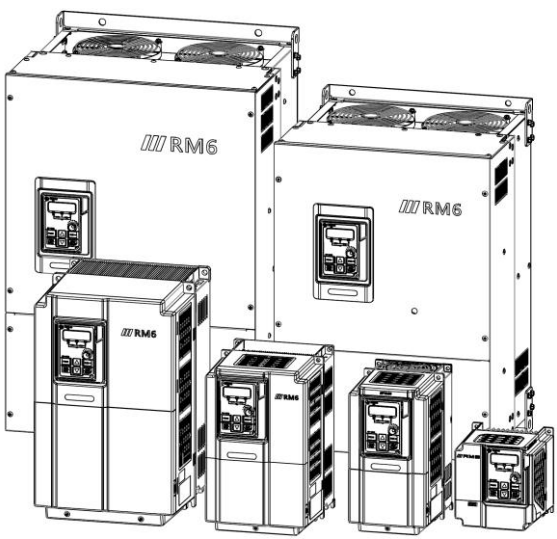
RHYMEBUS

AC MOTOR DRIVE

Operation Manual



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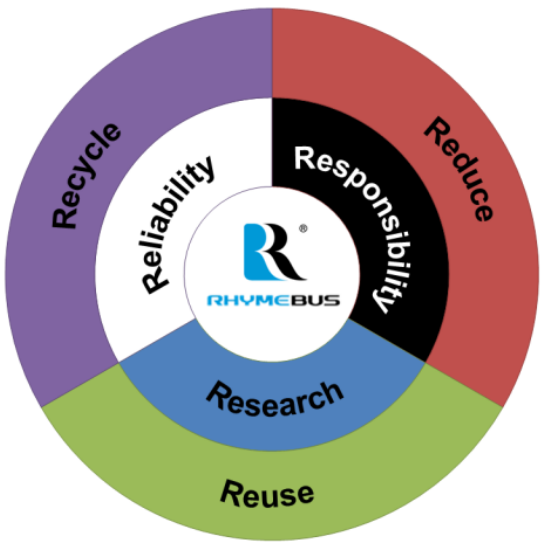
RM6 series

Quality • Satisfaction • Improvement • Innovation



Rhymebus Corporation

http://www.rhymebus.com.tw

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PREFACE

Thank you for using RHYMEBUS RM6 series drive. For proper operations and safety purposes, please do read and follow specific instructions contained in this manual before using the product. The manual shall be placed on the top of the machine, and all the setup parameters and reference numbers must be properly recorded in Attachment F to facilitate future maintenance and repairs.

SAFETY PRECAUTION

Please read this manual thoroughly and pay attention to the safety precautions marked with " **DANGER** " or " **CAUTION** " before installation, wiring, maintenance, or troubleshooting.

Only qualified personnel may proceed with installation, wiring, testing, troubleshooting, or other tasks.

※Qualified Personnel: Must be familiar with the fundamentals, structures, characteristics, operating procedures, and installation. This personnel must read the manual in details and follow the steps of security measures to prevent possible dangers.

DANGER	User may cause the casualty or serious damages if user does not abide by the instructions of the manual to execute the tasks.
CAUTION	User may cause injuries to the people or damage the equipment if user does not abide by the instructions of the manual to execute the tasks.

※Although the " ⚠ " mark may indicate minor damages, serious damages or injuries may be possibly incurred if the caution is not under user's attention.

Installation

CAUTION
a. Installation should only take place on top of the metal surface or any material with the fire resistant. Any place or location of high temperature, moist, oil and gas, cotton fiber, metal powder and erosive gas should be avoided.
b. If the product specification indicates IP00 (the protective level of the equipment structure), any human contact is forbidden to avoid the electric shock. The option of installing AC reactor(ACL) or DC reactor(DCL) should also be treated with caution.
c. Please make sure the surrounding temperature should not exceed 50°C when the installation needs to be placed inside the control panel.
d. For the environment of storage and installation, please follow the instructions of the environmental conditions illustrated in the sections of the common specification of RM6 series.

Wiring

⚠ DANGER

a. DO NOT conduct any wiring during the system power is ON to avoid the electric shock.

b. R/L1,S/L2,T/L3 are power inputs (electric source terminals) and U/T1,V/T2,W/T3 are drive's outputs connecting to a motor. Please DO NOT connect these input and output terminals to P, P⊕, N, N⊖, P1 and PR terminals.

c. Once the wiring is completed, the cover of the drive must be put back and must seal the drive to avoid other's accidental contact.

d. DO NOT connect 200V series drives to the electric source of 346/380/415/440/460/480V.

e. DO NOT connect the main circuit and multi-function terminals to the ground (PE).

f. PE ⏚ terminal must be exactly grounded. Ground the drive in compliance with the NEC standard or local electrical Code.

g. Please select "**section 3-4-1 Description of Terminals"**refer to page 22 for the screwing torque of the wiring terminal.

h. Please refer to the national or local electric Code for the appropriate spec. of the cords and wires.

i. Please install an appropriate Molded Case Circuit Breaker (MCCB) or Fuse at each path of power lines to a drive.

j. Please install the thermal relay between the individual motor and the drive when using one drive to propel several motors.

k. DO NOT connect phase leading capacitor, surge absorber, or non-three-phase motor to drive's U/T1,V/T2,W/T3 side.

l. AC reactor(ACL) installation is required when the power capacity exceeds 500kVA or more than 10 times of drive's rated capacity.

m. After power off (models which are below 30HP must wait at least 5 minutes; models include 40HP~75HP must wait at least 10 minutes; models which are above 100HP must wait at least 20 minutes). DO NOT touch the drive or perform any unwiring actions before drive indicator light (CHARGE) turns off. Use a multimeter with the DC voltage stage to measure the cross voltage between P, P⊕, N, N⊖ports (DC bus voltage must be less than 25V).

n. When the motor is under the voltage-proof, insulation testing, unwiring the U/T1,V/T2,W/T3 terminal of drive at first.

⚠ CAUTION

a. The RM6 series are designed to drive a three-phase induction motor. DO NOT use for single-phase motor or other purposes.

b. The main circuit and control circuit must be wired separately; control circuit must use a shielded or twisted-pair wires to avoid possible interferences.

c. The control circuit must use a shielded or twisted-pair shielded wires to avoid possible interferences and confirm the grounding.

Operation

DANGER

a. DO NOT open or remove the cover while power is on or during the operation. Do close up the cover before powering on the drive. DO NOT remove the cover except for wiring or periodic inspection.

b. At the function F_078=1 or 3, the drive will automatically restart when the power is restored. Stay away from the motor and machine.

c. At the function F_003=0 and F_001=0 or 1, the OFF/RESET key on keypad is ineffective. For safety operation, please install an emergency stop switch.

d. The drive can produce high frequency outputs. Before adjusting the frequency, please check the specifications of motor carefully to prevent the motor from unexpected damages.

e. If any of the protective functions have been activated, and the start command is set to terminal control (F_001=0 or 1). First remove the case and check if the all running commands set to OFF. Then press the OFF/RESET key to release the alarm.

CAUTION

a. DO NOT touch the heat sink or braking resistors due to the high heat.

b. Some models attach nylon rope when shipping. DO NOT proceed the movement or hanging the drive by this nylon rope to avoid unexpecting accident. Please select a suitable rope to proceed the movement or hanging the drive.

Compliance with UL standards and CSA standards (cUL-listed for Canada)

⚠ CAUTION

1. "Risk of Electric Shock"
   "Before starting or inspection, turn OFF the power and wait at least 5 minutes, and check for residual voltage between terminal P and N with a multi-meter or similar instrument has dropped to the safe level (50VDC or below), to avoid a hazard of electric shock."

2. "These devices are intended for installing in Pollution Degree2 environments only."

3. "Maximum surrounding air temperature 50°C for RM6 series"

4. Short circuit rating
   "Suitable for usage on a circuit capable of delivering not more than 5,000 rms symmetrical amperes, 240V maximum for 200V class input (within)40HP or less. Models RM6 rated for 200V class input."

   "Suitable for usage on a circuit capable of delivering not more than 5,000 rms symmetrical amperes, 480V maximum for 400V class input 50HP or less . Models RM6 rated for 400V class input."

   "Suitable for usage on a circuit capable of delivering not more than 10,000 rms symmetrical amperes, 480V maximum for 400V class input 60HP or above. Models RM6 rated for 400V class input."

   "Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local Codes."
5. Install UL certified branch circuit fuse between the power supply and the drive, referring to the table below.

Three-Phase 200V Series

Model number	Fuse type	Fuse current rating (A)
RM6-20P5	Class RK5 (250Vac, 200kA I.R.)	5
RM6-2001		10
RM6-2002		15
RM6-2003		20
RM6-2005		30
RM6-2007	Class T (300Vac, 200kA I.R.)	50
RM6-2010		80
RM6-2015		100

Compliance with UL standards and CSA standards (cUL-listed for Canada) (continued)

⚠ CAUTION

Three-Phase 400V Series

Model number	Fuse type	Fuse current rating (A)
RM6-4001	Class RK5 (600Vac, 200kA I.R.)	5
RM6-4002		10
RM6-4003		15
RM6-4005		20
RM6-4007	Class T (600Vac, 200kA I.R.)	30
RM6-4010		30
RM6-4015		40
RM6-4020		60

6. Main circuit terminal wiring
"Use 75°C Copper wire only."
"Field wiring connection must be made by a UL Listed and CSA Certified closed loop terminal connector sized for the wire gauge involved. Connector must be fixed using the crimp tool specified by the connector manufacturer."
See table below for main circuit wire size.

200V Class Series

Model number	Wire size AWG (mm^2)		
	Input (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)	Grounding
RM6-20P5	16 (1.3)	16 (1.3)	16 (1.3)
RM6-2001	16 (1.3)	16 (1.3)	
RM6-2002	14 (2.1)	16 (1.3)	14 (2.1)
RM6-2003	14 (2.1)	14 (2.1)	
RM6-2005	10 (5.3)	10 (5.3)	10 (5.3)
RM6-2007	8 (8.4)	8 (8.4)	
RM6-2010	6 (13.3)	6 (13.3)	8 (8.4)
RM6-2015	4 (21.1)	4 (21.1)	

Compliance with UL standards and CSA standards (cUL-listed for Canada)

⚠ CAUTION

400V Class Series

Model number	Wire size AWG (mm^2)		
	Input (R/L1, S/L2, T/L3)	Output (U/T1, V/T2, W/T3)	Grounding
RM6-4001	18 (0.8)	18 (0.8)	18 (0.8)
RM6-4002	18 (0.8)	18 (0.8)	
RM6-4003	16 (1.3)	16 (1.3)	16 (1.3)
RM6-4005	14 (2.1)	14 (2.1)	14 (2.1)
RM6-4007	12 (3.3)	12 (3.3)	12 (3.3)
RM6-4010	10 (5.3)	10 (5.3)	10 (5.3)
RM6-4015	8 (8.4)	10 (5.3)	
RM6-4020	8 (8.4)	8 (8.4)	

INTRODUCTIONS

Features

1. **Allow RS-485 communication interface control (Modbus RTU communication protocol).**
2. **PID control function for constant pressure, used for air compressor and pump system. Setting value and practical value can be displayed simultaneously on the monitor. PID control function also with the function of over pressure(OP)、PID feedback signal error (no Fb) ,and pressure start-stop control mode.**
3. **Air conditioning temperature control function, used for air conditioning pumps, fan, and cooling tower temperature control system.**
   This is different from PID control function to avoid frequency fluctuated phenomenon .It can maintain more stable speed and accurate temperature control.
4. **User can monitor the temperature of the drive and setting the pre-alarm level to forecast the maintenance cycle of the cooling fan in order to prevent from the overheat breakdown and the drive downtime loss.**
5. **The temperature management and fan control functions increase the lifetime of cooling fan and save the energy.**
6. **Special fan design for the model above RM6-2050 and RM6-4075 was made with IP54 iron cooling fan(fan blade air-flow is more stable and high-temperature resistant), which can be replaced from the front directly and make the maintenance more convenient.**
7. **9 types of monitor display of the drive**
   Including output frequency, output current, output voltage, heat sink temperature ,PID display the setting value and the practical value at the same time.
8. **It's available to connect three independent monitor (DM-501) displaying state during operation.**
9. **The keypad contains remote control function and the max distance is up to 100M.**
10. **The switching frequency can be adjusted between 800Hz~15KHz.Minium setting is 800HZ to reduce high frequency radiation interference.**

11 The function of torque motor frequency and control.
Two analog inputs to control torque motor frequency and load separately.

12 Parameter locks function can set up the parameter value lock and conceal it to prevent from data leakage or copy.

13 A9 type CPU is optional to choose Quick-release terminal block to save the switching service time.

14 Interchange function of Heavy duty /Normal duty.
Base on the motor load feature to choose 150%or120% Overload protection level.
Heavy duty: Constant torque load (mixer, conveyor..etc)
Normal duty: Variable torque load(windmill, pump…etc)

Table of Contents

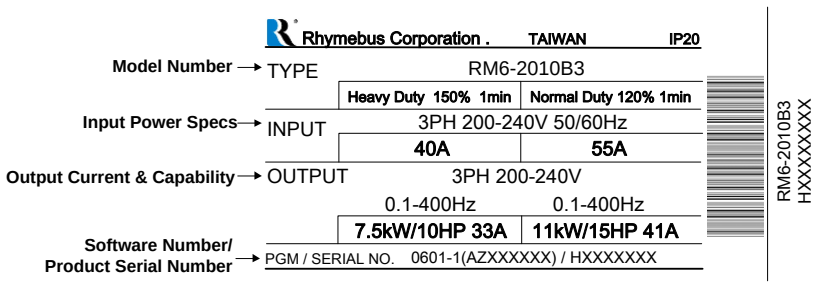
Chapter 1 Cautions Before Installation

1-1 Product Verification

The product has passed the strictest quality test before shipped out from the factory. However, the product might possibly sustain minor damages due to the impact, shaking, vibration, and other factors during the transportation. Please make sure to verify the following items after receiving this product. If the product verification finds anything abnormal, please contact the agent immediately for the further assistance.

1-2 Confirmation of Appearance

1. Check up the specifications at shipping label on the carton is identical with the nameplate of drive.
2. Check up the appearance of drive for any paint chipped off, smearing, deformation of shape, etc.
3. Check up the nameplate (as example RM6-2010) of the drive to verify the product descriptions with the order specification.



The drive depends on the motor load feature to choose the rated current of heavy duty or normal dury. Please refer to the following form to compare the differences of heavy duty and normal duty.

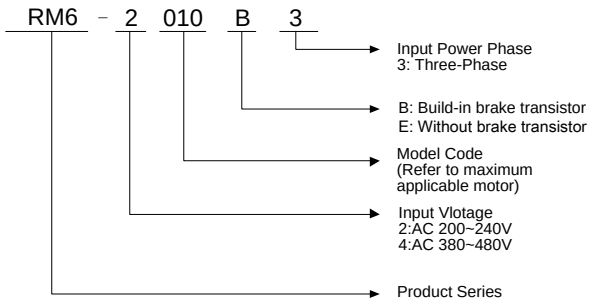
Motor load feature	Output rated curent	Overload capacity	Occasions
Heavy Duty	Based on the type difference (*Note 1)	150% of drive rated output current for 1 min	Constant torque (Mixer,conveyor…etc)
Normal Duty	Based on the type difference (*Note 1)	120% of drive rated output current for 1 min	Variable torque (windmill,pump…etc)

(*Note)

According to the detail rated specifications of heavy duty and normal duty,please refer to page 4 “2-1 RM6 Standard Specifications”.

The default setting is heavy duty mode,transfer to the normal duty please refer to page 51“4-3-7 The setting of Heavy Duty/Normal Duty”.

1-3 The Description of Nomenclature:



Model Code table for maximum applicable motor(Heavy Duty)

Model Code	HP/kW		Model Code	HP/kW		Model Code	HP/kW		Model Code	HP/kW	
0P5	0.5	0.4	015	15	11	075	75	55	300	300	220
001	1	0.75	020	20	15	100	100	75	350	350	250
002	2	1.5	025	25	18.5	125	125	90	420	420	315
003	3	2.2	030	30	22	150	150	110	500	500	375
005	5	3.7	040	40	30	175	175	132	600	600	450
007	7.5	5.5	050	50	37	200	200	160	—	—	—
010	10	7.5	060	60	45	250	250	200	—	—	—

Model Code table for maximum applicable motor(Normal Duty)

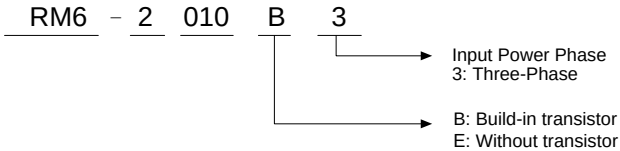
Model Code	HP/kW		Model Code	HP/kW		Model Code	HP/kW		Model Code	HP/kW	
0P5	1	0.75	015	20	15	075	100	75	300	350	250
001	2	1.5	020	25	18.5	100	125	90	350	420	315
002	3	2.2	025	30	22	125	150	110	420	500	375
003	5	3.7	030	40	30	150	175	132	500	600	450
005	7.5	5.5	040	50	37	175	200	160	600	700	600
007	10	7.5	050	60	45	200	250	200	—	—	—
010	15	11	060	75	55	250	300	220	—	—	—

1-4 Confirmation of Accessories

One operation manual is inclusive. Please verify other accessories inclusively such as braking resistor, AC reactor, etc..

1-5 Build-in Brake Transistor (Option)

Please confirm the product Code rules to make sure the product specifications of brake transistor order.



	RM6-□□□□B3 (Build-in BrakeTransistor)	RM6-□□□□E3 (Without Brake Transistor)
200V	1.under 2015: RM6-□□□□B3 only available in this series 2.2020~2075: RM6-□□□□B3、RM6-□□□□E3 both are available 3.above2100: RM6-□□□□E3 only available in this series	
400V	1.under 4025: RM6-□□□□B3 only available in this series 2.4030~4155: RM6-□□□□B3、RM6-□□□□E3 both are available 3.Above4150: RM6-□□□□E3 only available in this series	

※Please select “Standard Specifications” refer to page 4 to verify the product specifications with your requirements.

Chapter 2 Standard Specifications

2-1 RM6 Standard Specifications

2-1-1 Three-Phase 200V Series

Model case (RM6-□□□□B3)		20P5	2001	2002	2003	2005	2007	2010	2015
Maximum applicable motor (HP / kW)	Heavy Duty	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
	Normal Duty	1/0.75	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15
Rated output capacity (kVA)	Heavy Duty	1.1	1.9	3	4.2	6.5	9.5	13	18
	Normal Duty	1.6	2.6	3.8	5.8	8.0	12	16	23
Rated output current (A)	Heavy Duty	3	5	8	11	17	25	33	46
	Normal Duty	4.2	6.8	10	15.2	21	31	42	60
Maximum Output Voltage		Three-phase 200~240V(corresponding input voltage)							
Range of Output Frequency (Hz)		0.1~400.00Hz							
Power Source (ψ, V, Hz)		Three-phase 200~240V 50/60Hz							
Input current (A)	Heavy Duty	5	6	10	14	18	30	40	60
	Normal Duty	5	8	12	18	25	41	56	68
Permissible AC power source fluctuation		170~264V 50/60Hz / ±5%							
Overload Protection	Heavy Duty	150% of drive rated output current for 1 min							
	Normal Duty	120% of drive rated output current for 1 min							
Maximum cooling method (CFM)		Nature cooling		8	16	16	63	60	60
Applicable safety standards		—							
Protective structure		IP20							
Weight / Mass (kg)		1.8	1.8	1.9	2	2.1	3.0	5.4	5.7
Case Code		Case 1					Case 2	Case 3	

Model Case (RM6-□□□□B3/E3)		2020	2025	2030	2040	2050	2060	2075
Maximum applicable motor (HP / kW)	Heavy Duty	20/15	25/18.5	30/22	40/30	50/37	60/45	75/55
	Normal Duty	25/18.5	30/22	40/30	50/37	60/45	75/55	100/75
Rated output capacity (kVA)	Heavy Duty	24	29	34	44	57	70	84
	Normal Duty	29	34	43	57	70	84	105
Rated output current (A)	Heavy Duty	63	75	90	115	150	185	220
	Normal Duty	75	90	112	150	185	220	275
Maximum Output Voltage		Three-phase 200~240V(corresponding input voltage)						
Range of Output Frequency (Hz)		0.1~400.00Hz						
Power Source (ψ, V, Hz)		Three-phase 200~240V 50/60Hz						
Input current (A)	Heavy Duty	72	86	103	132	183	211	240
	Normal Duty	86	103	128	183	211	240	280
Permissible AC power source fluctuation		170~264V 50/60Hz / ±5%						
Overload Protection	Heavy Duty	150% of drive rated output current for 1 min						
	Normal Duty	120% of drive rated output current for 1 min						
Maximum cooling method (CFM)		150	150	216	216	212	394	394
Applicable safety standards		-						
Protective structure		IP20				IP00 (IP20 OPTION)		
Weight / Mass (kg)		12.4	13.1	14.7	14.8	42.7	44.3	46.3
Case Code		Case4				Case 5		

Model Case (RM6-□□□□E3)		2100	2125	2150	2200	2250
Maximum applicable motor (HP / kW)	Heavy Duty	100/75	125/90	150/110	200/160	250/200
	Normal Duty	125/90	150/110	175/132	250/200	–
Rated output capacity (kVA)	Heavy Duty	112	132	165	223	267
	Normal Duty	132	156	191	267	–
Rated output current (A)	Heavy Duty	295	346	432	585	700
	Normal Duty	346	410	500	700	–
Maximum Output Voltage		Three-phase 200~240V(corresponding input voltage)				
Range of Output Frequency (Hz)		0.1~400.00Hz				
Power Source (ψ, V, Hz)		Three-phase 200~240V 50/60Hz				
Input current (A)	Heavy Duty	280	330	405	550	660
	Normal Duty	330	385	470	660	–
Permissible AC power source fluctuation		170~264V 50/60Hz / ±5%				
Overload Protection	Heavy Duty	150% of drive rated output current for 1 min				
	Normal Duty	120% of drive rated output current for 1 min				
Maximum cooling method (CFM)		394	591	591	788	788
Applicable safety standards		-				
Protective structure		IP00(IP20 OPTION)				
Weight / Mass (kg)		63.6	89	90	164	167
Case Code		Case6	Case 7		Case 8	

※Please refer to “8-1.H the application of 220V” on page 139 .

2-1-2 Three-Phase 400V Series

Model Case (RM6-□□□□B3)		4001	4002	4003	4005	4007	4010	4015	4020
Maximum applicable motor (HP / kW)	Heavy Duty	1/0.75	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15
	Normal Duty	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15	25/18.5
Rated output capacity (kVA)	Heavy Duty	1.9	3	4.6	6.9	11	14	18	23
	Normal Duty	2.7	3.7	6.9	8.4	14	18	24	30
Rated output current (A)	Heavy Duty	2.5	4	6	9	14	18	24	30
	Normal Duty	3.5	4.8	9	11	18	23	31	39
Maximum Output Voltage		Three-phase 380~480V(corresponding input voltage)							
Range of Output Frequency (Hz)		0.1~400.00Hz							
Power Source (ψ, V, Hz)		Three-phase 380~480V 50/60Hz							
Input current (A)	Heavy Duty	3.5	5	8	12	16	22	28	43
	Normal Duty	4.2	5.8	12	13	20	26	44	47
Permissible AC power source fluctuation		323~528V 50/60Hz / ±5%							
Overload Protection	Heavy Duty	150% of drive rated output current for 1 min							
	Normal Duty	120% of drive rated output current for 1 min							
Maximum cooling method (CFM)		Nature Cooling	8.1	16.2	16.2	62.8	62.8	59.8	59.8
Applicable safety standards		-							
Protective structure		IP20							
Weight / Mass (kg)		1.8	1.9	2	2	3.0	3.1	5.6	5.7
Case Code		Case1				Case 2		Case 3	

Model Case (RM6-□□□□B3/E3)		4025	4030	4040	4050	4060	4075	4100	4125
Maximum applicable motor (HP / kW)	Heavy Duty	25/18.5	30/22	40/30	50/37	60/45	75/55	100/75	125/90
	Normal Duty	30/22	40/30	50/37	60/45	75/55	100/75	125/90	150/110
Rated output capacity (kVA)	Heavy Duty	30	34	46	57	69	88	114	137
	Normal Duty	34	44	57	69	84	110	137	165
Rated output current (A)	Heavy Duty	39	45	61	75	91	115	150	180
	Normal Duty	45	58	75	91	110	144	180	216
Maximum Output Voltage		Three-phase 380~480V(corresponding input voltage)							
Range of Output Frequency (Hz)		0.1~400.00Hz							
Power Source (ψ, V, Hz)		Three-phase 380~480V 50/60Hz							
Input current (A)	Heavy Duty	47	52	74	86	105	136	155	181
	Normal Duty	52	66	86	105	132	162	181	202
Permissible AC power source fluctuation		323~528V 50/60Hz / ±5%							
Overload Protection	Heavy Duty	150% of drive rated output current for 1 min							
	Normal Duty	120% of drive rated output current for 1 min							
Maximum cooling method (CFM)		59.8	150	216	216	216	212	394	394
Applicable safety standards		-							
Protective structure		IP20					IP00 (IP20 OPTION)		
Weight / Mass (kg)		5.8	12.8	12.9	15	15.3	44	45.5	46.4
Case Code		Case 3	Case 4				Case 5		

Note1: Only RM6-□□□□B3 with the type of 4025
Note2: Only RM6-□□□□E3 with the type of 4100.4125

Model Case (RM6-□□□□E3)		4150	4175	4200	4250	4300	4350	4420	4500	4600
Maximum applicable motor (HP / kW)	Heavy Duty	150/ 110	175/ 132	200/ 160	250/ 200	300/ 220	350/ 250	420/ 315	500/ 375	600/ 450
	Normal Duty	175/ 132	200/ 160	250/ 200	300/ 220	350/ 250	420/ 315	–	600/ 450	700/ 500
Rated output capacity (kVA)	Heavy Duty	165	193	236	287	329	366	446	533	660
	Normal Duty	193	232	287	316	366	396	–	655	732
Rated output current (A)	Heavy Duty	216	253	310	377	432	480	585	700	866
	Normal Duty	253	304	377	415	480	520	–	860	960
Maximum Output Voltage		Three-phase 380~480V(corresponding input voltage)								
Range of Output Frequency (Hz)		0.1~400.00Hz								
Power Source (ψ, V, Hz)		Three-phase 380~480V 50/60Hz								
Input current (A)	Heavy Duty	202	217	288	355	401	440	540	650	806
	Normal Duty	217	282	355	385	440	480	–	800	900
Permissible AC power source fluctuation		323~528V 50/60Hz / ±5%								
Overload Protection	Heavy Duty	150% of drive rated output current for 1 min								
	Normal Duty	120% of drive rated output current for 1 min								
Maximum cooling method (CFM)		394	394	591	591	788	788	788	1182	1182
Applicable safety standards		-								
Protective structure		IP00 (IP20 OPTION)								
Weight / Mass (kg)		64	64.5	95	97	159	163	164	217	272
Case Code		Case 6		Case 7		Case 8			Case 9	

※The weight of RM6 series standard specifications exclude ACL and DCL

※Please refer to the “outline dimensions of the inverter” on page 173.

※Applicable safety standard shows on planning.

2-2 RM6 Common Specifications

2-2-1 RM6

Control Characteristics	Control method	• Voltage vector sinusoidal PWM control (V/F control). • Switching frequency: 800Hz~15KHz.	
	Range of frequency setting	0.1~400.00Hz	
	Resolution of frequency setting	• Digital Keypad: 0.01Hz • Analog signal: 0.06Hz / 60Hz	
	Resolution of output frequency	0.01Hz	
	Frequency setting signal	DC 0~10V, 4~20mA.	
	Overload protection	Heavy duty	150% of drive rated output current for 1 minute.
		Normal duty	120% of drive rated output current for 1 minute.
	DC braking	• Time of DC braking after stop / before start: 0~20.0sec • DC braking frequency at stop: 0.1~60Hz • DC baking level: 0~150% of rated current	
	Braking torque	Approximately 20%(with built-in braking resistor connected, braking torque is approximately 100%).	
	Acceleration/ deceleration time	• 0sec(coast to stop), 0.0~3200.0sec(independent setting of the acceleration / deceleration). • The setting of acceleration /deceleration time can adjust from 0Hz to 60Hz	
	V/F pattern	• Linear, Energy saving mode (square of 2, 1.7, 1.5 curve) • V/F pattern (2 V/F points). • V/F pattern can be adjusted independently by analog input signal.	
	Other functions	slip compensation, auto-torque compensation, auto-adjustment for output voltage stability, auto-operation for energy-saving, auto-adjustment of switching frequency, restart after instantaneous power failure, speed tracing, overload detection, acceleration/deceleration switch , parameters copy	

Operation Characteristics	Input	Start method	Forward/ Reverse, Communication interface(RS-485 Modbus), 16 sets preset speed. 3-wire self-holding FWD/REV control.
		Multi-function inputs	6 sets programmable input terminals: X1~X6
			Refer to the function setting description of F_52~F_57
		Analog inputs	• Vin – GND: DC 0~10V • Iin – GND: DC 4~20mA / 2~10V or DC 0~20mA / 0~10V
			Refer to the function setting description of F_040, F_041, and F_126~F_128
	Output	Multi-function outputs	4 sets programmable output detection: Ta2–Tb2-Tc2, Ta1–Tb1–Tc1, Y1–CME, Y2–CME
			Refer to the function setting description of F_058~F_060, and F_131
		Analog outputs	• “FM+” – “M”-：DC 0~10V • “AM+” – “M”-：DC 0~10V
			Refer to the function setting description of F_044, F_045, F_129, F_130
Display	Keypad (KP-603)		output frequency, frequency command, output voltage, DC bus voltage, output current, motor speed(RPM), machine speed(MEM), terminal status and heat sink temperature, practical value, and setting value.
	Keypad (KP-602)		Multiple languages and 4 descriptions of monitor modes are shown at the same time.
	External indicator (DM-501)		Independent external display can be added for up to three sets(96mm * 48mm, 5 digits) to show output frequency, frequency command, output voltage, DC bus voltage, output current, terminal status and heat sink temperature, Machine speed, Motor speed.
Protections	Fault protection	Error trip messages of drive	EEPROM error(EEr), A/D converter error(AdEr), Fuse open(SC), Under voltage during operation(LE1), Drive over current(OC), Grounding fault (GF), Over voltage(OE), Drive overheat (OH), Drive overheat (Ht), Motor overload(OL), Drive overload(OL1), System overload(OLO), External fault(thr), NTC thermistor sensor fault(ntCF), Keypad interruption during copy(PAdF), Modbus communication overtime(Cot)
		Error trip messages of drive in close loop control	PID feedback signal error(no Fb), Over pressure(OP)
		Warning messages of drive	Power source under voltage(LE), Drive output interruption (bb), Coast to stop(Fr), Dynamic brake transistor over voltage(db), Software fault(PrEr), Drive overhea (Ht), Keypad cable trip before connecting(Err_00), Keypad cable trip during operation(Err_01), Over pressure(OP)

	Cooling method	• Nature cooling: 20P5, 2001, 4001,4002 models. • Fan cooling: Three fan control methods for cooling(forced air, operation air, temperature level setting) for other models.	
Environment	Atmosphere	Non-corrosive or non-conductive, or non-explosive gas or liquid, and non-dusty	
	Surrounding temperature	Heavy Duty	-10°C (14°F) ~ +50°C (122°F) (Non-freezing and non-condensing)
		Normal Duty	-10°C (14°F) ~ +40°C (104°F) (Non-freezing and non-condensing)
	Storage temperature	-25°C (-13°F) ~ +70°C (158°F)	
	Relative humidity	95% RH or less (No-condensing atmosphere)	
	Vibration	Less than 5.9m/sec² (0.6G)	
	Altitude	Less than 1000m (3280 ft.)	

Chapter 3 Installation and Confirmation

3-1 Basic Equipment

The drive needs the several components for the conjunctive operation. These components are called “basic equipment”, listed in the following:

3-1-1 Power Source: The voltage with three-phase or single-phase of the power source must meet the drive specifications.

3-1-2 MCCB or NFB: MCCB (Molded Case Circuit Breaker) or NFB (No Fuse Breaker) can withstand the inrush current at instant power ON and provide the overload and over-current protection to the drive.

3-1-3 Drive: The main device of motor control must be chosen in accordance with the rated voltage and current specifications of motor (please refer to the lists of Standard Specifications of drives).

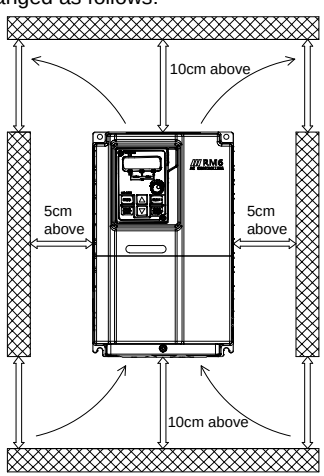
3-1-4 Motor: The specifications of motor are determined from the requirement. Please be cautious to the motor rated current that must not exceed the drive current.

3-2 Installing the Drive

For the safe operation of the drive, please be cautious to the environmental conditions where the drive is going to be installed.

3-2-1 AC Power: AC power input must be complied with the AC power input specification of the drive.(see RM6 series standard specifications)

3-2-2 Location: Due to the heat dissipating requirement during the drive operation, please install the drive with the least clearance space (shown as below figure) around the drive. Therefore, the location of installation should be arranged as follows:



3-2-3 Arrangement: Due to the heat generated at the machine operation, the drive must be installed in the ventilate space. If there are multiple inverters installed in the same panel and the position is placed up and down, it's recommended to install the guide between the inverters to avoid the inverter on the top getting hot airfolw form the inverter on the bottom.

The installations of drive are shown as below figure 1 and figure 2:

a. Internal cooling

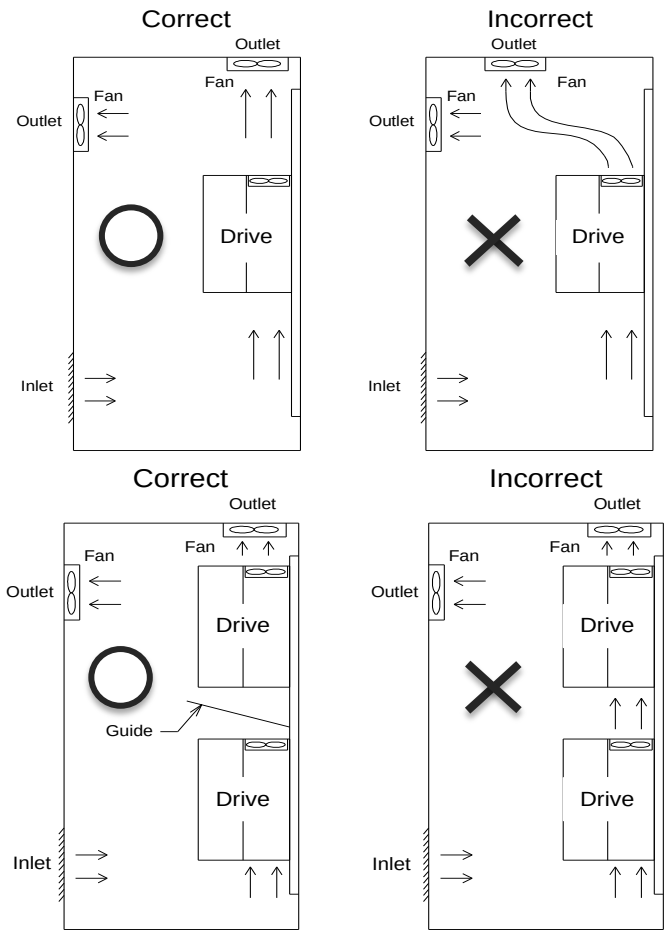


Figure 1: Drive mounting inside the cabinet/control panel

b. External cooling

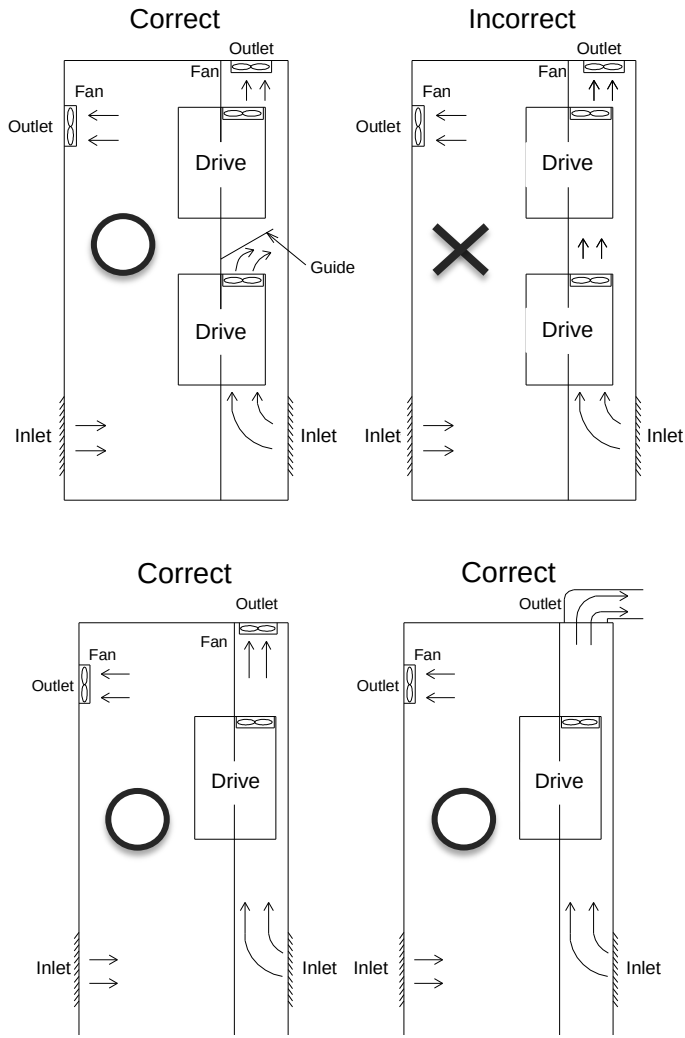


Figure 2: Drive mounting outside the cabinet/control panel

Note: The external cooling is suitable for 7.5HP above. Please ensure all air vents to be ventilated using the external cooling.

3-2-4 Specifications of Associated Accessories: The specifications of the accessories must be according to the specifications of the drive. Otherwise, the drive will be damaged and the life span of the drive will be shorten.

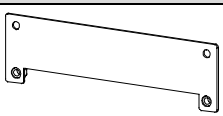
⚠ DO NOT add any power factor leading capacitor(RC, LC or other capacitance component) between the drive and motor to avoid any accidents.

3-2-5 Cleaning of Environment: The installed location of drive must consider the ventilation, cleanliness and moisture.

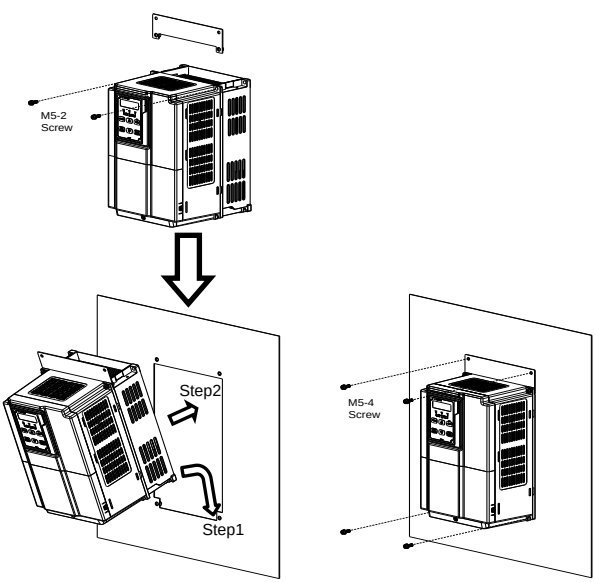
3-2-6 Operator: Only the qualified personnel can perform the operation and troubleshooting.

3-2-7 Drive Supporting Frame (option):

a. Applicable mode:

Scheme	Model	Part number
	RM6-2007 RM6-4010	M1031567
	RM6-2010~2015 RM6-4015~4025	M1031383
	RM6-2020~ 2040 RM6-4030~ 4060	M1031505

b. Instruction:



3-3 Cooling Fan Replacement

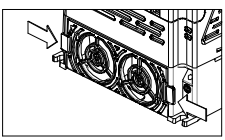
3-3-1 Steps of Cooling Fan Replacement

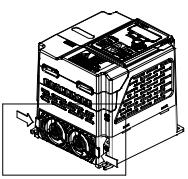
- ➲ 200V Series: RM6-20P5~RM6-2005
- ➲ 400V Series: RM6-4001~RM6-4005

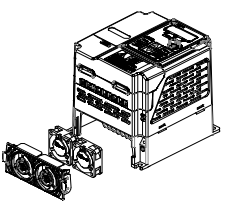
Replacement method of fan:

Step 1 Press the right and left sides which shows on the figure and pull upward.

Step 2 Remove the fan unit and replace the new one.



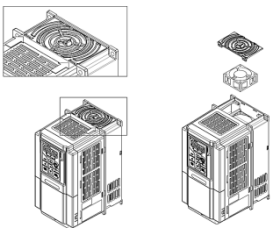




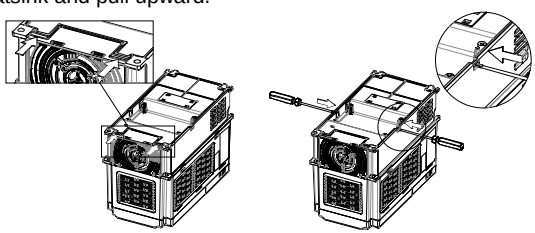
- 200V Series: RM6-2007
- 400V Series: RM6-4007~RM6-4010

Replacement method of fan:

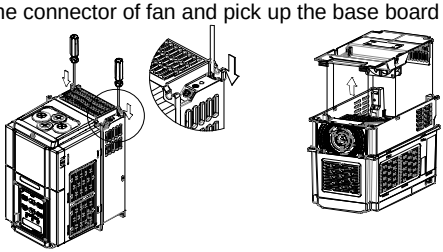
Step 1 Press the right and left sides which shows on the figure and pull upward.
Step 2 Remove the fan unit and replace the new one.



