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Preface

Thank you for choosing the CT-2000EV inverter, this inverter is suitable for operating induction motors. Please read this instruction manual carefully before actual usage in order to ensure proper operation and suit your needs. If this manual is not efficient in solving your problems, please contact our local agent or sales representative for further assistance.

Note before using

After shout down the power, do not touch circuit boards and electric components.

Do not check signals and components while the inverter is running. Wiring when power turn on is inhibition.

Do not fit capacitors to output side of inverter in order to improve the power ratio.

Control a motor within the capacity of the inverter unit.

In case of fitting MC between inverter and motor to control motor operation, then the capacity of inverter must be 6 times the capacity of motor.

Inspection upon receiving

Each of inverter is tested before ex-factory. Please check it as following procedures:

1. Check the model, the capacity and power voltage specifications are as ordered.

2. Check that no damage has occurred during transportation.

3. Check that none of the internal parts have been damaged or have fallen off.

4. Check that none of the connectors have been damaged or have fallen off.

5. Check that there is no loosening of the terminals or screws of each of the parts.

The above questions occur, please inform your local agent or our sales representative.

Storage and installation

Storage: If the inverter isn't installed immediately, it should be stored in a clean and dry location at ambient temperatures from 20   to 55   . The surrounding air must be free of corrosive contaminants.

Installation place: Places where the peripheral temperature is from -10   to 40   , and where the relative humidity is 90% or less. Avoid installing at places where there is dust, iron particles, corrosive gas, water spray, direct sunlight or too much vibration. And places where has good ventilation.

10 cm min

10cm min

10cm min

CT-2000EV

10 cm min
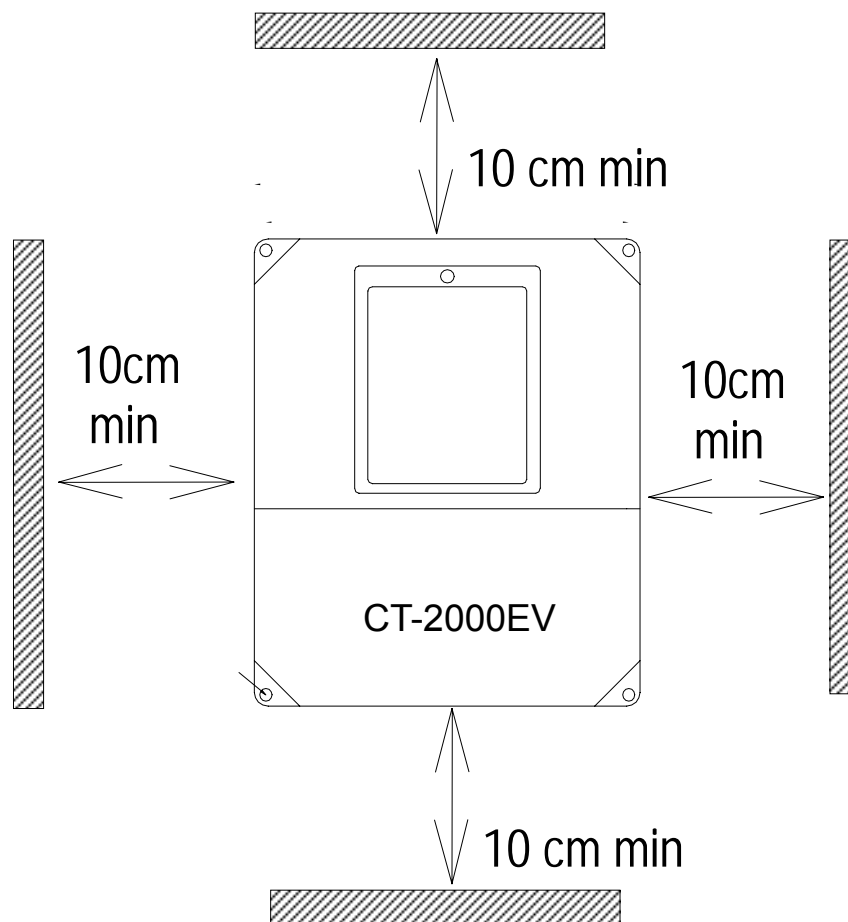
Exterior dimension: (**Unit: mm**)
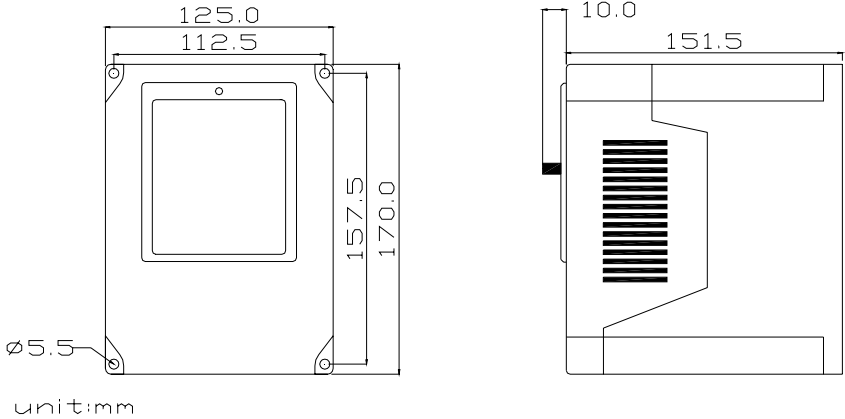
CT2002EV-A75 CT2002EV-1A5 CT2004EV-A75 CT2004EV-1A5
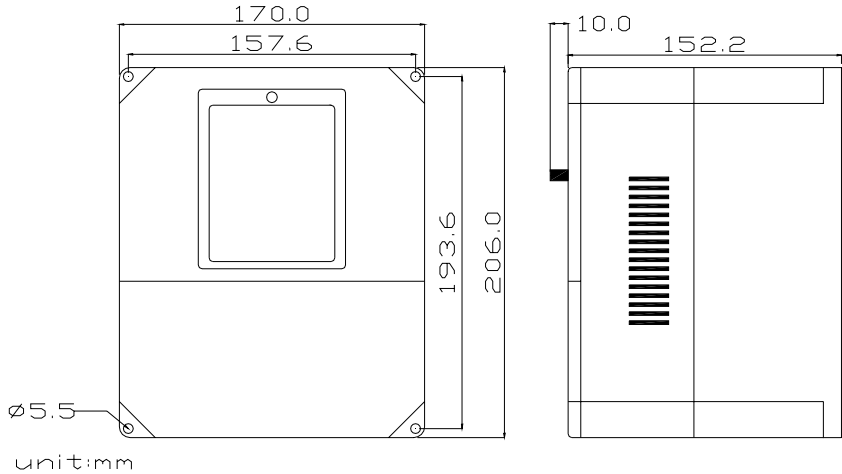
CT2002EV-2A2 CT2002EV-3A7 CT2004EV-2A2 CT2004EV-3A7

Chapter 1 Installation
1.1 Wiring Diagram

Wiring the master circuit and control circuit:

Wire according to the standard connection diagram. On using the external sequence control, please use small signal relay or double terminal relay to avoid relay terminal malfunction.

Signal wire

The signal circuit uses either shielded pairs or twisted pairs, should be wired either using a wiring duct separated from that for the power circuit, or with the wiring conduit isolated as much as possible.

Wiring between the master circuit and motor

Connect the master circuit, by wiring according to the master circuit terminal connection diagram. Care is required not to make a mistake when connecting the input and output terminals, wiring error will cause inverter damage. Specifications of master circuit path and NFB are as following:

Voltage (V)	Type	NFB (A)	Standard wiring (mm^2)
220V	CT2002EV-A75	10	2.0
	CT2002EV-1A5	15	2.0
	CT2002EV-2A2	20	2.0
	CT2002EV-3A7	30	3.5
	*CT2002EV-5A5	40	5.5
	*CT2002EV-7A5	40	5.5
380-460	CT2004EV-1A5	10	2.0
	CT2004EV-2A2	10	2.0
	CT2004EV-3A7	15	3.5
	*CT2004EV-5A5	15	3.5
	*CT2004EV-7A5	20	5.5

" * "   Under development

1.2 Reactor (ACL)

The master purpose for fitting A.C.L. at the R.S.T. input side is to curb instantaneous current and to improve ratio, it should be fitted the A.CL to R.S.T. input side under the following circumstance:

A. Where power system capacity is over **500KVA**.

B. Using the thyrister, phase advance capacity etc. For the same power supply.

Inductance of Power side from R.S.T of Inverter   A.C.L   :

Voltage (V)	Type	Current Value (A rms)	Inductance
220	CT2002EV-A75	6	1.8 mH
	CT2002EV-1A5	10	1.1 mH
	CT2002EV-2A2	15	0.71 mH
	CT2002EV-3A7	20	0.53 mH
	*CT2002EV-5A5	30	0.35mH
	*CT2002EV-7A5	40	0.26mH
380-460	CT2004EV-1A5	5	4.2 mH
	CT2004EV-2A2	7.5	3.6 mH
	CT2004EV-3A7	10	2.2 mH
	*CT2004EV-5A5	15	1.41mH
	*CT2004EV-7A5	20	1.0mH

" * "   Under development

1.3 Brake resistor standard of usage

CT2000EV series inverter contain brake resistor, P　PR terminals can be connected external brake resistor. The sizes of brake resistors refer to the table.

If inertia is too large or cycle of discharge is higher, user can increase wattage of resistor.

Voltage (V)	Type	Brake resistor standard		Remark
220	CT2002EV-A75	120 Ω	80 W	
	CT2002EV-1A5	80 Ω	160 W	
	CT2002EV-2A2	60 Ω	250 W	
	CT2002EV-3A7	36 Ω	400 W	
	*CT2002EV-5A5	24Ω	500W	
	*CT2002EV-7A5	18Ω	750W	
380-460	CT2004EV-1A5	360 Ω	300 W	
	CT2004EV-2A2	250 Ω	500 W	
	CT2004EV-3A7	150 Ω	800 W	
	*CT2004EV-5A5	100Ω	500W	
	*CT2004EV-7A5	75Ω	800W	

" * "　　Under development

1.4 Standard external connection diagram

Standard External Connection Diagram
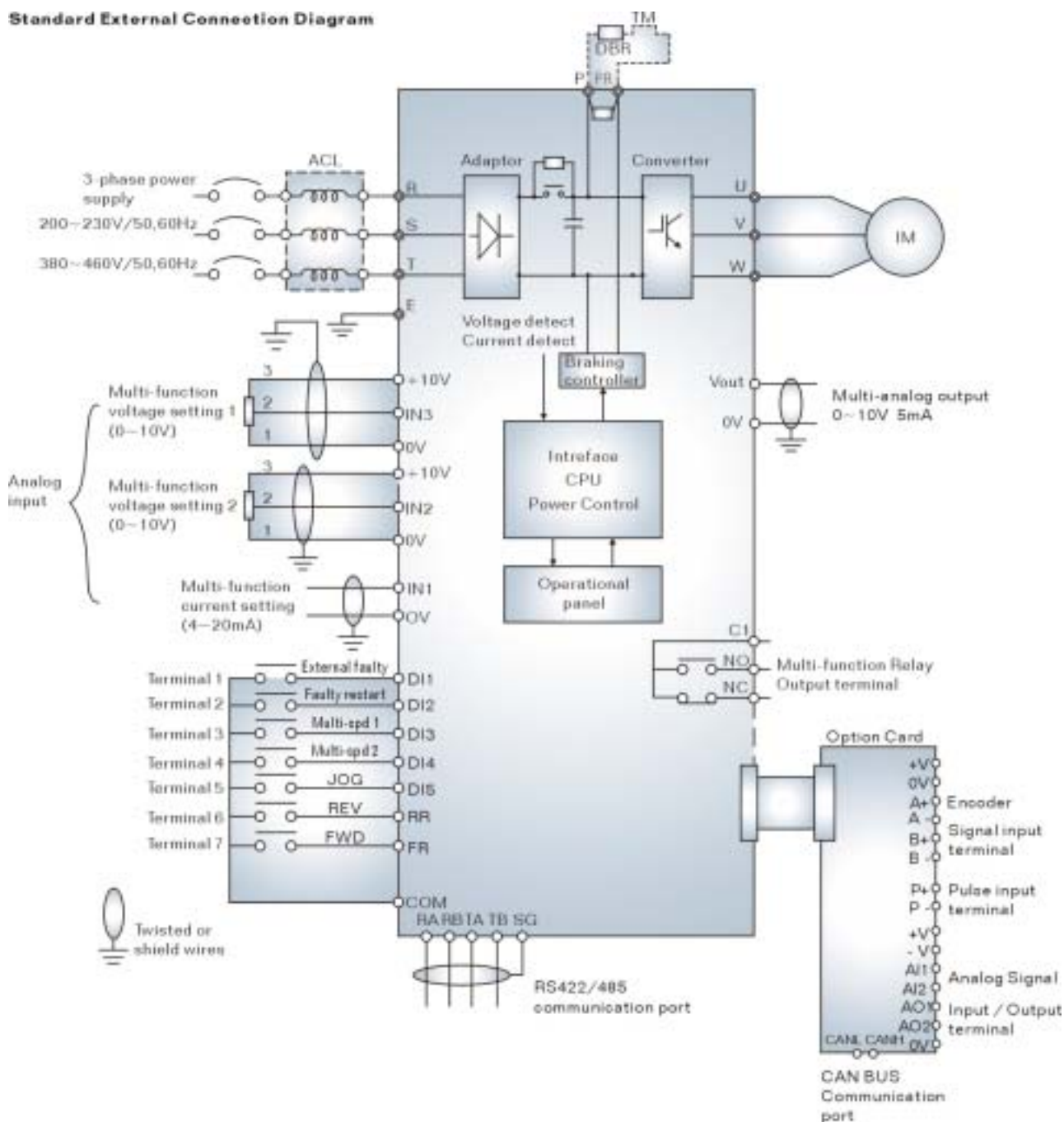
Terminals arrangement
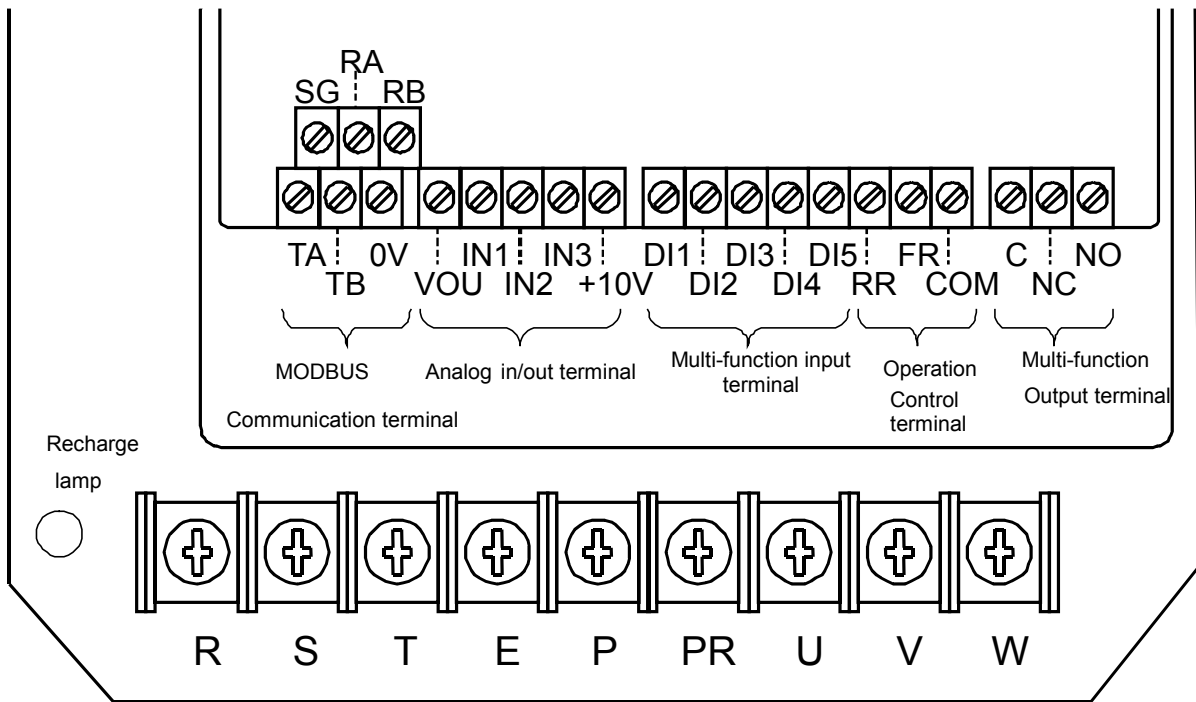
Terminal arrangement (220V inverter 3.7kW shown as above)
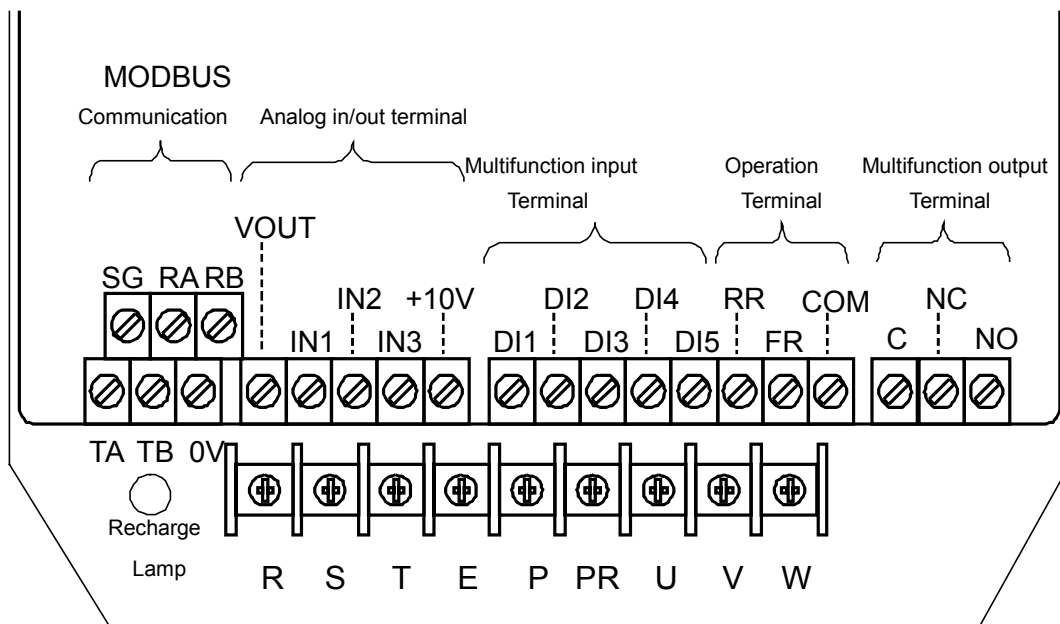
Terminal arrangement (220V inverter 1.5kW shown as above)

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1.5 Terminal Specification Description

Classification	Terminal symbol	Terminal name	Specification
Master Circuit	R.S.T	AC power input terminal.	3-phase AC power input: 200~230V 50/60Hz 380~460V 50/60Hz
	U.V.W	Inverter output terminal.	3-phase induction motor.
	E	Ground Terminal.	Ground Terminal of inverter.
	P PR	Breaking resistor connecting terminal.	Connected with brake resistor.
Analog input/ output terminal	+10V	+10V power output.	Provide +10VDC 30mA power.
	0V	Common of analog input/ output.	Common of analog input/ output terminal.
	IN1	Multi-function analog input 1.	4~20mA input.
	IN2	Multi-function analog input 2.	0~10V input.
	IN3	Master speed analog input 3.	0~10V input.
	VOUT	Multi-function analog output terminal.	0~10V 5mA output.
Multi-function analog input terminal	DI1	Multi-function analog input terminal1.	DC +24V 8mA Photocoupler isolation.
	DI2	Multi-function analog input terminal 1.	
	DI3	Multi-function analog input terminal 1.	
	DI4	Multi-function analog input terminal 1.	
	DI5	Multi-function analog input terminal 1.	
	COM	Multi-function input terminal common.	Connect with operation control terminal COM common.
Operation control terminal	RR	Reverse / stop terminal.	ON: reverse ; OFF: stop
	FR	Forward / stop terminal.	ON: forward ; OFF: stop
	COM	Operation control terminal.	Multi-function input and Operation control terminal common.
Multi-function analog output contact	NO	Multi-function output contact A.	240VAC 5A 28VDC 10A
	NC	Multi-function output contact B.	
	C	Multi-function output contact common.	Multi-function output terminal contact common.
MODBUS Communication terminal	TA	RS422 T+.	RS422 T+ or RS485 + terminal.
	TB	RS422 T -.	RS422 T - or RS485 – terminal.
	RA	RS422 R+.	RS422 R+.
	RB	RS422 R -.	RS422 R -.
	SG	Shield grounding terminal.	Provide shield grounding.

1.6 Option card standard wiring diagram

Option card

Up to option card could be mounted in the CT2000EV, the master functions of option card provides PG input terminal　2 sets of 12 bits analog input　2 sets of 12 bits analog output　1 set of P.W.M input terminal, and CAN BUS communication interface.

