a carelessness and the trouble by the reasons such as design related on your side.

●Problems due to improper maintenance or handling ,carelessness, or other reasons where the customer is determined to be responsible.

●Problems due to additions or modifications made to Nidec product without Nidec's approval.

●Problems due to usage of the product out of the environmental specifications

●Problems due to no maintenance on consumable or expendable parts.

●Problems due to packaging or fumigation.

●Problems due to the unforeseeable circumstances by present science technology at point of purchase or delivery.

●Problems caused by natural disaster.

●Other causes not due to defects Nidec workmanship or materials.

○fault diagnosis

Customers are responsible for periodic inspections of the product. Upon request, a Nidec representative will inspect the product for a fee. If the Nidec representative finds the product to be defective due to Nidec workmanship or materials and the defect occurs during the warranty period, this inspection fee will be waived and the problem remedied free of charge.

○Exceptions

Any inconvenience to the customer or damage to non-Nidec products due to Nidec's defective products are NOT covered by warranty regardless of the warranty period.

Above Warranty service is only applicable within Japan.

About the business in the foreign deal, use and the trouble, please contact with store of the purchase or us separately.

29. Troubleshooting

■■Motor does not rotate.

Cause	Diagnosis	Countermeasure
Main power supply is not correctly applied.	Check input voltage, output voltage, balance between phases, etc. to confirm power is applied correctly.	・Place a breaker for wiring, breaker for short circuit (with protection for overcurrent), electromagnetic contactor. ・Check if there is any voltage down, lacking of phase, inappropriate wire connection or contact, and repair/replace defect parts if necessary.
Broken wire, wire connection mistakes, poor wire connection, etc.	Check appropriateness of wire connections. Measure output current.	Repair or replace inappropriate wire connections to motor.
Short accelerating time period.	There may be a situation where motor does not rotate due to too short accelerating time period under certain load conditions.	Extend the time period of acceleration.
Too large load	Measure output current and check whether it is within the specification or not	Reduce the load.
	Check whether mechanical brake is applying or not.	Release the mechanical brake.
Lack of torque generated by motor.	Check whether motor starts or not by raising the torque boost value.	Raise the value of torque booster.
	Check the V/f pattern.	Change the V/f setting in accordance to the size of the motor.

■ Motor rotation does not increase.

Cause	Diagnosis	Countermeasure
Too low setting of Maximum Output	Check the data of the Maximum Output Frequency in	Change the Maximum Output Frequency to the

Frequency.	Parameter setting.	Appropriate value.
Too setting frequency is low	Check the speed adjustment at I/O Terminal.	・Raise the value of input frequency. ・Make certain wiring connection is correct.
Too large load.	Measure the output current and confirm whether or not it is within the specification.	Reduce the load.
Too long acceleration time.	Check the acceleration time of the parameter.	Set the acceleration time to match the load.
Speed setting method switching is inappropriate ・Operating potentiometer by setting of I/O terminal. ・ Operating External input by setting of potentiometer. ・Operating external input by setting of Fixed Speed. ・Operating potentiometer by setting of Fixed Speed.	Check the settings of Parameter's Switch of Speed Command Method.	Change the speed setting to the appropriate value.

■ Motor rotates to the reverse direction of rotation command.

Cause	Diagnosis	Countermeasure
Wiring to the motor is wrong	Check the wiring connection to motor.	Re-connect this product's U, V, W terminals to the motor's U, V, W respectively.
Setting the direction of rotation is wrong.	Check the rotation direction of Parameter setting.	Change the Direction of Rotation the appropriate value.
Open and close state of the Direction of Rotation terminal is inappropriate	Check the I/O terminal contact.	Change to the appropriate open and close state contact. ・Please provide contact between direction of rotation and COM.

		・Please change the wiring and contact.

■ Motor generates annoying noises.

Cause	Diagnosis	Countermeasure
Too low carrier frequency	Check the values of frequency of the noise and carrier frequency, and review whether they accord or not.	Change Parameter's carrier frequency to higher value.

■ Motor does not accelerate/decelerate within the time period set.

Cause	Diagnosis	Countermeasure
Too large load	Measure the output current.	Lower the load.
Inappropriate input of I/O Terminals.	Check whether signal line from I/O Terminals have any noises or not.	・Segregate the wirings of main circuit board and I/O Terminals as much as possible. ・Change the type of the wirings to I/O Terminals to shield wire or twist wire. ・Shorten the wirings to I/O Terminals as short as possible.
Lack of torque generated by motor.	Check whether motor starts or not by raising the torque boost value.	Raise the value of Torque Boost of Parameter.

■ Alarm Number [A00] (Driver Temperature Protection) is on.

Cause	Diagnosis	Countermeasure
The ambient temperature is higher than the specification limit of this product.	Measure the ambient temperature.	Lower the ambient temperature by appropriate measures such as ventilating air.
Cooling of this product is not enough.	Check whether the enough installing space for the product is secured or not.	Re-install the product to the location where the recommended space can be secured.
Too large load.	Measure the output current.	Lower the load.

