



RHYMEBUS INVERTER AC MOTOR CONTROLLER



RM5 series

FOREWORD

Thank you for choosing the RHYMEBUS " RM5 Series " high-function, inverter. This instruction manual gives information on installation, wiring, parameter unit operation, etc. as well as maintenance and inspection procedures. However, it is essential to read this manual carefully to use the equipment safely, correctly, and to its full capability. Please forward this manual to the end user.

SAFETY PRECAUTIONS


Please read this manual thoroughly prior to installation, wiring, operation, maintenance and trouble shooting. Also, any statement and symbol denoted by "DANGER" or "CAUTION" should be read carefully.



DANGER : Indicate dangerous cases that accompany the possibility of death or serious injury caused by erroneous handling not in accordance with manual.



CAUTION : Indicates dangerous cases that accompany the possibility of medium or light injury or material damage caused by erroneous handling not in accordance with manual.

* Note : that although  **CAUTION** indicates medium or light injury or material damage can be caused, there is possibility of serious injury.

Note :

that installation, wiring, operation and trouble shooting can be performed only by experienced peoples who know the principles, constructions, properties and operational procedures of inverter, can prevent damages, and read this manual completely.

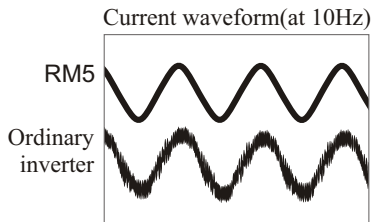
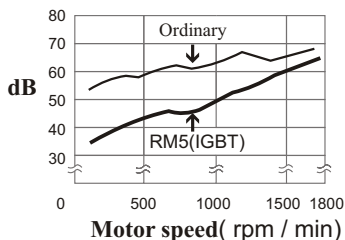
INTRODUCTIONS

Features (Software NO. P5102A)

- Low noise
- High torque
- Automatic voltage regulation
- User friendly
- Restart after instantaneous power interruption.
- 9 levels for speed setting
- 6 digits display
- Noncontact charge circuit for 7.5~30 HP
- Programmable inputs and outputs
- Store and copy settings by using KP-201 digital keypad
- Connect to the external indicators for displaying the status of inverter
- Energy saving
- Parameter management systems

- **Low noise**

Using IGBT by which the maximum switching frequency of sinusoidal PWM is 10kHz to 15kHz, the motor is operated smoothly and efficiently with low noise.



- **High torque**

At low speed, the torque compensation by which the compensated torque can be above 150% of rated torque is provided for smooth start in the case of heavy load.

- **Automatic voltage regulation (AVR)**

In spite of the fluctuation of power source, output voltage of inverter can be kept at the desired level.

- **User friendly**

There are two types of operating keypad, one for advanced applications and the other for usual use. User can choose one of them to function inverter easily and properly. Besides, the connector between inverter and keypad is the same as that of telephone. The remote control is then easily realized with maximum distance of 25 m.

- **Restart after instantaneous power interruption**

If the power source is shutdown during running, the functions of recording the speed of motor before power interruption and resuming that after restart are provided.

- **Levels for speed setting**

There are 5 independent acceleration time settings. Therefore, the maximum and minimum acceleration times are 0.015 sec. and 192000 sec. (about 22 days), respectively (excluding free running).

- **6 digits display**

There are 8 status of inverter can be displayed (frequency, speed, voltage, current, etc).

- **Noncontact charge circuit for 7.5~30 HP**

Prevent inverter from dust and the effect of life of machinery.

- **Programmable inputs and outputs**

There are 13 functions programmed by using input terminals X1~X6 and 12 functions programmed via output terminals, Y1 and Y2 (open collector), and Ta and Tb (relay output)

- **Store and copy settings**

The settings can be stored in KP-201 and used for the other inverter by means of plugging KP-201 in inverter. If the KP-201 containing stored settings is plugged in the other inverter, the copy of the stored settings to the other inverter can be performed, and the inverters have the same settings. This function is useful in the case of several inverters with the same data settings.

- **Connect to the external indicator for displaying the status of inverter**

There are 3 external indicators(96cm x 48cm, 5 digits)can be used simultaneously to indicate the inverter status such as frequency, speed, voltage, current, and line velocity etc. Therefore, it is not needed to use the other instruments or sensors such as CT etc., and the cost and wiring will be reduced

- **Energy saving**

Under the no load condition, the less energy is outputted for the purpose of saving energy.

Parameter management system

The management system is software, which can display the descriptions and settings of parameters in Chinese or English. The schematics diagram of management system is shown in the figure below.

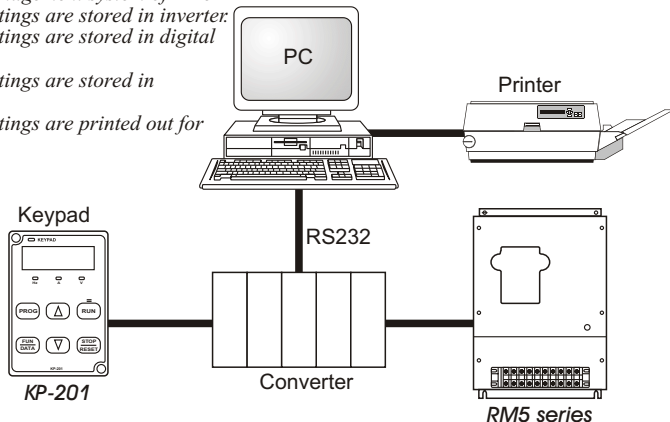
Parameter management system of RM5

Parameter settings are stored in inverter.

Parameter settings are stored in digital keypad.

Parameter settings are stored in computer.

Parameter settings are printed out for filing.



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CHAPTER 1 INSPECTIONS AT PURCHASE

(1) Confirmation of product

Although this product is under a rigorous quality control, the damages may be made by impact and vibration etc. during transportation. Upon unpacking of the inverter at site, please check the follows accordingly. If there is any defect, contact your local dealer at once.

A. Confirmation of appearance

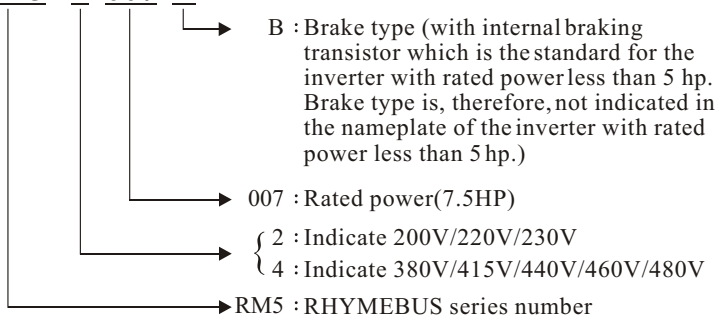
Is there any damage, filth or distortion to the appearance of inverter?

B. Do the rated capacity and specification shown on nameplate confirm to your requirements?

INVERTER		
TYPE	RM5-2007	→Model number
SOURCE	AC 200~230V 50/60Hz	→Input power source specifications
OUTPUT	5.5KW 25A	→Output current & capacity
SERIAL	8021520	→Serial number
RHYMEBUS CORPORATION		

C. Model number scheme:

RM5 - 2 007 B



D. Confirmation of accessories

Generally, there is one user's manual. If there are some accessories, such as braking resistor etc., are ordered please check inclusively.

E. Please refer to the standard specifications and confirm to your requirements.

(2) Standard specifications

RM5-200V Series

Series No. (RM5)	200 $\frac{1}{2}$	2001	2002	2003	2005	2007	2010	2015	2020	2025	2030	2040	2050	2060	2075	2100	2125	2150
Rated power of the motor (HP/KW)	0.5/0.4	1/0.75	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15	25/18.5	30/22	40/30	50/37	60/45	75/55	100/75	125/90	150/110
Rated continuous output power(KVA)	1.3	2	3	4	6	9	13	18	22	28	33	44	55	67	84	115	132	160
Rated continuous output current(A)	3	5	8	11	17	25	33	46	60	74	90	115	145	175	220	295	346	405
Rated output voltage(V)	3 ϕ 200 ~ 230V																	
Range of output frequency(Hz)	0.01 ~ 400Hz																	
Power source(ϕ , V, Hz)	1 ϕ /3 ϕ , 200~230V, 50/60Hz																	
Tolerance of power source voltage	180V~253V, 50/60Hz																	
Tolerance of frequency fluctuation	$\pm 5\%$																	

RM5-400V Series

Series No. (RM5)	4001	4002	4003	4005	4007	4010	4015	4020	4025	4030	4040	4050	4060	4075	4100	4125	4150	4175	4200	4250	4300
Rated power of the motor (HP/KW)	1/0.75	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15	25/18.5	30/22	40/30	50/37	60/45	75/55	100/75	125/90	150/110	175/132	200/160	250/200	300/220
Rated continuous output power(KVA)	1.9	3.3	4	7	10	14	18	23	30	34	46	56	66	84	104	134	165	193	232	287	316
Rated continuous output current(A)	2.5	4	6	9	14	18	24	30	39	45	61	73	87	110	137	176	204	253	304	377	415
Rated output voltage (V)	3 ϕ 380 ~ 460V																				
Range of output frequency(Hz)	0.01 ~ 400 Hz																				
Power source(ϕ , V, Hz)	3 ϕ , 380 ~ 480V, 50/60Hz																				
Tolerance of power source voltage	323V~506V, 50/60Hz																				
Tolerance of frequency fluctuation	$\pm 5\%$																				