Option card standard wiring diagram

INVERTER
CT2000EV

3　AC 200V
(400V)

PG

Option Card

PG Signal input
5V/12V

P.W.M signal input
5~10V 15mA
0.2~33KHz

Multi-function
Input/ output terminal

0~10V　IN/OUT
±10V　IN/OUT

ENCODER

OPTION

+V
0V
A+
A-
B+
B-
P+
P-
+V
-V
AI1
AI2
AO1
AO2
0V

IM

Shielded pairs or twisted pairs
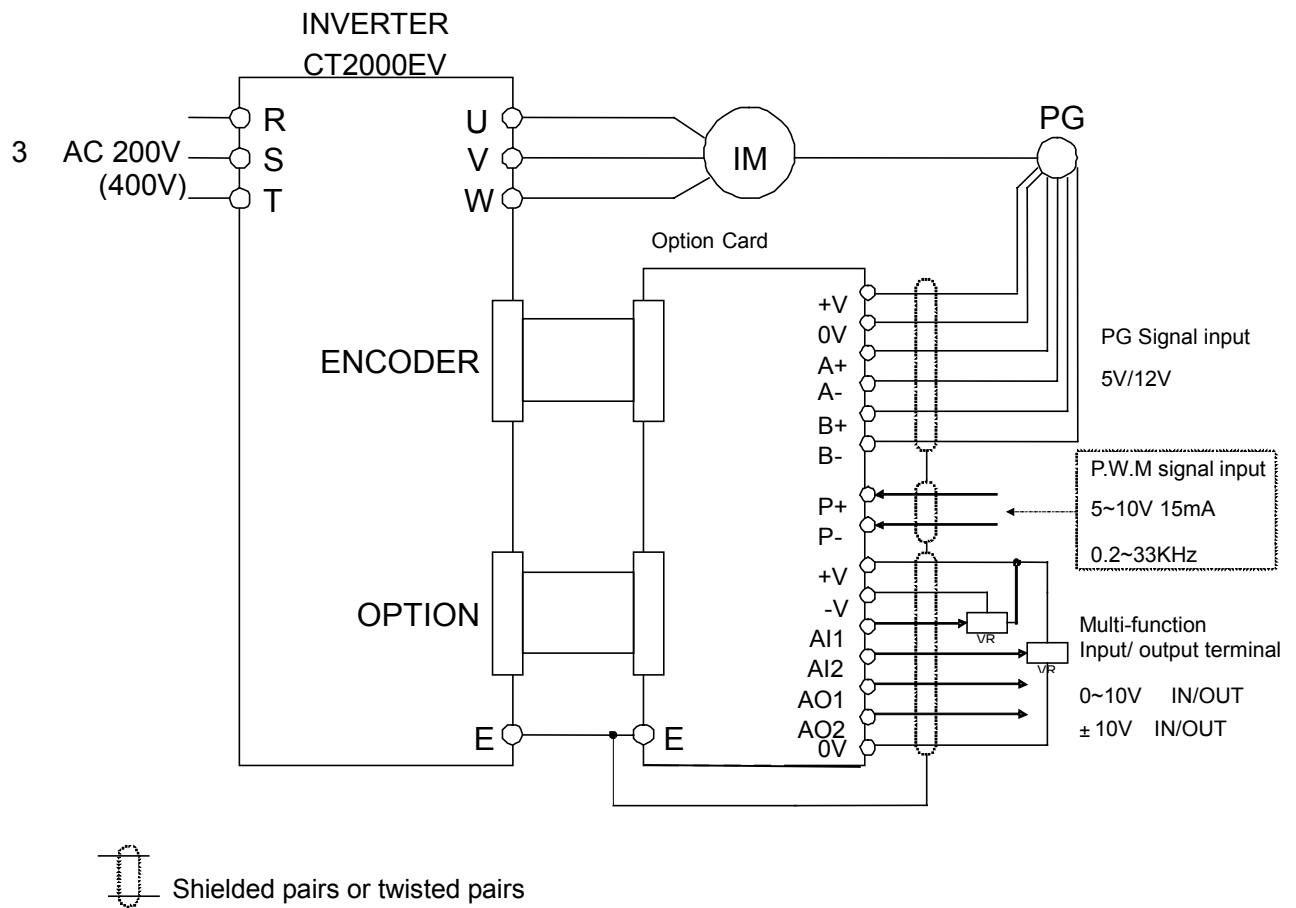
Option card terminal arrangement
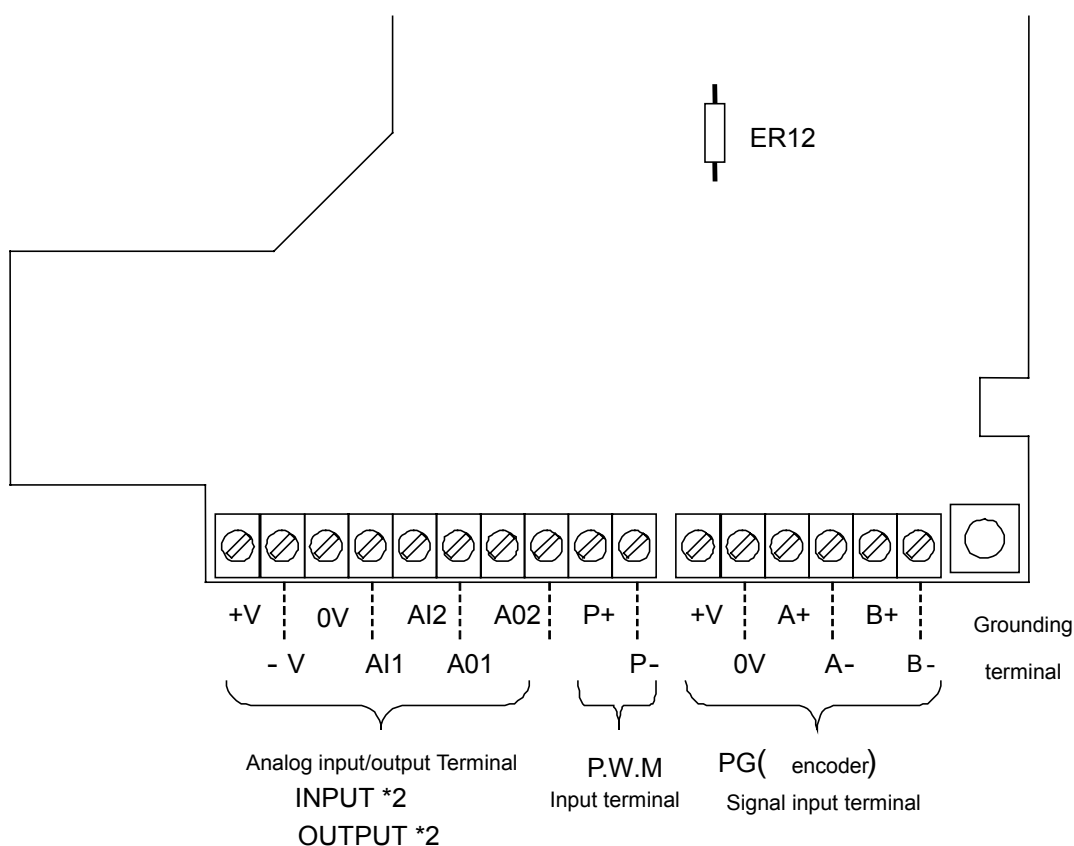
1.7 Option card terminal Function specification

Classification	Symbol of terminal	Name of terminal	Specification
Analog input/ output terminal	+V	+10V power output.	offer +10VDC 10mA power.
	-V	-10V power output.	offer -10VDC 10mA power.
	0V	Analog input/ output terminal common.	Analog in/ output terminal common, please do not mix up with others.
	AI1	Multi-function analog input 1.	By constant setting 0~10V or ±10V input.
	AI2	Multi-function analog input 2.	
	AO1	Multi-function analog output 1.	By constant setting 0~10V or ±10V 10mA output.
	AO2	Multi-function analog output 2.	

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Option card terminal Function specification (continued)

Classification	Symbol of terminal	Name of terminal	Specification
PG Signal input terminal	+V	PG power output.	12 VDC 200mA output *.
	0V	PG Signal common.	PG Signal common, please don't mix up with others.
	A+	A phase positive.	Line driver PG Signal input.
	A-	A phase negative.	
	B+	B phase positive.	
	B-	B phase negative.	
P.W.M input terminal	P+	P.W.M input positive.	Input 0.2~32kHz 5~10VDC 8mA~ 15mA P.W.M signal.
	P-	P.W.M input negative.	

* Output is 5 VDC 200mA when the resistor of ER12 was removed from option card.

Chapter 2 Operation and autotuning

Keypad

Unit indicator
V : Voltage
A : Ampere
Hz: Frequency

Operation mode display
FWD   Lit when forward, forward decel is flash
REV   Lit when reverse, reverse decel is flash

Status indicator
DISP: Monitor mode
ALARM: Error occurred

Operation control key
FWD: Forward
REV :   Reverse
STOP: Stop

Special control mode indicator
PLC   Function auto operation
Procedure control

A.TUNE: Motor auto detect
Keypad analog main speed Setting

Function key
Execute operations

Keypad display specification

Key	Name	Function
FWD	Forward key	Forward operation
REV	Reverse key	Reverse operation
STOP	Stop key	Stop operation faulty reset
PROG/SET	Function key	Monitor/ input mode swich constant setting
READ	Read key	Read/ exit content of constant
▶	Right shift key	Nonius right and shift
	Increment key	Increment
	Decrement key	Decrement

2.1 Operation of monitor
All mode operation

The operation modes of CT2000EV equipped monitoring and input modes, this section described mode and switching between modes.

Monitoring operation

A. Modify Monitoring
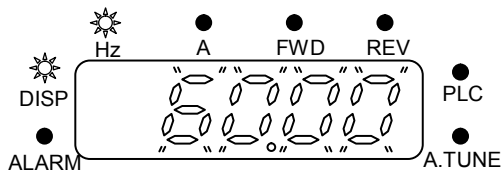
DISP indicator lit means monitoring item.
When stop operation, display operation command.
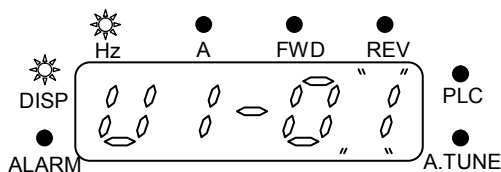
Press READ key

Monitoring item is U1-01.
Select monitoring items by pressing   and   key.

Press   key
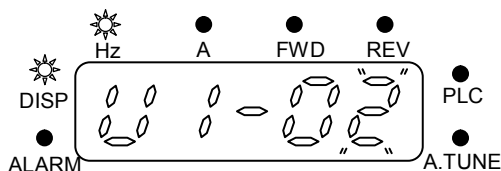
Set modifying monitoring as U1-02.
Select monitoring items by pressing   and   key.

Press READ key
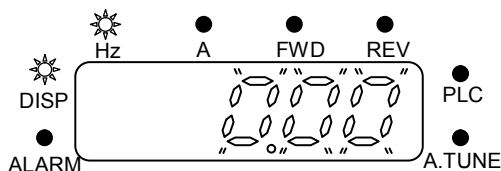
Enter U1-02 monitoring (output frequency).

B. Detect fault status

Hz · A · FWD · REV DISP [0 0 0 0 0 0 0] PLC ALARM A.TUNE	DISP indicator lit means monitoring item. When stop operation, display operation command.

Press READ key
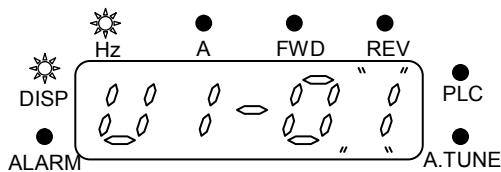
Hz · A · FWD · REV DISP [0 0 0 - 0 0 0] PLC ALARM A.TUNE	Monitoring is in the process of U1-01 Press ▶ key to shift the nonius.

Press ▶ key
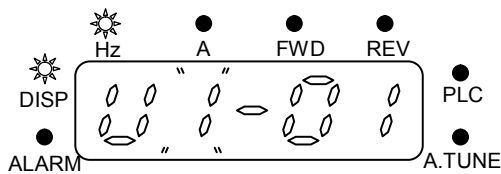
Hz · A · FWD · REV DISP [0 0 0 - 0 0 0] PLC ALARM A.TUNE	The nonius shift to secondary. Press key to select monitoring U1 is ordinary monitoring and U2 is fault status.

Press   key
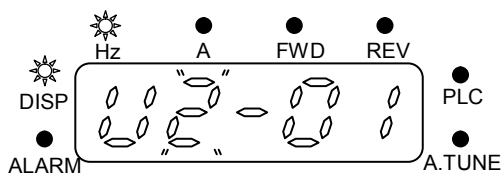
Hz · A · FWD · REV DISP [0 0 0 - 0 0 0] PLC ALARM A.TUNE	U2-01 is in the process of monitoring Press and key to select monitoring.

Press READ key
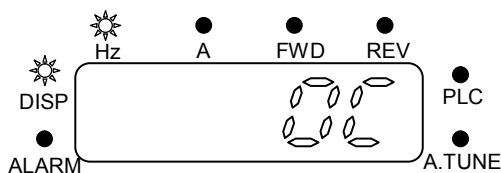
Hz · A · FWD · REV DISP [0 0 0] PLC ALARM A.TUNE	Enter U2-01, fault status shows OC (over current).

C. Press operation key under any situation
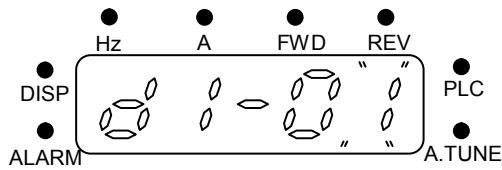
Input mode when DISP indicator is off.

Press FWD key
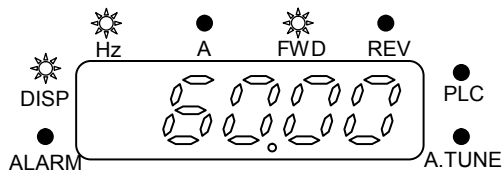
Press FWD/REV key; enter monitoring directly, and monitoring item set by o1-01.
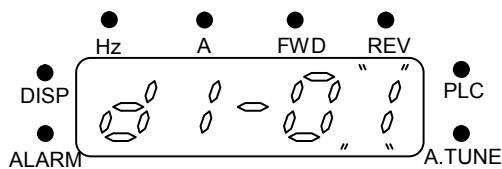
Input mode when DISP indicator is off.
Operation stop when FWD/ REV indicator is off.

Press STOP key
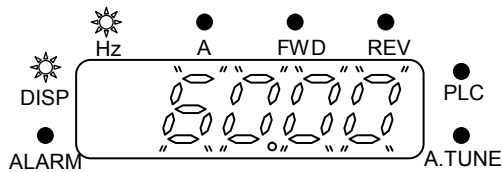
Press STOP key when stop operation, and enter monitoring directly.

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2.2 Operation of Input mode (macrocosm mode)
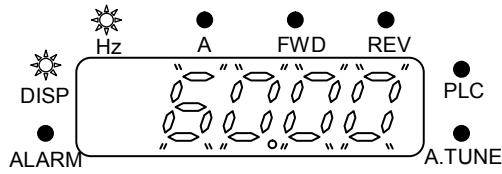
DISP indicator lit means Monitoring item.
When stop operation, display operation command.

Press PROG/SET key
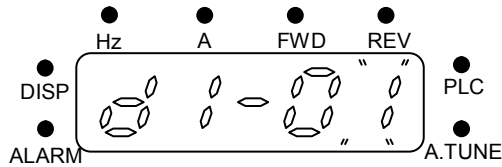
Input mode when DISP indicator is off.
Select constant by Press   key
Press ▶ key to shift the nonius.
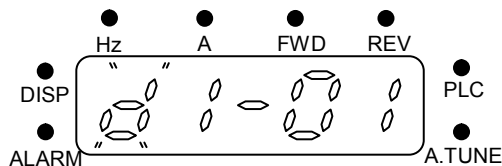
Press ▶ key

Input mode when DISP indicator is off.
Select constant by Press   key
Press ▶ key to shift the nonius.
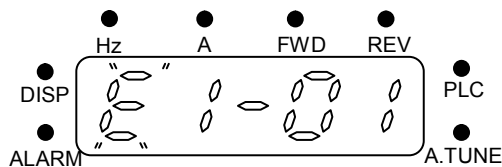
Press   key

Input mode when DISP indicator is off.
Select constant by Press   key
Press ▶ key to shift the nonius

Press READ key
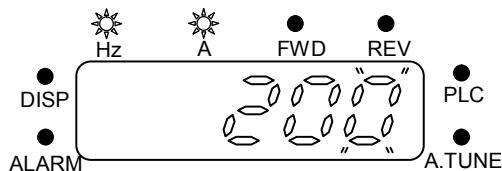
Enter E1-01 (input voltage).
Press ▶ and   key to modify the motion.

Press   key
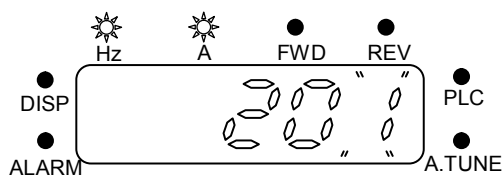
Enter E1-01 (input voltage).
Press ▶ and   key to modify the motion.

Operation and autotuning

Operation of Input mode (macrocosm mode) (continued)
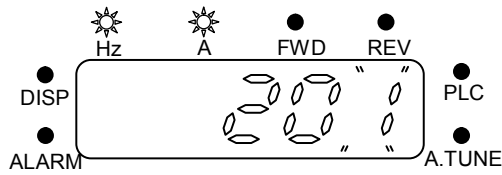
Constant E1-01 (input voltage).
(Press READ key could be back to constant selection directly, modify constant is invalid.)

Press PROG/SET key
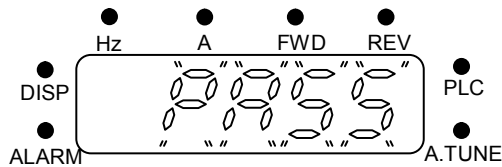
Set Constant, indicate, "PASS".
(Indicate "Err" if wrong setting)

Blinking 4 times
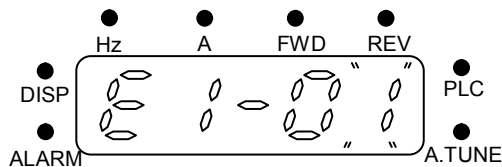
Back to constant select after the end of setting.

Press PROG/SET key
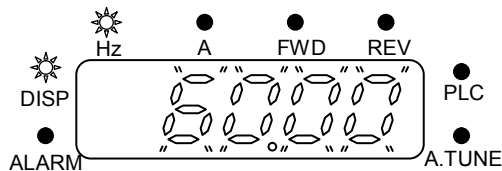
Back to monitoring.

Operation of Input mode (simple mode)

Press PROG/SET key

DISP indicator lit means Monitoring item.
When stop operation, display operation command.

Enter input, DISP indicator is off
No flash on display (No nonius).

Press　　key
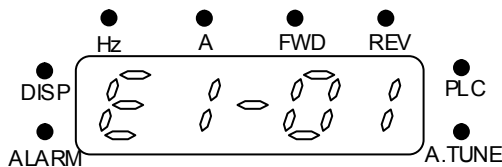
Press ▶and　　key to select constant.

Press READ key
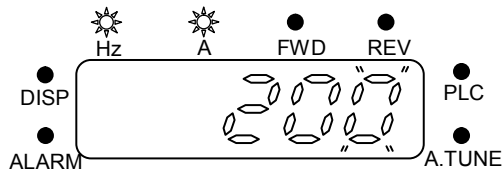
Enter E1-01 (input voltage)
(Press READ key to be back constant selection directly, modify constant invalid).

Press　　key
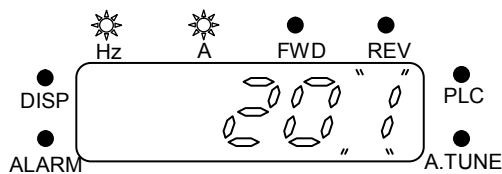
Enter E1-01 (input voltage)
(Press READ key can back constant select directly, modify constant invalid).

Press PROG/SET key
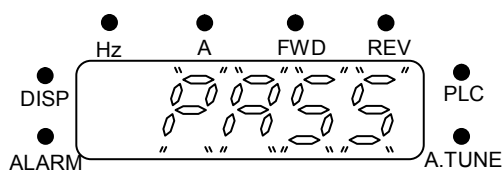
Set constant, indicate, "PASS"
(Indicate, "Err" If set wrong).

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Operation of Input mode （simple mode, continued）
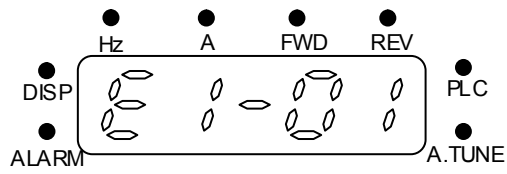
Back to constant selection after setting.

Press PROG/SET key
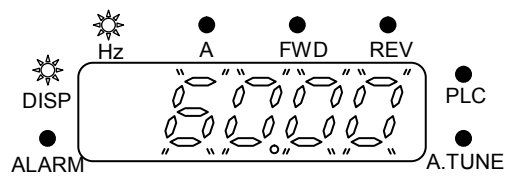
Back to monitoring.

2.3 Autotuning

Constant table of autotuning

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
T1-01	Select adjustment mode	0~ 2	0					
T1-02	V/f compensation setting	0~100	100%					
T1-03	Motor rated voltage	0.0~ 500.0	220.0 V					
T1-04	Motor rated current	10.0~ 200.0	100.0 %					
T1-05	Motor rated frequency	0.0~ 400.0	60.0 Hz					
T1-06	Pole of motor	2~8	4 pole					
T1-07	Motor rated speed	0~7200	1750 rpm					
T1-09	Motor unload current	10~ 100	45					

Description: Please enter T1-03~ T1-07 constants to implement motor autotuning according to motor specification.

The low speed compensation of V/f curve were set by T1-02 to apply to Rotational autotuning (T1-01), V/f curve will be modified after autotuning. Constant setting is the percentage of low speed star torque.

Select adjustment mode:

1   Rotational mode autotuning (T1-01=0)

Enter motor specification of nameplate after set T1-01=0. When the page of T1 constants was operated, the light of A.TUNE will be on. Pressing FWD this moment will process the function of autotuning, TunE is shown on screen. Motor data is needed by autotuning when motor run. Pass will be shown after succeeded.

2   Stationary mode autotuning (T1-01=1)

Input specification of nameplate after set T1-01=1. When the page of T1 constants was operated, the light of A.TUNE will light up. Pressing FWD this moment will process the function of autotuning, TunE is shown on screen. Motor data is needed by autotuning when motor run. Pass will be shown after succeeded. (Collocate with T1-09 motor unload current setting)

3   Stationary autotuning for line-to-line resistance only (T1-01=2)

Autotuning could be used to prevent control errors when the motor cable is long or

the cable length has changed or when the motor and inverter have different capacities. When keypad is operated through the page of T1 constant, the indicator A.TUNE will be lit, then press FWD to process autotuning deception motor line-to-line impedance(E2-05).

Notice:

1. The motor has to be disconnected from machine and a danger never occurs when Rotational mode autotuning is implemented.
2. A machine does not allow motor spontaneously Rotational, please implement Stationary mode autotuning. (T1-01=1)
3. Power will be supplied to the motor when Stationary mode autotuning and stationary for line-to-line resistance are performed even though the motor will not turn. Do not touch the motor until autotuning has been completed.

The constants will be automatically set after autotuning (continued):

Constant	Description
E1-08	Middle output voltage
E1-10	Minimum output voltage
E2-01	Motor rated current
E2-02	Slip of motor
E2-03	Motor unload current
E2-04	Poles of motor
E2-05	Motor resistance
E2-06	Motor leakage inductance

Notice:

1. For your own safety, motor operating in high speed when autotuning is implemented
2. Torque compensation C4 is applied when motor impedance is needed to test, E2-05 is needed to input motor impedance if autotuning is not implemented.
3. V/f curve will be spontaneously altered when torque compensation is started (C4-01 0 and E2-05 0).
4. Please set C3-01, if slip compensation is needed to start.