		Lower the value of Carrier Frequency of Parameter. ※ The motor sound will change. Take active air cooling measures such as installing a cooling fan.
Too high value set for Torque Boost.	Lower the value of Torque Boost of Parameter to the level where motor does not stall.	Adjust the value of Torque Boost.
Rated value of motor and setting of the product do not match.	Check whether the Maximum Output Frequency and Base Voltage accord to the motor's rated values or not. The motor's rated values can be confirmed with its nameplate.	Re-set the values of Parameter to the motor's rated values.

■ Alarm Number [A01] (Excessive Current Protection <Motor Current>) / [A10] (Excessive Current Protection <Output Current>) is on.

Too large load	Measure the output current.	Lower the load.
Acceleration/Deceleration time is short.	Check the loading status and determine appropriate time period of acceleration/deceleration.	Extend the time period of Acceleration/Deceleration time of Parameter.
Wire cut of output wiring, Magnet Wire cut of motor	Measure the output current (U, V, W phases).	Replace the output wire or replace the motor.
Insufficient tightening of Output Terminals	Check whether the screws of Output Terminals are loosened or not.	Tighten the screws again with the recommended torque.
Connection of a single phase motor.	Single phase motors cannot be used.	Single phase motors cannot be used.
Wire cut of input wiring connection	Measure the input voltage.	Repair or replace the input wiring connection.
Malfunctions by noises	Check whether there is any source of noises around or not.	・Remove the source of noises ・Take measures against noises

■ Alarm Number [A02] (Short Voltage Protection) is on.

Cause	Diagnosis	Countermeasure
Voltage reduction caused by instantaneous power failure.	Check whether instantaneous power failure occurs or not.	Take necessary measures against instantaneous power failures.

After turning off the Product, electricity is still stored in it when it is turned on again.	Check whether turning power on again before the green LED turns off or not.	Refrain from turning on the Product again within 5 minutes after turning it off.
Input voltage is insufficient to the required specification of the Product.	Measure the input voltage.	Raise the input voltage within the required range of the specifications.
There is a defect component and/or incorrect wire connection in the power supply circuit.	Measure the input voltage and identify a defect component and/or wiring problem.	Repair or replace the defect component and/or correct the wiring problem.
The same power supply may be used for another system which takes electrical surge, resulting in a temporary voltage shortage to the Product.	Review the power supply system.	Review the power supply system.
By the shortage of capacity of a power transformer, voltage falls by the incoming current of this product.	Measure the input voltage and the voltage fluctuations.	Review the capacity of power supply transformer.
Malfunctions by noises	Check whether there is any source of noises around or not.	・Remove the source of noises. ・Take measures against noise.

■ Alarm Number [A03] (Excess Voltage Protection) is on.

Cause	Diagnosis	Countermeasure
Input voltage is in excess of the required specification of the Product.	Measure the input voltage.	Lower the input voltage within the required range of the specifications.

Too short time period of acceleration.	Check whether the occurrence of the problem is at the time of the completion of rapid acceleration or not.	・Extend the time period of the acceleration of Parameter. ・Change V/f pattern by setting Parameter to Heavy Duty 2 or Free Setting.
Too short time period of deceleration.	Check whether motor stops irregularly or not when it decelerates.	Extend the time period of deceleration of Parameter.
Load is suddenly reduced.	Check whether irregularity occurs or not when the load becomes lightened.	Use the motor to the extent not to occur the high voltage protection.
Too large braking load.	This product does not correspond to big braking load.	This product does not correspond to big braking load.
Malfunctions by noises	Check whether there is any source of noises around.	・Remove the source of noises. ・Take measures against noises.

■ Alarm Number [A04] (Power Module Protection) is on.

Cause	Diagnosis	Countermeasure
Short circuit of the Product's output terminal.	Remove the Product and measure the resistance values between phases of motor (U, V, W) and check whether there is any substantially low value between the phases or not.	Remove the cause of the short-circuit including replacement of wire connections, connecting terminals, and motor itself.
The Product's output terminal is earthed.	Remove the Product and conduct Megger Test for motor cables (U, V, W).	Remove the causes for grounded short circuit including replacement of wire connections, connecting terminals, and motor itself.
Too large load.	Measure the electric current into a motor and confirm whether it is larger than calculated load value of the system design or not.	If the situation is judged as overloaded, reduce the load or use the Driver with higher capacity.
	Check the current and see whether it makes sudden fluctuations or not.	In case of occurrence of sudden current fluctuations, reduce the load fluctuation or change

		the Driver's capacity to larger.
Setting value for Torque Boost is too high.	Lower the value of Torque Boost of Parameter to the level where motor does not stall.	Adjust the value of Torque Boost.
Too short of the time period for acceleration and/or deceleration.	Check the loading conditions and determine optimized time period of acceleration and/or deceleration.	Extend the time period of acceleration.
Malfunctions by noises	Check whether there is any source of noises around or not.	・Remove the source of noise. ・Take measures against noises.

■ Alarm Number [A11] (Driver's Self Diagnostic Protection) is on.

Cause	Diagnosis	Countermeasure
Occurrence of Driver's destruction	To shut down the power and check the Diver status	The Alarm may be cancelled by rebooting. However, if the same error persists, the Driver may be out of order.
Malfunctions by noises	Check whether there is any source of noises around or not.	・Remove the source of noises. ・Take measures against noises.