Cat. No. I130E-EN-02

RX

Customised to your machine
Model: 3G3RX
200 V Class Three-Phase Input 0.4 to 55 kW
400 V Class Three-Phase Input 0.4 to 132 kW

QUICK START GUIDE

OMRON

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

RX Quick Start Guide

RX Quick Start Guide

1 SPECIFICATIONS

1.1 Upon receipt

Please perform the following task after receiving the drive:

- Inspect the driver for damage. If the drive appear damage upon receipt, contact your supplier.
- Verify the receipt of the correct model by checking the information on the nameplate. If you have received the wrong model contact your supplier.
- Refer to the User's Manual for detailed information about the product and functions.

Basic specifications and EMC filter

Voltage	Type	HD (150% overload for 60s)		ND (120% overload for 60s)		EMC filter
	3G3RX-	Max Motor (KW)	Rated current (A)	Max Motor (KW)	Rated current (A)	
3 x 200 V	A2004	0.4	3.0	0.75	3.7	AX-FIR2018-RE
	A2007	0.75	5.0	1.5	6.3	
	A2015	1.5	7.5	2.2	9.4	
	A2022	2.2	10.5	3.7	12.0	
	A2037	3.7	16.5	5.5	19.6	
	A2055	5.5	24.0	7.5	30.0	AX-FIR2053-RE
	A2075	7.5	32.0	11	44.0	
	A2110	11	46.0	15	58.0	
	A2150	15	64.0	18.5	73.0	AX-FIR2110-RE
	A2185	18.5	76.0	22	85.0	
	A2220	22	95.0	30	113.0	
	A2300	30	121.0	37	140.0	AX-FIR2145-RE
	A2370	37	145.0	45	169.0	AX-FIR3250-RE
	A2450	45	182.0	55	210.0	
	A2550	55	220.0	75	270.0	AX-FIR3320-RE
3 x 400 V	A4004	0.4	1.5	0.75	1.9	AX-FIR3010-RE
	A4007	0.75	2.5	1.5	3.1	
	A4015	1.5	3.8	2.2	4.8	
	A4022	2.2	5.3	4.0	6.7	
	A4040	4.0	9.0	5.5	11.1	
	A4055	5.5	14.0	7.5	16.0	AX-FIR3030-RE
	A4075	7.5	19.0	11	22.0	
	A4110	11	25.0	15	29.0	
	A4150	15	32.0	18.5	37.0	AX-FIR3053-RE
	A4185	18.5	38.0	22	43.0	
	A4220	22	48.0	30	57.0	
	A4300	30	58.0	37	70.0	AX-FIR3064-RE
	A4370	37	75.0	45	85.0	AX-FIR3100-RE
	A4450	45	91.0	55	105.0	AX-FIR3130-RE
	A4550	55	112.0	75	135.0	
	B4750	75	149.0	90	160.0	AX-FIR3250-RE
	B4900	90	176.0	110	195.0	
	B411K	110	217.0	132	230.0	AX-FIR3320-RE
	B413K	132	260.0	160	290.0	

1.2 Technical specification

Model number 3G3RX-		Specifications
Control functions	Control methods	Phase-to-phase sinusoidal pulse with modulation PWM (Sensorless vector control, close loop vector with motor feedback, V/F)
	Output frequency range	0.10 to 400.00 Hz
	Frequency precision	Digital set value: ±0.01% of the max. frequency
		Analogue set value: ±0.2% of the max. frequency (25 ±10 °C)
	Resolution of frequency set value	Digital set value: 0.01 Hz
		Analog input: 12 bit
	Resolution of output frequency	0.01Hz
	Starting torque	150%/0.3 Hz (under sensor-less vector control or sensor-less vector control at 0 Hz)
		200%/Torque at 0 Hz (under sensor-less vector control at 0Hz, when a motor size one rank lower than specified is connected)
	Overload capability	150%/60s, 200%/3s for CT; 120%/60s VT
	Frequency set value	0 to 10 VDC (10 KΩ), -10 to 10 VDC (10 KΩ), 4 to 20 mA (100 Ω), RS485 Modbus, Network options
	V/f Characteristics	V/f optionally changeable at base frequencies of 30 to 400 Hz, V/f braking constant torque, reduction torque, sensor-less vector control, sensor-less vector control at 0 Hz
Functionality	Analogue inputs	Analogue inputs 0 to 10 V and -10 to 10 V (10 KΩ), 4 to 20 mA (100 Ω)
	Analogue outputs	Analog voltage output, Analog current output, Pulse train output
	Accel/Decel times	0.01 to 3600.0 s (line/curve selection)
	Display	Status indicator LED's Run, Program, Power, Alarm, Hz, Amps, Volts, %
		Digital operator: Available to monitor 23 items, output current, output frequency...
Protection functions	Motor overload protection	Electronic Thermal overload relay and PTC thermistor input
	Instantaneous overcurrent	200% of rated current for 3 seconds
	Overload	150% for 1 minute
	Overvoltage	800 V for 400 V type and 400 V for 200 V type
	Momentary power loss	Decelerates to stop with DC bus controlled, coast to stop
	Cooling fin overheat	Temperature monitor and error detection
	Stall prevention level	Stall prevention during acceleration, deceleration and constant speed
	Ground fault	Detection at power on
	Power charge indication	On when voltage between P and N is higher than 45V
Ambient conditions	Degree of protection	IP20 / IP00
	Ambient humidity	90% RH or less (without condensation)
	Storage temperature	-20°C..+65°C (short-term temperature during transportation)
	Ambient temperature	-10°C to 50°C
	Installation	Indoor (no corrosive gas, dust, etc.)
	Installation height	Max. 1000 m
	Vibration	3G3RX-A□004 to A□220, 5.9 m/s^2 (0.6G), 10 to 55 Hz 3G3RX-A□300 to B□13K, 2.94 m/s^2 (0.3G), 10 to 55 Hz

1.3 Power ratings

Item			Three-phase 200 V class specifications													
3G3RX inverters, 200 V models			A2004	A2007	A2015	A2022	A2037	A2055	A2075	A2110	A2150	A2185	A2220	A2300	A2370	A2450	A2550
Max. applicable motor 4P	kW	at CT	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
		at VT	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Rated output capacity (kVA)	200 V	at CT	1.0	1.7	2.5	3.6	5.7	8.3	11.0	15.9	22.1	26.3	32.9	41.9	50.2	63.0	76.2
		at VT	1.3	2.1	3.2	4.1	6.7	10.4	15.2	20.0	26.3	29.4	39.1	49.5	59.2	72.7	93.5
	240 V	at CT	1.2	2.0	3.1	4.3	6.8	9.9	13.3	19.1	26.6	31.5	39.4	50.2	60.2	75.6	91.4
		at VT	1.5	2.6	3.9	5.0	8.1	12.4	18.2	24.1	31.5	35.3	46.9	59.4	71.0	87.2	112.2
Rated input voltage			3-phase (3-wire) 200 V -15% to 240 V +10%, 50/60 Hz ±5%														
Rated output voltage			3-phase: 200 to 240 V (Cannot exceed that of incoming voltage.)														
Rated output current (A)		at CT	3.0	5.0	7.5	10.5	16.5	24	32	46	64	76	95	121	145	182	220
		at VT	3.7	6.3	9.4	12	19.6	30	44	58	73	85	113	140	169	210	270
Radio noise filter			Built-in														
Weight (kg)			3.5	3.5	3.5	3.5	3.5	6	6	6	14	14	14	22	30	30	43
Braking	Regenerative braking		Built-in braking resistor circuit (discharge resistor separately mounted)											Regenerative braking unit separately mounted			
	Minimum connection resistance (Ω)		50	50	35	35	35	16	10	10	7.5	7.5	5	-	-	-	-

Item			Three-phase 400 V class specifications													
3G3RX inverters, 400 V models			A4004	A4007	A4015	A4022	A4040	A4055	A4075	A4110	A4150	A4185	A4220	A4300	A4370	A4450	A4550
Max. applicable motor 4P	kW	at CT	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55
		at VT	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Rated output capacity (kVA)	400 V	at CT	1.0	1.7	2.5	3.6	6.2	9.7	13.1	17.3	22.1	26.3	33.2	40.1	51.9	63.0	77.6
		at VT	1.3	2.1	3.3	4.6	7.7	11.0	15.2	20.9	25.6	30.4	39.4	48.4	58.8	72.7	93.5
	480 V	at CT	1.2	2.0	3.1	4.3	7.4	11.6	15.8	20.7	26.6	31.5	39.9	48.2	62.3	75.6	93.1
		at VT	1.5	2.5	4.0	5.5	9.2	13.3	18.2	24.1	30.7	36.5	47.3	58.1	70.6	87.2	112.2
Rated input voltage			3-phase (3-wire) 380 V -15% to 480V +10%, 50/60 Hz ±5%														
Rated output voltage			3-phase: 380 to 480 V (Cannot exceed that of incoming voltage.)														
Rated output current (A)		at CT	1.5	2.5	3.8	5.3	9.0	14	19	25	32	38	48	58	75	91	112
		at VT	1.9	3.1	4.8	6.7	11.1	16	22	29	37	43	57	70	85	105	135
Radio noise filter			Built-in														
Weight (kg)			3.5	3.5	3.5	3.5	3.5	6	6	6	14	14	14	22	30	30	30
Braking	Regenerative braking		Built-in braking resistor circuit (discharge resistor)											Regenerative braking unit separately mounted			
	Minimum connection resistance (Ω)		100	100	100	100	70	70	35	35	24	24	20	-	-	-	-

Item			Three-phase 400 V class specifications			
3G3RX inverters, 400 V models			B4750	B4900	B411K	B413K
Max. applicable motor 4P	kW	at CT	75	90	110	132
		at VT	90	110	132	160
Rated output capacity (kVA)	400 V	at CT	103.2	121.9	150.3	180.1
		at VT	110.8	135	159.3	200.9
	480 V	at CT	128.3	146.3	180.4	216.1
		at VT	133	162.1	191.2	241.1
Rated input voltage			3-phase (3-wire) 380 V -15% to 480V +10%, 50/60 Hz ±5%			
Rated output voltage			3-phase: 380 to 480 V (Cannot exceed that of incoming voltage.)			
Rated output current (A)		at CT	149	176	217	260
		at VT	160	195	230	290
Radio noise filter			Built-in			
Weight (kg)			60	60	80	80
Braking	Regenerative braking		Regenerative braking unit separately mounted			
	Minimum connection resistance (Ω)		-	-	-	-

2 INSTALLATION

2.1 Wiring sizes and protection

Type 3G3RX-	Main Circuit			Option	Control Circuit	Relay
	R(L1),S(L2),T(L3),U(T1),V(T2),W(T3)	Ro, To	Ground (symbol)	PD(+1),P(+), N(-),RB	AM,AMI,H,O,O2,OI,L,FM, FW, 8, 7, 6, 5, 4, 3, 2, 1, CM1,PLC,P24,CM2, 15,14,13,12,11,TH	AL0,AL1,AL2
A2004 to A2037 A4004 to A4040	M4	M4	M4	M4	M3	M3
A2055,A2075 A4055,A4075	M5		M5	M5		
A2110,A4110	M6		M5	M6		
A2150,A2185 A4150 to A4220	M6		M6	M6		
A2220	M8		M6	M8		
A2300	M8		M6	M8		
A4300	M6		M6	M6		
A2370	M8		M8	M8		
A4370	M8		M8	M8		
A2450	M8		M8	M8		
A4450,A4550	M8		M8	M8		
A2550, B4750 to B413K	M10		M8*	M10		

Screw Size	M3	M4	M5	M6	M8	M10
Torque	0.7 N·m (max. 0.8)	1.2 N·m (max. 1.4)	2.4 N·m (max. 4.0)	4.5 N·m (max. 4.9)	8.1 N·m (max. 8.8)	20.0 N·m (max. 22.0)

2.2 Terminal symbols, screw size and tightening torque

200V				400V			
Motor Output (kW)	Inverter Model 3G3RX-	Power Terminal Wiring Size Range (AWG)	Torque (N·m)	Motor Output (kW)	Inverter Model 3G3RX-	Power Terminal Wiring Size Range (AWG)	Torque (N·m)
0.4	A2004	14 (Stranded only)	1.8	0.4	A4004	14 (Stranded only)	1.8
0.75	A2007			0.75	A4007		
1.5	A2015			1.5	A4015		
2.2	A2022			2.2	A4022		
3.7	A2037	10 (Stranded only)		4.0	A4040		
5.5	A2055	8	4.0	5.5	A4055	12	4.0
7.5	A2075	6		7.5	A4075	10	
11	A2110	6 or 4		11	A4110	8	
15	A2150	2	4.9	15	A4150	6	4.9
18.5	A2185	1		18.5	A4185		
22	A2220	1 or 1/0	8.8	22	A4220	6 or 4	
30	A2300	2/0 or Parallel of 1/0		30	A4300	3	
37	A2370	4/0 (Prepared wire only) or Parallel of 1/0	20.0	37	A4370	1	20.0
45	A2450			45	A4450	1	
55	A2550	350 kcmil (Prepared wire only) or Parallel of 2/0 (Prepared wire only)	19.6	55	A4550	2/0	
				75	B4750	Parallel of 1/0	
				90	B4900		
				110	B411K	Parallel of 3/0	35.0
				132	B413K		

2.3 Installation dimensions

Figure 1

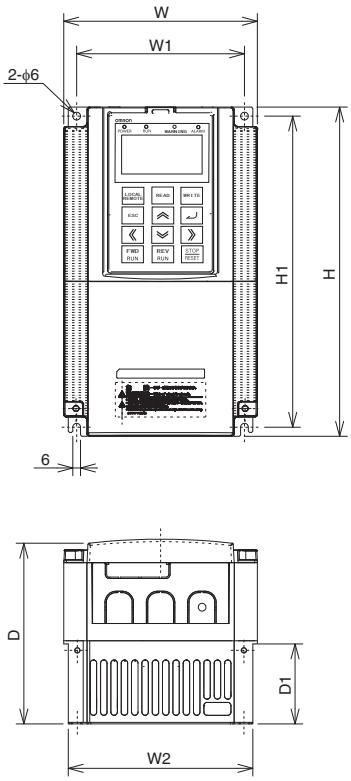


Figure 2

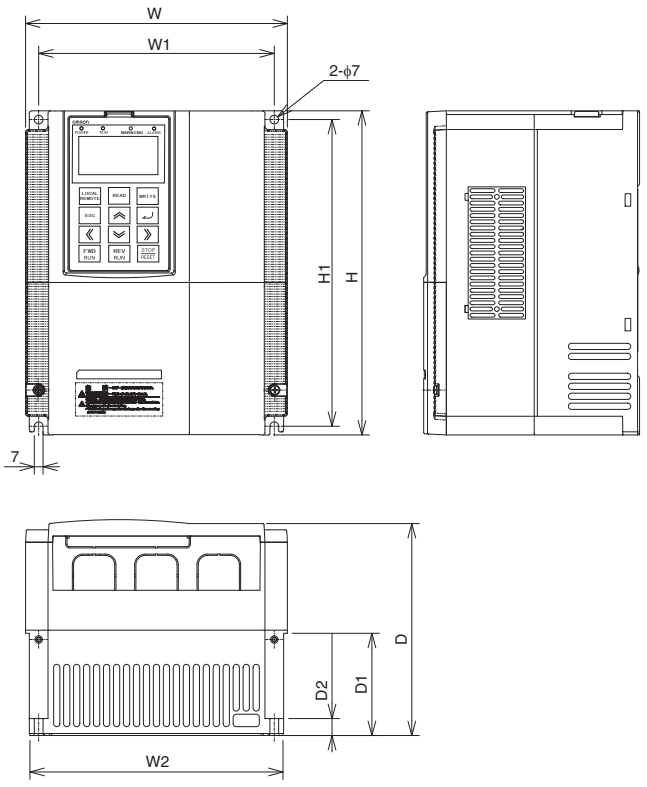


Figure 3

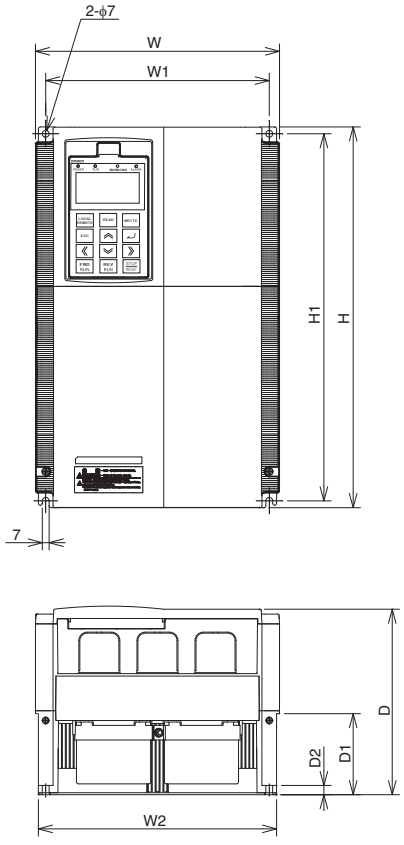


Figure 4

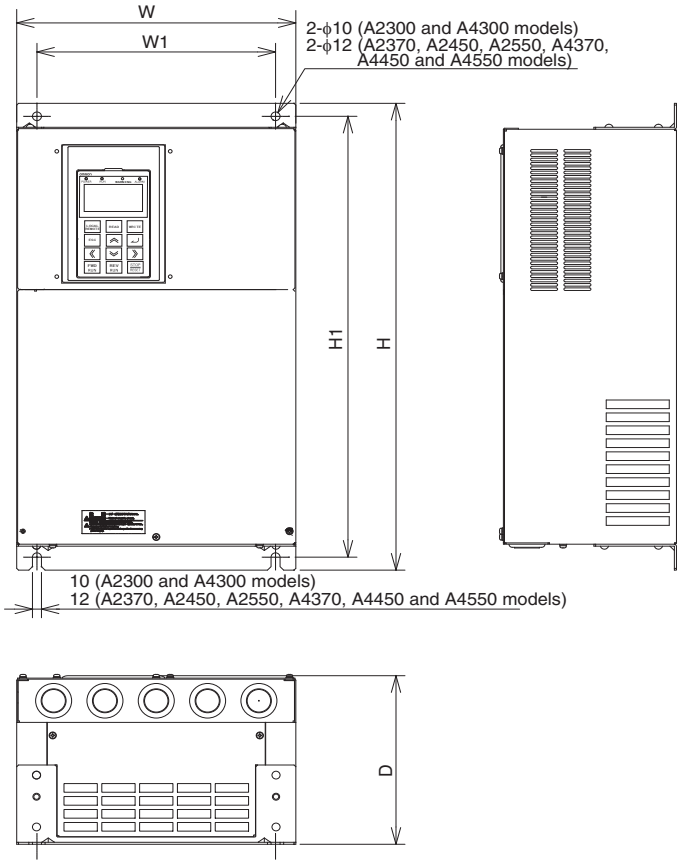
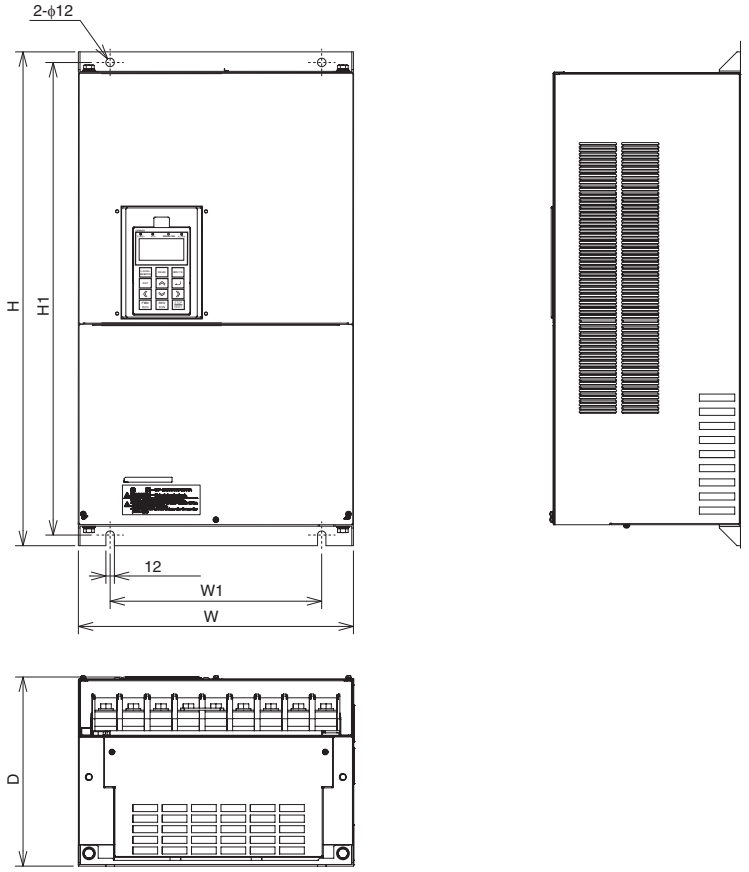
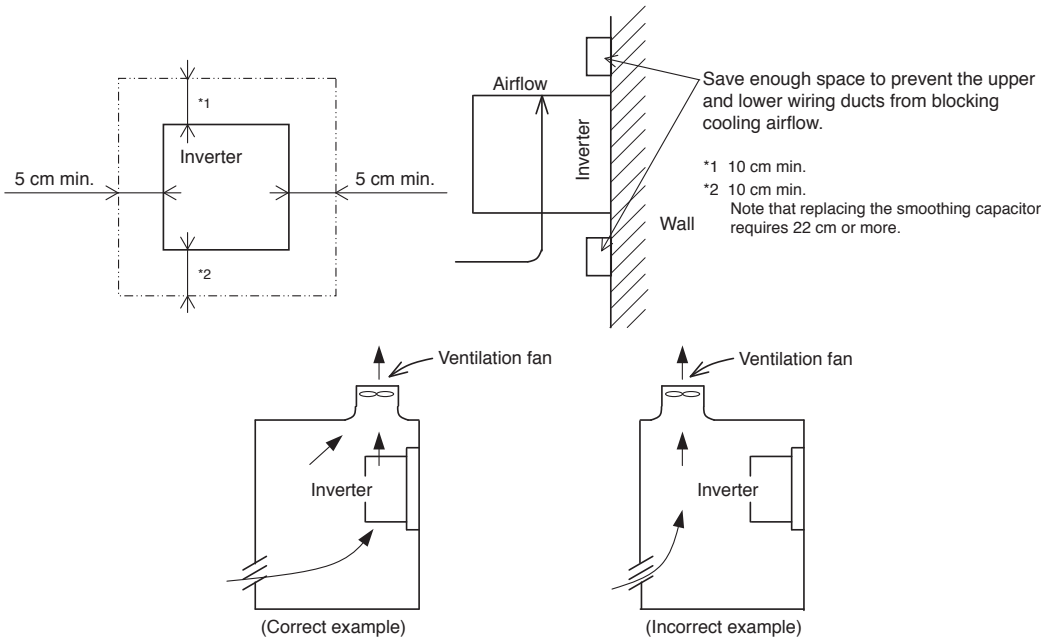