The functions of torque compensation and slip compensation, please refer to P. 54 55

Chapter 3 Settings by environment

3.1 Degrees of constant display

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
A1-01	Constant access level	0~2	2					

Description: A1-01 is set by constant access level, setting levels:

> 0: Read only mode
> 1: Simple mode
> 2: Macrocosm mode

Read only mode

Constants only could be read, and not modified after set A1-01=0. The rest of constants were locked, beside A1-01　d1-01~ 4 frequency command, d1-01~ 4 and d1-17 jog frequency could be modified. Select sequence of constants like simple mode at read mode.

Macrocosm mode

All constants could be read and modified after set A1-01=2.

Simple mode

The constant setting were modified to be simple mode after set A1-01=1. Simple mode provides 24 common use constants for operators to use and modify, the sequence as below:

sequence	Constant	Description	Remark
1	A1-01	Constant display levels	P.25
2	A1-02	Select control mode	P.27
3	b1-01	Select frequency command	P.30
4	b1-02	Select operation command	P.28
5	b1-03	Select stop pattern	P.31
6	C1-01	Acceleration time 1	P.35
7	C1-02	Deceleration time 1	P.35
8	C6-02	Select P.W.M. frequency	P.25
9	d1-01	Frequency command 1	P.64

Settings by environment

Simple mode (continued)

sequence	Constant	Description	Remark
10	d1-02	Frequency command 2	P.64
11	d1-03	Frequency command 3	P.64
12	d1-04	Frequency command 4	P.46
13	d1-17	Jog frequency	P.46
14	E1-01	Input voltage	P.46
15	E1-03	V/f curve select	P.46
16	E1-04	Highest output frequency	P.46
17	E1-05	Maximum voltage	P.46
18	E1-06	Base frequency	P.46
19	E1-09	Lowest output frequency	P.75
20	E1-10	Lowest output voltage	P.44
21	E1-13	Bias voltage	P.46
22	E2-01	Motor rated current	P.47
23	F1-01	PG pulse	P.81
24	H4-01	Analog output	P.19

3.2 Control mode selection

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
A1-02	Control mode selection	0~3	0					

Description: A1-02 is selected control mode, control mode can be selected:

        0: V/f opened loop control
        1: With V/f closed loop control of PG
        2: Opened loop vector control
        3: Closed loop with PG vector control

3.3 Recovering factory value

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
A1-03	Recovering factory value	0~5	0					

Description: A1-03 is the function of recovering Default value, partly or all of constants could be recovered default value.

Setting value	Content
0	Disable.
1	Recover auto procedure operation constant: b6-01~b6-18, C1~01~C1-16, d1-01~d1-16.
2	Recovering factory value. Uncontained auto procedure operation constant b6-01~b6-18, C1-01~C1-16, d1-01~d1-16.
3	Recovering factory value. Uncontained auto procedure operation constant b6-01~b6-18, C1-01~C1-16, d1-01~d1-16 and motor constant E1-01~E1-13, E2-01~E2-06.
4	All default values recover.
5	Eliminate error record.

3.4 Display setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
o1-01	Display setting when operation	1~31	2					

Description: o1-01 of monitoring could be set to operate and stop, monitoring will display automatically that was set by o1-01, please refer to user constants of U1 monitoring item to set monitoring.

Display unit setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
o1-03	Display unit setting	0.00~ 150.00	0.00					

Description: o1-03 can be set the unit of frequency display. Frequency display is as following: U1-01 frequency command U1-02 output frequency U1-05 motor speed U1-11 operation frequency. Units could be set: Hz % r.p.m. or set at will.

Setting methods please refer to following table

Setting value	Content
0.00	Frequency display
0.01	Display frequency %
0.02	Display r.p.m
0.03~150.00	Magnification adjustment Display value frequency multiply magnification

3.5 P.W.M. setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C6-02	Select P.W.M. frequency	0~15	2					

Description: C6-02 could be set P.W.M. frequency, the setting value as following:

Setting value	P.W.M. frequency	Setting value	P.W.M. frequency
0	2K Hz	5	12.5K Hz
1	4K Hz	6	15kHz
2	5K Hz	7-14	5KHz
3	8K Hz	15	By C6-03~04
4	10K Hz		

Select P.W.M. frequency at will

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C6-03	P.W.M. frequency upper limit level	2.0~ 15.0	12 KHz					
C6-04	P.W.M. frequency lower limit level	2.0~ 15.0	4 KHz					

Description: When setting value of C6-02 is15, P.W.M. frequency is variable, set C6-03 to maximum, and set C6-04 to be minimum. When C6-03 is smaller than C6-04, C6-03 will be the fixed P.W.M. frequency.
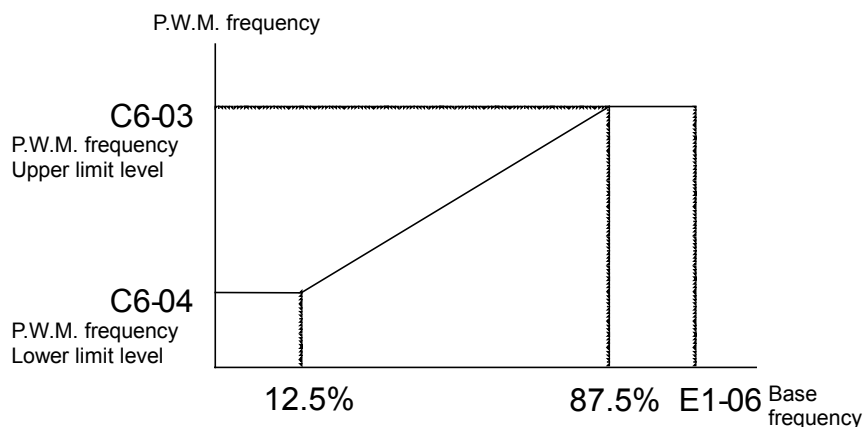
Chapter 4 Settings by function
4.1 Frequency command

Select frequency command input pattern

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b1-01	Select frequency command	0~5	5					

Description: b1-01 is select frequency command input pattern, select frequency reference source:

> 0: Keypad input
> 1: Analog input
> 2: P.W.M. input
> 3: VR knob of Keypad (variable resistor)
> 4: PLC auto procedure control
> 5: VR knob of Keypad (lag)

Use Keypad to input frequency command

Frequency command could be input by keypad, after set b1-01=0. Use d1-01to input frequency command when ordinary operate. d1-01~d1-16 is 1st speed to 16th speed frequency when use multi-speed function.

Use voltage (current) input frequency command (Analog input IN1~IN3 option card AI1~2)

Analog input could be frequency command, after set b1-01=1.

P.W.M. input

Use P.W.M. input terminal to input P.W.M. as frequency command, after set b1-01=2 and to collocate with option card.

Use VR knob of Keypad (variable resistor) input frequency command

Use VR knob of Keypad (variable resistor) input frequency command, after set b1-01=3, the input range is 0~ maximum frequency.

Set PLC auto procedure control, input frequency command by auto procedure control

Implement auto procedure control by set b1-01=4. Set 16 procedure references at most, Set all frequency command by d1-01~ d1-16.

Input frequency command by using the VR knob (resistor) of Keypad

Input frequency command by Keypad, after set b1-01=5, the function of lag built-in, it will be easy to adjust when input frequency. The input range is 0~ maximum frequency.

4.2 Multi-step speed operation

With CT2000EV inverters, you can change the speed to maximum 17 steps, using 16 frequency references and one jog frequency reference.
The following example of 5 steps speed operation constant setting and description.

Constant setting

To switch frequency references, set multi-step references 1 to 2 and jog frequency to input terminal function DI1~3.

Terminal	Constant	Setting	Details
DI1	H1-01	1	Multi-steps speed command 1
DI2	H1-02	2	Multi-steps speed command 2
DI3	H1-03	5	Jog frequency

According to multi-steps speed input combinations to set multi –step speed reference. The following table shows the possible combinations:

Step	DI1	DI2	DI3	Select frequency
1	0	0	0	Determine frequency command by b1-01
2	1	0	0	d1-02 frequency command 2/ analog auxiliary frequency 1
3	0	1	0	d1-03 frequency command 3/ analog auxiliary frequency 2
4	1	1	0	d1-04 frequency command 4
17	0	0	1	d1-17 jog frequency

*0=OFF   1=ON

When set analog input to step 1, step 2 and step 3 observe the following setting pattern:

A. When setting analog input to step 1, set b1-01=1   set analog input to 1   analog master speed   .

B. When setting analog input to step 2, set analog input to 4 (auxiliary frequency 2).

C. When setting analog input to step 3, set analog input to 5 (auxiliary frequency 3).

4.3 Operation command

Select operation command input pattern

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b1-02	Select operation command	0~2	1					

Description: b1-02 is select operation command input pattern, select frequency reference source:

> 0: Keypad control
> 1: External terminal control
> 2: MODBUS communication

Implement operation command from keypad.

Use the operation key FWD REV STOP of keypad to implement operation command of inverter after set b1-02=0.

Use operation control terminal to implement operation command.

Use operation control terminal to implement operation command, after set b1-02= 1.

When implements peroration by two wires: factory setting 2 wires operation.
When FR terminal is ON, to implement forward operation, operation stops when OFF.
When RR terminal is ON, implement reverse operation, operation stop when OFF.
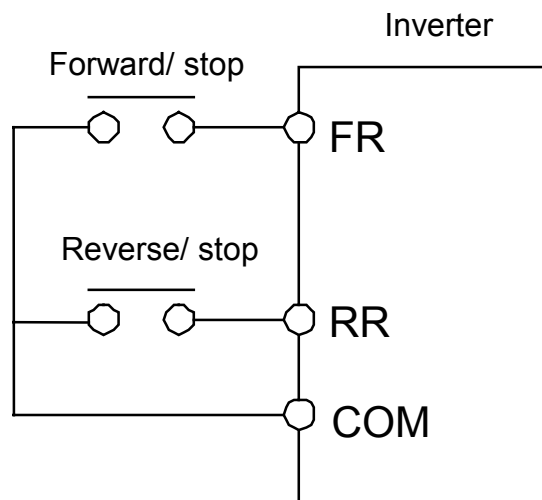
Fig. For example: 2 wires wiring graph

Performing operations using 3-wire sequence (continued):

When multi-function terminals (DI1~ 5) is set to 0, and operation terminal becomes 3-wire sequence operation (RUN   STOP   FR/ RR).
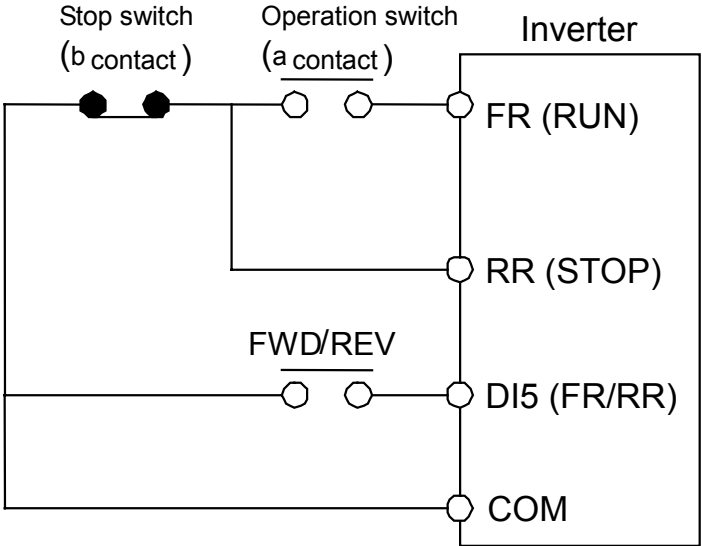
Fig. 3-wire sequence wiring example
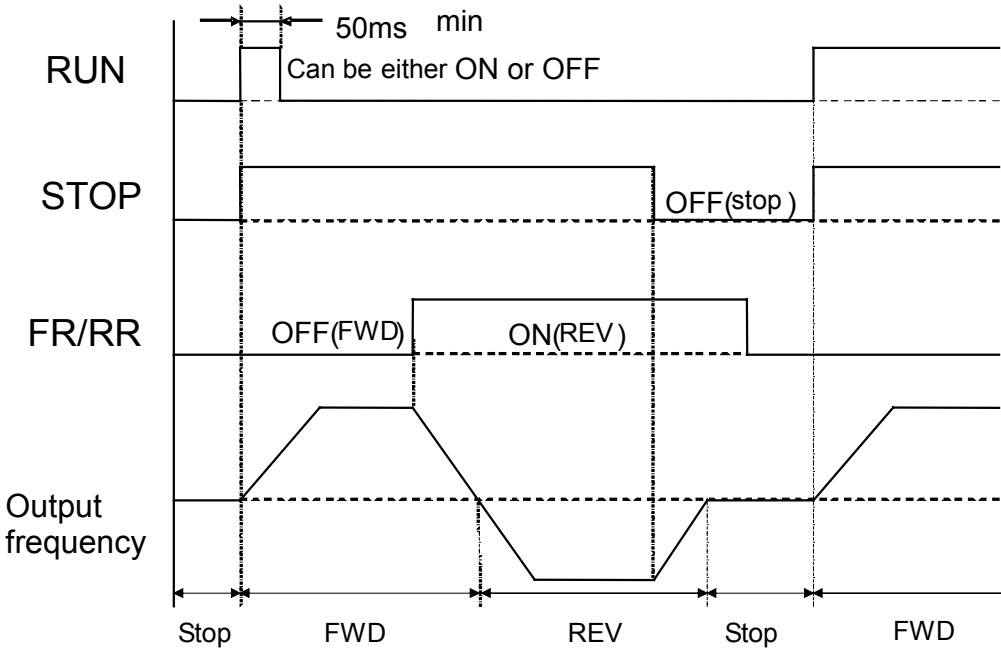
Fig. The example of 3-wire sequence operation

Turn on for 50ms and the RUN command, this will make the run command self-holding of the inverter.

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Prohibition of reverse operation

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b1-04	Prohibition of reverse operation	0~1	0					

Description: b1-04 is prohibition of reverse operation, when setting value is 1 to prohibit reverse default value is 0.

4.4 Jog operation

Implement jog operation with multi-function input terminal, 3 ways to operate:
1. Set terminal to be JOG with operation control.
2. Set terminal to be FJOG without operation control.
3. Set terminal to be RJOF without operation control.
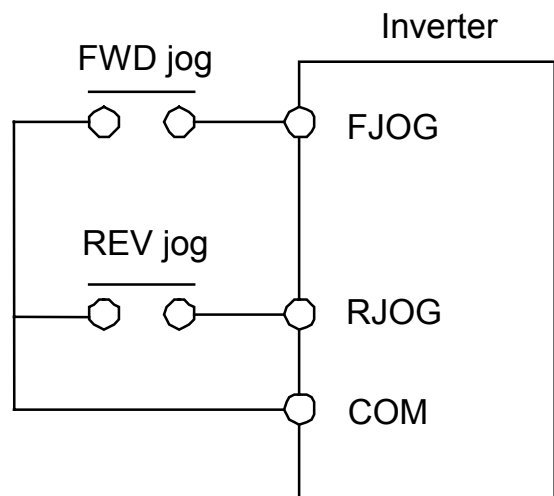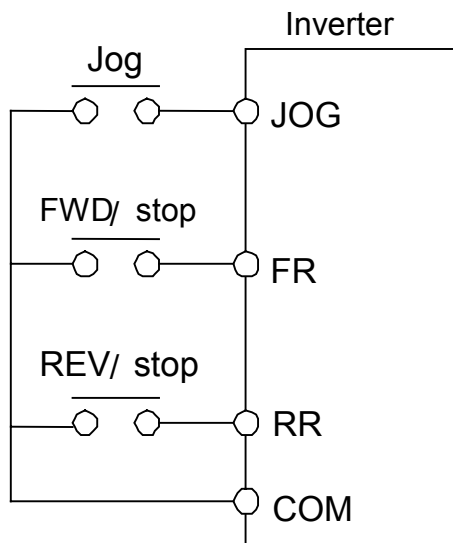
Select jog frequency after jog was taken. Implement jog operation after 2-wire/ 3-wire operation terminals is taken.

Implement forward jog operation when forward jog is taken.
Implement reverse jog operation when reverse jog is taken.

4.5 Stop pattern

Select Stationary operation pattern

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b1-03	Select stop pattern	0~3	0					

Description: b1-03 is selecting stop operation patterns, you can select:

        0: Deceleration to stop
        1: Coast to stop
        2: DC braking stop
        3: Coast to stop with timer

Deceleration stop

Set the motor to decelerate to stop according to selecting time after set b1-03=0, (factory setting: C1-02 deceleration time 1). If DC braking were set when stop, DC braking is implement when output frequency is lower than b2-01. For DC braking stop, refer to page 38.
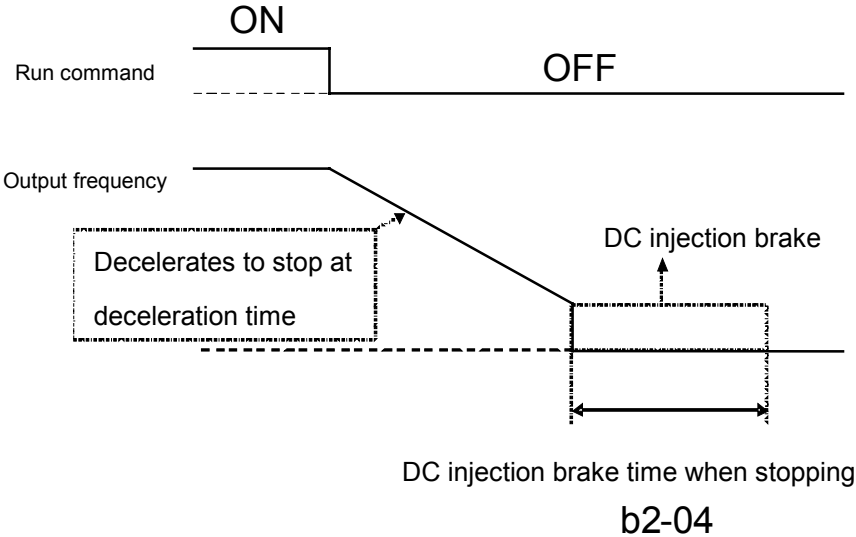
Fig. Deceleration to stop

Coast to stop

If the stop command is input when set b1-03=1, the inverter output voltage is interrupted, the motor coasts to a stop at inertia the load.
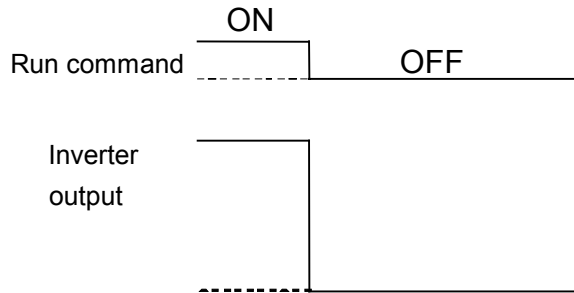
Fig. Coast to stop

DC braking stop

If the stop command is input and inverter output voltage will be interrupted after set b1-03=2, a wait is made for the time set in 2-03 and then the DC injection brake current set in b2-04 is sent to the motor to apply a DC injection brake to stop the motor. The DC injection brake time is determined by output frequency. Lengthen the minimum baseblock time (L2-03) when an over current (OC occurs during Stationary. This mode is enabling when V/f control.
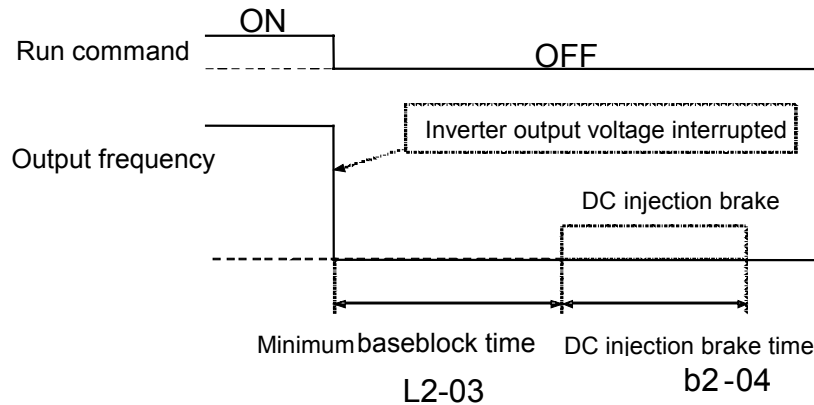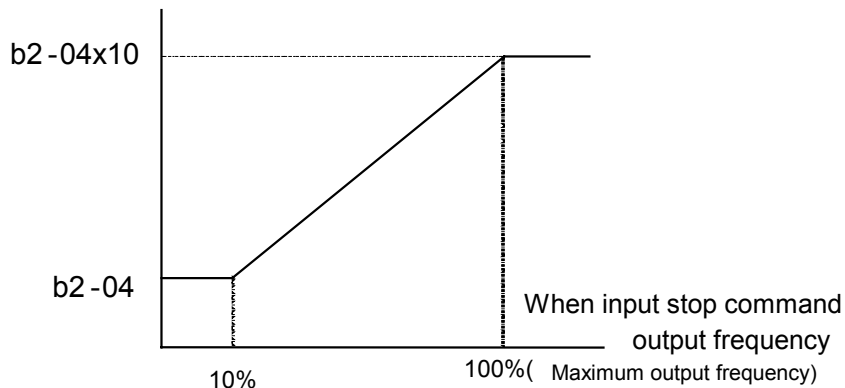
Fig. DC injection braking (DB) stop

Coast stop with timer

If the stop command is input when b1-03=3, the inverter output is interrupted to coast the motor to stop. The motor coasts to stop at inertia the load. Run commands are ignored until the time has elapsed. Set timer time by C1-04.

Run command

ON   OFF   ON   OFF   ON

Ignore run command

Output frequency

According to select frequency when decelerated time and stop to proceed coast time
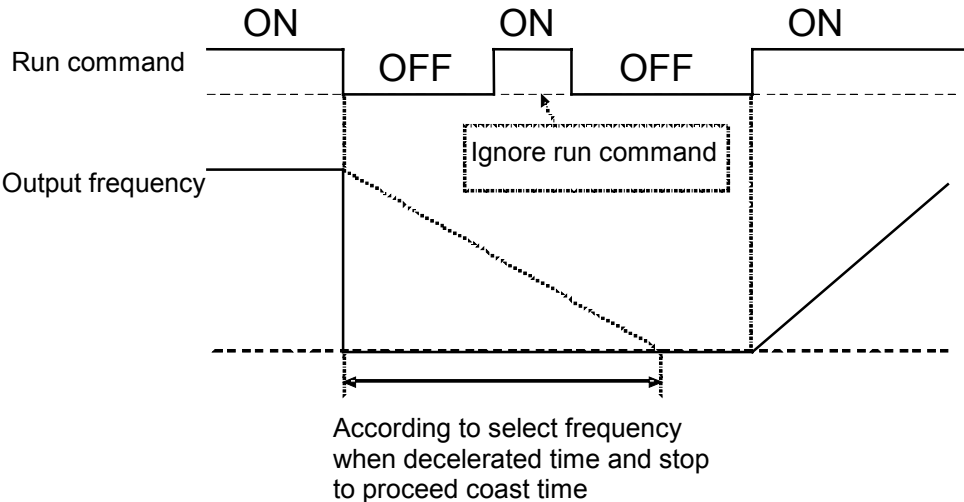
Fig. Coast stop with timer

4.6 DC injection brake

Using the DC injection brake

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vec tor	Vector PG
b2-02	DC injection braking current	0~100	50%					
b2-03	DC injection braking time at start	0.00~ 10.00	0.00 sec					

Description: Set DC injection brake when start to the motor whiles it is coasting to stop, to stop the motor and then restart it.
Set b2-03 to 0 to disable the DC injection brake at start.
Set the DC injection brake current using b2-02 as inverter rated current.