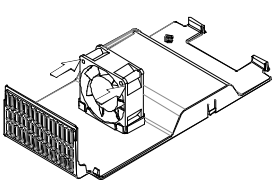
Step 3 Press the right and left sides shows in the figure and pull upward.
Step 4 Use the flathead screw driver to loosen the hooks on the right and left holes of the heatsink and pull upward.



Step 5 Use the flathead screw driver to loosen the hooks on the right and left holes which shows in the figure and pull upward.
Step 6 Remove the connector of fan and pick up the base board of the fan**.**



Step 7 Follow the direction of the arrow to remove the fan unit.

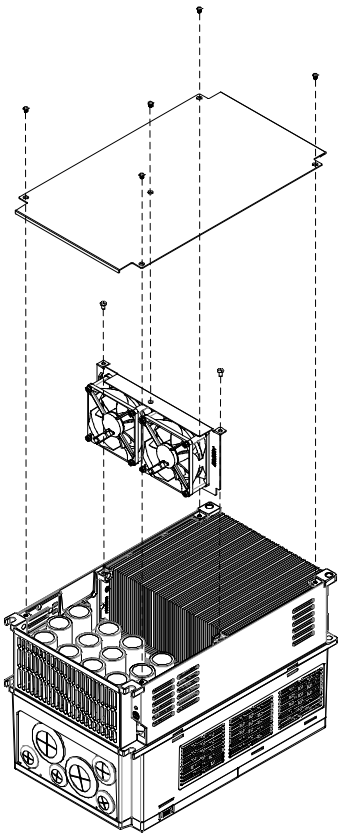


- 200V Series: RM6- 2010~RM6- 2040
- 400V Series: RM6- 4015~RM6- 4060

Replacement method of fan:

Step 1 Remove the screws fixed the back cover and remove the back cover.

Step 2 Remove the screws holding the fan units and remove the fan units and replace the new one.

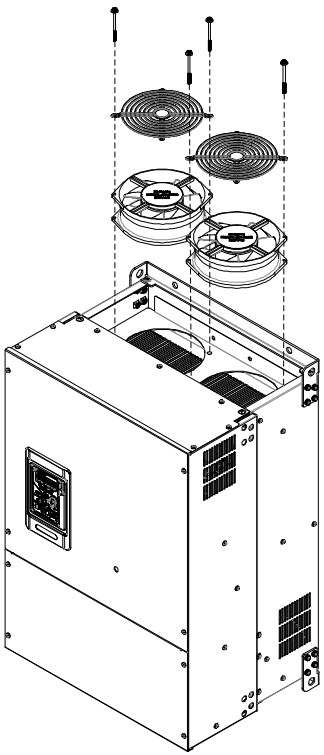


- 200V Series: RM6-2050~ RM6-2250
- 400V Series: RM6-4075~ RM6-4600

(1) Method 1：Replace directly from the top of the inverter

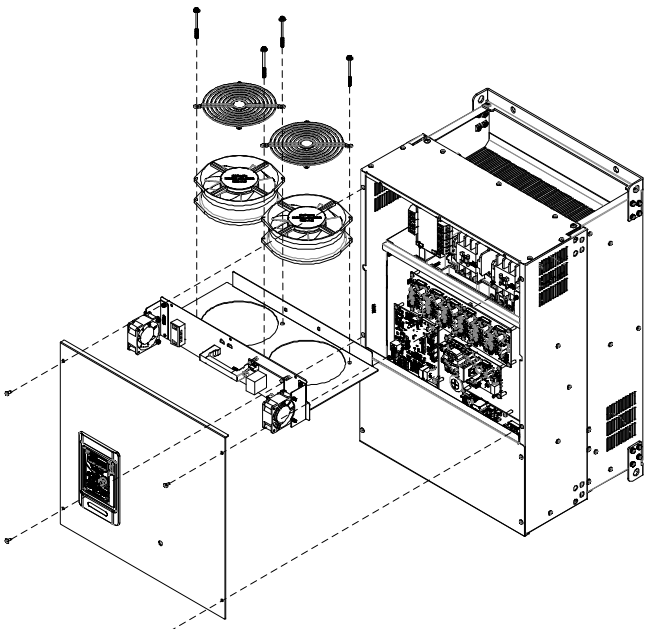
Step 1 Remove the screws holding the fan and the fan guard.

Step 2 Remove the connector of the fan and replace the new one.



(2) Method 2：Replace from the front of the inverter

Step 1 Remove the screws holding on the upper recover, then remove the connector of the keypad and remove the the upper cover.
Step 2 To pick up the fan unit, please remove the screws holding on the fan units and the connection line.
Step 3 Replace the new fan after picking up the fan unit.。



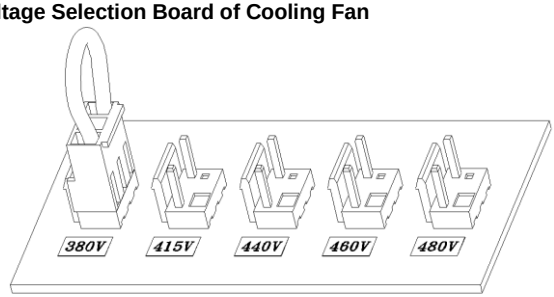
3-4 Descriptions of Main Circuit Terminal and Wiring Diagram

3-4-1 Description of Terminals

a.Main Circuit Terminals

Type	Symbol	Function	Description
Power Source	R,S,T (L1,L2,L3)	AC power source input terminals	Three-phase; sinusoidal power source input terminal.
	⊕, N⊖	DC power source input terminals	External DC power source terminal. ※Only 2007~2040, 4007~4060models have the terminal.
Motor	U,V,W (T1,T2,T3)	Drive outputs to motor terminals	Output three-phase variable frequency and voltage to motor.
Power and Braking	P(+), N(-)	Dynamic brake unit terminal	The terminals can connect to dynamic braking unit (option).
	P⊕, N⊖		
	P, N		
	P, PR	External braking resistor terminal	The terminals can connect to external braking resistor (option).
	P(+), PR		
	P⊕, PR		
	P(+), P1	External reactor terminal	The terminal can connect to DC reactor (DCL) for improving power factor. The default setting is connected by a jumper.
	P⊕, P1		
Grounding	PE(or G) ⏚	Grounding terminal	Ground the drive in compliance with the NEC standard or local electrical Code.

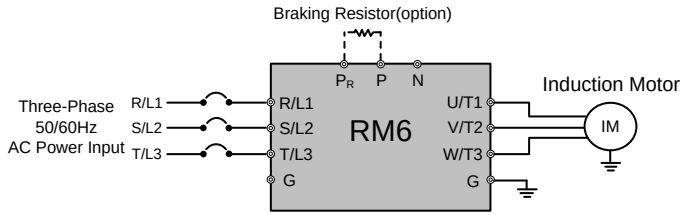
b. Voltage Selection Board of Cooling Fan

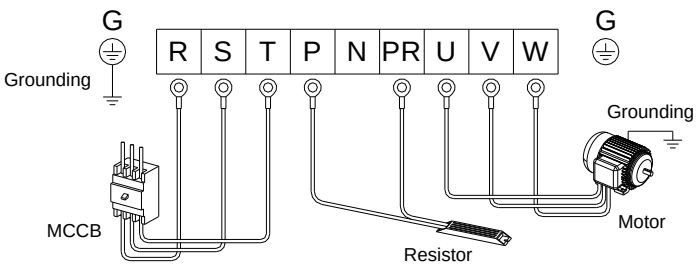


※The models above RM6-4075 have the voltage selection board shown in above figure when removing the back cover of the drive. Please carefully select the jumper position according to the power source (actual power voltage level) to avoid the burnout of the fan or the overheating of the drive.
(EX: When the power source is 460V, selecting the position from 380V to 460V)

c.Wiring of Main Circuit Terminal

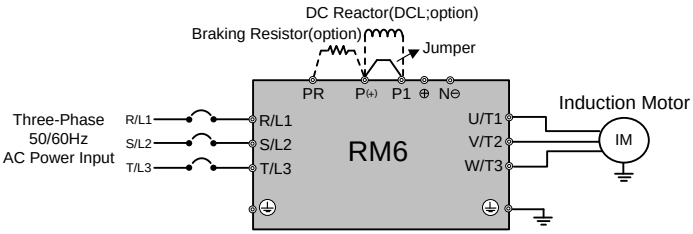
❶ Model:

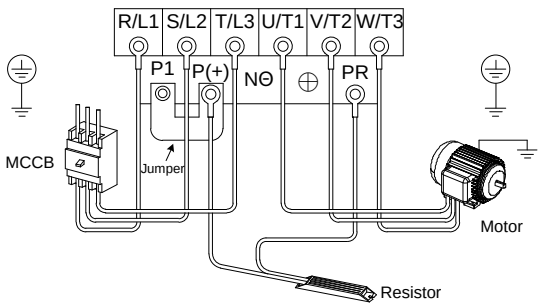




Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-_____: 20P5B3, 2001B3, 2002B3, 2003B3, 2005B3; 4001B3, 4002B3, 4003B3, 4005B3	M4	13.8 (15)	M4	13.8 (15)

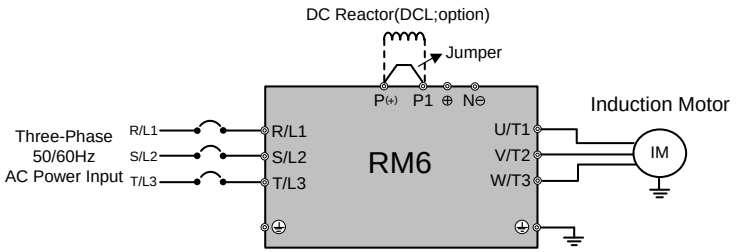
❷ Model：

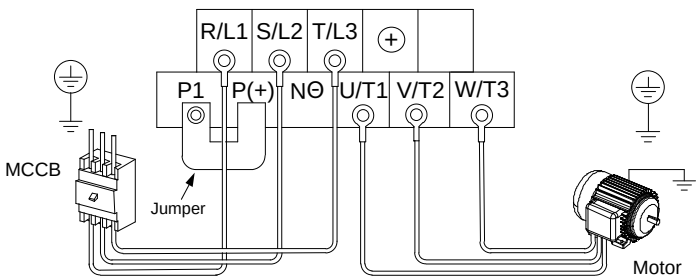




Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-: 2007B3; 4007B3, 4010B3	M4	15.6(18)	M4	13.8 (15)

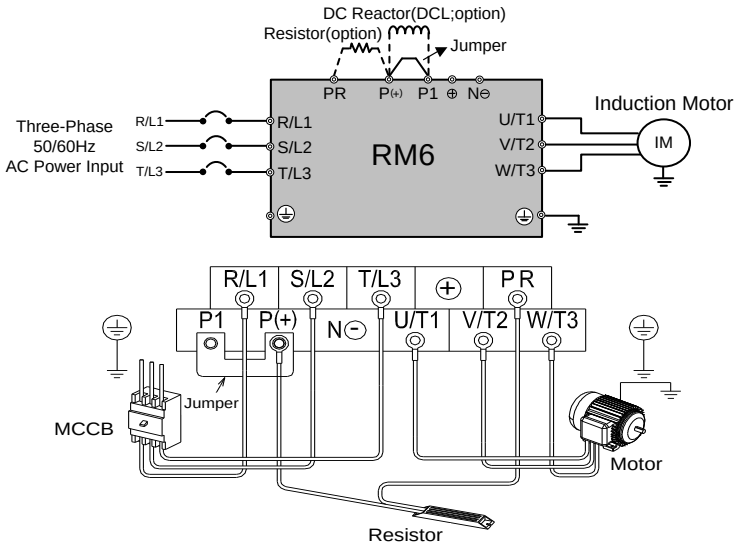
❸ Model:





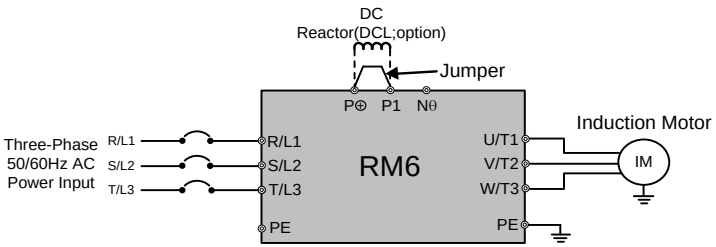
Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-: 2020E3, 2025E3, 2030E3, 2040E3 4030E3, 4040E3, 4050E3, 4060E3	M8	69.4(80)	M5	20.8(24)

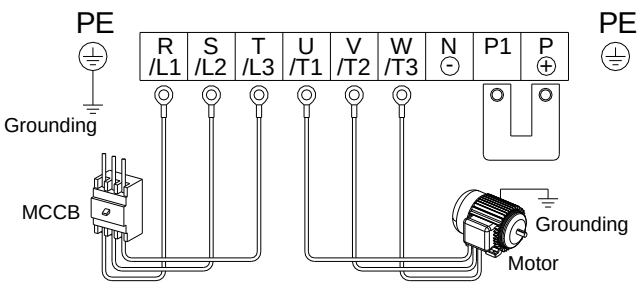
❹ Model：



Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-: 2010B3,2015B3; 4015B3, 4020B3, 4025B3	M5	20.8 (24)	M4	13.8 (15)
RM6-: 2020B3, 2025B3, 2030B3, 2040B3 4030B3, 4040B3, 4050B3, 4060B3	M8	69.4(80)	M5	20.8(24)

❺ Model：





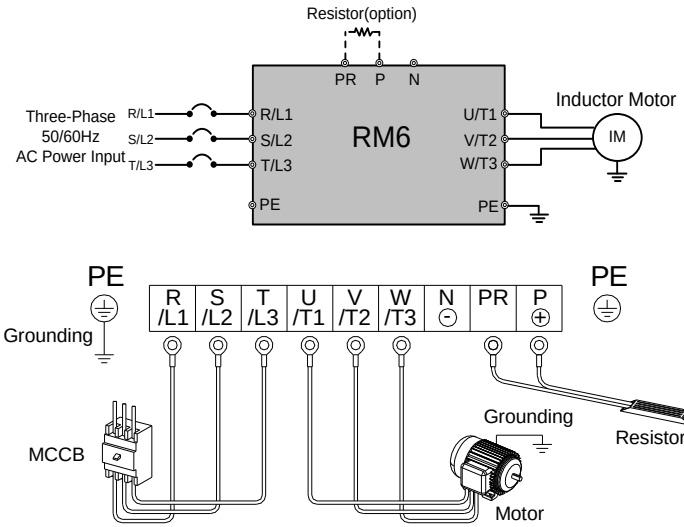
Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-: 2050E3, 2060E3, 2075E3; 4075E3, 4100E3, 4125E3	M8	104 (120)	M8	104 (120)

※For the models above RM6-4075, please notice “Voltage Selection Board of Cooling Fan” on page.22 .

※RM6:Models above 100HP : AC reactor (ACL) is the standard accessory;
Models above 175HP: DC reactor (DCL) is the standard accessory.

Please remove the jumper between P1 and P terminal, when connecting the external DC reactor (DCL). DO NOT remove the jumper, when DC reactor (DCL) does not be connected.

❻ Model：

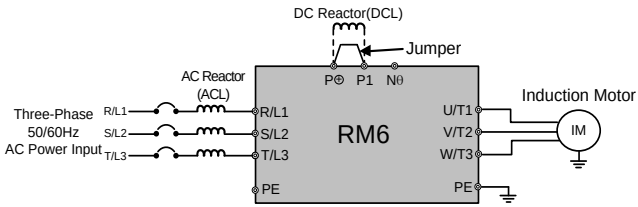


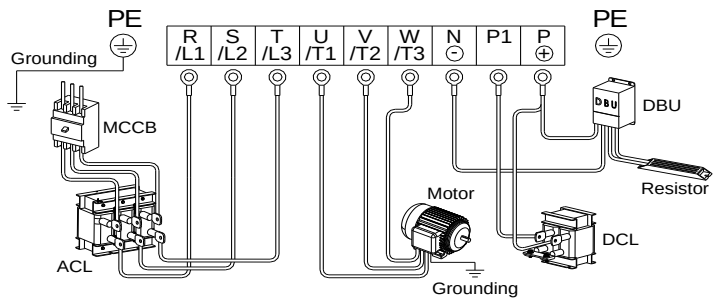
Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-: 2050B3, 2060B3, 2075B3; 4075B3, 4100B3, 4125B3	M8	104 (120)	M8	104 (120)

※For the models above RM6-4075, please notice " Voltage Selection Board of Cooling Fan" on page22 .

※RM6:Models above 100HP : AC reactor (ACL) is the standard accessory;

❼ Model:





Model number	Terminal screw size (except grounding terminal)	Tightening torque lb-in (kgf-cm)	Grounding terminal size	Tightening torque lb-in (kgf-cm)
RM6-: 2100E3, 2125E3, 2150E3, 2200E3, 2250E3; 4125E3, 4150E3, 4200E3, 4250E3, 4300E3, 4350E3,4420E3, 4500E3, 4600E3 4600E3	M12	347 (400)	M8	104 (120)

※Be cautious of the polarity of DBU when connecting to P⊕,N⊖ terminals of drive to avoid any possible damages to drive.

※For the models above RM6-4075, please notice “Voltage Selection Board of Cooling Fan” on page 22.

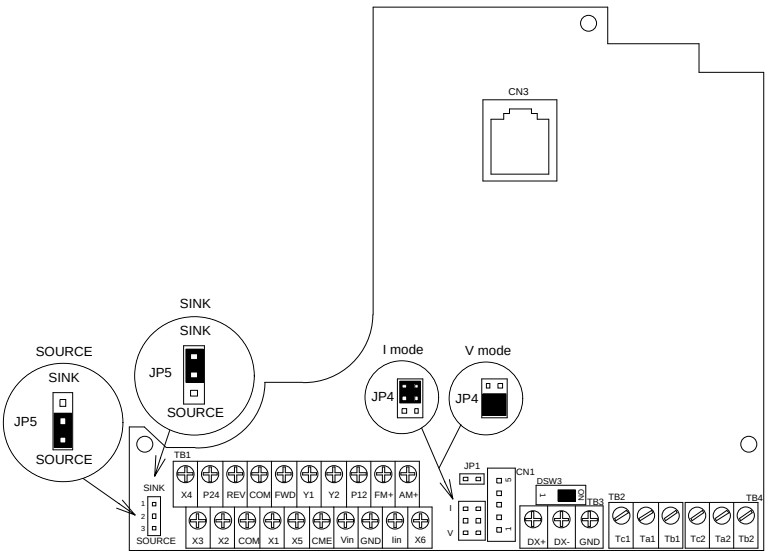
※RM6:Models above 100HP : AC reactor (ACL) is the standard accessory;
Models above 175HP: DC reactor (DCL) is the standard accessory.

Please remove the jumper between P1 and P terminal, when connecting the external DC reactor (DCL). DO NOT remove the jumper, when DC reactor (DCL) does not be connected.

3-4-2 Description of Jumper and DIP Switch

DO NOT change the jumper and the switch while the power is on.

(1) RM6-2001/2~RM6-2005
RM6-4001 ~ RM6-4005



CN1: External indicator (DM-501) socket

CN3: Digital keypad (KP-603) socket.

TB1: Input/Output terminals.Tightening torque: 5 lb-in (5.7 kgf-cm)

TB2,TB4: Multi-function output terminals (relay type). Tightening torque: 4.4 lb-in (5.1 kgf-cm)

TB3: Connection terminals for external communication interface. Tightening torque:3.5 lb-in (4 kgf-cm)

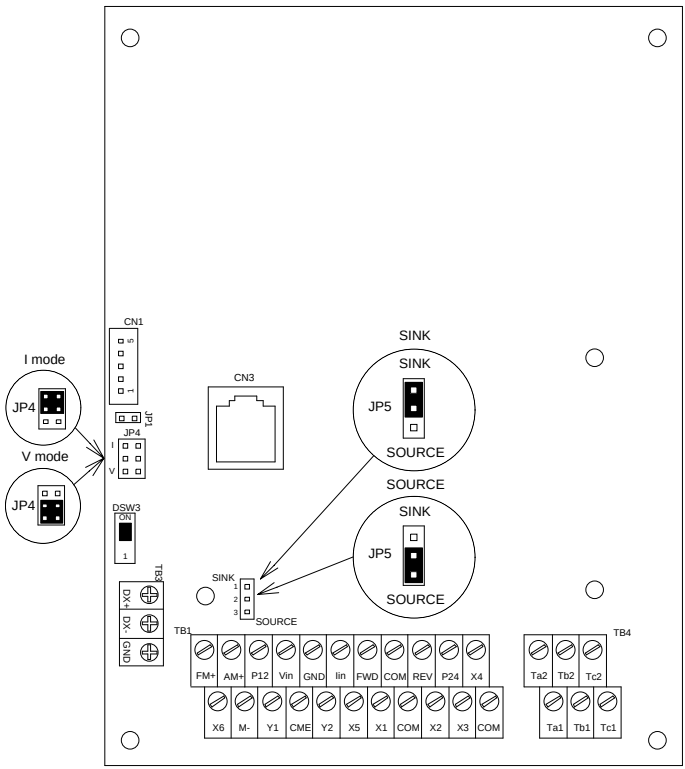
JP1: Input impedance selection of Iin (short circuit: 250Ω ; open circuit: 500Ω); Default: Short Circuit.

JP4: Input signal type selection of Iin (Voltage/Current). Default: Current

JP5: SINK/SOURCE mode selection of X1 to X6, FWD or REV (refer to page 35) Default: Sink

DSW3: Terminal resistor switch (ON: enable; 1: disable)

(2)RM6-2007 ~ RM6-2250
RM6-4007 ~ RM6-4600



CN1: External indicator (DM-501) socket.

CN2: Digital keypad (KP-603)socket.

TB1: Input/Output terminals. Tightening torque: 4.4 lb-in (5.1 kgf-cm)

TB3: Connection terminals for external communication interface. Tightening torque:3.5 lb-in (4 kgf-cm)

JP1: Input impedance selection of Iin (short circuit: 250Ω ; open circuit: 500Ω); Default: short circuit.

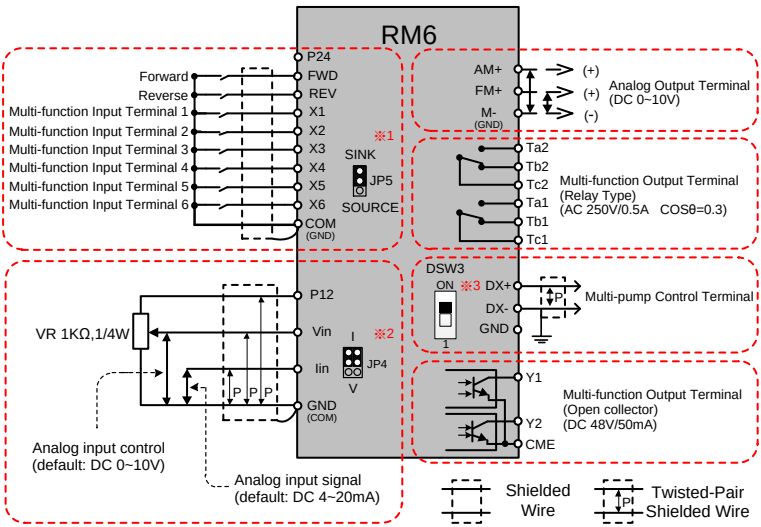
JP4: Input signal type selection of Iin (voltage/current). Default: current

JP5: SINK/SOURCE mode selection of X1 to X6, FWD or REV (refer to page 35). Default: SINK

DSW3: Terminal resistor switch (ON: enable; 1: disable).

3-5 Descriptions of Control Circuit Terminal and Wiring Diagram

3-5-1 Wiring Diagram



※1.JP5: SINK / SOURCE selection;

The signal input selection of multi-function input terminal, please see the section *3-5-3 SINK/SOURCE Definition*.

※2.JP4: I / V selection;

I position: Iin-GND terminal is inputted with the current signal.(default)

V position: Iin-GND terminal is inputted with the voltage signal.

※3.DSW3: The terminal resistor selection for multi-pump control: The internal resistance is 100Ω.

※4.The analog input selection is set by F_126 (default: DC 2~10V(4~20mA))

3-5-2 Control Terminals

Type		Symbol	Function	Description
Control circuit terminal	Control power	P24	Power terminal; Control device usage	Output DC+24V; Maximum supplied current is 50mA.
		P12/12V		Output DC+12V; Maximum supplied current is 20mA.
		GND (COM)	Common of analog input control terminal	Common terminal for control power (P12/12V,P24) and analog input terminal (Vin, Iin). Common terminal of COM and GND.
	Input terminals	FWD	Forward command terminal	Connect the FWD and COM terminals for forward operation. (F_001=0,1,2)
		REV	Reverse command terminal	Connect the REV and COM terminals for reverse operation. (F_001=0,1,2)
		X1	Multi-function input terminal 1	• Connect the X1 and COM terminals and set the function F_052. • Default setting: Multi-speed level 1 command
		X2	Multi-function input terminal 2	• Connect the X2 and COM terminals and set the function F_053. • Default setting: Multi-speed level 2 command
		X3	Multi-function input terminal 3	• Connect the X3 and COM terminals and set the function F_054. • Default setting: Jog command
		X4	Multi-function input terminal 4	• Connect the X4 and COM terminals and set the function F_055. • Default setting: Secondary Accel./Decel. time command
		X5	Multi-function input terminal 5	• Connect the X5 and COM terminals and set the function F_056 • Default setting: External fault command (thr)
		X6	Multi-function input terminal 6	• Connect the X6 and COM terminals and set the function F_057 • Default setting:Reset command
		COM (GND)	Common of digital input control terminals	Common of digital input control signal terminals. (FWD, REV and X1 ~ X6)
		Vin	Analog input terminal	Input range: DC 0~10V。
		Iin	Analog input terminal	• Input signal selection JP4: I position (current signal) JP4: V position (voltage signal) • Input range: DC 4~20mA (2~10V) or DC 0~20mA (0~10V) • The function is set by F_126.

Type		Symbol	Function	Description
Control circuit terminal	Output terminals	FM+ AM+	Analog output terminals	• Voltage meter with 10V full scale spec. (meter impedance: 10kΩ above) • Maximum output current: 1mA
		M- (GND)	Common of analog output terminals	Common of analog output terminals.
		Ta1	Multi-function output terminals (relay type)	• N.O (contact a); The function is set by F_060 (default setting: Error detection). • Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tb1		• N.C (contact b); The function is set by F_060 (default setting: Error detection). • Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tc1		Common terminal for Ta1,Tb1.
		Ta2		• N.O (contact a); The function is set by F_131 (default setting: Detection during operating). • Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tb2		• N.C (contact b); The function is set by F_131 (default setting: Error detection). • Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tc2		Common terminal for Ta2,Tb2.
		Y1	Multi-function output terminals (open collector type)	• The function is set by F_058, F_059. • Capacity: DC48V, 50mAMax
		Y2		
		CME		Common terminal of Y1, Y2.
		FM_P	Reserved	

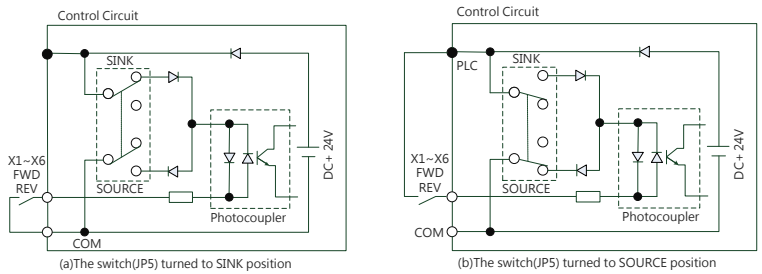
Control Terminals and Switch for External Communication

Type	Symbol	Function	Description
External Communication	DX+	Signal transmission terminal(+)	• Connect the RM6 series drive by transmission cable, when the drive is controlled by RS-485 communication interface. • Communication protocol: Modbus
	DX-	Signal transmission terminal(-)	
	GND	Grounding terminal of signal transmission	0V
Terminal resistor	DSW3	Terminal resistor switch	• When external device control multiple drives, switch the DSW3 to “ON” position at the first and last drive • Terminal resistance: 100Ω

Note: The total length of connecting cable can not exceed 500 meters.

3-5-3 SINK / SOURCE Definition

There are two ways of connection for multi-function input terminals:



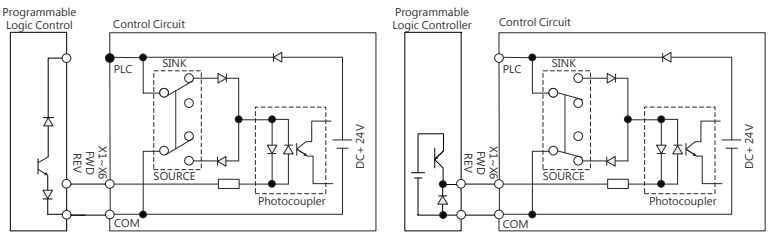
(a)The switch(JP5) turned to SINK position

(b)The switch(JP5) turned to SOURCE position

Figure(a) and (b) show two examples by using a switch to control X1 to X6, FWD, or REV terminals with sink or source mode.

3-5-4 Using a PLC Circuit

There are two ways of connection for multi-function input terminals by PLC circuit:



(a)The switch(JP5) turned to Sink position

(b)The switch(JP5) turned to Source position

Figure(a) and (b) show two examples by using PLC to control X1 to X6, FWD, or REV terminals with sink or source mode.

3-6 Wiring Cautions and Specifications

a. Wiring connection between drive and motor due to the variance of the rated power causes the variance of current leakage. The setting of the switching frequency, rated power, and cable length is listed in the below table.

Cable length / Rated power	10m	20m	30m	50m	100m	100m above
1/2~5HP	10KHz	7.5KHz	5KHz	2.5KHz	800Hz	800Hz
7.5~10HP	10KHz	7.5KHz	5KHz	2.5KHz	800Hz	800Hz
15~30HP	7.5KHz	5KHz	2.5KHz	2.5KHz	800Hz	800Hz
40~75HP	5KHz	5KHz	2.5KHz	2.5KHz	800Hz	800Hz
100~600HP	2.5KHz	2.5KHz	2.5KHz	800Hz	800Hz	800Hz

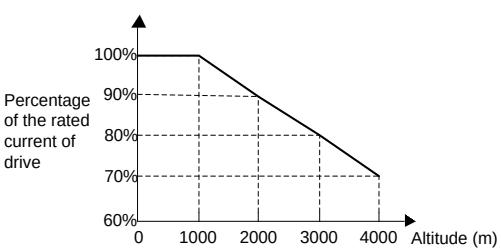
The setting of switching frequency is determined by F_081

F_081	=0	Switching frequency	800Hz	Note: 1. When the setting value of F_081 exceeds 4(10kHz) in RM6 series drive, recommending decrease the output current or selecting the higher rated output capacity. 2. DO NOT adjust the setting value of switching frequency (F_081) of 75HP above drives while the drive is running.
	=1		2.5KHz	
	=2		5KHz	
	=3		7.5KHz	
	=4		10KHz	
	=5		12.5KHz	
	=6		15KHz	

b. The wiring length between drive and motor must keep as short as possible. The parasitic capacitance effect is minor within 10 meters. The drive should connect an AC reactor (ACL) on the side of drive output terminals U/T1,V/T2,W/T3 and decrease the switching frequency if the wiring length is over 30m.

c. If the drive is used at the altitude over than 1000m, the relationship of drive's rated current and altitude is shown as below figure.

d. Recommend wire size and Molded Case Circuit Breaker(MCCB)



Three-Phase 200V Series

Model number RM6-_____	Input current (A)	MCCB (A)	Input wire size (R/L1,S/L2,T/L3) (mm^2)	Control circuit wire size (mm^2)	Grounding wire size (mm^2)
20 P5	5	5	2.0	0.75 ~ 1.25	2.0
2001	6	10	2.0		2.0
2002	10	15	2.0		2.0
2003	14	20	2.0		2.0
2005	18	30	3.5		3.5
2007	30	50	5.5		5.5
2010	40	80	8		8
2015	60	100	14		14
2020	69	110	22		22
2025	85	125	22		22
2030	103	150	38		38
2040	132	200	60		60
2050	176	300	80		80
2060	200	350	100		100
2075	240	400	60*2		60*2
2100	280	500	100*2		100*2
2125	330	500	150*2		150*2
2150	380	600	200*2		200*2
2200	550	800	200*2		200*2
2250	660	1000	250*2		250*2

Three-Phase 400V Series

Model number RM6-_____	Input current (A)	MCCB (A)	Input wire size (R/L1,S/L2,T/L3) (mm^2)	Control circuit wire size (mm^2)	Grounding wire size (mm^2)
4001	3.5	5	2.0		2.0
4002	5	10	2.0		2.0
4003	8	15	2.0		2.0
4005	12	20	3.5		3.5
4007	16	30	3.5		3.5
4010	22	30	5.5		5.5
4015	28	40	8.0		8.0
4020	38	60	8.0		8.0
4025	45	70	14		14
4030	52	90	22		22
4040	70	100	22		22
4050	84	125	22		22
4060	100	150	38	0.75 ~ 1.25	38
4075	130	200	60		60
4100	155	250	80		80
4125	177	300	100		100
4150	196	300	60*2		60*2
4175	217	350	100*2		100*2
4200	282	400	100*2		100*2
4250	355	600	150*2		150*2
4300	385	600	200*2		200*2
4350	440	700	250*2		250*2
4420	540	800	250*2		250*2
4500	650	1000	325*2		325*2
4600	800	1200	325*2		325*2

Note

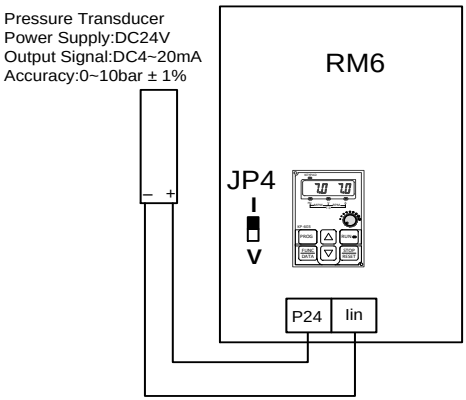
1. Please refer to the local electrical Code with respect to the wiring(the loading and continuity, the wire capability for the current and temperature, the length of wiring, and the surrounding temperature must be all considered in order to add or reduce the size of the wire).
2. Please use the cable that is suitable for 600V, 75℃ above.
3. This table is only for reference.

3-7 The Setting and Installing of Pessure Transducer

Example:

Take the constant pressure for example, the specification of the preesure transducer is 0~10bar and the PID control method selected to forward control (when the practical value is lower than the setting value, the drive will accelerated operated).

Wiring for Pressure Transducer



Parameter Setting

a. Restore the default value of PID control for 60Hz(F_210).

Name	**Func.**	Setting Value	**Description**
Analog Input Selection	F_220	dEFC4	PID control Default:60Hz

b.Set the function below according to the requirement.

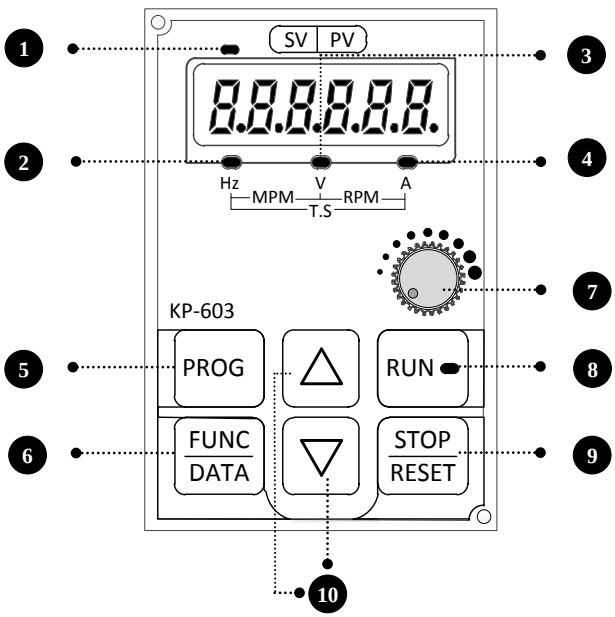
Name	**Func.**	Setting Value	**Description**
Analog Input Selection	F_125	4	Feedback signal cammand
Iin Selection	F_126	0	4~20mA
Maximum Value of Sensor	F_151	10	Corresponding value of pessure transducer 20mA
Minimum Value of Sensor	F_152	0	Corresponding value of pessure transducer 4 mA
PID Selection	F_153	1	Forward control,Postposition D
Check the jumper (JP4) is on the I position			

※Others feedback signal setting refer to definition on page 120

Chapter 4 Keypad Setting

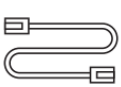
4-1 Descriptions of Keypad (KP-603)

- RM6 is able to use keypad KP-603 to operate start/stop,display the operating data,prarameter setting/changing/warning.KP-603 shows the significance of 7 segment displays and LED display to supply related information. KP-603 cables: applicable with 8-pin telephone cable (flat) or network cable (AMP)



Note:

1. 8-pin telephone cable: The cable length must be within 5 meters.
2. Network cable (AMP): The cable length can be over 5 meters (the longest length is 100 meters)
3. There are 4 specifications length of network cable (AMP) for KP-603 keypad (47cm,1.5M, 3M, 5M)

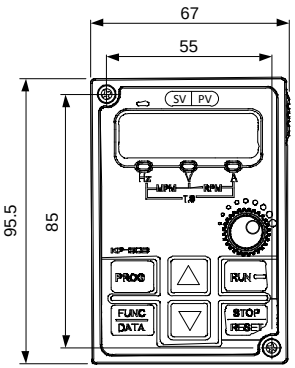
Option	Specs.
	47 CM
	1.5 M
	3 M
	5 M

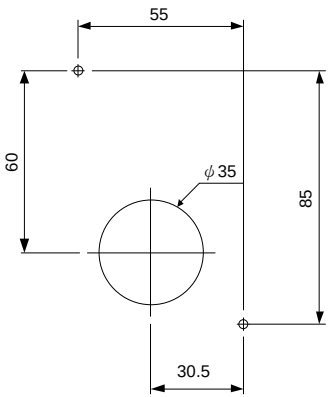
No	Symbol	Name	Discriptions
❶	KEYPAD	Power source signal	On: Power system is operating. Off:No power source input
❷	Hz	Frequency signal	Unit indicator light
❸	V	Voltage singal	Unit indicator light
❹	A	Current signal	Unit indicator light
❺	PROG	Program	・.Enter function setting mode ・.Back to monitor mode
❻	FUNC DATA	Function/data	・.Enter parameter setting mode ・Back to function setting mode ・Switch to monitor mode
❼		Keypad Pot Knob	Primary frequency command setting
❽	RUN	Drive start key and operation signal	・Drive start key ・Blinking: Acceleration and deceleration ・On:Constant speed ・Off: Stop operating
❾	STOP RESET	Stop/Reset	・.Drive stop output ・.Error occurs recover
❿		Up Down	Change the Setting Value and Parameter.

Note:Frequency shows negative data when reverse.

4-2 Instruction of Remote Controller (KP-603)and External Display

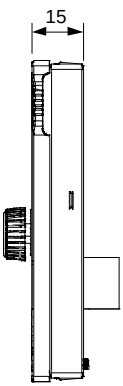
Dimension of front panel type	Panel Cutout Dimension

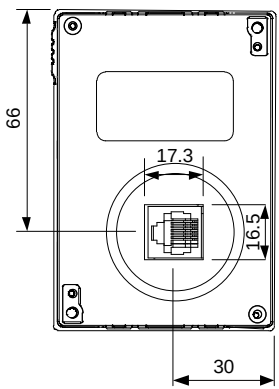




Unit: mm

Dimension of side panel type	Dimension of back panel type



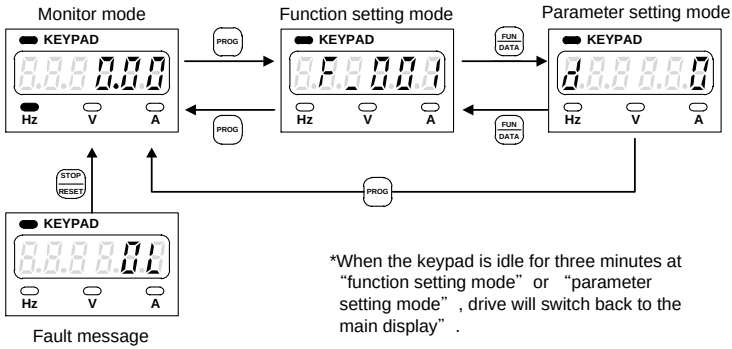


Unit: mm

4-3 The Operation of Keypad(KP-603) and Monitor Mode

4-3-1 Operation of Keypad

The operation of the digital keypad includes fault messages and three modes. The switching methods are shown as below figure:



*When the keypad is idle for three minutes at "function setting mode" or "parameter setting mode", drive will switch back to the main display".

The operation steps are shown as below table (by default value)

Operation Steps	Display
1.Start the drive and enter the monitor mode.	
2.Press PROG key and enter the function setting mode.	
3.Press FUN DATA key and enter the parameter setting mode.	
4.Press FUN DATA key and return to the function setting mode.	
5.Press PROG key and return to the monitor mode.	

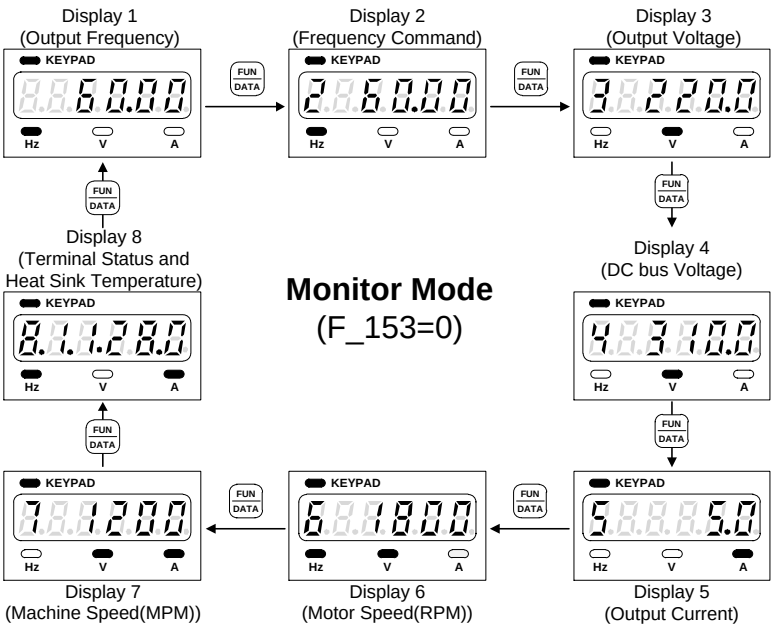
Error message display:

Operation Steps	Display
The fault message displayed during the drive operation	
After the error is troubleshooted, press STOP RESET key to clear the fault and return to the monitor mode.	