Figure 5



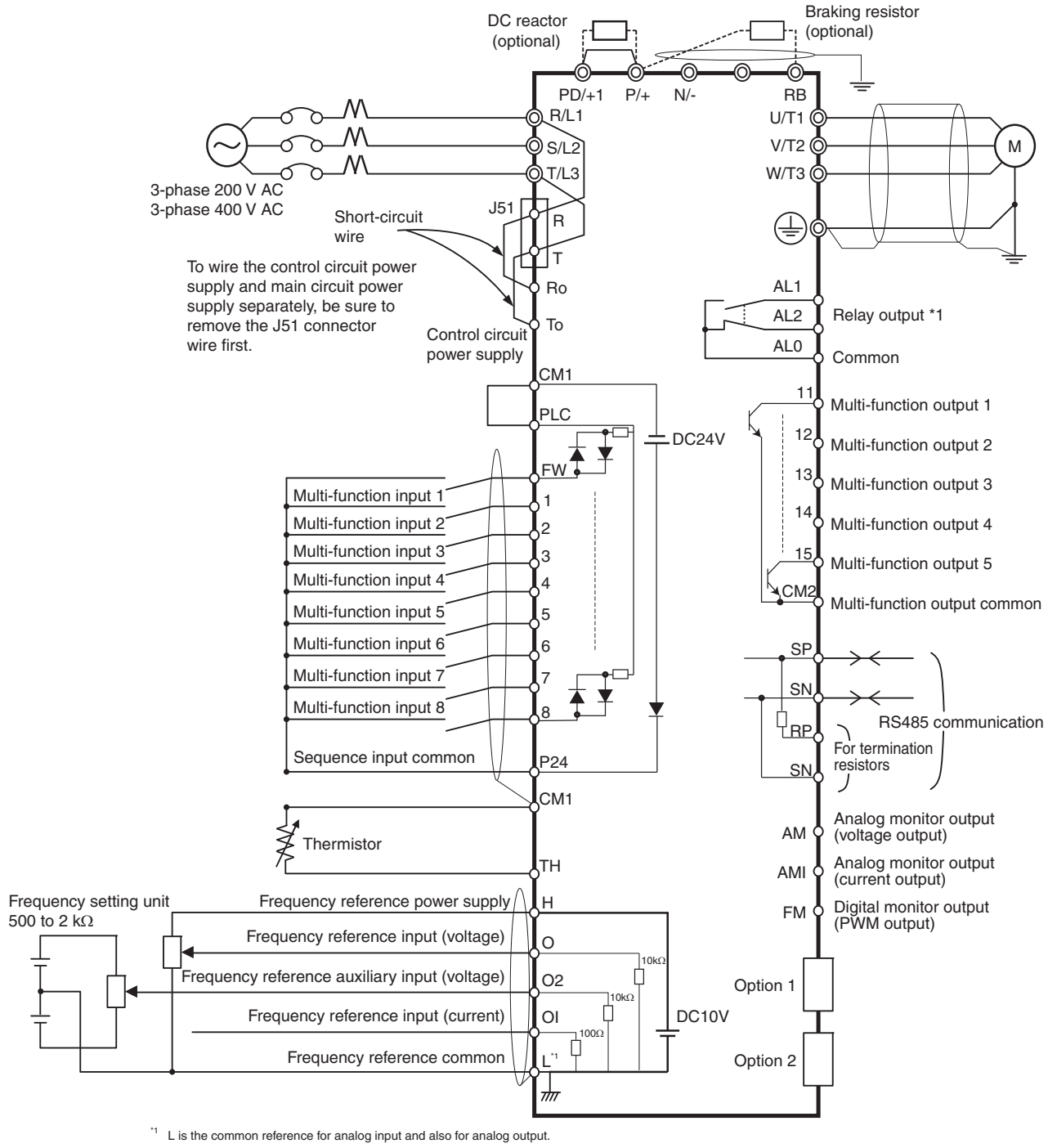
Voltage class	Inverter model 3G3RX-	Figure	Dimensions in mm								
			W	W1	W2	H	H1	D	D1	D2	Weight (kg)
Three-phase 200 V	A2004	1	150	130	143	255	241	140	62	-	3.5
	A2007										
	A2015										
	A2022										
	A2037										
	A2055	2	210	189	203	260	246	170	82	13.6	6
	A2075										
	A2110										
	A2150	3	250	229	244	390	376	190	83	9.5	14
	A2185										
	A2220										
	A2300	4	310	265	-	540	510	195	-	-	20
	A2370		390	300	-	550	520	250	-	-	30
	A2450										
	A2550		480	380	-	700	670	250	-	-	43
Three-phase 400 V	A4004	1	150	130	143	255	241	140	62	-	3.5
	A4007										
	A4015										
	A4022										
	A4040										
	A4055	2	210	189	203	260	246	170	82	13.6	6
	A4075										
	A4110										
	A4150	3	250	229	244	390	376	190	83	9.5	14
	A4185										
	A4220										
	A4300	4	310	265	-	540	510	195	-	-	22
	A4370		390	300	-	550	520	250	-	-	30
	A4450										
	A4550										
	B4750	5	390	300	-	700	670	268	-	-	60
	B4900										
	B411K		480	380	-	740	710	270	-	-	80
	B413K										

2.4 Installation environment clearance



Increased ambient temperature will shorten the life of the inverter. Keep the inverter away from heating elements, if the inverter is installed in an enclosure, keep the temperature within the range of specifications taking dimensions and ventilation under consideration.

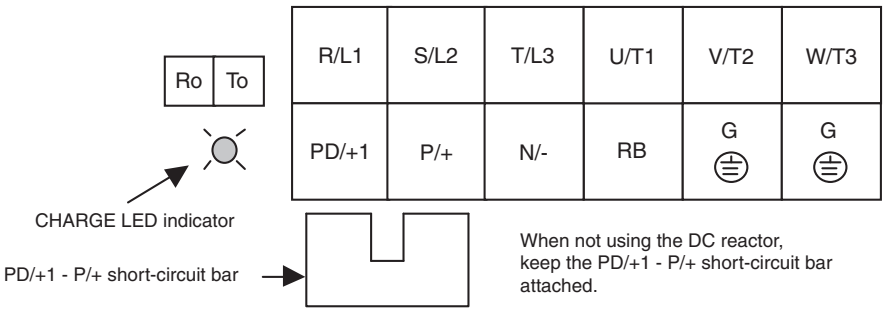
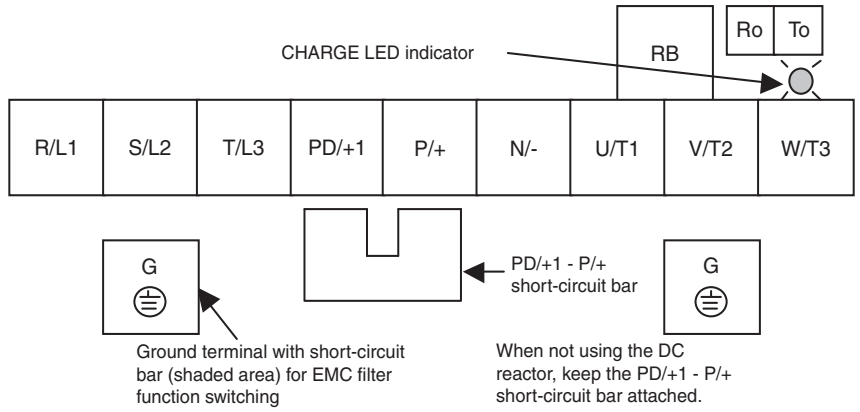
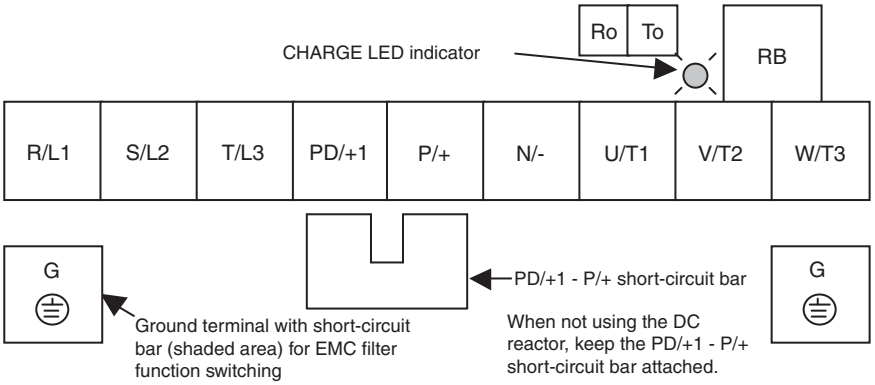
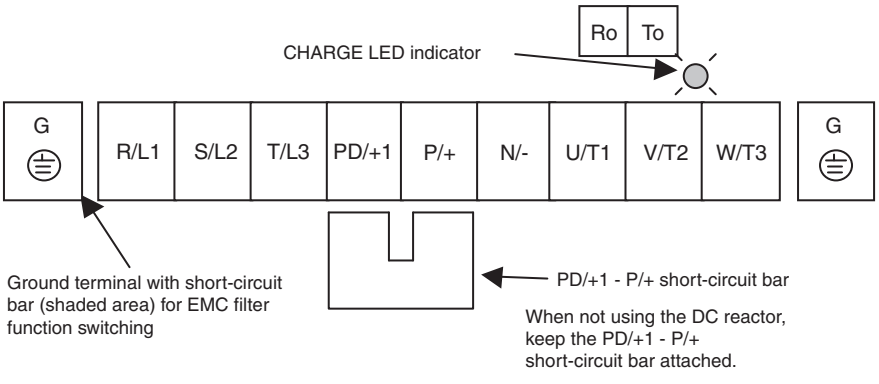
2.5 Wiring overview

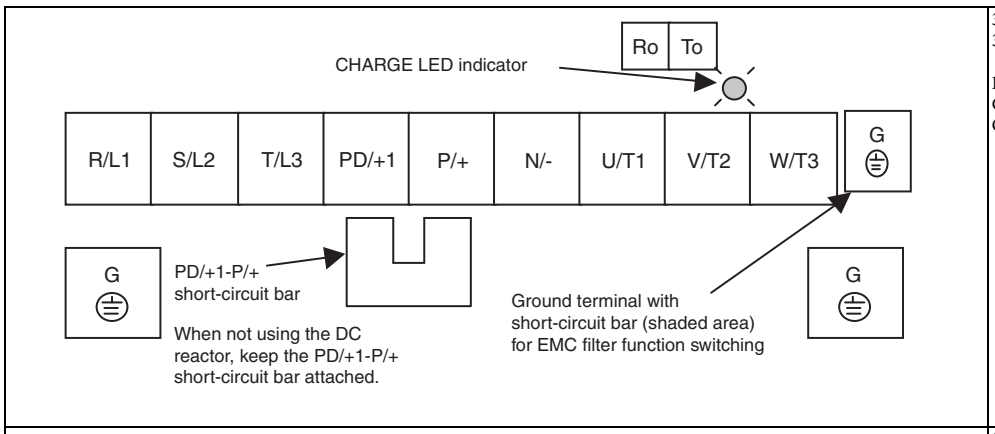


*1 L is the common reference for analog input and also for analog output.

2.6 Power wiring

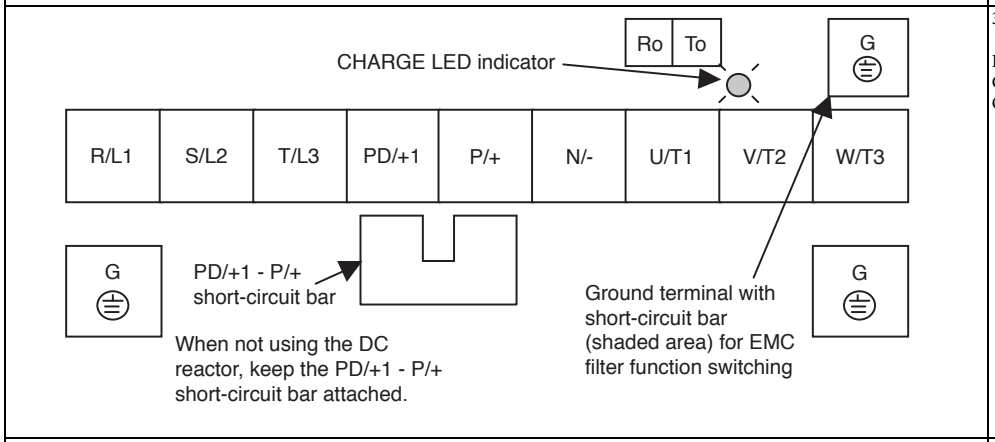
Terminal name	Purpose	Details
R, S, T (L1, L2, L3)	Main power supply input terminals	Connect the input power supply
U, V, W (T1, T2, T3)	Inverter output terminals	Three phase motor connection
PD/+1, P/+	External DC reactor terminal	Remove the short-circuit bar between terminals "PD/+1" and "P/+", and connect the optional power factor improvement DC reactor.
P/+, RB	Braking resistor connection terminals	Connect optional external braking resistors. (The RB terminal is provided for the inverters with 22KW or lower capacity.)
P/+, N/-	Regenerative braking unit connection terminal	Connect optional regenerative braking units.
⏚	Ground terminals	Inverter case ground terminal. Connect this terminal to the ground. Type-D (200V class), type-C (400V class)

Terminals arrangement	Applicable models
	3G3RX-A2004 to A2037 3G3RX-A4004 to A4037 Ro, To: M4 Ground terminal: M4 Others: M4
	3G3RX-A2055, A2075 3G3RX-A4055, A4075 Ro, To: M4 Ground terminal: M5 Others: M5 3G3RX-A2110 3G3RX-A4110 Ro, To: M4 Ground terminal: M6 Others: M5
	3G3RX-A2150, A2185 3G3RX-A4150 to A4220 Ro, To: M4 Ground terminal: M6 Others: M6 3G3RX-A2220 Ro, To: M4 Ground terminal: M6 Others: M8
	3G3RX-A2300 Ro, To: M4 Ground terminal: M6 Others: M8 3G3RX-A4300 Ro, To: M4 Ground terminal: M6 Others: M6 3G3RX-A2370 3G3RX-A4370 Ro, To: M4 Ground terminal: M8 Others: M8



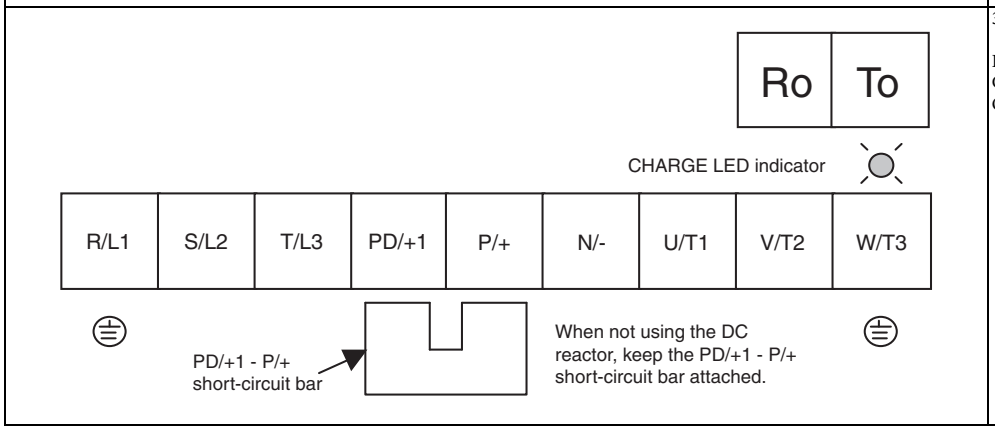
3G3RX-A2450
3G3RX-A4450 to A4550

Ro, To: M4
Ground terminal: M8
Others: M8



3G3RX-A2550

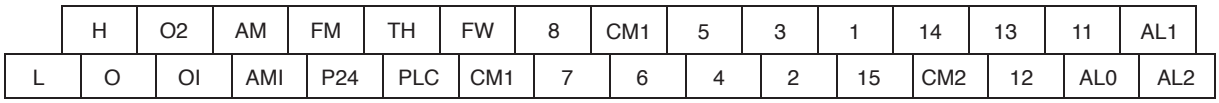
Ro, To: M4
Ground terminal: M8
Others: M10



3G3RX-B4750 to B413K

Ro, To: M4
Ground terminal: M8
Others: M10

2.7 Control wiring

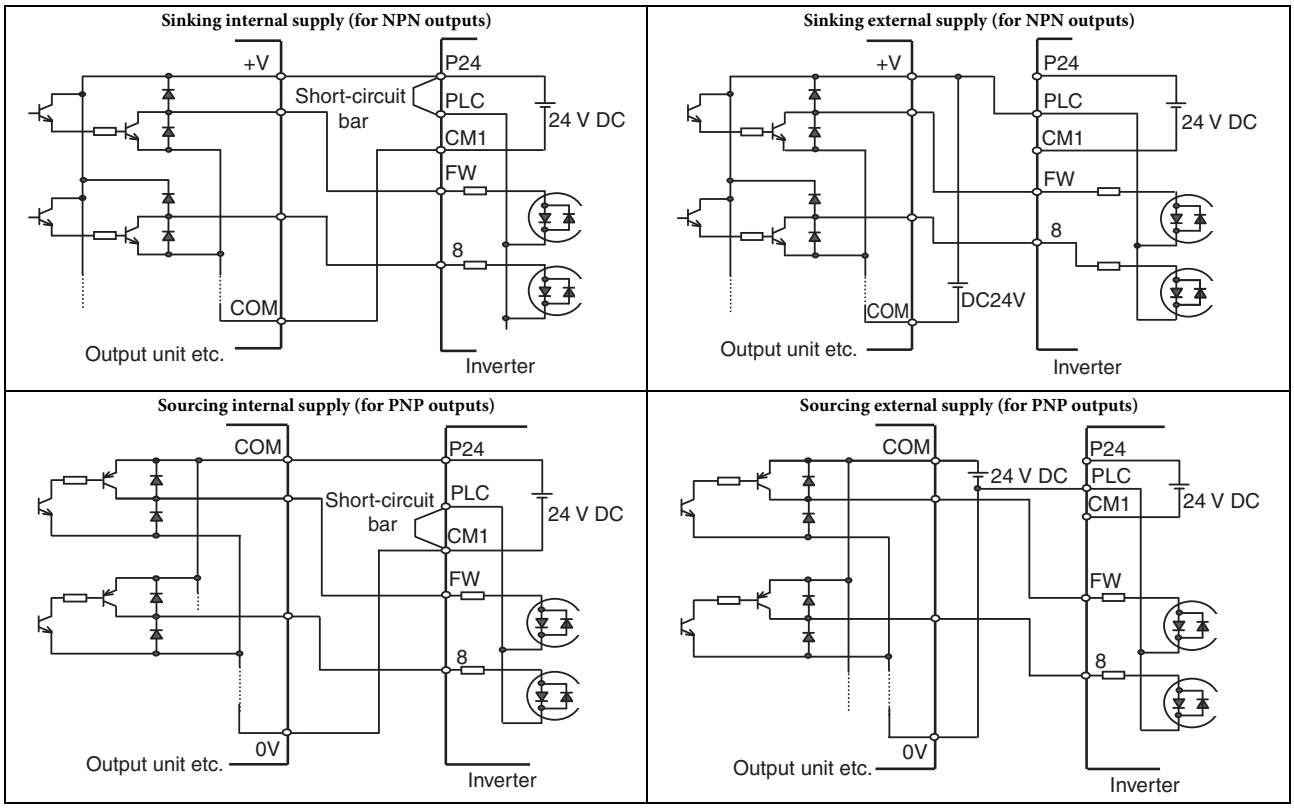


Terminal screw size M3 Tightening torque 0.7 N·m (0.8 max.)

Type	No.	Signal name	Function	Signal level
Frequency reference input	H	Frequency reference power supply	10 VDC 20 mA max	
	O	Voltage frequency reference input	0 to 12 VDC (10 kΩ)	
	O2	Voltage auxiliary frequency reference	0 to +/- 12 VDC (10 kΩ)	
	OI	Current frequency reference input	4 to 20 mA (100 Ω)	
	L	Frequency reference common	Common terminal for analog monitor (AM, AMI) terminals	
Monitor Output	AM	Multi-function analog voltage output	Factory setting: Output frequency	2 mA max
	AMI	Multi-function analog current output	Factory setting: Output frequency	4 to 20 mA (max imp 250 Ω)
	FM	PWM monitor output	Factory setting: Output frequency	0 to 10 VDC Max 3.6 kHz

Power Supply	P24	Internal 24 VDC	Power supply for contact input signal	100 mA max
	CM1	Input common	Common terminal for P24, TH and FM digital monitor	
Function Selection	FW	Forward rotation command terminal	Motor runs in forwards direction when FW is ON	27 VDC max Input imped 4.7 kΩ Max current 5.6 mA On: 18 VDC or more
	1	Multi-function input	Factory setting: Reverse (RV)	
	2		Factory setting: External trip (EXT)	
	3		Factory setting: Reset (RS)	
	4		Factory setting: Multi-step speed reference 1 (CF1)	
	5		Factory setting: Multi-step speed reference 2 (CF2)	
	6		Factory setting: Jogging (JG)	
	7		Factory setting: Second control (SET)	
	8		Factory setting: No allocation (NO)	
	PLC	Multi-function input common	Sink logic: Short-circuiting P24 and PLC Source logic: Short-circuiting PLC and CM1 With external supply remove short-circuit bar	
Status/ Factor	11	Multi-function output	Factory setting: During Run (RUN)	27 VDC max 50 mA max
	12		Factory setting: 0 Hz signal (ZS)	
	13		Factory setting: Overload warning (OL)	
	14		Factory setting: Overtorque (OTQ)	
	15		Factory setting: Constant speed arrival (FA1)	
	CM2	Multi-function output common	Common terminal for multi-function output terminals 11 to 15	
Relay output	AL1	Relay output (Normally close)	Factory setting: Alarm output (AL) Under normal operation AL2-AL0 open AL1-AL0 close	R load AL1-AL0 250 VAC 2 A AL2-AL0 250 VAC 1 A I load 250 VAC 0.2 A
	AL2	Relay output (Normally open)		
	AL0	Relay output common		
Sensor	TH	External thermistor input terminal	SC terminal functions as the common terminal 100 mW minimum Impedance at temperature error: 3 kΩ	0 to 8 VDC
Comms	SP	RS485 Modbus terminals	-	Differential input
	SN			
	RP	RS485 terminating resistor terminals	--	--
	SN			

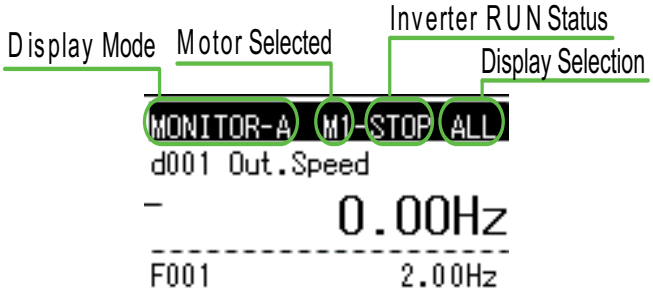
2.8 Digital inputs SINK/SOURCE (NPN/PNP) settings



3 PROGRAMMING RX

3.1 Digital operator

The display is used in programming the inverter's parameters, as well as monitoring specific parameter values during operation



Item	Content of Display	Content
Display Mode	MONITOR-A	Monitor-A mode
	MONITOR-B	Monitor-B mode
	FUNCTION	Function mode
	TRIP	Trip (error) mode
	WARNING	Warning mode (Alarm)
	OPTION	LCD Configuration Mode
Motor selected	M1	Motor 1 (SET multifunction = OFF)
	M2	Motor 2 (SET multifunction = ON)
Inverter RUN Status	STOP	Stopped
	FWD	Forward running
	REV	Reverse running
Display Selection (b037)	ALL	Display all
	UTL	Function individual display
	USR	User setting display
	CMP	Data compare display
	BAS	Basic display

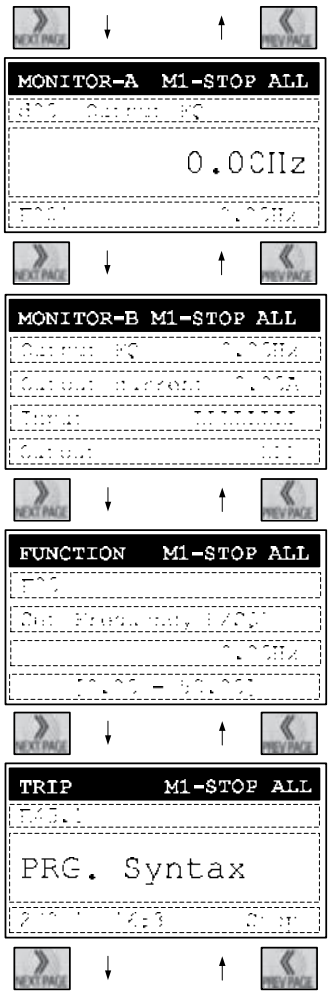
3.2 Navigation

LCD digital operator has four display modes which can be changed from one to another by pressing the or key at Navigation level. Moreover, there are 3 other models called Read mode, Write mode and Option mode. In any display mode, it moves to Read mode or Write mode via key or key, and moves to Option mode after pressing , and at the same time. It returns to display modes via key.