Common specifications

User interface		Digital and analog operating keypads with remote control.	
Control characteristics	Control characteristics	Sinusoidal PWM control.	
	Range of frequency setting	0.1 ~ 400.00Hz	
	Resolution of frequency setting	Digital keypad:0.1Hz, Analog keypad: 0.06/60Hz	
	Resolution of output frequency	0.01Hz	
	Analog voltage of frequency setting	DC 0 ~ 10V(20K Ω), 4 ~ 20mA(250 Ω)	
	Overload current	150% rated current for 1 minute.	
	5 acceleration/ deceleration times	Zero sec for free running, 0.1 ~ 3200 seconds for each setting,	
	Braking torque	About 20% (For the inverter rated power less than 10 hp, the braking transistor is included, and braking torque can be about 100%)	
Voltage/Frequency pattern	The pattern can be set arbitrarily.		
Stall prevention	The current of stall prevention can be set arbitrarily		
Operational characteristics	Input	Control of direction of rotation; forward / reverse rotation is controlled by using 3-line sustaining circuit.	
		Multiple function inputs	Stop command by using the 3-line sustaining circuit, jogging operation, secondary acceleration/deceleration time, multiple-level speed command 1, multiple-level speed command 2, multiple-level speed command 3, reset, command for exceptional conditions, command of inhibiting output, command of stop via free running, command of frequency search from the max. frequency, command of frequency search from the set frequency, acceleration/deceleration inhibition command, programmable contacts a and b.
		Analog inputs	Vin-GND (0~10V), lin-GND (4~20mA)
	Output	Multiple function outputs	Running, constant speed, zero speed, frequency detection, overload detection., stall prevention, undervoltage, braking, restart after instantaneous power interruption, restart after trouble shooting, exceptional conditions, programmable contacts a and b.
		Analog outputs	Analog voltage, DC 0~10 V with adjustable gain, for representing output frequency, frequency setting, or output current
Displays	Displays of keypads	Output frequency, frequency settings, output voltage, DC voltage, output current, motor speed, line velocity of motor, status of terminals.	
	Displays of external indicators	There are 3 external indicators (96cm 48cm, 5 digits) can be used simultaneously to indicate the frequency, speed, voltage, current, and line velocity etc.	
Protections	Functions	Overcurrent (OC), over voltage (OE), under voltage (LE), motor overload (OL), inverter overload (OLI), over heat (OH), ground fault current(GF), fuse open (SC), disconnection of KP-202 during running (PadF).	
	Diagnostics	Disconnection of digital keypad (Err_00, Err_01), EEPROM error (Eer)	
	Cooling	Force cooling (natural cooling for rated power of 1/2 and 1 Hp)	
Ambient conditions	Environment	Non-corrosive non-conductive, or non-explosive gas or liquid, and non-dusty.	
	Temperature	-10℃(14℉) ~+50℃(122℉),non-freezing and non-condensing	
	Storage temperature	-20℃(-4℉) ~+60℃(149℉)	
	Relative humidity	90% RH or less (non-condensing atmosphere)	
	Vibration	Less than 5.9m/sec2 (0.6G)	
Altitude	Less than 1000m (3280 ft)		

CHAPTER 2 INSTALLATIONS AND CONFIRMATIONS

(1) Basic setup

The inverters have to be incorporated with some elementary devices for driving motor. The essentially elementary devices of basic setup are

A.Power source

The power source should be agreed with the specifications of Inverter.

Nofuse brake (NFB)

The rating of NFB should be greater than the start current.

B.Inverter

This is main device of driving motor. Referring to the lists of standard specifications of inverter, inverter is chosen in accordance with the specifications of motor driven.

C.Motor

The specifications of motor are determined from the requirement of applications.

(2) Environment

For correct and safety operation, the operational environment of inverter should be cared and described as followings

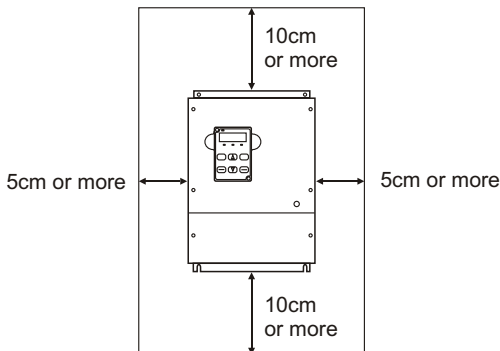
A.Power source

The power source should be agreed with the specifications of inverter.

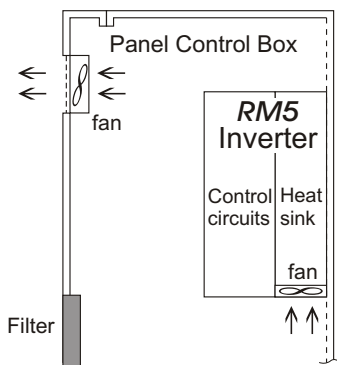
B.Location

For the considerations of heat generated by the operating machine, inverter has to be installed in the ventilative space. The installations of inverter are shown as followings.

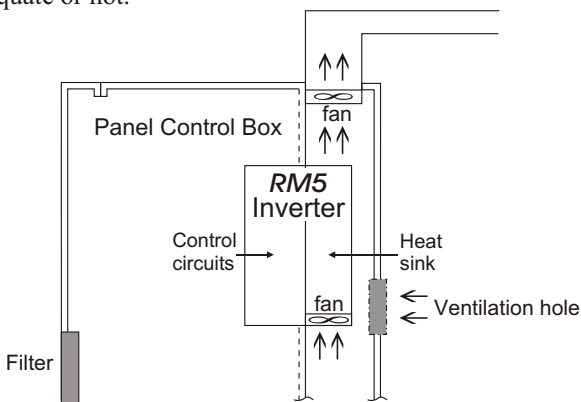
a. The space of installation is good for power dissipation or not.



- b. The cooling is needed if the inverter is installed in a protective case or distributor.



- c. If the inverter is installed in a protective case or distributor (suitable for 7.5~75 hp) and the cooling system is on or outside protective case or distributor, it should be mentioned that the hole for airflow is adequate or not.



- d. Specifications of the associated accessories

The specifications of the associated accessories have to be in accordance with the specifications of inverter used. Otherwise, the inverter will be damaged and the lifetime of inverter will be decreased.

e. Cleaning of environment



The ventilation, cleanliness and moisture of the space in which the inverter is installed have to be considered.

f. Operator

Only experienced peoples can perform operation and trouble shooting


(3) Descriptions of terminals and wiring diagram

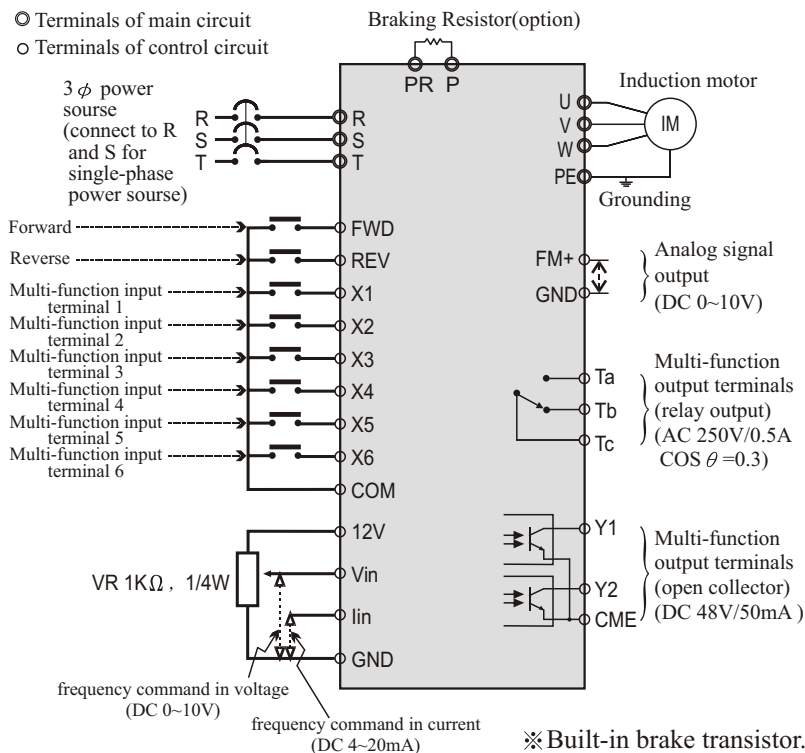
A. Wiring diagram

Note that the terminals represented by  and  are denoted for main and control circuits, respectively.

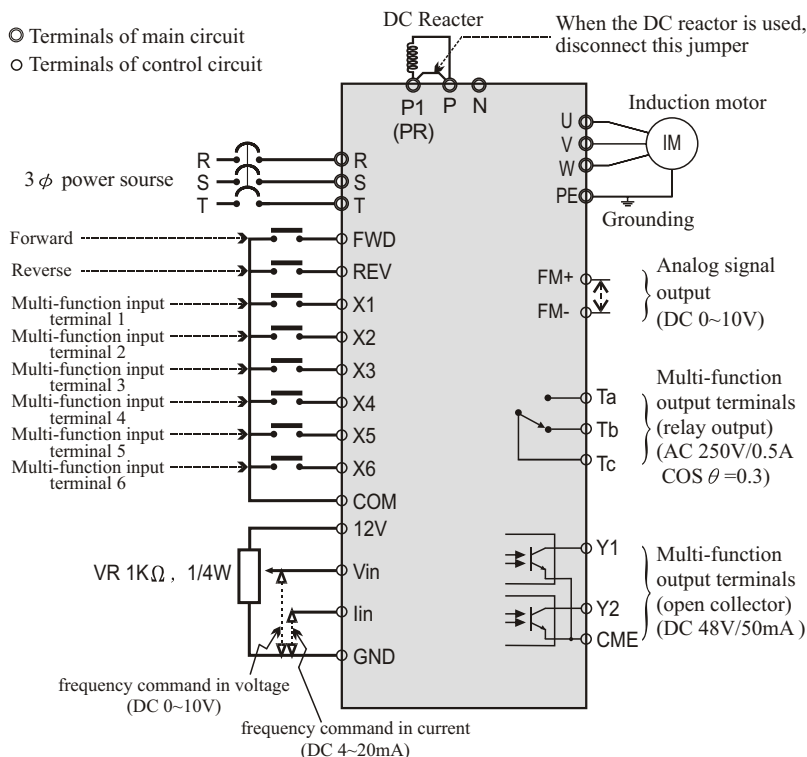
a. Wiring diagram for 0.5~5 HP

 Terminals of main circuit

 Terminals of control circuit



b. Wiring diagram for 7.5~75 HP



※ In case 7.5~30HP as build-in brake resistor, the mark of P1 will change to PR.