4-3-2 Description of Monitor Mode

(1) General Mode (60.00 or 50.00)

In (F_153=0) open-loop condition, it can be set any monitor mode 1~8 from F_006 (Selection of Main Display) at monitor mode, the drive will automatically switch back to the main display after 3 minute.

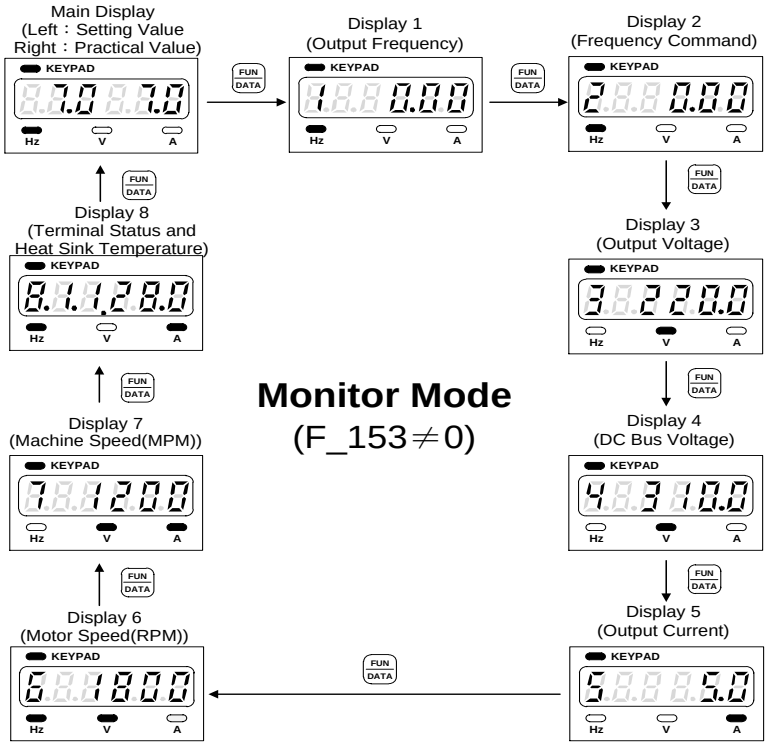


a.Select one of eight displays as the main display from function F_006 (Selection of Main Display).

b.Determine one of eight displays as the main display according to the application. When the parameter of function is completed without pressing PROG key, the drive will automatically switch back to the main display after 3 minute.

(2) PID Control Mode (dEF03 or dEF04)

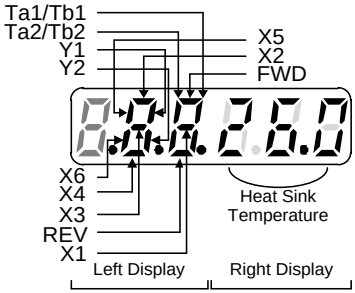
In (F_153≠0) close-loop condition, there are nine displays can be selected in the monitor mode. Press FUNC DATA key to switch the display in accordance with below sequence under monitor mode.



a.In (F_153≠0) close-loop condition, F_006(Selection of Main Display) is disable.

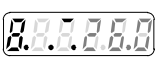
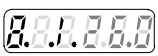
b.PID control is suitable for pressure control and temperature control.

The significance of seven-segment displays of Display 8 (Terminal status and heat sink temperature) is shown as below figure.



*grey-color digit in above figure means blinking

The significance of seven-segment display as below:

Display	Terminal	Description	Display	Terminal	Description
	FWD	FWD terminal is active		X5	X5 terminal is active
	REV	REV terminal is active		X6	X6 terminal is active
	X1	X1 terminal is active		Ta1,Tb1	Ta1,Tb1 terminals are active
	X2	X2 terminal is active		Ta2,Tb2	Ta2,Tb2 terminals are active
	X3	X3 terminal is active		Y1	Y1 terminal is active
	X4	X4 terminal is active		Y2	Y2 terminal is active

4-3-3 Description of Function Setting Mode

In function setting mode, there are 221 functions (F_000 ~ F_220) can be selected for RM6 series drive, and the setting steps are as below:

Operation Steps	Display
1.In the monitor mode, press PROG key to enter function setting mode.	
2.Press ▲ key to increase the function number.	
3.Press ▼ key to decrease the function number.	

4-3-4 Description of Parameter Setting Mode

In parameter setting mode, the setting range for every function is shown in Chapter 5 - Parameter List.

Operation Steps	Display
1.Select F_001 (Start Command Selection) as the example.	
2.Press FUNC DATA key to enter parameter setting mode.	
3. Press ▲▼ key to select the setting value.	
4.Press FUNC DATA key and return to function setting mode.	

4-3-5 Operation at Monitor Mode

In monitor mode(F_153=0), user can change the setting value of frequency command. (by dEF60)

Refer to operation steps, adjusted the frequency from 60Hz to 50Hz.

Operation Steps	Display
1.In monitor mode, setting frequency：60Hz。	
2. Press ▼ key or press ▼ key for a while,down to 50Hz。	
3. After completing the setting, press FUNC DATA key within 5 seconds (the setting value is under blinking status) or waiting the drive automatically save the setting value.	

In monitor mode(F_153≠0), user can change the value of setting pressure (SV). The operation steps are shown as below.
(by 0.0.E.C.3 or 0.0.E.C.4)

Operation Steps	Display
1.In monitor mode, the display of setting value(SV) and practical value(PV) as right figure.	
2. Press ▲▼ key to adjust the setting value of pressure.	
3.After completing the setting, press FUNC DATA key within 5 seconds (the setting value is under blinking status) the drive will automatically save the SV.	

4-3-6 Parameter Copy; Restore Default Value; Save/Restore Setting Value

a. Parameter Copy:

Including writing and readout functions. Parameter settings of two drives can be copied by "0.0.d.E.E" and "U.U.r.d.E.E" functions via keypad

a-1(Parameter Read Out: Drive parameter → Keypad)

Operation steps	Display
1.In the monitor mode, press PROG key to enter function setting mode.	
2.Press ▼ or ▲ key to select the function to F_220 (Default Setting) and then press FUNC DATA key to enter parameter setting mode.	
3.Press ▲ key and then select r.d.E.E parameter and then press FUNC DATA key to execute the parameter readout.	
4.Drive will start to copy the parameters to keypad, and then display the copy process on keypad.	
5.After completing the copy, the keypad will display 0.0.0.End message and automatically back to function setting mode.	

a-2 (Parameter Write In: Keypad parameter → Drive)

Operation steps	Display
1.In the monitor mode, press PROG key to enter function setting mode.	
2.Press ▼ or ▲ key to select the function to F_220 (Default Setting) and then press FUNC DATA key to enter parameter setting mode.	
3.Press ▲ key and then select UWr_EE parameter and then press FUNC DATA key to execute the writing.	
4.Keypad will start to copy the parameters to drive, and then display the copy process on keypad.	
5.After completing the copy, the keypad will display End message and automatically back to function setting mode.	

※DO NOT execute the copy for different software version, otherwise the parameters will occur error and the keypad will display UWr_F message.The software version please refer to the F_000 (Drive Information).

b. Restore Default Value:

RM6 series drive provide four default values for using. User can according to the demand to restore default values.

dEF60 (Restore the default value of general drive for 60 Hz)

dEF50 (Restore the default value of general drive for 50Hz)

dEFC3 (Restore the default value of PID control for 50Hz)

dEFC4 (Restore the default value of PID control for 60Hz)

※Be cautious of the usage of this parameter! This parameter will clear the saved setting value via SAv parameter.

Select the dEF50 parameter as an example, and the operation steps as below:

Operation Steps	Display
1.Press ▼ or ▲ key selecting the function to F_220 (Default Setting) and then press FUNC DATA key to enter parameter setting mode.	
2.Press ▲ key to select dEF50 parameter, and then press FUNC DATA key to execute the restoring.	
3.After completing the restoring, the keypad will display End message and back to the function setting mode.	

c . Save / Restore Setting Value:

(Save the setting value)

Operation Steps	Display
1.Press ▼ or ▲ key to select the function to F_220 (Default Setting) and then press FUNC DATA key to enter parameter setting mode.	
2.Press ▲ key to select SAv parameter, and then press FUNC DATA key to execute the saving.	
3.After completing the saving, the keypad will display End message and back to the function setting mode.	

(Restore the setting value)

Operation Steps	Display
1.Press ▼ or ▲ key to select the function to F_220 (Default Setting) and then press FUNC DATA key to enter parameter setting mode.	
2.Press ▲ key to select rES parameter, and then press FUNC DATA key to execute the restoring.	
3.After completing the restoring, the keypad will display End message and back to function setting mode.	

Note: “Restore” parameter is activation when the setting value is saved by “Save” parameter.

4-3-7 The Setting of Heavy Duty/Normal Duty

Default setting is heavy duty(HD),based on the load characteristic switch to the normal duty(ND).There are two ways of switching, and the operation steps as below:

a. Switch load mode based on the load characteristic in F_220.
Directly choose the function of F_220 (Default Setting) to select demand opinion and complete chaging to another motor load mode .

HdEF60 (Restore the default value of heavy duty for 60 Hz)

HdEF50 (Restore the default value of heavy duty for 50Hz)

NdEF60 (Restore the default value of normal duty for 60Hz)

NdEF50 (Restore the default value of normal duty for 50Hz)

Ex: Restore the default value of normal duty for 50Hz(Default Setting),the setting steps as below:

Operation Steps	Display
Press ▼ or ▲ key to select the function to F_220(Default Setting) and then press key to enter parameter setting mode.	
Press ▲ key and then select NdEF50 parameter and then press FUNC DATA key to restore the default value of normal duty.	
After completing , the keypad will display End message and automatically back to function setting mode.	

b.Manually adjust the function of F_211、F_048、F_070、F_071.
Based on the format as below to adjust the function of F_211、F_048、F_070、F_071 and complete the setting of heavy duty/normal duty.

Function	Name	HD setting value	ND setting value
F_048	Motor Rated Current	Based on motor rated current	Based on motor rated current
F_070	Stall Prevention Level at Acceleration	170	140
F_071	Stall Prevention Level at Constant Speed	160	130
F_211	HD/ND setting	0	1

Note: HD=Heavy Duty ND =Normal Duty

Note:Choose type 2 of switching way if some other parameters are set up already to avoid setting value from restoring to the default value.
After switching the motor load mode ,please restart the power and make sure Startup Display meets requirement.
Select RM6-2010 as example:

	Heavy Duty (HD)	Normal Duty(ND)
Startup Display		

Chapter 5 Parameter List

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_000	Drive Information	0: Software version 1: Drive model number 2: Drive running hours 3: Drive power supplying time 4: Software checksum Code 5: Reserved	—	—	—	70
F_001	Start Command Selection	<table><tr><th></th><th>Start command</th><th>Rotation direction command</th></tr><tr><td>0</td><td>FWD or REV terminal</td><td>FWD or REV terminal</td></tr><tr><td>1</td><td>FWD terminal</td><td>REV terminal</td></tr><tr><td>2</td><td rowspan="3">Keypad “RUN” key</td><td>FWD or REV terminal</td></tr><tr><td>3</td><td>Forward direction</td></tr><tr><td>4</td><td>Reverse direction</td></tr><tr><td>5~7</td><td>Reserved</td><td>Reserved</td></tr><tr><td>8</td><td>Communication interface</td><td>Communication interface</td></tr><tr><td>9</td><td>Communication interface</td><td>REV terminal</td></tr><tr><td>10</td><td>FWD terminal</td><td>Communication interface</td></tr><tr><td>11</td><td>Keypad “RUN” key</td><td>Communication interface</td></tr></table>	0~11	—	3	70
F_002	Primary Frequency Command Selection	0: Frequency command by analog signal via terminal. 1: Frequency command by keypad. 2: Motor speed (RPM) command by keypad. 3: Machine speed (MPM) command by keypad. 4: Frequency command by UP/DOWN terminal. 5: Frequency command by communication interface. 6: Frequency command is controlled by keypad knob(Vin, Iin are invalid)	0~6	—	1	74
F_003	Selection of “STOP” Key Validity	0: Start command by terminal, “OFF” key disabled. 1: Start command by terminal, “OFF” key enabled.	0,1	—	1	75
F_004	Frequency Command Selection	0: In the monitor mode, frequency command cannot be changed. 1: In the monitor mode, frequency command is changeable.	0,1	—	1	75
F_005	Selection of Frequency Command Auto-Storing	0: In the monitor mode, frequency command auto-storing disable. 1: In the monitor mode, frequency command auto-storing after 3 minutes.	0,1	—	1	75
F_006	Selection of Main Display	F_153=0 KP Setting of main display	1~8	—	1	76

means function can be set during the operation.

Func.	Name	Description				Range of Setting	Unit	Def60	Page
F_007	Machine Speed Ratio	Set the ratio of machine speed. This function determines MPM display value.				0.00~ 500.00	0.01	20.00	76
F_008	Digits of Decimal Value (Machine Speed)	Select the digits of decimal values displaying the machine speed.				0~3	—	0	76
F_009	Primary Speed	Multi-speed level 4 command	Multi-speed level 3 command	Multi-speed level 2 command	Multi-speed level 1 command	0.00~ 400.00	0.01 Hz	50.00 (Note1) 60.00 (Note2)	77
		OFF	OFF	OFF	OFF				
F_010	Preset Speed 1	OFF	OFF	OFF	ON			10.00	77
F_011	Preset Speed 2	OFF	OFF	ON	OFF			20.00	77
F_012	Preset Speed 3	OFF	OFF	ON	ON			30.00	77
F_013	Preset Speed 4	OFF	ON	OFF	OFF			0.00	77
F_014	Preset Speed 5	OFF	ON	OFF	ON			0.00	77
F_015	Preset Speed 6	OFF	ON	ON	OFF			0.00	77
F_016	Preset Speed 7	OFF	ON	ON	ON			0.00	77
F_196	Preset Speed 8	ON	OFF	OFF	OFF			0.00	77
F_197	Preset Speed 9	ON	OFF	OFF	ON			0.00	77
F_198	Preset Speed 10	ON	OFF	ON	OFF			0.00	77
F_199	Preset Speed 11	ON	OFF	ON	ON			0.00	77
F_200	Preset Speed 12	ON	ON	OFF	OFF			0.00	77
F_201	Preset Speed 13	ON	ON	OFF	ON			0.00	77
F_202	Preset Speed 14	ON	ON	ON	OFF			0.00	77
F_203	Preset Speed 15	ON	ON	ON	ON			0.00	77
F_017	Jog Speed	Frequency setting by manual						6.00	77
F_018	Reference Frequency of **Accel./Decel.** Time	The frequency corresponding to **Accel./Decel.** time.				0.01~ 400.00	0.01 Hz	50.00 (Note1) 60.00 (Note2)	79

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_019	Primary Acceleration Time	The acceleration time of primary speed, preset speed 4~16, and jog speed.	0.0~ 3200.0	0.1 sec	15.0 (Note5)	79
F_020	Primary Deceleration Time	The deceleration time of primary speed, preset speed 4~16, and jog speed.				79
F_021	Acceleration Time of Preset Speed 1	Acceleration time of preset speed 1.				79
F_022	Deceleration Time of Preset Speed 1	Deceleration time of preset speed 1.				79
F_023	Acceleration Time of Preset Speed 2	Acceleration time of preset speed 2.				79
F_024	Deceleration Time of Preset Speed 2	Deceleration time of preset speed 2.				79
F_025	Acceleration Time of Preset Speed 3	Acceleration time of preset speed 3.				79
F_026	Deceleration Time of Preset Speed 3	Deceleration time of preset speed 3.				79
F_027	Secondary Acceleration Time	Switch to secondary acceleration time by multi-function input terminal.				79
F_028	Secondary Deceleration Time	Switch to secondary deceleration time by multi-function input terminal.				79
F_029	Set S-curve for **Accel./Decel.** Time	Set S-curve to slow the acceleration and deceleration time at start and stop.	0.0~5.0	0.1 sec	0.0	79
F_030	Limitation of Output Voltage	0: Output voltage of V/F pattern is not limited, and decrease the swithching frequency automatically. 1: Output voltage of V/F pattern is limited, and decrease the swithching frequency automatically. 2: Output voltage of V/F pattern is not limited. 3: Output voltage of V/F pattern is limited .	0~3	—	0	81
F_031	Maximum Output Frequency	Maximum output frequency of drive.	0.1~400.0	0.1Hz	50.0 (Note1) 60.0 (Note2)	81

means function can be set during the operation

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_032	Starting Frequency	Starting frequency of drive's output.	0.1~10.0	0.1Hz	0.5	81
F_033	Starting Voltage	The voltage corresponds to the output starting frequency.	0.1~50.0	0.1V	8.0 (Note3) 12.0 (Note4)	81
F_034	Base Frequency	The frequency corresponds to the base voltage in V/F pattern.	0.1~400.0	0.1Hz	50.0 (Note1) 60.0 (Note2)	81
F_035	Base Voltage	The voltage corresponds to the base frequency in V/F pattern.	0.1~255.0 0.1~510.0	0.1V	220.0 (Note3) 380.0 (Note4)	81
F_036	V/F Frequency 1	Frequency at the first point of V/F pattern.	0.0~399.9	0.1Hz	0.0	81
F_037	V/F Voltage 1	Voltage at the first point of V/F pattern.	0.0~255.0 0.0~510.0	0.1V	0.0	81
F_038	V/F Frequency 2	Frequency at the second point of V/F pattern.	0.0~399.9	0.1Hz	0.0	81
F_039	V/F Voltage 2	Voltage at the second point of V/F pattern.	0.0~255.0 0.0~510.0	0.1V	0.0	81
F_040	Vin Gain	Analog input "Vin" gain ratio adjustment.	0.00~2.00	0.01	1.00	83
F_041	Vin Bias	Analog input "Vin" bias ratio adjustment.	-1.00~ 1.00	0.01	0.00	84
F_042	Frequency Upper Limit	The upper limit of output frequency= F_031(Maximum Output Frequency)*F_042	0.00~1.00	0.01	1.00	84
F_043	Frequency Lower Limit	The lower limit of output frequency= F_031(Maximum Output Frequency)*F_043	0.00~1.00	0.01	0.00	84
F_044	Analog Output Signal Selection (FM+) (DC 0~10V)	0: Output frequency 1:Frequencycommand 3: "Vin"analog input signal 4: "Iin" analog input signal. 5: DC bus voltage. 6:Output voltage. 7:Temperature of drive.	0~4	—	0	90
F_045	Analog Output Gain (FM+)	Analog output gain ratio adjustment.	0.00~2.00	0.01	1.00	90
F_046	Motor Overload Protection (OL)	0: Disable 1: Overload protection for dependent cooling fan type motor: Enabled (OL) 2: Overload protection for independent cooling fan type motor: Enabled (OL)	0~2	—	1	91
F_047	Filter Setting of Analog Input Signal	Filter the analog input signal when the frequency command is controlled by analog input terminal. (F_002=0).	0~255	—	20	88
F_048	Motor Rated Current	Set the value according to the motor rated current.	10%~150% of drive rated current	0.1A	Based on the rated current of motor	91

means function can be set during the operation.

Func.	Name	Description		Range of Setting	Unit	Def60	Page
F_049	Motor No-Load Current	Current setting according to the motor's no-load condition.		0~motor rated current	0.1A	1/3 motor rated current	91
F_050	Motor Slip Compensation	According to the load condition, set the motor slip compensation for motor running at constant speed. (0.0: off)		-9.9~10.0	0.1Hz	0.0	91
F_051	Number of Motor Poles	Determinate the RPM display value of monitor mode.		2~10	P	4P	91
F_052	Multi-function Input Terminal (X1)	=0: UP/DOWN frequency command enter key	±1:Jog command ±2:Secondary **Accel./Decel.**time command ±3:Multi-speed level 1 command ±4:Multi-speed level 2 command ±5:Multi-speed level 3 command ±6:Reset command ±7:External fault command (thr) ±8:Interruption of output command (bb) ±9:Coast to stop command (Fr) ±10:Speed tracing from the maximum frequency ±11:Speed tracing from the setting frequency ±12:Holding command ±13:UP command ±14:DOWN command ±15:Clear UP/DOWN frequency command ±16:Analog input source selection ±17:Stop command with 3-wire start/stop circuit ±18:Under close-loop control condition (F_153≠0), open-loop selection. ±19:Reset the integrator at close-loop control condition (F_153≠0) ±20: Stop command ±21: Multi-speed level 4 command	-21 ~ +21 (Note 8)	—	3	92
F_053	Multi-function Input Terminal (X2)	=0: DC braking enable (at stop)				4	
F_054	Multi-function Input Terminal (X3)	=0: Current limit enable				1	
F_055	Multi-function Input Terminal (X4)	=0: Selection of primary or secondary frequency command				2	
F_056	Multi-function Input Terminal (X5)	=0 Three-wire self-hold circuit Normal Open:N.O (contact a)				7	
F_057	Multi-function Input Terminal (X6)	=0 STOP command Normal Close:N.C (contact b)				6	

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_058	Multi-function Output Terminal (Y1)	0: Disable ±1: detection during operation ±2: Constant speed detection ±3: Zero speed detection ±4: Frequency detection ±5: Overload detection (OLO) ±6: Stall prevention detection ±7: Low voltage detection (LE) ±8: Braking detection ±9: Restart after instantaneous power failure detection ±10: Restart after error condition detection ±11: Error detection ±12: Overheating detection ±13: Upper limit of feedback detection ±14: On-Off dead band detection ±15: On-Off range detection ±16: Fan detection during operation	-16 ~ +16 (Note 8)	—	1	100
F_059	Multi-function Output Terminal (Y2)				2	
F_060	Multi-function Output Terminal (Ta1,Tb1)				11	
F_061	Constant Speed Detection Range	Set the bandwidth of constant speed detection range.	0.0~10.0	0.1Hz	2.0	101
F_062	Frequency Detection Range	Set the bandwidth of frequency detection range.	0.0~10.0	0.1Hz	2.0	101
F_063	Frequency Detection Level	Set the frequency detection level of multi-function output terminal.	0.0~400.0	0.1Hz	0.0	101
F_064	Automatic Torque Compensa-tion Range	According to the load condition, adjust the output voltage of the V/F pattern. (0.0: off)	0.0~25.5	0.1	1.0	105
F_065	System Overload Detection (OLO)	0: Disable 1: Enable	0,1	—	0	105
F_066	System Overload Detecting Selection	0: Detection during constant speed only 1: Detection during operation only	0,1	—	0	105
F_067	Output Setting after System Overload	0: Drive keeps operation when the overload is detected 1: Drive trips to protection when the overload is detected	0,1	—	0	105
F_068	System Overload Detection Level	When the output current of drive is larger than the level with the duration of F_069, the drive will trip to protection.	30%~200% of drive rated current	1%	160	105
F_069	System Overload Detection Time	When the output current of drive is larger than the level (F_068 * drive's rated current) with the duration, the drive will trip to protection.	0.1~25	0.1 sec	2.0	105

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_070	Stall Prevention Level at Acceleration	If stall is occurred during acceleration, the motor keeps running at constant speed. (200%: off)	30%~200% of drive rated current	1%	170	106
F_071	Stall Prevention Level at Constant Speed	While the stall is occurred during constant speed running condition, the prevention of stall is to decrease the speed of motor. (200%: off)	30%~200% of drive rated current	1%	160	106
F_072	Acceleration Time Setting after Stall Prevention under Constant Speed	Set the acceleration time after stall prevention under the constant speed.	0.1~ 3200.0	0.1 sec	15.0 (Note5)	106
F_073	Deceleration Time Setting for Stall Prevention under Constant Speed	Set the deceleration time at the stall prevention under the constant speed.	0.1~ 3200.0	0.1 sec	15.0 (Note5)	106
F_074	Stall Prevention Setting at Deceleration	0: Disable 1: Enable	0,1	—	1	106
F_075	DC Braking Level	Set the current level of DC braking.	0~150% of drive rated current	1%	50	107
F_076	Time of DC Braking after Stop	Set the time for DC braking after drive stopped.	0.0~20.0	0.1 sec	0.5	107
F_077	Time of DC Braking before Start	Set the time for DC braking before drive started.	0.0~20.0	0.1 sec	0.0	107
F_078	Operation Selection at Instantane-ous Power Failure	0: Drive cannot be restarted 1: Drive can be restarted from operating frequency. 2: Ramp to stop 3: Drive will re-accelerate again during ramp to stop interval, when the power is restored. 4. Drive will restart again from 0 Hz during ramp to stop interval, when the power is restored	0~4	—	0	108
F_079	Voltage Level of Ramp to Stop by Power Failure	Set the voltage of power source for ramp to stop.	150.0~ 192.0 300.0~ 384.0	0.1V	175.0 (Note3) 320.0 (Note4)	108

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_080	Auto-restart Times Setting of Error Trip	When the auto-restart times of error conditions (OC,OE,GF only) reach the setting value, the drive must be restarted manually. 0: Disable	0~16	1	0	111
F_081	Switching Frequency	The setting value is higher and the motor noise is lower.	0~6	—	1 (Note8)	111
F_082	Stop Mode	0: Ramp to stop 1: Coast to stop 2: Coast to stop + DC braking	0~2	—	0	112
F_083	Reverse Prohibition	0: Reverse rotation allowed. 1: Reverse rotation NOT allowed.	0,1	—	0	112
F_084	Jump Frequency 1	Avoid mechanical resonance point 1.	0.0~400.0	0.1Hz	0.0	109
F_085	Jump Frequency 2	Avoid mechanical resonance point 2.	0.0~400.0	0.1Hz	0.0	109
F_086	Jump Frequency 3	Avoid mechanical resonance point 3.	0.0~400.0	0.1Hz	0.0	109
F_087	Jump Frequency Range	Set the range of the jump frequency 1, 2, 3.	0.0~25.5	0.1Hz	0.0	109
F_088	The Current Level of Speed Tracing	When the current is higher than the “speed tracing current level”, the output frequency will trace downward.	0~200% of drive rated current	1%	150	109
F_089	Delay Time before Speed Tracing	Set the output delay time before the speed tracing.	0.1~5.0	0.1 sec	0.5	109
F_090	The V/F Pattern of Speed Tracing	Set the percentage of V/F output voltage at the speed tracing.	0~100%	1%	100	109
F_091	Error Record	Display the latest 5 error records.	—	—	—	113
F_092	Parameter Setting Lock	0: Parameters are changeable. Maximum frequency cannot exceed 120.0Hz. 1: Parameters are locked. Maximum frequency cannot exceed 120.0Hz. 2: Parameters are changeable. Maximum frequency can exceed 120.0Hz. 3: Parameters are locked. Maximum frequency can exceed 120.0Hz.	0~3	—	0	113
F_093	Automatic Voltage Regulation (AVR)	0: Disable 1: Enable	0,1	—	1	113
F_094	Drive Overload (OL1)	0: Disable 1: Electric thermal protection 2: Current limit overload protection 3: Electric thermal and Current limit overload protection are enabled.	0~3	—	3	111

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_095	Power Source	The value of setting according to the actual power source.	190.0~240.0 340.0~480.0	0.1V	220.0 (Note3) 380.0 (Note4)	111
F_096	Holding Frequency	The drive accelerates to the holding frequency and running at constant speed.	0.0~400.0	0.1Hz	0.5	110
F_097	Holding Time Interval	The drive runs at holding frequency by constant speed and running the time interval.	0.0~25.5	0.1 sec	0.0	110
F_098	Grounding Fault Protection (GF)	0: Disable 1: Enable (GF)	0,1	—	1	113
F_099	External Indicator 1	Select the monitor mode of external indicator 1 0: Disable	0~10	—	1 (Note7)	110
F_100	External Indicator 2	Select the monitor mode of external indicator 2 0: Disable	0~10	—	5 (Note7)	110
F_101	External Indicator 3	Select the monitor mode of external indicator 3 0: Disable	0~10	—	2 (Note7)	110
F_102	V/F Pattern Selection	0: Linear. 1: Energy-saving mode (auto-adjust V/F pattern according to the load condition). 2: Square curve. 3: 1.7th power curve. 4: 1.5th power curve.	0~4	—	0	113
F_103	Subtracted Frequency of Deceleration at Power Failure	When the power failure, drive will reduce the frequency level before ramp to stop. (F_078 Operation Selection at Instantaneous Power Failure)=2 or 3	0.0~20.0	0.1Hz	3.0	108
F_104	Deceleration Time 1 of Ramp to Stop by Power Failure	Set a deceleration time down to the turning frequency set in F_106.	0.0~3200.0	0.1 sec	15.0 (Note5)	108
F_105	Deceleration Time 2 of Ramp to Stop by Power Failure	Set a deceleration slope below the frequency set in F_106	0.0~3200.0	0.1 sec	15.0 (Note5)	108
F_106	Switching the Frequency of Ramp to Stop	Set the F_106 when the deceleration time is switched from F_104 setting value to F_105 setting value.	0.0~400.0	0.1Hz	0.0	108
F_107	Analog Frequency Dead Band	When the noise of analog input signal is large, appropriately increase the dead band to stabilize the frequency command. But adjusting this function will reduce the tuning linearity of input signal.	0.00~2.55	0.01 Hz	0.00	88

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_108	Digital Input Response Time	When the pulse width of digital signal is lower than setting time, the signal disabled.	5~16	1ms	10	100
F_109	Communication Interface Selection	0: RJ-45 1: DX+ / DX-	0,1	—	1	115
F_110	Communication Address	The followers use the address to send and receive messages from the host (0: disable)	0~254	—	0	115
F_111	Communication Baud Rate	0: 4800bps 1: 9600bps 2: 19200bps 3: 38400bps	0~3	—	1	115
F_112	Communication Protocol	0: 8,N,2 1: 8,E,1 2: 8,O,1 3: 8,N,1	0~3	—	1	115
F_113	Communication Overtime (Cot)	When the message transmission during communication transmission is interrupted, has no data transmitting, or delays, drive displays “Cot” message. (0.0: Communication overtime disable)	0.0~ 100.0	0.1 sec	0.0	115
F_114	Communication Overtime Disposal	0: Warning (Cot)；Continue operation 1: Warning (Cot)；Ramp to stop 2: Warning (Cot)；Coast to stop	0~2	—	0	115
F_115	Control Selection of Multi-Function Input Terminals	0: Multi-function input terminals (X1~X6) selves 1: Multi-function input terminals (X1~X6) command by communication interface	0,1	—	0	115
F_116	Fault Reset Selection	0: Auto-restart after error trip(OC,OE,GF only) 1: Auto reset 2: Auto reset without executing error detection (If the drive is operating over 24hrs without any error trip, the drive will automatically reset the counting number)	0~2	—	0	111
F_117	Error Tripping Time Interval before Auto-Restart	Set the error tripping time interval before drive auto restarts for F_116 when the drive trips to stop.	1~200	10sec	6	111
F_118	UP/DOWN Memory Selection	0: Clear the UP/DOWN frequency command when power failure. 1: Save the UP/DOWN frequency command at F_121 when power failure.	0, 1	—	0	98
F_119	UP/DOWN Frequency Resolution	0：0.01Hz 1～8 ：× 0.05Hz 9：0.5Hz 10～250：× 0.1Hz	0~250	—	0	98
F_120	UP/DOWN Trigger Mode	1~5: Cntinuous Accel./Decel. when the terminal is activated with the duration (1 ~ 5 sec). 6: Edge trigger.	1~6	—	1	98

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_121	UP/DOWN Frequency Adjustment	Adjust UP/DOWN frequency by keypad.	0.00~ 400.00	0.01 Hz	0.00	98
F_122	Secondary Frequency Command Selection	0: Frequency command by analog signal via terminal. 1: Frequency command by keypad. 2: Frequency command by UP/DOWN terminal. 3: Frequency command by communication interface.	0~3	—	0	97
F_123	Analog Input Selection	0:Vin+Iin 1:Vin-Iin 2:Iin-Vin 3:Vin or Iin (switch by multi-function input terminal X1 ~ X6).	0~3	—	0	85
F_124	Analog Input Selection (Vin)	0: Analog input gain. 1: Frequency command. 2: Current limit level. 3: Output voltage adjustment of V/F pattern. 4: Feedback signal	0~4	—	1	85
F_125	Analog Input Selection (Iin)	0: Analog input gain. 1: Frequency command. 2: Current limit level. 3: Output voltage adjustment of V/F pattern. 4. Feedback signal.	0~4	—	1	85
F_126	Iin Range Selection	0: 4~20mA (2~10V). 1: 0~20mA (0~10V).	0,1	—	0	86
F_127	Analog Input Gain (Iin)	The gain ratio of analog input terminal Iin.	0.00~2.00	0.01	1.00	83
F_128	Analog Input Bias (Iin)	The bias ratio of analog input terminal Iin.	-1.00~ 1.00	0.01	0.00	84
F_129	Analog Output Signal Selection (AM+)	0: Output frequency. 1: Frequency command. 2: Output current. 3: Vin frequency command. 4: Iin frequency command.	0~4	—	2	90
F_130	Analog Output Gain (AM+)	AM+ analog output adjustment ratio.	0.00~2.00	0.01	1.00	90
F_131	Multi-function Output Terminal (Ta2,Tb2)	The way of settings are same as multi-function output terminals setting. (F_058 ~ F_060)	-16~16 (Note 8)	—	1	100
F_132	DC Braking Frequency at Stop	Active frequency level of DC braking at stop.	0.1~60.0	0.1Hz	0.5	107

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_135	200% Current limit	0: Disable 1: Enable	0,1	—	0	111
F_136	PID Error Gain	When the PID command	0.1~8.0	—	1.0	116
F_137	Delay Time before Stop	When the “stop command” is activation at multi-function input terminal, drive will delay the setting time before stop.	0~1200	1sec	0	96
F_138	Overheating Level Adjustment	Overheating level(OH)=setting level+85℃	0.0~25.0	0.1℃	0.0	124
F_139	Operation Condition Memory	Record the last status of drive before power off. 0: Enable (F_001=2,3,4) 1: Disable	0,1	—	1	109
F_140	NTC Thermistor Setting	0: Disable. 1: Enable.	0,1	—	1	123
F_141	Drive Overheating Warning Selection	0: Disable 1: Warning (Ht): Continue operation. 2: Warning (Ht): Drive de-rates the switching frequency automatically per 5 minutes. 3: Warning (Ht): Stop operation.	0~3	—	0	123
F_142	Drive Overheating Warning Level	Set the warning level to prevent drive overheating.	45~85	1℃	70	123
F_143	Drive Overheating Dead Band	Set the temperature dead band of F_142 and F_145.	2.0~10.0	0.1℃	3.0	123
F_144	Fan Control Selection	0: Forced air: Start the fan at power ON. 1: Operation air: Start the fan at running. 2: Temperature level setting: Start the fan according to the setting of F_145.	0~2	—	1	124
F_145	Temperature Level of Fan Activation	Set the temperature level of fan activation.	25~60	1℃	50	124
F_146	Minimum Operation Time of Fan	Set the minimum operation time of fan when the fan stops.	0.1~25.0	0.1 min	0.5	124
F_147	“SV” Value	Set the “SV” value	F_151~ F_152	0.1	2.0	116
F_148	PID Control Display	0: PV value 1: Integration value 2: Deviation value 3: PID command value 4: PID feedback value	0~4	—	0	116
F_149	“SV-PV” Value Display	Main display selection(under PID control and command by “SV” condition) 0: “PV” value 1: “SV-PV” value	0,1	—	1	116

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_150	PID Control Command	0: By F_002 1: Analog frequency command controls “SV” 2: Keypad conrols “SV” 3: Communication interface controls “SV”	0~3	—	2	116
F_151	Upper Limit of Transmitter	Set the value in accordance with the maximum specification of transmitter.	-800.0~ 800.0	0.1	10.0	121
F_152	Lower Limit of Transmitter	Set the value in accordance with the minimum specification of transmitter.	-800.0~ 800.0	0.1	0.0	121
F_153	PID Control Mode Selection	0: Open-loop operation 1: Forward control; D postposition 2: Forward control; D preposition 3: Reverse control; D postposition 4: Reverse control; D preposition	0~4	—	0	116
F_154	P Selection	0: P postposition 1: P preposition	0,1	—	1	119
F_155	Proportional Gain(P)	Set the gain value for deviation adjustment. (0.0: P control disabled)	0.0~25.0	0.1	1.0	119
F_156	Integration Time(I)	Set the integration time for deviation adjustment. (0.0: I control disabled)	0.0~25.0	0.1 sec	2.0	119
F_157	Derivative Time(D)	Set the derivative time for deviation adjustment. (0.00: D control disabled)	0.00~2.50	0.01 sec	0.00	119
F_158	Derivative Time of Feedback	Set the derivative time for feedback signal.	0.00~2.50	0.01 sec	0.00	119
F_159	Integration Upper Limitation	Set the upper limitation value of integrator. （1.00=Maximum of output frequency）	0.00~1.00	0.01	1.00	119
F_160	Integration Lower Limitation	Set the lower limitation value of integrator.	-1.00~ 1.00	0.01	0.00	119
F_161	Integrator Initialized Value	Set the initial value of the integrator before PID starts.	-1.00~ 1.00	0.01	0.00	119
F_162	PID Buffer Space	Set the buffer space of PID output value.	0~255	—	2	119
F_163	Feedback Signal Filter	Filter the feedback signal.	0~255	—	10	121
F_164	Feedback Signal Trip Detection	0: Disable 1: Enable (at F_126=0)	0,1	—	1	121
F_165	Feedback Signal Selection r	0: Direct proportion signal. 1: Inverse proportion signal.	0,1	—	0	121
F_166	(2^{nd} PI Control) Active Range	Drive command by 2^{nd} PI control when the deviation value is within the setting range(F_147-“PV” value) 0.0: Disable	0.0~25.0	0.1	0.0	120

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_167	(2^{nd} PI Control) Active Time	Drive command by 2^{nd} control with the time duration and then switching back the primary PI control. 0.0: Disable	0.0~300.0	0.1	0.0	120
F_168	Proportional Gain(P2)	Set the gain value for deviation adjustment. (0.0: P control disabled)	0.0~25.0	0.1	1.0	120
F_169	Integration Time(I2)	Set the integration time for deviation adjustment. (0.0: I control disabled)	0.0~25.0	0.1 sec	2.0	120
F_170	Display Setting by Open-Loop Command	Main display selection when the drive command by PID and executing open-loop command. 0: PV display 1: According to the setting value of F_006	0,1	—	0	119
F_171	Setting Selection by Open-Loop Command	Primary speed selection when the drive command by PID and executing open-loop command. 0: Analog input terminals 1: Keypad 2: UP/DOWN command 3: Communication interface	0~3	—	1	119
F_172	Keypad Selection by Open-Loop Command	Command can be adjusted by keypad when the drive command by PID and executing open-loop command. 0: Primary speed 1: “SV” value	0,1	—	0	120
F_174	(On-Off) Control Selection	(On-Off) Control Selection 0: Forward control1: Reverse control	0,1	—	0	122
F_175	(On-Off) Delay Time Control	(On-Off)Delay Time Conrol 0: Disable1: Enable	0,1	—	0	122
F_176	(On) Range Setting	Drive is activation when the “PV” value exceeds the “On” range.	-12.8~ 12.7	0.1	1.0	122
F_177	(Off) Range Setting	Drive is activation when the “PV” value exceeds the “Off” range.	0.0~10.0	0.1	1.0	122
F_178	(On) Delay Time	Drive is activation when the “PV” value exceeds the “On” range and maintaining a duration(F_178)	0~250	1sec	0	122
F_179	(Off) Delay Time	Drive is activation when the “PV” value exceeds the “Off” range and maintaining a duration(F_179)	0~250	1sec	0	122
F_180	(On-Off) **Accel./Decel.** Time Selection	0: Primary Accel./Decel. time 1: Secondary Accel./Decel. time	0,1	—	1	123
F_181	(Off) Holding Time	Hold the “Off” condition with the duration.	0~240	1sec	0	123
F_182	Air Condi-tioning Mode	0: Disable 1: Enable	0,1	—	0	124

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_183	(Air Conditioning Mode) Temperature Response Time	The respone time of “PV” value is according to the setting value of F_183. PV > (SV+F186) , Variation of acceleration: (Hz/sec) = (F_184/ F183)	0.0~25.0	0.1 sec	5.0	124
F_184	(Air Conditioning Mode) Variation Frequency	Change the frequency according to the setting value of F_183 PV > (SV+F187)，Variation of deceleration: (Hz/sec) = (F_184/ F183)*4.	0.1~25.0	0.1Hz	2.0	124
F_185	(Air Conditioning Mode) Upper Limit Range of Temperature	**Upper limit value = “SV” value + F_185** **Lower limit value = “SV” value + F_186** When the temperature is over uppr limit value, drive outputs the setting value of F_042(Frequency Upper Limit) When the temperature is under lower limit value, drive outputs the setting value of F_043(Frequency Lower Limit)	F_184~ 20.0	0.1	3.0	124
F_186	(Air Conditioning Mode) Lower Limit Range of Temperature		0~F_184	0.1	1.0	124
F_187	(Air Conditioning Mode) Holding Frequency Level	When the operation frequency of drive is under (F_031*F_187) and maintaining F_188 duration, drive outpus full speed by oper-loop condition and maintaining a duration(F_189) and then recovering PID control. *F_188=0 Disable	0.00~1.00	0.01	0.50	125
F_188	(Air Conditioning Mode) Detection Time of Holding Frequency		0.0~25.0	0.1hr	0.0	125
F_189	(Air Conditioning Mode) Full Speed Time		0.0~25.0	0.1 min	1.0	125
F_190	(Feedback Limit) Detection	0: Disable 1: Warning detection；Continue operation 2: Warning detection；Stop output 3: Error detection；Error trip	0~3	—	0	121
F_191	(Feedback Limit) Level	Set the physical volume according to the specification of transmitter(refer to F_151, F_152)	-800.0~ 800.0	0.1	8.0	121
F_192	(Feedback Limit) Detection Setting	0: Detection when “PV” > F_191 1: Detection when “PV” < F_191	0,1	—	0	121

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	Def60	Page
F_193	(Feedback Limit) Detection Time	When the feedback signal exceeds the setting value of F_191 and maintaining a duration, drive is detection. Drive will close the detection when the feedback signal is without the range of feedback limit. (Set the range according to the physical volume of transmitter)	0~2550	1 sec	300	122
F_194	(Feedback Limit) Range Setting		0~20.0	0.1 unit	1.0	122
F_195	(Feedback Limit) Condition Selection	0: Enable during operation 1: Enable full time	0,1	—	1	122
F_208	Filter Setting of Keypad Pot knob	Filter the input signal when the frequency command is controlled by the keypad pot knob.(F_002＝6)	0~255	—	10	114
F_209	Keypad Pot Knob bias	Analog input “Keypad Pot knob bias ratio adjustment.	0.00~1.00	0.01	0.00	114
F_211	Drvie duty selection	0: Heavy duty(150% OL1) 1: Normal duty(120% OL1)	0~1	—	0	114
F_212	Parameter Display Selection of Password lock	1:Parameter cannot be changed after F_213 is locked, but it can display the setting value. 2:Parameter cannot be changed after F_213 is locked, but it cannot display the setting value.	0,1	—	0	114
F_213	Parameter Lock Password Setting	Setting the password of parameter lock.	0~9999	1	0	114
F_214	Parameter Lock Decoding Setting	Decoding the password of parameter lock.	0~9999	1	—	114
F_215	Current Oscillation Gain (HPF)	The setting gain of the current oscillation (16=1)	0~255	—	0	—
F_220	Cut frequency of Current Oscillation	When the setting value is too high, it will make the output current to high in light duty.	0~2000	—	400	—
F_221	Current Oscillation Gain (LPF)	When the setting value is too high, it will make the output current to high in light duty. Gain = setting value/128	0~255	—	128	—
F_222	Upper frequency of Current Oscillation prevention	The function of current oscillation enable when the output frequency is within the range of F_222 and F_223.	0~255	Hz	25	—
F_223	lower frequency of Current Oscillation prevention		0~255	Hz	14	—

means function can be set during the operation.