Each mode has its own layers, where contents and parameters settings cannot be changed at Navigation level. When pressing key at Navigation level, a cursor will appear on below layer.

LCD Navigation levels

To move among the different Navigation levels press keys or .The outline of each mode is shown below.



Monitor Mode A

The "d" group inverter parameters and "F~U" group inverter parameter are displayed on the same screen in this mode. The content of "d" group parameter is displayed with big font characters.The function code such as "F001" and contents of "F~U" parameters are displayed, without the function name.

Monitor Mode B (Monitor x 4)

In this mode, four "d" group inverter parameters can be displayed at the same screen. The function codes of these parameters are not displayed.

Function Mode (setting)

In this mode, "F~U" group parameters can be displayed and set. Function code, function name, parameter content and parameter range are shown.

"d" group inverter parameter cannot be set and displayed in this mode.

Trip Mode

Trip information and warning information are displayed in this mode. With inverter trip or a warning happens, the trip screen will be displayed from any display modes. In Option Mode, Read Mode and Write Mode, the LED or WARNING LED will light up.

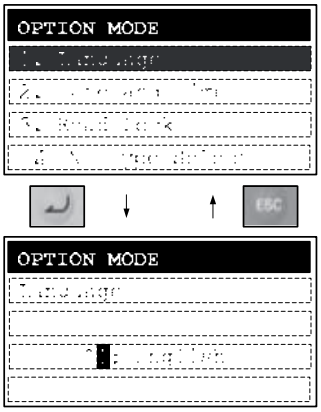
Pressing at the same time the up and down key in function code or data display will enable the single-digit edit mode that allows a faster navigation, refer to the manual for more details.

3.3 Language selection

To change the language is necessary to enter in OPTION MODE pressing , and keys at the same time. The cursor will appear in the first row of the Option Mode menu. Use or key to move between the option Mode menu. To return to the navigator layer, press the key.

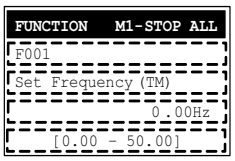
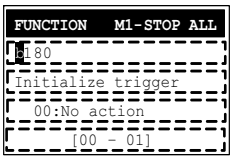
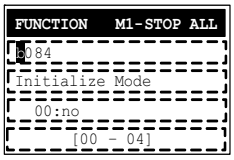
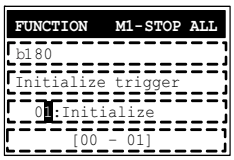
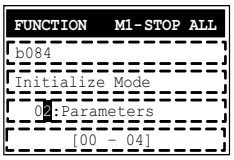
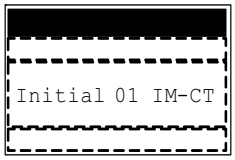
Select the Language option and press the key. The cursor will appear in the Language option value. Use the or key to select the value to set. Press the key to store the new value.Press the key to cancel the new value.

In the same way than the language is possible to set the date for the real time clock or use the read and write operation. For more details refer to RX or AX-OP05 user's manuals



3.4 Initialization

Initialize the parameters use the following procedure. Set parameter b084 to "2" and parameter b180 to "1".

Display example	Description		
	Press the Prev. Page or Next Page key until function mode is displayed. And Press the Set key to enter function mode.		With the Prev. Page, Next Page, Up and Down keys select parameter b180 and press Set key to edit
	With the Prev. Page, Next Page, Up and Down keys select parameter b084. Then press the Set key for parameter edition.		With the Up and Down keys put parameter b180 to 1.
	With the Up and Down keys put the parameter b084 to 2. Press the set key to store the change		Press the Set key and initialization process starts

3.5 Inverter modes

Display code	Function name	Setting range/content	Initial value	Remarks
A044	V/f characteristics selection	00: VC (Constant torque characteristics)	00	Use A244 for second motor Use A344 for third motor (only option 0 and 1 available)
		01: VP (Special reduced torque characteristics)		
		02: Free V/F (characteristics)		
		03: SLV (Sensorless vector control)		
		04: 0SLV (0-Hz sensorless vector control)		
		05: V2 (Sensor vector control)		
b049	Dual rate selection	00: CT (Constant torque) 150% overload during 60s	00	Some parameters default and ranges depends off this setting. Refer to below table for details
		01: VT (Variable torque) 120% overload during 60s		
d060	Inverter mode	IM-CT (Induction motor constant torque)	-	
		IM-VT (Induction motor variable torque)		

Neither the A044 or the b049 needs a initialization to become effective but some parameters could be changed automatically when any of these parameters are modified.

This table shows the parameters that change when the dual rating selection is modified, remember that rated currents for heavy and normal duty are different.

Name	Func. code	HD		ND	
V/f characteristics selection	A044	00: VC (Const. torque) 01: VP (Reduced torque) 02: Free V/F 03: SLV (Sensorless vector) 04: 0SLV (0-Hz sensorles) 05: V2 (Sensor vector)	00: Const. torque	00: VC (Const. torque) 01: VP (Reduced torque) 02: Free V/F	00: Const. torque
DC injection braking power	A054	0 to 100(%) 0.4 to 55kW 0 to 80(%) 75 to 132kW	50(%) 0.4-55kW 40(%) 75-132kW	0 to 70(%) 0.4 to 55kW 0 to 50(%) 75 to 132kW	50(%) 0.4 to 55kW 40(%) 75 to 132kW
Startup DC injection braking power	A057	0 to 100(%) 0.4 to 55kW 0 to 80(%) 75 to 132kW	0(%)	0 to 70(%) 0.4 to 55kW 0 to 50(%) 75 to 132kW	0(%)
DC injection braking carrier frequency	A059	0.5 to 15.0(kHz) 0.4-55kW 0.5 to 10.0(kHz) 75-132kW	5.0(kHz)0.4-55kW	0.0 to 12.0(kHz) 0.4-55kW 0.5 to 8.0(kHz) 75 - 132kW	3.0(kHz)
Electronic thermal level	b012	(0.20 to 1.00) x Rated current	Rated current (A)	(0.20 to 1.00) x Rated current	Rated current (A)
Overload limit level	b022	(0.20 to 2.00) x Rated current (A) 04 to 55kW (0.20 to 1.80) x Rated current (A) 75 to 132kW	1.50 x Rated current (A)	(0.20 to 1.50) x Rated current (A)	1.20 x Rated current (A)
Overload limit level 2	b025				

Name	Func. code	HD		ND	
Carrier frequency	b083	0.5 to 15.0(kHz) 0.4-55kW 0.5 to 10.0(kHz) 75-132kW	5.0(kHz) 0.4-55kW	0.5 to 10.0(kHz) 0.4-55kW 0.5 to 8.0(kHz) 75 - 132kW	3.0(kHz)
Motor capacity selection	H003	0.2 to 160(kW)	Depends on type	0.4 to 160(kW)	1 size up than HD

3.6 Basic settings

After selecting the inverter mode follow next steps for a basic operation of the inverter

- Select frequency reference source on parameter A001

Parameter	Parameter Name	Details
A001	Frequency reference selection	00: VR (Digital Operator (FREQ adjuster)
		01: Terminal
		02: Digital operator (F001)
		03: RS485 (ModBus communication)
		04: Option 1
		05: Option 2
		06: Pulse train frequency
		07: EzSQ (Drive programming)
		10: (Math) Operation function result

- Select Run command source on parameter A002

Parameter	Parameter Name	Details
A002	Run command selection	01: Terminal
		02: Digital Operator (F001)
		03: RS485 (ModBus communication)
		04: Option 1
		05: Option 2

- Adjust the stopping method by b091 and the acceleration/deceleration ramps on parameters F002 and F003

Parameter	Parameter Name	Details
b091	Stop selection	00: Decel-Stop (Deceleration to stop)
		01: Free-RUN (Free run stop)
F002	Acceleration time 1	0.01 to 3600.00
F003	Deceleration time 1	0.01 to 3600.00

- Set the motor base frequency and AVR voltage of the motors in parameters A003 and A082

Parameter	Parameter Name	Details
A003	Base frequency	30.0 to maximum frequency [A004]
A082	AVR voltage selection	200-V class: 200 to 240V 400-V class: 380 to 480V

- Set the motor data: rated current (b012), rated power (H003) and number of poles (H004)

Parameter	Parameter Name	Details
b012	Electronic thermal level	0.20 x Rated current to 1.00 x Rated current
H003	Motor capacity selection	0.20 to 160.0 kW
H004	Motor pole number selection	2 to 10 poles
P011	Encoder pulses	128 to 65535 (Only for sensor vector control)

- When working in sensorless vector control, 0-Hz sensorless vector or sensor vector control always perform motor auto tuning by parameter H001 to achieve a good performance (see next section for details)

At this point the inverter is ready to run the motor for the first time, but first review this check-list:

- Verify the power LED is ON. If not, check the power connections.
- Make sure the motor is disconnected from any mechanical load.
- Make sure that you have a frequency reference checking the content of F001
- Now give the RUN command from the selected source. The RUN LED will turn ON.
- The motor should start turning.
- Remove the RUN command or press the STOP key to stop the motor rotation.

3.7 Auto tuning (vector control modes)

The RX inverter has auto-tuning function to get suitable motor control performance by measuring the motor constants automatically. Auto-tuning is effective only for vector control types (sensorless, 0-Hz or sensor type). Basically two modes are available the static and the rotative:

- Static is less accurate but it could be used in situations where motor rotation could damage the mechanics. For this type neither the I0 (no-load current) or the J (inertia) are calculated.
- Rotative auto-tuning moves the motor following a special operation pattern to find the motor characteristics. However, the torque during auto-tuning is not sufficient so is recommended to detach the mechanical system and should not be used with for example vertical loads.

The Auto-tuning mode is selected by parameter H001 but also is necessary to set H002 to use the parameters find during the autotuning process.

Parameter	Parameter Name	Description
H001	Auto-tuning selection	00: OFF (Disabled)
		01: ON (STOP)
		02: ON (Rotation)
H002	Motor parameter selection	00: Standard motor parameter
		01: Auto-tuning parameter
		02: Auto-tuning parameter (online auto-tuning enabled)

For a correct auto-tuning calculation please take into account following recommendations before starting:

- Use only a motor of the same size or one size lower than the inverter.
- Be sure to disable the DC braking setting (A051=00)
- Be sure to deactivate ATR digital input (52: Enable torque cmd. input)
- In rotary mode the motor rotates up to 80% of base frequency, check if it's a problem for the application.
- Motor should not be driven by any other external force.
- All the brakes should be released
- Be sure that physical limits of the machine will not be reach
- Even for none-rotative auto-tuning there is a risk that motor moves slightly

After checking the above points and setting parameter H001 proceed with the activation of the Run command from the source selected on A002 and the auto-tuning will start. Please check the diagram on next page for detailed information of all the steps.

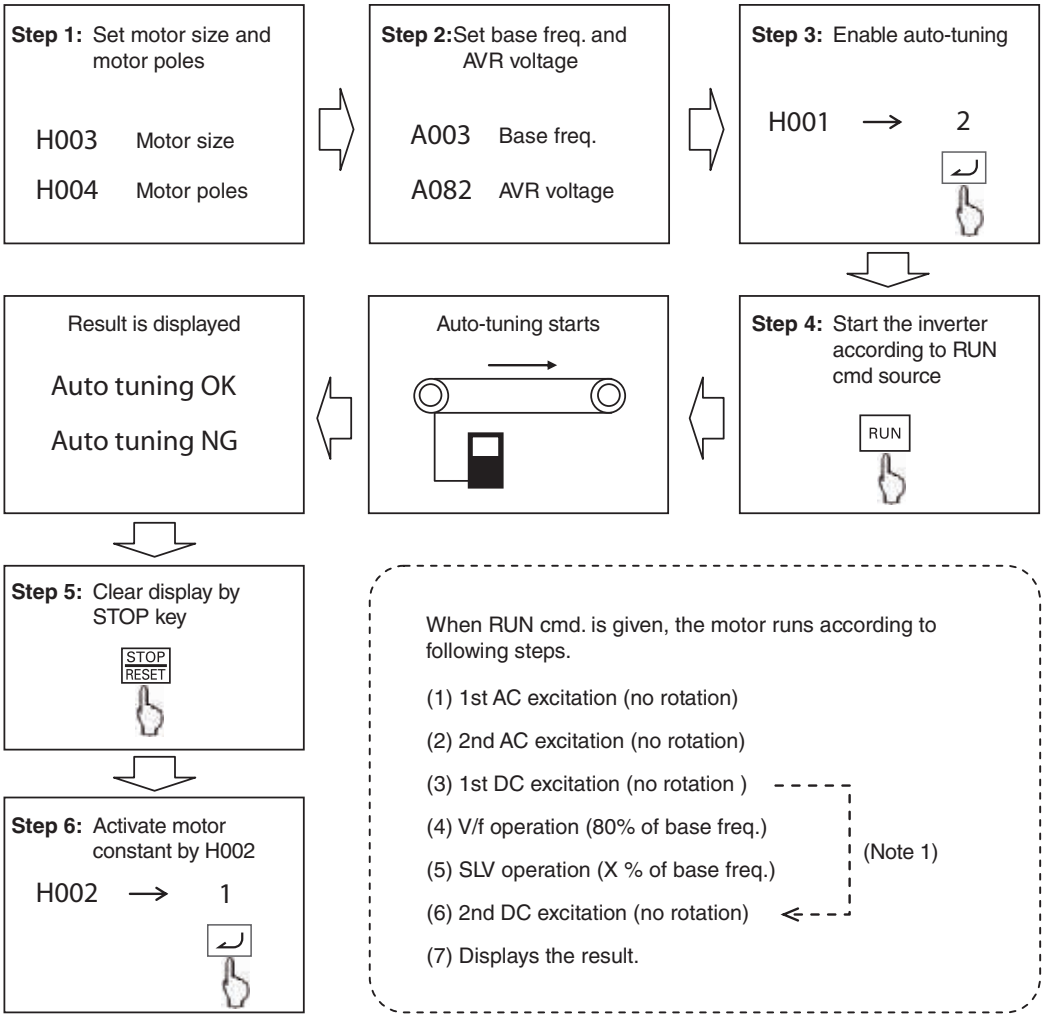
After tuning the H001 returns to "00" status and the motor characteristics are transferred to those parameter, remember to set H002 to use them.

Parameter	Parameter Name	Description
H030	Motor parameter R1 (auto-tuning data)	0.001 to 65.535 Ω
H031	Motor parameter R2 (auto-tuning data)	0.001 to 65.535 Ω
H032	Motor parameter L (auto-tuning data)	0.01 to 655.35 mH
H033	Motor parameter Io (auto-tuning data)	0.01 to 655.35 A
H034	Motor parameter J (auto-tuning data)	0.001 to 9999.000 kgm2

In case rotary tuning is not possible or autotuning results in a very high No Load current (H033) (this is possible with small motors), please use this formula to calculate theoretical value:

H033 = Inom * sin (arccos(cos phi)).

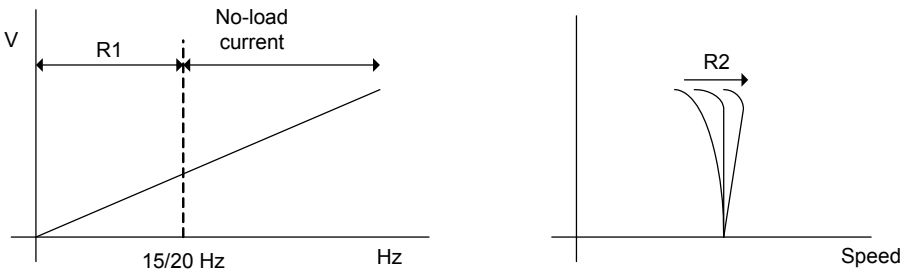
Next diagram shows the auto-tuning procedure with motor rotation



A fine tuning could be achieved setting parameter H005 that adjust the motor speed response. If the motor vibrates at constant speed then you should reduce the H005 setting, if on the contrary the response of the motor is not enough you could increase the value.

The H005 acts as a global gain response but also is possible to adjust the motor response at certain areas adjusting the motor parameters separately.

- The R1 parameter is adjusting the voltage applied at low speed, below 15-20Hz
- No load current I0 is used for adjusting the voltage above this 15-20Hz
- Finally R2 value is used to adjust the slip of the motor

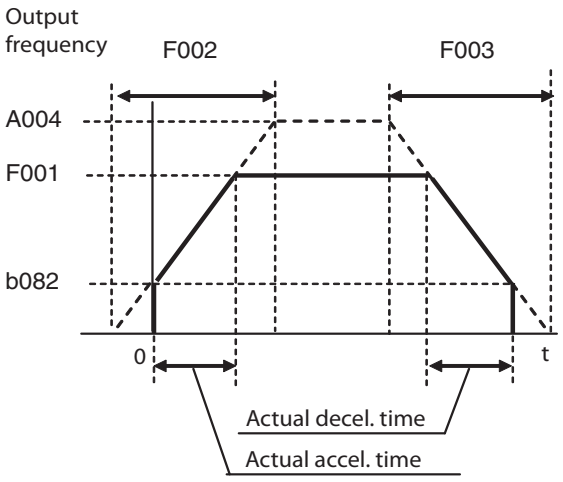


3.8 Ramps adjustment

The basic frequency (speed) profile is defined by parameters contained in the "F" Group as shown to the right. The set running frequency is in Hz, but acceleration and deceleration are specified in the time duration of the ramp (from zero to maximum frequency, or from maximum frequency to zero).

Acceleration 1 and Deceleration 1 are the standard default accel and decel values for the main profile. Accel and decel values for an alternative profile are specified by using parameters A092 through A093.

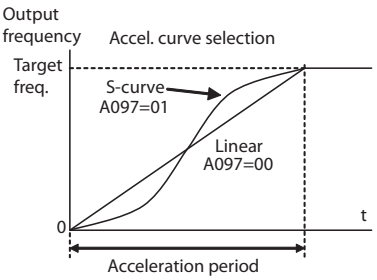
Acceleration and deceleration can be set via Drive programming as well via parameter P031



Parameter	Parameter Name	Description
A004	Maximum frequency	A003 to 400
b082	Starting frequency	0.10 to 9.99 Hz
F001	Output frequency setting/monitor	0.00 to 400.00 Hz
F002	Acceleration time 1	0.01 to 3600.00 s
F003	Deceleration time 1	0.01 to 3600.00 s
P031	Acceleration/Deceleration time input type	00: OPE (Digital operator)
		01: Option 1
		02: Option 2
		03: EzSQ (Drive Programming)

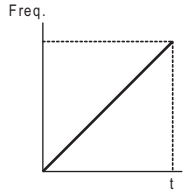
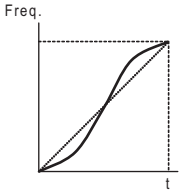
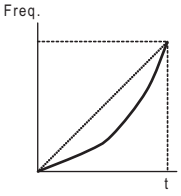
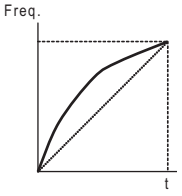
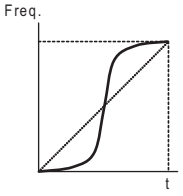
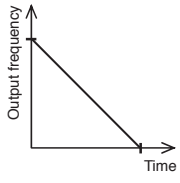
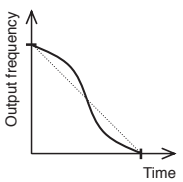
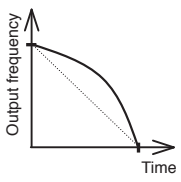
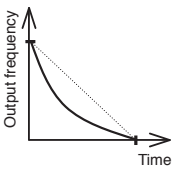
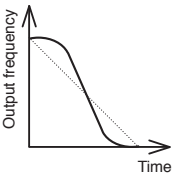
Standard acceleration and deceleration is linear. The inverter CPU can also calculate an S-curve acceleration or deceleration curve as shown. These profiles are useful for favoring the load characteristics in particular applications, like for example the U-curve for deceleration of big inertial load. Even if the shape of the ramps change the time keeps being the same one set in F002/F003

Curve settings for acceleration and deceleration are independently selected. To enable the S-curve, use function **A097** (acceleration) and **A098** (deceleration).



Parameter	Parameter Name	Description
A097	Acceleration pattern selection	00: Line 01: S-curve 02: U-curve 03: Inverse U-curve 04: EL-S curve
A098	Deceleration pattern selection	
A131	Acceleration curve parameter	01 (small curve) to 10 (large curve)
A132	Deceleration curve parameter	01 (small curve) to 10 (large curve)
A150	EL-S-curve ratio 1 during acceleration	0 to 50%
A151	EL-S-curve ratio 2 during acceleration	0 to 50%
A152	EL-S-curve ratio 1 during deceleration	0 to 50%
A153	EL-S-curve ratio 2 during deceleration	0 to 50%

This table shows the different acceleration shapes

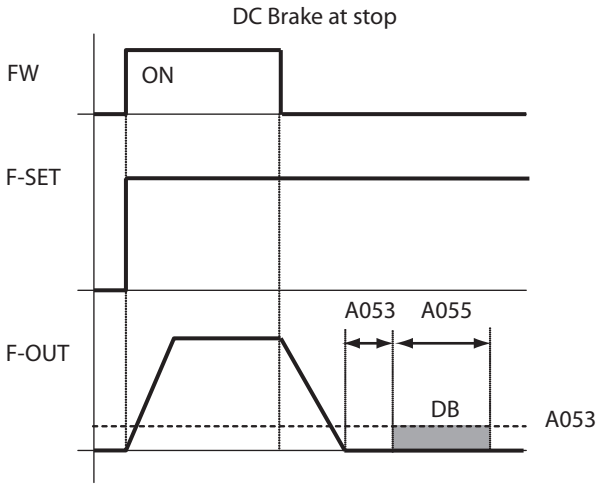
Setting	00	01	02	03	04
Curve	Line	S-curve	U-curve	Inverse U-curve	EL S-curve
A097 (Accel. pattern)					
A098 (Decel. pattern)					

3.9 DC braking

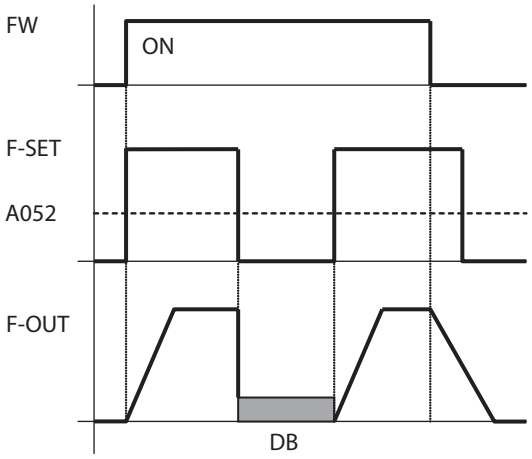
The DC braking feature can provide additional stopping torque during deceleration or before acceleration and is particularly useful at low speeds when normal deceleration torque is minimal. This function injects a DC voltage into the motor windings which generates a DC current that force the motor to stop.