※ For the up to 400V 40HP/KW, there are small terminals,

0	380	415	440	460
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on the right side of RST, UVW, which are connected to the wire of cooling fan and contactor. Be sure connect to the correct required voltage. (Ex. when power is 380V, then must be connect 0 and 380V. In case the power change to 460V, please connect to 0 and 460V)

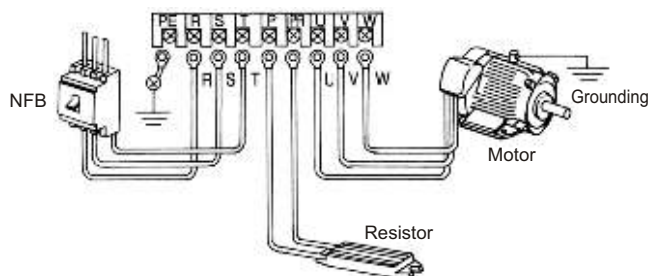
B. Descriptions of terminals

a. Terminals of main circuit

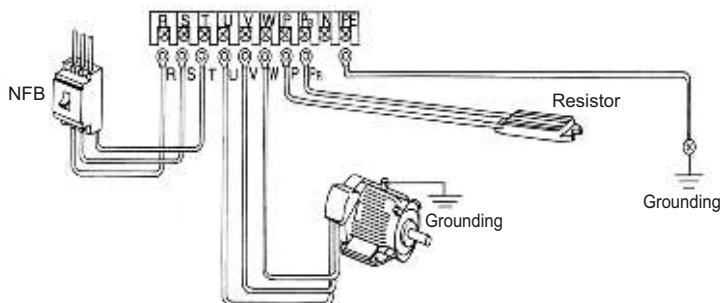
Terminals	Symbols	Name	Descriptions
Main Circuit	Power source	R.S.T.	Input AC voltage
	Motor	U.V.W.	Inverter output voltage
	Power and braking	P.N.	Dynamic brake terminals
		PR	External braking resistor
		P1	External reactor
Grounding	PE	Grounding	Less than 100 Ω for the third grounding method

b. Main circuit

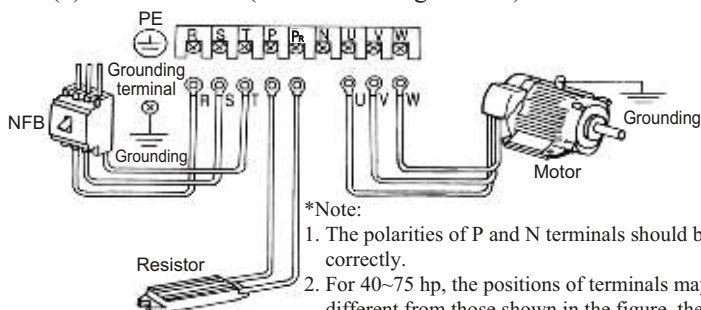
(1) For 1/2~5 HP



(2) For 7.5~10 HP (connect braking resistor)



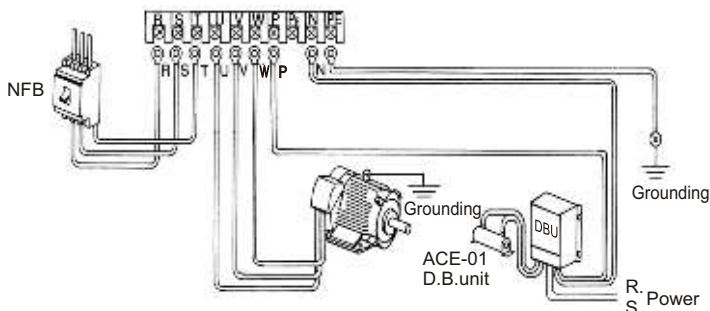
(3) For 15~30 HP (connect braking resistor)



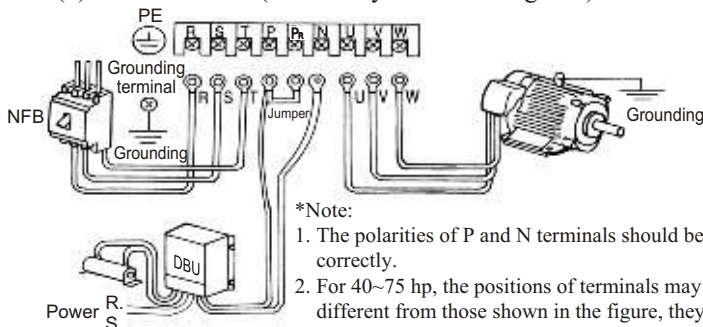
*Note:

1. The polarities of P and N terminals should be wired correctly.
2. For 40~75 hp, the positions of terminals may be different from those shown in the figure, they are , however, labeled with the same symbols or characters. Please wire the system according to the labels of terminals.

(4) For 7.5~10 HP (connect dynamic braking unit)



(5) For 15~30 HP (connect dynamic braking unit)



*Note:

1. The polarities of P and N terminals should be wired correctly.
2. For 40~75 hp, the positions of terminals may be different from those shown in the figure, they are , however, labeled with the same symbols or characters. Please wire the system according to the labels of terminals.

c. Terminals of control circuit

Terminals		Symbols	Name	Descriptions
Control Circuit	Input terminals	FWD	Forward operation	FWD-COM is short-circuit for forward operation
		REV	Reverse operation	REV-COM is short-circuit for reverse operation
		X1	Multiple function input terminal 1	Function is determined by F_052
		X2	Multiple function input terminal 2	Function is determined by F_053
		X3	Multiple function input terminal 3	Function is determined by F_054
		X4	Multiple function input terminal 4	Function is determined by F_055
		X5	Multiple function input terminal 5	Function is determined by F_056
		X6	Multiple function input terminal 6	Function is determined by F_057
		COM	Common of input terminals	Common of input terminal signals
		Vin	Voltage type of frequency command input	Analog voltage 0~+10 V
		Iin	Current type of frequency command input	DC current 4~20mA
	Power source	+12V	Reference voltage of control signals	12V reference voltage with maximum current 20mA
		GND	Ground of control signals	Ground of control signals
	Output terminals	FM+ FM-	Analog output terminals	DC 0~10 V outputs to voltage-type meter such as frequency meter or current meter. For 0.5~5 HP, FM+ and GND are used to output voltage
		Ta	Multiple function output terminals (relay outputs)	The function of contact a (normally open) is determined by F_60. (The capacity of contact is 250VAC, 0.5A and $\cos \phi = 0.3$)
		Tb		The function of contact a (normally close) is determined by F_60. (The capacity of contact is 250VAC, 0.5A and $\cos \phi = 0.3$)
		Tc		Common terminals of Ta and Tb.
		Y1	Multiple function output terminals (Open-collector)	Function is determined by Function is determined by F_058.
		Y2		Function is determined by Function is determined by F_059.
		CME		Common of terminals Y1 and Y2

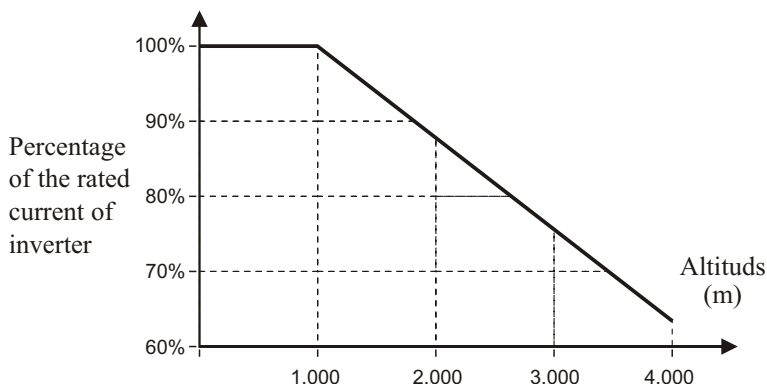
C. The notes and specifications of wiring

- a. The leakage current between ground and the wires that are connected between inverter and motor, is not the same for different rated power. The setting of carry frequency (F₅₅) is referred to the table below.

Distance Rated power	10 m	25 m	50 m	100 m	Above 100 m
1/2 ~ 5HP	12.5KHz or less	10KHz or less	7.5KHz or less	5KHz or less	2.5KHz or less
7.5 ~ 10HP	10KHz or less	7.5KHz or less	5KHz or less	2.5KHz or less	2.5KHz or less
15 ~ 30HP	7.5KHz or less	5KHz or less	2.5KHz or less	2.5KHz or less	2.5KHz or less
40 ~ 75HP	5KHz or less	2.5KHz or less	2.5KHz or less	2.5KHz or less	2.5KHz or less
100~150HP	2.5KHz or less	2.5KHz or less	2.5KHz or less	2.5KHz or less	2.5KHz or less

Note : That the carry frequency is set by F₀₈₁.

- b. If the inverter is used where the altitude is greater than 1000 m, the relationship between current and altitude should be mentioned and referred to the figure shown below.



c. Precautions



DANGER

1. If the inverter is powered, the wiring is inhibited.
2. R, S and T terminals, connected to power source, are power input terminals of inverter. U, V and W terminals, connected to motor, are power output terminals of inverter. The care that P, N, PI and PR terminals can not be connected to either power source or motor must be made.
3. After turn off power source, please don't touch the inverter and change the wiring when indicator is light.
4. The terminals of main power circuit and control circuit can not be connected to PE terminal.
5. After wiring is completed, please put on the inverter cover for avoiding the other people's touch.
6. For 200 V series, 346/380/440/460 V power source can not be used.
7. In the restart after instantaneous power interruption, running is resumed and the people around motor and machinery should be controlled for avoiding danger and damage.
8. The wiring of main circuit and control circuit should be separated for avoiding interference.
9. Only experienced people can perform installation, wiring, operation and trouble shooting.
10. The RM5 series are not designed against explosion and then should be kept away from gas, oil and explosion etc.



CAUTION

1. The RM5 series should be kept away from corrosive gas, oil, dust, high temperature, elevated humidity and explosion etc.
2. If inverter is installed in a protective case or distributor, the ambient temperature can not exceed +50 °C.
3. Isolated wires of control signals are recommended, noise and grounding have to be considered for avoiding interference.
4. Wiring terminals and installation:
 - (1) Wiring should be made according to the symbols of terminals. Keep terminals connected tightly with wire.
 - (2) Appropriate wiring size should be used. Connect R, S and T terminals to power source (In the case of single phase power source connect R and S terminals to power source).
 - (3) Use nofuse brake (NFB), magnetic contact or fuse at power source input terminals, and use a thermal relay (THRY) to protect motor if the motor capacity is smaller than inverter.
 - (4) After U, V and W terminals of motor have been disconnected, the insulation of motor can be then tested. Note that testing motor and inverter can be performed only by experienced peoples

d. Recommended wiring size (for reference only)

MOTOR (HP)	200V Series (mm ²)			400V Series (mm ²)		
	Main circuit	Control circuit	Grounding wire	Main circuit	Control circuit	Grounding wire
1	2	0.75	The same as that of main circuit	2	0.75	The same as that of main circuit
2	2			2		
3	2			2		
5	3.5			3.5		
7.5	5.5			3.5		
10	8			5.5		
15	14			8		
20	22			8		
25	30			14		
30	38			22		
40	60			30		
50	80			30		
60	100			38		
75	60 X 2			60		
100	100 X 2			80		
125	150 X 2			100		
150	200 X 2			60 X 2		

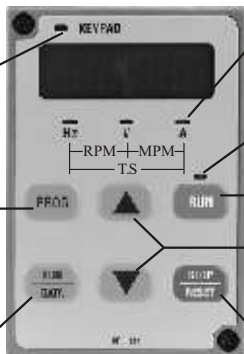
CHAPTER 3 TYPES OF KEYPADS

(1) Digital keypad (KP-201)

1. If LED is light, speed is command by keypad.
2. If LED is not light, speed is command by terminals.

1. Enter function code setting mode.
2. Back to monitor mode.

1. Enter parameter setting mode.
2. Back to monitor mode.



1. T.S : Indicator of the status of terminals .

2. Indicator of unit.

1. Constant speed : LED is light.

2. Acc./dec. : LED flashes.

Inverter begins to output frequency.