Func.	Name	Description	Range of Setting	Unit	DEf60	Page
F_224	Default Setting	0: Disable CLF: Clear error records dEF60: Restore the default value of drive for 60Hz. dEF50: Restore the default value of drive for 50Hz. SAv: Save the setting value. rES: Restore the setting value. rd_EE: Read the parameters from drive to digital keypad Wr_EE: Write the parameters from digital keypad to drive dEFC3: Restore the default value of PID control for 50Hz dEFC4: Restore the default value of PID control for 60Hz dEFC1~dEFC6: Customize default value PdEF60: Default value of 60Hz.(Normal Duty) PdEF50: Default value of 50Hz.(Normal Duty)	—	—	0	76

Note:
1. The default value of 50 Hz.
2. The default value of 60 Hz.
3. Specification of 200V.
4. Specification of 400V.
5. 0.5 ~ 5HP: 5 sec/7.5~30HP: 15sec/40HP above: 30 sec
6. Setting value=0, represented for " no display"
7. + : Represents a contact (N.O) / – : Represents b contact (N.C)
   Up/Down control wiring must not exceed over 20m when multi-function terminals are used for Up/Down control.
8. Heavy Duty / Normal duty

Heavy Duty	Normal duty
20P5~2007/4001~4007:6	2001~2005/4001~4005:6
2010~2060/4010~4060:4	2007~2060/4007~4060:4
2075~2150/4075~4150:2	2075~2150/4075~4150:2
2200~2250/4175~4600:1	2200~2250/4175~4700:1

9. Function : F_133、F_134、F_173、F_204~F_207、F_210、F_216~F_219 = Reserved
10. "dEF" the default value refer to < AppendixE Default Value List>
    dEF60:60Hz:general type
    dEF50:50Hz:general type
    dEFC3:50Hz:PID control
    dEFC4:60Hz: PID control

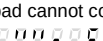
means function can be set during the operation.

Chapter 6 Parameter Setting Description

A. Keypad Setup

F_000	Drive Information

0: Software version
1: Drive model number.
2: Drive running hours.
3: Drive power supplying time.
4: Software checksum Code.
5: Reserved

a. The keypad cannot copy parameters from different versions of drive software ,and it will display  message when it occurs.

b. Pressing the ▲ or ▼ key can switch display status.

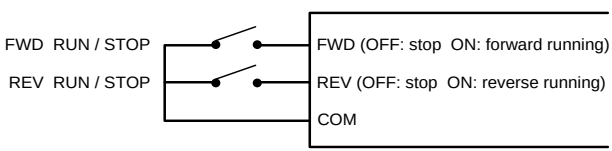
F_001	Start Command Selection

a. F_001=0

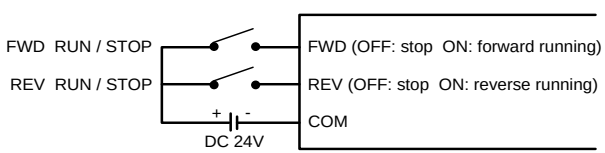
(I). **Forward running is controlled by FWD terminal, reverse running is controlled by REV terminal.**

(II). **Drive stops operation when FWD and REV terminals are simultaneously open-circuit or short-circuit.**

SINK (NPN) mode:



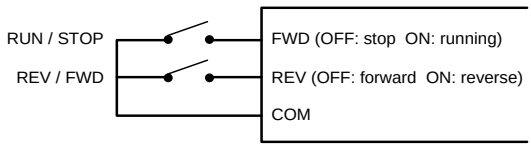
SOURCE (PNP) mode:



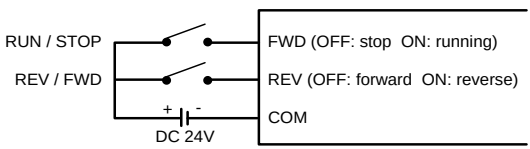
b. F_001=1

Start is command by FWD terminal.
Rotation direction command by REV terminal.

SINK (NPN) mode:



SOURCE (PNP) mode:

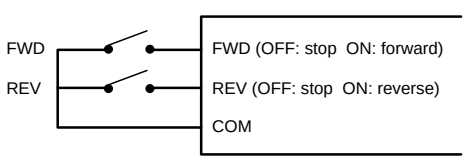


c. F_001=2

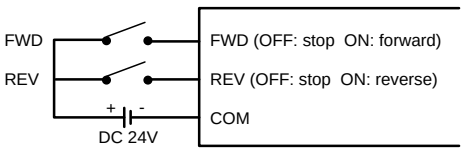
(I). **Start is command by keypad "**  **" key.**
Rotation direction command by FWD or REV terminal.

(II). **Drive stops operation when FWD and REV terminals are simultaneously open-circuit or short-circuit.**

SINK (NPN) mode:



SOURCE (PNP) mode:



d. F_001=3

Start is command by the keypad "RUN" key.
Motor rotates at the forward direction (clockwise).

e. F_001=4

(I). **Start is command by keypad "RUN" key.**
Motor rotates at the reverse direction (counterclockwise).

(II). **The most left digit of output frequency will show "–".**

f. F_001=8

Start is command and rotate direction by the RS-485 communication interface.
Related control command refer to "7-6 Drive Registers and Command Code".

g. F_001=9

Start is command by RS-485 communication interface.
Rotation direction command by REV terminal.
Related control command refer to "7-6 Drive Registers and Command Code"

h. F_001=10

Start is command by FWD terminal.
Rotation direction command by RS-485 communication interface.
Related control command refer to "7-6 Drive Registers and Command Code"

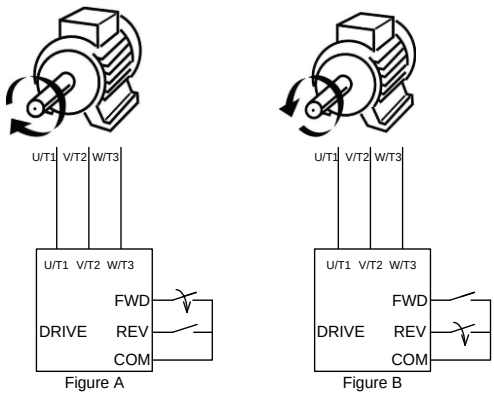
i. F_001=11

Start is command by Keypad
Rotation direction command by RS-485 communication interface.
Related control command refer to "7-6 Drive Registers and Command Code"

Note:

1. When F_001 set to 0 or 2 and FWD-COM and REV-COM are simultaneously open-circuit, the monitor mode will display blanking " 0.0.0.0.0.0 " (except "Display 8-terminal status"). If FWD-COM and REV-COM are simultaneously short-circuit, the monitor mode will display blanking " 0.0.0.0.0.5 " (except "Display 8-terminal status").

2. The definition of rotation direction is according to IEC (International Electrotechnical Commission) standard. Observing the motor from axle center side, not the fan side. The standard rotation direction (Forward) is clockwise



EX: F_001=0,

Forward (FWD) rotation is clockwise (Figure A).

Reverse (REV) rotation is counter-clockwise (Figure B).

F_002	Primary Frequency Command Selection

a. F_002=0

Frequency command is controlled by "Vin" or "Iin" analog input terminal (select Vin or Iin analog input sources by F_123).

(I). Vin-GND: Input range DC 0~10V。

※ The gain or bias of frequency command can be set by function F_040 and F_041.

(II). Iin-GND: Select the input signal mode via "JP4" switch.

SW1→I position (current signal); Range: 4~20mA or 0~20mA (set by F_126).

SW1→V position (voltage signal); Range: 2~10V or 0~10V (set by F_126).

※ The gain or bias of frequency command can be set by function F_127 and F_128.

b. F_002=1

Frequency command is controlled by keypad.

The primary speed, jog speed and preset speeds (F_009 ~ F_017, F_196 ~ F_203) can be set during operation and the frequency command can be set under monitor mode.

c. F_002=2

Motor speed (RPM) is command by keypad .

d. F_002=3

Machine speed (MPM) is command by keypad .

e. F_002=4

Frequency command is controlled by UP/DOWN terminal.

Multi-function input terminals can be set UP command, DOWN command, UP/DOWN frequency clear and enter commands.

f.F_002=5

Frequency command is controlled by RS-485 communication interface.

Related control command refer to "7-6 Drive Registers and Command Code"

g.F_002=6

Frequency command is controlled by keypad Pot Knob.

Note: In monitor mode, when F_002 sets 1, 2 or 3, pressing [▲] or [▼] key one time and the frequency command will be blink but not changing. Press the [▲] or [▼] key again to change the frequency command.

F_003	Selection of “STOP” Key Validity

a. F_003=0

When the start is command by terminal, the “STOP/RESET” key of keypad disabled.

b. F_003=1

When the start is command by terminal, the “STOP/RESET” key of keypad enabled.

c. The applications of “STOP” key.

1. Emergency stop:

When the start and frequency encommand are both controlled by multi-function input terminal (F_001=0 or 1), the output frequency will be decreased to 0Hz and displaying 0.00 on keypad by pressing “STOP/RESET” key during operation.
If the drive needs to be restarted, cut off the wire between the terminals of the start command (FWD or REV) and COM and restart the drive again.

2.Normal stop:

F_001=2 or 3, the start command by “RUN” key of keypad and the stop is controlled by “STOP/RESET” key.

F_004	KP-603 Frequency Command Selection

a. F_004=0

In the monitor mode, the frequency command cannot be changed to avoid possible mistakes and errors.

b. F_004=1

In the monitor mode, the frequency command can be changed.

F_005	KP-603 Selection of Frequency Command Auto-Storing

a. F_005=0

In the monitor mode, the frequency command will not be saved automatically.

b. F_005=1

In the monitor mode, the frequency command will be saved automatically after 3 minutes.

F_006	KP-603 Selection of Main Display

In the monitor mode, there are 8 monitor modes can be selected. The corresponding value and monitor modes are shown as below table:

1. Output Frequency	5. Output Current
2. Frequency Command	6. Motor Speed (RPM)
3. Output Voltage	7. Machine speed (MPM)
4. DC bus Voltage	8. Terminals Status

Note: One of above 8 monitor modes can be selected as the “main display”, and others can be as the “auxiliary display”. When the display is under “auxiliary display” mode (including the setting mode and other monitor modes), the display will switch to “main display” automatically after 3 minutes by idling the keypad.

In the function of F_153≠0 monitor mode, if it is in the close-loop conditions,the function of F_006(Selection of Main Display) is disabled.

F_007	Machine Speed Ratio

Set the displaying ratio for “display 7-machine speed” under monitor mode.

Machine speed = machine speed ratio (F_007) x output frequency

F_008	Digits of Decimal Value (Machine Speed)

Set the digits of decimal values for machine speed to provide the better resolution for observing. (the max. accuracy is the thousandth digit)

F_220	Default Setting

Drive can restore the default setting values and restoring the parameter setting values. The parameter of F_220 are described as below table:

0 (0): Disable
CLF (CLF): Clear error records
dEF60 (dEF60): Restore the default value of drive for 60Hz.
dEF50 (dEF50): Restore the default value of drive for 50Hz.
SAv (SAv): Save the setting value.
rES (rES): Restore the setting value.
rd_EE (rd_EE): Read the parameters from drive to digital keypad
Wr_EE (Wr_EE): Write the parameters from digital keypad to drive
dEFC3 (dEFC3):Restore the default value of PID control for 50Hz.
dEFC4 (dEFC4):Restore the default value of PID control for 60Hz.
dEFC1~dEFC6：Dedicated machine default.
PdEF60 (PdEF60):Restore the default value of normal duty for 60 Hz
PdEF50 (PdEF50):Restore the default value of normal duty for 50 Hz

Note: rd_EE and Wr_EE are used to copy functions to several drives with the same setting value.

B. Preset Speed Setup

F_009	Primary Speed
F_010~F_016	Preset Speed 1~ Preset Speed 7
F_017	Jog Speed
F_196~ F_203	Preset Speed 8~ Preset Speed 15

a. Related functions:

(I) The setting of acceleration and deceleration time (F_018 ~ F_029).

(II) The setting of multi-function input terminals (F_052 ~ F_055).

b. Switch of jog speed, primary speed and preset speeds.

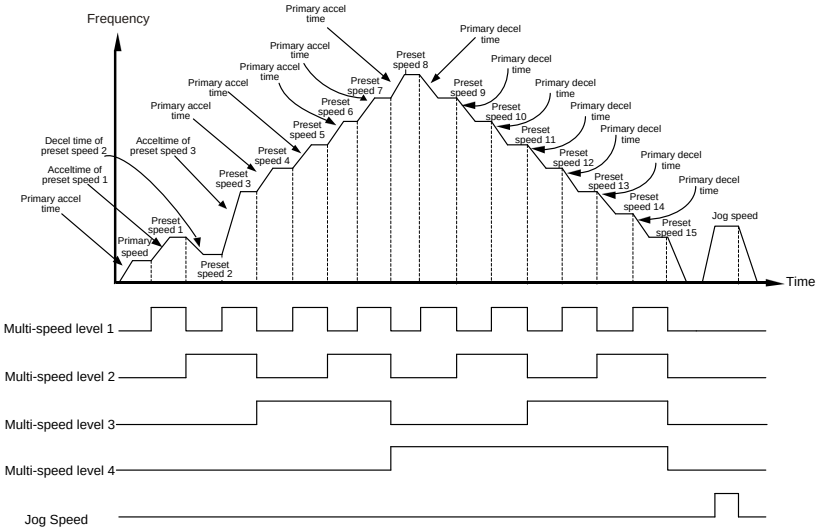
※ The ON/OFF conditions as below table are "contact a (N.O)" setting of functions.

Jog speed command	Multi-speed level 4 command	Multi-speed level 3 command	Multi-speed level 2 command	Multi-speed level 1 command	Command Description
ON	ON	**X**	**X**	**X**	Jog speed
OFF	OFF	OFF	OFF	OFF	Primary speed
OFF	OFF	OFF	OFF	ON	Preset speed 1
OFF	OFF	OFF	ON	OFF	Preset speed 2
OFF	OFF	OFF	ON	ON	Preset speed 3
OFF	OFF	ON	OFF	OFF	Preset speed 4
OFF	OFF	ON	OFF	ON	Preset speed 5
OFF	OFF	ON	ON	OFF	Preset speed 6
OFF	OFF	ON	ON	ON	Preset speed 7
OFF	ON	OFF	OFF	OFF	Preset speed 8
OFF	ON	OFF	OFF	ON	Preset speed 9
OFF	ON	OFF	ON	OFF	Preset speed 10
OFF	ON	OFF	ON	ON	Preset speed 11
OFF	ON	ON	OFF	OFF	Preset speed 12
OFF	ON	ON	OFF	ON	Preset speed 13
OFF	ON	ON	ON	OFF	Preset speed 14
OFF	ON	ON	ON	ON	Preset speed 15

Note:

1. " **X** " : Don't care
2. Jog speed has the highest priority. That is, when the jog speed is activated, other speed commands disabled.
3. Jog speed command and the multi-speed commands are programmed by the multi-function input terminals (X1 ~ X6) by functions (F_052 ~ F_057). ON / OFF the terminal in accordance with above table to switch the speed.

c. The priority of speed command: Jog speed>Multi-sped>primary speedMulti-speed and acceleration/deceleration time



※ The acceleration / deceleration time of jog speed and preset speed 4~15 are according to the setting of primary acceleration / deceleration time (F_019, F_020).

※ Jog speed control include start command. When drive stop, activating the jog speed command can start the drive without start command.

※ Analog input terminals (Vin, Iin) are invalid under jog speed, preset speed 1~15 and primary speed control.

※ Please refer to F_018 ~ F_029 for acceleration / deceleration time setting.

C. Multi-Speed Accel./Decel. Time Setup

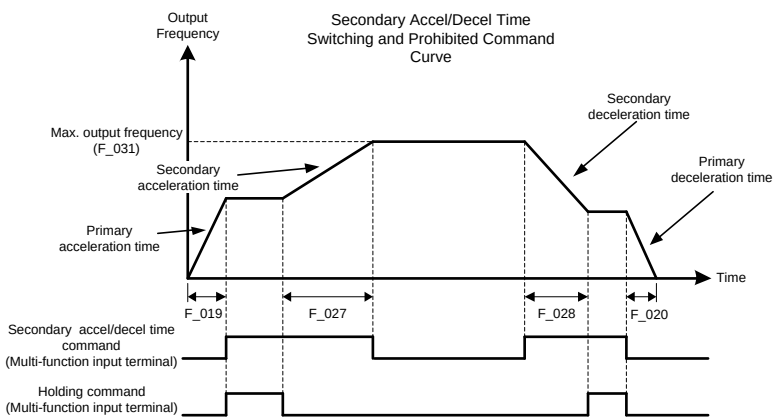
F_018	Reference Frequency of **Accel./Decel.** Time
F_019	Primary Acceleration Time
F_020	Primary Deceleration Time
F_021	Acceleration Time of Preset Speed 1
F_022	Deceleration Time of Preset Speed 1
F_023	Acceleration Time of Preset Speed 2
F_024	Deceleration Time of Preset Speed 2
F_025	Acceleration Time of Preset Speed 3
F_026	Deceleration Time of Preset Speed 3
F_027	Secondary Acceleration Time
F_028	Secondary Deceleration Time
F_029	Set S-curve for **Accel./Decel.** Time

a. The multi-speeds acceleration / deceleration time is the time interval from 0Hz to the setting of F_018 (Reference Frequency of **Accel./Decel.** Time). Multi-speed level commands can simultaneously control preset speeds and the preset speed acceleration / deceleration time.

b. The acceleration / deceleration time of primary speed, preset speed 4 ~ 15 and jog speed are controlled by the setting of primary acceleration / deceleration time.

c. The switch between primary accel / decel and secondary accel / decel can be selected by multi-function input terminals.

Illustration is as follows:



d. The “holding command” is disabled when STOP command is activated.

※STOP command:

(I) When F_001 set 0 or 2, “FWD” and “REV” terminals are simultaneously short-circuit or open-circuit.

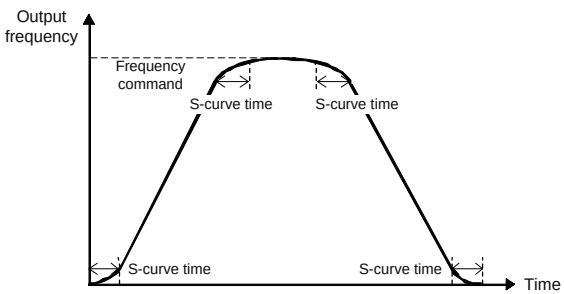
(II) When F_001 set 1, “FWD” terminal is open-circuit.

(III) When F_003 set 1, pressing the “OFF/RESET” key.

(IV) Press the “OFF/RESET” key when start command by keypad.

e. Set the S-curve function depend on the application to buffer the impact during start, stop, acceleration and deceleration.

EX: To buffer the impact when the object fall on the conveyor line or the running of elevator.



D. V/F Pattern Setup

F_030	Limitation of Output Voltage

a. F_030 = 0

The output voltage of V/F pattern: No limit, and auto-decrease of switching frequency.

b. F_030 = 1

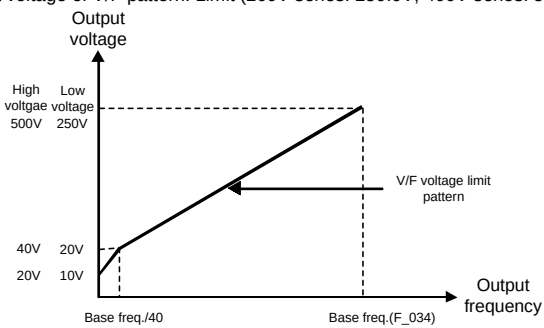
The output voltage of V/F pattern :Limit (200V series: 250.0V; 400V series: 500.0V), and auto-decrease of switching frequency

c. F_030 = 2

The output voltage of V/F pattern: No limit.

d. F_030 = 3

The output voltage of V/F pattern: Limit (200V series: 250.0V; 400V series: 500.0V).



※Switching frequency please refer to "F_81 Switching Frequency on page 111".

F_031	Maximum Output Frequency	
F_032	Starting Frequency	Range: 0.1~10.0Hz
F_033	Starting Voltage	

The range of 200V series is 0.1 ~ 50.0V.

The range of 400V series is 0.1 ~ 100.0V.

F_034	Base Frequency

Motor base frequency;

The setting must be according to the nameplate of motor.

F_035	Base Voltage

Motor base voltage;

The setting must be according to the nameplate of motor.

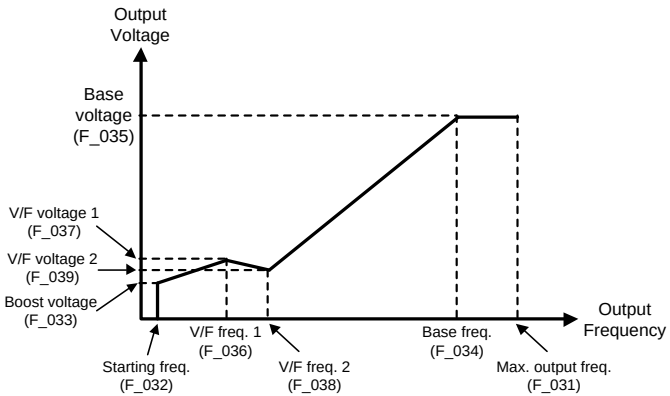
(200V series: 0.1~255.0V; 400V series: 0.1~510.0V)

F_036	V/F Frequency 1	Range 0.0 ~ 399.9Hz。
F_038	V/F Frequency 2	

F_037	V/F Voltage 1	200V series: 0.0~255.0V 400V series: 0.0~510.0V
F_039	V/F Voltage 2	

F_031 ~ F_039 are the functions related to V/F pattern. Please refer to below figure:

V/F Pattern



Note: The interrelationships of above functions are explained as follow:

1.The priority of frequency level:
Base frequency ＞ V/F frequency 2 ＞ V/F frequency 1 ＞ start frequency

2.When the setting value of V/F frequency 2 is less than the setting value of V/F frequency1, the setting of V/F frequency (voltage) 2 is disable.

3.When V/F frequency1 or V/F frequency 2 is less than the starting frequency, the V/F frequency (voltage) 1 or 2 is disable.

4.No limitation between F_033 (Starting Voltage), F_035 (Base Voltage), F_037 (V/F Voltage 1), F_039 (V/F Voltage 2) when setting the values.

E. Analog Input Command Setup

The analog input terminals:

"Vin" – "GND":DC 0~10V;

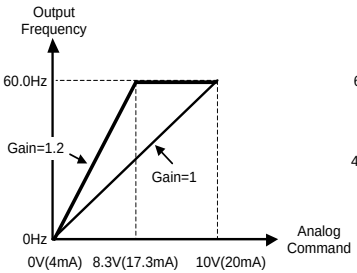
"Iin" – "GND":DC 4~20mA (2~10V) or 0~20mA (0~10V)

F_040	Vin Gain	Rate 0~2.00
F_127	Analog Input Gain (Iin)	

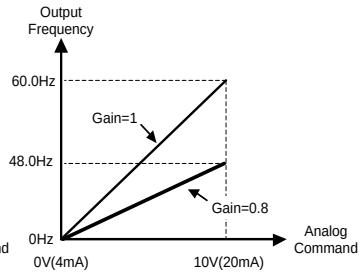
a. (General Mode)

The corresponding frequency command value of analog command =
Maximum output frequency (F_031) x Analog input gain (F_040 or F_127)
EX: If analog input bias (F_041 or F_128) = 0.00

Maximum output frequency = 60.0Hz
Analog input gain = 1.20



Maximum output frequency = 60.0Hz
Analog input gain = 0.80



b. (PID Control Mode)

PV value = Maximum transmitter(F_151) x Analog input gain(F_040 or F_127)
EX: If analog input bias (F_041 or F_128) = 0.00

Maximum transmitter=10bar
Analog input gain = 1.20

Maximum transmitter=10bar
Analog input gain = 0.80

F_041	Vin Bias	Rate 0~1.00
F_128	Iin Bias	

a. (General Mode)

The corresponding frequency command value of analog command = maximum output freq. (F_031) x analog input bias (F_041 or F_128)

EX: If analog input gain (F_040 or F_127) = 1.00

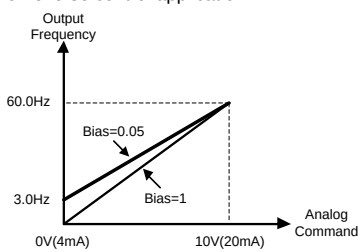
Maximum output frequency =60.0Hz
Analog input bias=0.05

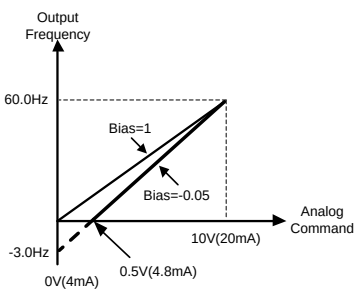
Maximum output frequency =60.0Hz
Analog input bias=-0.05

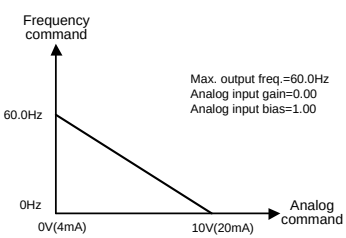
$$\text{Freq.command} = \frac{(\text{Max. freq. command} - \text{C.V})}{\text{10V (or 20mA)}} \times (\text{Analog command}) + \text{C.V}$$

* C.V = The corresponding frequency command value of analog command

Example of reverse control application:







b. (PID control mode)

PV value = Maximum transmitter (F_151)x Analog input gain (F_041 or F_128)

F_123	Analog Input Selection

0: Vin+Iin

1: Vin-Iin

2: Iin-Vin

3: Vin or Iin (switch by multi-function input Terminal X1 ~ X6)

F_124	Analog Input Selection (Vin)

0: Analog input gain
1: Frequency command
2: Current limit level
The level setting range is 1 ~150%.(the setting value displays at F_133)
3: Output voltage adjustment of V/F pattern
4: Feedback signal

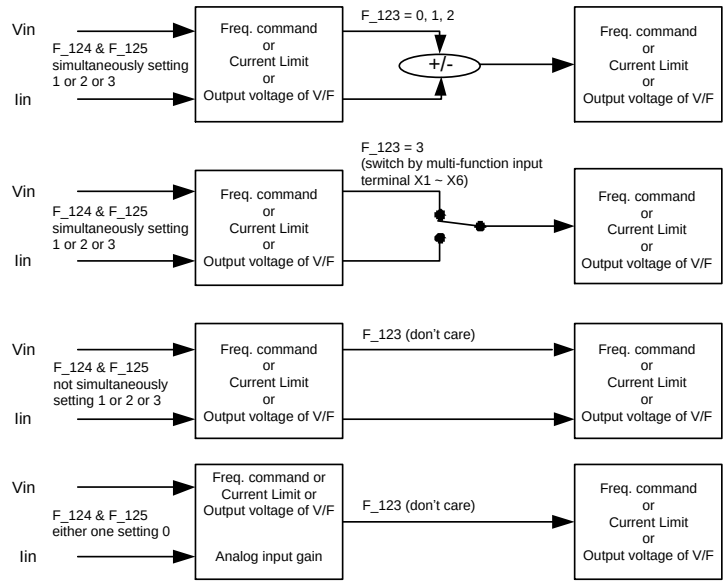
F_125	Analog Input Selection (Iin)

0: Analog input gain
1: Frequency command
2: Current limit level
The level setting range is 1 ~150%.
3: Output voltage adjustment of V/F pattern
4: Feedback signal

F_126	Iin Range Selection

0:DC 4~20mA(2-10V)
1:DC 0~20mA(0-10V)

The interrelationships of F_123, F_124 and F_125 are shown as below figure:



The interrelationships table of F_123, F_124, F_125

F_123 Analog Input Selection	F_124 Analog Input Selection (Vin)	F_125 Analog Input Selection (Iin)	Description
0	1	1	Vin & Iin: Frequency command. Vin + Iin
0	2	2	Vin & Iin: Current limit level. Vin + Iin
0	3	3	Vin & Iin: Output voltage adjustment of V/F pattern. Vin + Iin
1	1	1	Vin & Iin: Frequency command. Vin - Iin
1	2	2	Vin & Iin: Current limit level. Vin - Iin
1	3	3	Vin & Iin: Output voltage adjustment of V/F pattern. Vin - Iin
2	1	1	Vin & Iin: Frequency command. Iin - Vin
2	2	2	Vin & Iin: Current limit level. Iin - Vin
2	3	3	Vin & Iin: Output voltage adjustment of V/F pattern. Iin - Vin
3	1	1	Vin & Iin: Frequency command. Vin or Iin (switch by multi-function input Terminal X1 ~ X6).
3	2	2	Vin & Iin: Current limit level. Vin or Iin (switch by multi-function input Terminal X1 ~ X6).
3	3	3	Vin & Iin: Output voltage adjustment of V/F pattern. Vin or Iin (switch by multi-function input Terminal X1 ~ X6).

F_123 (Analog Input Selection)	F_124 Analog Input Selection (Vin)	F_125 Analog Input Selection (Iin)	Description
X	1	0	Vin: Frequency command. Iin: Vin Analog input
X	0	1	Vin: Iin Analog Input
			Iin: Frequency command.
X	1	2	Vin: Frequency command
			Iin: Current limit level
X	1	3	Vin: Frequency command
			Iin: Output voltage adjustment of V/F pattern.
X	2	1	Vin: Current limit level. Iin: Frequency command
X	2	3	Vin: Current limit level. Iin: Output voltage adjustment of V/F pattern.
X	3	1	Vin: Output voltage adjustment of V/F pattern. Iin: Frequency command.
X	3	2	Vin: Output voltage adjustment of V/F pattern. Iin: Current limit level.

X: don't care

F_047	Filter Setting of Analog Input Signal

a. Filter the analog input signal when the frequency command by analog input terminals. (F_002=0).

b. The larger setting value will cause the slower response.

c. 0: Disable the filtering.

F_107	Analog Frequency Dead Band

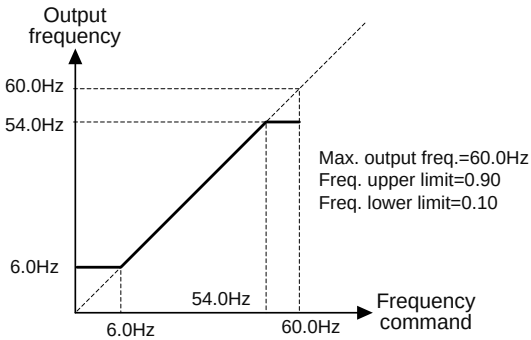
a. When the noise of analog input signal is large, appropriately increase the dead band to stabilize the frequency command. But adjusting this function will reduce the tuning linearity of input signal.

b. This setting must be applied along with the F_047

F. Upper and Lower Frequency Limit Setup

F_042	Frequency Upper Limit	Rate:0~1.00
F_043	Frequency Lower Limit	

Illustrate as following figure:



Upper limit of output frequency = F_042 (Frequency Upper Limit) x F_031 (Maximum Output Frequency)
Lower limit of output frequency = F_043 (Frequency Lower Limit) x F_031 (Maximum Output Frequency)

G. Analog Output Setup

The analog output terminals:
"FM+" – "M-": DC 0 ~ 10V;
"AM+" – "M-": DC 0 ~ 10V
(1/2 HP ~ 5HP models are marked by "FM+" – "GND" and "AM+" – "GND")

F_044	Analog Output Signal Selection(FM+) (DC 0~10V)
F_129	Analog Output Signal Selection(AM+) (DC 0~10V)

0: Output frequency
The analog output terminal (FM+ or AM+) outputs DC 0~10V to correspond the output frequency. (the terminal will output signal when drive operation)

1: Frequency command
The analog output terminal (FM+ or AM+) outputs DC 0~10V to correspond the frequency command. (the terminal will output when drive is operation or stop)

2: Output current
The analog output terminal (FM+ or AM+) outputs DC 0~10V to correspond the output current. (max. corresponding value is rated output current of drive)

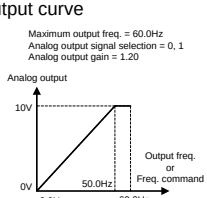
3: "Vin" analog input signal
The analog output terminal (FM+ or AM+) outputs DC 0~10V to correspond the signal of "Vin" analog input terminal. (the setting is activation when F_124=1)

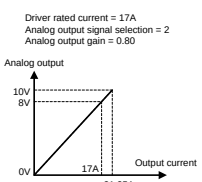
4: "Iin" analog input signal
The analog output terminal(FM+ or AM+) outputs DC 0~10V to correspond the signal of "Iin" analog input terminal. (the setting is activation when F_125=1)

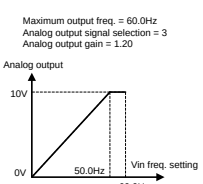
F_045	Analog Output Gain(FM+)
F_130	Analog Output Gain(AM+)

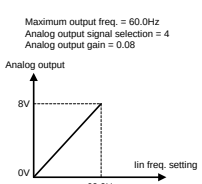
a. Analog output gain = $\frac{\text{Maximum output freq.}}{\text{Output freq. (freq. command)}}$ or $\frac{\text{Drive rated current}}{\text{Output current}}$

b. Analog output curve









H. Motor Protection Setup

F_046	Motor Overload Protection (OL)

Enable the function can preventing the motor from damage by operating in the overload condition for a long time.
0: Disable
1: Overload protection for dependent cooling fan type motor: Enabled (OL)
2: Overload protection for independent cooling fan type motor: Enabled (OL)

F_048	Motor Rated Current	The rated current of setting must be according to the nameplate of motor.

F_049	Motor No-Load Current	The rated current of setting must be according to the nameplate of motor. (1/3 of motor rated current)

F_050	Motor Slip Compensation

a. The slip of motor is variable depending on the load. When the load current is over the level of slip compensation, the drive will compensate the output frequency to output constant speed. The setting range is -9.9~10.0Hz.
b. Compensation frequency =

$$\frac{\text{loading current - (No load current(F\_049))}}{\text{Rated current(F\_048)-(NO load current(F\_049))}} \times \text{Slip compensation(F\_050)}$$

F_051	Number of Motor Poles

a. The settings are listed as below:
2P, 4P, 6P, 8P, 10P
b. The rotation speed display in the monitor mode:

$$\text{Motor speed (RPM)} = \frac{120}{\text{Number of motor poles(F\_051)}} \times \text{Output frequency}$$

I. Multi-Function Input Setup

F_052	Multi-function Input Terminal (X1)
F_053	Multi-function Input Terminal (X2)
F_054	Multi-function Input Terminal (X3)
F_055	Multi-function Input Terminal (X4)
F_056	Multi-function Input Terminal (X5)
F_057	Multi-function Input Terminal (X6)

a. "＋" represents positive logic (N.O; contact a)

b. "－" represents negative logic (N.C; contact b)

c. Multi-function terminals X1 ~ X6 can be set to perform following functions:

±1: Jog command (refer to F_017)

±2: Secondary **Accel./Decel.** time command (refer to F_027, F_028)

±3: Multi-speed level 1 command (refer to F_010 ~ F_016)

±4: Multi-speed level 2 command (refer to F_010 ~ F_016)

±5: Multi-speed level 3 command (refer to F_010 ~ F_016)

±6: Reset command

When the drive trips to stop, executing reset command can clear the fault

±7: External fault command (thr)

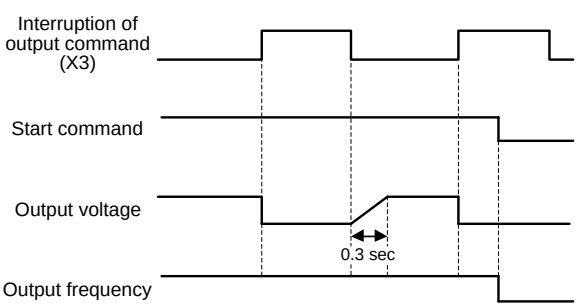
a. When the terminal received the fault command during operation, drive trips to stop.

b. This function is disabled when the drive at stop condition

±8: Interruption of output command (bb)

The parameter can interrupt the output voltage of drive.

Interruption of output command (F_054=8)



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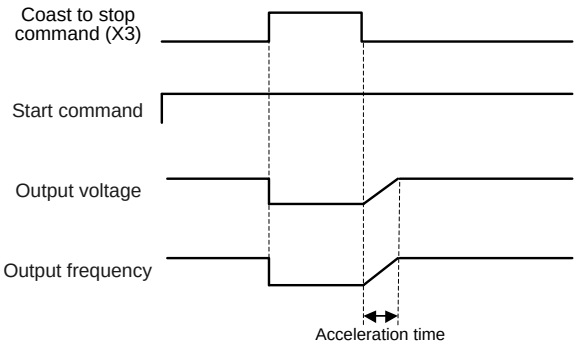
±9: Coast to stop command (Fr)

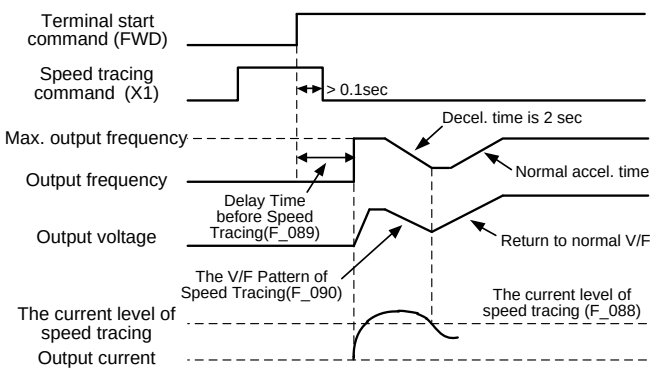
Cut off the control of motor from drive immediately

Coast to stop command (F_055=9)



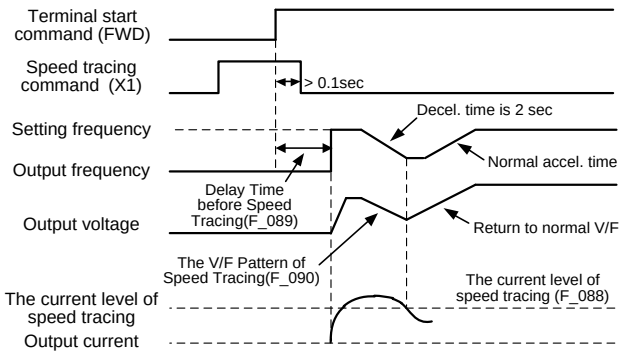
±10: Speed tracing from the maximum frequency

Speed tracing from the maximum frequency (F_053=10)



±11: Speed tracing from the setting frequency

Speed tracing from the setting frequency
(F_053=11)



±12: Holding command

±13: UP command

Frequency command can be increased by step.

±14: DOWN command

Frequency command can be decreased by step.

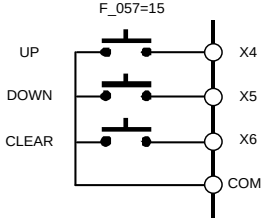
±15: Clear UP/DOWN frequency command

Frequency command is cleared to 0.00Hz.

Illustrate as below figures:

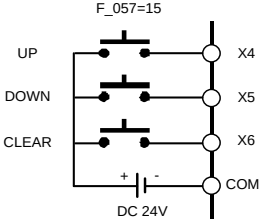
SINK (NPN) mode

F_055=13
F_056=14
F_057=15



SOURCE (PNP) mode

F_055=13
F_056=14
F_057=15



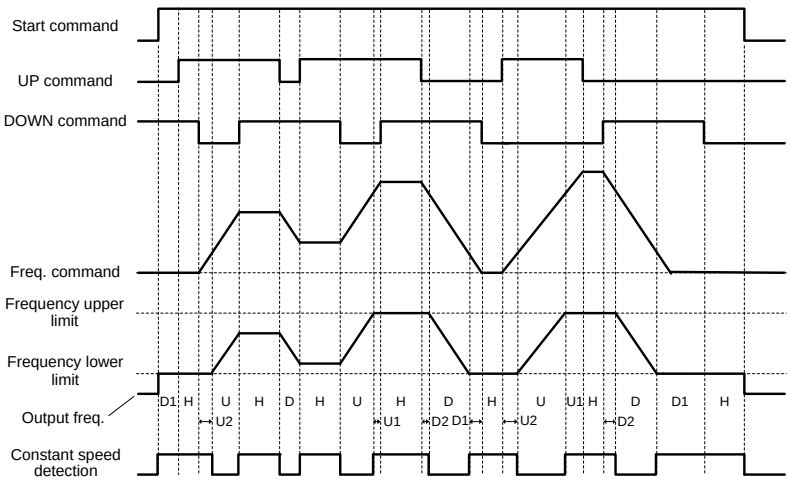
±16: Analog input source selection

Select one of analog input sources(Vin or Iin) as the input signal.