There are several modes available depending on the application requirements:

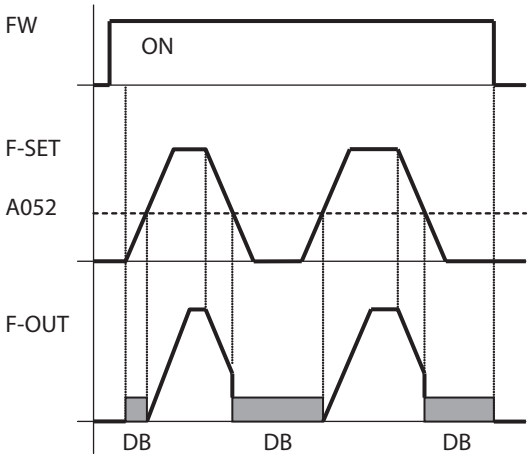
- Normal DC braking is used when A051 is set to "01" (Enable during stop) and the RUN command (FW/RV) is turned OFF, at the moment that deceleration stops the DC brake starts with a settable power (A054) and duration (A055). Additionally is possible to specify a wait time between the end of the ramp and the DC braking on parameter A053, during which the motor will free run. If free-run is selected as stopping method the DC braking will start just when the Run commands turns OFF.



- DC braking by frequency detection can be selected setting A051 to "02" (Frequency detection). In this case DC braking operates when the output frequency comes down to the one you specified in A052 while the RUN command is still active. External DB and internal DC braking are invalid during the frequency detection mode.

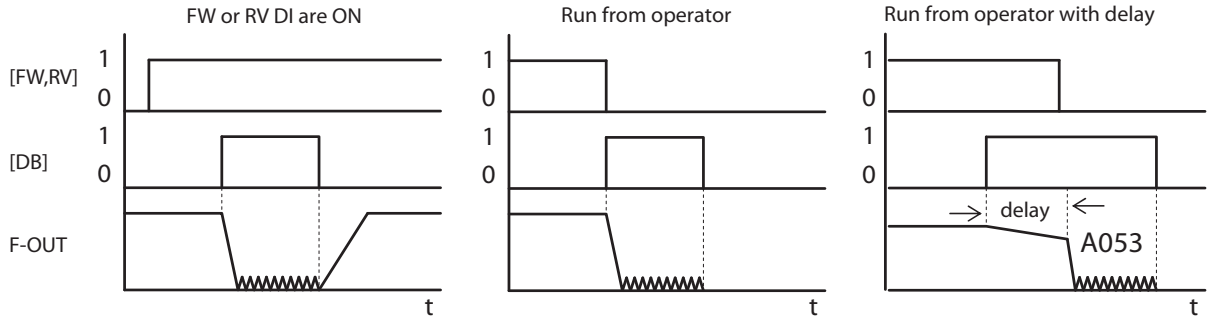


Eample 1: Step change in F-SET



Example 2: Analog change in F-SET

- Last option is to trigger the DC injection by a digital input when the terminal (DB) is turned ON. Set parameters A053 and A054 to setup this function. There are several cases depending on the motor rotation and Run command status.

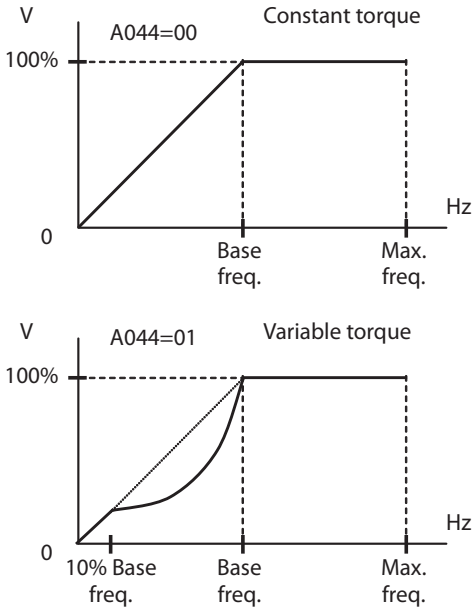


DC braking at startup is also possible by independent setup of parameters A057 and A058. This is useful in applications were load should be totally stopped before starting the movement.

Parameter	Parameter Name	Description
A051	DC injection braking selection	00: OFF (Disabled) 01: ON (Enabled) 02: ON (FQ) (Frequency control [A052 set value])
A052	DC injection braking frequency	0.00 to 400.00 Hz
A053	DC injection braking delay time	The delay from the end of controlled deceleration to start of DC braking (motor free runs until DC braking begins) 0.0 to 5.0 s
A054	DC injection braking power	0 to 100% (0.4 to 55 kW) 0 to 80% (75 to 132 kW)
A055	DC injection braking time	Sets the duration for DC braking 0.0 to 60.0 s
A056	DC injection braking method selection	00: Edge operation 01: Level operation
A057	Startup DC injection braking power	0 to 100% (0.4 to 55 kW) 0 to 80% (75 to 132 kW)
A058	Startup DC injection braking time	Sets the duration for DC braking 0.0 to 60.0 s
A059	DC injection braking carrier frequency	Carrier frequency of DC braking performance 0.5 to 15.0 kHz (0.4 to 55 kW) 0.5 to 10.0 kHz (75 to 132 kW)

Be careful to avoid specifying too long braking time or too high carrier frequency that can cause motor overheating. If you use DC braking is recommended to use motors with a built-in thermistor and wire it to inverter's thermistor input.

3.10 V/F curve

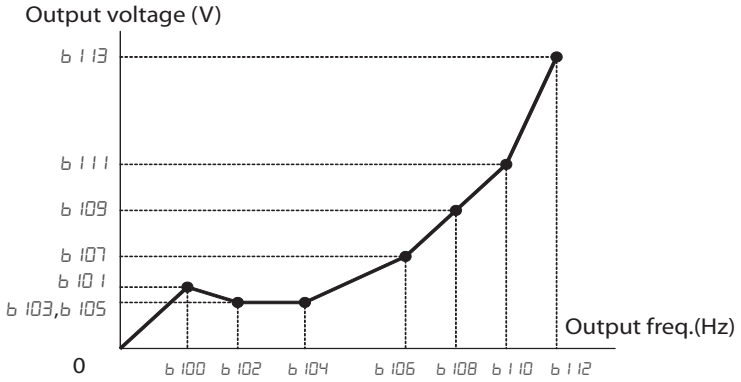


The inverter generates the motor output according to the V/f algorithm selected on parameter A044. The factory default is Constant torque ("00"). Review following description to help you choose the best torque control algorithm for your application:.

- **Constant and Variable (Reduced) Torque** - Graph on the right shows the constant torque characteristic from 0 Hz to the base frequency **A003**. The voltage remains constant for output frequencies higher than the base frequency.
- **Variable torque** - Graph on the right shows the variable (reduced) torque curve, which has a constant torque characteristic from 0 Hz to 10% of the base frequency. This helps to achieve higher torque at low speed with reduced torque curve at higher speeds.
- **Sensorless Vector Control** - You can achieve high torque performance without motor speed feedback but a good tuning of the motor is necessary to do it. Please remember to perform auto-tuning for this control method. (A044="3")
- **0-Hz sensorless vector control** - Similar to sensorless but focus on a high starting torque around 0-Hz point. Remember to use an inverter one frame bigger than the motor.
- **Sensor vector control** - Provides a full close vector control with an external encoder achieving high torque and speed precision in all the speed range.

- **Free V/F Control** - The free V/F setting function allows you to set an arbitrary V/F characteristics by specifying seven voltage and frequency points (**b100**~**b113**) on the V/F characteristic curve (A044="2")

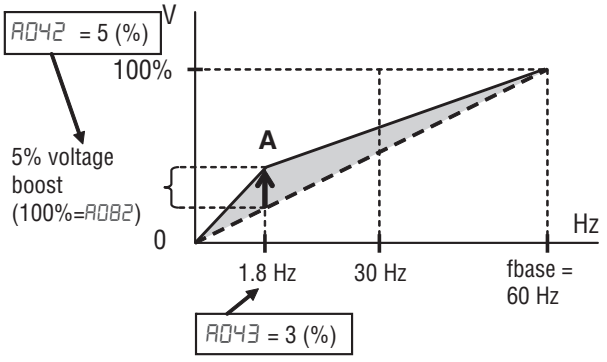
This table shows the details about the Free V/F control

Parameter	Parameter Name	Diagram	Range
b100	Free V/F frequency 1		0 to b102 (Hz)
b101	Free V/F voltage 1		0.0 to 800.0 (V)
b102	Free V/F frequency 2		0 to b104 (Hz)
b103	Free V/F voltage 2		0.0 to 800.0 (V)
b104	Free V/F frequency 3		0 to b106 (Hz)
b105	Free V/F voltage 3		0.0 to 800.0 (V)
b106	Free V/F frequency 4		0 to b108 (Hz)
b107	Free V/F voltage 4		0.0 to 800.0 (V)
b108	Free V/F frequency 5		0 to b110 (Hz)
b109	Free V/F voltage 5		0.0 to 800.0 (V)
b110	Free V/F frequency 6		0 to b112 (Hz)
b111	Free V/F voltage 6		0.0 to 800.0 (V)
b112	Free V/F frequency 7		0 to 400.0 (Hz)
b113	Free V/F voltage 7		0.0 to 800.0 (V)

3.11 Torque boost function

Manual torque boost - Constant and Variable torque algorithms feature and adjustable torque boost curve that could help during the startup of load with very big inertia or friction. On those cases it may be necessary to increase the low frequency starting torque characteristic by boosting the voltage above the normal V/F ratio. Basically it attempts to compensate for voltage drop in the motor primary winding in the low speed range.

Be aware that running the motor at a low speed for a long time can cause motor overheating and this happens more often when manual torque boost is activated and motor doesn't have force ventilation.

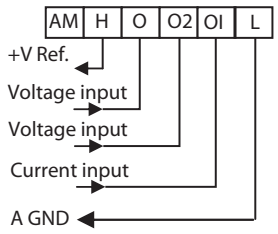


Automatic torque boost- Use the voltage compensation (A046) and slip compensation (A047) to obtain a better performance under automatic torque boost mode (A041=01) adjusting the output frequency and output voltage automatically depending on the load. The output voltage due automatic boost is added to the manual torque boost voltage so both should be adjusted.

Parameter	Parameter Name	Description
A041	Torque boost selection	00: Manual torque boost 01: Automatic torque boost
A042	Manual torque boost voltage	Can boost starting torque between 0 and 20% above normal V/f curve 0.0 to 20.0%
A043	Manual torque boost frequency	Sets the frequency of the V/f breakpoint for torque boost 0.0 to 50.0%
A044	V/f characteristics selection	00: VC (Constant torque characteristics) 01: VP (Special reduced torque characteristics) 02: Free V/F (characteristics)
A045	Output voltage gain	Sets voltage gain of the inverter 20 to 100%
A046	Automatic torque boost voltage compensation gain	Sets voltage compensation gain under automatic torque boost 0 to 255
A047	Automatic torque boost slip compensation gain	Sets slip compensation gain under automatic torque boost 0 to 255

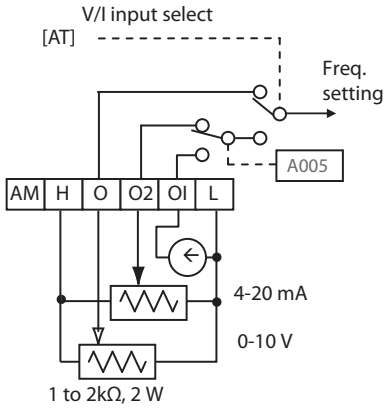
3.12 Analog inputs

RX provides three analog inputs, the input terminal group includes the [L], [OI], [O],[O2] and [H] terminals on the control connector, which provide Voltage [O] (0 to 10V),[O2] (-10 to 10V) or Current [OI](4-20mA) input. All analog input signals must use the analog ground [L].



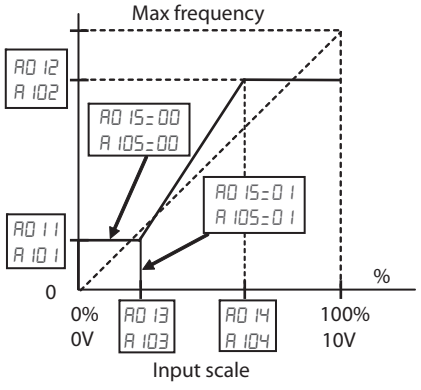
If you use either the voltage or current analog inputs, you must select one of them using the logic input terminal function [AT] analog type. Refer to next table for details about the combinations between A005 and [AT] terminal. Remember that you must also set A001=01 to select analog input as the frequency source.

If [AT] function is not assigned to any digital input the inverter recognizes the [AT] as OFF and the used value depends on A005 parameter setting. Default setting use [O]+[OI] as analog input. In case either (O) or (OI) is to be referred, please ground the other.



A005	[AT] Input	Analog Input Configuration
00	ON	[O]
	OFF	[OI]
01	ON	[O]
	OFF	[O2]
02	ON	[O]
	OFF	Integrated POT on external operator panel
03	ON	[OI]
	OFF	Integrated POT on external operator panel

For [O] input and using parameters A013 and A014 you could select the portion of the voltage input range. Parameters A011 and A012 select the start and end frequency of the converted output frequency range, respectively. When the line does not begin at the origin (A011 and A013 > 0), then A015 defines whether the inverter outputs 0 Hz or the A011 specified frequency for analog input below A013.



Parameter	Parameter name	Description
A011	O start frequency	0.00 to 400.00 Hz
A012	O end frequency	0.00 to 400.00 Hz
A013	O start ratio	0 to 100%
A014	O end ratio	0 to 100%
A015	O start selection	00: External start frequency (A011 set value) 01: 0 Hz
A101	OI start frequency	0.00 to 400.00 Hz
A102	OI end frequency	0.00 to 400.00 Hz
A103	OI start ratio	0% to OI end ratio
A104	OI end ratio	OI start ratio to 100%
A105	OI start selection	00: Start FQ (Use OI start frequency [A101]) 01: 0 Hz

Parameter	Parameter name	Description
A016	O, O2, OI sampling	1 to 30 31 (with 500ms filter ±0.1 Hz hysteresis)
A111	O2 start frequency	-400.00 to 400.00 Hz
A112	O2 end frequency	-400.00 to 400.00 Hz
A113	O2 start ratio	-100% to O2 end ratio
A114	O2 end ratio	O2 start ratio to 100%

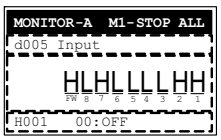
3.13 Digital inputs

The function codes in the following table let you assign between a wide range of functions to any of the eight logic inputs for the RX inverter. The functions C001 through C008 configure the terminals [1] through [8] respectively, terminal [FW] could not be set and work always as Run forward or to start a Drive programing. The "value" of these particular parameters is not a scalar value, but it is a discrete number that selects one option from many available options.

Input Function Summary Table				
Option Code	Terminal Symbol	Function Name	Description	
01	RV	Reverse run/stop	ON	Inverter is in Run Mode, motor runs reverse
			OFF	Inverter is in Stop Mode, motor stops
02	CF1	Multi-step speed setting binary 1	ON	Binary encoded speed selection bit 3 to bit 0
03	CF2	Multi-step speed setting binary 2		
04	CF3	Multi-step speed setting binary 3	OFF	
05	CF4	Multi-step speed setting binary 4		
06	JG	Jogging	ON	Inverter is in Run Mode, output to motor runs at jog parameter frequency
07	DB	External DC injection braking	ON	DC braking will be applied during deceleration
08	SET	Set (select) 2nd control	ON	The inverter uses 2nd motor parameters for generating frequency output to motor
			OFF	The inverter uses 1st (main) motor parameters for generating frequency output to motor
09	2CH	2-step acceleration/deceleration	ON	Frequency output uses 2nd-stage acceleration and deceleration values
			OFF	Frequency output uses standard acceleration and deceleration values
11	FRS	Free-run stop	ON	Causes output to turn OFF, allowing motor to free run (coast) to stop
12	EXT	External trip	ON	When assigned input transitions OFF to ON, inverter latches trip event and displays E 12
			OFF	No trip event for ON to OFF, any recorded trip events remain in history until reset
13	USP	USP function	ON	On power up, the inverter will not resume a Run command
			OFF	On power up, the inverter will resume a Run command that was active before power loss
14	CS	Commercial switch	ON	Motor can be driven by commercial power
			OFF	Motor is driven via the inverter
15	SFT	Soft lock	ON	The keypad and remote programming devices are prevented from changing parameters
			OFF	The parameters may be edited and stored
16	AT	Analog input switching	ON	Refer to Analog Input selection
			OFF	
17	SET3	Set (select) 3rd control	ON	The inverter uses 3rd motor parameters for generating frequency output to motor
18	RS	Reset inverter	ON	The trip condition is reset, the motor output is turned OFF, and powerup reset is asserted
			OFF	Normal power-ON operation
20	STA	Start (3-wire start)	ON	Starts the motor rotation
21	STP	Stop (3-wire stop)	ON	Stops the motor rotation
22	F/R	FWD, REV (3-wire forward/reverse)	ON	Selects the direction of motor rotation: ON = FWD. While the motor is rotating, a change of F/R will start a deceleration, followed by a change in direction
			OFF	Selects the direction of motor rotation: OFF = REV. While the motor is rotating, a change of F/R will start a deceleration, followed by a change in direction
23	PID	PID enabled/disabled	ON	Temporarily disables PID loop control. Inverter output turns OFF as long as PID Enable is active (A071=01)
			OFF	Has no effect on PID loop operation, operates normally if PID Enable is active (A071=01)
24	PIDC	PID integral reset	ON	Resets the PID loop controller. Main consequence is that integrator sum is forced to zero
26	CAS	Control gain switching	ON	Control gain switching function
27	UP	UP/DWN function accelerated	ON	Accelerates (increases output frequency) motor from current frequency
28	DWN	UP/DWN function decelerated	ON	Decelerates (decreases output frequency) motor from current frequency
29	UDC	UP/DWN function data clear	ON	Clears the UP/DWN frequency memory by forcing it to equal the set frequency parameter F001. Setting C101 must be set=00 to enable this function to work
31	OPE	Forced operator	ON	Forces the source of the output frequency setting A001 and the source of the Run command A002 to be from the digital operator
			OFF	Source of output frequency set by A001 and source of Run command set by A002 is used

Input Function Summary Table				
Option Code	**Terminal Symbol**	**Function Name**	**Description**	
32	SF1	Multi-step speed setting bit 1	ON	Bit encoded speed select, Bit 1 to Bit 7
33	SF2	Multi-step speed setting bit 2		
34	SF3	Multi-step speed setting bit 3		
35	SF4	Multi-step speed setting bit 4	OFF	
36	SF5	Multi-step speed setting bit 5		
37	SF6	Multi-step speed setting bit 6		
38	SF7	Multi-step speed setting bit 7		
39	OLR	Overload limit switching	ON	Perform overload restriction
			OFF	Normal operation
40	TL	Torque limit enabled	ON	Setting of b040 is enabled
			OFF	Max. torque is limited with 200%
41	TRQ1	Torque limit switching 1	ON	Torque limit related parameters of Powering/regen, and FW/RV modes are selected by the combinations of these inputs.
42	TRQ2	Torque limit switching 2	OFF	
43	PPI	P/PI switching	ON	Proportional speed control for vector control
			Off	Proportional and integral speed control for vector control
44	BOK	Brake confirmation	ON	Brake confirmation signal received
			OFF	Brake confirmation signal not received
45	ORT	Orientation	ON	Orientation function is performed
46	LAC	LAD cancel	ON	Set ramp times are ignored. Inverter output immediately follows the freq. command.
			OFF	Accel. and/or decel. is according to the set ramp time
47	PCLR	Position deviation clear	ON	Clear the position deviation data
			OFF	Maintain the position deviation data
48	STAT	Pulse train position command input permission	ON	Pulse train position command input enable
50	ADD	Frequency addition	ON	Adds the A145 (add frequency) value to the output frequency
			OFF	Does not add the A145 value to the output frequency
51	F-TM	Forced terminal block	ON	Force inverter to use input terminals for output frequency and Run command sources
			OFF	Source of output frequency set by A001 and source of Run command set by A002 is used
52	ATR	Torque command input permission	ON	Torque control command input is enabled
53	KHC	Integrated power clear	ON	Clear watt-hour data
54	SON	Servo ON	ON	Inverter enters in servo lock status
			OFF	Inverter goes into free-run status (Run command will not be accepted on this state)
55	FOC	Preliminary excitation	ON	Supplies excitation current to the motor to establish magnetic flux
			OFF	Inverter goes into free-run status (Run command will not be accepted on this state)
56	MI1	Drive programming input 1	ON	General purpose input (1) to (8) under Drive programming
57	MI2	Drive programming input 2		
58	MI3	Drive programming input 3		
59	MI4	Drive programming input 4		
60	MI5	Drive programming input 5	OFF	
61	MI6	Drive programming input 6		
62	MI7	Drive programming input 7		
63	MI8	Drive programming input 8		
65	AHD	Analog command held	ON	Analog command is held
			OFF	Analog command is not held
66	CP1	Position command selection 1	ON	Multistage position commands are set according to the combination of these switches.
67	CP2	Position command selection 2	OFF	
68	CP3	Position command selection 3		
69	ORL	Zero return limit signal	ON	Limit signal of homing is ON
70	ORG	Zero return startup signal	ON	Starts homing operation
71	FOT	Forward driving stop	ON	Torque limit is set to 10% on the forward direction
72	ROT	Reverse driving stop	ON	Torque limit is set to 10% on the reverse direction
73	SPD	Speed/position switching	ON	Speed control mode
			OFF	Position control mode
74	PCNT	Pulse counter	-	Input works as a counter which value could be check in monitor d028.
75	PCC	Pulse counter clear	ON	Clears the total count value (d028)
82	PRG	Drive program start	ON	Executing Drive program
			OFF	No execution
255	no	No allocation	-	(input ignored)

All this functions could be assigned to any of the multi-function inputs on parameters C001 to C008, select if the input will be normally open or normally close and the response time of the input.

Parameter	Parameter name	Description
C001	Multi-function input 1 selection	Select input terminal [1] function
C002	Multi-function input 2 selection	Select input terminal [2] function
C003	Multi-function input 3 selection	Select input terminal [3] function
C004	Multi-function input 4 selection	Select input terminal [4] function
C005	Multi-function input 5 selection	Select input terminal [5] function
C006	Multi-function input 6 selection	Select input terminal [6] function
C007	Multi-function input 7 selection	Select input terminal [7] function
C008	Multi-function input 8 selection	Select input terminal [8] function
C011	Multi-function input 1 operation selection	Select logic conversion: 00: NO (normally open) 01: NC (normally closed)
C012	Multi-function input 2 operation selection	
C013	Multi-function input 3 operation selection	
C014	Multi-function input 4 operation selection	
C015	Multi-function input 5 operation selection	
C016	Multi-function input 6 operation selection	
C017	Multi-function input 7 operation selection	
C018	Multi-function input 8 operation selection	
C019	FW terminal operation selection	
C160	Input terminal response time 1	Sets response time of each input terminal: 0 to 200 (x 2 ms)
C161	Input terminal response time 2	
C162	Input terminal response time 3	
C163	Input terminal response time 4	
C164	Input terminal response time 5	
C165	Input terminal response time 6	
C166	Input terminal response time 7	
C167	Input terminal response time 8	
C168	FW terminal response time	
d005	Multi-function input monitor	 Example FW, Multi-function input terminals 7, 2, 1: ON Multi-function input terminals 8, 6, 5, 4, 3: OFF

An input terminal configured for option code 18 ([RS] Reset command) cannot be configured for normally closed operation.

3.14 Digital outputs

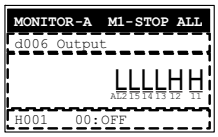
Function codes in the following table let you assign different options into logical outputs (terminals [11] to [15] and [AL]) on parameter C021 to C026..