Using analog input as DC injection brake current command

Set multi-function analog input (H3-01/H3-05 / H3-09) to 6 and use analog input as DC injection brake current command, when input 10V (20mA) is 100% of inverter rated current.

DC injection brake at stop

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vec tor	Vector PG
b2-01	DC injection brake starting frequency	0.0~ 10.0	0.5Hz					
b2-04	DC injection brake at stop	0.00~ 10.00	0.00 sec					

Description: Set DC injection brake at stop. Stop pattern setting is deceleration stop or DC injection brake stop. When input stop run command, output frequency less then b2-01 and start DC injection brake frequency. When DC injection brake start, DC injection brake frequency is b2-02
Set b2-04 to 0 to disable DC injection brake at stop.
If setting value of b2-01 less then minimum input frequency, to implement DC injection brake as minimum output frequency E1-09.

4.7 Acceleration/ Deceleration constants

Acceleration/ Deceleration time setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C1-01	Acceleration time 1	0.0~6000.0	10.0 sec					
C1-02	Deceleration time 1							
C1-03	Acceleration time 2							
C1-04	Deceleration time 2							
C1-05	Acceleration time 3							
C1-06	Deceleration time 3							
C1-07	Acceleration time 4							
C1-08	Deceleration time 4							
C1-09	Acceleration time 5							
C1-10	Deceleration time 5							
C1-11	Acceleration time 6							
C1-12	Deceleration time 6							
C1-13	Acceleration time 7							
C1-14	Deceleration time 7		100.0					
C1-15	Jog acceleration time		1 .0					
C1-16	Jog deceleration time							
C1-17	Emergency stop time							
C1-18	Acceleration/ Deceleration time unit	0~1	1.0					
C1-19	Acceleration/ Deceleration time switch frequency	0.0~400.0	0.0Hz					
C1-20	Multi-steps speed/PLC operation Acceleration/ Deceleration pattern	0~1	0					

Description: Acceleration time setting: the time that accelerates from 0 to 50Hz.
Deceleration time setting: the time that decelerates from 50Hz to 0.
Acceleration/ Deceleration time of factory preset is C1-01, C1-02.

Acceleration/ Deceleration time unit setting

SETS C1-18 to change acceleration/ deceleration times a unit. Factory value is 1.

Setting value	Description
0	Set 0.01 second a unit, setting range is 0.00~600.00 seconds.
1	Set 0.1 second a unit setting range 0.0~6000.0 seconds.

Automatic switch acceleration/ deceleration time

When output frequency reached to setting value of C1-19, auto switch acceleration/ deceleration time
Set C1-19 to 0 and disable.

Output frequency

C1-19
Accel/ Decel time
switch frequency

C1-07   C1-01   C1-02   C1-08
Accel time 4   Accel time 1   Decel time 1   Decel time 4
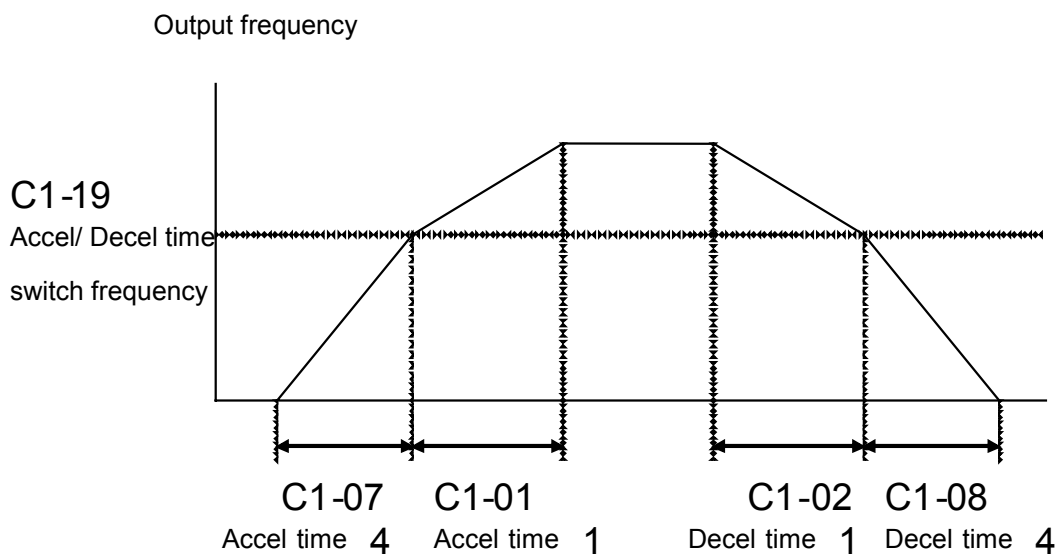
Fig.   Automatic switch acceleration/ deceleration time

Emergency stop time C5-17

The deceleration time was used when a fault has been detected by the inverter , or input emergency stop command to DI external terminal.

To switch acceleration/ deceleration time by using multi-functions input terminal

Inverter could implement four kinds of acceleration/ deceleration time, to switch by using two multi-functions input terminal, Set multi-function input terminal (H1-01~05) to 9 and 10, according to multi-functions combinations to select acceleration/ deceleration time.

Multi-steps acceleration/ deceleration time 1 (Set to 9)	Multi-steps acceleration/ deceleration time 2 (Set to 10)	Acceleration time	Deceleration time
OFF	OFF	C1-01	C1-02
ON	OFF	C1-03	C1-04
OFF	ON	C1-05	C1-06
ON	ON	C1-07	C1-08

When multi-steps speed/ PLC to run, automatic switch over acceleration/ deceleration time

When the inverter implements multi-steps speed operation or PLC, beside follow aforementioned patterns to set acceleration/ deceleration time, user could set operation multi-steps speed to automatic switch acceleration/ deceleration time. Set C1-20 to 1 and acceleration/ deceleration time when multi-steps speed/ PLC operates as following table:

Multi-steps speed	PLC	Frequency command	Acceleration/ deceleration time	
1st step speed	1st step	d1-01	C1-01	C1-02
2nd step speed	2nd step	d1-02	C1-03	C1-04
3rd step speed	3rd step	d1-03	C1-05	C1-06
4th step speed	4th step	d1-04	C1-07	C1-08
5th step speed	5th step	d1-05	C1-09	C1-10
6th step speed	6th step	d1-06	C1-11	C1-12
7th step speed	7th step	d1-07	C1-13	C1-14
8th step speed	8th step	d1-08	C1-15	C1-16
9th step speed	9th step	d1-09	C1-01	C1-02
10th step speed	10th step	d1-10	C1-03	C1-04
11th step speed	11th step	d1-11	C1-05	C1-06
12th step speed	12th step	d1-12	C1-07	C1-08
13th step speed	13th step	d1-13	C1-09	C1-10
14th step speed	14th step	d1-14	C1-11	C1-12
15th step speed	15th step	d1-15	C1-13	C1-14
16th step speed	16th step	d1-16	C1-15	C1-16

S-curve acceleration/ deceleration time setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C2-01	S-curve time at acceleration	0.00~ 2.50	0.20 sec					
C2-02	S-curve time at acceleration end	0.00~ 2.50	0.20 sec					
C2-03	S-curve time at deceleration	0.00~ 2.50	0.20 sec					
C2-04	S-curve time at deceleration end	0.00~ 2.50	0.20 sec					

Description: To implement acceleration/ deceleration by using S-curve to reduce impact when start/ stop the machine. Inverter could be set all S-curve characteristics time at acceleration/ deceleration time start and end. When set S-curve characteristics, the acceleration/ deceleration time will increase.

Output frequency
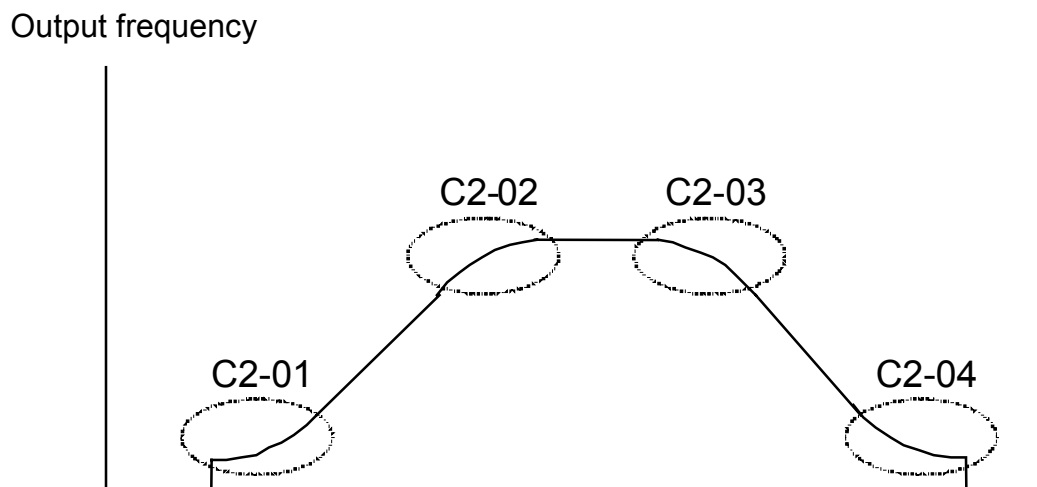
Fig. S-curve characteristics

4.8 Frequency limits

Frequency command limits

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vec tor	Vector PG
d2-01	Frequency command upper limit level	0.0~ 100.0	100.0 %					
d2-02	Frequency command lower limit level		0%					

Description: Frequency command upper and lower limits could be set to limit run frequency of motor operation. Set maximum output frequency E1-04 as 100%.

Jump frequencies

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vec tor	Vector PG
d3-01	Jump frequency 1	0.0~ 400.0	0.0Hz					
d3-02	Jump frequency 2							
d3-03	Jump frequency 3							
d3-04	Jump frequency width	0.0~ 20.0	1.0Hz					

Description: The objective of this function in order to avoid resonance occurred between subsistent vibration of machine and motor operation. Set machine vibration frequency that you would like to avoid. Jump frequency setting will prohibit motor operation when constant speed operation, but jump will not occur during acceleration/ deceleration procedure.
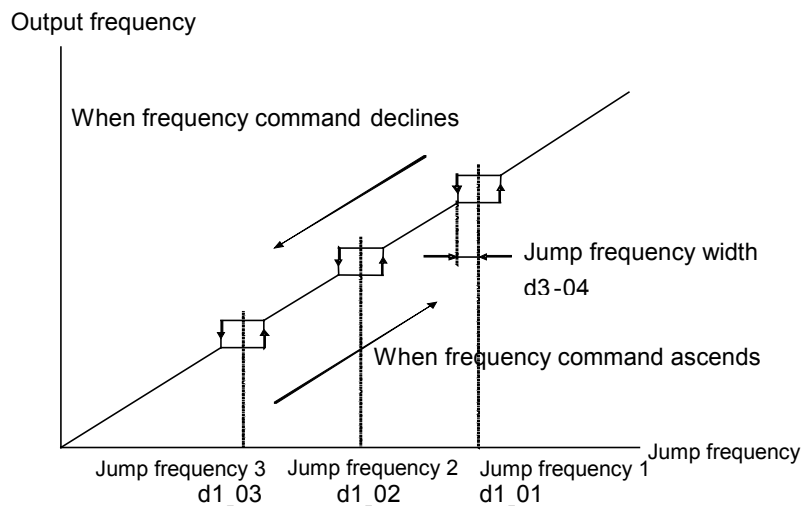
4.9 Input/ output terminals

4.9.1 Multi-functions input terminals

Multi-functions input terminals setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vect or	Vector PG
H1-01	Multi-functions terminal DI1 function	0~19	16					
H1-02	Multi-functions terminal DI2 function		8					
H1-03	Multi-functions terminal DI3 function		1					
H1-04	Multi-functions terminal DI4 function		2					
H1-05	Multi-functions terminal DI5 function		5					

Description: User could set functions of multi-functions terminals by request as following constants:

Multi-functions input terminals constants

Setting value	Function	Control patterns			
		VF	VF PG	Vector	Vector PG
0	3-wire operation control				
1	Multi-steps speed command 1				
2	Multi-steps speed command 2				
3	Multi-steps speed command 3				
4	Multi-steps speed command 4				
5	Jog frequency selection (JOG)				
6	Forward jog (FJOG)				
7	Reverse jog (RJOG)				
8	Auto restart attempts				
9	Multi-steps acceleration/ deceleration time 1				
10	Multi-steps acceleration/ deceleration time 2				
12	PID integration control reset				
13	PID integration control maintain				
14	PID soft start				
15	Switch PID error input characteristics				
16	Not used				
17	PLC reset				
18	Emergency stop by time of C1-17				
19	Coast stop				

4.9.2 Multi-functions output terminals

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H2-02	Multi-functions relay output	0~10	0					

Description: User could set function of multi-functions output contact by request as following constants:

Multi-functions output contacts function constants

Setting value	Function	Control patterns			
		VF	VF PG	Vector	Vector PG
0	Operation				
1	Zero speed				
2	Inverter overheat				
3	Drive failure				
4	Overload failure				
5	Acceleration				
6	Deceleration				
7	Speed agree				
8	Frequency arrive 1				
9	Frequency arrive 2				
10	Not used				

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H2-03	Frequency position detect	0~400	0.5					

H2-03

Time
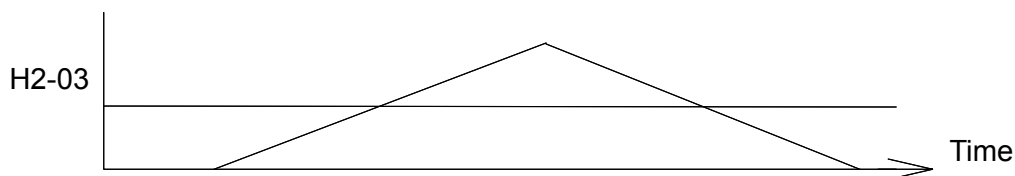
No-Nc or external relay

OPEN   CLOSE

Time
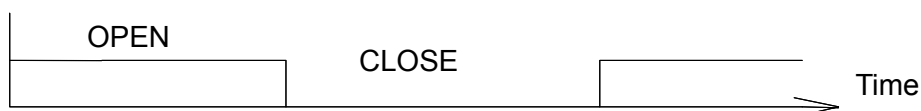
4.10 Analog input/ output

4.10.1 Analog input

CT2000EV provide 3 analog input terminals, the number and specification:

IN1: Multi-functions 4~20 m A current input
IN2: Multi-functions 0~10V current input
IN3: Multi-functions 0~10V current input

Analog input (terminal IN3)

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H3-01	IN3 function selection	0~12	1					
H3-02	IN3 input gain	0.0~ 1000.0	100.0 %					
H3-03	IN3 input bias	±100.0	0.0%					

Example: Preset terminal IN3 to analog master speed, when set b1-01=1 is effective.
The input range is 0~10V to indicate 0~100% (when H3-02=100%).
Maximum output frequency E1-04.

The function of H3-02 is enlarge/ reduce magnification of IN3, factory value is 100.0%.
The function of H3-03is bias adjust of IN3, factory value is 0%.

Maximum output frequency E1-04=60.0Hz   H3-02=100%   H3-03=0%, input range of IN3 at this time as

0~10V = 0 ~100% = 0.00 ~ 60.00Hz

If H3-02=150%   H3-03=10%, input range of IN3 at this time as

0~10V = 10%+ (0~150%) = 10~160%
60Hz*10%=6Hz
60Hz*160%=96Hz > 60Hz
IN3 master frequency range = 6~60Hz

Multi-functions input terminals contact (IN1 IN2)

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H3-05	IN2 function selection	0~12	0					
H3-06	IN2 input gain	0.0~ 1000.0	100.0 %					
H3-07	IN2 input bias	±100.0	0.0%					
H3-09	IN1 function selection	0~12	0					
H3-10	IN1 input gain	0.0~ 1000.0	100.0 %					
H3-11	IN1 input bias	±100.0	0.0%					

Description: Terminal of IN1 and IN2 are multi-functions analog input, the input specification 10V(20mA) indicate 100%, use H3-06 (H3-10) to set enlarge/ reduce magnification, and H3-07 (H3-11) to set bias %.
 All functions of multi-functions analog input, refer to constants P.118.

Analog input filter time

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H3-04	IN3 Analog input filter time	1~1000	5sec					
H3-08	IN2 Analog input filter time	1~1000	5sec					
H3-12	IN1 Analog input filter time	1~1000	5sec					

Description: Set filter time of analog input terminal IN1~IN3. Set filter time longer, the ability of rejects noise is stronger. But reaction of input will be corresponsive slower. Please set suitable time by request.

4.10.2 Analog output

CT2000EV inverter provides an analog output terminal, the serial No. and specification:

VOUT: Multi-function Vdc voltage output

Multi-function analog output (VOUT)

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H4-01	VOUT function selection	1~27	11					
H4-02	VOUT output gain	0.00~ 2.50	1.00					
H4-03	VOUT output bias	±10.0	0.0%					
H4-04	VOUT output filter time	1~ 1000	5 sec					

Description: Multi-function analog output could be selected monitoring (U1-XX) to transfer to analog voltage output, when selected one is 100%, output 10V. Please refer to U1 constants.

H4-03 can be set analog output bias (output is lower than 0V, output 0V only).

H4-02 could be set analog output enlarge magnification (output exceed 10V, output 10V only).

The function of H4-04 could be set as the filter time of analog output terminal. The filter time setting is longer, the capability of erasing filter is stronger, but the reaction of output become slow. Please set the adaptable time by user request.

Chapter 5 V/f control

Set A1-02 to 0 to implement V/f control.

5.1 V/f curve setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
E1-01	Input voltage	155~500	220V					
E1-03	V/f curve select	0~15	15					
E1-04	Maximum output frequency	40.0~400.0	60.0 Hz					
E1-05	Maximum voltage	0.0~500.0	220.0 V					
E1-06	Base frequency	0.0~400.0	60.0 Hz					
E1-07	Middle output frequency	0.0~400.0	3.0Hz					
E1-08	Middle output voltage	0.0~500.0	15.0V					
E1-09	Minimum output frequency	0.0~400.0	0.5Hz					
E1-10	Minimum voltage	0.0~500.0	5.0V					
E1-13	Base voltage	0.0~500.0	220.0 V					

Description: Set E1-03 to 15 to set V/f curve freely:
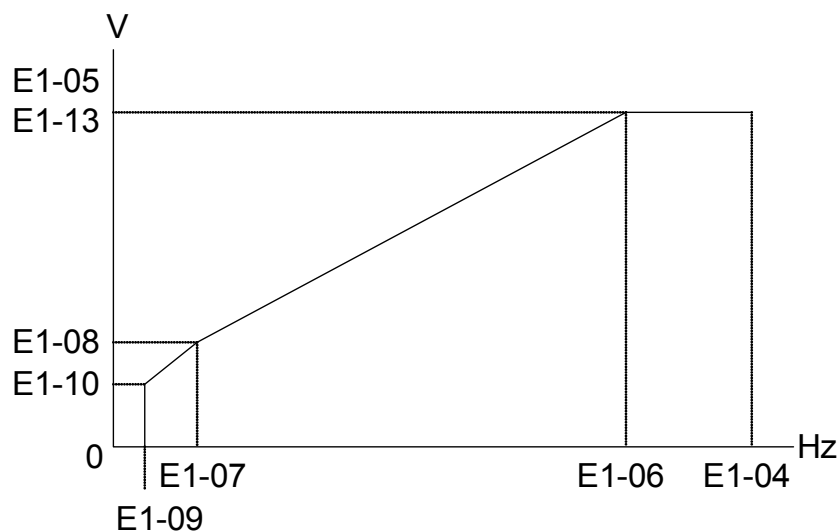
Description(continued): Set E1-03 to 0~14 to select preset V/f curve:

Setting value	Characteristic	Application	Specifications
0	Constant torque characteristic	General application	50Hz
1			60Hz
2			60Hz voltage saturation at 50Hz
3			72Hz 60Hz torque characteristic
4	Low torque characteristic	Inertial load of fans pump etc.	50Hz 3 decrement
5			50Hz 2 decrement
6			60Hz 3 decrement
7			50Hz 2 decrement
8	High startup torque characteristic	The wiring distance between inverter and motor is too long (150m) a large torques required at startup output terminal add reactor	50Hz medium startup torque
9			50Hz large startup torque
10			60Hz medium startup torque
11			60Hz large startup torque
12	Fixed output operation	Inverter output constant voltage output when operation exceed 60Hz	90Hz voltage saturation at 60Hz
13			120Hz voltage saturation at 60Hz
14			180Hz voltage saturation at 60Hz

Each setting value of V/f curves, please refer to the following constants:
These are values for 220V.   Values for 380V (E1-13), multiply 380/220=1.727.