F_123 = 3 (Vin or Iin)

+16	Terminal short-circuit: Analog input source (Vin).
	Terminal open-circuit: Analog input source (Iin).
-16	Terminal short-circuit: Analog input source (Iin).
	Terminal open-circuit: Analog input source (Vin).

Time chart of UP/DOWN command



U=UP (acceleration) condition

D=DOWN (deceleration) condition

H=HOLD (constant speed) condition

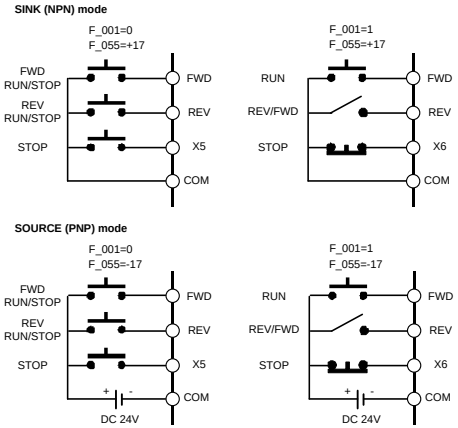
U1=UP condition bounded at the upper limit of the frequency.

U2=UP condition bounded at the lower limit of the frequency.

D1=DOWN condition bounded at the lower limit of the frequency.

D2=DOWN condition bounded at the upper limit of the frequency.

±17: Stop command with 3-wire start/stop circuit.



±18: Under the PID control, speed selection by open-loop command.

±19: Under the PID control, reset the integrator.

±20: Stop mode

±21: Multi-speed level 4 command

F_137	Delay Time before Stop	0~1200 sec

If "Stop Command" is activation at multi-function input terminal(F_052~F_055),drive will delay the setting time (F_137) before stop

d. When the parameter of F_052, F_053, F_054, F_055 is set to "0", the functions are described as below:

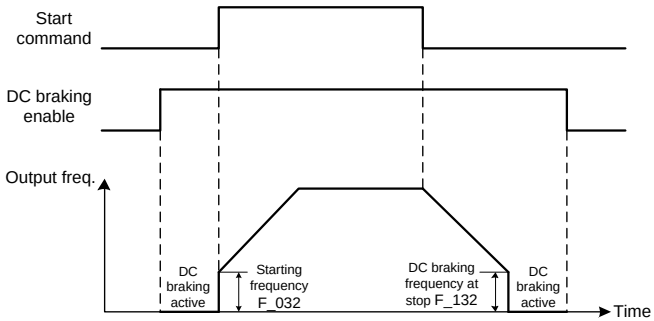
i. F_052: "UP/DOWN frequency command enter key" by X1.

X1 and COM is open-circuit:
UP/DOWN command can adjust the frequency command, but the output frequency will not be reacted by the frequency command.

X1 and COM is short-circuit:
The output frequency will start acceleration or deceleration until reaching the frequency command.

ii. F_053: "DC braking enable (at stop)" by X2

1. The terminal is activated and the drive is at stop condition: DC braking enabled.
2. When the DC braking is activated, the output current is according to the setting of F_075 (DC Braking Level).
3. The DC braking command will be cleared and the motor runs to the setting frequency when the start or jog command enabled.
4. The output frequency is decreased to the setting value of F_132 (DC Braking Frequency at Stop) and DC braking enabled, when the start command or jog command is disabled.



iii. F_054: "Current limit enable" by X3

Monitor the current limit level percentage by F_133 (Current Limit Level)

Use KP-603 keypad:

a. X3 and COM is short-circuit:

Analog terminal sets the current limit level: **Enable**

When F_124 (Analog Input Selection (Vin)) or F_125 (Analog Input Selection Iin) is set to 2, the user can set the current limit level from analog input terminal and monitoring the setting value at F_133 (range: 1~150%).

※The function is disable before stall occurring during acceleration and constant speed.

b. X3 and COM is open-circuit:

Analog terminal sets the current limit level: **Disable**

The setting value of current limit level is according to F_071(Stall Prevention Level at Constant Speed). (range: 30~200%)

iv. F_055: "Selection of primary or secondary frequency command" by X4

a. X4 and COM is short-circuit:

The output frequency will switch to secondary frequency command.

F_122 (Secondary Frequency Command Selection):

0: Frequency command by anabhhhhlog signal via terminal.

1: Frequency command by keypad.

2: Frequency command by UP/DOWN terminal.

b. X4 and COM is open-circuit:

The output frequency command by primary frequency.

F_002 (Primary Frequency Command Selection):

0: Frequency command by analog signal via terminal.

1: Frequency command by keypad.

2: Motor speed (RPM) command by keypad.

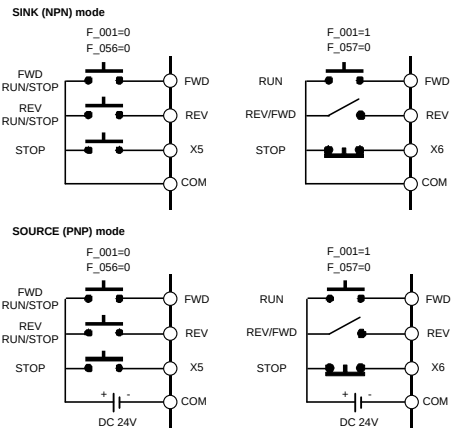
3: Machine speed (MPM) command by keypad.

4: Frequency command by UP/DOWN terminal.

5: Freqency command by RS-485 communication interface.

v. F_056: "three-wire self-hold circuit STOP command" by X5
Normal Open:N.O (contact a)

vi. F_056: "three-wire self-hold circuit STOP command" by X6
Normal Close:N.C (contact b)



F_118	UP/DOWN Memory Selection

0: Clear the UP/DOWN frequency command when power failure.
Drive will clear the UP/DOWN frequency command to 0.00Hz when the power failure.

1: Save the UP/DOWN frequency command when power failure.
Drive will save the UP/DOWN frequency command to F_121 (UP/DOWN Frequency Adjustment) when the power failure.

F_119	UP/DOWN Frequency Resolution

Select the resolution of UP/DOWN frequency command.

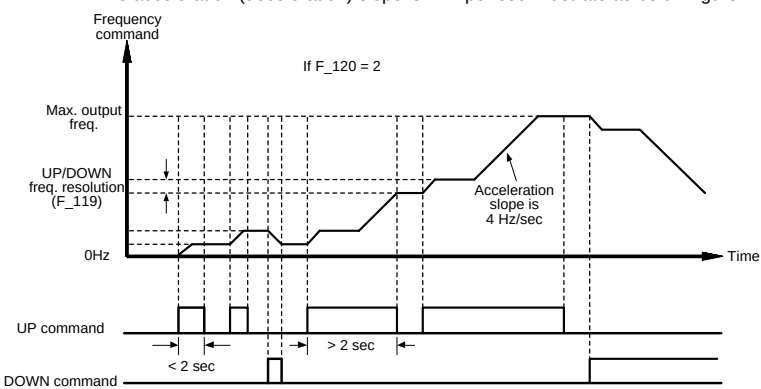
Setting value	Unit	Frequency command resolution
0	0.01Hz	Freq. command resolution = 0.01Hz
1~8	×0.05Hz	Freq. command resolution = Setting value × Unit EX: Setting value = 8; The variance is 8×0.05= 0.4Hz by inputting UP/DOWN command per time.
9	0.5Hz	Freq. command resolution = 0.5Hz
10~250	×0.1Hz	Freq. command resolution = Setting value × Unit EX: Setting value = 250; The variance is 250×0.1= 25Hz by inputting UP/DOWN command per time.

F_120	UP/DOWN Trigger Mode

1~5: Edge trigger or continuous Accel./Decel./ when the terminal is activated with the duration (1 ~ 5 unit:sec).

When the UP/DOWN command enabled and exceeding the setting value, the output frequency will accelerate(decelerate) to the upper(lower) limit output frequency until the UP/DOWN command disabled.

The acceleration (deceleration) slope is 4Hz per sec. Illustrate as below figure:



6: Edge trigger.

UP/DOWN signal triggers the drive during the transition of the signal(0→1 or 1→0). The signal response time is 30ms.

F_121	UP/DOWN Frequency Adjustment	Range 0~400Hz

Directly use KP-603 keypad to input the UP/DOWN frequency command.

Enter the parameter setting mode of F_121 to adjust the frequency command. The drive will output the frequency according to the setting value.

The drive will save the setting value to F_121 after 5 sec when the frequency command is changed.

F_108	Digital Input Response Time	Range 5~16ms

a. Setting the input response time of multi-function terminals (X1~X6, FWD and REV) (digital debouncing).

b. If the signal width of digital inputs is smaller than the digital input response time, the program of drive will reject the input signal and do no process to input signal.

J. Multi-Function Outputs Setup

F_058	Multi-function Output Terminal (Y1)
F_059	Multi-function Output Terminal (Y2)
F_060	Multi-function Output Terminal (Ta1,Tb1)
F_131	Multi-function Output Terminal (Ta2,Tb2)

a. Y1 and Y2 are open-collector output terminals.
The maximum output specification is below DC48V / 50mA.

b. Ta1, Ta2 (N.O) and Tb1,Tb2 (N.C) are relay output terminals.
The maximum output specification is AC 250V / 0.5A, cosθ=0.3.

c. "＋" represents positive logic (N.O; contact a)
"－" represents negative logic (N.C; contact b)

d. Y1, Y2, Ta1, Ta2, Tb1, and Tb2 can be set as below functions:

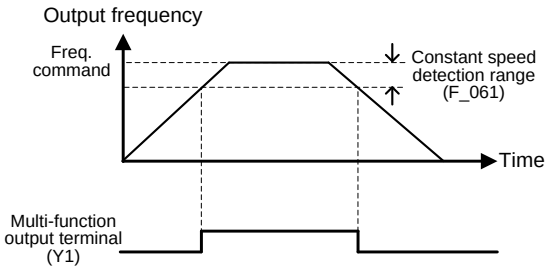
0: Disable (No function operated at terminals)

±1: Operation command detection. (Detection when start command is inputted)

±2: Constant speed detection.

F_061	Detection when drive runs at constant speed.	0~10Hz

Constant speed detection (F_058=2)



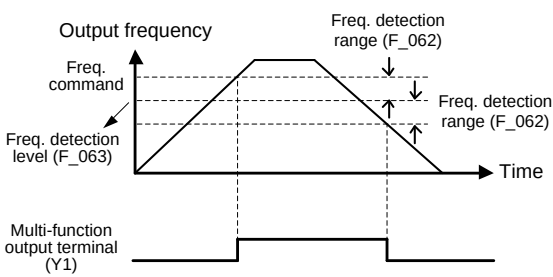
±3: Zero speed detection.

Detection when the drive at stop condition or the frequency command is less than the F_032 (Starting Frequency).

±4: Frequency detection

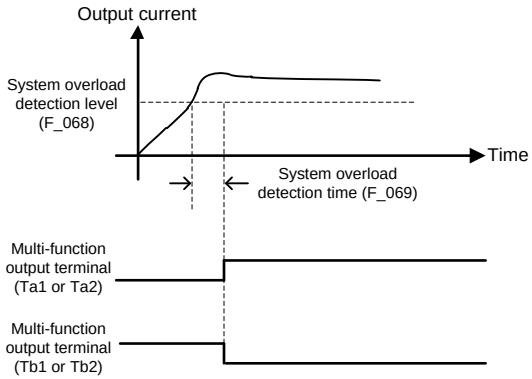
F_062	Frequency Detection Range	0~10Hz
F_063	Frequency Detection Level	0~400Hz

Frequency detection (F_059=4)



±5: Overload detection (OLO)

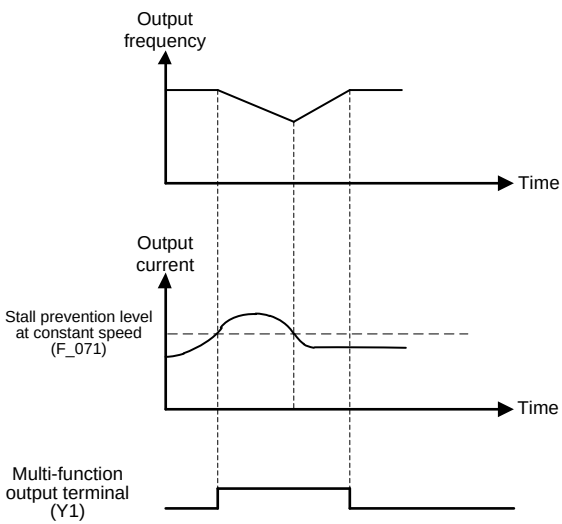
Overload detection (F_060=5)



※ “Contact a”is short-circuit when detection is activated;
“Contact b”is open-circuit when detection is activated.

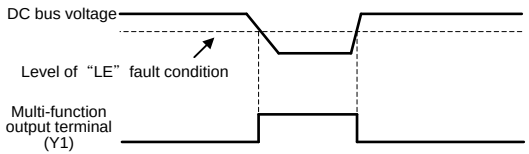
±6: Stall prevention detection

Stall prevention detection (F_058=6)



±7: Low voltage detection (LE)

Low voltage detection (F_058=7)



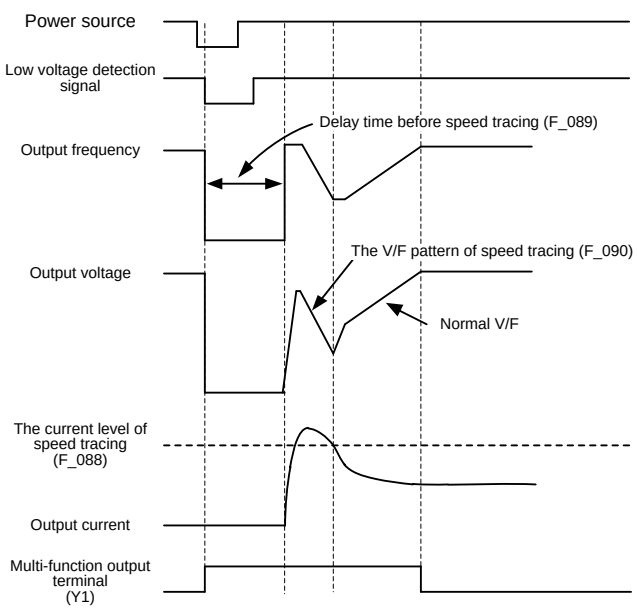
±8: Braking detection

Detection when the DC bus voltage is higher than dynamic brake voltage.

±9: Restart after instantaneous power failure detection

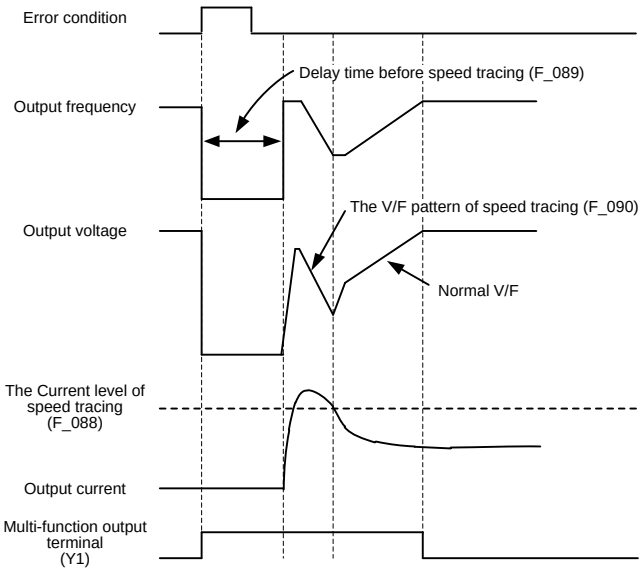
The parameter is activated when F_078 (Operation Selection at Instantaneous Power Failure) sets “1”.

Restart after instantaneous power failure detection (F_058=9)



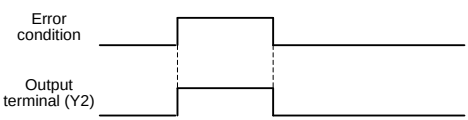
±10: Restart after error condition detection

Restart after error condition detection (F_058=10)



±11: Error detection

Error detection (F_059=11)



±12: Overheating detection

±13: Upper limit of feedback detection

Feedback detection information please refer to “F_193 on page 122”

±14: On-Off dead band detection

On-Off information please refer to “F_174 on page 122”

±15: On-Off range detection

±16: Fan detection during operation.

K. Automatic Torque Compensation

F_064	Automatic Torque Compensation Range	0~25.5V

Dynamic compensation by voltage to avoid any insufficient voltage at heavy-duty load.
The adjustment method is to minimize the output current by adjusting the parameter. (maximum power factor).
Higher compensation setting will result higher current.

L. Overload Detection Setup(OLO)

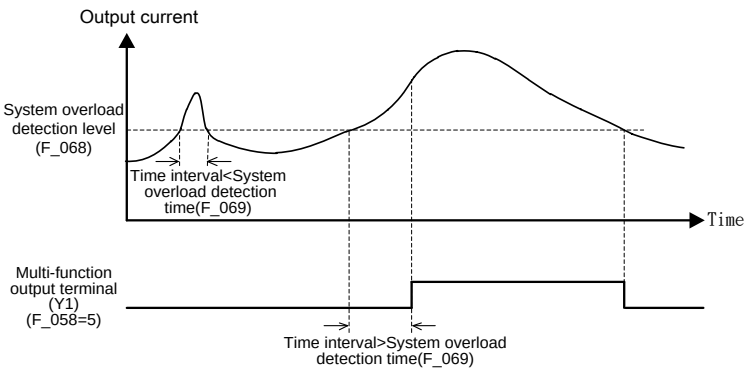
F_065	System Overload Detection (OLO)	0: Disable 1: Enable(OLO)

F_066	System Overload Detecting Selection	0: During constant speed only. 1: During operation (acceleration, deceleration or constant speed.)

F_067	Output Setting after System Overload	0: Drive keeps operation when the overload is detected. 1: Drive trips to protection when the overload is detected.

F_068	System Overload Detection Level	30%~200% Rated current
F_069	System Overload Detection Time	Range 0.1~25sec.

System overload detection is shown as below figure:



The systeom overload detection is activated when the output current exceeds the value of F_068 (System Overload Detection Level) with the time interval of F_069 (System Overload Detection Time) and the keypad will displayed OLO

Detection during operation includes acceleration, deceleration or constant speed.
The purpose of overload detection is to prevent the system damage. The detection level and time can be set by user requirements.

M. Stall Prevention Setup

F_070	Stall Prevention Level at Acceleration	30%~200% Rated Current
F_071	Stall Prevention Level at Constant Speed	

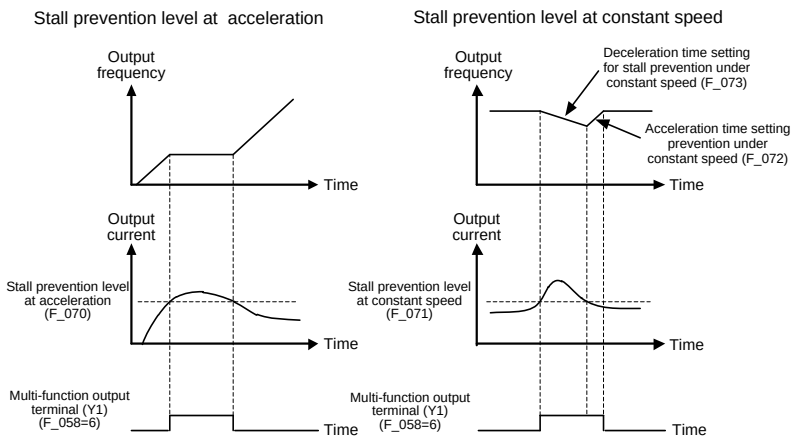
When the drive is RM6 series, the setting range is 30~200% of drive rated current.
When the setting value is 200, the stall prevention is disable.

F_072	Acceleration Time Setting after Stall Prevention under Constant Speed	0.1~3200sec.

F_073	Deceleration Time Setting for Stall Prevention under Constant Speed	0.1~3200sec.

F_074	Stall Prevention Setting at Deceleration	0: Disable 1: Enable

The description is as shown in a figure below:

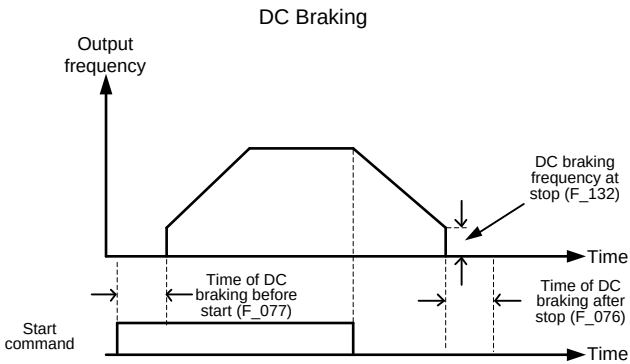


When enabling the F_074 (Stall Prevention Setting at Deceleration) and the stall occurs at deceleration, drive will operation at constant speed.
According to the actual requirement to disable the F_074 (Stall Prevention Setting at Deceleration), when connecting a dynamic brake unit.
If the DC bus voltage of drive is higher than the dynamic brake voltage level during stop, the keypad will display "OV" and the drive cannot be start by pressing "RUN" key.
If the DC bus voltage is less than the dynamic brake voltage level, the drive will automatically recover to normal and displaying the main display.

N. DC Braking Setup

F_075	DC Braking Level	The current level setting of DC braking.
F_076	Time of DC Braking after Stop	0~20sec
F_077	Time of DC Braking before Start	0~20sec
F_132	DC Braking Frequency at Stop	0.1~60Hz

DC braking after stop is to prevent the motor from coasting.
DC braking before start is to prevent the motor from rotation due to external force at start.



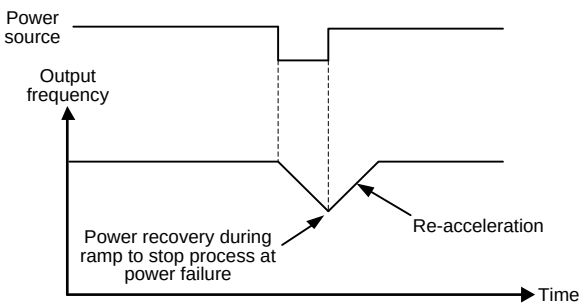
If the frequency command is set below F_032 (Starting Frequency) during operation and the output frequency is below the starting frequency, the DC braking will be activated. The setting value of F_132 is disable at the moment.

O. Drive Status after Power Failure

F_078	Operation Selection at Instantaneous Power Failure

Restart selection after drive instantaneous power failure.
0: Drive cannot be restarted
1: Drive can be restarted from operating frequency.
(Refer to the parameter description “Restart after instantaneous power failure detection” of multi-function output setting.)
Drive cannot be restarted with generator simultaneously when the generator is instantaneous power failure. Please restart the drive after the generator is restarted.
Disposal after power failure.
2: Ramp to stop
3: Drive will re-accelerate during ramp to stop interval, when the power is restored.
4: Drive will re-accelerate from 0Hz during ramp to stop interval, when the power is restored.
(Refer to the parameter description of F_079, F_103 ~ F_106.)

Re-acceleration after power recovery when the drive during ramp to stop process at power failure condition



F_079	Voltage Level of Ramp to Stop by Power Failure

Set the voltage of power source for ramp to stop.

When F_078=2 or3,the power source voltage is lower than the level F_079,basis to F_103~F_106 to setup ramp to stop process at power failure condition.
200V series: 150.0~192.0V
400V series: 300.0~384.0V

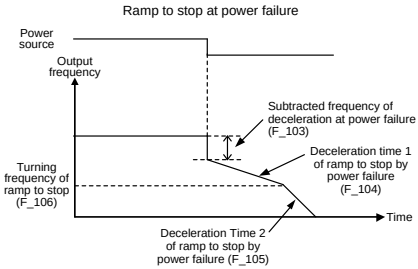
F_103	Subtracted Frequency of Deceleration at Power Failure

When the power failure, drive will reduce the frequency level before ramp to stop.
Output frequency(after) = Output frequency(before) – Subtracted Frequency.

F_104	Deceleration Time 1 of Ramp to Stop by Power Failure
F_105	Deceleration Time 2 of Ramp to Stop by Power Failure

F_106	Turning Frequency of Ramp to Stop

Set the turning frequency level of ramp to stop when the deceleration time is switched from F_104 setting value to F_105 setting value.



F_139	Operation Condition Memory	0: Enable(F_001=2,3,4) 1: Disable

The ramp to stop at power failure function is suitable for the inertia load.

⚠ CAUTION

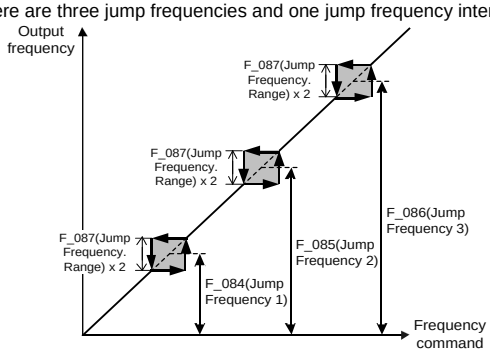
At the function F_078=1 or 3, the drive will automatically restart when the power is restored. Stay away from the motor and machine.

P. Jump Frequency

F_084	Jump Frequency 1	Setting Range:0~400Hz
F_085	Jump Frequency 2	
F_086	Jump Frequency 3	
F_087	Jump Frequency Range	Setting Range:0~25.5Hz

In order to avoid the mechanical resonance, these parameters allow resonant frequency to be jumped.

There are three jump frequencies and one jump frequency interval.



Q. Speed Tracing

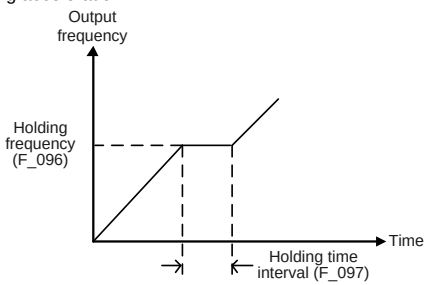
F_088	The Current Level of Speed Tracing	0~200% Rate current
F_089	Delay Time before Speed Tracing	Time for speed tracing before stop output 0.1~5 sec
F_090	The V/F Pattern of Speed Tracing	0~100%V/F voltage

The main application of speed tracing function is used for the speed tracing for the restart after instantaneous power failure, fault restart or the speed tracing command by the multi-function input terminal.
Refer to speed tracing for multi-function input terminals.

R. Holding Frequency and Time Interval

F_096	Holding Frequency	0~400Hz
F_097	Holding Time Interval	0~25.5sec

The main purpose of "holding" is to prevent the over slip of motor causing over-current and stall during acceleration.



S. External Indicators

F_099	External Indicator 1
F_100	External Indicator 2
F_101	External Indicator 3

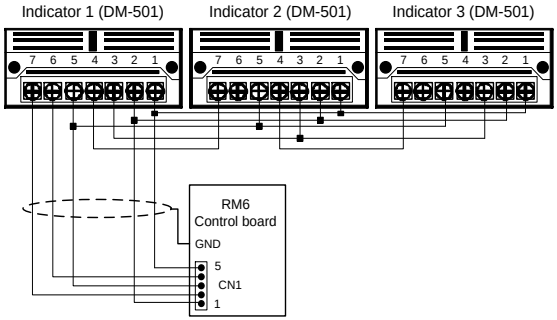
a. F_099 ~ F_101 can be set according to the setting method of F_006.

1.Output Frequency	6.Motor Speed(RPM)
2. Frequency Command	7.Machine Speed(MPM)
3. Output Voltage	8.Terminal Status/Heat Sink Temperature
4.DC busVoltage	9.Practical Value
5. Output Current	10.Setting Value

Note: DM-501 can not monitor setting value and practical value simultaneously,only can check the data individually

b. Please select twisted-pair shield wiring and shielding connected to the GND terminal of drive's control board.

c. The wiring diagram of external indicators is shown as below:



d. The position of connecter (CN1). Please refer to page 30、31

T. Fault Protection and Auto-reset

F_080	Auto-restart Times Setting of Error Trip	Use of Times:0~16.
F_116	Fault Reset Selection	

0: Auto-restart after error trip(OC,OE,GF only) RESET immediately,
1: Auto reset, F_117 interval time after auto-restart from 0 Hz
2: Auto reset without executing error detection

※ If the drive is operating over 24hrs without any error trip, the drive will automatically reset the counting number

※ F_116 Fault Reset Selection mode will automatically restart；make sure to turn off the power when matain the machine to avoid from danger.

F_117	Error Tripping Time Interval before Auto-Restart	Range:1~200, 1unit=10sec

U. Drive Overload Protection

F_135	200% Current Limitation	0：Disable 1：Enable

0: Disable
If drive's output current exceeds 220% rated current, the drive will display OC.
1: Enable
If drive's current exceeds 200% rated current, the drive will control PWM output voltage. (Limit current: 200%)

F_094	Drive Overload (OL1)

Prevent the drive damage due to overload.

0: Disable.
1: Electric thermal protection
Drive trips to stop when the output current is over 150 % of drive rated current for 1 min.(inverse time curve protection)
2: Current limit overload protection.
When the output current exceeds 200%, drive will limit the current to 200% and counting the times for tripping.
3: Electric thermal and Current limit overload protection are enabled.

V. Others Functions

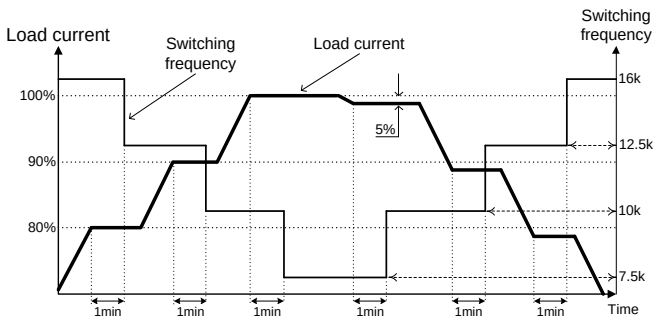
F_081	Switching Frequency

When the value of F_081 is set to “0”, the switching frequency of PWM voltage will be 800Hz and others switching frequency = F_081×2.5kHz.
The higher switching frequency has less noise. But using higher switching frequency must consider the cable length between drive and motor and must be adjusted according the connection distance between drive and motor. (Refer to “3-6 Wiring Caitions and Specifications” on page 36)

※Upper limit of switching frequency

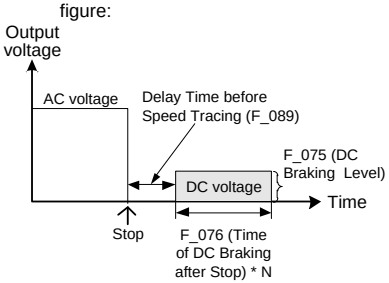
Heavy duty			Normal duty		
0.5HP~75HP	→	15kHz	1HP~30HP	→	15kHz
Above 100HP	→	10kHz	40HP~100HP	→	10kHz
			Above 100HP	→	7.5kHz

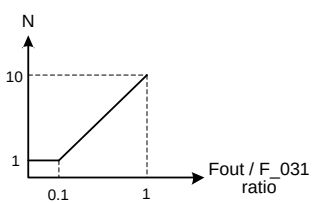
※ Switching frequency will be modulated with load automatically.



F_082	Stop Mode	0: Ramp to stop 1: Coast to stop 2: Coast to stop + DC braking

When the value of F_082 is set to “2”, the operation characteristic is shown as below figure:





*F_031 (Maximum Output Frequency)

When the output current of drive is abnormal at DC braking, appropriately increase the setting value of F_089 (Delay Time before Speed Tracing).

F_083	Reverse Prohibition	0: Reverse rotation allowed 1: Reverse rotation NOT allowed
F_091	Error Record	

Display the latest 5 records of errors. Pressing the ▲ or ▼ key can display other error records. (1: the latest error)

F_092	Parameter Setting Lock

0: Parameters are changeable. Maximum frequency cannot exceed 120.0Hz.
1: Parameters are locked. Maximum frequency cannot exceed 120.0Hz.
2: Parameters are changeable. Maximum frequency can exceed 120.0Hz.
3: Parameters are locked. Maximum frequency can exceed 120.0Hz.

F_093	Automatic Voltage Regulation (AVR)	

0: Disable The value of setting according to F_095.
1: Enable PWM output voltage will modulate automatically according to PN voltage

F_095	Power Source

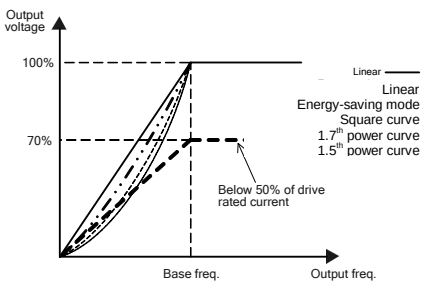
The setting value according to the actual power source voltage.
200V series setting range: 190.0 ~ 240.0V;
400V series setting range: 340.0 ~ 480.0V.
When the drive is power ON for first time and the power source voltage is lower than the 90% of F_095 setting value, the drive will display “LE” warning message.
After the power ON for drive, the drive displays “LE” message when the power source is lower than the 70% of F_095 setting value.

F_098	Grounding Fault Protection (GF)	0: Disable 1: Enable

If the leakage current exceeds 70% rated current of drive, the drive will trip to stop.

F_102	V/F Pattern Selection

0: Linear.
1: Energy-saving mode (auto-adjust V/F pattern according to the load condition.)
2: Square curve.
3: 1.7th power curve.
4: 1.5th power curve.



When the drive is used for fan or light-duty load applications, this function can be set to

achieve the energy-saving purpose.

F_208	Filter Setting of Keypad Pot

When the signal is noisy, use Keypad Pot to increase setting value and stabilize frequency command appropriately.

F_209	Keypad Pot Knob bias

When command value KP Pot Knob turn to 0, the value will correspond to the ratio of the setting value.

F_211	Drive duty selection

Motor load mode selection:
1: Heavy duty(150% OL1)
2: Normal duty(120% OL1)
Note: More details please refer to page 51.

F_212	Parameter Display Selection of Password lock

1: Paramerter cannot be changed after F_136 locked, but it can show the setting value.
2: Paramerter cannot be changed after F_136
locked, but it cannot display the setting value, it will show 
(Exclude the parameter of F_000、F_051、F_091、F_134、F_220)

F_213	Parameter Lock Password Setting

Preventing any unqualified personnel from setting the invalid parameters.
After setting the password by number 1~9999, the operation panel displays  .
Parameters cannot be changed after setting the passwords.

F_214	Parameter Lock Decoding Setting

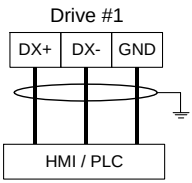
1. Enter the setting password to decode the parameter password setting.
If the input passwords are correct, the operation panel displays "  ".
When user inputs wrong parameter passwords, the panel will display "  " at 1st time; and then display "  "(PWF2) at 2nd time, and display "  "(PWF3) at 3rd time.
2. If user inputs wrong parameter passwords for 3 times, the drive must be power off and restart to re-begin the password decoding process.

W. Communication Setting

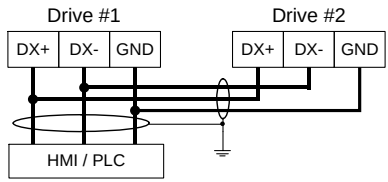
F_109	Communication Interface Selection	0：RJ-45 1：DX+ / DX-

F_110	Communication Address	0: disable

The followers use the address to send and receive messages from the host



Single Control



Multi Control

F_111	Communication Baud Rate	0: 4800bps 2: 19200bps 1: 9600bps 3: 38400bps

F_112	Communication Protocol	0: 8,N,2 1: 8,E,1 2: 8,O,1 3: 8,N,1

F_113	Communication Overtime (Cot)

When the message transmission during communication transmission is interrupted, has no data transmitting, or delays, drive displays “Cot” message.

F_114	Communication Overtime Disposal	0: Warning (Cot)；Continue operation 1: Warning (Cot)；Ramp to stop 2: Warning (Cot)；Coast to stop

F_115	Control Selection of Multi-Function Input Terminals	0: Multi-function input terminals selves 1: Multi-function input terminals command by communication interface

X. PID Control Functions

F_153	PID Control Mode Selection

0: Open-loop operation
1: Forward control; D postposition
2: Forward control; D preposition
3: Reverse control; D postposition
4: Reverse control; D preposition

※ Forward control: When the system practical value is less than the setting value, the drive will start to accelerate.
※ Forward control: When the system practical value is less than the setting value, the drive will start to decelerate.
※ D preposition-take F_158 Derivative time of Feedback as feedback.
※ D postposition-difference take F_157 setting value as Derivative control.

F_136	PID Error Gain

When PID command to select SV value, the PID error may multiply F_155, setting of physical quantity to change as frequency value.

F_147	SV Setting	Set the “SV” value for adjustment

F_148	PID Control Display

PID calculated value, enter F_148 and setting from PV value:
0: PV value
1: Integration value
2: Deviation value
3: PID command value
4: PID feedback value

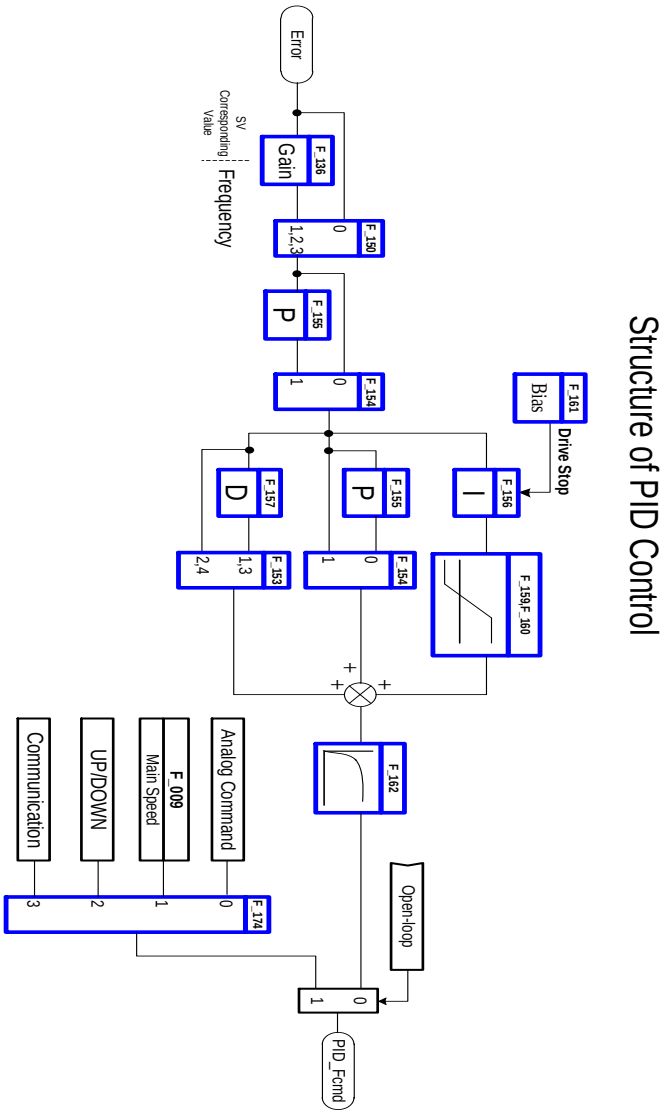
F_149	Main Display (F_153≠0)

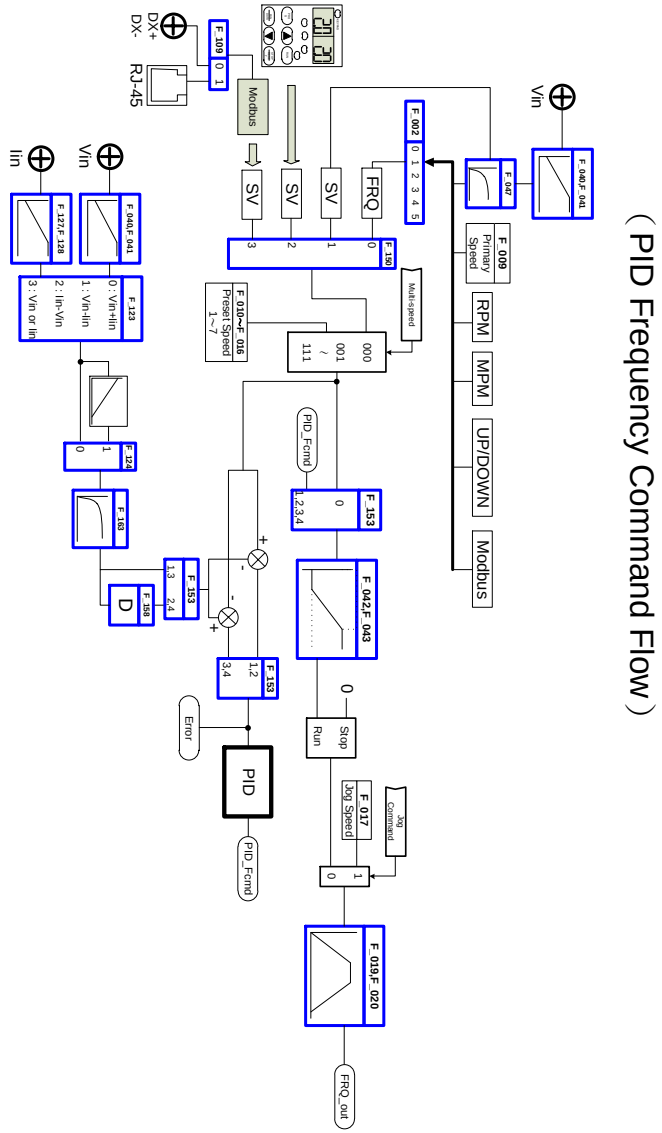
0: “PV” value
1: “SV-PV” value. Left side display SV value, Right side display PV value.

F_150	PID Control Command

To select PID command (Refer to the picture description below)
0: By F_002
1: Analog frequency command controls “SV”
2: Keypad controls “SV”
3: Communication interface controls “SV”

Note:As frequency setting SV value, according maximum frequency (F_031) corresponds to maximum value of sensor, and 0Hz corresponds to maximum sensor minimum value of sensor.