Output Function Summary Table				
Option Code	Terminal Symbol	Function Name	Description	
00	RUN	Run signal	ON	When the inverter is in Run Mode
01	FA1	Constant speed arrival signal	ON	When output to motor is at the set frequency
			OFF	When output to motor is OFF, or in any acceleration or deceleration ramp
02	FA2	Over set frequency arrival signal	ON	When output to motor is at or above the set freq., even if in accel (C042) or decel (C043) ramps
			OFF	When output to motor is OFF, or at a level below the set frequency
03	OL	Overload warning	ON	When output current is more than the set threshold (C041) for the overload signal
04	OD	Excessive PID deviation	ON	When PID error is more than the set threshold for the deviation signal
05	AL	Alarm output	ON	When an alarm signal has occurred and has not been cleared
06	FA3	Set-frequency-only arrival signal	ON	When output to motor is at the set frequency, during accel (C042) and decel (C043).
07	OTQ	Overtorque	ON	Estimated motor torque exceeds the specified level
08	IP	Signal during momentary power interruption	ON	Momentary power interruption/undervoltage
09	UV	Signal during undervoltage	ON	Inverter is in undervoltage
10	TRQ	Torque limit	ON	Torque limit function is executing
11	RNT	RUN time over	ON	Total running time of the inverter exceeds the specified value
12	ONT	Power ON time over	ON	Total power ON time of the inverter exceeds the specified value
13	THM	Thermal warning	ON	Accumulated thermal count exceeds the C061 set value
19	BRK	Brake release	ON	Output for brake release

Output Function Summary Table				
Option Code	Terminal Symbol	Function Name	Description	
20	BER	Brake error	ON	Brake error has occurred
21	ZS	0 Hz signal	ON	Output frequency falls below the threshold specified in C063
22	DSE	Excessive speed deviation	ON	Deviation of speed command and actual speed exceeds the specified value P027.
23	POK	Position ready	ON	Positioning is completed
24	FA4	Set frequency exceeded 2	ON	When output to motor is at or above the set freq., even if in accel (C045) or decel (C046) ramps
25	FA5	Set frequency only 2	ON	When output to motor is at the set frequency, during accel (C045) and decel (C046).
26	OL2	Overload warning 2	ON	When output current is more than the set threshold (C111) for the overload signal
27	ODc	Analog O disconnection detection	ON	When the [O] input value < B070 setting (signal loss detected)
28	OIDc	Analog OI disconnection detection	ON	When the [OI] input value < B071 setting (signal loss detected)
29	O2Dc	Analog O2 disconnection detection	ON	When the [O2] input value < B072 setting (signal loss detected)
31	FBV	PID FB status output	ON	Transitions to ON when the inverter is in RUN Mode and the PID Process Variable (PV) is less than the Feedback Low Limit (C053)
			OFF	Transitions to OFF when the PID Process Variable (PV) exceeds the PID High Limit (C052), and transitions to OFF when the inverter goes from Run Mode to Stop Mode
32	NDc	Network error	ON	When communications watchdog timer (period specified by C077) has time out
33	LOG1	Logic operation output 1	ON	When the Boolean operation specified by C144 has a logical “1” result
34	LOG2	Logic operation output 2	ON	When the Boolean operation specified by C147 has a logical “1” result
35	LOG3	Logic operation output 3	ON	When the Boolean operation specified by C150 has a logical “1” result
36	LOG4	Logic operation output 4	ON	When the Boolean operation specified by C153 has a logical “1” result
37	LOG5	Logic operation output 5	ON	When the Boolean operation specified by C156 has a logical “1” result
38	LOG6	Logic operation output 6	ON	When the Boolean operation specified by C159 has a logical “1” result
39	WAC	Capacitor life warning signal	ON	Lifetime of internal capacitor has expired.
40	WAF	Cooling fan life warning signal	ON	Lifetime of cooling fan has expired.
41	FR	Starting contact signal	ON	Either FW or RV command is given to the inverter
			OFF	No FW or RV command is given to the inverter, or both are given to the inverter
42	OHF	Fin overheat warning	ON	Temperature of the heat sink exceeds a specified value (C064)
43	LOC	Light load detection signal	ON	Motor current is less than the specified value (C039)
44	MO1	Drive programming output 1	ON	General output 1 is ON (Used by Drive programing)
45	MO2	Drive programming output 2	ON	General output 2 is ON (Used by Drive programing)
46	MO3	Drive programming output 3	ON	General output 3 is ON (Used by Drive programing)
47	MO4	Drive programming output 4	ON	General output 4 is ON (Used by Drive programing)
48	MO5	Drive programming output 5	ON	General output 5 is ON (Used by Drive programing)
49	MO6	Drive programming output 6	ON	General output 6 is ON (Used by Drive programing)
50	IRDY	Operation ready signal	ON	Inverter can receive a run command
51	FWR	Forward run signal	ON	Inverter is driving the motor in forward direction
52	RVR	Reverse run signal	ON	Inverter is driving the motor in reverse direction
53	MJA	Fatal fault signal	ON	Inverter is tripping with major failure
54	WCO	Window comparator O	ON	Analog voltage input value is inside of the window comparator (b060 to b062)
55	WCOI	Window comparator OI	ON	Analog current input value is inside of the window comparator (b063 to b065)
56	WCO2	Window comparator O2	ON	Analog voltage input value is inside of the window comparator (b066 to b068)
63	OPO	Option board output	ON	(output terminal for option card)
255	no	Not used	ON	–

In the same way of that the digital inputs is possible to choose between normally close and normally open and even is possible to use some On and Off delay for each of the outputs.

Parameter	Parameter name	Description
C021	Multi-function output terminal 11 selection	Programmable functions available for logic (discrete) outputs transistor type
C022	Multi-function output terminal 12 selection	
C023	Multi-function output terminal 13 selection	
C024	Multi-function output terminal 14 selection	
C025	Multi-function output terminal 15 selection	
C026	Relay output (AL2, AL1) function selection	Programmable functions available for logic (discrete) outputs relay type
C031	Multi-function output terminal 11 contact selection	Select logic conversion: 00: NO contact at AL2; NC contact at AL1 01: NC contact at AL2; NO contact at AL1
C032	Multi-function output terminal 12 contact selection	
C033	Multi-function output terminal 13 contact selection	
C034	Multi-function output terminal 14 contact selection	
C035	Multi-function output terminal 15 contact selection	
C036	Relay output (AL2, AL1) contact selection	

Parameter	Parameter name	Description
C130	Output 11 ON delay	0.0 to 100.0 s
C131	Output 11 OFF delay	
C132	Output 12 ON delay	0.0 to 100.0 s
C133	Output 12 OFF delay	
C134	Output 13 ON delay	0.0 to 100.0 s
C135	Output 13 OFF delay	
C136	Output 14 ON delay	0.0 to 100.0 s
C137	Output 14 OFF delay	
C138	Output 15 ON delay	0.0 to 100.0 s
C139	Output 15 OFF delay	
C140	Relay output on delay	0.0 to 100.0 s
C141	Relay output off delay	
d006	Multi-function output monitor	 Example Multi-function output terminals 12, 11: ON Relay output terminal AL2, Multi-function output terminals 15, 14, 13: OFF

3.15 Analogue outputs

Several monitors are available through the analogue outputs [AM], [AMI] or the PWM output [FM].

Parameter	Parameter name	Description
C027	FM selection	00: Output FQ (Output frequency) 01: OI (Output current) 02: Output TRQ (Output torque) 03: Pulse FQ (Digital output frequency) 04: Output V (Output voltage) 05: Power 06: Thermal (Thermal load rate) 07: LAD-FQ (LAD frequency) 08: Pulse I (Digital current monitor) 09: Motor tmp (Motor temperature) 10: Heat sink tmp (Fin temperature) 12: YA0 (Drive programming) 19: OP1 (Option board 1) 20: OP2 (Option board 2)
C028	AM selection	00: Output FQ (Output frequency) 01: OI (Output current) 02: Output TRQ (Output torque) 04: Output V (Output voltage) 05: Power 06: Thermal (Thermal load rate) 07: LAD-FQ (LAD frequency) 08: Pulse I (Digital current monitor) 09: Motor tmp (Motor temperature) 10: Heat sink tmp (Fin temperature) 11: Out TRQ sign (Output torque <signed>) 13: YA1 (Drive programming) 19: OP1 (Option board 1) 20: OP2 (Option board 2)
C029	AMI selection	00: Output FQ (Output frequency) 01: OI (Output current) 02: Output TRQ (Output torque) 04: Output V (Output voltage) 05: Power 06: Thermal (Thermal load rate) 07: LAD-FQ (LAD frequency) 09: Motor tmp (Motor temperature) 10: Heat sink tmp (Fin temperature) 14: YA2 (Drive programming)
C030	Digital current monitor reference value	Current with digital current monitor output at 1,440Hz 0.20 x Rated current to 2.00 x Rated current

When inverter is in sensor vector control the real motor speed from encoder (d008) is used instead of the output frequency.

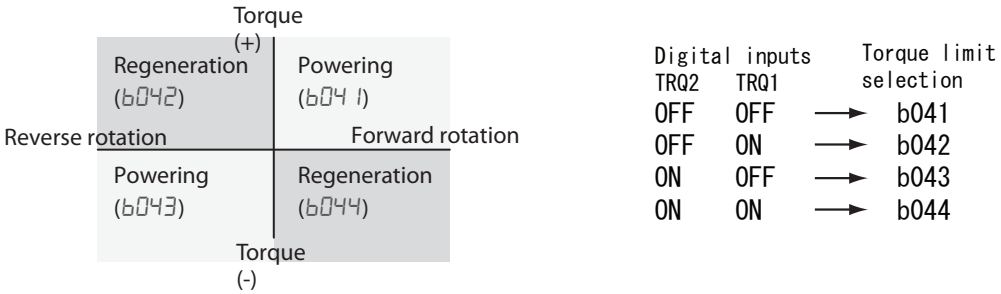
For the pulse train output there are two types of outputs, code “03” and “08” outputs a pulse train with a 50% duty cycle while the PWM has a fixed frequency of 156.25Hz were the duty cycle is changed depending on the output.

When the monitor displays the value set in digital current monitor reference (C030), 1440Hz is output.

3.16 Torque limit

Torque limit function allows you to limit the motor output when sensorless vector control "03", 0-Hz sensorless vector control "04" or sensor vector control "05" is selected in A044. In open loop vector function has limited accuracy and repeatability, performance is much better when encoder feedback is used. You can choose between different options using parameter b040.

- Quadrant specific setting mode (b040=00) in which individual torque limit values are applied on the four quadrants (forward powering, reverse regeneration...) by torque limits 1 to 4 (b041 to b044)



- Terminal-switching mode (b040=01) where the torque limit values set in torque limits 1 to 4 (b041 to b044) are switched depending on the combination of the states of the torque limit switch terminals 1 and 2 (TRQ1 and TRQ2) assigned to digital inputs.
- Analog voltage input mode (b040=02) where the torque limit value is set by a voltage applied to the terminal O. Range 0 to 10V corresponds with torque limit range between 0 and 200% that is valid for all operating states.
- Option 1 and 2 allows to give the torque limit value from a communication option board installed on the inverter.

If "TL" torque limit enable functions has been assigned to any of the multi-function inputs the setting of parameter b040 only is valid when this input is ON. No torque limitation will be applied when the input is OFF.

Parameter	Parameter name	Description
b040	Torque limit selection	00: 4-quadrant (Four-quadrant separate setting) 01: TRQ input (Terminal switch) 02: [O] input (Analog input) 03: Option 1 04: Option 2
b041	Torque limit 1 (fwd/power)	0 to 200% (0.4 to 55 kW) 0 to 180% (75 to 132 kW) no (torque limit disabled)
b022	Torque limit 2 (rev/regen.)	0 to 200% (0.4 to 55 kW) 0 to 180% (75 to 132 kW) no (torque limit disabled)
b043	Torque limit 3 (rev/power)	0 to 200% (0.4 to 55 kW) 0 to 180% (75 to 132 kW) no (torque limit disabled)
b044	Torque limit 4 (fwd/regen.)	0 to 200% (0.4 to 55 kW) 0 to 180% (75 to 132 kW) no (torque limit disabled)
b045	Torque LADSTOP selection	00: OFF (Disabled) 01: ON (Enabled)

100% torque is referred to inverter rated current, absolute torque value is up the motor to be combined. Range for inverters from 75 to 132KW is limited to 180% instead of 200%.

3.17 Torque control

Torque control is only available in sensor vector control A044=”05” and it requires to setup following parameters. 100% torque is referred to inverter rated current but absolute torque value depends on the motor connected.

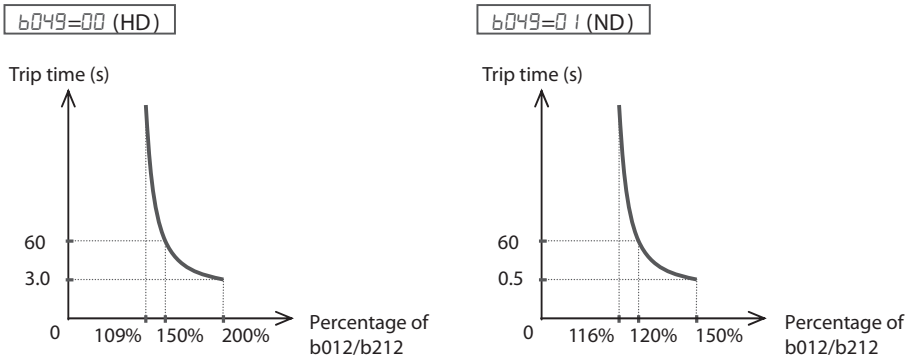
Parameter	Parameter name	Description
P033	Torque reference input selection	00: O (Terminal O) 01: OI (Terminal OI) 02: O2 (Terminal O2) 03: OPE (Digital operator) 06: Option 1 07: Option 2
P034	Torque reference setting	0 to 200% (0.4 to 55 kW) 0 to 180% (75 to 132 kW)
P035	Polarity selection at torque reference via O2	00: Sign (Signed) 01: Direction (Depends on the RUN direction)
P036	Torque bias mode	00: OFF (None) 01: OPE (Digital operator) 02: O2 (Terminal O2) 06: Option 1 07: Option 2
P037	Torque bias value	-200 to 200% (0.4 to 55 kW) -180 to 180% (75 to 132 kW)
P038	Torque bias polarity selection	00: Sign (Signed) 01: Direction (Depends on the RUN direction)
P039	Speed limit value in torque control (forward)	0.00 to Maximum frequency
P040	Speed limit value in torque control (reverse)	0.00 to Maximum frequency

To enable the torque control is necessary to assign the “ATR” (Enable torque command input) to one of the multi-function inputs and set it to ON. When the input is OFF the inverter will work in speed mode.

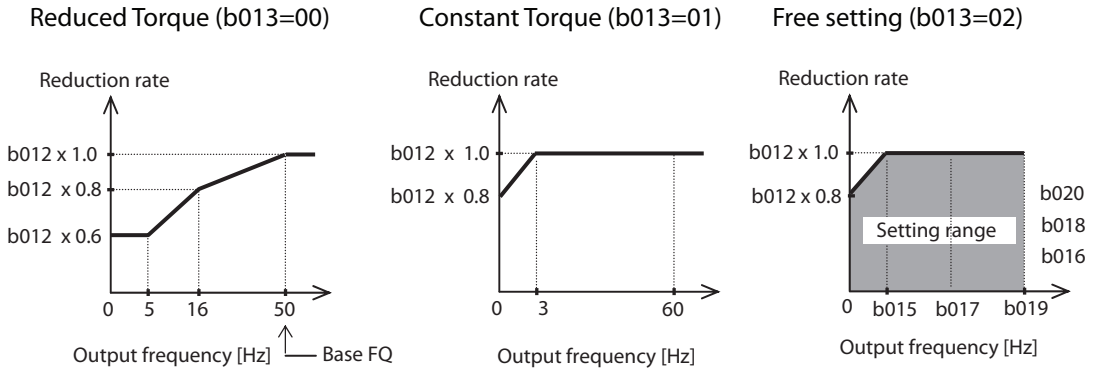
When speed limit is reached the inverter changes between torque and speed proportional control so is possible that inverter runs at higher speeds than the one set in P039 or P040 parameters.

3.18 Electronic thermal overload

The thermal overload detection protects the inverter and motor from overheating due to an excessive load using a current inverse time curve to determine the trip point. The characteristic curve depends on dual rate setting in b049 and is unique for both inverter and motor but reduction rate depending on the frequency could be selected in parameter b013



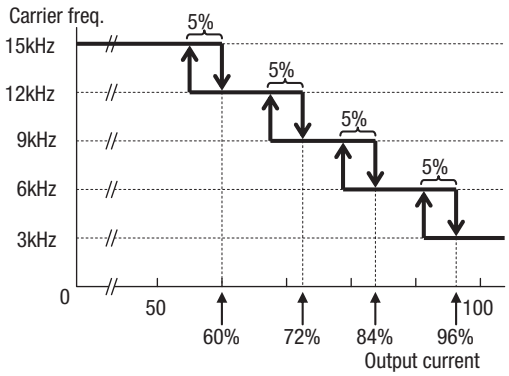
b013 could be used to match the torque characteristic with the load. Output current on the winding is used for this calculation as is proportional to the torque generated by the motor. That's why the current level has to be set in parameter b012 with a range that goes from 20 to 100% of the inverter rated current.



Parameter	Parameter name	Description
b012	Electronic thermal level	0.20 x Rated current to 1.00 x Rated current
b013	Electronic thermal characteristics selection	00: Reduced TRQ (Reduced torque characteristics) 01: Const TRQ (Constant torque characteristics) 02: Free set (Free setting)
b015	Free setting electronic thermal frequency 1	0 to 400 Hz
b016	Free setting electronic thermal current 1	0.0 to Rated current
b017	Free setting electronic thermal frequency 2	0 to 400 Hz
b018	Free setting electronic thermal current 2	0.0 to Rated current
b019	Free setting electronic thermal frequency 3	0 to 400 Hz
b020	Free setting electronic thermal current 3	0.0 to Rated current

3.19 Carrier frequency (PWM)

The internal switching frequency of the inverter circuitry (also called chopper frequency) defines the IGBT commutation speed that is used to generated the output frequency. Is adjustable from 2.0 to 15KHz (depending on the inverter size) where the audible noise decrease at higher frequencies while the RFI noise and leakage current increase.

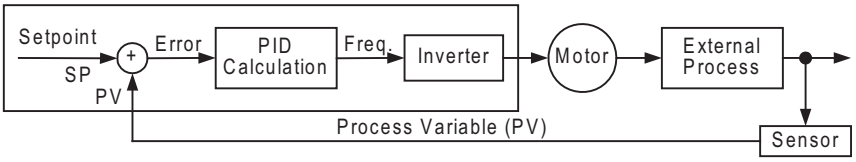


The carrier frequency is adjusted by parameter b083 but the activation of the automatic carrier frequency reduction on parameter b089 could reduce the selected value when the output current increase. On this way is possible to have a high carrier frequency with light loads and avoid the current derating when the load increase. The upper limit is defined by b083 while the lower one is 3KHz with 2KHz per second reduction rate. When the output current falls below -5% of each level, the function will be reset.

Parameter	Parameter name	Description
b083	Carrier frequency	0.5 to 15.0 kHz (0.4 to 55 kW) 0.5 to 10.0 kHz (75 to 132 kW)
b089	Automatic carrier reduction	00: OFF (Disabled) 01: ON (Enabled)

3.20 PID function

When enabled, the built-in PID loop calculates an ideal inverter output value that cause the loop feedback process variable (PV) to move closer to the set point value (SP). The frequency command is used as SP and the PID loop algorithm will read the analog input for the process variable and calculate the proper inverter output to reach it



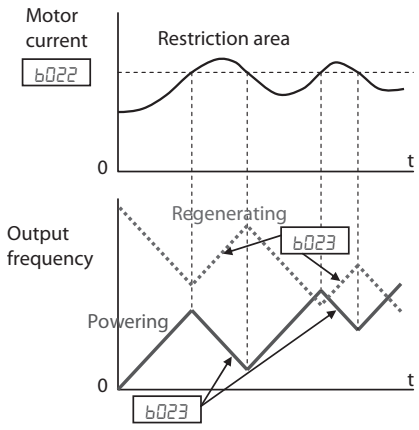
In standard operation, inverter uses a reference source selected by A001 for the output frequency which may be a fixed or variable value. To enable PID operation is necessary to set A071 to "01" and this will cause the inverter to calculate the target frequency or set point. This presents some advantages like potential energy saving and direct control over the process variable instead of the motor speed.

Parameter	Parameter name	Description
A071	PID selection	00: OFF (Disabled) 01: ON (+) (Enabled) 02: ON (+/-) (Reverse output enabled)
A072	PID P gain	0.2 to 5.0
A073	PID I gain	0.0 to 3600.0 s
A074	PID D gain	0.00 to 100.00 s
A075	PID scale	0.01 to 99.99
A076	PID feedback selection	00: OI 01: O 02: Modbus (RS485 communication) 03: Pulse (Pulse train frequency) 10: Math (Operation function output)
A077	Reverse PID function	00: OFF (Deviation = Target value - Feedback value) 01: ON (Deviation = Feedback value - Target value)
A078	PID output limit function	0.0 to 100.0%
A079	PID feed forward selection	00: Disabled 01: O 02: OI 03: O2
C044	PID deviation excessive level	0.0 to 100.0%
C052	PID FB upper limit	0.0 to 100.0%
C053	PID FB lower limit	0.0 to 100.0%

3.21 Current limitation functions

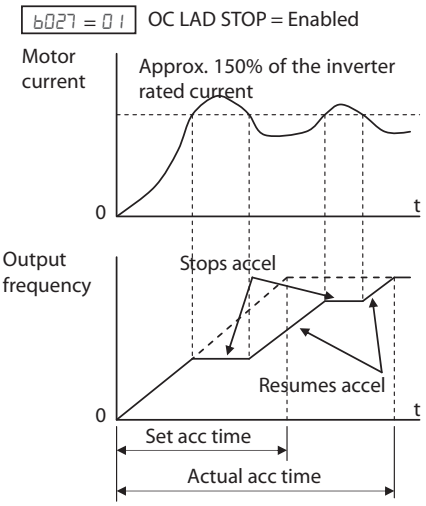
Overload Restriction reduce the output frequency while motoring or increase it during regeneration to restrict the overload when the output current exceeds a certain limit. You can adjust the inverter to apply overload restriction only during constant speed allowing higher currents for acceleration.

Additionally two separate sets of parameters are available and is possible to choose between them by intelligent input terminal "39: OLR"



Over-current Trip Suppression function monitors the motor current and actively changes the output frequency profile to keep the motor current below 150% of the motor rated current. Basically the acceleration ramp is stopped above this current and only restarts when the current goes below the set value. It avoids the trip but the total acceleration time could be longer when this function is enable.

Please consider that this function doesn't operate keeping a constant motor current so is still possible to have an over-current trip during extreme acceleration.