Setting value 3	Setting value 4	Setting value 5

Setting value 6	Setting value 7	Setting value 8

Setting value 9	Setting value 10	Setting value 11

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Setting value 12	Setting value 13	Setting value 14
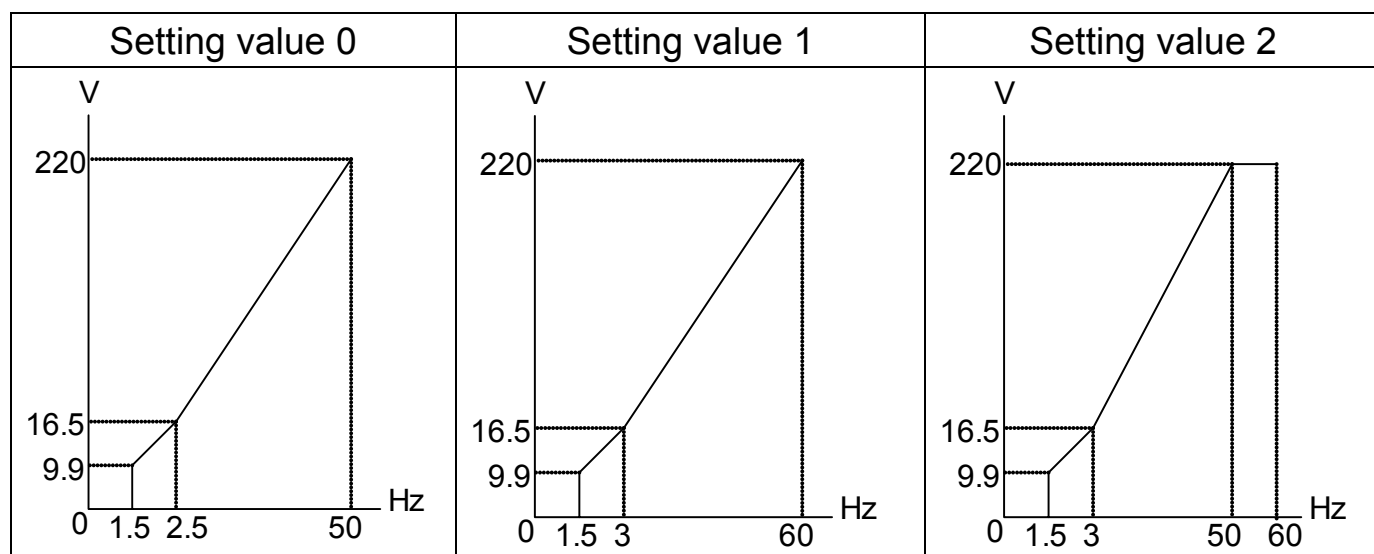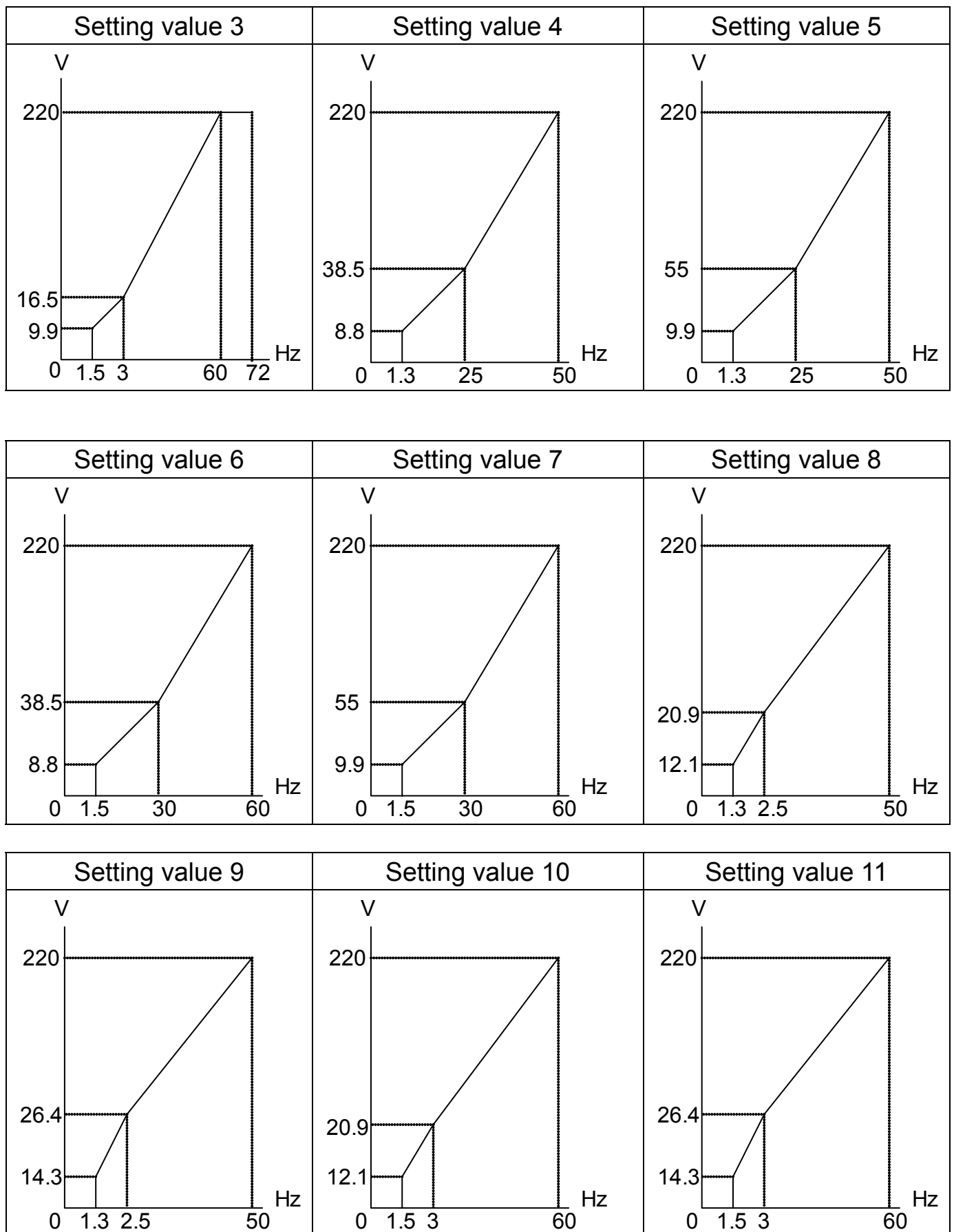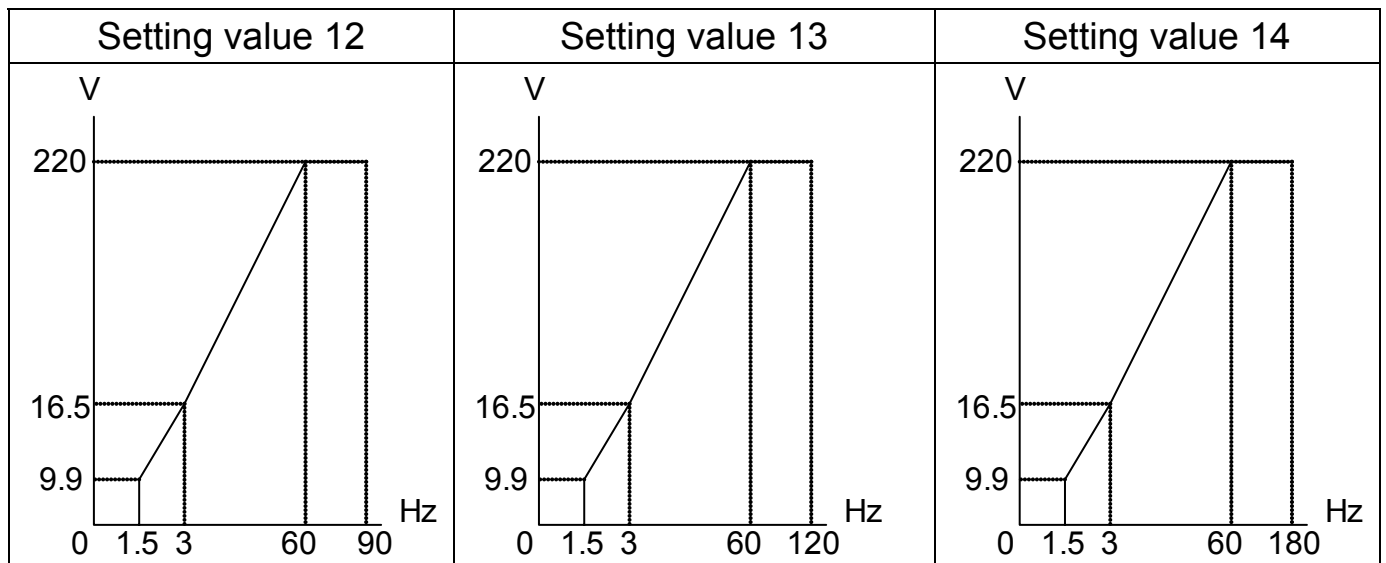
5.2 Torque compensation

Set torque compensation

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C4-01	torque compensation gain	0~2.50	0.60					
C4-02	torque compensation lag time	0~10000	50 ms					
C4-03	Unload current adjustment	30~150	60					
C4-04	Torque compensation frequency point	1.5~10	2.50					

Description: Torque compensation is automatic function of increasing torque when the load of motor is detected too high. To measure the resistant of motor is demanded to use this function. Please use the automatic measure of motor or input known the resistant of motor E2-05.

Setting precaution:

1. Frequency torque compensation will run when operation frequency exceeds C4-04 which be set.
2. Increase the value of C4-03 when unload current is too large, opposite when too small to collocate C4-04.
3. Increase gain of C4-01 when motor start and the torque is not enough. Over current occurred when start, please decrease gain of C4-01.
4. Current exceeds rated current when motor idled, and decrease gain of C4-01.
5. Vibration occurred when motor rotated, and decrease gain C4-01 or increase delay time C4-02.
6. Please collocate with slip compensation when operated rated speed under 3Hz is demanded.
7. Torque compensation is invalid when the resistant of motor is E2-05=0 or torque compensation gain C4-01=0, operated by set V/f curve.

5.3 Slip compensation

Slip compensation setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C3-01	Slip compensation gain	0~2.50	0.00					
C3-02	Slip compensation delay time	0~10000	500 ms					
C3-03	Restriction of Slip compensation	0~250	200%					

Description: when motor load is larger, the motor slip is higher, in the meantime, the rotate speed of motor axle will be reduced, and frequency command inconsistent. Slip compensation is slip was brought by motor capacity and use increase output frequency to make actuality rotate frequency of motor to close to frequency command. The compensation pattern is motor rated slip E2-02 multiply frequency C3-01 and add to output frequency. Due to compensation demand motor rated slip E2-02 that detected by autotuning or input by the specification on nameplate. Slip (Hz)= rated frequency (Hz)- rated rpm (rpm)×pole/120

Setting precaution:

1. Slip compensation is invalid when set gain of C3-01 to 0.
2. In the status of loading to measure motor speed and gradually adjust gain. Increase gain when speed is too low, on the contrary to decrease gain.
3. Shrink delay time C3-02 when the reaction of slip compensation is too low. Increase delay time C3-02 when speed is unstable.

Chapter 6 V/f control with PG

Implement V/f control with PG to set A1-02 to 1. This control pattern should collocate with option card.

6.1 V/f cure setting

Setting pattern is the same with V/f control, please refer to P.50.
Maximum frequency, maximum voltage, base frequency, base voltage etc. is set usually.

Torque compensation

Torque compensation gain is fixed to 1 and collocates with E2-05 of V/f control with PG, and collocate motor resistant setting to use autotuning or input for oneself.
C4-02 torque compensation delay time can be adjust the reaction of torque compensation, please refer to P.54. Normally, there is no need to make setting.

Slip compensation

Slip compensation gain is fixed to 1 in V/f control with PG, and compensation E2-02 is 100% of motor slip to use autotuning or input of oneself.
C3-02 slip compensation delay time can adjust the reaction of slip compensation, please refer to P.55. Normally, there is no need to make setting.
C3-03 slip compensation restriction to restrict maximum value of slip compensation. Normally, there is no need to make setting.

6.2 ASR

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C5-01	Proportional gain of ASR	0.00~ 300.00	0.2					
C5-02	Integral time of ASR	0.000~ 10.000	0.200 sec					

Description: Adjust pattern of speed circuit, in status of loading (mechanical transmit connect), adjust by following steps:

Adjust proportional gain C5-01 to maximum value of machine and motor without vibration in the status of zero-speed.

Adjust proportional gain C5-02 to minimum value of machine and motor without vibration in the status of zero-speed.

If vibration occurred when high rpm operation of systems demand

Yes

C5-01 proportional gain decrease

C5-02 integral time increase

No

End of adjust

Chapter 7 Vector control with PG

Implement Vector control with PG to set A1-02 to 3. This control pattern should collocate with option card.

7.1 Motor constant setting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
E2-01	Motor rated current	10.0~200.0	100.0 %					
E2-02	Motor slip	0.00~20.00	2.00 Hz					
E2-03	Motor unloading current	10.0~100.0	30.0 %					
E2-04	The pole of motor	2~8	4 pole					
E2-05	Motor resistance	0.000~65.000	0.000					
E2-06	Motor leakage inductance	0.0~40.0	0.0%					
F1-01	PG Pulse	0~20000	1024					

Description: Please set motor constant by the nameplate of motor or autotuning.

Motor rated current E2-01 and motor unloading current E2-03 setting. Set motor rated current and unloading current by inverter rated current is 100%.

Input slip by nameplate of motor, calculate pattern:
   Slip (Hz)= rated frequency (Hz)- rated rpm x (pole/120)

Motor resistance and Motor leakage inductance, please input motor company offered or automatic set by autotuning

F1-01 should collocate with PG / Option of motor to set P.W.M. About the rest functions of PG, please refer to P.80

7.2 ASR

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C5-01	Proportional gain of ASR	0.00~ 300.00	0.2					
C5-02	Integral time of ASR	0.000~ 10.000	0.200 sec					

Description: Adjust pattern of speed circuit, in status of loading (mechanical transmit connect) , adjust by following steps:

```
┌─────────────────────────────────────────┐
│ Adjust proportional gain C5-01 to        │
│ maximum value of machine and motor       │
│ without vibration in the status of       │
│ zero-speed.                              │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────┐
│ Adjust proportional gain C5-02 to        │
│ minimum value of machine and motor       │
│ without vibration in the status of       │
│ zero-speed.                              │
└─────────────────────────────────────────┘
                    │
                    ▼
┌──────────────────────────────┐   Yes   ┌────────────────────────────┐
│ If vibration occurred when   │ ──────► │ C5-01 proportional gain    │
│ high rpm operation of        │         │ decrease                   │
│ systems demand               │         └────────────────────────────┘
└──────────────────────────────┘                       │
                │ No                                    ▼
                ▼                         ┌────────────────────────────┐
┌──────────────────────────────┐         │ C5-02 integral time        │
│        End of adjust         │         │ increase                   │
└──────────────────────────────┘         └────────────────────────────┘
```

7.3 ACR

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
C5-06	Proportional gain of ACR	0.00~ 300.00	0.2					
C5-07	Integral time of ACR	0.5~ 2000.0	15 msec					
C5-08	Select proportional/ integral of ACR	0~1	0					

Description: Input PI of current circuit by user or by autotuning, selected by C5-08.
C5-08=0:use as C5-06 and C5-07 to be PI of ACR.
C5-08=1:by autotuning.

7.4 Torque limits

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L7-01	Forward torque limit							
L7-02	Reverse torque limit	0~250	150%					
L7-03	Torque limit in forward rotation							
L7-04	Torque limit in reverse rotation							

Description: Torque limits of 4 quarters are set by L7-01~04. Torque limits of 4 quarters are also set by analog input. Set analog input H3-01/05/09to be torque limit, analog input is priority.

Setting value	Application
9	Forward torque limit
10	Reverse torque limit
11	Re-generation torque limit
12	Forward/ reverse torque limit

Torque output (positive)

L7-01

L7-04

Re-generator

Reverse

Forward

Re-generator

L7-03

L7-02

Torque output (negative)
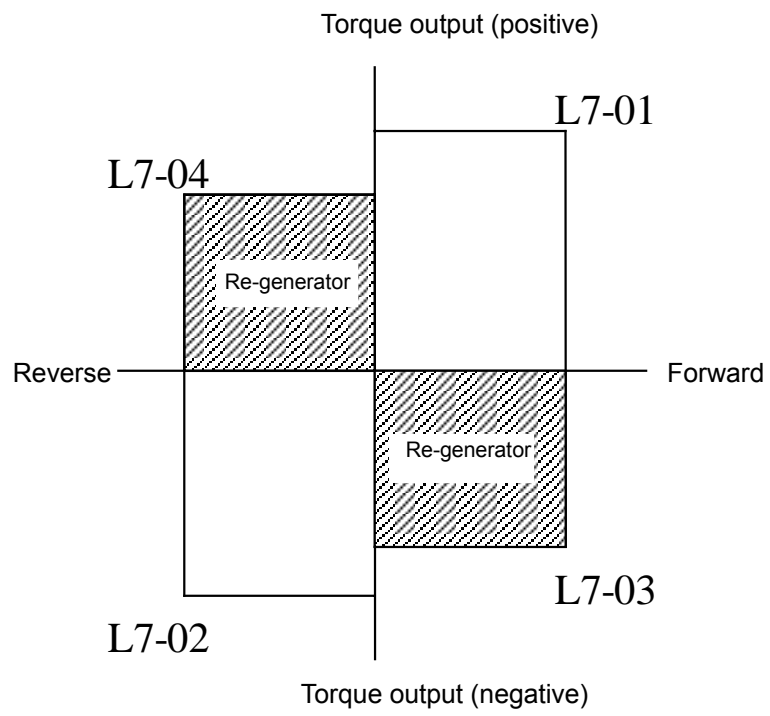
Chapter 8 PID control

PID control is a pattern of making the feedback value match the set target value. By combination proportional control (P) integral control (I) and derivative control (D), you can even control targets that you want to reach status.

The characteristics of the PID control operations as below:

Proportional control (P): output of operation proportional to the error. Feedback value cannot equal to target when only use Proportional control.

Integral control (I): output of operation integral to the error. Used for matching feedback value to target value, however, intense change might cause integral control to disperse.

Derivative control (D): output of operation derivative to the error, respond rapid variations.
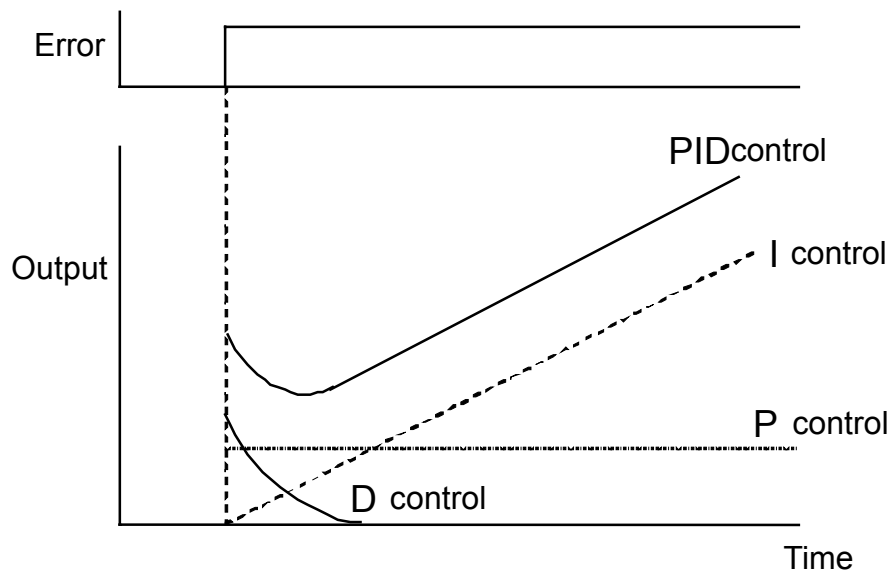
Fig. PID control motion

PID control application

The following table shows example of PID control application to use inverter:

Application	Control details	Example of sensor used
Speed control	Feeds back machinery speed information, and matches speed to the target value.	Tachometer generator
Pressure control	A feedback pressure information, and performs constant pressure control.	Pressure sensor
Flow rate control	A feed back flow rate control information, and controls the flow rate highly accurately.	Flow rate sensor
Temperature control	A feedback temperature information, and performs temperature adjustment control.	Thermocouple thermistor

PID control pattern selecting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-01	Select PID control	0~4	0					

Description: b5-01 is PID control pattern selecting, select as following:

0: Disable.
1: PID output is inverter output, D control error.
2: PID output is inverter output, D control feedback.
3: PID output is adjustment of inverter output, D control error.
4: PID output is adjustment of inverter output, D control feedback.

PID target value setting patterns

Target value setting patterns as following:

Setting pattern	Description	Priority
Master speed frequency	Set master speed as target value, maximum output frequency is 100%	4
Analog input	Set analog input as target value, 10V is 100%, use gain and bias setting to adjust. Set H3-01/ 05 /09 to 8.	1
P.W.M. input	Set H6-01=2 and P.W.M. input as target value.	3
Option card input	Set the analog terminal of option card input as target value.	2

PID feedback value setting value

Feedback value setting patterns as following:

Setting pattern	Description	Priority
Analog input	Set analog input as feedback value, 10V is100%, use gain and bias setting to adjust. Set H3-01/ 05/ 09 to 7.	1
P.W.M. input	Set H6-01=1, and P.W.M. input as target value.	3
Option card input	Set the analog terminal of option card input as feedback value.	2

PID control

PID adjustment patterns

Use PID control when target value is fixed, observe feedback wave to implement adjustment.

1. Increase P value to within a range that does not vibrate.
2. Reduce I value to within a range that does not vibrate.
3. Increase D value to within a range that does not vibrate.

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-02	Proportional control (P)	0.00~ 25.00	1.00					
b5-03	Integral time (I)	0.0~ 360.0	1.0 sec					
b5-05	Derivative time(D)	0.00~ 10.00	0.00 sec					

PID output limits

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-04	Maximum value of Integral control (I)	0.0~ 100.0	100.0 %					
b5-06	Maximum value of PID output							

Description: Set % a unit as upper limit level of PID control output and derivative control. 100% indicates maximum frequency output.

PID output adjust

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-07	PID offset adjustment	±100.0	0.0%					
b5-09	PID output characteristics selection	0~1	0					
b5-10	PID output gain	0.0~ 25.0	1.0					
b5-11	PID output reverse selecting	0~1	0					

Description: Set b5-07 the offset after PID control as a percentage of the maximum output frequency.

Set b5-10 to PID output enlarges magnification.

Set b5-09 to PID output polarity, when polarity is set to 1.

Set b5-11 to select PID output whether inverting or not, when inverted is set to 1.

PID output delay

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-08	PID output delay time	0.00~ 10.00	0.00 sec					
b5-19	PID output delay position selecting	0~1	0					

Description: Set b5-19 delay to the object:

PID output delay when set to 0.

D control output delay when set to 1.

Set b5-08 to delay time.

PID control

PID command acceleration/ deceleration time

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-17	PID target value acceleration/ deceleration time	0.0~ 25.5	0.0 sec					

Description: Set b5-17 to PID target value acceleration/ deceleration time, set time to accelerate from 0 to 100%. When needed PID target value is the smooth curve not P.W.M. wave when used.

Notice: Due to PID output will pass by acceleration/ deceleration of C1. If mechanical pulsation was caused by setting b5-17 and acceleration/ deceleration of C1. User can reduce C1 to avoid pulsation.

Select position of P controller

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-18	Position of P controller selecting	0~1	0					

Description: Select position of P controller.

P I D controllers were divided to individual controller when set setting value to 0.

P controller is located in front of I D controllers when set setting value to 1. (enter I D controller after error passed by P controller).