Structure of PID Control
Error
SV Corresponding Value
Frequency
Gain
F_136
1,2,3
0
F_150
P
F_155
1
0
F_154
Bias
F_161
Drive Stop
I
F_156
F_159,F_160
D
F_157
P
F_155
1
0
F_154
2,4
1,3
F_153
+
+
+
F_162
Open-loop
1
0
PID_Fcmd
Analog Command
F_009
Main Speed
UP/DOWN
Communication
0
1
2
3
F_174


（PID Frequency Command Flow）
Vin
F_040~F_041
F_042
F_009
Primary Speed
RPM
MPM
UP/DOWN
Modbus
F_002
0 1 2 3 4 5
SV
SV
SV
FRQ
F_150
3 2 1 0
Multi-speed
000
001
111
F_010~F_016
Preset Speed 1~7
PID_Fcmd
F_153
0 1,2,3,4
F_042,F_043
F_153
1,3 2,4
D
F_158
F_153
1,2 3,4
Error
PID
PID_Fcmd
0
Stop
Run
Jog Command
F_017
Jog Speed
0 1
F_018,F_020
FRQ_out
Iin
Vin
F_127,F_128
F_040,F_041
F_123
0 : Vin+Iin
1 : Vin-Iin
2 : Iin-Vin
3 : Vin or Iin
F_124
0 1
F_103
DX+
DX-
RJ-45
F_109
0 1
Modbus

F_154	P Selection	0: P postposition, Parallel for PID control 1: P preposition, Tandem for PID control

F_155	Proportional Gain(P)	Set the gain value for deviation adjustment. Range 0~25.0

This proportional gain is to compensate the gain for the deviation value of proportional setting. Higher gain value may easily cause system to vibrate, but lower gain value may result the slow reaction of drive.

F_156	Integration Time(I)	Set the integration time for deviation adjustment. (0.0: I control disabled) Range:0~100sec.

The integration time is to compensate the stable deviation of the system.
The integration time setting is according to the response time of the system feedback.

F_157	Derivative Time(D)	Set the derivative time for deviation adjustment. Range: 0~2.50 sec.

This derivative time is to compensate the variance of deviation value.
Higher derivative time setting of deviation value will result higher compensation to system.

F_158	Derivative Time of Feedback	Set the derivative time for feedback signal. Range 0~2.50 sec.

To evaluate the variance of feedback value. (Refer to F_153)

F_159	Integration Upper Limitation	Set the upper limitation value of integrator. The maximum output frequency 0~1.00
F_160	Integration Lower Limitation	Set the lower limitation value of integrator. The maximum output frequency-1.00~1.00
F_161	Integrator Initialized Value	The maximum output frequency-1.00~1.00

Function F_161 is to set the initial value of the staring frequency of integrator to accumulate and subtract this initial value according to the deviation value. The upper/lower limitation of frequency is set by function F_159 and F_160.

F_162	PID Buffer Space	Set the buffer space of PID output value. Range 0~255

Filtering the frequency command after adding P, I, D setting value. Higher setting value of F_162 will slow down the drive output.

F_170	Display Setting by Open-Loop Command
F_171	Setting Selection by Open-Loop Command

When the open-loop instruction is acting, frequency command by F_171 to select and operate, displaying content set by F_170.
Note:F_153≠0

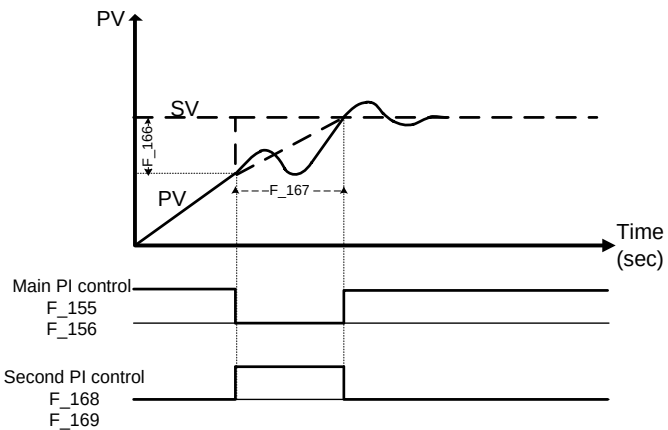
F_172	Keypad Selection by Open-Loop Command

Under control of PID to select Open-Loop Command，as F_171=1, Keypad can be adjusted.
0: Primary Speed
1: SV

F_166	(2nd PI Control) Active Range	Range:0~25.0
F_167	(2nd PI Control) Active Time	Range:0~300sec
F_168	Proportional Gain(P2)	Range:0~25.0
F_169	Integration Time(I2)	Range:0~25sec

F_167=0.0 When deviation contraction of SV、PV are in the active range of F_166;PID Control is based on P2 and I2.
F_167≠0.0 When deviation contraction of SV、PV are in the range of F_166;second control work with the time duration (F_167) and then switching back to the main PI control.

(Refer to the illustration as below.)



Y.Feedback Signal

When the transmitter connect Vin terminal, F_124 setting number is 4 and then the transmitter connected Iin terminal ,F_125 setting number is 4.
If the gap between PV value and real value is still different, user can fine tuning the F_151 and F_152.

F_151	Upper Limit of Transmitter	Setting range: -800~800
F_152	Lower Limit of Transmitter	

Setting to the transmitter of specification enable to SV/PV value accordance with system display.
Maximum value of transmitter: 20mA(or 10V) correspond with value.
Minimum value of transmitter: 4mA(or 2V) correspond with value (F_126=0);
0 mA(or 0V) correspond with value(F_126=1).

F_163	Feedback Signal Filter	Range 0~255

When the feedback signal produces interference phenomenon that can raise the value of feedback signal filter to prevent interference. If the value setting too high, the response of feedback signal will become slowly.

F_164	Feedback Signal Trip Detection

0: Disable
1: Enable.
Disconnect detection: Suitable for 4~20mA transmitter output terminal, however, when the transmitter detect 0mA that represent for disconnecting.

F_165	Feedback Signal Selection

0: Direct proportion signal. PV value displays maximum value of sensor.
1: Inverse proportion signal.PV value displays minimum value of sensor.

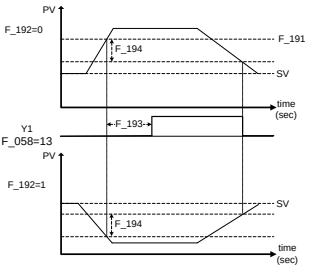
F_190	(Feedback Limit)Detection (OP)

0: Disable
1: Warning detection；Continue operation
2: Warning detection；Stop output
3: Error detection；Error trip

F_191	(Feedback Limit)Level	Range -800~800
F_192	(Feedback Limit) Detection Setting	

Feedback Limit Setting=0: PV value > Limit level detection
Feedback Limit Setting=1 PV value < Limit level detection

F_193	(Feedback Limit)Detection Time	Range 0~2550sec
F_194	(Feedback Limit)Range Setting	Range 0~5.0



F_195	(Feedback Limit)Condition Selection

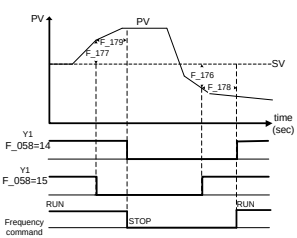
0: Valid during operation
When the drive of start command is displaying “On”, OP detecting function is valid during operation.
1: Full-time valid(*F_001=1)
The drive of start command On / Off are valid for full time.

F_175	(On-Off)Delay Time Control

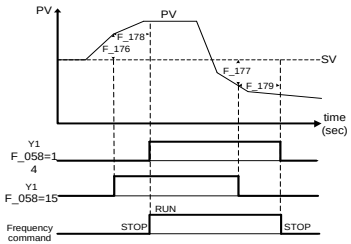
F_153≠0
The drive according to On/Off set value to control start/stop.
0: Disable 1: Enable

F_176	(On) Range Setting	Range-12.8~12.7
F_177	(Off) Range Setting	Range 0~10.0
F_178	(On)Delay Time	Range 0~250sec
F_179	(Off)Delay Time	
F_174	(On-Off)Control Selection	0：Forward 1：Reverse

Forward : Start condition is PV value < SV value. Stop condition is PV value > SV value.



Reverse: Start condition PV value > SV value. Stop condition is PV < SV value.

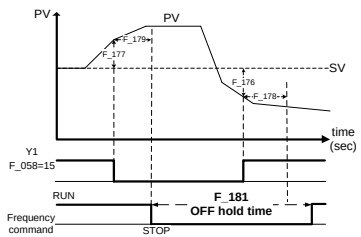


F_180	(On-Off)**Accel./Decel.** Time Selection

0: Primary Accel./Decel. time
1: Secondary Accel./Decel. time

F_181	(Off)Holding Time

When the Off function of drive is acting, it can be forced to set holding time.

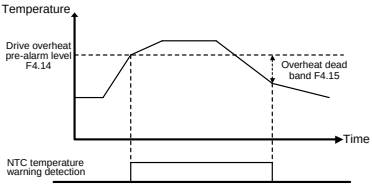


F_140	NTC Thermistor Setting

The drive should be enclosed NTC thermistor that can detect the temperature of sink and fan control.
0:Disable
1:Enable

F_141	Drive Overheating Warning Selection	
F_142	Drive Overheating Warning Level	Range: 45~85℃
F_143	Drive Overheating Dead Band	Range: 2.0~10

When the drive heat sink temperature is over the pre-alarm level, the drive displays " Ht " until the temperature drops below the drive overheat dead band.
a. The settings are listed as below:
0: Disable
1: Warning: Continuous operation.
2: Warning: Drive de-rates the switching frequency automatically every 5 minutes.
3: Warning: Drive trips to stop, and the cooling fans activate. After the temperature decreases lower than "drive overheat dead band, drive starts to operate again.



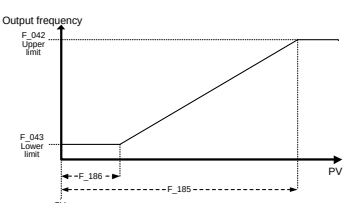
F_144	Fan Control Selection	
F_145	Temperature Level of Fan Activation	Range: 25~60℃
F_146	Minimum Operation Time of Fan	Range: 0.1~25min

Function: Increase the lifetime of drive cooling fans, save energy and extend the maintenance cycle time of heat sink.
The settings are listed as below:
0:Forced air cooling
Start and continuously operate the cooling fans of drive when power ON.
1:Operation air cooling
Cooling fans of drive is start when the drive is operation. Cooling fans will stop when the drive disable and after waiting at the minimum operation time.
2: Temperature control
Drive cooling fans activate when the drive temperature is over the temperature level of fan activation. Cooling fans will stop when the temperature of drive drops below the overheat dead band of drive after waiting at the minimum operation time.

F_138	Overheat Level Adjustment	Overheat（OH）Level=Setting Value＋85℃

F_182	Air Conditioning Mode	0:Disable 1:Enable
F_183	(Air Conditioning Mode) Temperature Response Time	Range: 0~25sec
F_184	(Air Conditioning Mode) Variation Frequency	Range: 0.1~25Hz
F_185	(Air Conditioning Mode) Upper Limit Range of Temperature	Range: F_184~20.0
F_186	(Air Conditioning Mode) Lower Limit Range of Temperature	Range: 0~F_184

1. Under control of air condition mode: PV > (SV+F_186),output frequency accelerate the rate of change (Hz/sec)=(F_184/F_183).
2. Under control of air condition mode: PV >(SV+F_187),output frequency decelerate the rate of change (Hz/sec)=(F_184/F_183)*4.
3. Start command: the frequency lower than frequency limit range(F_043), the accelerating time is second acceleration time(F_027); Stop command: decelerating time follow the second deceleration time(F_028).



F_187	(Air Conditioning Mode) Holding Frequency Level	Range: 0~1.00
F_188	(Air Conditioning Mode) Detection Time of Holding Frequency	Range: 0.0~25 hr
F_189	(Air Conditioning Mode) Full Speed Time	Range: 0.0~25min

In air compressor mode:
When the drive under the level of holding speed (F_187) and the time continue to over holding speed (F_188); the drive will force open-loop to run at full speed and after maintain at full speed time (F_189), the drive will return to PID operation.

1.When the drive is operating under the level of holding speed (F_187), and the counter may start moving. If output frequency is over holding speed, the counter will clean the value as 0.
2.When the counter reach at holding speed (F_188), the drive may run at full speed and after persisted for a moment (F_189) that the drive returns would be normal.
3.F_188 setting as 0, it stands for closing this function.

Chapter 7 Communication Description

7-1Communication Protocol

Serial data transmission is an asynchronous serial data transmission: 1 frame = 11 bits (3 types of format shown in below figures)

● 8,N,1：1 start bit，8 data bits，1 stop bit

START	BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	STOP

● 8,N,2: 1 start bit，8 data bits，2 stop bits

START	BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	STOP	STOP

● 8,E,1: 1 start bit，8 data bits，1 even parity bit，1 stop bit

START	BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	EVEN PARITY	STOP

● 8,O,1: 1 start bit，8 data bits，1 odd parity bit，1 stop bit

START	BIT0	BIT1	BIT2	BIT3	BIT4	BIT5	BIT6	BIT7	ODD PARITY	STOP

7-2 Message Format

Address (Drive)	OP Code	Data n	…	Data 1	Data 0	CRC 0	CRC1	END
Drive Address No. (1 Byte)	Operation Message (1 Byte)	Data Message (Data length “n”: depending on OP Code)				CRC Checksum		No Transmitting ≧10ms

●**Address:** Drive address number for host to control.

00H: The host broadcasts messages to all receivers (drives). All receivers only receive the message but have no messages returned to the host.

01H~FEH: The host designates the receiver (drive) by defining the drive address number.

●**OP Code(Operation Code):** The operation of the host to the drive.

03H- Read multi-registers
06H- Write to single register
08H- Receiver detection
10H- Write to multi-registers

●**Data:** Including start register, several registers, data length (maximum 8 data), data content (maximum 16 bits)

Note: Data length – 1 byte, others – 1 word(2 bytes)

●**CRC Checksum:** Cyclical Redundancy Check performs XOR and bit shifting operations for all hexadecimal values in the message to generate the checksum Code to verify the communication validity.

Checksum is to sum all message bits for 16-bit CRC calculations. (See CRC Checksum)

●**Message Length:** Message length is listed in between maximum and minimum values. Message lengths of OP Code 03H and 10H are dependent on the number of registers required in one message. (See Operation Code(OP Code) Description)

OP Code	Description	Instruction Code		Return Code	
		Min(bytes)	Max(bytes)	Min(bytes)	Max(bytes)
03H	Read multi-registers	8	8	7	21
06H	Write to single register	8	8	8	8
08H	Drive Detection	8	8	8	8
10H	Write to multi-registers	11	25	8	8

●**Operation Code(OP Code) Description:**

※03H (Read multi-registers):

Example: Read data from registers 2101H and 2102H of the drive 1

Message Code (Host to Drive)

Address	OP Code	Starting Register		Register Numbers to Readout		CRC Checksum	
		MSB	LSB	MSB	LSB	LSB	MSB
02H	03H	21H	01H	00H	02H	9FH	C4H

This example shows the host to read the drive data from 2 registers of the drive. The host identifies drive 1 by calling the drive address (02H) with the “read” operation command (03H) to read the drive data from the registers (2101H – starting register) to the register (2102H – Register Numbers to Readout defines the numbers of register for data readouts).

Return Code (Drive to Host)

Address	OP Code	Data Bytes	2101H(Register) Data		2102H(Register) Data		CRC Checksum	
			MSB	LSB	MSB	LSB	LSB	MSB
02H	03H	04H	55H	00H	17H	70H	D6H	EBH

The host reads registers 2101H and 2102H of drive (02H) (drive status and speed command). After the drive receives the host’s command, the drive returns 4 bytes data (2101H=5500H and 2102H=1770H) to the host.

Caution: The host cannot simultaneously broadcast 03H OP Code to drives when multiple drives connected or all drives reject host’s OP Code.

※06H (Write to single register)

Example: Write a data (1770H) into the drive register (2001H)

Message Code (Host to Drive)

Address	OP Code	Drive Register		Register Data		CRC Checksum	
		MSB	LSB	MSB	LSB	LSB	MSB
02H	06H	20H	01H	17H	70H	DDH	EDH

This example shows the host to write the data (1770H) to the register (2001H) of the drive. The host identifies drive 1 by calling the drive address (02H) with the "write" operation command (06H) to write the data (1770H) into the register (2001H).

Return Code (Drive to Host)

Address	OP Code	Drive Register		Register Data		CRC Checksum	
		MSB	LSB	MSB	LSB	LSB	MSB
02H	06H	20H	01H	17H	70H	DDH	EDH

The host writes data 1770H into the drive register 2001H. After receiving data from the host and writing data into drive's registers, the drive returns the original receiving message to the host. OP Code-06H of the host can synchronously broadcast to all drives but has no return Code to the host.

※08H (Drive detection): Only use when testing the communication

OP Code – 08H is to detect if the drive is correctly receiving the data from the host. The main purpose of using this OP Code is to ensure the host data to be correctly sent to the drive.

Example: Verify the data (0000H and AA55H) to be correctly received by the drive.

Message Code (Host to Drive)

Address	OP Code	Data 1		Data 2		CRC Checksum	
		MSB	LSB	MSB	LSB	LSB	MSB
02H	08H	00H	00H	AAH	55H	5EH	A7H

The host sends OP-Code (08H) to verify the data 0000H and AA55H to be correctly received by the drive.

Return Code (Drive to Host)

Address	OP Code	Data 1		Data 2		CRC Checksum	
		MSB	LSB	MSB	LSB	LSB	MSB
02H	08H	00H	00H	AAH	55H	5EH	A7H

The drive returns the same message to the host to confirm the data well received from the host. Data 1 must be 0000H but Data 2 can be any values.

Note: The host cannot simultaneously broadcast 08H OP Code to all drives when multiple drives connected or drives reject drive's OP Codes.

※10H (Write to multi-registers)

When multiple data need to write into the drive from the host, the host can define how many registers and data to be written into the drive.

This example is illustrating 2 data (1011H and 1770H) from the host to be written into 2 drive registers (2000H and 2001H).

Message Code (Host to Drive)

Address	OP Code	Starting Register		Register Number to Write		Data Length	Data 1		Data 2		CRC Checksum	
		MSB	LSB	MSB	LSB		MSB	LSB	MSB	LSB	LSB	MSB
02H	10H	20H	00H	00H	02H	04H	10H	11H	17H	70H	3FH	FBH

The host calls the drive 1 by defining the drive address (02H) with the write to multi-registers OP Code (10H) to write 2 data (1011H and 1770H) into the drive registers (2000H and 2001H) which are defined by calling starting register (2000H) with “register number to write” (0002H). In this example, if user has 4 data to write to 4 drive registers, the message Code can be as follows:

a. Starting register: 2000H (still)
b. Register number to write: 0004H

Then, 4 data will be sequentially written into 4 registers starting from 2000H, 2001H, 2002H, to 2003H.

Return Code (Drive to Host)

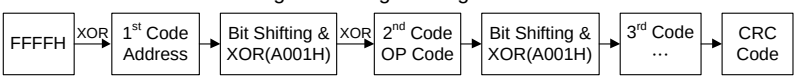
Address	OP Code	Starting Register		Register Numbers to Write		CRC Checksum	
		MSB	LSB	MSB	LSB	LSB	MSB
02H	10H	20H	00H	00H	02H	4AH	3BH

The host writes 2 data (1011H and 1770H) with total data length 4 byte to 2000H and 2001H registers of drive. The drive receives and writes the data to the registers, and then returns the message to the host. The host can synchronously broadcast all drives to write multi-data to multi-registers in order to change the data synchronously.

7-3 CRC Checksum Algorithm

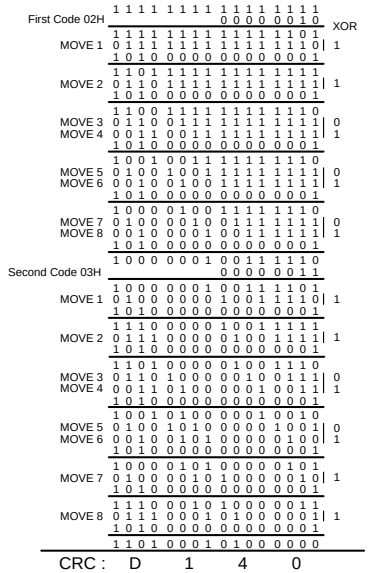
CRC checksum Code is to verify the message validity during the communication and its algorithm is to apply each Code in the message to perform XOR and bit shifting operations to generate the CRC Code.

Here is the checksum algorithm diagram to generate CRC Code.



The following example shows how CRC Code is generated.

Example: To generate CRC Code D140 from Address Code: 02H and OP Code: 03H

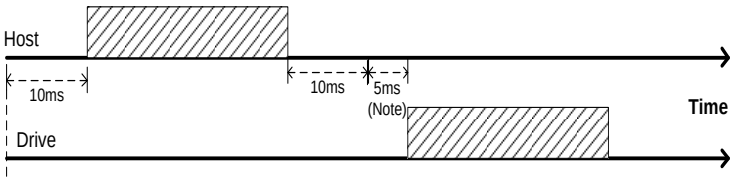


The following example of using C language to create a sample program for CRC checksum algorithm

Example: C language sample program

```
unsigned char *data;                    // Message pointer
unsigned char length;                   // Message length
unsigned int crc_chk(unsigned char *data,unsigned char length)
{
        int i;
        unsigned int reg_crc=0xffff;
        while(length--)
         {
           reg_crc^=*data++;
           for(i=0;i<8;i++)
               if(reg_crc&0x01)
                  reg_crc=(reg_crc>>1)^0xa001;
               else
                  reg_crc=reg_crc>>1;
         }
}
```

7-4 Processing Time of Communication Transmission



Communication Starts/Resets

The communication waits for 10ms to start the communication transmission after the drive powers on or the communication function of the drive changes. The drive needs 5ms processing time to return the message to the host after the message is received from the host. If the broadcast DO NOT send back the massage , the host can start sending the message Code after 5ms.

Note: if the message Code is to “Read” or “Write” the parameter, the drive needs 100ms processing time to return the message to the host.

7-5 Communication Troubleshooting

1. When error occurs at the communication network, the drive provides the self-testing function to identify where error occurs. Please check communication function settings to verify the validity of functions.

2. When the host receives returned error messages from a drive, the host sends the invalid operation command to drive. The following table is the error message format.

Address	OP Code	Error Code	CRC Checksum	
			LSB	MSB
02H	1xxxxxxxB	xxH	xxH	xxH

OP Code sets MSB (bit7) as 1 for the original command message, but error Code gives different values according to different types of errors. The below table is describing types of error Code:

Error Code	Error Type	Descriptions
0 0	Serial communication format error	Parity error of serial communication
0 1		Data frame error of serial communication
0 2		Over-bit error of serial communication
0 3	Modbus OP Code error	OP Code is not in either 03H,06H,08H, or 10H
0 4	Modbus CRC error	CRC checksum error
0 5	Modbus data range error	1. Data length in transmission not matched with the protocol 2. Data range over the register length at “write”
0 6	Modbus register characteristics error	Registers writes into read-only registers
0 7	Modbus register error	No-defined registers

7-6 Drive Registers and Command Code

●Registers – Write Operation

Reg. No.	Name	Description	
10nnH (*Note 1)	Function setting	Drive function setting/monitoring; nn: F_000~F_220	
2000H	Operation command 1	b0~b1	00: No use
			01: Stop
			10: Start
			11: JOG command
		b2~b3	Reserved
		b4~b5	00: No use
			01: Forward command
			10: Reverse command
			11: Rotation direction change command
		b6~b7	00: Primary Accel./Decel. time
			01: Second Accel./Decel. time
			10: Third Accel./Decel. time
			11: Fourth Accel./Decel. time
		b8~bB	0000: Primary speed (communication)
			0001: Preset speed 1
			0010: Preset speed 2
			0011: Preset speed 3
			0100: Preset speed 4
			0101: Preset speed 5
			0110: Preset speed 6
			0111: Preset speed 7
			1000: Preset speed 8
			1001: Preset speed 9
			1010: Preset speed 10
			1011: Preset speed 11
			1100: Preset speed 12
			1101: Preset speed 13
			1110: Preset speed 14
			1111: Preset speed 15
		bB	Reserved
		bC~bD	00: No use
			01: b6~bB functions (*Note 2)
			10: Enable operation command 2 resister.
			11: 01 and 10 Disable
		bE~bF	Reserved

●Registers – Write Operation

2001H	Frequency command	Primary frequency is set by communication (unit: 0.01Hz)	
2002H	Operation command 2	b0	1: External fault command
		b1	1: Reset command
		b2	1: Jog command
		b3	1: Output interruption command
		b4	1: Coast to stop command
		b5	1: Secondary **Accel./Decel.** command
		b6	1: **Accel./Decel.** prohibition command
		b7	1: Select analog input source
		b8	1: DC braking enable
		b9	1: Secondary frequency selection
		bA~bF	Reserved
2003H	SV settimg value	Setting value of constant pressure (unit: 0.1)	

●Registers – Read Operation

Reg. No.	Name	Description	
2100H	Drive error Code	00H	No error
		01H	Drive over current (OC)
		02H	Over voltage (OE)
		03H	Drive overheat (OH)
		04H	Drive overload (OL1)(OL2)
		05H	Motor overload (OL)
		06H	External fault (thr)
		07H	Short protection (SC)
		08H	A/D converter error (AdEr)
		09H	Reserved
		0AH	Reserved
		0BH	Reserved
		0CH	Reserved
		0DH	Grounding fault (GF)
		0EH	Under voltage during operation (LE1)
		0FH	EEPROM error (EEr)
		10H	Reserved
		11H	Drive output interruption (bb)
		12H	System overload (OLO)
		13H	Reserved
		14H	Reserved
		15H	Coast to stop (Fr)

●**Registers – Read Operation**

2101H	Drive status 1	b0 ~b7	Reserved
		b8	1: Frequency command by communication
		b9	1: Frequency command by analog inputs
		bA	1: Operation command by communication
		bB	1: Parameter locks
		bC	1: Drive running status
		bD	1: Jog running status
		bE	1: Forward indication
		bF	1: Reverse indication
2102H	Frequency command	Monitor drive's frequency command (unit: 0.01Hz)	
2103H	Output frequency	Monitor drive's output frequency(unit: 0.01Hz)	
2104H	Output current	Monitor drive's output current(unit: 0.1A)	
2105H	DC bus voltage	Monitor drive's DC bus voltage(unit: 0.1V)	
2106H	Output voltage	Monitor drive's AC output voltage(unit: 0.1V)	
2107H	Frequency of multi-speed	Monitor drive's frequency of multi-speed(*Note 3)	
2108H	Practical Value	Practical value (unit:0.1 pressure sensor unit)	
2109H	Reserved		
210AH	Reserved		
210BH	Reserved		
210CH	Reserved		
210DH	Drive's temperature	Monitor the temperature of heat sink(unit:0.1℃)	
210EH	Reserved		
210FH	Reserved		
2300H	I/O terminal status	b0	1: FWD terminal operation
		b1	1: REV terminal operation
		b2	1: X1 terminal operation
		b3	1: X2 terminal operation
		b4	1: X3 terminal operation
		b5	1: X4 terminal operation
		b6	1: X5 terminal operation
		b7	1: X6 terminal operation
		b8	1: Y1 terminal detection
		b9	1: Y2 terminal detection
		bA	1: Ta1,Tb1 terminal detection
		bB	1: Ta2,Tb2 terminal detection
		bC	1: Primary speed is controlled by analog input.
		bD	1: Primary speed is controlled by keypad.
		bE	1: Primary speed is controlled by UP/DOWN command.
		bF	1: Primary speed is controlled by communication.

●**Registers – Read Operation**

2301H	Drive status 2	b0	Reserved
		b1	1: Constant speed
		b2	1: Zero speed
		b3	1: Frequency detection
		b4	1: System overload
		b5	1: Stall prevention
		b6	Reserved
		b7	1: Braking action
		b8	Reserved
		b9	Reserved
		bA	1: Error occurs
		bB ~bF	Reserved
2302H	Reserved		
2303H	Fault record 1	Fault record 1 (*Note 4)	
2304H	Fault record 2	Fault record 2 (*Note 4)	
2305H	Fault record 3	Fault record 3 (*Note 4)	
2306H	Fault record 4	Fault record 4 (*Note 4)	
2307H	Fault record 5	Fault record 5 (*Note 4)	

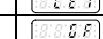
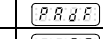
Note:

1.10nnH—Write and read allowed
2000H~2002H—Write only, read prohibited
2100H~210FH—Read only, write prohibited

2.The b6~bB function is enabled, multi-function command –Multi-speed 1, 2, 3,4 will be inactive.

3. 0: Analog
1: Primary speed
2~8: Multi-speed 1~7
9: Jog speed
11: Communication
12~19: Preset speed 8~15

4.Fault record table

Error Code	Drive display	Description
01H	 (AdEr)	A/D converter error
08H	 (OC)	Drive over current
0CH	 (OE)	Over voltage
0DH	 (LE1)	Under voltage during operation
0EH	 (GF)	Grounding fault
0FH	 (OH)	Drive overheat
10H	 (OL)	Motor overload
11H	 (OL1)	Drive overload
12H	 (OLO)	System overload
13H	 (thr)	External fault
14H	 (PAdF)	Keypad interruption during copy
15H	 (SC)	Fuse open

7-7 Programming Examples – Register and Command

7-7-1 Access Drive Function Setting – Write Operation

Example: Set function F_009 (primary speed) = 30 Hz

a. Drive register used: 0009H(9 (decimal value)=0009H(hex)

b. Register data: 0BB8H(30Hz=30.00Hz(resolution:0.01Hz)

→ 30.00÷0.01=3000(decimal)=0BB8H(hex))

Code to write to drive register from the host (CRC exclusive)

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	10H	09H	0BH	B8H

7-7-2 Host Control to Drive – Write Operation

When the host control by Modbus communication, user can simply create an icon or active key/button to activate the drive. The following examples shows how to program the communication control.

1. Start the drive:

a. Create an icon or active button/key on the host for "Drive Start"

b. Program the host with the following Code for "Drive Start"

c. The drive register to be written for start operation: 2000H

d. The register data for start operation: 0002H

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	20H	00H	00H	02H

2. Forward rotation command:

a. Create an icon or active button/key on the host for "Forward"

b. Program the host with following Code for "Forward" rotation control

c. The drive register to be written for forward command: 2000H

d. The register data for forward command: 0010H

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	20H	00H	00H	10H

3. Speed Setting (frequency command) – without using drive function setting:

Set the speed to be 30.05Hz (resolution: 0.01Hz)

a. The drive register to be written for Speed setting(frequency command): 2001H

b. Convert 30.05Hz to hexadecimal value:
30.05 x 100 (by the resolution) = 3005 (decimal) = 0BBDH

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	20H	01H	0BH	BDH

4.Primary Acceleration/Deceleration Time Setting:

Set the acceleration/deceleration time = 1.5 seconds (resolution: 0.1 seconds)

Primary accel time

a. Set F_019 (Primary accel time) = 1.5 seconds
Register number: 1013H (19 (decimal) = 0013H(hex)).

b. Register data:
000FH (1.5÷0.1(resolution:0.1sec.)=15(decimal)=000FH(hex)

Primary decel time

a. Set F_020 (Primary dec. time) = 1.5 seconds
Register number: 1014H(20(decimal)=0014H(hex))

b. Register data:
000FH(1.5 ÷0.1(resolution:0.1sec.) = 15(decimal)=000FH(hex)

Acceleration/Deceleration Time Setting

a. Register number: 2000H

b. Register data: 000HH(b6~b7)

Set the acceleration time F_019 = 1.5 seconds

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	10	13	00H	0FH

Set the deceleration time F_020 = 1.5 seconds

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	10	14	00H	0FH

Select primary acceleration/deceleration time

Address	OP Code	Drive Register		Register Data	
		MSB	LSB	MSB	LSB
01H	06H	20H	00H	00H	00H

7-7-3 Host Control to Drive – Read Operation

1. Drive Error Trips (Fault Code):

Example: Drive error trips due to “GF” (grounding fault) and the fault message displayed at the host.

a. The host sends the below Codes to access the drive register to monitor drive faults (read only one register data)
-Drive register: 2100H
-Number of register to read: 1 ➔ 0001H

Message Code (Host to Drive)

Address	OP Code	Drive Register		Register Numbers to Readout	
		MSB	LSB	MSB	LSB
01H	03H	21H	00H	00H	01H

b. The drive returns the fault Code to the host when “GF” occurs:
-GF Code: 0DH

Return Code (Drive to Host)

Address	OP Code	Data Byte	2100H(Register) Data	
			MSB	LSB
01H	03H	02H	00H	0DH

c. Program the host to convert register data 000DH to “GF” message

2. Drive Frequency Output Readout:

Example: If the drive frequency outputs = 40.65Hz, read the data output from the drive and display 40.05Hz in the host.

a. The host sends the below Codes to access the drive register to read out the frequency output data (read only one register data)
-Drive register: 2103H
-Number of register to read: 1 ➔ 0001H

Message Code (Host to Drive)

Address	OP Code	Drive Register		Register Numbers to Readout	
		MSB	LSB	MSB	LSB
01H	03H	21H	03H	00H	01H

b. The drive returns the frequency output readouts to the host
-Output frequency readouts from the drive (2103H register data):

Return Code (Drive to Host)

Address	OP Code	Data Byte	2103H(Register) Data	
			MSB	LSB
01H	03H	02H	0FH	E1H

c. Program the host to convert register data 0FE1H (Hex value)
= 4065 (Decimal value)
d. Display the output frequency (resolution = 0.01): 4065/100 = 40.65 (unit in Hz)

Chapter 8 Operation Procedures and Fault Protection

8-1 Operation Procedures

⚠ DANGER
1. DO NOT remove wires when the internal indicator of the drive remains ON. 2. DO NOT remove wires when the internal indicator (CHARGE)of the drive remains ON.

⚠ CAUTION
1. Check if the shield of wire is broken after wiring is completed to avoid electric leakage or short circuit. 2. Screws on the terminal must be fastened.

A. Verify and check the compatibility between power source, voltage, motor, and drive.

B. Connect the power to drive R/L1, S/L2, T/L3 (three-phases) or R/L1, S/L2 terminals (single-phase).

C. Set all required parameters and functions after power is ON and measure the output voltage of the drive at U/T1, V/T2, W/T3 terminals to verify if the output voltage and current are valid. Press OFF/RESET when completing all verifications.

D. Switch off the power and wait for drive's power indicators off, and then connect drive's U/T1, V/T2, W/T3 terminals to the motor.

E. Operate the motor with the drive by low speed after power ON to verify the validity of the motor rotation direction and then to slowly increase the motor speed.

F. Motor start or stop must be controlled by drive control signal instead of switching the power ON / OFF. The lifetime of the drive will be significantly reduced if the invalid operation using the switch control of the power is applied to motor control.

G. Because the starting current of motor is 6~8 times of rated current, DO NOT install the magnetic contactor between the drive and motor for the motor operation.

H. When using the single-phase power source to drive the three-phase drive (not the standard type of single-phase power input), first confirm the horsepower of motor, and then calculate the motor rated current by multiplying the motor rated current by 2 times to the base value of drive rated current. The drive selection for this single-phase power must have the rated current equal to the calculated drive rated value.

Formula: Motor rated current × 2 = Drive rated output current

Example:

a. Drive selection:

Motor specification: 220VAC, 1HP ; rated current: 3.1A

Base value of drive rated current=3.1 (A) × 2 = 6.2 (A)

Drive specifications: 220VAC, 1HP drive = 5A (rated output current)
2HP drive = 8A (rated output current)

⇨ Select 2HP drive for 1HP AC motor.

b. Wiring of power: Connect the single-phase power line to R, S terminals.

c. Parameter settings:
Please reset below functions. If the parameters are not modified, the motor and drive could be possibly damaged.

F_048 Motor Rated Current = 3.1A
(the setting must be based on the motor rated current)

F_068 System Overload Detection Level = 80
(the half of the default setting value 160%)

F_071 Stall Prevention Level at Constant Speed = 80
(the half of the default setting value 160%)

8-2 Fault Protection Display and Troubleshooting

a: Description:

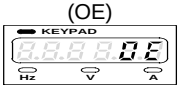
The drive has well protection functions to protect drive and motor when faults occur. When the fault occurs, the drive trips by the protection functions and display fault message on keypad. After the fault is troubleshooted, reset the drive by pressing OFF/RESET of keypad or command the drive to reset through multi-function input terminals by an external reset signal

b: Protection and Troubleshooting List:

Error Trip Messages of Drive

Display	Description	Cause	Troubleshooting
(EEr) 	**EEPROM error**	●EEPROM_data write fault. ●EEPROM component defected.	●Please reset all parameters to default value and restart the drive. ●Return the drive to repair, when the fault cannot be eliminated.
(AdEr) 	**A/D converter error**	A/D_converter broke down	Call out customer service rto repair
(SC) 	**Fuse open**	●Drive internal fuse open. ●IGBT power module damage.	Call out customer service rto repair
(LE1) 	**Under voltage during operation** The internal DC bus voltage level is below 70%.	●Phase failure of input power. ●Instantaneous power off. ●Voltage variation of power source is too high. ●Motor with instant overload causing the high voltage drop.	Increase the power capacity.

Error Trip Messages of Drive

Display	Description	Cause	Troubleshooting
(OC) 	**Drive over current** The output current of drive during operation exceeds 220% of drive's rated current.	●Output terminals are short circuit. ●Motor load overburden. ●The acceleration time is too fast. ●Drive starts at 0 while the motor is running in rotation. ●Wrong wiring or poor insulation. ●Overtop Starting voltage. ●Ouput side with power capacitor or filter capacitor.	●Check U/T1,V/T2,W/T3 terminals to verify if terminals are short. ●Check motor correspond to drive. ●Check if the motor operated in over-rated condition. ●Check overload condition of motor. ●Check if the acceleration time is too fast.
(GF) 	**Grounding fault** ●The three-phase output current is unbalance and exceeding the detection level of grounding fault. ●Grounding fault protection:F_098	Check for possible bad insulation at motor's output side or wire.	Check the insulation of motor's wire and motor.
(OE) 	**Over voltage** ●The internal DC bus voltage of drive is over the protection level. ●200V series: About DC410V. ●400V series: About DC820V.	●The deceleration time is too fast ; regenerative voltage makes DC bus voltage overtop. ●Overtop power supply voltage. ●Surge voltage occurs in drive's input power side.	●Increase deceleration time. ●Add DUB. ●Check input voltage is in the range of rated voltage. ●Add AC reactor at power input terminal.

Error Trip Messages of Drive

Display	Description	Cause	Troubleshooting
(OH) 	**Drive overheat** The temperature of drive's heat sink reaches the trip level.	●The surrounding temperature is too high. ●The heat sink has foreign body. ●The cooling fan of drive is fault.	●Improve the system ventilation. ●Clean the foreign body on the heat sink. ●Return the drive to replace the cooling fan.
(OL) 	**Motor overload** Operation current exceeds 150% of motor's rated current and reaches the motor overload protection time.	●Motor overloaded. ●The voltage setting of V/F pattern is too high or too low. ●The current setting of motor's rated current is invalid.	●Check the load of motor. ●Check if the acceleration or deceleration time is too short. ●Check if V/F setting is proper. ●Check if the rated current setting is valid.
(OL1) 	**Drive overload** Operation current exceeds 150% of drive's rated current for 1 minute.	●Motor overload. ●The voltage setting of V/F pattern is too high or too low. ●Drive capacity is too small.	●Check if the load of motor overload. ●Check if the acceleration or deceleration time is too fast. ●Check if V/F setting is proper. ●Select the higher capacity of drive.
(OLO) 	**System overload** ●Load system is overload and the operation current reaches the active level. ●Detection level: F_068. ●Detection time: F_069.	_ _ _	Check the usage of mechanical equipment

Error Trip Messages of Drive

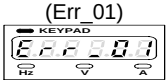
Display	Description	Cause	Troubleshooting
(thr) 	**External fault**	The multi-function terminal receives the external fault signal.	Clear the external fault and then press OFF/RESET key.
(ntCF) 	**NTC thermistor sensor fault**	NTC thermistor sensor is fault.	Please call customer service for drive repair.
(PAdF) 	**Keypad interruption during copy**	●The connecting wire of the keypad is loosen. ●The keypad jack of the drive is oxidized.	Check the connecting wire of keypad.

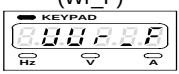
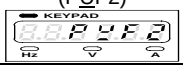
Error Trip Messages of Drive at close-loop Control

Display	Description	Cause	Troubleshooting
(no Fb) 	**PID feedback signal error**	Under closed loop control,the feedback signal wire is loosen/ tripped.	Check the feedback signal wire.
(OP) 	**Over pressure**	Under_closed-loop control,the feedback limit is abnormal.	●Check the setting of functions are adaquate (F_190~F_194) ●Check if the pressure is normal.

Warning Messages of Drive

*When the drive displays below messages, drive stops output. If the abnormal condition is removed, the drive auto recovers the normal operation.

Display	Description	Cause	Troubleshooting
(LE) 	**Power source under voltage** The internal DC bus voltage level below 70%	The voltage of power source is too low.	Check if the voltage of power source is valid.
(bb) 	**Drive output interruption**	Drive stops the output when the output interruption command is activated.	Clear drive output interruption command.
(Fr) 	**Coast to stop**	Drive stops the output when the coast to stop command is activated.	Clear “Coast to stop” command.
(db) 	**Dynamic brake over voltage** The internal DC bus voltage of drive is over the protection level.	DC bus voltage is too high.	Check if the input power is within drive’s rated input range.
(PrEr) 	**Program fault**	— — —	Check the software version of drive.
(Ht) 	**Drive overheat** The temperature of drive’s heat sink reaches warning levelF_142.	●Surrounding temperature is too high. ●The heat sink has foreign body. ●The cooling fan of drive is fault.	●Improve the system ventilation. ●Clean the dust on the heat sink. ●Return the drive to replace the cooling fan.
(Err_00)  (Err_01) 	**Err_00: Keypad cable trip before connecting Err_01: Keypad cable trip during operation**	●Thecconnecting wirecofcthe keypad is loosen. ●The keypad jack of the drive is oxidized.	Check the wire between the keypad and drive.
(OP) 	**Over pressure**	Undercclosed_loop control,feedback_limit alarm.	●Check the setting of functions are adequate (F_190~F_194) ●Check if the pressure is normal.