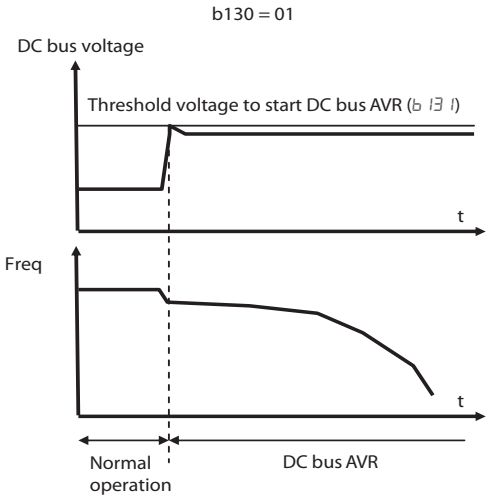


Parameter	Parameter name	Description
b021	Overload limit selection	00: OFF (Disabled) 01: ON-Acc/Cnst (Enabled in acceleration/constant speed operation) 02: ON-Cnst (Enabled in constant speed operation) 03: ON-A/C(R) (Enabled in acceleration/constant speed operation (Accelerates during regeneration))
b022	Overload limit level	0.20 x Rated current to 2.00 x Rated current (0.4 to 55 kW) 0.20 x Rated current to 1.80 x Rated current (75 to 132 kW)
b023	Overload limit parameter	0.10 to 30.00 s
b024	Overload limit selection 2	00: OFF (Disabled) 01: ON-Acc/Cnst (Enabled in acceleration/constant speed operation) 02: ON-Cnst (Enabled in constant speed operation) 03: ON-A/C(R) (Enabled in acceleration/constant speed operation (Accelerates during regeneration))
b025	Overload limit level 2	0.20 x Rated current to 2.00 x Rated current (0.4 to 55 kW) 0.20 x Rated current to 1.80 x Rated current (75 to 132 kW)
b026	Overload limit parameter 2	0.10 to 30.00 s
b027	Overcurrent suppression function	00: OFF (Disabled) 01: ON (Enabled)

3.22 Overvoltage protection

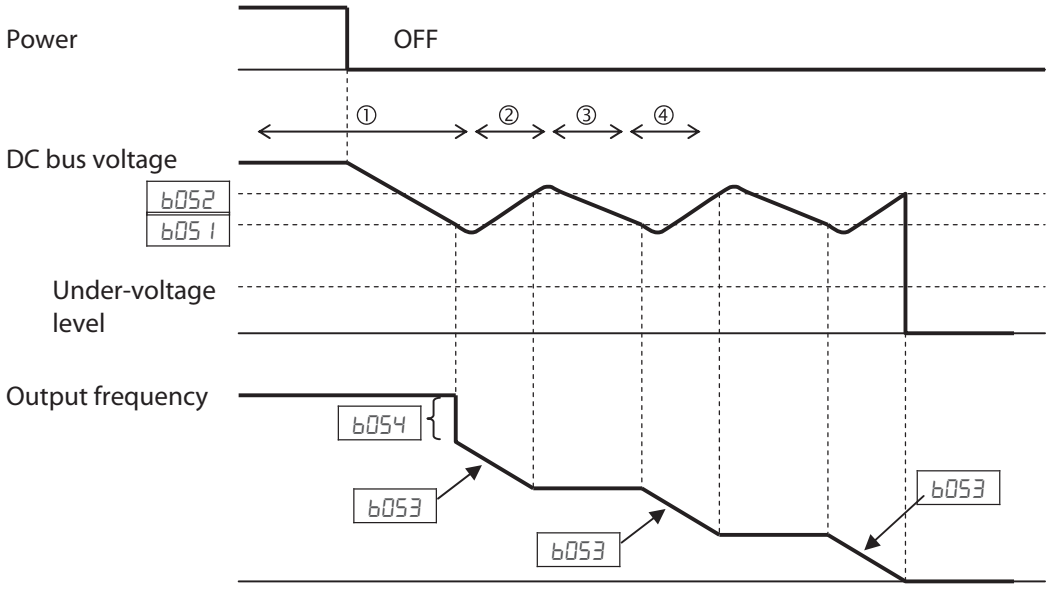
DC Bus AVR (Automatic Voltage regulation) helps to avoid an overvoltage trip when the DC bus voltage increase due regeneration during deceleration. The function keeps the DC bus voltage stable at certain level regulating the deceleration ramp by a PI function. Please that the actual deceleration time can be longer in this case.

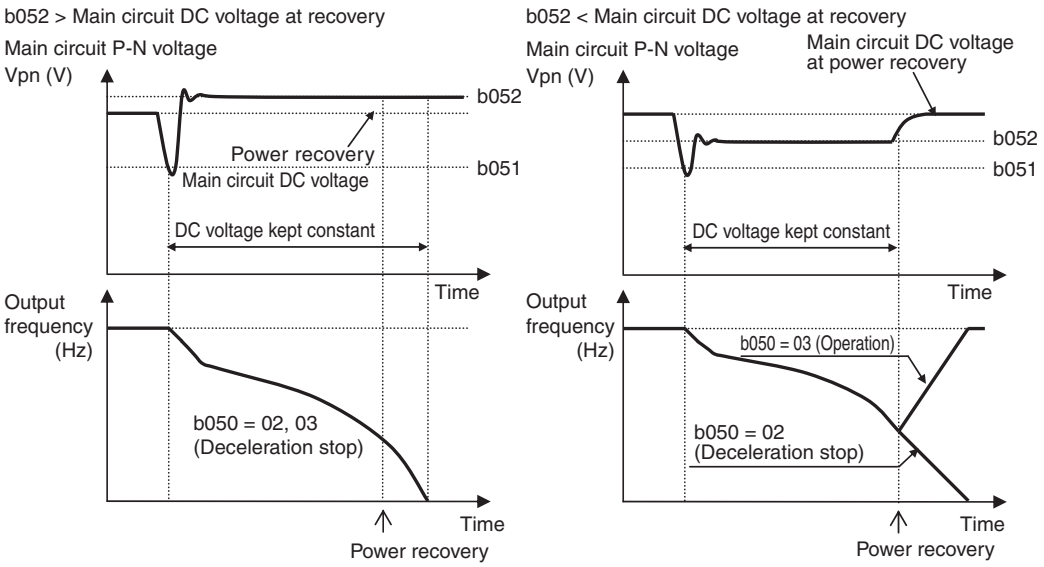
Parameter	Parameter name	Description
b130	Overvoltage protection function selection during deceleration	00: OFF (Disabled) 01: V-const (DC voltage kept constant) 02: Accel (Acceleration enabled)
b131	Overvoltage protection level during deceleration	200-V class: 330 to 390 400-V class: 660 to 780
b132	Overvoltage protection parameter	0.10 to 30.00 s
b133	Overvoltage protection proportional gain setting	0.00 to 2.55
b134	Overvoltage protection integral time setting	0.000 to 65.535 s



3.23 Controlled stop at power loss

This function is intended to achieve a controlled stop and avoid free-running of the motor when power is lost during run mode. Inverter controls the internal DC bus voltage while decelerating the motor using the regenerative energy to keep the DC bus at a level that allows to reduce the motor speed and avoid a long coasting time. Next diagram shows how the function works





Note: The main circuit DC voltage level, while the function is running, may fall below the b052 set value depending on the proportional gain and integral time settings.

To use this function remove the J51 connector cable connected between terminals Ro and To, and connect the cable from main terminal P to Ro and from N to To. The cable size should be 0.75mm^2 or larger.

When the DC voltage of the inverter goes down to b051 level, inverter decrease the output frequency by a amount set in b054 to force the motor to regenerate energy that is used to increase the DC bus value. Then deceleration continues at the rate set in b053 until the upper limit b052 is reach where the deceleration ramp stops until the DC bus drops again. This operation is repeated until the motor is totally stopped or there is not enough regeneration from the motor so DC bus goes below the undervoltage level.

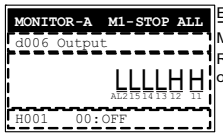
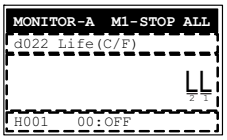
Parameter	Parameter name	Description
b050	Selection of non-stop function at momentary power interruption	00: OFF (Disabled) 01: V-Cnst (STOP) (Enabled (deceleration stop)) 02: NS1 (Enabled (without recovery)) 03: NS2 (Enabled (with recovery))
b051	Starting voltage of non-stop function at momentary power interruption	0.0 to 1000.0 V
b052	Stop deceleration level of non-stop function at momentary power interruption	0.0 to 1000.0 V
b053	Deceleration time of non-stop function at momentary power interruption	0.01 to 3600.00 s
b054	Deceleration starting width of non-stop function at momentary power interruption	0.00 to 10.00 Hz

4 PARAMETER LIST

The PDU (Process Data Unit) register number are addressed starting at zero. Therefore register numbered “0012h” addressed as “0011h”. Register address value (transmitted on Modbus line) is 1 less than the Register number of the table

4.1 Parameter group D: Monitors

Function code	Function name	Monitoring and setting items	Units	Modbus Register No.
d001 (high)	Output frequency monitor	0.00 to 400.00	Hz	1001h
d001 (low)				1002h
d002	Output current monitor	0.0 to 9999.0	A	1003h
d003	Rotation direction monitor	FWD: Forward STOP: Stop REV: Reverse	-	1004h
d004 (high)	PID feedback value monitor	0.00 to 999000.00	-	1005h
d004 (low)				1006h

Function code	Function name	Monitoring and setting items	Units	Modbus Register No.
d005	Multi-function input monitor	 Example FW, Multi-function input terminals 7, 2, 1: ON Multi-function input terminals 8, 6, 5, 4, 3: OFF		1007h
d006	Multi-function output monitor	 Example Multi-function output terminals 12, 11: ON Relay output terminal AL2, Multi-function output terminals 15, 14, 13: OFF		1008h
d007 (high)	Output frequency monitor (after conversion)	0.00 to 39960.00 (Output frequency x Conversion factor of b086)	-	1009h
d007 (low)				100Ah
d008 (high)	Real frequency monitor	-400.00 to 400.00	Hz	100Bh
d008 (low)				100Ch
d009	Torque reference monitor	-200 to +200	%	100Dh
d010	Torque bias monitor	-200 to +200	%	100Eh
d012	Output torque monitor	-200 to +200	%	1010h
d013	Output voltage monitor	0.0 to 600.0	V	1011h
d014	Input power monitor	0.0 to 999.9	W	1012h
d015 (high)	Power ON time monitor	0.0 to 999999.9	-	1013h
d015 (low)				1014h
d016 (high)	Total RUN time	0 to 999999	h	1015h
d016 (low)				1016h
d017	Power ON time monitor	0 to 999999	h	1017h
				1018h
d018	Fin temperature monitor	-020. to 200.0	°C	1019h
d019	Motor temperature monitor	-020. to 200.0	°C	101Ah
d022	Life assessment monitor	 1: Main circuit board capacitor service life 2: Cooling fan rpm reduction		101Dh
d023	Program counter	0 to 1024	-	101Eh
d024	Program number	0 to 9999	-	101Fh
d025 (high)	Drive programming monitor (UM0)	-2147483647 to 2147483647	-	102Eh
d025 (low)				102Fh
d026 (high)	Drive programming monitor (UM1)	-2147483647 to 2147483647	-	1030h
d026 (low)				1031h
d027(high)	Drive programming monitor (UM2)	-2147483647 to 2147483647	-	1032h
d027 (low)				1033h
d028 (high)	Pulse counter monitor	0 to 2147483647	-	1034h
d028 (low)				1035h
d029 (high)	Position command monitor	-1073741823 to 1073741823 when HAPR is selected	-	1036h
d029 (low)		-268435456 to 268435456 when APR2 is selected		1037h
d030 (high)	Current position monitor	-1073741823 to 1073741823 when HAPR is selected	-	1038h
d030 (low)		-268435456 to 268435456 when APR2 is selected		1039h
d031	Clock	2000/1/1 to 2099/12/31 (Increments of 1 day) 00:00 to 23:59 (Increments of 1 min)	-	-
d60	Inverter mode	00 to 01	-	1057h
d80	Fault frequency monitor	0 to 65535	-	0011h
d081	Fault monitor 1 (Latest)	Error code (condition of occurrence) Output frequency [Hz] Output current [A] Internal DC voltage [V] RUN time [h] ON time [h]	-	0012h to 001Bh
d082	Fault monitor 2		-	001Ch to 0025h
d083	Fault monitor 3		-	0026h to 002Fh
d084	Fault monitor 4		-	0030h to 0039h
d085	Fault monitor 5		-	003Ah to 0043h
d086	Fault monitor 6		-	0044h to 004Ch
d090	Warning monitor	Warning code 0 to 385	-	004Eh
d102	DC voltage monitor	0.0 to 999.9	V	1026h
d103	Regenerative braking load rate monitor	0.0 to 100.0	%	1027h
d104	Electronic thermal monitor	0.0 to 100.0	%	1028h

4.2 Parameter group A

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register Nº	Default
A001	Frequency reference selection	00: VR (Digital operator (FREQ adjuster)) 01: Terminal 02: Digital operator (F001) 03: RS485 (Modbus communication) 04: Option 1 05: Option 2 06: Pulse train frequency 07: EzSQ (Drive programming) 10: (Math) Operation function result	–	×	1201h	01
A002	Run command selection	01: Terminal 02: Digital operator (F001) 03: RS485 (Modbus communication) 04: Option 1 05: Option2	–	×	1202h	01
A003	Base frequency	30 to maximum frequency [A004]	Hz	×	1203h	50
A203	2nd set base frequency	30 to 2nd maximum frequency [A204]	Hz	×	2203h	50
A303	3rd set base frequency	30 to 3rd maximum frequency [A304]	Hz	×	3203h	50
A004	Maximum frequency	A003 to 400	Hz	×	1204h	50
A204	2nd maximum frequency	A203 to 400	Hz	×	2204h	50
A304	3rd maximum frequency	A303 to 400	Hz	×	3204h	50
A005	O/OI selection	00: [O]/[OI] switches between O/OI terminal AT 01: [O]/[O2] switches between O/O2 terminal AT 02: [O]/VR switches between O/FREQ adjuster via terminal AT (enabled only when 3G3AX-OP01 is used) 03: [OI]/VR switches between OI/FREQ adjuster via terminal AT (enabled only when 3G3AX-OP01 is used) 04: [O2]/VR switches between O2/FREQ adjuster via terminal AT (enabled only when 3G3AX-OP01 is used)	–	×	1205h	00
A006	O2 selection	00: [O2] only 01: [O/OI-P] auxiliary frequency reference (not reversible) 02: [O/OI-PM] auxiliary frequency reference (reversible) 03: [OFF] O2 disabled	–	×	1206h	03
A011	O start frequency	0.00 to 400.00	Hz	×	120Bh 120Ch	0.00
A012	O end frequency	0.00 to 400.00	Hz	×	120Dh 120Eh	0.00
A013	O start ratio	0 to 100	%	×	120Fh	0
A014	O end ratio	0 to 100	%	×	1210h	100
A015	O start selection	00: External start frequency (A011 set value) 01: 0 Hz	–	×	1211h	01
A016	O, O2, OI sampling	1 to 30 31 (with 500 ms filter ±0.1 Hz hysteresis)	–	×	1212h	31
A017	Drive programming (EzSQ) selection	00: Disable 01: [PRG] start 02: Always ON	–	×	1213h	00
A019	Multi-step speed selection	00: Binary: 16-step selection with 4 terminals 01: Bit: 8-step selection with 7 terminals	–	×	1215h	00
A020	Multi-step speed reference 0	0.00 to max frequency [A004]	Hz	✓	1216h 1217h	6.00
A220	2nd multi-step speed reference 0	0.00 to max frequency [A204]	Hz	✓	2216h 2217h	6.00
A320	3rd multi-step speed reference 0	0.00 to max frequency [A304]	Hz	✓	3216h 3217h	6.00
A021	Multi-step speed reference 1	0.00/starting frequency to max frequency	Hz	✓	1218h 1219h	0.00
A022	Multi-step speed reference 2	0.00/starting frequency to max frequency	Hz	✓	121Ah 121Bh	0.00
A023	Multi-step speed reference 3	0.00/starting frequency to max frequency	Hz	✓	121Ch 121Dh	0.00
A024	Multi-step speed reference 4	0.00/starting frequency to max frequency	Hz	✓	121Eh 121Fh	0.00
A025	Multi-step speed reference 5	0.00/starting frequency to max frequency	Hz	✓	1220h 1221h	0.00
A026	Multi-step speed reference 6	0.00/starting frequency to max frequency	Hz	✓	1222h 1223h	0.00
A027	Multi-step speed reference 7	0.00/starting frequency to max frequency	Hz	✓	1224h 1225h	0.00
A028	Multi-step speed reference 8	0.00/starting frequency to max frequency	Hz	✓	1226h 1227h	0.00
A029	Multi-step speed reference 9	0.00/starting frequency to max frequency	Hz	✓	1228h 1229h	0.00
A030	Multi-step speed reference 10	0.00/starting frequency to max frequency	Hz	✓	122Ah 122Bh	0.00
A031	Multi-step speed reference 11	0.00/starting frequency to max frequency	Hz	✓	122Ch 122Dh	0.00

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No	Default
A032	Multi-step speed reference 12	0.00/starting frequency to max frequency	Hz	✓	122Eh	0.00
					122Fh	
A033	Multi-step speed reference 13	0.00/starting frequency to max frequency	Hz	✓	1230h	0.00
					1231h	
A034	Multi-step speed reference 14	0.00/starting frequency to max frequency	Hz	✓	1232h	0.00
					1233h	
A035	Multi-step speed reference 15	0.00/starting frequency to max frequency	Hz	✓	1234h	0.00
					1235h	
A038	Jogging frequency	0.00/starting frequency to 9.99	Hz	✓	1238h	6.00
A039	Jogging stop selection	00: FRS (Free running on jogging stop/disabled in operation) 01: DEC (Deceleration stop on jogging stop/disabled in operation) 02: DB (DC injection braking on jogging stop/disabled in operation) 03: FRS (RUN) (Free running on jogging stop/enabled in operation) 04: DEC (RUN) (Deceleration stop on jogging stop/enabled in operation) 05: DB (RUN) (DC injection braking on jogging stop/enabled in operation)	-	×	1239h	04
A041	Torque boost selection	00: Manual torque boost 01: Automatic torque boost	–	×	123Bh	00
A241	2nd torque boost selection	00: Manual torque boost 01: Automatic torque boost	–	×	223Bh	00
A042	Manual torque boost voltage	0.0 to 20.0	%	✓	123Ch	1.0
A242	2nd manual torque boost voltage	0.0 to 20.0	%	✓	223Ch	1.0
A342	3rd manual torque boost voltage	0.0 to 20.0	%	✓	323Ch	1.0
A043	Manual torque boost frequency	0.0 to 50.0	%	✓	123Dh	5.0
A243	2nd manual torque boost frequency	0.0 to 50.0	%	✓	223Dh	5.0
A343	3rd manual torque boost frequency	0.0 to 50.0	%	✓	323Dh	5.0
A044	V/F characteristics selection	00: VC (Constant torque characteristics) 01: VP (Special reduced torque characteristics) 02: Free V/F (characteristics) 03: SLV (Sensorless vector control) 04: 0SLV (0-Hz sensorless vector control) 05: V2 (Sensor vector control)	–	×	123Eh	00
A244	2nd V/F characteristics selection	00: VC (Constant torque characteristics) 01: VP (Special reduced torque characteristics) 02: Free V/F (characteristics) 03: SLV (Sensorless vector control) 04: 0SLV (0-Hz sensorless vector control) 05: V2 (Sensor vector control)	–	×	223Eh	00
A344	3rd V/F characteristics selection	00: VC (Constant torque characteristics) 01: VP (Special reduced torque characteristics)	–	×	323Eh	00
A045	Output voltage gain	20 to 100	%	✓	123Fh	100
A046	Automatic torque boost voltage compensation gain	0 to 255	–	✓	1240h	100
A246	2nd automatic torque boost voltage compensation gain	0 to 255	–	✓	2240h	100
A047	Automatic torque boost slip compensation gain	0 to 255	–	✓	1241h	100
A247	2nd automatic torque boost slip compensation gain	0 to 255	–	✓	2241h	100
A051	DC injection braking selection	00: OFF (Disabled) 01: ON (Enabled) 02: ON (FQ) (Frequency control [A052 set value])	–	×	1245h	01
A052	DC injection braking frequency	0.00 to 400.00	Hz	×	1246h	0.50
A053	DC injection braking delay time	0.0 to 5.0	s	×	1247h	0.0
A054	DC injection braking power	0 to 100 (0.4 to 55 kW)	%	×	1248h	50
		0 to 80 (75 to 132 kW)				40
A055	DC injection braking time	0.0 to 60.0	s	×	1249h	0.5
A056	DC injection braking method selection	00: Edge operation 01: Level operation	–	×	124Ah	01
A057	Startup DC injection braking power	0 to 100 (0.4 to 55 kW) 0 to 80 (75 to 132 kW)	%	×	124Bh	0
A058	Startup DC injection braking time	0.0 to 60.0	s	×	124Ch	0.0
A059	DC injection braking carrier frequency	0.5 to 15.0 (0.4 to 55 kW)	kHz	×	124Dh	5.0
		0.5 to 10.0 (75 to 132 kW)				3.0
A061	Frequency upper limit	0.00/frequency lower limit to max frequency	Hz	×	124Fh	0.00
					1250h	
A261	2nd frequency upper limit	0.00/2nd frequency lower limit to 2nd max frequency	Hz	×	224Fh	0.00
					2250h	
A062	Frequency lower limit	0.00/starting frequency to frequency upper limit	Hz	×	1251h	0.00
					1252h	
A262	2nd frequency lower limit	0.00/starting frequency to 2nd frequency upper limit	Hz	×	2251h	0.00
					2252h	
A063	Jump frequency 1	0.0 to 400.0	Hz	×	1253h	0.00
					1254h	
A064	Jump frequency width 1	0.0 to 10.00	Hz	×	1255h	0.50
A065	Jump frequency 2	0.0 to 400.00	Hz	×	1256h	0.00
					1257h	
A066	Jump frequency width 2	0.0 to 10.00	Hz	×	1258h	0.50

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register N°	Default
A067	Jump frequency 3	0.0 to 400.00	Hz	×	1259h 125Ah	0.00
A068	Jump frequency width 3	0.0 to 10.00	Hz	×	125Bh	0.50
A069	Acceleration stop frequency	0.0 to 400.00	Hz	×	125Ch 125Dh	0.00
A070	Acceleration stop time	0.0 to 60.0	s	×	125Eh	0.0
A071	PID selection	00: OFF (Disabled) 01: ON (+) (Enabled) 02: ON (+/-) (Reverse output enabled)	–	×	125Fh	00
A072	PID P gain	0.2 to 5.0	–	✓	1260h	1.0
A073	PID I gain	0.0 to 3600.0	s	✓	1261h	1.0
A074	PID D gain	0.00 to 100.00	s	✓	1262h	0.00
A075	PID scale	0.01 to 99.99	Time	×	1263h	1.00
A076	PID feedback selection	00: OI 01: O 02: Modbus (RS485 communication) 03: Pulse (Pulse train frequency) 10: Math (Operation function result)	–	×	1264h	00
A077	Reverse PID function	00: OFF (Deviation = Target value - Feedback value) 01: ON (Deviation = Feedback value - Target value)	–	×	1265h	00
A078	PID output limit function	0.0 to 100.0	%	×	1266h	0.0
A079	PID feed forward selection	00: Disabled 01: O 02: OI 03: O2	–	×	1267h	00
A081	AVR selection	00: Always ON 01: Always OFF 02: OFF during deceleration	–	×	1269h	02
A082	AVR voltage selection	200-V class: 200/215/220/230/240 400-V class: 380/400/415/440/460/480	V	×	126Ah	-
A085	RUN mode selection	00: Normal operation 01: Energy-saving operation 02: Automatic operation	–	×	126Dh	00
A086	Energy-saving response/accuracy adjustment	0.0 to 100.0	–	✓	126Eh	50.0
A092	Acceleration time 2	0.01 to 3600.00	s	✓	1274h 1275h	10.00
A292	2nd acceleration time 2	0.01 to 3600.00	s	✓	226Fh 2270h	10.00
A392	3rd acceleration time 2	0.01 to 3600.00	s	✓	326Dh 326Eh	10.00
A093	Deceleration time 2	0.01 to 3600.00	s	✓	1276h 1277h	10.00
A293	2nd deceleration time 2	0.01 to 3600.00	s	✓	2271h 2272h	10.00
A393	3rd deceleration time 2	0.01 to 3600.00	s	✓	326Fh 3270h	10.00
A094	2-step acceleration/deceleration selection	00: 2CH-terminal (Switched via multi-function input 09) 01: Preset FQ (Switched by setting) 02: FWD-REV (Enabled only when switching forward/ reverse)	–	×	1278h	00
A294	2nd 2-step acceleration/deceleration selection	00: 2CH-terminal (Switched via multi-function input 09) 01: Preset FQ (Switched by setting) 02: FWD-REV (Enabled only when switching forward/ reverse)	–	×	2273h	00
A095	2-step acceleration frequency	0.00 to 400.00	Hz	×	1279h 127Ah	0.00
A295	2nd 2-step acceleration frequency	0.00 to 400.00	Hz	×	2274h 2275h	0.00
A096	2-step deceleration frequency	0.00 to 400.00	Hz	×	127Bh 127Ch	0.00
A296	2nd 2-step deceleration frequency	0.00 to 400.00	Hz	×	2276h 2277h	0.00
A097	Acceleration pattern selection	00: Line 01: S-curve 02: U-curve 03: Inv. U curve 04: EL-S curve	–	×	127Dh	01
A098	Deceleration pattern setting	00: Line 01: S-curve 02: U-curve 03: Inv. U curve 04: EL-S curve	–	×	127Eh	01
A101	OI start frequency	0.00 to 400.00	Hz	×	1281h 1282h	0.00
A102	OI end frequency	0.00 to 400.00	Hz	×	1283h 1284h	0.00
A103	OI start ratio	0 to OI end ratio	%	×	1285h	20
A104	OI end ratio	OI start ratio to 100	%	×	1286h	100