Increase or decrease setting.

1. Inverter stops frequency output.

2. Reset.

(2) Analog keypad (KP-202)

1. If LED is light, speed is command by keypad.
2. If LED is not light, speed is command by terminals.

Frequency setting.



The LED will be light, if the corresponding ADJ has been chosen by RSW.

1. Constant speed : LED is light.

2. Acc./dec. : LED flashes.

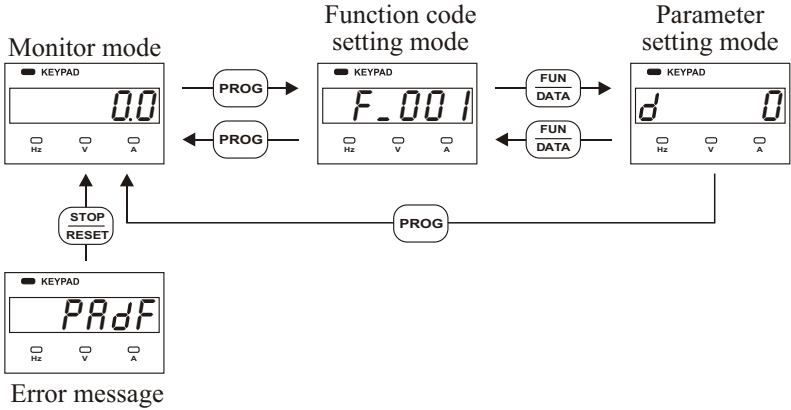
Inverter begins to output frequency.

1. Inverter stops frequency output.

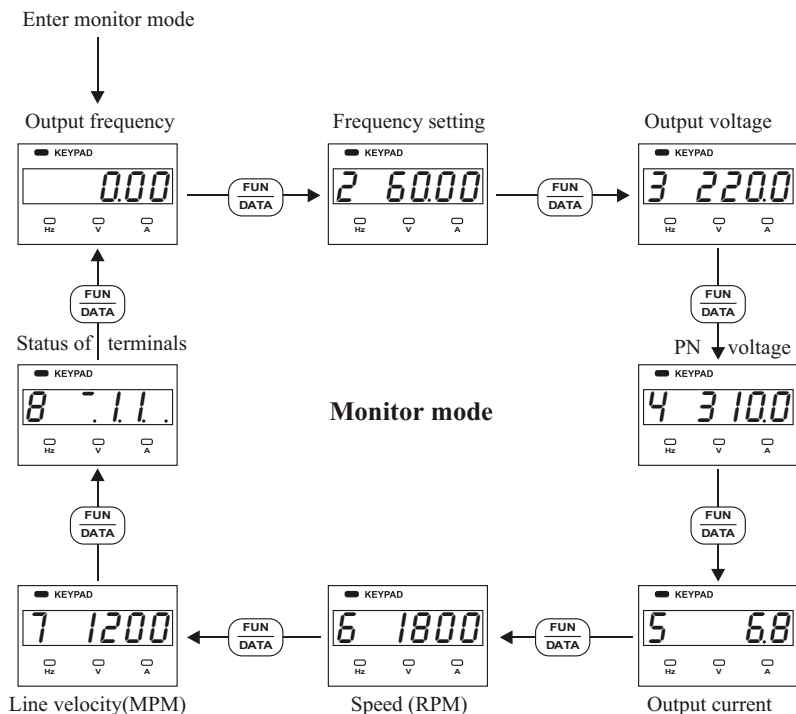
2. Reset.

(1) Setting of digital keypad

A. Digital keypad has three modes and displays for exceptional conditions. The switching among these is shown in the setting diagram below.



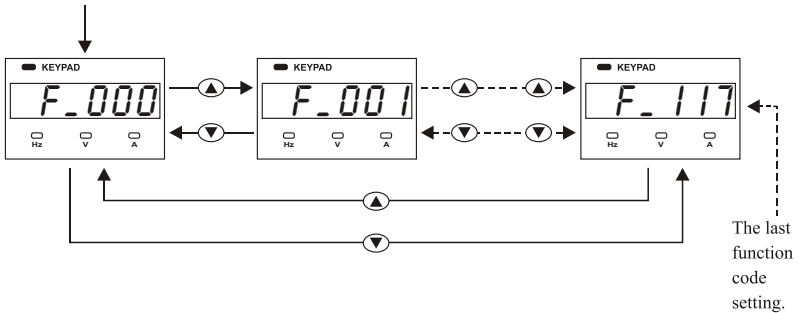
- B. In the monitor mode, there are 8 displays, 1 main display and 7 auxiliary displays, used to indicate the status of inverter. The most left digit indicates the number of auxiliary display (2~8), and the most left digit is turned off for indicating main display.



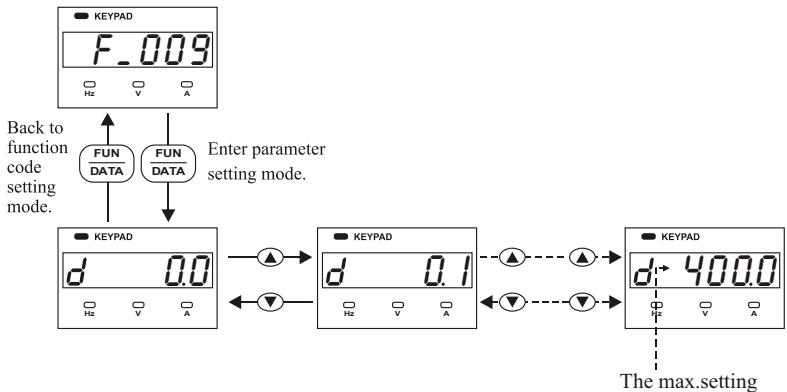
- Any display can be set to be the main display by F_006.
- The function that the user defines own main display is convenient to choose the most important status of inverter as main display for certain applications. If the keypad has not been operated and the auxiliary display has been displayed for about 3 minutes, the main display is shown automatically for user to monitor the most important status of inverter.

C. In the function code setting mode, there are 118 function codes (F_000~F_117) to be set and the setting diagram is shown in the figure below.

Enter function code setting mode.

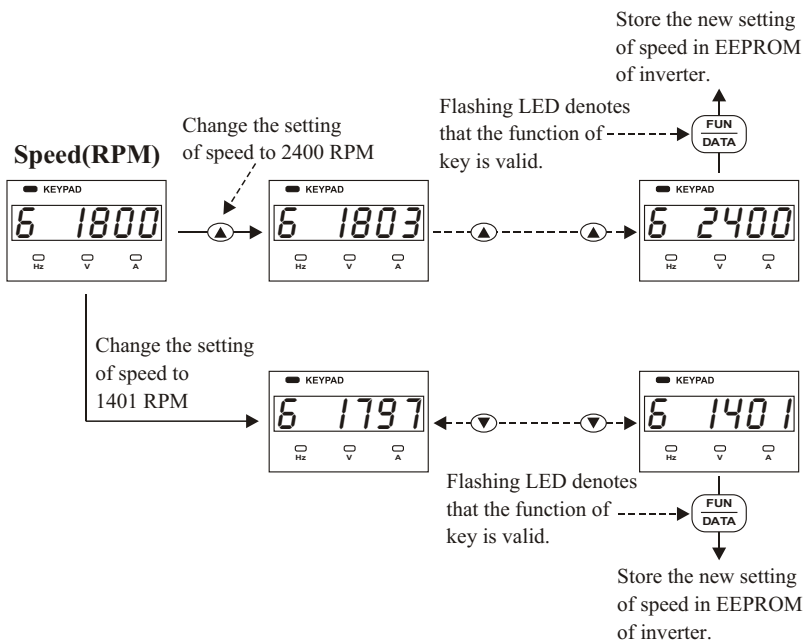



D. In the data setting mode, the range of setting is defined in function code and the setting diagram is shown in the figure below.





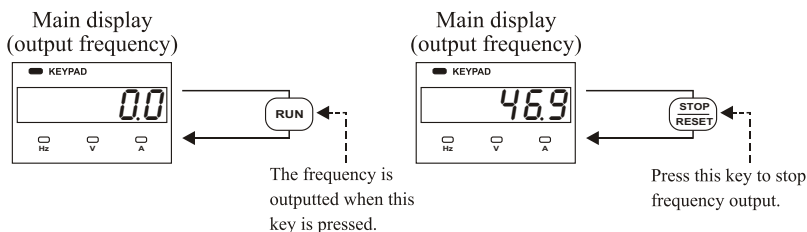
The range of data setting of F_009 is 0.0 ~ 400.0 Hz.

E. In the monitor mode, the frequency command, speed (RPM) and line velocity (MPM) can be changed. For example, the setting diagram of changing speed is shown in the figure below.



- In the monitor mode, ▲ and ▼ on keypad are used to increase and decrease speed, respectively.
- After speed setting, the LED of keypad is flashing with the value of setting, press  within 5 minutes to store speed setting.


F. Only in the monitor mode, the frequency output can be controlled by pressing  or 




G. Copy and resume factory settings

a. The function of copy is defined to store settings in digital keypad (KP-201) or write settings from digital keypad to inverter.


(1) Store settings in digital keypad

To disconnect digital keypad and press  until that digital keypad is connected to inverter, the LED of keypad will display 'r d _EE' to indicate that the setting is storing in digital keypad (KP-201).