Display	Description	Cause	Troubleshooting
(dtF) 	**Direction command error**	Forward/reverse commands input at the same time.	Check the direction command.
(Wr_F) 	**Different software version inter-copy**	The software version of drives are different.	Check up the software version.
(LOC) 	**Parameter locking**	Password protection of parameters at the same time.	-
(ULOC) 	**Parameter Password Unlock**	Enter wrong password	-
(PUF1) 	**First time you enter wrong**	Enter wrong password	Please enter the correct password
(PUF2) 	**Second time you enter wrong**	Enter wrong password	Please enter the correct password
(PUF3) 	**Third time you enter wrong**	Enter wrong password	Enter the wrong password more than three times, please turn off and restart the power on to enter the correct password.
(Cot) 	**Communication overtime** ●Detection time: F_113 ●F_114=0	●Communication wire is loosen or connecting wire is incorrect. ●Host and receiver Communication setting are different. ●Communication signal is disconnect	●Check the wiring of communication wire. ●Check the communi-cation setting. ●Check if the F_113 Communication detect time is appropriate.

Chapter 9 Applicable Safety Regulation

9-1 UL Safety Regulation and cUL Certification

Underwriters Laboratories Inc.(UL) is an independent organization for the product safety test. Focus the safety of product to establish the standard and test procedure to against the fire or other accidents to protect the user, customer service engineer and general people.

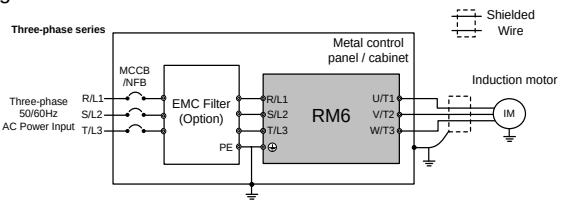
cUL is represented that the product is confirmed by UL and compile with safety standard made by Canadian Standard Association, cUL certificate product have available efficiency with CSA specification.

Model number	Corresponding standard
RM6	UL508C
	CSA C22.2 No.14-05

9-2 European Safety Regulation

To relate the CE safety regulation mark of drive not guarantee the mechanical equipment totally corresponding to the request of CE safety regulation by using the drive. To pass the request of CE safety regulation, the mechanical equipment must satisfy some conditions. The mechanical equipment usually use not only the drive but also other devices. Therefore, the mechanical manufacturer must estimate if the specification of total equipment is corresponding to the regulation.

If the user hopes the product to correspond the regulation, please select the suitable EMC filter refer to page 155 and installing the filter correctly according to the figures as below.



Model number	Corresponding standard
RM6	EMC：EN61000-6-2, -4、EN61800-3
	LVD：EN61800-5-1

Note：Please indeed ground the drive, motor and metal control panel/cabinet and connecting the shielded wire with metal control panel/cabinet. Please select shielded cable for motor usage and reducing the cable length as short as possible.

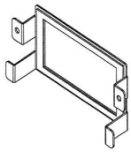
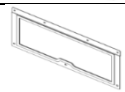
Chapter 10 Optional Accessory and Peripheral Equipment

10-1 Peripheral Equipment of Drive

	Name		Function Descriptions	Note
Main Circuit Option		AC reactor(input)	Suppress the surge voltage. Reduce the harmonic. Improve power factor.	Page154
		AC reactor(output)	Reduce dv/dt of motor side. Reduce motor vibration and EMC interference.	Page154
		DC reactor	Reduce the harmonic. Improve power factor.	Page155
		Break Resistor	Convert regenerative voltage to thermal energy.	Page162
		Dynamic brake unit (DBU)	Apply with break resistor in the series of big horsepower. Convert regenerative voltage to thermal energy	Page165
		EMC filter	Reduce electromagnetic (conductive) interference	Page155
		Zero-Phase Radio Frequency filter (RFI)	Reduce frequency (radiation) interference	Page158
	—	Regenerative unit (RM6A6)	Feed regenerative energy back to grid. Better energy saving than the break resistor.	—
Option	—	IP20 Accessory	With the option to enhance the protective structure	Page170
		Supporting frame accessory	Fix the sheet metal of drive.	Page16
		downside strainer	Install strainer to reduce the dust on heat sink if the drive is installed in poor environment.	Page149
		KP-603 network cable (RJ-45 network cable)	There are 4 specifications length of network cable (AMP) for KP-603 keypad (47CM, 1.5M, 3M, and 5M).	Page40
		KP plastic lid	When pull outside KP-603, put the original keypad on the plastic lid to prevent the object invade.	—
		Auxiliary controller	Tension /linked / ratio / signal transform.	Page180
		External display (DM501)	Independent indicator to display the monitor information of drive.	Page179

10-2 Strainer

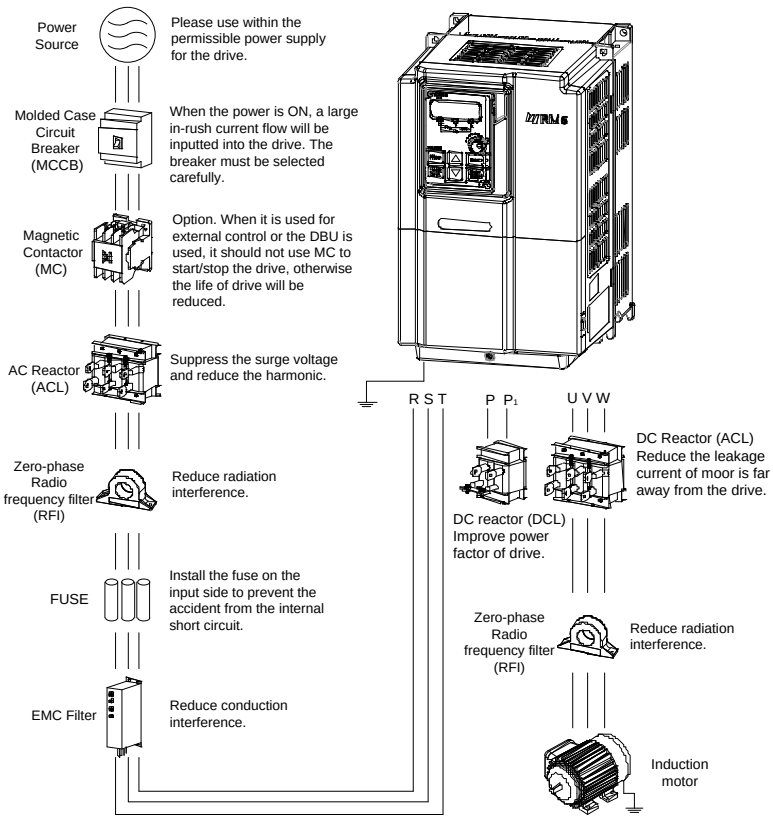
When the drive is in an adverse environment, install strainer to reduce the dust on heat sink.

Illustration	Size case	Suit	Material Number
	CASE3	RM6-2007 RM6-4007~ RM6-4010	M1031568
	CASE2	RM6-2010~ RM6-2025 RM6-4015~ RM6-4040	M1031482
	CASE4	RM6-2020~ RM6-2040 RM6-4030~ RM6-4060	M1031504
	CASE5	RM6-2050~ RM6-2075 RM6-4075~ RM6-4125	M1031665

10-3 Peripheral Equipment of Drive

⚠ CAUTION

1. When the drive requires the following equipment, please select the proper external equipment. The incorrect setup will result in the failure of drive, reducing drive's life, and even damage the drive.
2. The surrounding temperature of drive will influence drive's life. Please monitor the surrounding temperature of drive to avoid the temperature exceeding the permitting specifications when the drive is installed in closed place. In addition, the control signal should be far away from the wiring of main circuit to avoid the signal interference.
3. To prevent the engineer from electric shocks, please do the grounding well of motor and drive. Motor's grounding must connect to drive's grounding terminal.

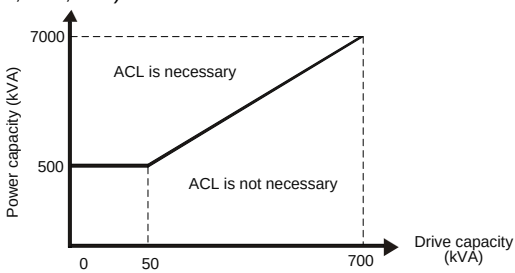


10-4 Selection of Reactor

⚠ CAUTION
Due to the AC reactor(ACL) or DC reactor(DCL) possibly produce the heat (about 100℃) in use, please DO NOT touch the reactor and note the environment conditions.

a. Suppress the harmonic current of power and improve the power factor is the main function of the ACL and DCL. Connect the ACL at the power source input terminal of the drive also can suppress the surge voltage to protect the drive.

b. When the power capacity is over 500kVA or more than ten times of the rated capacity of the drive, adding the ACL (as below figure) is necessary. The input terminal (R/L1,S/L2,T/L3) of the drive must connect ACL.



c. When the heater (with the SCR), air compressor, high-frequency equipment, or welding machine is installed at the same power source system, the harmonic current will interfere the drive. Thus, add the ACL at the input terminal (R/L1,S/L2,T/L3) of the drive is required.

d. When multiple drives of high horse power are used, due to harmonic wave generate, adding ACL at the input terminal (R/L1,S/L2,T/L3) of the drive is required to prevent the drive from the possible interference and power quality deterioration.

e. When the cable length between the drive and motor is over 30 meters or multiple motors are used in parallel, please add ACL at the output terminal of the drive.

f. Add the ACL at the input terminal(R/L1,S/L2,T/L3), the power factor is above 75%; Add ACL and DCL, the power factor is above 90%.(the specifications of ACL and DCL, please refer to page 154 ~155)

g. When horse power of drive is 100HP (included) or above, ACL is the standard equipment. When the drive is 175HP (included) or above, DCL is the standard equipment.

h. The connecting cable between the drive and DCL must be the same specifications with the cable of input terminal(R/L1,S/L2,T/L3).

AC Reactor (ACL) Specifications

Drive model number	Input (R/L1,S/L2,T/L3)		Output (U/T1,V/T2,W/T3)		Drive model number	Input (R/L1,S/L2,T/L3)		Output (U/T1,V/T2,W/T3)	
	(mH)	(A)	(mH)	(A)		(mH)	(A)	(mH)	(A)
RM6-20P5	1.0	10	1.0	10	RM6-4001	1.0	10	1.0	10
RM6-2001	1.0	10	1.0	10	RM6-4002	1.0	10	1.0	10
RM6-2002	1.0	15	1.0	15	RM6-4003	1.0	15	1.0	15
RM6-2003	1.0	15	1.0	15	RM6-4005	1.0	15	1.0	15
RM6-2005	0.2	30	0.2	30	RM6-4007	0.2	30	0.2	30
RM6-2007	0.2	30	0.13	50	RM6-4010	0.2	30	0.2	30
RM6-2010	0.13	50	0.13	50	RM6-4015	0.2	30	0 .13	50
RM6-2015	0.13	50	0.07	75	RM6-4020	0.13	50	0 .13	50
RM6-2020	0.07	75	0.05	100	RM6-4025	0.13	50	0.13	50
RM6-2025	0.05	100	0.05	100	RM6-4030	0.13	50	0.07	75
RM6-2030	0.05	100	0.035	150	RM6-4040	0.07	75	0.05	100
RM6-2040	0.035	150	0.025	200	RM6-4050	0.05	100	0.05	100
RM6-2050	0.025	200	0.025	200	RM6-4060	0.05	100	0.035	150
RM6-2060	0.025	200	0.015	300	RM6-4075	0.035	150	0.025	200
RM6-2075	0.015	300	0.013	400	RM6-4100	0.025	200	0.025	200
RM6-2100	0.013	400	0.013	400	RM6-4125	0.025	200	0.015	300
RM6-2125	0.013	400	0.01	600	RM6-4150	0.015	300	0.015	300
RM6-2150	0.01	600	0.01	600	RM6-4175	0.015	300	0.013	400
RM6-2200	0.006	800	0.006	800	RM6-4200	0.013	400	0.013	400
RM6-2250	0.006	800	0.005	1000	RM6-4250	0.013	400	0.01	600
—	—	—	—	—	RM6-4300	0.01	600	0.01	600
—	—	—	—	—	RM6-4350	0.01	600	0.006	800
—	—	—	—	—	RM6-4420	0.006	800	0.006	800
—	—	—	—	—	RM6-4500	0.006	800	0.005	1000
—	—	—	—	—	RM6-4600	0.005	1000	0.005	1000

DC Reactor (DCL) Specifications

Drive model number	200V Series		Drive model number	400V Series	
	(mH)	(A)		(mH)	(A)
RM6-2007	1.2	30	RM6-4007	1.5	20
RM6-2010	0.9	50	RM6-4010	1.2	30
RM6-2015	0.5	75	RM6-4015	1.2	30
RM6-2020	0.5	75	RM6-4020	0.9	50
RM6-2025	0.4	100	RM6-4025	0.9	50
RM6-2030	0.4	100	RM6-4030	0.9	50
RM6-2040	0.25	150	RM6-4040	0.5	75
RM6-2050	0.2	200	RM6-4050	0.4	100
RM6-2060	0.2	200	RM6-4060	0.4	100
RM6-2075	0.15	300	RM6-4075	0.25	150
RM6-2100	0.177	400	RM6-4100	0.2	200
RM6-2125	0.177	400	RM6-4125	0.2	200
RM6-2150	0.126	600	RM6-4150	0.15	300
RM6-2200	0.09	800	RM6-4175	0.15	300
RM6-2250	0.09	800	RM6-4200	0.177	400
—	—	—	RM6-4250	0.177	400
—	—	—	RM6-4300	0.126	600
—	—	—	RM6-4350	0.126	600
—	—	—	RM6-4420	0.09	800
—	—	—	RM6-4500	0.09	800
—	—	—	RM6-4600	0.07	1000

Outline dimensions of AC reactor (ACL)

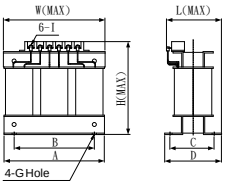


Figure A

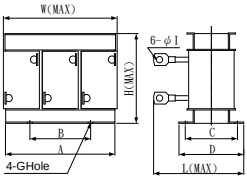


Figure B

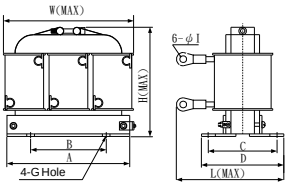


Figure C

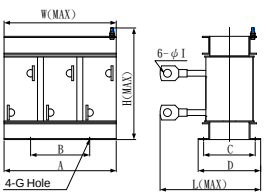


Figure D

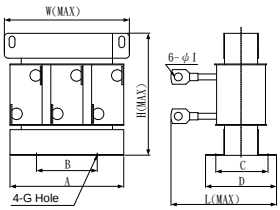


Figure E

Specifications of AC reactor (ACL)

Capacity	Figure	A	B	C	D	W (MAX)	L (MAX)	H (MAX)	G	I	Weight (kg)
1.0mH/10A	A	91	81	58	70	93	80	110	7×4.5	3	1.8
1.0mH/15A	A	109	86	58	77	111	95	135	12×5	3	2.0
0.2mH/30A	A	109	86	58	77	111	95	135	16×8	6	2.2
0.13mH/50A	B	150	80	70	85	152	126	130	16×8	6	4.6
0.07mH/75A	B	150	80	68	85	151	126	131	16×8	6	4.8
0.05mH/100A	C	146	90	77	99	155	132	132	16×8	8	4.1
0.035mH/150A	C	146	90	77	99	155	132	132	16×8	8	4.1
0.025mH/200A	B	180	100	90	107	182	160	150	16×8	8	9.8
0.015mH//300A	D	230	120	104	130	230	220	210	25×14	12	19
0.013mH//400A	D	230	120	104	130	230	240	200	22×10	12	20.2
0.01mH//600A	D	280	140	120	135	280	270	235	22×10	16	29.3
0.006mH/800A	E	300	150	140	174	300	300	305	25×13	15	65
0.005mH/1000A	E	350	160	145	184	350	290	320	25×13	14	84.6

(unit: mm)

Outline dimensions of DC reactor (DCL)

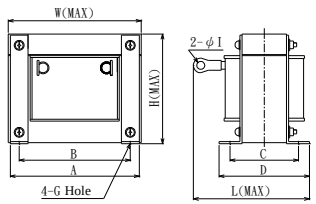


Figure A

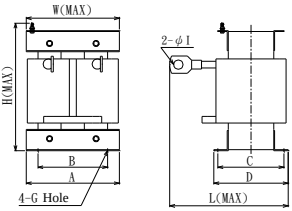


Figure B

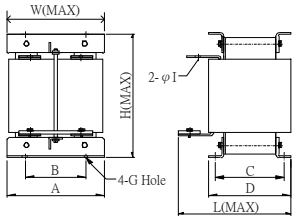


Figure C

Specifications of DC reactor (DCL)

Capacity	Figure	A	B	C	D	W (MAX)	L (MAX)	H (MAX)	G	I	Weight (kg)
1.5mH/20A	A	96	80	81	98	96	120	85	11×5	5	3.0
1.2mH/30A	A	114	95	89	110	114	150	100	13×6	6	4.4
0.9mH/50A	A	134	111	87	107	134	160	115	14×6	6	6.5
0.5mH/75A	A	134	111	87	107	134	160	115	14×6	6	6.8
0.4mH/100A	A	162	135	102	133	162	180	140	17×8	8	12.5
0.25mH/150A	A	162	135	114	145	162	188	140	17×8	8	13.8
0.2mH/200A	A	162	135	122	153	162	200	139	17×8	8	15.5
0.15mH/300A	B	160	120	123	140	190	225	230	21×10	12	19
0.177mH/400A	B	200	150	160	170	200	280	270	22×13	12	34.7
0.126mH/600A	C	240	182	175	194	240	320	315	20×13	14	60.5
0.09mH/800A	C	250	150	150	190	250	290	385	25×13	15	72
0.07mH/1000A	C	270	160	155	200	270	310	400	25×13	15	86

(unit: mm)

10-5 Selection of EMC Filter

Electromagnetic interference, EMC, has restricted limits in multiple countries, especially in Europe.

Drive will generate high-frequency / low-frequency noise to interfere the surrounding equipment by radiation or conduction when the drive is running.

⚠ CAUTION

(1) Keep all grounding connections together.
(2) Use the largest area as grounding conductor, for example the cabinet wall.
(3) The filter must be mounted on the same panel as the drive.

Recommending specification of EMC filter

Select an EMC filter in accordance with the model number of drive to suppress drive's electromagnetic interference.

200V Series

Drive model number	EMC filter model number	Rated current / phase
RM6-20P5	FN3270H-10-44	10A / 3Ψ
RM6-2001	FN3270H-10-44	10A / 3Ψ
RM6-2002	FN3270H-10-44	10A / 3Ψ
RM6-2003	FN3270H-20-44	20A / 3Ψ
RM6-2005	FN3270H-20-44	20A / 3Ψ
RM6-2007	FN3270H-35-33	35A / 3Ψ
RM6-2010	FN3270H-35-33	35A / 3Ψ
RM6-2015	FN3270H-50-34	50A / 3Ψ
RM6-2020	FN3270H-65-34	65A / 3Ψ
RM6-2025	FN3270H-80-35	80A / 3Ψ
RM6-2030	FN3270H-100-35	100A / 3Ψ
RM6-2040	FN3270H-150-99	150A / 3Ψ
RM6-2050	FN3270H-200-99	200A / 3Ψ
RM6-2060	FN3270H-200-99	200A / 3Ψ
RM6-2075	FN3270H-250-99	250A / 3Ψ
RM6-2100	FN3270H-320-99	320A / 3Ψ
RM6-2125	FN3270H-400-99	400A / 3Ψ
RM6-2150	FN3270H-600-99	600A / 3Ψ
RM6-2200	FN3270H-800-99	800A / 3Ψ
RM6-2250	FN3270H-800-99	800A / 3Ψ

400V series

Drive model number	EMC filter model number	Rated current / phase
RM6-4001	FN3270H-10-44	10A / 3Ψ
RM6-4002	FN3270H-10-44	10A / 3Ψ
RM6-4003	FN3270H-10-44	10A / 3Ψ
RM6-4005	FN3270H-10-44	10A / 3Ψ
RM6-4007	FN3270H-20-44	20A / 3Ψ
RM6-4010	FN3270H-20-44	20A / 3Ψ
RM6-4015	FN3270H-35-33	35A / 3Ψ
RM6-4020	FN3270H-35-33	35A / 3Ψ
RM6-4025	FN3270H-50-34	50A / 3Ψ
RM6-4030	FN3270H-50-34	50A / 3Ψ
RM6-4040	FN3270H-65-34	65A / 3Ψ
RM6-4050	FN3270H-80-35	80A / 3Ψ
RM6-4060	FN3270H-100-35	100A / 3Ψ
RM6-4075	FN3270H-150-99	150A / 3Ψ
RM6-4100	FN3270H-200-99	200A / 3Ψ
RM6-4125	FN3270H-200-99	200A / 3Ψ
RM6-4150	FN3270H-250-99	250A / 3Ψ
RM6-4175	FN3270H-320-99	320A / 3Ψ
RM6-4200	FN3270H-320-99	320A / 3Ψ
RM6-4250	FN3270H-400-99	400A / 3Ψ
RM6-4300	FN3270H-600-99	600A / 3Ψ
RM6-4350	FN3270H-600-99	600A / 3Ψ
RM6-4420	FN3270H-800-99	800A / 3Ψ
RM6-4500	FN3270H-800-99	800A / 3Ψ
RM6-4600	FN3270H-1000-99	1000A / 3Ψ

Note:
The leakage current of FN3270 series approximately 26.4mA ~ 59.5mA

10-6 Selection of Zero-Phase Radio Frequency Filter (RFI Filter)

Please read this manual carefully to understand the correct and safety operations before using the product to prevent possible personnel injuries caused by false operations.

⚠ CAUTION
(1) DO NOT touch zero-phase radio frequency filter (RFI) to prevent yourself from burning by the high temperature during the operation. (2) While lift up product, please note the weight of product and move it with proper method to avoid possible injuries.(Please be more cautious to the sharp parts). (3) Wiring or inspection must be done by qualified professional technicians.

By installing the RFI filter(s), it can reduce the radio frequency interference generated by drive.

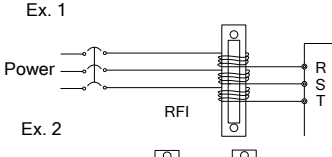
1. Specification of product:

	Model	RM6 series
Environmental Condition	Use Place	(1) Keep the drive away from high temperature, high humidity, and flammable gases. (2) If the zero-phase radio frequency filter is installed inside the power distribution panel, the surrounding temperature should not exceed the range(-10 ~ +50℃). (3) The heat will be generated in the zero-phase radio frequency filter, so the space should be reserved for heat dissipation.
	Ambient Temperature	-10 ~ +50℃(no condensation)
	Ambient Humidity	90%RH(no dew)
	Vibration	Below 5.9m/ s^2 (0.6G)

2. Wiring for RFI: Connect the RFI filter in accordance with the following wiring diagram.

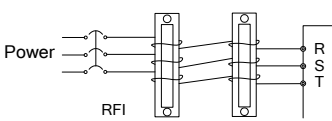
(1) Install the RFI filter at the power source site of the drive

Ex. 1



Pass all 3-phase power cords through RFI filter in same direction with same coil number, and then connect to the power input terminal of the drive. Caution: DO NOT exceed 4 coils to prevent overheating of RFI filter.

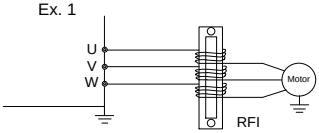
Ex. 2



(Note)
Either the ground wire or the four-core cable with ground wire cannot pass through RFI filter; otherwise the filtration effect will be reduced.

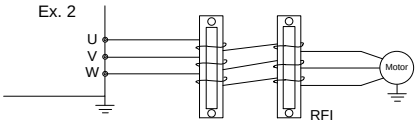
(2) Install the RFI filter at the output site of the drive

Ex. 1



Pass all 3-phase power cords through RFI filter in same direction with same coil number, and then connect to motor terminals of the drive. Caution: DO NOT exceed 4 coils to prevent overheating of RFI filter.

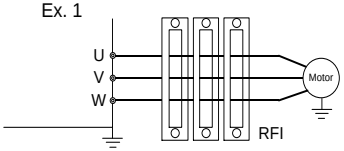
Ex. 2



(Note)
Either the ground wire or the four-core cable with ground wire cannot pass through RFI filter; otherwise the filtration will be reduced

(3) If the power cords are too thick to be winded, pass the power cords through RFI filter directly, and connect two or more RFI in series.

Ex. 1



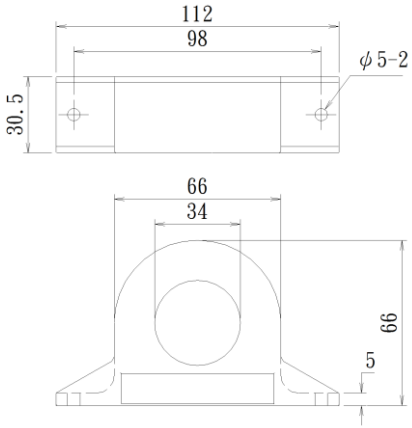
Pass all 3-phase power cords through RFI filter in same direction with same coil number, and then connect to motor terminals of the drive. Caution: DO NOT exceed 4 coils to prevent overheating of RFI filter.

(Note)
Either the ground wire or the four-core cable with ground wire cannot pass through RFI filter; otherwise the filtration will be reduced.

3. If noise of radio frequency is too high, user can add mount of RFI to reduce the noise.
4. The suggestions of RFI filter using maximum wire sixe as below:

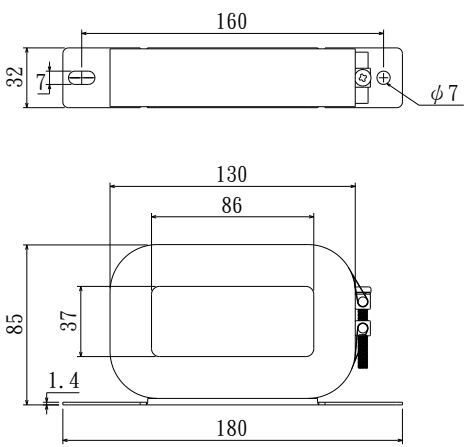
Model	Wire Size (mm²)	Coil Number of 3-Phase Wire
RFI-01	2/3.5	4
	5.5	3
	8/14	2
	22	1
RFI-02	22/38	4
	50/60	2
	80/100/125/150	1
RFI-03	50/60	3
	80/100/125/150	2
	200	1
RFI-04	50/60	4
	80/100	3
	125/150	2
	200	2
	250	1

5.Outline dimensions of RFI-01:



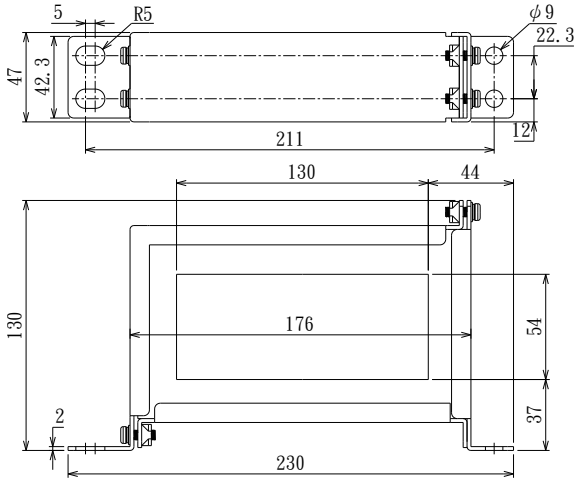
(unit: mm)

6.Outline dimensions of RFI-02:



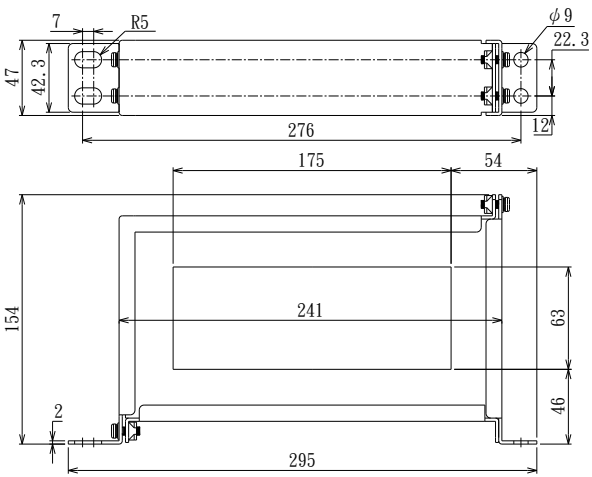
(unit: mm)

7.Outline dimensions of RFI-03:



(unit: mm)

8. Outline dimensions of RFI-04:



(unit: mm)

Chapter 11 Dynamic Brake Unit and Braking Resistor

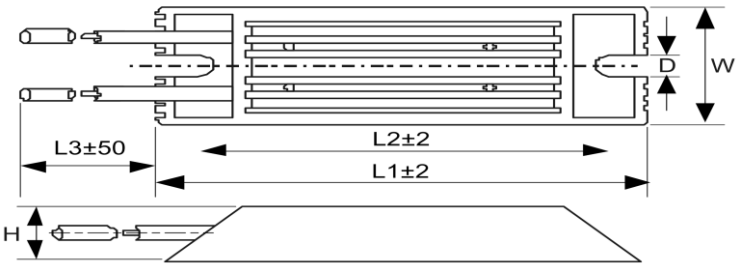
11-1 Internal Braking Transistor Models

Standard internal type: RM6-2001~ 2015; RM6-4001 ~ 4025

Optional type: RM6-2020B ~ 2075B; RM6-4030B ~ 4125B

11-2 Outline of Braking Resistor (Option)

Aluminum Case Resistor



11-3 Rated Specification of Braking Resistor

Model number	Specification	Dimensions (mm)						Max. weight (g)
		L1	L2	L3	W	H	D	
MHL100-100	100W/100Ω	165	150	350	40	20	5.3	200
MHL100-400	100W/400Ω	165	150	350	40	20	5.3	200
MHL500-20	500W/20Ω	335	320	1000	60	30	5.3	1100
MHL500-40	500W/40Ω	335	320	350	60	30	5.3	1100

Note:

1. When the braking is frequently applied, please increase the resistor wattage and add the cooling fan to prevent the resistor from overheating.
2. Aluminum case resistors have the better thermal performance. Please select 1.2 times rated power resistor by using general wirewound type resistor.
3. Please use the heat-resistant wire for the brake resistor wiring.

⚠ DANGER
When the dynamic brake unit is fault, the braking transistor maybe turn on for full cycle. Add the thermal protection device to cut off the power at high temperature to avoid the drive burnout (refer to the section f of Appendix D for wiring of braking resistor).

11-4 Recommend Specification of Braking Resistor

11-4-1 AC 200V Series

Model number of drive	Braking resistor specification		Approximate braking torque (10%ED)
	Minimum specification	Recommend combination	
RM6-2001B3	100Ω/100W	MHL100-100*1	140
RM6-2002B3			75
RM6-2003B3	40Ω/500W	MHL500-40*1	160
RM6-2005B3			105
RM6-2007B3	20Ω/1000W	MHL500-40*2 (2pcs in parallel)	140
RM6-2010B3			110
RM6-2015B3	13.3Ω/1500W	MHL500-40*3 (3pcs in parallel)	115
RM6-2020B3	10Ω/2000W	MHL500-40*4 (4 pcs in parallel)	120
RM6-2025B3	8Ω/2500W	MHL500-40*5 (5 pcs in parallel)	120
RM6-2030B3	6.6Ω/3000W	MHL500-40*6 (6 pcs in parallel)	120
RM6-2040B3	3.3Ω/6000W	MHL500-40*12 (12 pcs in parallel)	190
RM6-2050B3	2.5Ω/8000W	MHL500-40*16 (16 pcs in parallel)	200
RM6-2060B3			165
RM6-2075B3	2.0Ω/10000W	MHL500-40*20 (20 pcs in parallel)	160

11-4-2 AC 400V Series

Model number of drive	Braking resistor specification		Approximate braking torque (10%ED)
	Minimum specification	Recommending combination	
RM6-4001B3	400Ω/100W	MHL100-400*1	145
RM6-4002B3	200Ω/200W	MHL100-400*2 (2pcs in parallel)	180
RM6-4003B3	133Ω/300W	MHL100-400*3 (3pcs in parallel)	180
RM6-4005B3	100Ω/400W	MHL100-400*4 (4pcs in parallel)	160
RM6-4007B3	80Ω/1000W	MHL500-40*2 (2pcs in series)	125
RM6-4010B3			100
RM6-4015B3	40Ω/2000W	MHL500-40*4 (2pcs in parallel,2sets in series)	150
			120
RM6-4025B3	27Ω/3000W	MHL500-40*6 (2pcs in parallel,2sets in series)	135
RM6-4030B3	20Ω/4000W	MHL500-40*8 (4 pcs in parallel,2 sets in series)	160
RM6-4040B3			120
RM6-4050B3	13.3Ω/6000W	MHL500-40*12 (6 pcs in parallel,2 sets in series)	150
RM6-4060B3	10Ω/8000W	MHL500-40*16 (8 pcs in parallel,2 sets in series)	165
RM6-4075B3	8Ω/10000W	MHL500-40*20 (10 pcs in parallel,2 sets in series)	160

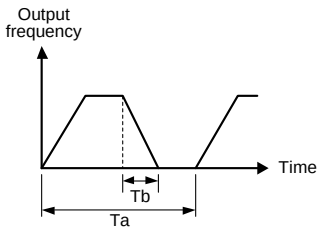
11-5 Recommend Specification of Dynamic Brake unit (DBU6) and Braking Resistor

11-5-1 AC 200V series

Drive Model number	DBU specification		Braking resistor specification		Approximate braking torque (10%ED)
	Model (DBU6-)	Unit (set)	Recommend combination	Unit (set)	
RM6-2100E3	L400	1	MHL500-40*18 (9000W / 2.2Ω; 18pcs in parallel)	1	110
RM6-2125E3	L400	1	MHL500-40*22 (11000W / 1.82Ω;22pcs in parallel)	1	115
RM6-2150E3	L400	1	MHL500-40*26 (13000W / 1.54Ω;26pcs in parallel)	1	115
RM6-2200E3	L400	2	MHL500-40*18 (9000W / 2.2Ω;18pcs in parallel)	2	110
RM6-2250E3	L400	2	MHL500-40*22 (11000W / 1.82Ω;22pcs in parallel)	2	115

11-5-2 AC 400V series

Drive Model number	DBU specification		Braking resistor specification		Approximate braking torque (10%ED)
	Model (DBU6-)	Unit (set)	Recommend combination	Unit (set)	
RM6-4100E3	H200	1	MHL500-40*24 (12000W / 6.6Ω; 12pcs in parallel, 2 sets in series)	1	145
RM6-4125E3					120
RM6-4150E3	H300	1	MHL500-40*36 (18000W / 4.4Ω; 18pcs in parallel, 2 sets in series)	1	155
RM6-4175E3					130
RM6-4200E3	H400	1	MHL500-40*48 (24000W / 3.3Ω; 24pcs in parallel, 2 sets in series)	1	140
RM6-4250E3					115
RM6-4300E3	H600	1	MHL500-40*72 (36000W / 2.2Ω; 36pcs in parallel, 2 sets in series)	1	155
RM6-4350E3	H600	1	MHL500-40*80 (40000W / 2Ω; 40pcs in parallel, 2 sets in series)	1	150
RM6-4420E3	H400	2	MHL500-40*44 (22000W / 3.63Ω; 22pcs in parallel, 2 sets in series)	2	135
RM6-4500E3	H400	2	MHL500-40*52 (26000W / 3.08Ω; 26pcs in parallel, 2 sets in series)	2	130
RM6-4600E3	H600	2	MHL500-40*66 (33000W / 2.42Ω; 33pcs in parallel, 2 sets in series)	3	140



Note:
1. %ED (Effective Duty Cycle) = Tb/Ta*100% (continuous operation time Tb<15 sec).The definition is shown as left figure.
2. Above wattages of table is defined at 10%ED.
3. 200V series drive or DBU braking activation voltage is DC 395V
4. 400V series drive or DBU braking activation voltage is DC 790V
5. The formula between %ED and resistor power is as follows:

$$Pres=\frac{Vdc^2\times\%ED}{R}$$

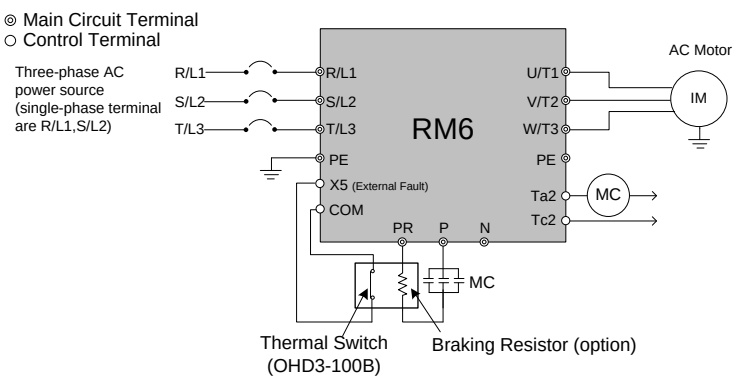
Pres:Total power (W)
Vdc:400V(200V series) or 800V(400V series)
R:Total resistor(Ω)

11-6 Wiring Diagram of External Braking Resistor and Thermal Switch

CAUTION

Strongly recommend to Install the thermal switch for the brake protection to prevent the brake from any possible damages caused by the overheating on the braking resistor. Please refer to the figure 1 and 2 as following for the wiring diagram.

1.) Wiring diagram a



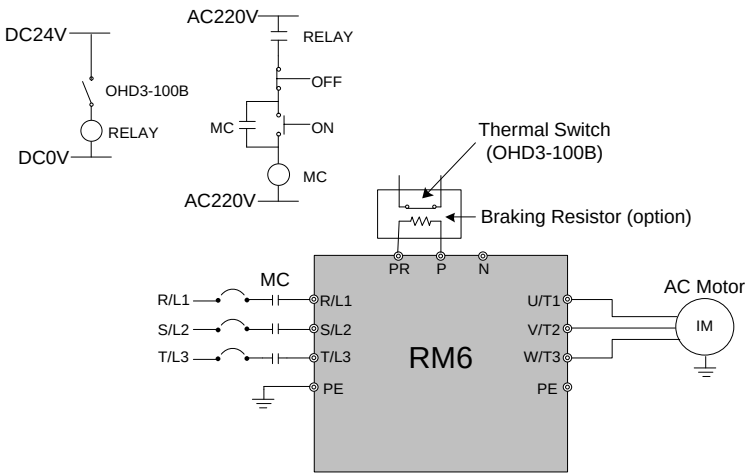
(Figure 1)

(1) Use the thermal switch to protect the temperature of braking resistor and generate an external fault signal to the multi-function terminal (X5) to stop the drive when the braking resistor is overheating and interrupt the connection of magnet contactor (MC) by output terminals Ta2/Tc2.

(2) Set the multi-function terminal (X5) to “-7” (External fault).

(3) Set the multi-function terminal (Ta2/Tc2) to “-11” (Error detection).

2.) Wiring diagram b



(Figure 2)

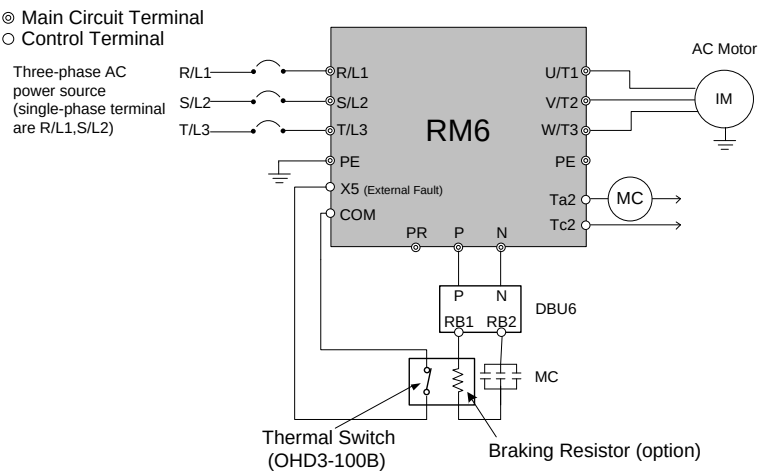
When the drive power is controlled by the magnet contactor (MC), use the thermal switch to control magnet contactor (MC). When the braking resistor is overheating, the contactor (MC) is disconnected.

11-7 Wiring Diagram of External Dynamic Brake Unit(DBU) and Thermal Switch

CAUTION

Strongly recommend to Install the thermal switch for the brake protection to prevent the brake from any possible damages caused by the overheating on the braking resistor. Please refer to the figure 1 and 2 as following for the wiring diagram.

1.) Wiring diagram a



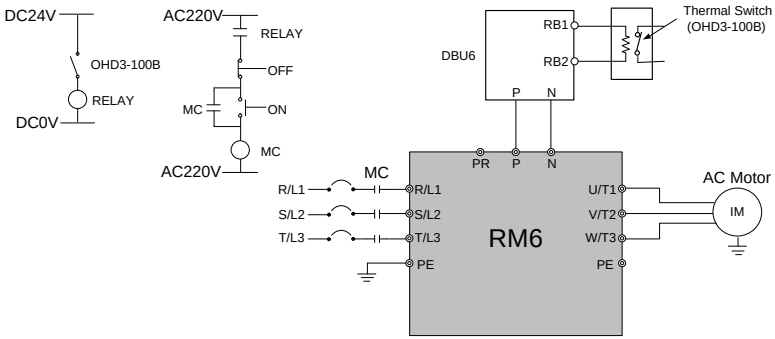
(Figure 1)

(1) Use the thermal switch to protect the temperature of braking resistor and generate an external fault signal to the multi-function terminal (X5) to stop the drive when the braking resistor is overheating and interrupt the connection of magnet contactor (MC) by output terminals Ta2 /Tc2.

(2) Set the multi-function terminals (X5) to “-7” (External fault).

(3) Set the multi-function terminals (Ta2/Tc2) to “-11” (Error detection).

2.) Wiring diagram b

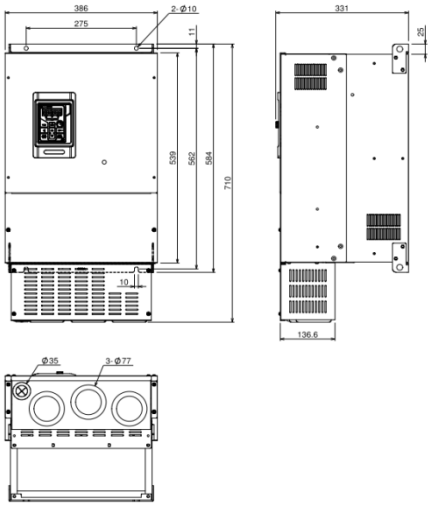


(Figure 2)

When the drive power is controlled by the magnet contactor (MC), use the thermal switch to control magnet contactor (MC). When the braking resistor is overheating, the contactor (MC) is disconnected.