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register Nº	Default
A105	OI start selection	00: Start FQ (Use OI start frequency [A101]) 01: 0 Hz	–	×	1287h	00
A111	O2 start frequency	-400.00 to 400.00	Hz	×	128Dh 128Eh	0.00
A112	O2 end frequency	-400.00 to 400.00	Hz	×	128Fh 1290h	0.00
A113	O2 start ratio	-100 to O2 end ratio	%	×	1291h	-100
A114	O2 end ratio	O2 start ratio to 100	%	×	1292h	100
A131	Acceleration curve parameter	01 (small curve) to 10 (large curve)	–	×	12A5h	02
A132	Deceleration curve parameter	01 (small curve) to 10 (large curve)	-	×	12A6h	02
A141	Operation frequency input A setting	00: Operator (Digital operator (F001)) 01: VR (Digital operator (FREQ adjuster)) (Enabled when 3G3AX-OP01 is used) 02: O (Input O) 03: OI (Input OI) 04: Modbus (RS485 communication) 05: Option 1 06: Option 2 07: Pulse (Pulse train frequency)	-	×	12AFh	02
A142	Operation frequency input B setting	00: Operator (Digital operator (F001)) 01: VR (Digital operator (FREQ adjuster)) (Enabled when 3G3AX-OP01 is used) 02: O (Input O) 03: OI (Input OI) 04: Modbus (RS485 communication) 05: Option 1 06: Option 2 07: Pulse (Pulse train frequency)	–	×	12B0h	03
A143	Operator selection	00: ADD (Addition (A + B)) 01: SUB (Substraction (A - B)) 03: MUL (Multiplication (A x B))	–	×	12B1h	00
A145	Frequency addition amount	0.00 to 400.00	Hz	×	12B3h 12B4h	0.00
A146	Frequency addition direction	00: ADD (Add A145 value to output frequency) 01: SUB (Subtract A145 value from output frequency)	–	×	12B5h	00
A150	EL-S-curve ratio 1 during acceleration	0 to 50	%	×	12B9h	10
A151	EL-S-curve ratio 2 during acceleration	0 to 50	%	×	12BAh	10
A152	EL-S-curve ratio 1 during deceleration	0 to 50	%	×	12BBh	10
A153	EL-S-curve ratio 2 during deceleration	0 to 50	%	×	12BCh	10

4.3 Parameter group B

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
b001	Retry selection	00: TRIP (Alarm) 01: 0 Hz start 02: f-match (Frequency matching start) 03: f-match trip (Trip after frequency matching deceleration stop) 04: Actv. f-match (Active frequency matching restart)	–	×	1301h	00
b002	Allowable momentary power interruption time	0.3 to 25.0	s	×	1302h	1.0
b003	Retry wait time	0.3 to 100.0	s	×	1303h	1.0
b004	Momentary power interruption/undervoltage trip during stop selection	00: OFF (Disabled) 01: ON (Enabled) 02: Decel-OFF (Disabled during stop and deceleration stop)	–	×	1304h	00
b005	Momentary power interruption retry time selection	00: 16 times 01: No limit	–	×	1305h	00
b006	Input phase loss protection selection	00: OFF (Disabled) 01: ON (Enabled)	–	×	1306h	00
b007	Frequency matching lower limit frequency setting	0.00 to 400.00	Hz	×	1307h 1308h	0.00
b008	Trip retry selection	00: TRIP (Alarm) 01: 0 Hz start 02: f-match (Frequency matching start) 03: f-match trip (Trip after frequency matching deceleration stop) 04: Actv. f-match (Active frequency matching restart)	–	×	1309h	00
b009	Undervoltage retry time selection	00: 16 times 01: No limit	–	×	130Ah	00
b010	Overvoltage/overcurrent retry time selection	1 to 3	Time	×	130Bh	3
b011	Trip retry wait time	0.3 to 100.0	s	×	130Ch	1.0
b012	Electronic thermal level	0.20 x Rated current to 1.00 x Rated current	A	×	130Dh	-
b212	2nd electronic thermal level	0.20 x Rated current to 1.00 x Rated current	A	×	230Ch	-
b312	3rd electronic thermal level	0.20 x Rated current to 1.00 x Rated current	A	×	330Ch	-
b013	Electronic thermal characteristics selection	00: Reduced TRQ (Reduced torque characteristics) 01: Const TRQ (Constant torque characteristics) 02: Free set (Free setting)	–	×	130Eh	00

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
b213	2nd electronic thermal characteristics selection	00: Reduced TRQ (Reduced torque characteristics) 01: Const TRQ (Constant torque characteristics) 02: Free set (Free setting)	–	×	230Dh	00
b313	3rd electronic thermal characteristics selection	00: Reduced TRQ (Reduced torque characteristics) 01: Const TRQ (Constant torque characteristics) 02: Free set (Free setting)	–	×	330Dh	00
b015	Free setting, electronic thermal frequency 1	0.00 to 400.00	Hz	×	1310h	0.00
b016	Free setting, electronic thermal current 1	0.0 to Rated current	A	×	1311h	0.00
b017	Free setting, electronic thermal frequency 2	0.00 to 400.00	Hz	×	1312h	0.00
b018	Free setting, electronic thermal current 2	0.0 to Rated current	A	×	1313h	0.00
b019	Free setting, electronic thermal frequency 3	0.00 to 400.00	Hz	×	1314h	0.00
b020	Free setting, electronic thermal current 3	0.0 to Rated current	A	×	1315h	0.00
b021	Overload limit selection	00: OFF (Disabled) 01: ON-Acc/Cnst (Enabled in acceleration/constant speed operation) 02: ON-Cnst (Enabled in constant speed operation) 03: ON-A/C(R) (Enabled in acceleration/constant speed operation (Accelerates during regeneration))	–	×	1316h	01
b022	Overload limit level	0.20 x Rat current to 2.00 x Rat current (0.4 to 55 kW) 0.20 x Rat current to 1.80 x Rat current (75 to 132 kW)	A	×	1317h	-
b023	Overload limit parameter	0.10 to 30.00	s	×	1318h	1.00
b024	Overload limit selection 2	00: OFF (Disabled) 01: ON-Acc/Cnst (Enabled in acceleration/constant speed operation) 02: ON-Cnst (Enabled in constant speed operation) 03: ON-A/C(R) (Enabled in acceleration/constant speed operation (Accelerates during regeneration))	–	×	1319h	01
b025	Overload limit level 2	0.20 x Rat current to 2.00 x Rat current (0.4 to 55 kW) 0.20 x Rat current to 1.80 x Rat current (75 to 132 kW)	A	×	131Ah	-
b026	Overload limit parameter 2	0.10 to 30.00	s	×	131Bh	1.00
b027	Overcurrent suppression function	00: OFF (Disabled) 01: ON (Enabled)	–	×	131Ch	00
b028	Active frequency matching restart level	0.20 x Rat current to 2.00 x Rat current (0.4 to 55 kW) 0.20 x Rat current to 1.80 x Rat current (75 to 132 kW)	A	×	131Dh	-
b029	Active frequency matching restart parameter	0.10 to 30.00	s	×	131Eh	0.50
b030	Starting frequency at active frequency matching restart	00: Off FQ (Frequency at interruption) 01: Max.FQ (Max. frequency) 02: Set FQ (Set frequency)	–	×	131Fh	00
b031	Soft lock selection	00: Lock (SFT) (Data other than b031 cannot be changed when terminal SFT is ON) 01: Only FQ (SFT) (Data other than b031 and the specified frequency parameter cannot be changed when terminal SFT is ON) 02: Lock (Data other than b031 cannot be changed) 03: Only FQ (Data other than b031 and the specified frequency parameter cannot be changed) 10: RUN chg mode (Data other than parameters changeable during operation cannot be changed)	–	×	1320h	01
b034	RUN time/Power ON time setting	0 to 65535	h	×	1323h 1324h	0
b035	Rotation direction limit selection	00: FREE (Forward and reverse are enabled) 01: FWD (Only forward is enabled) 02: REV (Only reverse is enabled)	–	×	1325h	00
b036	Reduced voltage startup selection	0 (reduced voltage startup time: small) to 255 (reduced voltage startup time: large)	–	×	1326h	6
b037	Display selection	00: All (Complete display) 01: Utilized (Individual display of functions) 02: User (User setting) 03: Compare (Data comparison display) 04: Basic (Basic display)	–	×	1327h	00
b038	Initial screen selection	000 to 202	–	×	1328h	001
b039	User parameter automatic setting function selection	00: OFF (Disabled) 01: ON (Enabled)	–	×	1329h	00
b040	Torque limit selection	00: 4-quadrant (Four-quadrant separate setting) 01: TRQ input (Terminal switch) 02: [O] input (Analogue input) 03: Option 1 04: Option 2	–	×	132Ah	00
b041	Torque limit 1 (fwd-power in 4-quadrant mode)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW) no (Torque limit disabled)	%	×	132Bh	150
b042	Torque limit 2 (rev/regen. in 4-quadrant mode)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW) no (Torque limit disabled)	%	×	132Ch	150
b043	Torque limit 3 (rev/power in 4-quadrant mode)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW) no (Torque limit disabled)	%	×	132Dh	150
b044	Torque limit 4 (fwd/regen. in 4-quadrant mode)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW) no (Torque limit disabled)	%	×	132Eh	150
b045	Torque LADSTOP selection	00: OFF (Disabled) 01: ON (Enabled)	–	×	132Fh	00

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
b046	Reverse rotation prevention selection	00: OFF (Disabled) 01: ON (Enabled)	–	×	1330h	00
b049	Dual rate selection	00: CT (Constant torque) 01: VT (Variable torque)	–	×	1333h	00
b050	Selection of non-stop function at momentary power interruption	00: OFF (Disabled) 01: V-Cnst (STOP) (Enabled (deceleration stop)) 02: NS1 (Enabled (without recovery)) 03: NS2 (Enabled (with recovery))	–	×	1334h	00
b051	Starting voltage of non-stop function at momentary power interruption	0.0 to 1000.0	V	×	1335h	220/400
b052	Stop deceleration level of non-stop function at momentary power interruption	0.0 to 1000.0	V	×	1336h	360/720
b053	Deceleration time of non-stop function at momentary power interruption	0.01 to 360.00	s	×	1337h 1338h	1.00
b054	Deceleration starting width of non-stop function at momentary power interruption	0.00 to 10.00	Hz	×	1339h	0.00
b055	Proportional gain setting of non-stop function at momentary power interruption	0.00 to 2.55	–	✓	133Ah	0.20
b056	Integral time setting of non-stop function at momentary power interruption	0.000 to 65.535	s	✓	133Bh	0.100
b060	Window comparator O upper limit level	0 to 100	%	✓	133Fh	100
b061	Window comparator O lower limit level	0 to 100	%	✓	1340h	0
b062	Window comparator O hysteresis width	0 to 10	%	✓	1341h	0
b063	Window comparator OI upper limit level	0 to 100	%	✓	133Fh	100
b064	Window comparator OI lower limit level	0 to 100	%	✓	1340h	0
b065	Window comparator OI hysteresis width	0 to 10	%	✓	1341h	0
b066	Window comparator O2 upper limit level	-100 to 100	%	✓	1345h	100
b067	Window comparator O2 lower limit level	-100 to 100	%	✓	1346h	-100
b068	Window comparator O2 hysteresis width	0 to 10	%	✓	1347h	0
b070	Analog operation level at O disconnection	0 to 100 no: Ignored	%	×	1349h	no
b071	Analog operation level at OI disconnection	0 to 100 no: Ignored	%	×	134Ah	no
b072	Analog operation level at O2 disconnection	0 to 100 no: Ignored	%	×	134Bh	no
b078	Integrated power clear	Cleared with the Enter key after changing to 01	–	✓	1351h	00
b079	Integrated power display gain	1 to 1000	–	✓	1352h	1
b082	Starting frequency	0.10 to 9.99	Hz	×	1355h	0.50
b083	Carrier frequency	0.5 to 15.0 (0.4 to 55 kW) 0.5 to 10.0 (75 to 132 kW)	kHz	×	1356h	5.0 3.0
b084	Initialization selection	00: no (Clears the trip monitor) 01: Trip data (Initializes data) 02: Parameters (Clears the trip monitor and initializes data) 03: Trip+Param (Clears the trip monitor and parameters) 04: Trip+Prm+EzSQ (Clears the trip monitor, parameters and Drive Program)	–	×	1357h	00
b085	Initialization parameter selection	01 (Do not change)	–	×	1358h	01
b086	Frequency conversion coefficient	0.1 to 99.9	–	✓	1359h	1.0
b087	STOP key selection	00: ON (Enabled) 01: OFF (Disabled) 02: Only RESET (Disabled only during stop)	–	×	135Ah	00
b088	Free-run stop selection	00: 0 Hz start 01: f-match (Frequency matching start) 02: Actv. f-match (Active frequency matching restart)	-	×	135Bh	00
b089	Automatic carrier reduction	00: OFF (Disabled) 01: ON (Enabled)	–	×	135Ch	00
b090	Usage of regenerative braking function	0.0 to 100.0	%	×	135Dh	0.0
b091	Stop selection	00: Decel-Stop 01: Free-RUN	–	×	135Eh	00
b092	Cooling fan control	00: Alws-ON (Always ON) 01: ON in RUN (ON during RUN)	–	×	135Fh	01
b095	Regenerative braking function operation selection	00: OFF (Disabled) 01: RUN-ON (Enabled (Disabled during stop)) 02: Alws-ON (Enabled (Enabled during stio))	–	×	1362h	00
b096	Regenerative braking function ON level	330 to 380 660 to 760	V	×	1363h	360/720
b098	Thermistor selection	00: Disabled 01: PTC enabled 02: NTC enabled	–	×	1365h	00
b099	Thermistor error level	0 to 9999	Ω	×	1366h	3000
b100	Free V/F frequency 1	0 to free V/F frequency 2	Hz	×	1367h	0
b101	Free V/F voltage 1	0.0 to 800.0	V	×	1368h	0.0
b102	Free V/F frequency 2	0 to free V/F frequency 3	Hz	×	1369h	0
b103	Free V/F voltage 2	0.0 to 800.0	V	×	136Ah	0.0
b104	Free V/F frequency 3	0 to free V/F frequency 4	Hz	×	136Bh	0
b105	Free V/F voltage 3	0.0 to 800.0	V	×	136Ch	0.0
b106	Free V/F frequency 4	0 to free V/F frequency 5	Hz	×	136Dh	0
b107	Free V/F voltage 4	0.0 to 800.0	V	×	136Eh	0.0
b108	Free V/F frequency 5	0 to free V/F frequency 6	Hz	×	136Fh	0
b109	Free V/F voltage 5	0.0 to 800.0	V	×	1370h	0.0

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
b110	Free V/F frequency 6	0 to free V/F frequency 7	Hz	×	1371h	0
b111	Free V/F voltage 6	0.0 to 800.0	V	×	1372h	0.0
b112	Free V/F frequency 7	0 to 400	Hz	×	1373h	0
b113	Free V/F voltage 7	0.0 to 800.0	V	×	1374h	0.0
b120	Brake control selection	00: OFF (Disabled) 01: ON (Enabled)	–	×	137Bh	00
b121	Brake wait time for release	0.00 to 5.00	s	×	137Ch	0.00
b122	Brake wait time for acceleration	0.00 to 5.00	s	×	137Dh	0.00
b123	Brake wait time for stopping	0.00 to 5.00	s	×	137Eh	0.00
b124	Brake wait time for confirmation	0.00 to 5.00	s	×	137Fh	0.00
b125	Brake release frequency	0.00 to -400.00	Hz	×	1380h	0.00
b126	Brake release current	0.0 to 2.00 x Rated current (0.4 to 55 kW) 0.0 to 1.80 x Rated current (75 to 132 kW)	–	×	1381h	-
b127	Brake input frequency	0.00 to 400.00	Hz	×	1382h	0.00
b130	Overvoltage protection function selection during deceleration	00: OFF (Disabled) 01: V-const (DC voltage kept constant) 02: Accel (Acceleration enabled)	–	×	1385h	01
b131	Overvoltage protection level during deceleration	200-V class: 330 to 390 400-V class: 660 to 780	V	×	1386h	380/760
b132	Overvoltage protection parameter	0.10 to 30.00	s	×	1387h	1.00
b133	Overvoltage protection proportional gain	0.00 to 2.55	–	✓	1388h	0.50
b134	Overvoltage protection integral time setting	0.000 to 65.535	s	✓	1389h	0.060
b164	Auto return initial display	00: OFF 01: ON	–	×	13A7h	00
b166	Data read/write selection	00: R/W OK (Read/Write OK) 01: R/W protected (Read/Write protected)	–	×	13A9h	00
b180	Initialize trigger	00: No action 01: Initialize	–	×	13B7h	00

4.4 Parameter group C

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
C001	Multi-function input 1 selection	Check Digital inputs on page 23	–	×	1401h	01
C002	Multi-function input 2 selection		–	×	1402h	12
C003	Multi-function input 3 selection		–	×	1403h	18
C004	Multi-function input 4 selection		–	×	1404h	02
C005	Multi-function input 5 selection		–	×	1405h	03
C006	Multi-function input 6 selection		–	×	1406h	06
C007	Multi-function input 7 selection		–	×	1407h	08
C008	Multi-function input 8 selection		–	×	1408h	no
C011	Multi-function input 1 operation selection	00: NO 01: NC	–	×	140Bh	00
C012	Multi-function input 2 operation selection	00: NO 01: NC	–	×	140Ch	00
C013	Multi-function input 3 operation selection	00: NO 01: NC	–	×	140Dh	00
C014	Multi-function input 4 operation selection	00: NO 01: NC	–	×	140Eh	00
C015	Multi-function input 5 operation selection	00: NO 01: NC	–	×	140Fh	00
C016	Multi-function input 6 operation selection	00: NO 01: NC	–	×	1410h	00
C017	Multi-function input 7 operation selection	00: NO 01: NC	–	×	1411h	00
C018	Multi-function input 8 operation selection	00: NO 01: NC	–	×	1412h	00
C019	FW terminal operation selection	00: NO 01: NC	–	×	1413h	00
C021	Multi-function output terminal 11 selection	Check Digital inputs on page 25	–	×	1415h	00
C022	Multi-function output terminal 12 selection		–	×	1416h	21
C023	Multi-function output terminal 13 selection		–	×	1417h	03
C024	Multi-function output terminal 14 selection		–	×	1418h	07
C025	Multi-function output terminal 15 selection		–	×	1419h	01
C026	Relay output (AL2, AL1) function selection		–	×	141Ah	05
C027	FM selection	Check Analogue outputs on page 27	–	×	141Bh	00
C028	AM selection	Check Analogue outputs on page 27	–	×	141Ch	00
C029	AMI selection	Check Analogue outputs on page 27	–	×	141Dh	00
C030	Digital current monitor reference value	0.20 x Rated current to 2.00 x Rated current	–	✓	141Eh	-
C031	Multi-function output terminal 11 contact selection	00: NO 01: NC	–	×	141Fh	00
C032	Multi-function output terminal 12 contact selection	00: NO 01: NC	–	×	1420h	00
C033	Multi-function output terminal 13 contact selection	00: NO 01: NC	–	×	1421h	00
C034	Multi-function output terminal 14 contact selection	00: NO 01: NC	–	×	1422h	00

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
C035	Multi-function output terminal 15 contact selection	00: NO 01: NC	–	×	1423h	00
C036	Relay output (AL2, AL1) contact selection	00: NO contact at AL2; NC contact at AL1 01: NC contact at AL2; NO contact at AL1	–	×	1424h	01
C038	Light load signal output mode	00: ACC/DEC/CST (Enabled during acceleration/deceleration/constant speed) 01: Const (Enabled only during constant speed)	–	×	1426h	01
C039	Light load detection level	0.00 to 2.00 x Rated current (0.4 to 55 kW) 0.00 to 1.80 x Rated current (75 to 132 kW)	A	×	1427h	-
C040	Overload warning signal output mode	00: ACC/DEC/CST (Enabled during acceleration/deceleration/constant speed) 01: Const (Enabled only during constant speed)	–	×	1428h	01
C041	Overload warning level	0.0: Does not operate 0.10 x Rated current to 2.00 x Rated current (0.4 to 55 kW) 0.10 x Rated current to 1.80 x Rated current (75 to 132 kW)	A	×	1429h	-
C042 (high)	Arrival frequency during acceleration	0.00 to 400.00	Hz	×	142Ah	0.00
C042 (low)					142Bh	
C043 (high)	Arrival frequency during deceleration	0.00 to 400.00	Hz	×	142Ch	0.00
C043 (low)					142Dh	
C044	PID deviation excessive level	0.0 to 100.0	%	×	142Eh	3.0
C045 (high)	Arrival frequency during acceleration 2	0.00 to 400.00	Hz	×	142Fh	0.00
C045 (low)					1430h	
C046 (high)	Arrival frequency during deceleration 2	0.00 to 400.00	Hz	×	1431h	0.00
C046 (low)					1432h	
C052	PID FB upper limit	0.0 to 100.0	%	×	1438h	100.0
C053	PID FB lower limit	0.0 to 100.0	%	×	1439h	0.0
C055	Overtorque level (Forward power running)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW)	%	×	143Bh	200
C056	Overtorque level (Reverse regeneration)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW)	%	×	143Ch	200
C057	Overtorque level (Reverse power running)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW)	%	×	143Dh	200
C058	Overtorque level (Forward regeneration)	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW)	%	×	143Eh	200
C061	Thermal warning level	0 to 100	%	×	1441h	80
C062	Alarm code selection	00: OFF 01: 3-bit 02: 4-bit	–	×	1442h	00
C063	0 Hz detection level	0.00 to 100.00	Hz	×	1443h	0.00
C064	Fin overheat warning level	0 to 200	°C	×	1444h	120
C071	Communication speed selection (Baud rate selection)	02: Loop-back test 03: 2400 bps 04: 4800 bps 05: 9600 bps 06: 19200 bps	–	×	144Bh	05
C072	Communication station No. selection	1 to 247	–	×	144Ch	1
C073	Communication bit length selection	7: 7-bit 8: 8-bit	–	×	144Dh	8
C074	Communication parity selection	00: No parity 01: Even 02: Odd	–	×	144Eh	00
C075	Communication stop bit selection	1: 1-bit 2: 2-bit	–	×	144Fh	1
C076	Communication error selection	00: Trip 01: Decel-Trip (Trip after deceleration stop) 02: Ignore 03: Free-RUN (Free-run stop) 04: Decel-Stop (Deceleration Stop)	–	×	1450h	02
C077	Communication error timeout	0.00 to 99.99	s	×	1451h	0.00
C078	Communication wait time	0 to 1000	ms	×	1452h	0
C079	Communication method selection	00: ASCII 01: Modbus-RTU	–	×	1453h	01
C081	O adjustment	0 to 65535	–	✓	1455h	Factory default
C082	OI adjustment	0 to 65535	–	✓	1456h	Factory default
C083	O2 adjustment	0 to 65535	–	✓	1457h	Factory default
C085	Thermistor adjustment	0.0 to 1000.0	–	✓	1459h	Factory default
C091	Debug mode selection	Use “00”. Do not change.	–	×	145Fh	00
C101	UP/DWN selection	00: Not save (Do not store the frequency data) 01: Save (Store the frequency data)	–	×	1469h	00
C102	Reset selection	00: ON-RESET (Trip reset at power-on) 01: OFF-RESET (Trip reset when the power is OFF) 02: On in Trip (Enabled only during trip (Reset when the power is ON)) 03: Trip RESET (Trip reset only)	–	✓	146Ah	00