(2) Write setting from digital keypad to inverter






To disconnect digital keypad and press  until that digital keypad is connected to inverter, the LED of keypad will display 'uu _EE' to indicate that the setting is writing from digital keypad (KP-201) to inverter.

b. Resume factory settings

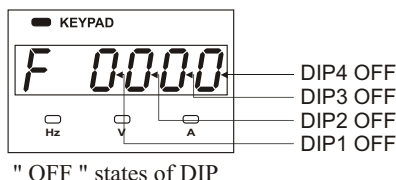
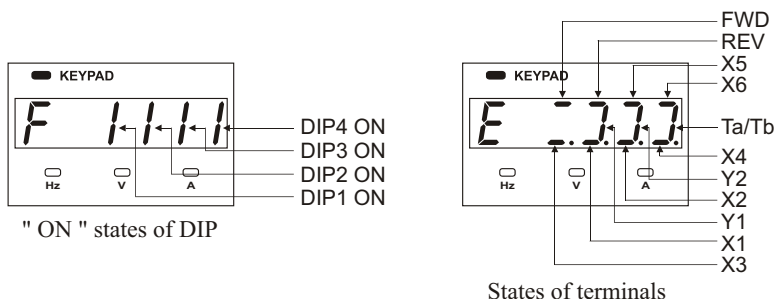
To disconnect digital keypad and press  until that digital keypad is connected to inverter, the LED of keypad will display 'r E5' to indicate that the factory settings have been resumed.

(2) Settings of analog keypad (KP-202)

A. Descriptions of functions of RSW

RSW	Functions	Corresponding VR	Range	Factory setting
	Output frequency	—	—	—
	Boost voltage	 ADJ1	0.1 ~ 127.5V	Low voltage(220V):6.0V High voltage(440V):12.0V
	Primary acceleration time	 ADJ2	0.0 ~ 165.0 sec	0.5 ~ 5HP : 5.0 sec 7.5 ~ 30HP : 15.0 sec above 40HP : 30 sec
	Primary deceleration time	 ADJ3	0.0 ~ 165.0 sec	0.5 ~ 5HP : 5.0 sec 7.5 ~ 30HP : 15.0 sec above 40HP : 30 sec
	Speed level 1	 ADJ4	0.0 ~ 120.0 Hz	10.0 Hz
	Max. output frequency	 ADJ5	0.0 ~ 60.0 Hz	60.0 Hz
	Secondary Acc/Dec time	 ADJ6	0.0 ~ 165.0 sec	0.5 ~ 5HP : 5.0 sec 7.5 ~ 30HP : 15.0 sec above 40HP : 30 sec
	Frequency setting	 FREQ	—	—
	Indicate frequency setting	—	—	—
	Indicate output voltage	—	—	—
	Indicate DC voltage	—	—	—
	Indicate output current	—	—	—
	Indicate speed of motor	—	—	—
	Indicate line velocity	—	—	—
	Indicate status of terminals	—	—	—
	Indicate status of DIP	—	—	—







- a. The function code associated with VR can be changed.
- b. The status of terminals and DIP are shown as the figure below.



B. Descriptions of functions of DIP

No. Switch	DIP	Functions	Descriptions	Remark
1		Carry frequency	ON : Carry frequency is 2.5 kHz. OFF: Don't change the Carry frequency.	Refer to P. 59
2		Selections of Base frequency	ON : Base frequency at 50Hz. OFF: Don't change frequency.	Refer to P. 59
3		Selections of frequency setting	ON : Frequency commands is generated by terminals. OFF: Don't change the source of commands.	Refer to P. 59
4		Selections of rotation control	ON : Rotation and direction commands are generated by terminals. OFF: Don't change the source of commands.	Refer to P. 59

C. Descriptions of functions of ADJ

ADJ	Functions	Range	Factory setting	Remark
 ADJ1	Boost voltage	0.1 ~ 127.5V	Low voltage(220V) : 6.0 V High voltage(440V) : 12.0 V	Refer to P. 60
 ADJ2	Primary acceleration time	0.0 ~ 165.0 sec	0.5 ~ 5HP : 5 sec 7.5 ~ 30HP : 15.0 sec above 40HP : 30 sec	Refer to P. 60
 ADJ3	Primary deceleration time	0.0 ~ 165.0 sec	0.5 ~ 5HP : 5 sec 7.5 ~ 30HP : 15.0 sec above 40HP : 30 sec	Refer to P. 60
 ADJ4	Speed level 1	0.0 ~ 120.0 Hz	10.0 Hz	Refer to P. 60
 ADJ5	Max. output frequency	0.0 ~ 60.0 Hz	60.0 Hz	Refer to P. 60
 ADJ6	Secondary deceleration time	0.0 ~ 165.0 sec	0.5 ~ 5HP : 5 sec 7.5 ~ 30HP : 15.0 sec above 40HP : 30 sec	Refer to P. 60

CHAPTER 5 LIST OF FUNCTION CODE SETTINGS

Function	Name	Descriptions	Range of setting	Resolution	Factory setting	No. page reference for detail
F_000	Version of software	Display the version of software.	—	—	P5102A	29
F_001	Selections of start command	Start command Direction command	0 ~ 3	—	3	29
		0 : FWD and REV terminal				
		1 : FWD terminal REV terminal				
		2 : Start signal is FWD and REV terminals generated by keypad FWD and REV terminals are useless				
F_002	Select source of speed setting	0: Indicate that the frequency is set by terminals. 1: Indicate that RPM is set by keypad. 2: RPM set by keypad. 3: MPM set by keypad.	0 ~ 3	—	1	30
F_003	Selection of validity of STOP on keypad	0: Indicate terminals generate start signal and STOP on keypad is invalid. 1: Indicate terminals generate start signal and STOP on keypad is valid.	0,1	—	0	30
F_004	Select function of changing frequency for KP-201	0: indicate that KP-201 is in monitor mode and that the frequency setting can not be changed. 1: indicate that KP-201 is in monitor mode and that the frequency setting can be changed.	0,1	—	1	30
F_005	Select function of storing frequency for KP-201	0: indicate that KP-201 is in monitor mode and that the frequency setting can not be stored automatically. 1: indicate that KP-201 is in monitor mode and that the frequency setting can be stored automatically after 3 minutes.	0,1	—	1	30
F_006	Select main display of KP-201	Select one of 8 displays as main display.	1 ~ 8	—	1	31
F_007	Speed constant	Set the value of MPM displayed on keypad.	0 ~ 500.00	0.01	20.00	31
F_008	No. decimal of speed display	Set the no. decimal of speed displayed on keypad.	0 ~ 3	—	0	31
F_009	Main speed	Jog X3 X2 X1 OFF OFF OFF OFF	0.00~400.00	0.01Hz	60.00 (50.00) (Re.1)	32
F_010	Speed level 1	OFF OFF OFF ON	0.00~400.00	0.01Hz	10.00	32
F_011	Speed level 2	OFF OFF ON OFF	0.00~400.00	0.01Hz	20.00	32
F_012	Speed level 3	OFF OFF ON ON	0.00~400.00	0.01Hz	30.00	32
F_013	Speed level 4	OFF ON OFF OFF	0.00~400.00	0.01Hz	0.00	32
F_014	Speed level 5	OFF ON OFF ON	0.00~400.00	0.01Hz	0.00	32
F_015	Speed level 6	OFF ON ON OFF	0.00~400.00	0.01Hz	0.00	32
F_016	Speed level 7	OFF ON ON ON	0.00~400.00	0.01Hz	0.00	32
F_017	Jog speed	ON X X X	0.00~400.00	0.01Hz	6.00	32
F_018	Base freq. of acc/dec	The frequency associated with acc/dec time.	0.01~400.00	0.01Hz	60.00	34
F_019	Primary acceleration time	The acceleration time of main speed, speed level 4~7, and jog speed.	0.0~3200.0 sec	0.1s	15.0 (Re. 5)	34
F_020	Primary deceleration time	The deceleration time of main speed, speed level 4~7, and jog speed.	0.0~3200.0 sec	0.1s		
F_021	Acceleration time of speed level 1	Acceleration time of speed level 1	0.0~3200.0 sec	0.1s		
F_022	Deceleration time of speed level 1	Deceleration time of speed level 1	0.0~3200.0 sec	0.1s		
F_023	Acceleration time of speed level 2	Acceleration time of speed level 2	0.0~3200.0 sec	0.1s		
F_024	Deceleration time of speed level 2	Deceleration time of speed level 2	0.0~3200.0 sec	0.1s		
F_025	Acceleration time of speed level 3	Acceleration time of speed level 3	0.0~3200.0 sec	0.1s		
F_026	Deceleration time of speed level 3	Deceleration time of speed level 3	0.0~3200.0 sec	0.1s		

X : means don't care

The color as means which can be set during operation.

~ LIST OF FUNCTION CODE SETTINGS ~

Function	Name	Descriptions	Range of setting	Resolution	Factory setting	No. page reference (for detail)
F_027	Secondary acceleration time	Multiple function-input terminals control the situation of the determination of secondary acceleration time.	0.0~3200.0 sec	0.1s	15.0	34
F_028	Secondary deceleration time	Multiple function-input terminals control the situation of the determination of secondary deceleration time.	0.0~3200.0 sec	0.1s	15.0	34
F_029	Setting of S-curve acc/dec time	Setting of acceleration / deceleration time of S-curve acceleration / deceleration.	0.0 ~ 5.0	0.1s	0.0	34
F_030	Limitation of output voltage	0: output voltage is not limited.	0,1	—	1	36
		1: output voltage is limited.				
F_031	Max. output frequency	Operational maximum output frequency.	0.1~400.0	0.1Hz	50.0 (Re.1), 60.0 (Re.2)	36
F_032	Start frequency	Start frequency of inverter output frequency.	0.1~10.0Hz	0.1Hz	0.5	36
F_033	Boost voltage	Output voltage associated with output start frequency.	0.1~50.0V	0.1V	6.0(Re.3)	36
			0.1~100V		12.0(Re.4)	
F_034	Base frequency	The frequency associated with rated voltage in V/F pattern.	0.1 ~400.0 Hz	0.1Hz	50.0(Re.1) 60.0(Re.2)	36
			0.1~255.0V		220.0 (Re.3)	
F_035	Base voltage	The rated voltage of all V/F pattern.	0.1~510.0V	0.1V	380.0 (Re.4)	36
			0.1~510.0V		380.0 (Re.4)	
F_036	Frequency at the changing point 1	Frequency at the changing point 1 of V/F pattern.	0.0 ~400.0 Hz	0.1Hz	0.0	36
F_037	Voltage at the changing point 1	Voltage at the changing point 1 of V/F pattern.	0.0~255.0V	0.1V	0.0	36
			0.0~510.0V			
F_038	Frequency at the changing point 2	Frequency at the changing point 2 of V/F pattern.	0.0~400.0Hz	0.1Hz	0.0	36
F_039	Voltage at the changing point 2	Voltage at the changing point 2 of V/F pattern.	0.0~255.0V	0.1V	0.0	36
			0.0~510.0V			
F_040	Frequency command gain	Proportional gain between analog frequency command and output frequency.	0.00~2.00	0.01	1.00	38
F_041	Gain of bias frequency	Gain of analog bias frequency.	-1.00~1.00	0.01	0.0	38
F_042	Ratio of upper bound of output frequency	The upper bound of output voltage is defined as the percentage of the maximum output frequency. (1.00 denotes the maximum frequency)	0.00 ~1.00	0.01	1.00	39
F_043	Ratio of lower bound of output frequency	The lower bound of output voltage is defined as the percentage of the maximum output frequency. (1.00 denotes the minimum frequency)	0.00 ~1.00	0.01	0.00	39
F_044	Selection of analog output signal	0: analog signal indicates output frequency. 1: analog signal indicates frequency setting. 2: analog signal indicates output current.	0 ~ 2	—	0	40
F_045	Analog output gain	Gain = max. output frequency/output frequency. or Gain = rated current of inverter/output current.	0.01~2.00	0.01	1.00	40
F_046	Overload protection selection	0: no overload protection for motor.	0,1	—	1	41
		1: overload protection for motor.				
F_047	Relay selection	0: standard rated time protection for motor.	0,1	—	0	41
		1: short rated time protection for motor.				
F_048	Rated current of motor	According to the spec. of motor.	10%~120% by the inverter rated current	0.1A	According to the spec. Of motor	41
F_049	No-load current of motor	According to the spec. of motor.	0 ~ motor rated current	0.1A	1/3 motor rated current	41