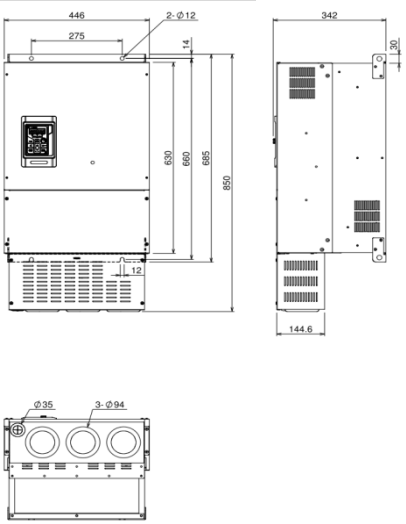
Chapter 12 IP20 Kit

CASE5: RM6-2050~2075/4075~4125



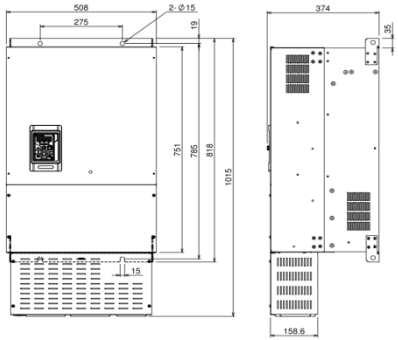
Outline dimension	Correspond connector spec
Ø35	1”
Ø77	2-1/2”

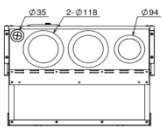
CASE6: RM6-2100/4150~4175



Outline dimension	Correspond connector spec
Ø35	1”
Ø94	3”

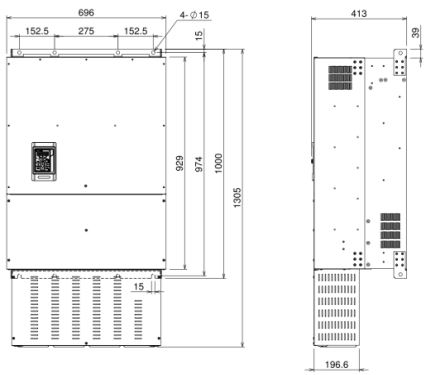
CASE7: RM6-2125~2150/4200~4250

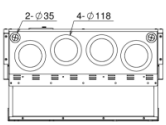




Outline dimension	Correspond connector spec
Ø35	1”
Ø94	3”
Ø118	4”

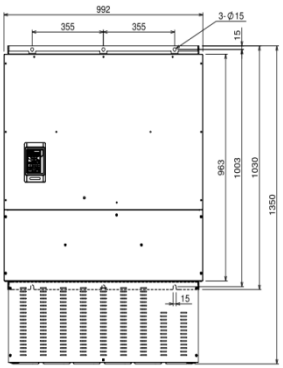
CASE8: RM6-2200~2250/4300~4420

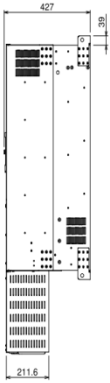


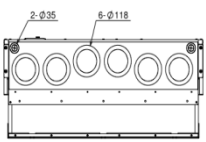


Outline dimension	Correspond connector spec
Ø35	1”
Ø118	4”

CASE8: RM6-2200~2250/4300~4420





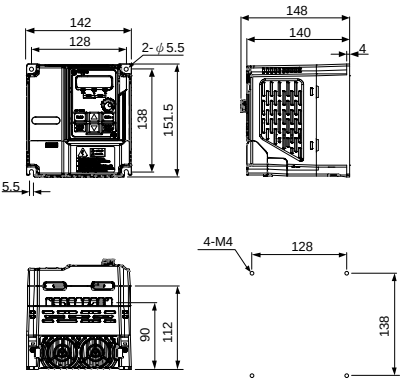


Outline dimension	Correspond connector spec
Ø35	1”
Ø118	4”

Chapter 13 Outline Dimension Drawing of Drives

Model Number：

RM6-20P5 ~ RM6-2005；
RM6-4001 ~ RM6-4005



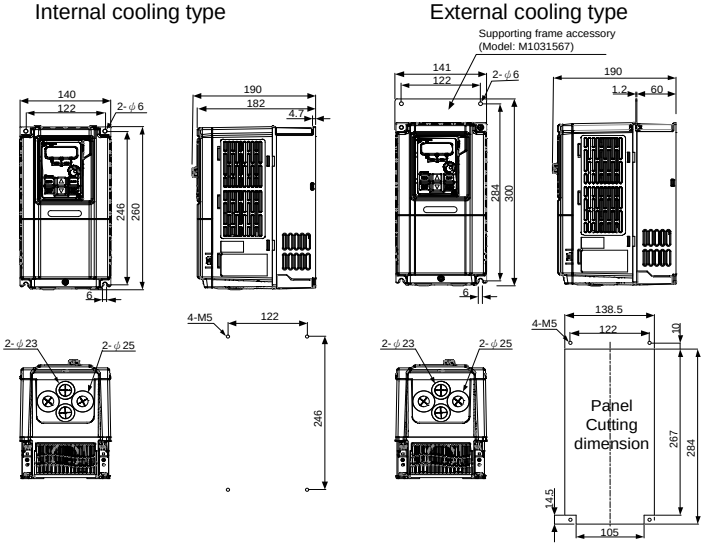
(Unit: mm)

Model Number：

RM6-2007；
RM6-4007~RM6-4010

Internal cooling type

External cooling type

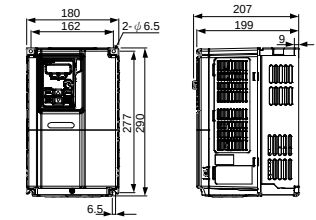


(Unit: mm)

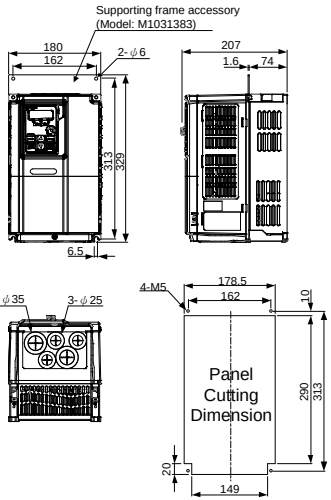
Model Number：

RM6-2010 ~ RM6-2015；
RM6-4015 ~ RM6-4025

Internal cooling type



External cooling type

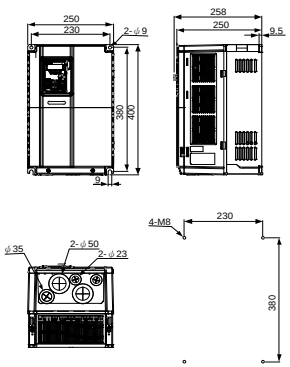


(Unit: mm)

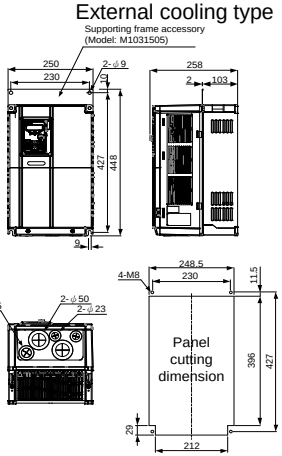
Model Number：

RM6-2020 ~ RM6-2040；
RM6-4030 ~ RM6-4060

Internal cooling type



External cooling type



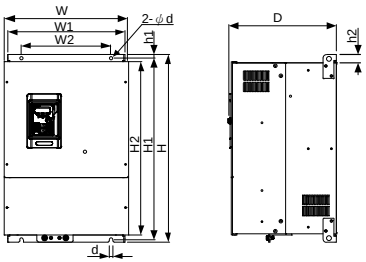
(Unit: mm)

Model Number：

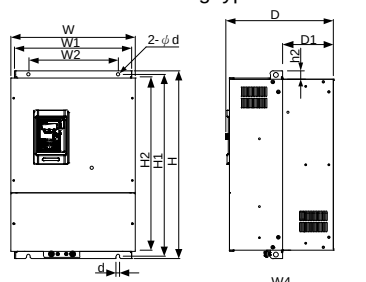
RM6-2050 ~ RM6-2250；

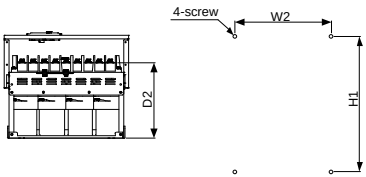
RM6-4075 ~ RM6-4600

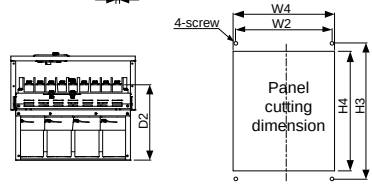
Internal cooling type



External cooling type







* Refer to below table for outline dimension

RM6 200V Series

	Model Case	Size (mm)														Screw
		W	W1	W2	W3	H	H1	H2	H3	H4	h1	h2	D	D1	D2	d	(mm)
CASE5	RM6-2050 RM6-2060 RM6-2075	386	361	275	365	584	562	539	564	545	11	25	331	155	242	10	M8
CASE6	RM6-2100	446	418	275	427	685	660	630	662	634	14	30	334	163	246	12	M10
CASE7	RM6-2125 RM6-2150	508	479	275	487	818	785	751	788	758	19	35	374	183	257	15	M12
CASE8	RM6-2200 RM6-2250	696	654	580	657	1000	974	929	978	936	15	39	413	182	294	15	

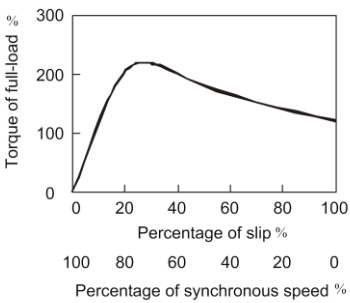
RM6 400V Series

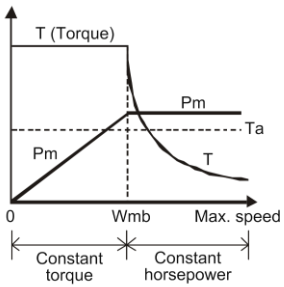
	Model Case	Size (mm)														screw
		W	W1	W2	W3	H	H1	H2	H3	H4	h1	h2	D0	D1	D2	d	(mm)
CASE5	RM6-4075 RM6-4100 RM6-4125	386	361	275	365	584	562	539	564	545	11	25	331	155	242	10	M8
CASE6	RM6-4150 RM6-4175	446	418	275	427	685	660	630	662	634	14	30	334	163	246	12	M10
CASE7	RM6-4200 RM6-4250	508	479	275	487	818	785	751	788	758	19	35	374	183	257	15	
CASE8	RM6-4300 RM6-4350 RM6-4420	696	654	580	657	1000	974	929	978	936	15	39	413	182	294	15	M12
CASE9	RM6-4500 RM6-4600	992	954	710	958	1030	1003	963	1007	968	15	39	427	185	308	15	

Appendix A Selection of Motor

a. Standard Motor

1. Must be used the 3-phase induction motor as load.
2. The speed of cooling fan will decrease when the motor is operated at low speed. DO NOT operate the motor at low speed for a long time to prevent the temperature of motor from overheating. For the low speed with long time operation condition, please select the motor with independent cooling fan.
3. Standard three-phase induction motor (NEMA B) characteristics as follows:





4. When the motor speed exceeds the rated speed (50/60Hz), the torque will be decreased while the motor speed increasing.
5. Check the motor insulation. The standard requirement is 500V (or 1000V) / 100MΩ above.

b. Special Motors

1. Synchronous Motor:	Higher starting current but lower V/F than the standard motor. Select the bigger drive capacity.
2. Submersible Motor:	Higher rated current than standard motor. Notice V/F pattern, the lower speed limit (approximately 30Hz), and the insulation quality. Be careful wtih the insulation resistance of motor (with wiring)while installing. Add ACL at motor side.
3. Explosion-proof Motor:	No explosion-proof mechanism within the drive. Be aware of installation safety.

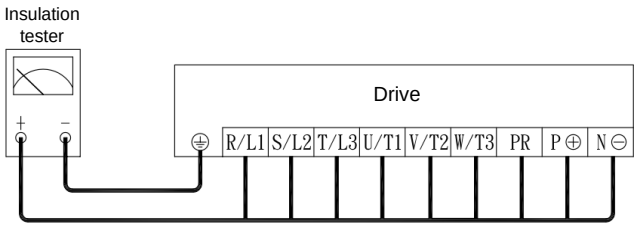
c. Insulation Measurement of Drive and Motor

1. Measure the drive insulation impedance

a. Please be extremely cautious to following steps to test the main circuit insulation of drive. Any incautious operations while testing the drive insulation may possibly harm operating personnel and cause serious damages to drive.

b. Remove all wiring at power terminal (main circuit) and control circuit terminal before the testing is conducted. Please follow the below diagram to wire all power terminals in parallel with an insulation tester for drive insulation test.

c. Using an insulation tester with DC500V to test the insulation value of drive. The drive insulation impedance must be greater than 20MΩ. If drive insulation impedance is below 20MΩ, please contact with the customer service.



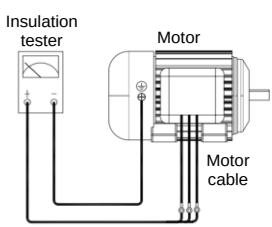
Drive Insulation Impedance Measurement

2. Measure the motor insulation impedance

a. Remove the U/T1, V/T2, W/T3 cables of motor from the drive before measuring the motor insulation impedance, and then measure the motor insulation impedance (including motor cables) using the insulation tester with DC500V. The motor insulation impedance (including motor cables) must be greater than 20MΩ.

b. If motor insulation impedance is less than 20MΩ, DO NOT install a drive, or the lifetime of drive may be possibly damaged due to insufficient motor insulation.

c. Please follow the below connection diagram for motor insulation test. Motor cables must be connected in parallel to the insulation tester with DC500V to test the insulation, and the motor insulation impedance must be greater than 20MΩ to connect the drive.



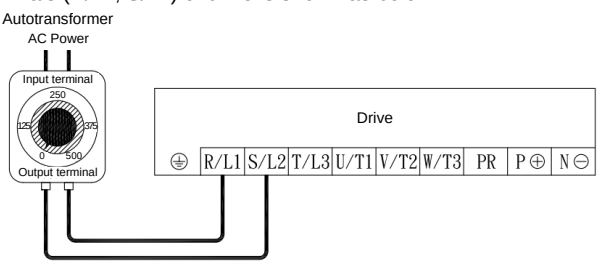
Motor Insulation Impedance Measurement (including motor cables)

Appendix B Instruction of Drive Charging

CAUTION
If the drive is unused or stored in the storage over 1 year, the surface of aluminum foil of electrolytic capacitor within the drive will be oxidized and cracked causing the L and C value up. This is the common characteristics of capacitor. Therefore, if drive placed for a long time and user input the voltage directly, it may cause drive damaged due to high current or oxide film cracked.

a. If the drive is stored or non-used (no power ON) over 1 year, it is necessary to charge the drive by autotransformer for 30 minutes from 0 volt to the half of drive's rated voltage and then to apply drive rated voltage to charge the drive for another 30 minutes.

b. When charging the internal capacitor of drive, the wiring between autotransformer and terminals (R/L1, S/L2) of drive is shown as below:



Connection diagram between autotransformer and drive

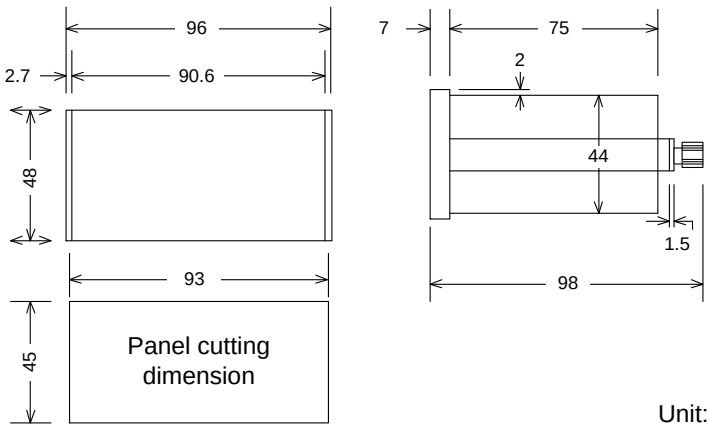
Note: If the drive is already applied with drive rated voltage and doesn't display correctly, please contact the customer service for repair service.

Appendix C Remote Controller and External Display

External display: DM-501

DM-501 don't connect extra power to the drive;DM-501 can display Voltage, Current, Frequency, machine speed,etc.

1. Outline dimensions



Unit:mm

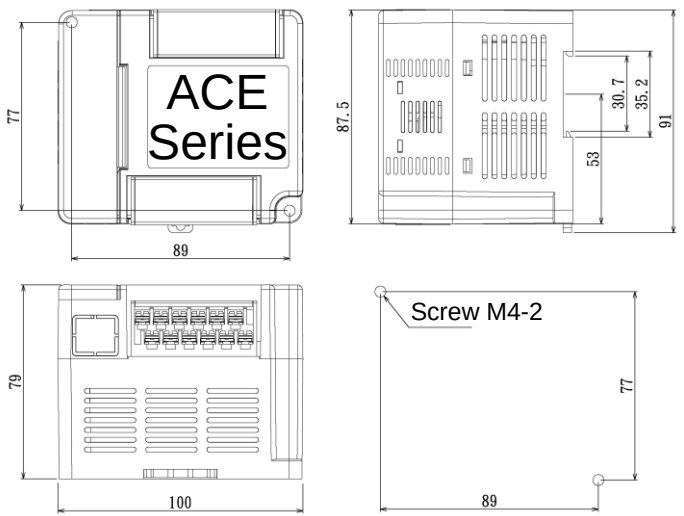
2. Appearance of display panel

3. The standard length of 2.54/5P wires is 1.5 m and 3 m respectively. DO NOT exceed this length.

Appendix D Auxiliary Controller (ACE-S Series)

Type	Name	Application
ACE-S02/02B/02C	**DEVIATION DETECTOR**	Convert the angle deviation which is detected by ADD-02 (SYNCHRO) into DC voltage signal. The deviation detector can control the drive operation by switching the aligned-speed, synchronized, and constantly tensile operations. The built-in tilt circuit for output signal can slow the acceleration/deceleration time and reduce the mechanical impact.
ACE-S04/06	**RATIO / DIFFERENTIAL CONTROLLER**	The controller can select ratio (ACE-S04) or differential (ACE-S06) control mode. One set controller can connect with 6 set of drivers, when the controller is set to ratio or differential mode. (Default setting is ratio control mode (ACE-S04). The built-in tilt circuit for output signal can slow the acceleration/deceleration time and reduce the mechanical impact.
ACE-S08/09	**SPEED SIGNAL TRANSFER / FEEDBACK CONTROLLER**	Convert the rotation speed of motor into DC voltage by tachogenerator or photo-interrupter pulse generator as the frequency control signal or feedback signal of rotation speed to the drive. The controller can match with the potentiometer or deviation detector to enable constant tension, constantly liner speed and slack of winding for cloth, wire or plastic applications. The controller can match with tachogenerator to enable constantly linear speed or constant speed control for motor. The built-in tilt circuit for output signal can slow the acceleration/deceleration time and reduce the mechanical impact.
ACE-S10	**MULTI-FUNCTION CONTROLLER**	**Multi-place control:** The drive can be started, accelerated, decelerated, and stopped by remote control, and the drive can auto-storing the operation frequency when the power failure by using multi-function controller. **Traverse control:** Used in the occasion of making silk thread move around by traverse winding equipment. **Sequential operation control with multi-speed:** Execute the sequential control in accordance with the setting speed, and supporting the circulation operation.

Type	Name	Application
ACE-S12	**SIGNAL DISTRIBUTOR**	Transfer the input current into voltage signal and then sending to 5 sets output terminal in simultaneously (The output signal can be switched to current or voltage signal). For multiple drives with constant pressure application. The pressure signal can be sent to more than 1 drive simultaneously so that remaining the constant pressure control.
ACE-S13A/13B	**SIGNAL ISOLATION CONVERTER**	Having DC 0~10V/DC 4~20mA(0~20mA) signals input-output isolation circuit by converting the input signal. Four signals (I-I, I-V, V-V, V-I). ACE-S13A: Output current range : DC 0 ~ 20mA ACE-S13B: Output current range : DC 4 ~ 20mA



Appendix E Default Value List

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_000	Drive Information	—	—	—	—
F_001	Start Command Selection	3	3	1	1
F_002	Selection of Command	1	1	1	1
F_003	Selection of “STOP” Key Validity	1	1	1	1
F_004	Frequency Command Selection	1	1	1	1
F_005	Selection of Frequency Command Auto-Storing	1	1	1	1
F_006	Selection of Main Display	1	1	1	1
F_007	Machine Speed Ratio	20.00	20.00	20.00	20.00
F_008	Digits of Decimal Value(MPM)	0	0	0	0
F_009	Primary Speed	60	50	00.0	00.0
F_010	Multi-speed 1	10.0	10.00	10.00	10.00
F_011	Multi-speed 2	20.00	20.00	20.00	20.00
F_012	Multi-speed 3	30.00	30.00	30.00	30.00
F_013	Multi-speed 4	0.00	0.00	0.00	0.00
F_014	Multi-speed 5	0.00	0.00	0.00	0.00
F_015	Multi-speed 6	0.00	0.00	0.00	0.00
F_016	Multi-speed 7	0.00	0.00	0.00	0.00
F_017	Jog Speed	6.00	6.00	6.00	6.00
F_196	Multi-speed 8	0.00	0.00	0.00	0.00
F_197	Multi-speed 9	0.00	0.00	0.00	0.00
F_198	Multi-speed 10	0.00	0.00	0.00	0.00
F_199	Multi-speed 11	0.00	0.00	0.00	0.00
F_200	Multi-speed 12	0.00	0.00	0.00	0.00
F_201	Multi-speed 13	0.00	0.00	0.00	0.00
F_202	Multi-speed 14	0.00	0.00	0.00	0.00
F_203	Multi-speed 15	0.00	0.00	0.00	0.00
F_018	Based Frequency of **Accel./Decel.** Time	60.00	50.00	50.0	60.00
F_019	Primary Acceleration Time	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_020	Primary Deceleration Time	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_021	Preset Speed1	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_022	Preset Speed1	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_023	Preset Speed2	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_024	Preset Speed2	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_025	Preset Speed3	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_026	Preset Speed3	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_027	Secondary Acceleration Time	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_028	Secondary Deceleration Time	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_029	Set S-curve for **Accel./Decel.** Time	0.0	0.0	0.0	0.0
F_030	Limitation of Output Voltage	0	0	0	0
F_031	Maximum Output Frequency	60.00	50.00	50.00	60.00
F_032	Starting Frquency	0.5	0.5	0.5	0.5
F_033	Starting Voltage	8.0 (note:2) 12.0 (note:3)	8.0 (note:2) 12.0 (note:3)	8.0 (note:2) 12.0 (note:3)	8.0 (note:2) 12.0 (note:3)
F_034	Base Frequency	60.00	50.00	50.00	60.00
F_035	Base Voltage	200 (note:2) 380 (note:3)	200 (note:2) 380 (note:3)	200 (note:2) 380 (note:3)	200 (note:2) 380 (note:3)
F_036	V/F Frequency1	0.0	0.0	0.0	0.0
F_037	V/F Frequency1	0.0	0.0	0.0	0.0
F_038	V/F Frequency2	0.0	0.0	0.0	0.0
F_039	V/F Frequency2	0.0	0.0	0.0	0.0
F_040	Vin Gain	1.00	1.00	1.00	1.00
F_041	Vin Bias	0.00	0.00	0.00	0.00
F_042	Frequency Upper Limit	1.00	1.00	1.00	1.00
F_043	Frequency Lower Limit	0.00	0.00	0.40	0.40
F_044	FM+ Analog Output Signal Selection	0	0	0	0
F_045	FM+ Analog Output Gain	1.00	1.00	1.00	1.00
F_046	Motor Overload Protection (OL)	1	1	1	1
F_047	Filter Setting of Analog Input Signal	20	20	20	20
F_048	Motor Rated Current	—	—	—	—
F_049	Motor No-Load Current	—	—	—	—
F_050	Motor Slip Compensation	0.0	0.0	0.0	0.0
F_051	Number of Motor Poles	4P	4P	4P	4P
F_052	Multi-function Input Terminal X1	3	3	3	3
F_053	Multi-function Input Terminal X2	4	4	4	4

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_054	Multi-function Input Terminal X3	1	1	1	1
F_055	Multi-function Input Terminal X4	2	2	18	18
F_056	Multi-function Input Terminal X5	7	7	7	7
F_057	Multi-function Input Terminal X6	6	6	6	6
F_058	Multi-function Output Terminal Y1	3	3	3	3
F_059	Multi-function Output Terminal Y2	2	2	2	2
F_060	Multi-function Output Terminal Ta1,Tb1	11	11	11	11
F_061	Constant Speed Detection Range	2.0	2.0	2.0	2.0
F_062	Frequency Detection Range	2.0	2.0	2.0	2.0
F_063	Frequency Detection Level	0.0	0.0	0.0	0.0
F_064	Automatic Torque Compensation Range	1.0	1.0	1.0	1.0
F_065	System Overload Detection (OLO)	0	0	0	0
F_066	System Overload Detecting Selection	0	0	0	0
F_067	Output Setting after System Overload	0	0	0	0
F_068	System Overload Detection Level	160	160	160	160
F_069	System Overload Detection Time	2.0	2.0	2.0	2.0
F_070	Stall Prevention Level at Acceleration	170	170	170	170
F_071	Stall Prevention Level at Constant Speed	160	160	160	160
F_072	Acceleration Time Setting after Stall Prevention under Constant Speed	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_073	Deceleration Time for Stall Prevention under Constant Speed	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_074	Stall Prevention Setting at Deceleration	1	1	1	1
F_075	DC Braking Level	50	50	50	50
F_076	Time of DC Braking after Stop	0.5	0.5	0.5	0.5
F_077	Time of DC Braking before Start	0.0	0.0	0.0	0.0
F_078	Operation Selection at Instantaneous Power Failure	0	0	0	0
F_079	The Voltage Level Setting at Power Failure	175 (Note2) 320 (Note3)	175 (Note2) 320 (Note3)	175 (Note2) 320 (Note3)	175 (Note2) 320 (Note3)

Appendix E Default Value List

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_080	Auto-restart Times Setting of Error Trip	0	0	0	0
F_081	Switching Frequency	1	1	1	1
F_082	Stop Mode	0	0	1	1
F_083	Reverse Prohibition	0	0	0	0
F_084	Jump Frequency1	0.0	0.0	0.0	0.0
F_085	Jump Frequency2	0.0	0.0	0.0	0.0
F_086	Jump Frequency3	0.0	0.0	0.0	0.0
F_087	Jump Frequency Range	0.3	0.3	0.3	0.3
F_088	The Current Level of Speed Tracing	150	150	150	150
F_089	Delay Time for Speed Tracing	0.5	0.5	0.5	0.5
F_090	The V/F Pattern of Speed Tracing	100	100	100	100
F_091	Error Record	—	—	—	—
F_092	Parameter Setting Lock	0	0	0	0
F_093	Automatic Voltage Regulation (AVR)	1	1	1	1
F_094	Drive Overload (OL1)	3	3	3	3
F_095	Power Source	220.0 (Note2) 380.0 (Note3)	220.0 (Note2) 380.0 (Note3)	220.0 (Note2) 380.0 (Note3)	220.0 (Note2) 380.0 (Note3)
F_096	Analog Frequency Dead Band	0.5	0.5	0.5	0.5
F_097	Holding Time Interval	0.0	0.0	0.0	0.0
F_098	Grounding Fault Protection (GF)	1	1	1	1
F_099	External Indicator 1	1	1	1	1
F_100	External Indicator 2	5	5	5	5
F_101	External Indicator 3	2	2	2	2
F_102	V/F Pattern Selection	0	0	0	0
F_103	Subtracted Frequency of Deceleration at Power Failure	3.0	3.0	3.0	3.0
F_104	Deceleration Time 1 of Ramp to Stop by Power Failure	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_105	Deceleration Time 2 of Ramp to Stop by Power Failure	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)	15.0 (Note1)
F_106	Switching the Frequency of Ramp to Stop	0.0	0.0	0.0	0.0
F_107	Analog Frequency Dead Band	0.00	0.00	0.00	0.00
F_108	Digital Input Response Time	10	10	10	10
F_109	Communication Interface Selection	1	1	1	1
F_110	Communication Address	0	0	0	0

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_111	Communication Baud Rate	1	1	1	1
F_112	Communication Protocol	1	1	1	1
F_113	Communication Overtime (Cot)	0.0	0.0	0.0	0.0
F_114	Feedback Signal Trip Detection	0	0	0	0
F_115	Control Selection of Multi-Function Input Terminals	0	0	0	0
F_116	Fault Reset Selection	0	0	0	0
F_117	Error Tripping Time Interval before Auto-Restart	6	6	6	6
F_118	UP/DOWN Memory Selection	0	0	0	0
F_119	UP/DOWN Frequency Resolution	0	0	0	0
F_120	Water Shortage Detection by Current Level	1	1	1	1
F_121	UP/DOWN Frequency Adjustment	0.00	0.00	0.00	0.00
F_122	Secondary Frequency Command Selection	0	0	0	0
F_123	Analog Input Selection	0	0	0	0
F_124	Analog Input Selection (Vin)	1	1	1	1
F_125	Analog Input Selection (Iin)	1	1	4	4
F_126	Iin Range Selection	0	0	0	0
F_127	Iin Gain (Analog Input)	1.00	1.00	1.00	1.00
F_128	Iin Bias (Analog Input)	0.00	0.00	0.00	0.00
F_129	AM+ Analog Output Signal Selection	2	2	2	2
F_130	AM+ Analog Output Gain	1.00	1.00	1.00	1.00
F_131	Multi-function Output Terminal Ta2,Tb2	1	1	1	1
F_132	DC Braking Frequency at Stop	0.5	0.5	0.5	0.5
F_133	Reserved	-	-	-	-
F_134	Reserved	-	-	-	-
F_135	Current Limitation	0	0	1	1
F_136	PID Deviation Gain	1.0	1.0	1.0	1.0
F_137	Delay Time before Stop	0	0	0	0
F_138	Overheat Protection and Temperature Adjustment	0.0	0.0	0.0	0.0
F_139	Operation Condition Memory	1	1	1	1
F_140	NTC Thermistor Setting	1	1	1	1
F_141	Drive Overheating Warning Selection	0	0	0	0
F_142	Drive Overheating Warning Level	70	70	70	70

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_143	Drive Overheating Dead Band	3.0	3.0	3.0	3.0
F_144	Fan Control Selection	1	1	1	1
F_145	Temperature Level of Fan Activation	50	50	50	50
F_146	Minimum Operation Time of Fan	0.5	0.5	0.5	0.5
F_147	SV Setting	2.0	2.0	2.0	2.0
F_148	PID Control Display	0.0	0.0	0.0	0.0
F_149	“SV-PV” Value Display	1	1	1	1
F_150	PID Control Command	2	2	2	2
F_151	Upper Limit of Transmitter	10.0	10.0	10.0	10.0
F_152	Lower Limit of Transmitter	0.0	0.0	0.0	0.0
F_153	PID Control Mode Selection	0	0	1	1
F_154	P Selection	1	1	1	1
F_155	Gain Value(P)	1.0	1.0	2.0	2.0
F_156	Integration Time (I)	2.0	2.0	1.0	1.0
F_157	Derivative Time (D)	0.00	0.00	0.00	0.00
F_158	Feedback Derivative Time	0.00	0.00	0.00	0.00
F_159	Integration Upper Limitation	1.00	1.00	1.00	1.00
F_160	Integration Lower Limitation	0.00	0.00	0.40	0.40
F_161	Integrator Initialized Value	0.00	0.00	0.00	0.00
F_162	PID Buffer Space	2	2	2	2
F_163	Feedback Signal Filter	10	10	10	10
F_164	Feedback Signal Detection	1	1	1	1
F_165	Feedback Signal Selection	0	0	0	0
F_166	(2nd PI Control)Active Range	0.0	0.0	2.0	2.0
F_167	(2nd PI Control)Active Time	0.0	0.0	15.0	15.0
F_168	P2, Gain Value	1.0	1.0	2.0	2.0
F_169	I2, Integration Value	2.0	2.0	1.0	1.0
F_170	Display Setting by Open-Loop Command	0	0	0	0
F_171	Setting Selection by Open-Loop Command	1	1	1	1
F_172	KP Selection by Open-Loop Command	0	0	1	1
F_174	(On-Off) Control Selection	0	0	0	0
F_175	(On-Off) Delay Time Control	0	0	0	0
F_176	(On) Range Setting	1.0	1.0	1.0	1.0
F_177	(Off) Range Setting	1.0	1.0	1.0	1.0
F_178	(On)Delay Time	0	0	0	0

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_179	(Off)Delay Time	0	0	0	0
F_180	(On-Off)Accel./Decel. Time Selection	1	1	1	1
F_181	(Off)Holding Time	0	0	0	0
F_182	Air Conditioning Mode	0	0	0	0
F_183	(Air Conditioning Mode) TemperatureResponse Time	5.0	5.0	5.0	5.0
F_184	(Air Condi-tioning Mode) Variation Frequency	2.0	2.0	2.0	2.0
F_185	(Air Conditioning Mode) Upper Limit Range of Temperature	3.0	3.0	3.0	3.0
F_186	(Air Conditioning Mode) Lower Limit Range of Temperature	1.0	1.0	1.0	1.0
F_187	(Air Conditioning Mode) Holding Frequency Level	0.50	0.50	0.50	0.50
F_188	(Air Conditioning Mode) Detection Time of Holding Frequency	0.0	0.0	0.0	0.0
F_189	(Air Conditioning Mode) Full Speed Time	1.0	1.0	1.0	1.0
F_190	(Feedback Limit) Detection (OP)	0	0	0	0
F_191	(Feedback Limit) Level	8.0	8.0	8.0	8.0
F_192	(Feedback Limit) Detection Setting	0	0	0	0
F_193	(Feedback Limit) Detection Time	300	300	300	300
F_194	(Feedback Limit) Range Setting	1.0	1.0	1.0	1.0
F_195	(Feedback Limit) Detection Condition	1	1	1	1
F_204 ~ F_207	Reserved	-	-	-	-
F_208	Filter Setting of Keypad Pot knob	10	10	10	10
F_209	Keypad Pot Knob bias	0.00	0.00	0.00	0.00
F_211	Drive duty selection	0	0	0	0
F_212	Parameter Display Selection of Password lock	0	0	0	0
F_213	Parameter Lock Password Setting	0	0	0	0
F_214	Parameter Lock Decoding Setting	-	-	-	-

Appendix E Default Value List

Func.	Name	dEF60 60Hz General	dEF50 50Hz General	dEFC3 50Hz PID Control	dEFC4 60Hz PID Control
F_215	Current Oscillation Gain (HPF)	0	0	0	0
F_216 ~ F_219	Reserved	-	-	-	-
F_220	Cut frequency of Current Oscillation	400	400	400	400
F_221	Current Oscillation Gain (LPF)	128	128	128	128
F_222	Upper frequency of Current Oscillation prevention	25	25	25	25
F_223	lower frequency of Current Oscillation prevention	14	14	14	14
F_224	Default Setting	-	-	-	-

dEF60= 60Hz general type
dEF50= 50Hz general type
dEFC3= 50Hz PID control
dEFC4= 60Hz PID control
Note:
1. 0.5 ~ 5HP: 5 sec
   7.5~30HP: 15sec
   40HP above: 30 sec
2. Specification of 200V.
3. Specification of 400V.

Appendix F Setting Memo

Func.	Description	dEF60	Setting Value
F_000		-	
F_001		3	
F_002		1	
F_003		1	
F_004		1	
F_005		1	
F_006		1	
F_007		20.00	
F_008		0	
F_009		60.00	
F_010		10.00	
F_011		20.0	
F_012		30.0	
F_013		0.00	
F_014		0.00	
F_015		0.00	
F_016		0.00	
F_017		6.00	
F_018		60.00 (50.00)	
F_019		Note	
F_020		Note	
F_021		Note	

Func.	Description	dEF60	Setting Value
F_022		Note	
F_023		Note	
F_024		Note	
F_025		Note	
F_026		Note	
F_027		Note	
F_028		Note	
F_029		0.0	
F_030		0	
F_031		60.00 (50.00)	
F_032		0.5	
F_033		200Vseries 8.0 400Vseries: 12.0	
F_034		60.00 (50.00)	
F_035		200Vseries: 220.0 400Vseries 380.0	
F_036		0.0	
F_037		0.0	
F_038		0.0	
F_039		0.0	
F_040		1.00	
F_041		0.00	
F_042		1.00	
F_043		0.40	

Func.	Description	dEF60	Setting Value
F_044		0	
F_045		1.00	
F_046		1	
F_047		20	
F_048		According to the rated current of motor	
F_049		1/3 motor Rated current	
F_050		0.0	
F_051		4P	
F_052		3	
F_053		4	
F_054		1	
F_055		2	
F_056		–	
F_057		–	
F_058		3	
F_059		2	
F_060		11	
F_061		2.0	
F_062		2.0	
F_063		0.0	
F_064		1.0	
F_065		0	
F_066		0	
F_067		0	

Func.	Description	dEF60	Setting Value
F_068		160	
F_069		2.0	
F_070		170	
F_071		160	
F_072		Note	
F_073		Note	
F_074		1	
F_075		50	
F_076		0.5	
F_077		0.0	
F_078		0	
F_079		200Vseries 175.0 400Vseries 320.0	
F_080		0	
F_081		1	
F_082		0	
F_083		0	
F_084		0.0	
F_085		0.0	
F_086		0.0	
F_087		0.0	
F_088		150	
F_089		0.5	
F_090		100	

Func.	Description	dEF60	Setting Value
F_091		–	
F_092		0	
F_093		1	
F_094		3	
F_095		200V series 220.0 400Vseires 380.0	
F_096		0.5	
F_097		0.0	
F_098		1	
F_099		1	
F_100		5	
F_101		2	
F_102		0	
F_103		3.0	
F_104		Note	
F_105		Note	
F_106		0.0	
F_107		0.00	
F_108		10	
F_109		1	
F_110		0	
F_111		1	
F_112		1	
F_113		0.0	
F_114		0	
F_115		0	

Func.	Description	dEF60	Setting Value
F_116		0	
F_117		6	
F_118		0	
F_119		0	
F_120		1	
F_121		0.00	
F_122		0	
F_123		0	
F_124		1	
F_125		1	
F_126		0	
F_127		1.00	
F_128		0.00	
F_129		2	
F_130		1.00	
F_131		1	
F_132		0.5	
F_133		–	
F_134		–	
F_135		0	
F_136		1.0	
F_137		0	
F_138		0.0	
F_139		1	
F_140		1	

Appendix F Setting Memo

Func.	Description	dEF60	Setting Value
F_141		0	
F_142		70	
F_143		3.0	
F_144		1	
F_145		50	
F_146		0.5	
F_147		2.0	
F_148		0	
F_149		1	
F_150		2	
F_151		10.0	
F_152		0.0	
F_153		0	
F_154		1	
F_155		1.0	
F_156		2.0	
F_157		0.00	
F_158		0.00	
F_159		1.00	
F_160		0.00	
F_161		0.00	
F_162		2	
F_163		10	
F_164		1	
F_165		0	
F_166		0.0	

Func.	Description	dEF60	Setting Value
F_167		0.0	
F_168		1.0	
F_169		2.0	
F_170		0	
F_171		1	
F_172		0	
F_173		–	
F_174		0	
F_175		0	
F_176		1.0	
F_177		1.0	
F_178		0	
F_179		0	
F_180		1	
F_181		0	
F_182		0	
F_183		5.0	
F_184		2.0	
F_185		3.0	
F_186		1.0	
F_187		0.50	
F_188		0.0	
F_189		1.0	
F_190		0	
F_191		8.0	
F_192		0	

Func.	Description	dEF60	Setting Value
F_193		300	
F_194		1.0	
F_195		1	
F_196		0.00	
F_197		0.00	
F_198		0.00	
F_199		0.00	
F_200		0.00	
F_201		0.00	
F_202		0.00	
F_203		0.00	
F_204		—	
F_205		—	
F_206		—	
F_207		—	
F_208		10	

Func.	Description	dEF60	Setting Value
F_209		0.00	
F_210		—	
F_211		0	
F_212		0	
F_213		0	
F_214		—	
F_215		0	
F_216		-	
F_217		—	
F_218		—	
F_219		—	
F_220		400	
F_221		128	
F_222		25	
F_223		14	
F_224		0	

Note:
The setting value is based on the HP of the drive.
0.5 ~ 5HP → 5 sec
7.5 ~ 30HP → 15 sec
Above 40HP → 30 sec

Appendix G Fault Display

Error Trip Messages of Drive

Display	Description	Display	Description
(EEr) 	EEPROM error	(OH) 	Drive overheating
(AdEr) 	A/D converter error	(OL) 	Motor overload
(SC) 	Fuse open	(OL1) 	Drive overload
(LE1) 	Under voltage during operation	(OLO) 	System overload
(OC) 	Drive over current	(thr) 	External fault
(GF) 	Grounding fault	(ntCF) 	NTC Thermistor sensor fault
(OE) 	Over voltage	(PAdF) 	Keypad interruption during copy
(Cot) 	Communication overtime		

Error Trip Messages of Drive at close-loop Control

(no Fb) 	PID feedback signal error	(OP) 	Over pressure

Warning Messages of Drive

*When the drive displays below messages, drive will stop output. If the abnormal condition is removed, the drive will auto-restarting.

Display	Description	Display	Description
(LE) 	Power source under voltage	(Cot) 	Communication overtime
(bb) 	Drive output interruption	(OP) 	Over pressure
(Fr) 	Coast to stop	(Ht) 	Drive overheating
(db) 	Dynamic brake transistor over voltage	(PrEr) 	Software fault
(Err_00)  (Err_01) 	Err_00: Keypad cable trip before connecting Err_01: Keypad cable trip during operation	(Wr_F) 	Different software version inter-copy
(LOC) 	Parameter Password Unlock	(PUF1) 	First time you enter wrong
(ULOC) 	Parameter Password Unlock	(PUF2) 	Second time you enter wrong
(dtF) 	Direction command error	(PUF3) 	Third time you enter wrong