Select step of I controller reset

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b5-20	Select control reset	0~1	0					

Description: Setting value is 0, clear I control Integral value when place stop command or place reset command.

Setting value is 1, clear I control Integral value when only place reset command.

I reset command must be controlled by multi-functions input terminal (set multi-functions input H1-XX to 12).

PID control block
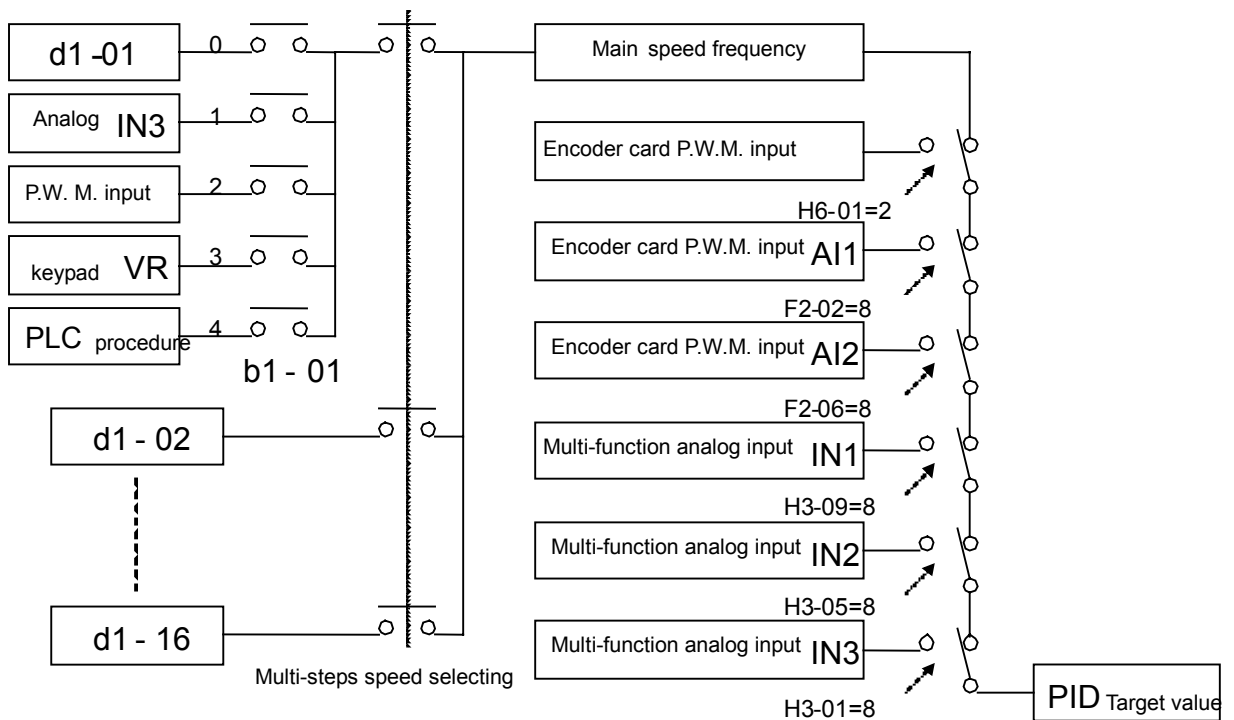
Fig. PID target value setting pattern
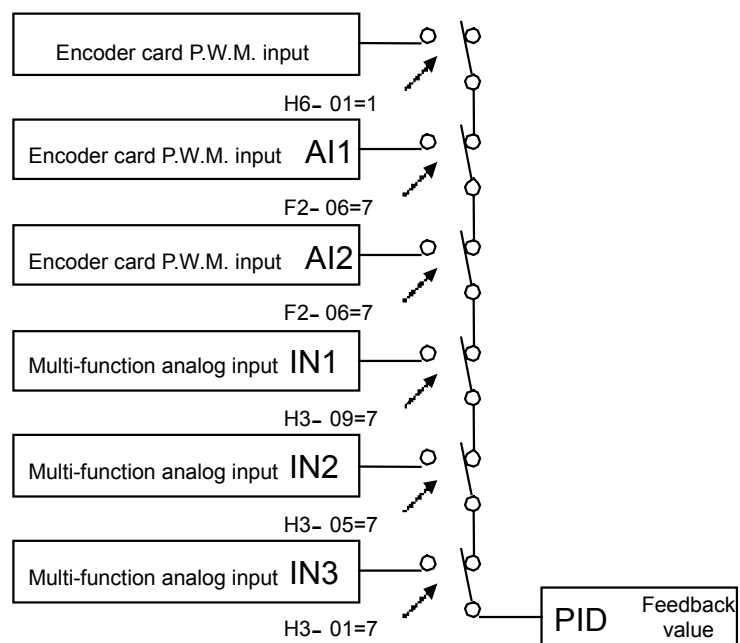
Fig. PID feedback value setting pattern

PID control block (continued)
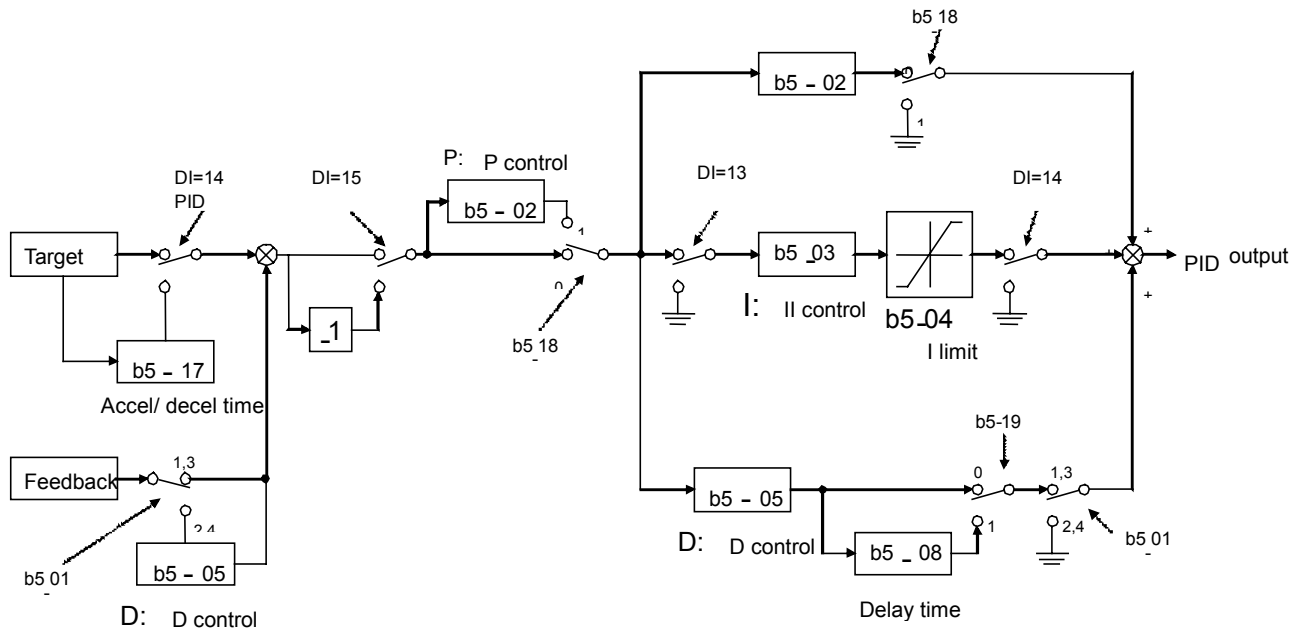
Fig. PID control block 1
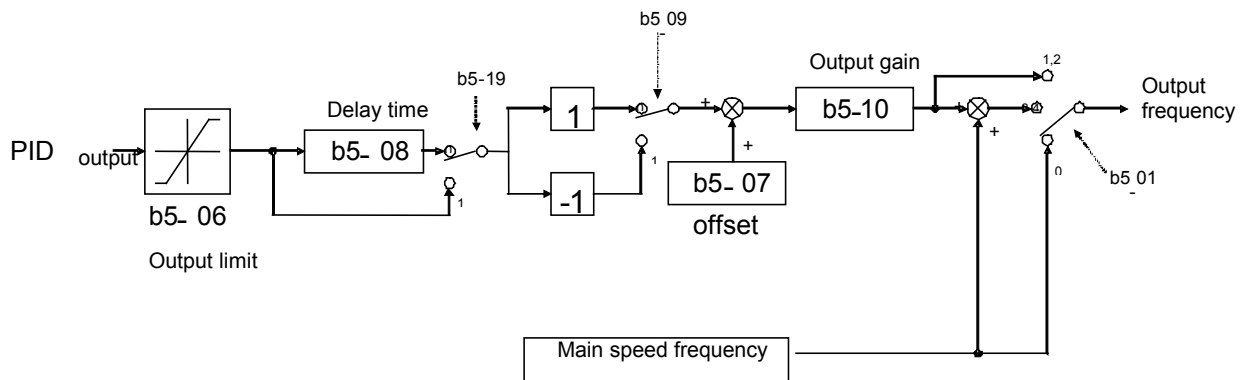
Fig. PID control block 2

Chapter 9 Multi-step function mode

Related constants

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vec tor	Vector PG
b6-01	1st step operation time	0~255	0 min					
b6-02	2nd step operation time							
b6-03	3rd step operation time							
b6-04	4th step operation time							
b6-05	5th step operation time							
b6-06	6th step operation time							
b6-07	7th step operation time							
b6-08	8th step operation time							
b6-09	9th step operation time							
b6-10	10th step operation time							
b6-11	11th step operation time							
b6-12	12th step operation time							
b6-13	13th step operation time							
b6-14	14th step operation time							
b6-15	15th step operation time							
b6-16	16th step operation time							
b6-17	Auto procedure control pattern selecting	0~6	0					
b6-18	Auto procedure control pattern selecting	0~1	0					
C1-01	Acceleration time 1	0.0~ 6000.0	10.0 sec					
C1-02	Deceleration time 1							
C1-03	Acceleration time 2							
C1-04	Deceleration time 2							
C1-05	Acceleration time 3							
C1-06	Deceleration time 3							
C1-07	Acceleration time 4							

Related constants (continued)

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vec tor	Vector PG
C1-08	Deceleration time 4	0.0~ 6000. 0	10.0 sec					
C1-09	Acceleration time 5							
C1-10	Deceleration time 5							
C1-11	Acceleration time 6							
C1-12	Deceleration time 6							
C1-13	Acceleration time 7							
C1-14	Deceleration time 7							
C1-15	Acceleration time 8							
C1-16	Deceleration time 8							
C1-20	Accel/ decel pattern when multi-steps speed/ PLC operation	0~1	0					
d1-01	Frequency command 1	0.00~ 400.0 0	0.00 Hz					
d1-02	Frequency command 2							
d1-03	Frequency command 3							
d1-04	Frequency command 4							
d1-05	Frequency command 5							
d1-06	Frequency command 6							
d1-07	Frequency command 7							
d1-08	Frequency command 8							
d1-09	Frequency command 9							
d1-10	Frequency command 10							
d1-11	Frequency command 11							
d1-12	Frequency command 12							
d1-13	Frequency command 13							
d1-14	Frequency command 14							
d1-15	Frequency command 15							
d1-16	Frequency command 16							

Multi-step function mode selecting

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b6-17	Multi-step function mode selecting	0~6	0					

Description: b6-17 is multi-step function mode selecting, user can select:

0: Liner operation, stop after operated one circle.
1: Liner operation, automatically restart fro first circle after operated one circle.
2: Liner operation, stay at last step after operated one circle and wait for input signal of reset, restart from first circle.
3: Preservation
4: Gradually operation, stop after operated one circle.
5: Gradually operation, automatically restart fro first circle after operated one circle.
6: Gradually operation, stay at last step after operated one circle and wait for input signal of reset, restart from first circle.

Multi-step function mode reset

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b6-18	Multi-step function mode reset	0~1	0					

Description: b6-18 is multi-step function mode reset. Reset when setting value is 1.
DI terminal is also used as the function of multi-step function mode reset.
Set H1-xx to 17, terminal applies when reset.

Multi-step function mode

Liner operation, (single circle):

Set b6-17 to 0 to implement liner multi-step function mode. Six steps multi-step function mode as example to descript setting pattern and operation status:

1. Set six steps multi-step function mode:

    Set all steps of operation time b6-01~06 and operation frequency d1-01~d1-06. Set operation time b6-07 to 0 to operate until sixth step.

2. Set automatically procedure operation control:

    Set b1-01 to 4, source of frequency command is multi-step function mode control.

3. Implement operation, automatically stop after operated to the end of sixth step. Operate again from first step when restart.

    If stop during operation or recover after power failure, it will start operation from current of operation step when operates again. For example, the third frequency d1-03=30Hz, set operation time to 32min, power failure occurred when the third step operated to 12min, then restart again and implement 30Hz to operate when power on, next apply to the fourth step after operated 20min.

4. If user wants to stop current operation status during operation and restart from first step to use reset to clear operation timer. Set b6-18 to 1 or DI terminal (17)applies to multi-step function mode to reset.
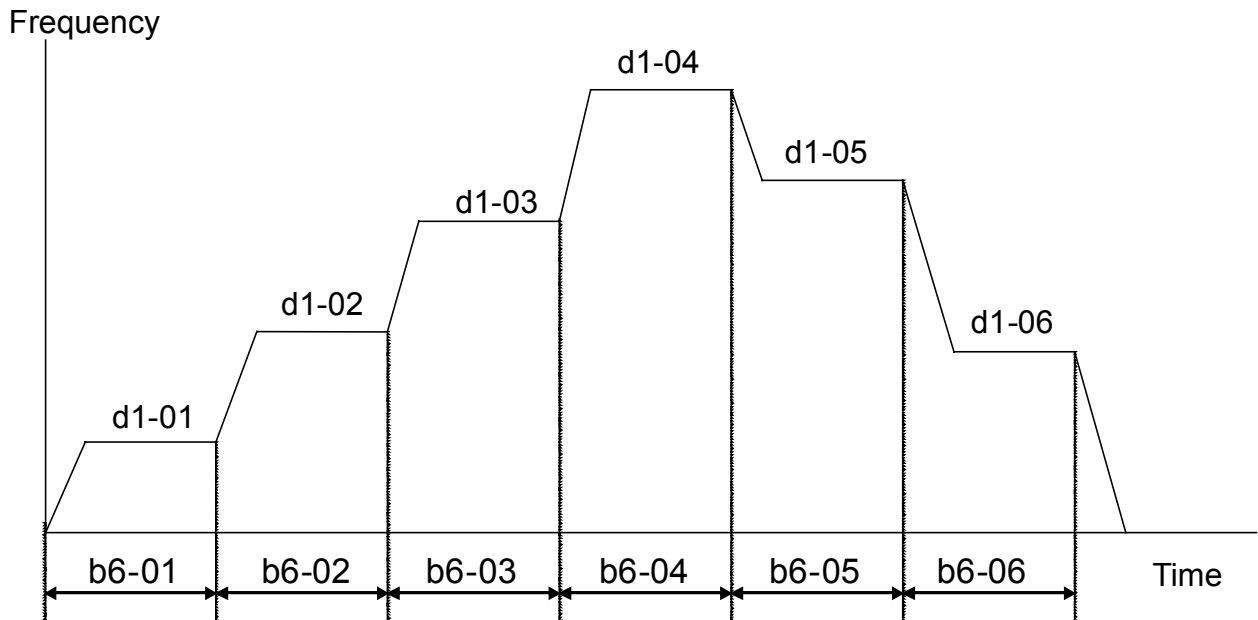
Fig. Liner operation (Single circle)

Liner operation (constant operation):

Set b6-17 to 1 to implement liner multi-step function mode. it will automatically restart from the first step after the end of operation. Detailed information and an example refer to previous page.
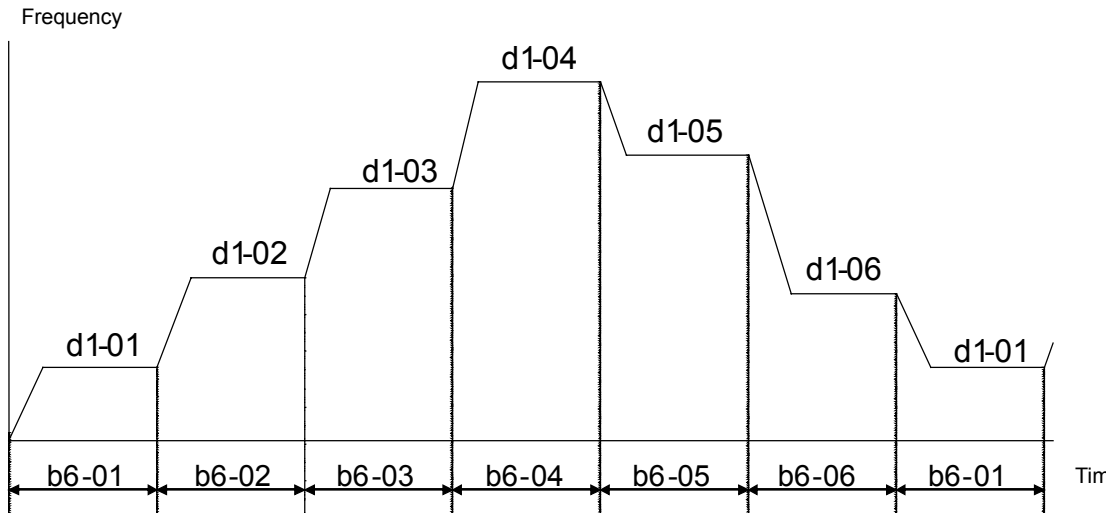
Fig. Liner operation (continuous operation)

Liner operation (continuous operation, wait for reset):

Set b6-17 to 2 to implement multi-step function mode. After the end of operation, and perform speed as the last speed in the step , wait for reset signal input, then change to first step's speed. Detailed information and an example refer to previous page.
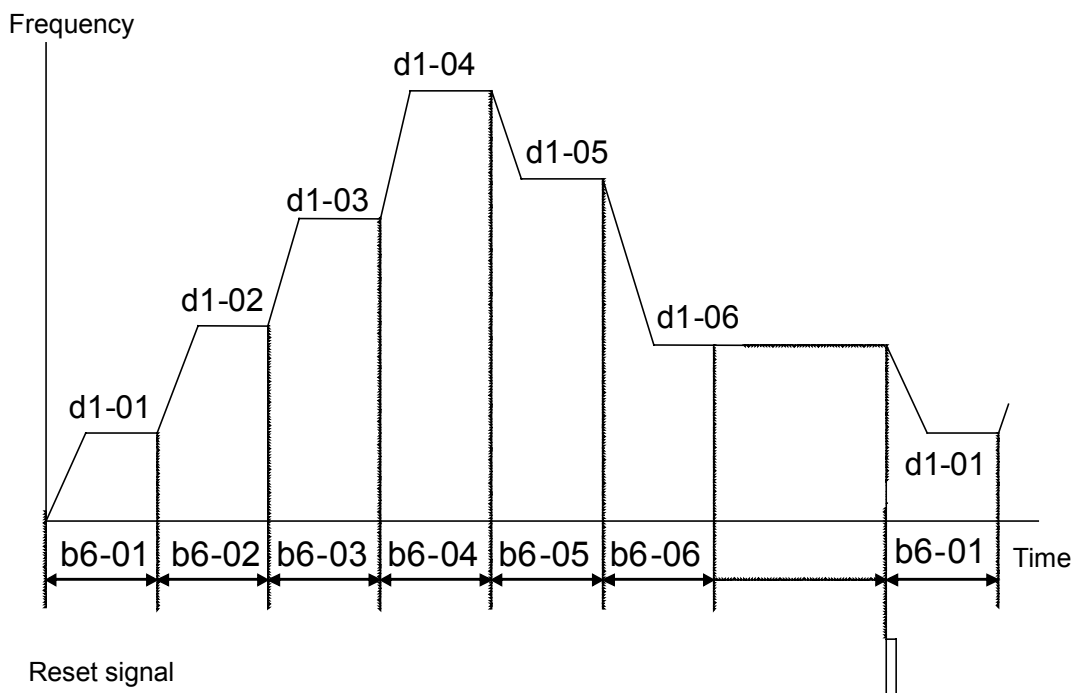
Fig. Liner operation (continuous operation, wait for reset)

Gradually operation (single circle):

Set b6-17 to 4, to implement multi-step function mode operation gradually, it is different from liner operation, the frequency command is set by gradually operation is final frequency of stage of operation.

Frequency
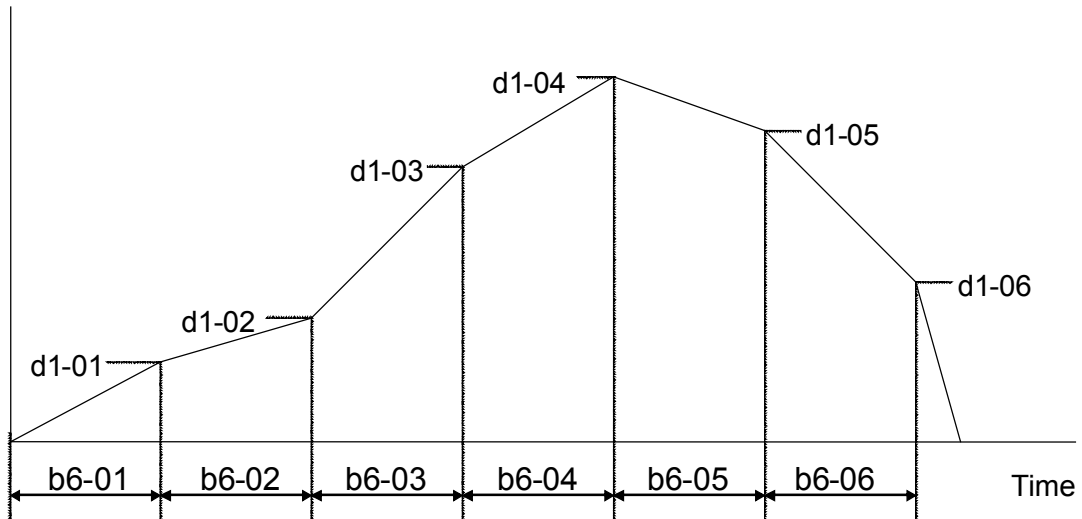
Fig . Gradually operation

Gradually operation (continuous operation):

Set b6-17 to 5, to implement gradually multi-step function mode operation. The inverter will automatically operate from first step after end of operation. Please pay attention, if the setting value of last step is not 0. The result of first and last step will be different. Therefore, please set the frequency command of last step to 0.