~ LIST OF FUNCTION CODE SETTINGS ~

Function	Name	Descriptions	Range of setting	Resolution	Factory setting	No. page reference (for detail)
F_050	Slip compensation	According to the load condition, slip is compensated for constant speed.	-9.9~5.0 Hz	0.1Hz	0.0	41
F_051	No. poles of motor	Setting of poles of motor for conversion of MPM.	2 ~ 10	2P	4P	41
F_052	Input terminal X1 setting	0: STOP command with 3-line sustaining circuit. (X5 — contact a, X6 — contact b) ±1: jog command. ±2: switching between the secondary acceleration and deceleration. ±3: multiple speed level 1 command. ±4: multiple speed level 2 command 2. ±5: multiple speed level 3 command 3. ±6: Reset command. ±7: External exception command. ±8: inhibition command for output. ±9: stop in free running. ±10: speed search from the maximum frequency. ±11: speed search from the set frequency. ±12: inhibition command for acceleration and deceleration.	-12~+12	—	3	42
F_053	Input terminal X2 setting				4	
F_054	Input terminal X3 setting				1	
F_055	Input terminal X4 setting				2	
F_056	Input terminal X5 setting				7	
F_057	Input terminal X6 setting				6	
F_058	Output terminal Y1 setting	±1: running detection. ±2: constant speed detection. ±3: zero speed detection. ±4: frequency detection. ±5: overload detection. ±6: stall prevention detection. ±7: undervoltage detection. ±8: detection of braking. ±9: detection of restart after instantaneous power interruption. ±10: detection of restart after exceptional conditions. ±11: detection of exceptional conditions.	-11~+11	—	1	45
F_059	Output terminal Y2 setting				2	
F_060	Settings of output terminals Ta and Tb				11	
F_061	Frequency range for constant speed detection	Frequency range for constant speed detection.	0.0~10.0 Hz	0.1Hz	2.0	49
F_062	Frequency detection range	Frequency detection range.	0.0~10.0 Hz	0.1Hz	2.0	49
F_063	Level of freq. detection	Level of frequency detection for multiple function output terminal.	0.0~400.0 Hz	0.1Hz	0.0	49
F_064	Gain of the automatic torque boost	According to the load condition, adjust the output voltage of the certain V/F pattern.	0.0 ~ 3.0	0.1	1.0	49
F_065	Selection of overload detection(OLO)	0: There is no output for overload detection.	0,1	—	0	50
		1: There is output for overload detection.				
F_066	Status of overload detection(OLO)	0: There is output for the condition of constant frequency only.	0,1	—	0	50
		1: There is output for any frequency.				
F_067	Output setting for overload (OLO)	0: Inverter is still running after that overload has been detected.	0,1	—	0	50
		1: Output of inverter is inhibited after that overload has been detected.				
F_068	Level of overload setting(OLO)	The setting of level of current for overload detection.	30%~200% by the inverter rated current	1%	160	50
F_069	Time interval for overload detection	The time interval, in which the output current is greater than the setting of F_068, required for overload detection.	0.1~10.0 sec	0.1s	0.1	50
F_070	Level of stall prevention at the constant speed.	If stall is occurred at the constant-speed running, the speed is decreased.	30%~200% by the inverter rated current	1%	170	51

The color as means which can be set during operation.

~ LIST OF FUNCTION CODE SETTINGS ~


Function	Name	Descriptions	Range of setting	Resolution	Factory setting	No. page reference for detail
F_071	Level of stall prevention during acc.	If stall is occurred during acceleration, motor is kept at constant speed.	30%~200% by the inverter rated current	1%	160	51
F_072	Acceleration time of recovery after stall prevention at the constant speed	Setting of acceleration time of recovery after stall prevention at the constant speed.	0.1 ~3200.0 sec	0.1s	15.0	51
F_073	Deceleration time of recovery after stall prevention at the constant speed	Setting of deceleration time of recovery after stall prevention at the constant speed.	0.1 ~3200.0 sec	0.1s	15.0	51
F_074	Select function of stall prevention during dec.	0: there is no stall prevention during deceleration. 1: there is stall prevention during deceleration.	0, 1	—	1	51
F_075	Current of DC braking	Setting of level of current for DC braking setting.	0%~150% by the inverter rated current	1%	50	52
F_076	Time interval of DC braking in stop	In stop the required time interval for DC braking setting.	0.0~20.0 sec	0.1s	0.5	52
F_077	Time interval of DC braking in start	In start the required time interval for DC braking setting.	0.0~20.0 sec	0.1s	0.0	52
F_078	Selection of resumption	0: inverter can not be restarted after instantaneous power interruption. 1: inverter will be restarted after instantaneous power interruption. 2: shutdown. 3: Enable controlled deceleration stop. (F_103, F_104, F_105, F_106)	0 ~ 3	—	0	53
F_079	Level of power source for shutdown	Level of power source for shutdown.	130.0~192.0V 230.0~384.0V	0.1V	175.0(Re.3) 320.0(Re.4)	53
F_080	Number of restart	Number of restart for exceptional conditions.	0 ~ 16	1	0	57
F_081	Carry frequency setting	Note that the higher the setting is, the lower the noise is. The carry frequency is inversely proportional to the distance between inverter and motor.	1 ~ 6	—	4	57
F_082	Types of stop	0: Indicate stop via deceleration. 1: Indicate stop via free running.	0, 1	—	0	57
F_083	Inhibition of reversal rotation	0: Indicate that reversal rotation is allowed. 1: Indicate that reversal rotation is not allowed.	0, 1	—	0	57
F_084	Jumping frequency 1	For avoiding the resonance of machinery, the jump of frequency command is occurred in frequency 1.	0.0~400.0 Hz	0.1Hz	0.0	54
F_085	Jumping frequency 2	For avoiding the resonance of machinery, the jump of frequency command is occurred in frequency 2.	0.0~400.0 Hz	0.1Hz	0.0	54
F_086	Jumping frequency 3	For avoiding the resonance of machinery, the jump of frequency command is occurred in frequency 3.	0.0~400.0 Hz	0.1Hz	0.0	54
F_087	Jump of frequency	The jump of frequency command in frequency 1, 2 and 3.	0.0~25.5Hz	0.1Hz	0.0	54
F_088	Current for speed tracking	If the current is greater than that for speed tracking, the output frequency is decreased.	0%~200% of the inverter rated current	1%	150	55
F_089	Time interval for speed tracking	The time interval, with zero output frequency, preceding with speed tracking.	0.5 ~ 5.0 sec	0.1s	0.5	55
F_090	V/F pattern of speed tracking	In the speed tracking, the setting of percentage of output voltage obtained from the original V/F pattern.	0~100%	1%	100	55
F_091	Fault records	Display the last 5 records of faults.	—	—	no_Err	57
F_092	Lock of parameters	0:Parameters are changeable. Max. frequency can not over 120.0Hz. 1:parameters are locked. Max. frequency can not over 120.0Hz. 2:Parameters are changeable. Max. frequency can over 120.0Hz. 3:parameters are locked. Max. frequency can over 120.0Hz.	0~3	—	0	57
F_093	Selection of automatic voltage regulation	0: Indicate that voltage is not regulated automatically. 1: Indicate that voltage is regulated automatically.	0, 1	—	1	57