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
C103	Reset frequency matching selection	00: 0 Hz start 01: f-match (Frequency matching start) 02: Actv. f-match (Active frequency matching restart)	–	×	146Bh	00
C105	FM gain setting	50 to 200	%	✓	146Dh	100
C106	AM gain setting	50 to 200	%	✓	146Eh	100
C107	AMI gain setting	50 to 200	%	✓	146Fh	100
C109	AM bias setting	0 to 100	%	✓	1471h	0
C110	AMI bias setting	0 to 100	%	✓	1472h	20
C111	Overload warning level 2	0.0 to 2.00 x Rated current (0.4 to 55 kW) 0.0 to 1.80 x Rated current (75 to 132 kW)	A	×	1473h	-
C121	O zero adjustment	0 to 65535	–	✓	147Dh	Factory default
C122	OI zero adjustment	0 to 65535	–	✓	147Eh	Factory default
C123	O2 zero adjustment	0 to 65535	–	✓	147Fh	Factory default
C130	Output 11 ON delay	0.0 to 100.0	s	×	1486h	0.0
C131	Output 11 OFF delay	0.0 to 100.0	s	×	1487h	0.0
C132	Output 12 ON delay	0.0 to 100.0	s	×	1488h	0.0
C133	Output 12 OFF delay	0.0 to 100.0	s	×	1489h	0.0
C134	Output 13 ON delay	0.0 to 100.0	s	×	148Ah	0.0
C135	Output 13 OFF delay	0.0 to 100.0	s	×	148Bh	0.0
C136	Output 14 ON delay	0.0 to 100.0	s	×	148Ch	0.0
C137	Output 14 OFF delay	0.0 to 100.0	s	×	148Dh	0.0
C138	Output 15 ON delay	0.0 to 100.0	s	×	148Eh	0.0
C139	Output 15 OFF delay	0.0 to 100.0	s	×	148Fh	0.0
C140	Relay output ON delay	0.0 to 100.0	s	×	1490h	0.0
C141	Relay output OFF delay	0.0 to 100.0	s	×	1491h	0.0
C142	Logic output signal 1 selection 1	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	1492h	00
C143	Logic output signal 1 selection 2	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	1493h	00
C144	Logic output signal 1 operator selection	00: AND 01: OR 02: XOR	–	×	1494h	00
C145	Logic output signal 2 selection 1	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	1495h	00
C146	Logic output signal 2 selection 2	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	1496h	00
C147	Logical output signal 2 operator selection	00: AND 01: OR 02: XOR	–	×	1497h	00
C148	Logic output signal 3 selection 1	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	1498h	00
C149	Logic output signal 3 selection 2	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	1499h	00
C150	Logical output signal 3 operator selection	00: AND 01: OR 02: XOR	–	×	149Ah	00
C151	Logic output signal 4 selection 1	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	149Bh	00
C152	Logic output signal 4 selection 2	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	149Ch	00
C153	Logical output signal 4 operator selection	00: AND 01: OR 02: XOR	–	×	149Dh	00
C154	Logic output signal 5 selection 1	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	149Eh	00
C155	Logic output signal 5 selection 2	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	149Fh	00
C156	Logical output signal 5 operator selection	00: AND 01: OR 02: XOR	–	×	14A0h	00
C157	Logic output signal 6 selection 1	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	14A1h	00
C158	Logic output signal 6 selection 2	Same as options for C021 to C026 (excluding LOG1 to LOG6)	–	×	14A2h	00
C159	Logical output signal 6 operator selection	00: AND 01: OR 02: XOR	–	×	14A3h	00
C160	Input terminal response time 1	0 to 200 (x 2 ms)	ms	×	14A4h	1
C161	Input terminal response time 2	0 to 200 (x 2 ms)	ms	×	14A5h	1
C162	Input terminal response time 3	0 to 200 (x 2 ms)	ms	×	14A6h	1
C163	Input terminal response time 4	0 to 200 (x 2 ms)	ms	×	14A7h	1

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
C164	Input terminal response time 5	0 to 200 (x 2 ms)	ms	×	14A8h	1
C165	Input terminal response time 6	0 to 200 (x 2 ms)	ms	×	14A9h	1
C166	Input terminal response time 7	0 to 200 (x 2 ms)	ms	×	14AAh	1
C167	Input terminal response time 8	0 to 200 (x 2 ms)	ms	×	14ABh	1
C168	FW terminal response time	0 to 200 (x 2 ms)	ms	×	14ACh	1
C169	Multi-step speed/position determination time	0 to 200 (x 2 ms)	ms	×	14ADh	0

4.5 Parameter group H

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
H001	Auto-tuning selection	00: OFF (Disabled) 01: ON (STOP) 02: ON (Rotation)	–	×	1501h	00
H002	Motor parameter selection	00: Standard motor parameter 01: Auto-tuning parameter 02: Auto-tuning parameter (online auto-tuning enabled)	–	×	1502h	00
H202	2nd motor parameter selection	00: Standard motor parameter 01: Auto-tuning parameter 02: Auto-tuning parameter (online auto-tuning enabled)	–	×	2502h	00
H003	Motor capacity selection	0.20 to 160.0 (kW)	kW	×	1503h	Factory default
H203	2nd motor capacity selection	0.20 to 160.0 (kW)	kW	×	2503h	Factory default
H004	Motor pole number selection	2/4/6/8/10	Pole	×	1504h	4P
H204	2nd motor pole number selection	2/4/6/8/10	Pole	×	2504h	4P
H005	Speed response	0.001 to 80.000	–	✓	1505h 1506h	1.590
H205	2nd speed response	0.001 to 80.000	–	✓	2505h 2506h	1.590
H006	Stabilization parameter	0 to 255	–	✓	1507h	100
H206	2nd stabilization parameter	0 to 255	–	✓	2507h	100
H306	3rd stabilization parameter	0 to 255	–	✓	3507h	100
H020	Motor parameter R1	0.001 to 65.535	Ω	×	1515h 1516h	-
H220	2nd motor parameter R1	0.001 to 65.535	Ω	×	2515h 2516h	-
H021	Motor parameter R2	0.001 to 65.535	Ω	×	1517h 1518h	-
H221	2nd motor parameter R2	0.001 to 65.535	Ω	×	2517h 2518h	-
H022	Motor parameter L	0.01 to 655.35	mH	×	1519h 151Ah	-
H222	2nd motor parameter L	0.01 to 655.35	mH	×	2519h 251Ah	-
H023	Motor parameter Io	0.01 to 655.35	A	×	151Bh 151Ch	-
H223	2nd motor parameter Io	0.01 to 655.35	A	×	251Bh 251Ch	-
H024	Motor parameter J	0.001 to 9999.000	kgm^2	×	151Dh 151Eh	-
H224	2nd motor parameter J	0.001 to 9999.000	kgm^2	×	251Dh 251Eh	-
H030	Motor parameter R1 (auto-tuning data)	0.001 to 65.535	Ω	×	1524h 1525h	-
H230	2nd motor parameter R1 (auto-tuning data)	0.001 to 65.535	Ω	×	2524h 2525h	-
H031	Motor parameter R2 (auto-tuning data)	0.001 to 65.535	Ω	×	1526h 1527h	-
H231	2nd motor parameter R2 (auto-tuning data)	0.001 to 65.535	Ω	×	2526h 2527h	-
H032	Motor parameter L (auto-tuning data)	0.01 to 655.35	mH	×	1528h 1529h	-
H232	2nd motor parameter L (auto-tuning data)	0.01 to 655.35	mH	×	2528h 2529h	-

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
H033	Motor parameter Io (auto-tuning data)	0.01 to 655.35	A	×	152Ah	-
					152Bh	
H233	2nd motor parameter Io (auto-tuning data)	0.01 to 655.35	A	×	252Ah	-
					252Bh	
H034	Motor parameter J (auto-tuning data)	0.001 to 9999.000	kgm^2	×	152Ch	-
					152Dh	
H234	2nd motor parameter J (auto-tuning data)	0.001 to 9999.000	kgm^2	×	252Ch	-
					252Dh	
H050	PI proportional gain	0.0 to 1000.0	–	✓	153Dh	100.0
H250	2nd PI proportional gain	0.0 to 1000.0	–	✓	253Dh	100.0
H051	PI integral gain	0.0 to 1000.0	–	✓	153Eh	100.0
H251	2nd PI integral gain	0.0 to 1000.0	–	✓	253Eh	100.0
H052	P proportional gain	0.01 to 10.00	–	✓	153Fh	1.00
H252	2nd P proportional gain	0.01 to 10.00	–	✓	253Fh	1.00
H060	Limit at 0 Hz	0.0 to 100.0	%	✓	1547h	100.0
H260	2nd limit at 0 Hz	0.0 to 100.0	%	✓	2547h	100.0
H061	Boost amount at SLV startup, 0 Hz	0 to 50	%	✓	1548h	50
H261	2nd boost amount at SLV startup, 0 Hz	0 to 50	%	✓	2548h	50
H070	For PI proportional gain switching	0.0 to 1000.0	–	✓	1551h	100.0
H071	For PI integral gain switching	0.0 to 1000.0	–	✓	1552h	100.0
H072	For P proportional gain switching	0.00 to 10.00	–	✓	1553h	1.00
H073	Gain switching time	0 to 9999	ms	✓	1554h	100

4.6 Parameter group P

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No	Default
P001	Operation selection at option 1 error	00: Trip 01: RUN (Continues operation)	–	×	1601h	00
P002	Operation selection at option 2 error	00: Trip 01: RUN (Continues operation)	–	×	1602h	00
P011	Encoder pulses	128 to 65535	Pulse	×	160Bh	1024
P012	V2 control mode selection	00: ASR (Speed control mode) 01: APR (Pulse train position control mode) 02: APR2 (Absolute position control mode) 03: HAPR (High resolution absolute position control mode)	–	×	160Ch	00
P013	Pulse train mode selection	00: Mode 1 01: Mode 2 03: Mode 3	–	×	160Dh	00
P014	Orientation stop position	0 to 4095	–	×	160Eh	0
P015	Orientation speed setting	Starting frequency to Max. frequency (upper limit: 120.0)	Hz	×	160Fh	5.00
P016	Orientation direction setting	00: FWD (Forward side) 00: REV (Reverse side)	–	×	1610h	00
P017	Position ready range setting	0 to 10000	Pulse	×	1611h	5
P018	Position ready delay time setting	0.00 to 9.99	s	×	1612h	0.00
P019	Electronic gear setting position selection	00: FB (Position feedback side) 01: REF (Position command side)	–	✓	1613h	00
P020	Electronic gear ratio numerator	1 to 9999	–	✓	1614h	1
P021	Electronic gear ratio denominator	1 to 9999	–	✓	1615h	1
P022	Position control feedforward gain	0.00 to 655.35	–	✓	1616h	0.00
P023	Position loop gain	0.00 to 100.00	rad/s	✓	1617h	0.50
P024	Position bias amount	-2048 to 2048	rad/s	✓	1618h	0
P025	Secondary resistance compensation enable/disable selection	00: OFF (Disabled) 01: ON (Enabled)	–	×	1619h	00
P026	Overspeed error detection level	0.0 to 150.0	%	×	161Ah	135.0
P027	Speed deviation error detection level	0.00 to 120.00	Hz	×	161Bh	7.50
P028	Motor gear ratio numerator	1 to 9999	–	×	161Ch	1
P029	Motor gear ratio denominator	1 to 9999	–	×	161Dh	1
P031	Acceleration/deceleration time input type	00: OPE (Digital operator) 01: Option 1 02: Option 2 03: EzSQ (Drive programming)	–	×	161Fh	00
P032	Orientation stop position input type	00: OPE (Digital operator) 01: Option 1 02: Option 2	–	×	1620h	00
P033	Torque reference selection	00: O (Terminal O) 01: OI (Terminal OI) 02: O2 (Terminal O2) 03: OPE (Digital operator) 06: Option 1 07: Option 2	–	×	1621h	00

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No	Default
P034	Torque reference setting	0 to 200 (0.4 to 55 kW) 0 to 180 (75 to 132 kW)	%	✓	1622h	0
P035	Polarity selection at torque reference via O2	00: Sign (Signed) 01: Direction (Depends on the RUN direction)	–	×	1623h	00
P036	Torque bias mode	00: OFF (None) 01: OPE (Digital operator) 02: O2 (Terminal O2) 05: Option 1 06: Option 2	–	×	1624h	00
P037	Torque bias value	-200 to 200 (0.4 to 55 kW) -180 to 180 (75 to 132 kW)	%	✓	1625h	0
P038	Torque bias polarity selection	00: Sign (Signed) 01: Direction (Depends on the RUN direction)	–	×	1626h	00
P039	Speed limit value in torque control (forward)	0.00 to maximum frequency	Hz	✓	1627h 1628h	0.00
P040	Speed limit value in torque control (reverse)	0.00 to maximum frequency	Hz	✓	1629h 162Ah	0.00
P044	DeviceNet comm watch dog timer	0.00 to 99.99	s	×	162Eh	1.00
P045	Operation setting at communications error	00: Trip 01: Decel-Trip (Trip after deceleration stop) 02: Ignore 03: Free RUN 04: Decel-Stop (Deceleration stop)	–	×	162Fh	00
P046	Instance number	0: Basic speed I/O 1: Extended speed I/O 2: Extended speed and torque control 3: Special I/O 4: Extended control I/O 5: Extended control I/O and multifunction I/O monitor 6: Flexible format 7: Extended speed and acceleration control 8-20: Not used	–	×	1630h	1
P048	Operation setting at idle mode detection	00: Trip 01: Decel-Trip (Trip after deceleration stop) 02: Ignore 03: Free RUN 04: Decel-Stop (Deceleration stop)	–	×	1632h	00
P049	Polarity setting for rotation speed	0/2/4/6/8/10/12/14/16/18/20/22/24/26/28/30/32/34/36/38	–	×	1633h	0
P055	Pulse train frequency scale	1.0 to 50.0	kHz	×	1639h	25.0
P056	Pulse train frequency filter time constant	0.01 to 2.00	s	×	163Ah	0.10
P057	Pulse train frequency bias amount	-100 to 100	%	×	163Bh	0
P058	Pulse train frequency limit	0 to 100	%	×	163Ch	100
P060	Multi-step position command 0	-268435455 to 268435455	-	✓	163Eh 163Fh	0
P061	Multi-step position command 1	-268435455 to 268435455	-	✓	1640h 1641h	0
P062	Multi-step position command 2	-268435455 to 268435455	-	✓	1642h 1643h	0
P063	Multi-step position command 3	-268435455 to 268435455	-	✓	1644h 1645h	0
P064	Multi-step position command 4	-268435455 to 268435455	-	✓	1646h 1647h	0
P065	Multi-step position command 5	-268435455 to 268435455	-	✓	1648h 1649h	0
P066	Multi-step position command 6	-268435455 to 268435455	-	✓	164Ah 164Bh	0
P067	Multi-step position command 7	-268435455 to 268435455	-	✓	164Ch 164Dh	0
P068	Zero return mode	00: Low speed 01: High speed 1 02: High speed 2	-	✓	164Eh	00
P069	Zero return direction selection	00: FWD (Forward side) 01: REV (Reverse side)	-	✓	164Fh	00
P070	Low-speed zero return frequency	0.00 to 10.00	Hz	✓	1650h	0.00
P071	High-speed zero return frequency	0.00 to maximum frequency	Hz	✓	1651h	0.00
P072	Position range specification (forward)	0 to 268435455 (at P012: 02) 0 to 1073741823 (at P012: 03)	-	✓	1652h 1653h	+26843 5455
P073	Position range specification (reverse)	-268435455 to 0 (at P012: 02) -1073741823 to 0 (at P012: 03)	-	✓	1654h 1655h	-26843 5455
P074	Teaching selection	00: X00 (Multi-step position command 0 (P060)) 01: X01 (Multi-step position command 1 (P061)) 02: X02 (Multi-step position command 2 (P062)) 03: X03 (Multi-step position command 3 (P063)) 04: X04 (Multi-step position command 4 (P064)) 05: X05 (Multi-step position command 5 (P065)) 06: X06 (Multi-step position command 6 (P066)) 07: X07 (Multi-step position command 7 (P067))	-	✓	1656h	00
P100	Drive program parameter U(00)	0 to 65535	-	✓	1666h	0
P101	Drive program parameter U(01)	0 to 65535	-	✓	1667h	0

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No	Default
P102	Drive program parameter U(02)	0 to 65535	-	✓	1668h	0
P103	Drive program parameter U(03)	0 to 65535	-	✓	1669h	0
P104	Drive program parameter U(04)	0 to 65535	-	✓	166Ah	0
P105	Drive program parameter U(05)	0 to 65535	-	✓	166Bh	0
P106	Drive program parameter U(06)	0 to 65535	-	✓	166Ch	0
P107	Drive program parameter U(07)	0 to 65535	-	✓	166Dh	0
P108	Drive program parameter U(08)	0 to 65535	-	✓	166Eh	0
P109	Drive program parameter U(09)	0 to 65535	-	✓	166Fh	0
P110	Drive program parameter U(10)	0 to 65535	-	✓	1670h	0
P111	Drive program parameter U(11)	0 to 65535	-	✓	1671h	0
P112	Drive program parameter U(12)	0 to 65535	-	✓	1672h	0
P113	Drive program parameter U(13)	0 to 65535	-	✓	1673h	0
P114	Drive program parameter U(14)	0 to 65535	-	✓	1674h	0
P115	Drive program parameter U(15)	0 to 65535	-	✓	1675h	0
P116	Drive program parameter U(16)	0 to 65535	-	✓	1676h	0
P117	Drive program parameter U(17)	0 to 65535	-	✓	1677h	0
P118	Drive program parameter U(18)	0 to 65535	-	✓	1678h	0
P119	Drive program parameter U(19)	0 to 65535	-	✓	1679h	0
P120	Drive program parameter U(20)	0 to 65535	-	✓	167Ah	0
P121	Drive program parameter U(21)	0 to 65535	-	✓	167Bh	0
P122	Drive program parameter U(22)	0 to 65535	-	✓	167Ch	0
P123	Drive program parameter U(23)	0 to 65535	-	✓	167Dh	0
P124	Drive program parameter U(24)	0 to 65535	-	✓	167Eh	0
P125	Drive program parameter U(25)	0 to 65535	-	✓	167Fh	0
P126	Drive program parameter U(26)	0 to 65535	-	✓	1680h	0
P127	Drive program parameter U(27)	0 to 65535	-	✓	1681h	0
P128	Drive program parameter U(28)	0 to 65535	-	✓	1682h	0
P129	Drive program parameter U(29)	0 to 65535	-	✓	1683h	0
P130	Drive program parameter U(30)	0 to 65535	-	✓	1684h	0
P131	Drive program parameter U(31)	0 to 65535	-	✓	1685h	0
P160	Option I/F cmd W register 1	0000 to FFFF	–	✓	16A2h	0000
P161	Option I/F cmd W register 2	0000 to FFFF	–	✓	16A3h	0000
P162	Option I/F cmd W register 3	0000 to FFFF	–	✓	16A4h	0000
P163	Option I/F cmd W register 4	0000 to FFFF	–	✓	16A5h	0000
P164	Option I/F cmd W register 5	0000 to FFFF	–	✓	16A6h	0000
P165	Option I/F cmd W register 6	0000 to FFFF	–	✓	16A7h	0000
P166	Option I/F cmd W register 7	0000 to FFFF	–	✓	16A8h	0000
P167	Option I/F cmd W register 8	0000 to FFFF	–	✓	16A9h	0000
P168	Option I/F cmd W register 9	0000 to FFFF	–	✓	16AAh	0000
P169	Option I/F cmd W register 10	0000 to FFFF	–	✓	16ABh	0000
P170	Option I/F cmd R register 1	0000 to FFFF	–	✓	16ACh	0000
P171	Option I/F cmd R register 2	0000 to FFFF	–	✓	16ADh	0000
P172	Option I/F cmd R register 3	0000 to FFFF	–	✓	16AEh	0000
P173	Option I/F cmd R register 4	0000 to FFFF	–	✓	16AFh	0000
P174	Option I/F cmd R register 5	0000 to FFFF	–	✓	16B0h	0000
P175	Option I/F cmd R register 6	0000 to FFFF	–	✓	16B1h	0000
P176	Option I/F cmd R register 7	0000 to FFFF	–	✓	16B2h	0000
P177	Option I/F cmd R register 8	0000 to FFFF	–	✓	16B3h	0000
P178	Option I/F cmd R register 9	0000 to FFFF	–	✓	16B4h	0000
P179	Option I/F cmd R register 10	0000 to FFFF	–	✓	16B5h	0000
P180	Profibus node address	0 to 125	–	×	16B6h	0
P181	Profibus clear mode	00: Clear 01: Last value	–	×	16B7h	00
P182	Profibus map selection	00: PPO 01: Conventional 02: Flexible mode	–	×	16B8h	00
P190	CompoNet node address	0 to 63	–	×	16C0h	0
P192	DeviceNet node address	0 to 63	–	×	16C2h	63
P195	ML2 frame length	00: 32 bytes 01: 17 bytes	–	×	16C5h	00
P196	ML2 node address	21 to 3E	–	×	16C6h	21

4.7 Parameter group F

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
F001	Output frequency setting/monitor	0.0/Starting frequency to 1st/2nd/3rd max. frequency 0.00 to 400.00	Hz	✓	0001h 0002h	0.00
F002	Acceleration time 1	0.01 to 3600.00	s	✓	1103h 1104h	10.00
F202	2nd acceleration time 1	0.01 to 3600.00	s	✓	2103h 2104h	10.00
F302	3rd acceleration time 1	0.01 to 3600.00	s	✓	3103h 3104h	10.00
F003	Deceleration time 1	0.01 to 3600.00	s	✓	1105h 1106h	10.00
F203	2nd deceleration time 1	0.01 to 3600.00	s	✓	2105h 2106h	10.00
F303	3rd deceleration time 1	0.01 to 3600.00	s	✓	3105h 3106h	10.00
F004	Operator rotation direction selection	00: FWD (Forward) 01: REV (Reverse)	–	×	1107h	00

4.8 Parameter group U: User parameters

Any function code can be register on these 32 parameters. When display mode is set be “user parameter” only U001 to U032 plus d001, F001, b037 are displayed.

Function code	Function name	Monitoring and setting items	Units	Run mode edit	Modbus Register No.	Default
U001	User 1 selection	no/d001 to P196	-	✓	-	no
U002	User 2 selection	no/d001 to P196	-	✓	-	no
U003	User 3 selection	no/d001 to P196	-	✓	-	no
U004	User 4 selection	no/d001 to P196	-	✓	-	no
U005	User 5 selection	no/d001 to P196	-	✓	-	no
U006	User 6 selection	no/d001 to P196	-	✓	-	no
U007	User 7 selection	no/d001 to P196	-	✓	-	no
U008	User 8 selection	no/d001 to P196	-	✓	-	no
U009	User 9 selection	no/d001 to P196	-	✓	-	no
U010	User 10 selection	no/d001 to P196	-	✓	-	no
U011	User 11 selection	no/d001 to P196	-	✓	-	no
U012	User 12 selection	no/d001 to P196	-	✓	-	no

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Cat. No. I130E-EN-02

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