Frequency
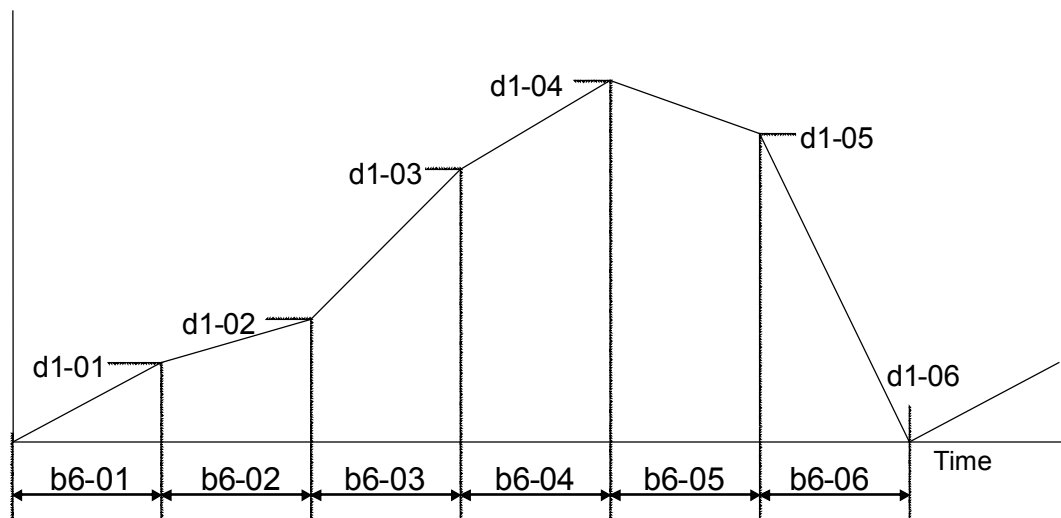
Fig . Gradually operation (continuous)

Gradually operation (continuous operation wait for reset):

Set b6-17 to 6, to implement multi-step function mode operation gradually. After the end of operation to maintain last step frequency operation, then restart   from the first step to operate after wait for reset signal input.

Acceleration/ deceleration time setting

When implement multi-step function mode operation, except use general acceleration/ deceleration time, user can make all steps operation with each acceleration/ deceleration time by setting C1-20=1. Detail constants, please refer to P.70

Chapter 10 Modbus communication

This product built in with standard RS422/RS485 communicate port, support international standard MODBUS protocol, user can monitor single or many inverters by using PLC, PC, industrial computer or other equipment which support MODBUS protocol.

The physical links

The wiring of this product can use either RS422（4 wires）or RS485（2 wires），by JUMPER(J5).

JUMPER setting	
J5	J5
RS422	RS485
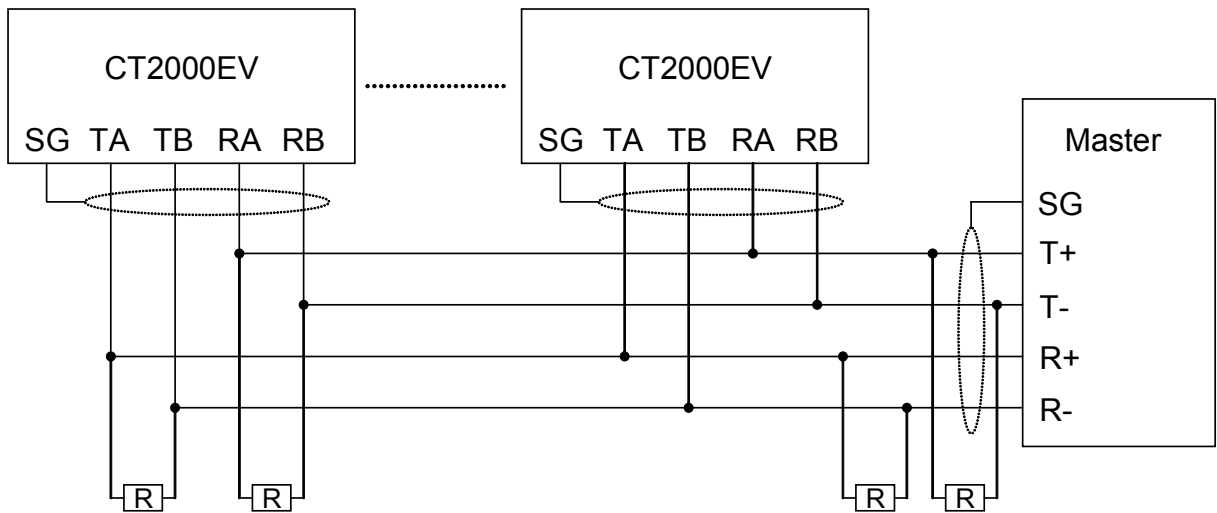
Fig. RS422 The physical links

The physical links (continued)
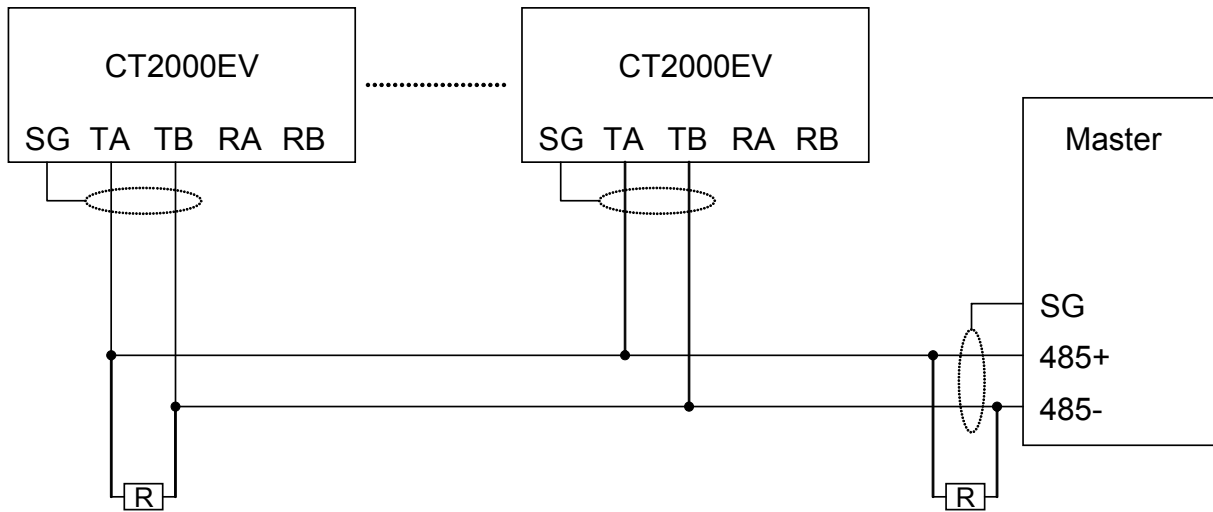
Fig. RS485 The physical links

Related constants

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H5-01	Address(ID)	0~240	31					

Description: each inverter should be set its own address in a communication net, each address has to be the only one in this net.

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H5-02	Baud rate	0~4	3					

Description: available baud rate setting

Setting value	Baud rate	Setting value	Baud rate
0	1200 bps	3	9600 bps
1	2400 bps	4	19200 bps
2	4800 bps		

Related constants (continued)

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H5-03	Parity bit check	0~2	0					

Description: Setting value 0: disable
1: even parity bit
2: odd parity bit

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H5-06	Communication respond waiting time	2~65	2ms					

Description: When inverter receive a data, it will send the response data after H5-06 time, it is used masterly when Master process speed slower or TE single delay time of two wires communication.

Description	Notes	Setting	MODBUS Address
Operation command	FR	1	4BH
	RR	3	
	STOP	4	

Description	Notes	Notes (U1-12)
Operation status	Standby	12
	FR	3
	RR	15
	FR decelerate and stop	1
	RR decelerate and stop	13
	FR shift RR	5
	RR shift FR	7

Data structure

This product support MODBUS RTU protocol, Function 03H   06H code, the data protocol of all function codes as below.

Function 03H:Read holding registers

Read 2 data from register in an inverter at slave address =1FH, data address are continuous and the beginning address is 280H   the RTU MODE data frame are listed as below:

RTU Mode:

Query	
Field name	Example
Slave address	1FH
Function	03H
Starting address (high byte)	02H
Starting address (low byte)	80H
Number of register (high byte)	00H
Number of register (low byte)	02H
CRC error check (low byte)	C7H
CRC error check (high byte)	E5H

Response	
Field name	Example
Slave address	1FH
Function	03H
Byte count	04H
Content of address 006BH (high byte)	03H
Content of address 006BH (low byte)	E8H
Content of address 006CH (high byte)	00H
Content of address 006CH (low byte)	00H
CRC error check (low byte)	84H
CRC error check (high byte)	42H

MODBUS communication

Function 06H:write single register

Write a data as 1000(03E8H) to the register which is at address 1FH in an inverter at slave address= 0280H, the RTU MODE data frame are listed as below:

RTU Mode:

Query	
Field name	Example
Slave address	1FH
Function	06H
Data address (high byte)	02H
Data address (low byte)	80H
Data content (high byte)	03H
Data content (low byte)	E8H
CRC error check (low byte)	8AH
CRC error check (high byte)	9AH

Response	
Field name	Example
Slave address	1FH
Function	06H
Data address (high byte)	02H
Data address (low byte)	80H
Data content (high byte)	03H
Data content (low byte)	E8H
CRC error check (low byte)	8AH
CRC error check (high byte)	9AH

CRC Generation :

1. Load 16 bit register with FFFF hex all 1's . Call this the CRC register.
2. Exclusive OR the first eight-bit byte of the message with the low order byte of the 16-bit CRC register, putting the result in the CRC register
3. Shift the CRC register one bit to the right (toward the LSB), zero filling the MSB. Extract and examine the LSB.
4. If the LSB is 0, repeat Step 3 (another shift). If the LSB is 1. Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001).
5. Repeat Step 3 and Step 4 until eight shifts have been performed. When this is done, a complete eight-bit byte will have been processed.
6. Repeat 2~5 for next eight-bit byte of the message. Continue doing this until all bytes hence were processed.
   The final content of the CRC register is the CRC value.

CRC Generation (continued)**:**

Pseudo code for generating a CRC-16:

```
CONST ARRAY BUFFER      /* data   ex: 11h, 03h, 00h,6bh,00h,02h */
CONST WORD POLYNOMIAL = 0a001h      /* X16 = X15 + X2 + X1 */
/* SUBROTINUE OF CRC CACULATE START */
CRC_CAL(LENGTH)
VAR INTEGER LENGTH;
{
     VAR WORD CRC16 = 0FFFFH ;      /* CRC16 initialize */
     VAR INTEGER = I,j;                    /* LOOP COUNTER */
     VAR BYTE DATA;                        /* DATA BUFFER */
     FOR (I=1;I=LENGTH;I++)            /* BYTE LOOP */
     {
          DATA == BUFFER[I];
          CRC16 == CRC16 XOR DATA;
          FOR (J=1;J=8;J++)              /* BIT LOOP */
          {
               IF ((DATA XOR CRC16) AND 0001H) = 1 THEN
                    CRC16 = (CRC16 SHR 1) XOR POLYNOMIAL;
               ELSE
                    CRC16 == CRC16 SHR 1;
               DATA == DATA SHR 1;
          };
     };
};
```

Chapter 11 Option card function

11.1 Pulse Generator / Option

Set Pulse Generator

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
F1-01	PG pulse	0~ 20000	1024					

Description: F1-01 is pulse setting of pulse generator, please input by pulse generator specification.

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
F1-05	Set PG rotate direction	0~1	0					

Description: F1-05 is rotate direction setting of pulse generator.
A phase surpassed B phase is forward, when set to 0.
B phase surpassed A phase is forward, when set to 1.

Detect PG breaking

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
F1-02	Movement when detected PG breaking	0~3	1					
F1-14	Detect PG breaking time	0.0~ 10.0	2.0 sec					

Description: When detect PG breaking over F1-14 setting time, the inverter will move according to F1-02.

F1-02=0:Decelerate to stop (stopped by deceleration time).
F1-02=1:Free run stop.
F1-02=2:Emergency stop (stopped by C1-17 deceleration time).
F1-02=3:Disable.

Detect over speed

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
F1-03	Select movement when over speed occurred	0~3	1					
F1-08	Detect over speed positioning	0~120	115%					
F1-09	Detect over speed time	0.0~2.0	1.0 sec					

Description: When motor speed surpassed F1-08 set positioning and detected time over F1-09 time, the inverter will move according to F1-03 set.

F1-08 setting method: Set over speed detects positioning by maximum output frequency is 100%.
F1-03=0:Decelerate to stop (stopped by deceleration time).
F1-03=1:Free run stop.
F1-03=2:Emergency stop (stopped by C1-17 deceleration time).
F1-03=3:Disable.

Analog input/ analog output

11.2 Analog input

Option card offers two analog input terminals, the serial No. and specification:

AI1: Multi-function 0~10V / ±10V voltage input

AI2: Multi-function 0~10V / ±10V voltage input

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
F2-01	AI1 specification selecting	0~1	0					
F2-02	AI1 function selecting	0~12	0					
F2-03	AI1 input gain	0.0~ 1000.0	100%					
F2-04	AI1 input bias	±100.0	0.0%					
F2-05	AI2 specification selecting	0~1	0					
F2-06	AI2 function selecting	0~12	0					
F2-07	AI2 input gain	0.0~ 1000.0	100%					
F2-08	AI2 input bias	±100.0	0.0%					
F2-09	AI1 Analog input filter time	1~ 1000	5					
F2-10	AI2 Analog input filter time	1~ 1000	5					

Description: The specification of AI1and AI2 exist 0~10V and ±10V by setting F2-01 and F2-05. Set 0 to 0~10V, set 1 to ±10V.

AI1 and AI2 can use F2-03 and F2-07 to set enlarge/ reduce magnification, as well as set F2-04 and F2-08 to bias %.
AI1and AI2 can be set, please refer to P.118
If F2-02=1 or F2-06=1 setting H3-01=0.
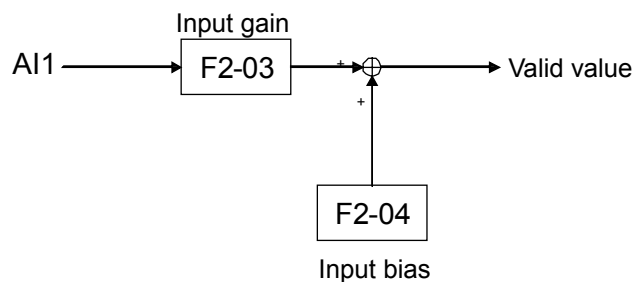
11.3 Analog output

Option card offers two analog output terminals, the serial No. and specification:

AO1: Multi-function 0~10V / ±10V voltage output

AO2: Multi-function 0~10V / ±10V voltage output

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
F4-01	AO1 function selecting	1~27	1					
F4-02	AO1 output gain	0~2.50	1.00					
F4-03	AO2 function selection	1~27	1					
F4-04	AO2 output gain	0~2.50	1.00					
F4-05	AO1 output bias	±10.0	0%					
F4-06	AO2 output bias	±10.0	0%					
F4-07	AO1 output specification	0~1	0					
F4-08	AO2 output specification	0~1	0					
F4-09	A01 Analog output filter time	1~1000	5.0					
F4-10	A02 Analog output filter time	1~1000	5.0					

Description: The specification of AO1and AO2 exist 0~10V and ±10V, set by F4-07 and F4-08.

The filter time could be set by F4-09 &10 , the filter time setting is longer, the capability of erasing filter is stronger, but the reaction of output become slow. Please set the adaptable time by user request.

Setting value	Description
0	0~10V output
1	±10V output

AO1 and AO2 can use F4-02 and F4-04 to set enlarge/ reduce magnification, as well as F4-05 and F4-06 set to bias %.

AO1 and AO2 can be set, please refer to monitoring constants U1.

11.4 Pulse input

Pulse input

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
H6-01	Pulse input function	0~2	0					
H6-02	Pulse input counting	1000~ 32000	1440 Hz					
H6-03	Pulse input gain	0.0~ 1000.0	100.0 %					
H6-04	Pulse input bias	±100.0	0.0%					
H6-05	Pulse input filter	0.00~ 2.00	0.10 sec					

Description: Input pulse frequency is 100% by H6-02 setting value, then changeover to be percentage and enlarge/ reduce magnification of H6-03, after that plus H6-04 bias value to be effective percentage.
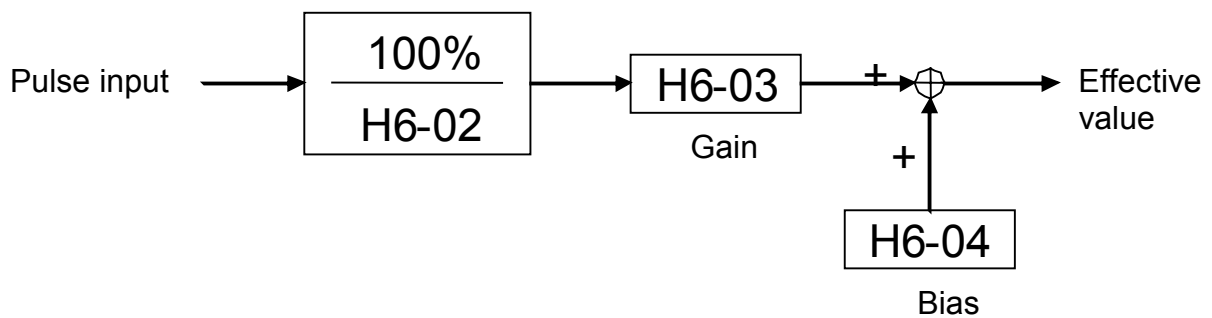
When set H6-01 to pulse input, user can input the function:
0:Frequency command, set maximum output frequency E1-04 to 100%.
1:PID Feedback value.
2:PID Command value.

Set H6-05 to filter time of pulse input.

Chapter 12 Protective function

12.1 Stall prevention function

Stall prevention in acceleration

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L3-01	Stall prevention selection during acceleration	0~1	1					
L3-02	Stall prevention level during acceleration	0~200	150%					

Description: When a heavy load is placed on the motor or acceleration time is too short during acceleration. Due to current output too much to lead inverter to over current, it can prevent from motor stall. The inverter will stop accelerating when output current exceeds L3-02 during acceleration.

L3-02 setting pattern: Set inverter rated current to 100%.

L3-01 =0, disabled
=1, enabled
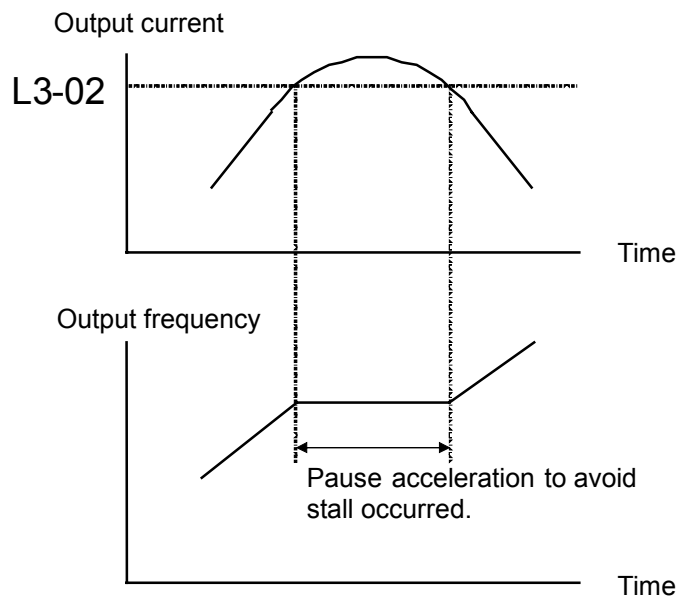
fig. Stall prevention in acceleration

Protective function

Stall prevention limit during acceleration

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L3-03	Stall prevention limit during acceleration	0~100	50%					

Description: If using the motor in the constant output range, and automatically lowered to prevent stalling, disable to prevent the stall prevention level in the constant output range from being reduced more than necessary.

Stall prevention level during acceleration

L3-02

L3-03 x L3-02

E1-06
Base frequency

Output frequency
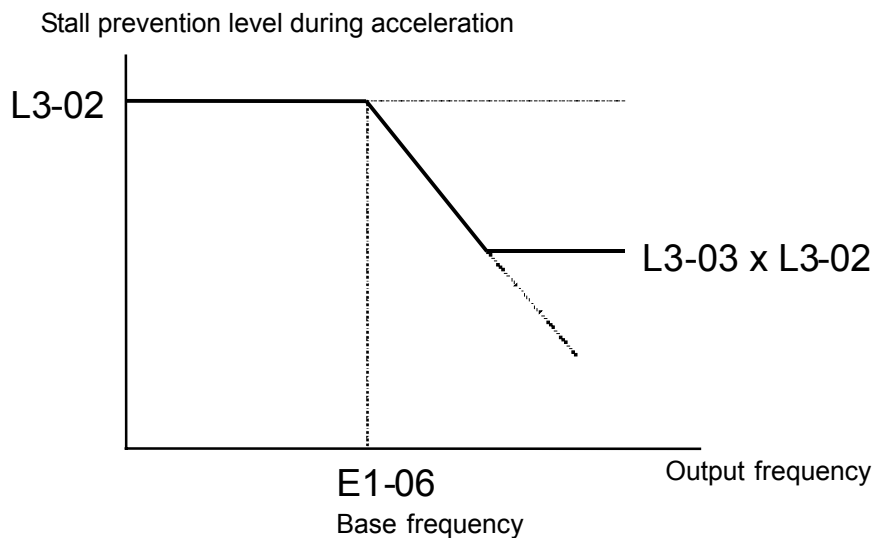
fig. Stall prevention limit during acceleration

Stall prevention limit during deceleration

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L3-04	Stall prevention limit during deceleration	0~1	1					

Description: If DC Bus exceeds setting value and stop deceleration to avoid inverter (OV- over voltage) when the motor decelerated.