~ LIST OF FUNCTION CODE SETTINGS ~

Function	Name	Descriptions	Range of setting	Resolution	Factory setting	No. page reference for detail
F_094	Selection of the overload protection of inverter (OLI)	0: Indicate that there is no overload protection.	0,1	—	1	57
		1: Indicate that there is overload protection.				
F_095	Voltage level of power source	The range of setting is in accordance with power source.	190~240V 340~480V	0.1V	220(Re.3) 380(Re.4)	57
F_096	Creeping frequency setting	The output frequency is accelerated to creeping frequency and then is in constant frequency.	0.0~400.0 Hz	0.1Hz	0.5	55
F_097	Time duration of creep	The time interval for output frequency to be accelerated to creeping frequency.	0.0~25.5 sec	0.1s	0.0	
F_098	No. external indicator	No. external indicator connected to inverter.	0 ~ 3	—	0(Re.10)	55
F_099	Selection of display of external indicator 1	Selection of display of external indicator 1	0 ~ 8	—	1 (Re.11)	56
F_100	Selection of display of external indicator 2	Selection of display of external indicator 2	0 ~ 8	—	2 (Re.11)	
F_101	Selection of display of external indicator 3	Selection of display of external indicator 3	0 ~ 8	—	3 (Re.11)	
F_102	Selection of energy saving device	0: do not equip energy-saving device.	0,1	—	0	58
		1: equip energy-saving device.				
F_103	Decrease frequency of deceleration time of shutdown power source	If power source shutdown, then the frequency = output frequency - decrease frequency.	0.0~20.0	0.1Hz	3.0	53
F_104	Deceleration time 1 of power source for shutdown	Deceleration time when output frequency larger than switch frequency(F_106)	0.0~3200.0	0.1s	15.0 (Re.5)	53
F_105	Deceleration time 2 of power source for shutdown	Deceleration time when output frequency smaller than switch frequency(F_106)	0.0~3200.0	0.1s	15.0 (Re.5)	53
F_106	Switch frequency of power source for shutdown	Frequency setting value of switch the deceleration time of speed level 2.	0.0~400.0	0.1Hz	0.0	53
F_107	Selection of parameter of ADJ1	Selecting parameter of ADJ1 of KP-202	0 ~ 47	—	19	59
F_108	Selection of parameter of ADJ2	Selecting parameter of ADJ2 of KP-202	0 ~ 47	—	9	
F_109	Selection of parameter of ADJ3	Selecting parameter of ADJ3 of KP-202	0 ~ 47	—	10	
F_110	Selection of parameter of ADJ4	Selecting parameter of ADJ4 of KP-202	0 ~ 47	—	1	
F_111	Selection of parameter of ADJ5	Selecting parameter of ADJ5 of KP-202	0 ~ 47	—	20	
F_112	Selection of parameter of ADJ6	Selecting parameter of ADJ6 of KP-202	0 ~ 46	—	17 (Re.12)	
F_113	Selection of parameter of DIP1	Selecting parameter of DIP1 of KP-202	0 ~ 15	—	8	
F_114	Selection of parameter of DIP2	Selecting parameter of DIP2 of KP-202	0 ~ 15	—	5	
F_115	Selection of parameter of DIP3	Selecting parameter of DIP3 of KP-202	0 ~ 15	—	3	
F_116	Selection of parameter of DIP4	Selecting parameter of DIP4 of KP-202	0 ~ 15	—	1	
F_117	Selections of resumption of factory setting	0: useless	0 ~ 7	—	0	31
		1: clear fault records				
		2: resume the factory settings of 60 Hz				
		3: resume the factory settings of 50 Hz				
		4: store settings				
		5: resume last settings				
		6: digital keypad(KP-201) ← inverter parameters				
		7: digital keypad(KP-201) → inverter parameters				

The color as  means which can be set during operation.

Remark:

- | | |
|---|--|
| (1) Factory settings for 50 Hz | (9) The dynamic braking transistor is installed. |
| (2) Factory settings for 60 Hz | |
| (3) Specifications of low voltage system. | (10) The setting is zero to denote that there is no external indicator |
| (4) Specifications of high voltage system. | (11) The setting is zero to denote that there is no display. |
| (5) 0.5~5 hp: 5 sec | (12) + : represents contact a (normally open) |
| 7.5~30 hp: 15 sec | — : represents contact b (normally close) |
| above 40 hp: 30 sec | |
| (6) It is useless if the setting is zero | |
| (7) Display '  ' | |
| (8) It will be recovered after the reset of inverter. | |

6. DESCRIPTIONS OF FUNCTION CODE SETTINGS

(1) Settings of keypad

A. F_000 : Version of software

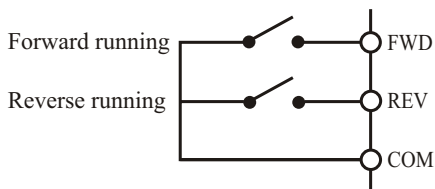
This manual has to be incorporated with software version P5102A.

B. F_001 : Select start and direction commands

a. $F_001=0$

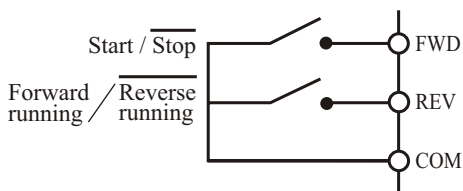
(1) FWD and REV control both start and direction commands

(2) FWD and REV are either open or closed simultaneously to stop running.



b. $F_001=1$

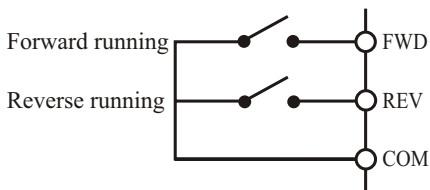
Start control by FWD terminal, Rotation control by REV terminal.



c. $F_001=2$

(1) Keypad generates start command, and FWD and REV generate direction command.

(2) FWD and REV are either open or closed simultaneously to stop running.



d. $F_{001} = 3$

Start signal is generated by keypad, FWD and REV terminals are useless, and the running is in the positive direction.

Note : that for $F_{001}=0, 2$, if FWD-COM and REV-COM are open simultaneously, the frequency display in the monitor mode will display flashed ' - - - - - ', and if FWD-COM and REV-COM are closed simultaneously, the frequency display in the monitor mode will display flashed ' ΔF '.

C. F_{002} : Select source of speed setting

a. $F_{002} = 0$

Indicate that the analog terminals (Vin or Iin) set the speed.

(1) range of Vin-GND : 0~10 V

(2) range of Iin-GND : 4~20 mA

Note : that the gain and bias of analog signals are the same as those set in F_{040} and F_{041} .

b. $F_{002} = 1$

Indicate that the speed is set by keypad.

(1) For KP-201, main speed and the multiple level speeds can be set, besides, the frequency can be set in the monitor mode.

(2) For KP-202, using knob on the panel sets speed.

c. $F_{002} = 2$

RPM set by keypad.

d. $F_{002} = 3$

MPM set by keypad.

D. F_{003} : Selection of validity of STOP on keypad

a. $F_{003} = 0$

Indicate terminals generate start signal and STOP on keypad is invalid.

b. $F_{003} = 1$

Indicate terminals generate start signal and STOP on keypad is valid.

E. F_{004} : Select function of changing frequency for KP-201

a. $F_{004} = 0$

Indicate that KP-201 is in monitor mode and that the frequency setting can not be changed.

b. $F_{004} = 1$

Indicate that KP-201 is in monitor mode and that the frequency setting can be changed.

F. F_{005} : Select function of storing frequency for KP-201

a. $F_{005} = 0$

Indicate that KP-201 is in monitor mode, the main speed setting value can not be stored automatically.

b. $F_{005} = 1$

Indicate that KP-201 is in monitor mode, the main speed setting value can be stored automatically after 3 minutes later.

G. *F_006*: Select main display of KP-201

This function is designed for KP-201. In the monitor mode, there are 8 displays as followings.

- | | |
|----------------------|------------------------|
| 1. Output frequency | 5. Output current |
| 2. Frequency setting | 6. Motor speed (RPM) |
| 3. Output voltage | 7. Line velocity (MPM) |
| 4. Voltage of PN | 8. Status of terminals |

Note : that any display can be set to be the main display, and that if the keypad has not been operated and the auxiliary display has been displayed for about 3 minutes, the main display is shown.

H. *F_007*: Speed constant

The range of setting is 0~500.00 to set the value of MPM displayed on keypad Line velocity = speed constant output frequency, which is the value of MPM, displayed in the monitor mode.

I. *F_008*: No. decimal of speed display

Increasing the no. decimal to display the monitored signal more precisely. The range of *F_008* is 0~3.

J. *F_117*: Selections of resumption of factory setting

This function is used to resume the factory settings and store/write settings between inverter and KP-201.

0 : Useless

CLF : Clear fault records

dEF60 : Resume the factory settings of 60 Hz.

dEF50 : Resume the factory settings of 50 Hz.

SRU : Store settings

rES : Resume last settings

r_d_EE : Digital keypad (KP-201) ← inverter parameters

UUr_EE : Digital keypad (KP-201) → inverter parameters

Note : that the codes '*r_d_EE*' and '*UUr_EE*' are functions of copy to be used for the case of several inverters with the same settings.

(2) Multiple speed level settings

- A. F_{009} : Main speed with range 0.00 ~ 400.00 Hz
- B. F_{010} : Speed level 1 with range 0.00 ~ 400.00 Hz
- C. F_{011} : Speed level 2 with range 0.00 ~ 400.00 Hz
- D. F_{012} : Speed level 3 with range 0.00 ~ 400.00 Hz
- E. F_{013} : Speed level 4 with range 0.00 ~ 400.00 Hz
- F. F_{014} : Speed level 5 with range 0.00 ~ 400.00 Hz
- G. F_{015} : Speed level 6 with range 0.00 ~ 400.00 Hz
- H. F_{016} : Speed level 7 with range 0.00 ~ 400.00 Hz
- G. F_{017} : Jog speed with range 0.00 ~ 400.00 Hz

a. The corresponding function codes

(1) Acceleration and deceleration time for multiple speed level
(F_{018} ~ F_{019})

(2) Multiple function input terminal settings (F_{052} ~ F_{057})

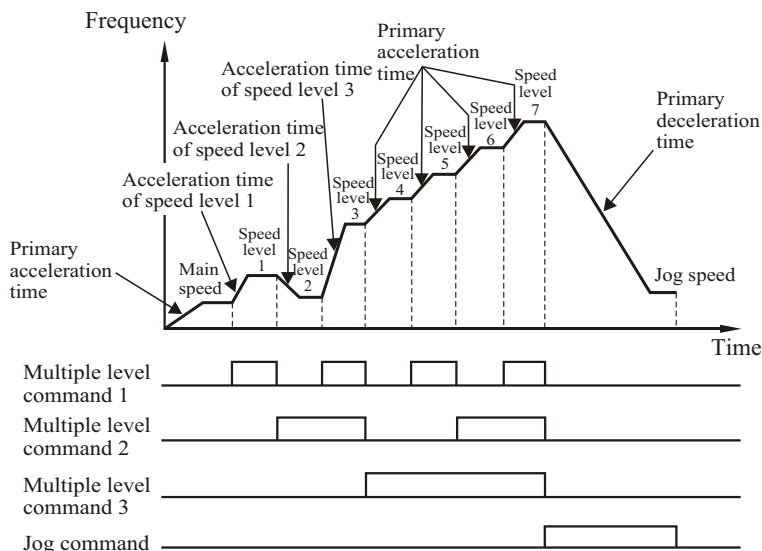
b. Production of multiple speed level

Jog command	Multiple level Command 3	Multiple level Command 2	Multiple level Command 1	
ON	X	X	X	Jog speed
OFF	OFF	OFF	OFF	Main speed
OFF	OFF	OFF	ON	Speed level 1
OFF	OFF	ON	OFF	Speed level 2
OFF	OFF	ON	ON	Speed level 3
OFF	ON	OFF	OFF	Speed level 4
OFF	ON	OFF	ON	Speed level 5
OFF	ON	ON	OFF	Speed level 6
OFF	ON	ON	ON	Speed level 7

Note:

- (1) 'X' denotes "don't care".
- (2) Jog speed has the highest priority.
- (3) Jog speed and multiple speed levels are determined by the status, ON or OFF, of multiple function input terminals which are programmed by the settings of the multiple function inputs (F_{051} , F_{056}).
- (4) 'ON' denotes that the contact a (normally open) is shortcircuit and contact b (normally close) is open. 'OFF' denotes that the contact a (normally open) is open and contact b (normally close) is shortcircuited.

c. Multiple speed level and the associated acc/dec time

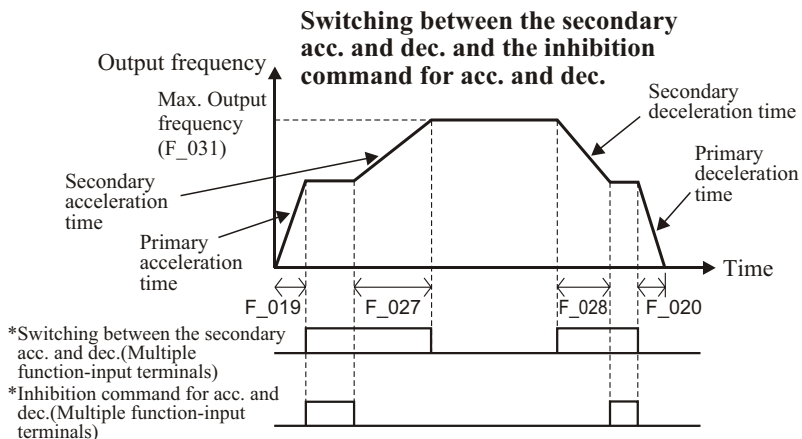


Note:

- (1) The acceleration/deceleration times of jog speed and speed level 4~7 are the same as those of main speed
- (2) In stop if the jog speed command is generated, motor will be running in jog speed without start command.
- (3) Except main speed, the analog inputs (Vin and Iin) are useless for multiple speed levels.
- (4) Acceleration and deceleration times are set in F_018~F_029.

(3) Acc/dec time of multiple speed level

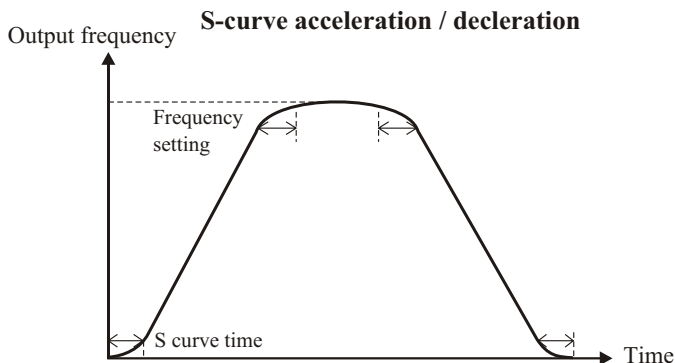
- A. F_{018} : Base frequency of acc/dec with range 0.01~400.00 Hz
- B. F_{019} : Primary acceleration time with range 0.0~3200.0 seconds
- C. F_{020} : Primary deceleration time with range 0.0~3200.0 seconds
- D. F_{021} : Acceleration time of speed level 1 with range 0.0~3200.0 seconds
- E. F_{022} : Deceleration time of speed level 1 with range 0.0~3200.0 seconds
- F. F_{023} : Acceleration time of speed level 2 with range 0.0~3200.0 seconds
- G. F_{024} : Deceleration time of speed level 2 with range 0.0~3200.0 seconds
- H. F_{025} : Acceleration time of speed level 3 with range 0.0~3200.0 seconds
- I. F_{026} : Deceleration time of speed level 3 with range 0.0~3200.0 seconds
- J. F_{027} : Secondary acceleration time with range 0.0~3200.0 seconds
- K. F_{028} : Secondary deceleration time with range 0.0~3200.0 seconds
- L. F_{029} : Acc/dec time of Scurve acceleration/deceleration with range 0.0~5.0 seconds
 - a. Multiple acc/dec times are the time duration in which output frequency is from 0 to base frequency (F_{018}).
 - b. The acceleration/deceleration times of jog speed and speed level 4~7 are the same as those of main speed
 - c. Secondary acc/dec times have the higher priority. Multiple function input terminals can be programmed to enable secondary acc/dec. The timing chart is shown in figure below.



- d. If the stop signal is generated, the command of inhibiting acc/dec is useless.

Note: that there are 4 types of STOP signal described as followings:

- (1) If F_001=0 or 2, FWD and REV are either open or closed simultaneously.
 - (2) If F_001=1, FWD is open.
 - (3) If F_003=1, press STOP.
 - (4) If start command is generated by keypad, press STOP.
- e. The acceleration/deceleration times of S curve acceleration/deceleration are set for smooth running, for example, to avoid the drop of object in transmission line or shock of elevator.



(4) V/F pattern settings

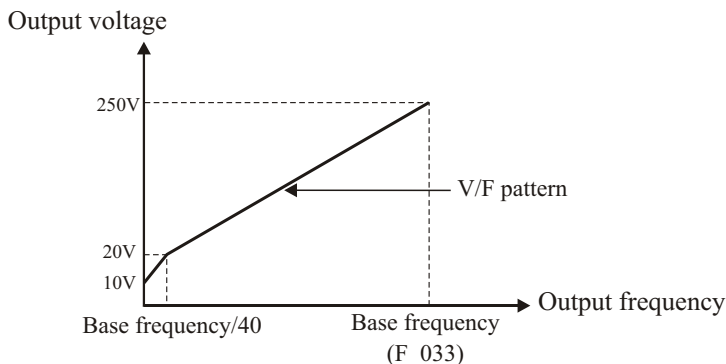
A. F_030 : Limitation of output voltage

a. $F_030 = 0$

Output voltage is not limited

b. $F_030 = 1$

Output voltage is limited and can not be greater than the voltage of V/F pattern.



B. F_031 : Max. output frequency with range 0.1~400.0 Hz.

C. F_032 : Start frequency with range 0.1~10.0 Hz

D. F_033 : Boost voltage. 0.1~50.0 V for low voltage, and 0.1~100.0 V for high voltage

E. F_034 : Base frequency with range 0.1~400.0 Hz

F. F_035 : Base voltage. 0.1~255.0 V for low voltage, and 0.1~510.0 V for high voltage

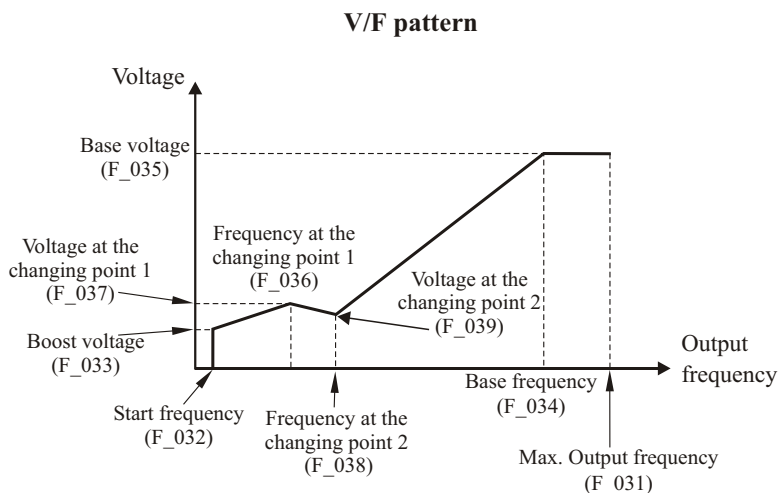
G. F_036 : frequency, range 0.0~400.0 Hz, at the changing point 1

H. F_037 : Voltage, range 0.1~255.0 V for low voltage and 0.1~510.0 V for high voltage, at the changing point 1

I. F_038 : frequency, range 0.0~400.0 Hz, at the changing point 2

J. F_039 : Voltage, range 0.1~255.0 V for low voltage and 0.1~510.0 V for high voltage, at the changing point 2

The relationship among the settings of F_031~F_039 is shown in the following figure.



Note:

- (1) Base voltage > start voltage and the voltages at the changing point 1 and 2.
- (2) Base frequency > frequency at changing point 2
> frequency at changing point 1 > start frequency
- (3) If frequency at changing point 2 is less than that at changing point 1, frequency at changing point 2 is useless.
- (4) If frequencies at changing point 1 and 2 are less than start freq., frequencies at changing point 1 and 2 are useless.

(5) Analog input commands

A. F_040 : Frequency command gain with range 0.00~2.00

a. Analog input terminals are V_{in} -GND (0~10 V) and I_{in} -GND (4~20 mA)

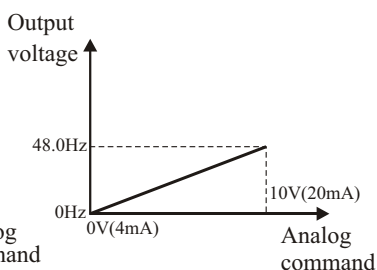
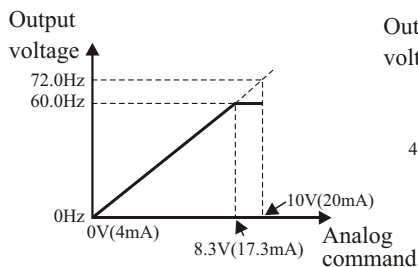
b. The maximum frequency setting max. output freq. (F_031) freq. command gain (F_040) For example, gain of analog bias frequency=0

Max. output freq.= 60.0 Hz

Frequency command gain= 1.20

Max. output freq.= 60.0 Hz

Frequency command gain=0.80



B. F_041 : Gain of analog bias frequency with range 1.00~1.00

a. Bias freq.= max. output freq. (F_031) gain of bias freq. (F_041)

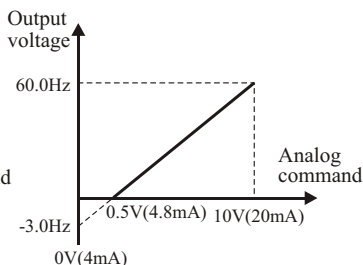
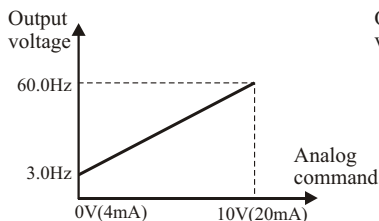
For example, frequency command gain = 1.0

Max. output freq.= 60.0 Hz

Gain of analog bias frequency =0.05

Max. output freq.= 60.0 Hz

Gain of analog bias frequency =0.05



b. frequency setting =

$$\frac{\text{Max. Frequency setting - bias frequency}}{10\text{V (20mA)}} \times \text{analog command input}$$

+ gain of frequency