L3-04 =0, disabled

=1, enabled

Output frequency

Stop deceleration when DC Bus in the high side

Time
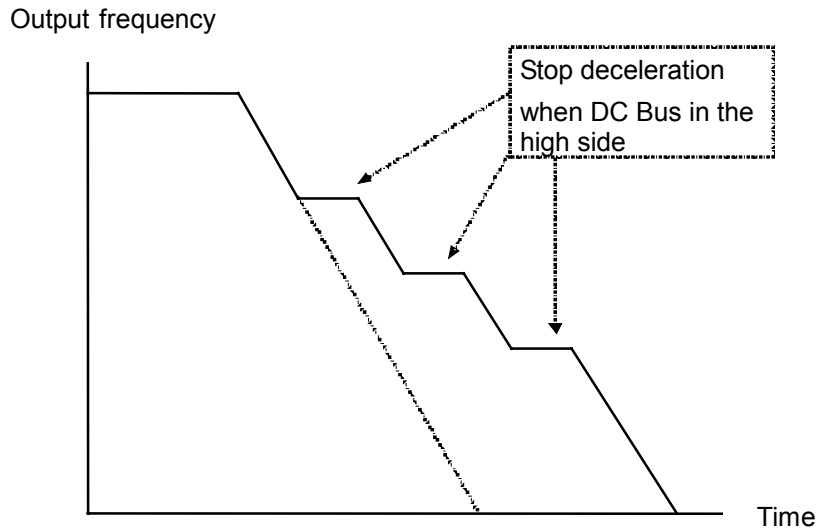
Fig. Stall prevention function when stall

Stall prevention limit during constant speed

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L3-05	Stall prevention selection during operation	0~1	1					
L3-06	Stall prevention level during operation	30~200	150%					

Description: A heavy load is placed on the motor when constant operation and makes inverter output current exceed L3-06 setting value. The inverter will automatically reduce output frequency to prevent the motor from stall (OC/OL). When a load disappeared or lightened and makes inverter output current be smaller than L3-06 setting value. The inverter will automatically accelerate to work frequency.

L3-06 setting pattern: set 100% by inverter rated current.

L3-05 =0, disabled

=1, enabled, decelerated by C1-14 deceleration time.
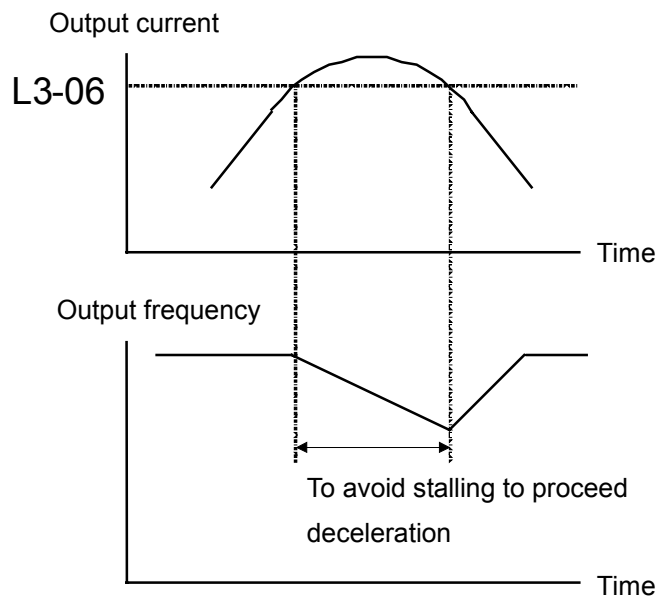
Fig. Stall prevention during constant speed

12.2 Continuously operation

Power is restored then restart automatically after momentary power loss

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L2-01	Momentary power loss direction	0~2	0					
L2-02	Momentary power loss compensation time	0.0~2.0	0.1 sec					
L2-04	Voltage recover time	0.0~20.0	0.3 sec					

Description: If a temporary power loss occurs, user can restart the inverter automatically after power is restored to continue motor operation. To restart the inverter after power restored, set L2-01=1 or 2

If L2-01 is set to 1, when power is restored within the time set in L2-02, the inverter will restart. If the time set in L2-02 is exceeded, UV (under voltage) will be detected.

If L2-01 is set to 2, when power is restored while the control power supply is kept CPU to work, the inverter will restart UV (under voltage) will be cleared automatically.

Speed search setting is collocated when use momentary stop and restart.

AC power

Time

Inverter output

Power restored in L2-02 time

Time

Momentary power loss, compensation time

Voltage recover time

L2-02

Speed search waiting time

Speed search when restart

L2-04

b3-05
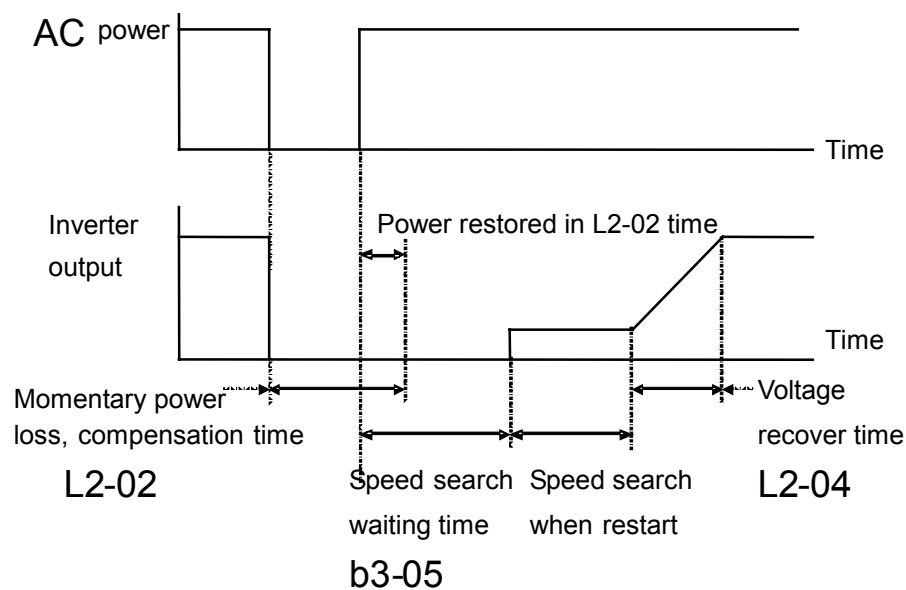
fig. Momentary stop then restart sequence diagram

Speed search

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
b3-01	Speed search selection	0~2	0					
b3-02	Speed search operating current	0~200	120%					
b3-03	Speed search deceleration time (current detection)	0.1~ 10.0	2.0 sec					
b3-05	Speed search waiting time	0.0~ 20.0	0.2 sec					

Description: The speed search function finds the actual speed of motor that is rotational using inertia, and then starts smoothly from that speed. When restoring power after a temporary power loss or rotational using inertia fan is enable. There are two ways of speed search by set b3-01.

b3-01 = 0, disable

=1, enable, MCK feedback (above 3HP)

=2, enable, current detection

=3, enable, MCK disconnection start+ inertia start

MCK feedback speed search: search motor rotation speed by MCK feedback signal, then start operation by the speed.
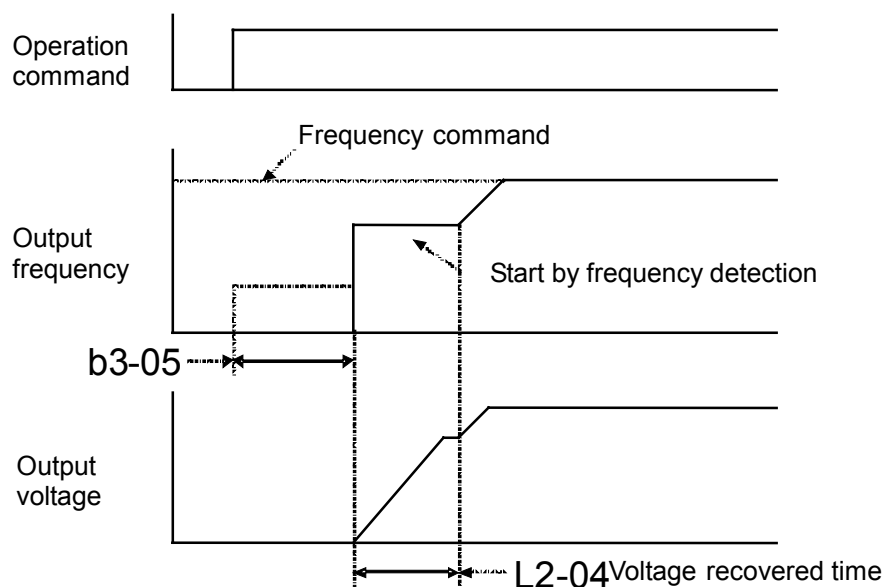
fig. MCK feedback speed search

Current detection speed search: Start searching motor speed by frequency command or maximum output frequency, when output current exceeds b3-02 setting in searching and start by b3-03 time to decrease output frequency, after current is lower than b3-02 setting value and implement regular operation.
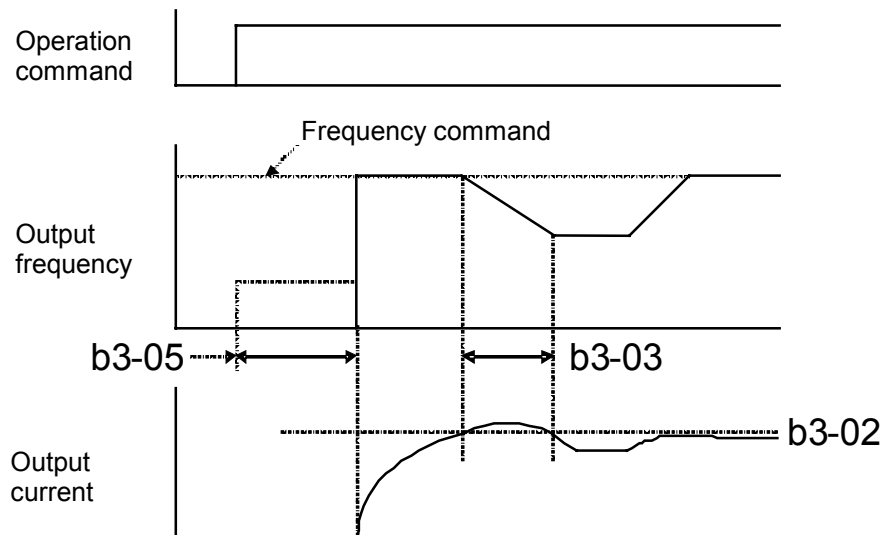
fig. Current detection speed search

Setting precautions

A. When C control mode is V/f control with PG, the unit will start from the PG feedback speed.

B. If the inverter output side is equipped with a contactor, set the delay time of contactor motion b3-05. When not using the contact, user can reduce the search time by setting 0.0 seconds to implement motion of speed search early.

C. If the motor cannot be restarted smoothly, when use current detection speed search, please reduce b3-02 setting value or extend L2-04 setting value.

D. If over current (OC) is detected when using speed search after momentary power loss then restart, please extend b3-05 or L2-04 setting value.

12.3 Overheating protection

Inverter overheat protection

The inverter used the PTC (Positive Temperature Coefficient) of module to detect the internal temperature of module to protect inverter from overheating. Overheating detection level, overheating forecast level and motion when overheating forecast are settable.

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L8-02	Inverter overheating forecast detection level	50~100	90%					
L8-03	Motion when Inverter overheating forecast detection	0~3	3					
L8-04	Inverter overheating detection level	50~130	95					

Description: Set L8-04 to Inverter overheating detection level. OH1 is displayed and inverter will stop free run when it is detected.

L8-02 set Inverter overheating forecast level, set 8-04 to 100%. Select operation by L8-03 when overheating forecast occurred.

L8-03 setting value	Description
0	Deceleration stop (Inverter is stopped by set deceleration time)
1	Coast stop
2	Emergency stop (Inverter is stopped by C1-17)
3	Continuous operation, OH 2 displays overheating forecast.

DBU (braking transistor) overheat protection

The deceleration time of inverter is too short, when the motor regeneration energy is too large, inverter will start braking to use resistor to release regeneration energy, but transistor consume energy as well as bring heat. Transistor is burned, if bring too high thermal energy.

Constant	Description	Setting range	Default value	Change during operation	Control patterns			
					VF	VF PG	Vector	Vector PG
L8-01	Braking transistor overheating protection	0~1	0					

Description: Set L8-01 to protect braking transistor to avoid releasing energy for long time and burn.

Enable when setting value is 1.

Malfunction code dbOH is displayed when detected braking transistor overheat. Braking will be shut down. If regeneration is not improvement, OU over voltage might occur, lengthen the deceleration time or replace the braking resistor unit with one with a higher breaking capacity.

12.4 Overload protection

Motor overload protection

When motor operation exceeds motor rated current is overload operation. It is overload operation. If motor is under overload operation, it might lead to burn the motor.

Set protection point of motor to be 150% of motor rated current, overload time is 60 seconds, OL 1 is displayed when overload occurred, motor stops coast.

Failures in driving

Display	Description	Checking item	Trouble Shooting
OC	Over-current (230%)	Is acceleration/ deceleration time too short? Is variation of load too wide?	Increase acceleration/ deceleration time; to lighten load.
OV	Over voltage	Deceleration time is rapid, re-generation voltage is too high, and power is too high.	To increase deceleration time, to enhance breaking ability.
LU	Low power	Does power source lacking phase or does not have any input?	Check power source and wiring.
PLU	Low power	Power is too low, DC voltage detective error.	To improve supply power, to replace control board.
OH 1	Overheat, inverter keep going	Cooling fan stop, atmosphere temperature high, overload operation of motor.	Change fan, cooling atmosphere temperature, lighten load.
OH 2	Overheat, inverter stop	Cooling fan stop, atmosphere temperature high, overload operation of motor.	Change fan, cooling atmosphere temperature, lighten load.
OL 1	Overload detected 150% nearly 1 minute	Does the motor continue operating under over load?	To lighten load, increase the capacity of the inverter and motor.
EC00	CAN communication complete malfunction	Does CAN Bus of option card connect wrong way, is constant set wrong ?	CAN Bus of option card connect right way, constant is set correct
EC08	CAN feedback malfunction in part	Does CAN Bus of option card connect wrong way, is constant set wrong ?	CAN Bus of option card connect right way, constant is set correct
EE 0	Option error	Is the option unconnected or error	Re-wiring, to replace option.
OS	Over speed	Wrong setting of option, poles of motor and system.	Re-examine constant and system.

Chapter 13 Specification and user constants table

13.1 Specification

Standard Specification 200V series

Motor rate (KW)	0.4	0. 75	1. 5	2. 2	3. 7	5. 5	7. 5
Model (CT2002)	EV-A4	EV-A75	EV-1A5	EV-2A2	EV-3A7		
Rated current (A)	2.4	4.2	7.4	11.1	18		
Rated capacity KVA	1	1.8	2.9	4.4	7.1		
Rated input voltage	3 200~230V ±10% 50 / 60Hz ±5%						
Rated output voltage	3 200~230V ±10%						
Control pattern	V/f loop control V/f closed loop control vector loop control vector closed loop control torque control						
Frequency accuracy	Digital setting:±0.01 Analog setting:± 1% 35						
Frequency resolution	Digital setting:0.01 Hz Analog setting: Maximum frequency/4096 Hz						
Frequency range	0.00 ~ 400.00 Hz						
V/f ratio	15 patterns or any V/f pattern						
Torque compensation	0 ~ 200% voltage compensation						
Accel/ decel time	0.0 ~ 6000.0sec. linear, 8-step setting and 0.0~2.50sec(S curve setting)						
Braking	DC braking dynamic braking						
Standard feature	Jogging upper/ lower frequency setting 16-step speed setting PLC (multi-step function control) RS485/RS422 communication setting jumper frequency PID control multi-function analog input/ output						
Option card function	Option input pulse input CAN Bus analog output/ input(12bitX 2 suits each)						
Frequency setting	Digital Analog setting by keypad DC 0~10V Analog setting DC 0~10V 4~20mA						
Display	7-segment LED display frequency voltage current setting value operation function operation indicator fault status						
Protection	Low voltage high voltage overload over current overheat						
Overload capacity	Continuous rated current 150%						
Altitude	Indoor Altitude 1,000 meters						
Ambient temperature	-10 ~ 40						
Humidity	Relative between 45% to 90% No condensing						
Cooling system	Forced air-cooling						
Weight (kg)	1. 6	1. 6	1. 6	2. 5	2. 5		

" " under development.

Standard Specification 400V series

Motor rate (KW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5
Model (CT2004)	EV-A4	EV-A75	EV-1A5	EV-2A2	EV-3A7		
Rated current (A	1	2.2	4.0	6.2	9		
Rated capacity (KVA)	1	1.7	3.2	4.9	7.1		
Rated input voltage	3 200~230V ±10% 50 / 60Hz ±5%						
Rated output voltage	3 200~230V ±10%						
Control pattern	V/f loop control V/f closed loop control vector loop control vector closed loop control torque control						
Frequency accuracy	Digital setting:±0.01 Analog setting:± 1% 35						
Frequency resolution	Digital setting:0.01 Hz Analog setting: Maximum frequency/4096 Hz						
Frequency range	0.00 ~ 400.00 Hz						
V/f ratio	15 pattern or any V/f pattern						
Torque compensation	0 ~ 200% voltage compensation						
Accel/ decel time	0.0 ~ 6000.0sec. linear, 8-step setting and 0.0~2.50sec(S curve setting)						
Motor braking	DC braking dynamic braking						
Standard feature	Jogging upper/ lower frequency setting 16-step speed setting PLC (multi-step function control) RS485/RS422 communication setting jumper frequency PID control multi-function analog input/ output						
Option card function	Option input pulse input CAN Bus analog output/ input(12bitX 2 suits each)						
Frequency setting	Digital Analog setting by keypad DC 0~10V Analog setting DC 0~10V 4~20mA						
Display	7-segment LED display frequency voltage current setting value operation function operation indicator fault status						
Protection	Low voltage over voltage overload over current overheat						
Overload capacity	Continuous rated current 150%						
Altitude	Indoor Altitude 1,000 meters						
Ambient temperature	-10 ~ 40						
Humidity	Relative between 45% to 90% No condensing						
Cooling system	Forced air-cooling						
Weight (kg)	1.6	1.6	1.6	2.5	2.5		

"   " under development.

13.2 User constants table
Constants classification arch-table

A. Environment setting	------------	A1	Environment setting
B. Application	------------	b1	Operation mode setting
		b2	DC injection braking
		b3	Speed search inertia start
		b5	PID control
		b6	PLC multi-function operation
C. Adjustment	------------	C1	Acceleration/ deceleration time
		C2	S-curve acceleration/ deceleration
		C3	Motor slip characteristic
		C4	Torque characteristic
		C5	Closed loop control
		C6	P.W.M. frequency
D. Command	------------	d1	Frequency command
		d2	Frequency limit
		d3	Jump frequency
E. Motor constant	------------	E1	V/f characteristic
		E2	Motor constant
F. Option card function	------------	F1	PG Option card setting
		F2	Option card analog input
		F4	Option card analog output
		F6	Reserved
H. Terminal function	------------	H1	Multi-function input terminal
		H2	Multi-function output terminal
		H3	Analog input
		H4	Analog output
		H5	MODBUS communication
		H6	PWM input
L. Protection function	------------	L2	Power loss ride through
		L3	Stall prevention
		L7	Torque limit
		L8	Overheat protection
O. Display setting	------------	o1	Display setting
T. Autotuning	------------	T1	Motor autotuning
U. Monitor	------------	U1	Monitor status
		U2	Malfunction record

A1: Environment setting

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
A1-01	Constant display levels	Set access rank of constant: 0: read mode. 1: simple mode. 2: macrocosm mode.	0~2	2						101H	P. 25
A1-02	Select control mode	Select control mode: 0: V/f opened loop control. 1: with V/f closed loop control of PG. 2: opened loop vector control. 3: closed loop with PG vector control.	0~3	0						102H	P. 27
A1-03	Recovering factory value	0: invalid 1: Only recover PLC constant 2: Recovering default value, uncontained PLC constant. 3: Recovering Factory value, uncontained motor and PLC constant. 4. All constants recover factory value. 5. Eliminate error record.	0~5	0						103H	P. 27
A1-04	Code	Input code.	0~9999	0						104H	
A1-05	Motor rated voltage	0 : 380V. 1 : 415V. 2 : 440V. 3 : 460V. (220Vseries unsetting).	0~3	0						105H	

A1: Environment setting (factory appropriable constants)

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
A1-06	Setting HP	Setting HP of inverter: 220V series: 440V series: 0=1/2 HP 32=1/2 HP 1= 1HP 33= 2HP 2= 2HP 34= 3HP 3= 3HP 35= 4HP 4= 5HP 36= 5HP	0~64	By specifications						106H	
A1-07	Current display fine-tuning	Adjust current deviation.	-100.0~100.0	0.0%						107H	
A1-08	DC Bus fine-tuning	Adjust DC Bus deviation.	±15.0	0.0V						108H	
A1-09	Dead time	Set dead time for inverter: 0= 2.0us, 6= 3.2us 1= 2.2us, 7= 3.6us 2= 2.1us, 8= 4.0us 3= 2.6us, 9= 4.4us 4= 2.8us, 10=4.8us 5= 3.0us	0~10	5						109H	
A1-10	Dead time compensation	Set Dead time compensation percentage.	0~150	100%						10AH	

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b1: Select frequency command input pattern

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
b1-01	Select frequency command	Select frequency command input pattern: 0: Keypad input. 1: Analog input. 2: P.W.M. input. 3: VR knob of Keypad. 4: PLC auto procedure control. 5: VR knob of Keypad (lag).	0~5	5						180H	P. 30
b1-02	Select control mode	select operation command input pattern: 0: Keypad control. 1: External terminal control. 2:MODBUS communication.	0~2	0						181H	P. 32
b1-03	Select Stationary pattern	Select Stationary operation patterns: 0: Deceleration to stop. 1: Coast to stop. 2: DC braking stop. 3. Coast to stop with timer.	0~3	0						182H	P. 35
b1-04	Prohibition of reverse operation	0: Reversible. 1: Prohibit reverse.	0~1	0						183H	P. 34

b1: DC braking stop

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
b2-01	DC injection brake starting frequency	Set Hz as a unit to start process frequency of DC brake when decelerate to stop. When b2-01 < E1-09, it starts from E1-09 to process.	0.0~10.0	0.5Hz						189H	P. 38
b2-02	DC injection braking current	Set DC brake current Set rated current as 100%	0~100	50%						18AH	P. 38
b2-03	DC injection braking time at start	Set DC brake time when start inverter Set value to be 0.00, DC brake invalid when start inverter	0.00~10.00	0.00 sec						18BH	P. 38
b2-04	DC injection brake at stop	Set DC brake time when start inverter Set value to be 0.00, DC brake invalid when start inverter	0.00~10.00	0.00 sec						18CH	P. 38

b3: Speed search (inertia start)

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
b3-01	Speed search selection	Set speed search pattern when start 0: Disable. 1: MCK feedback. 2: current detection. 3: MCK disconnection start + inertia start.	0~2	0						191H	P. 92
b3-02	Speed search operating current	Set active current of speed search. Set rated to be 100%. Please decrease set value when disable to start.	0~200	120%						192H	P. 92
b3-03	Speed search deceleration time (current detection)	Set the speed search for the exportation in the action frequency deceleration time. The enactment decelerates from the most high exportation frequency to 0.	0.1~ 10.0	2.0 sec						193H	P. 92
b3-05	Speed search waiting time	Wait for the time have been set when start, then start process the action of speed search.	0.0~ 20.0	0.2 sec						195H	P.92

b5: PID control

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
b5-01	Select PID control	0: invalid. 1: PID output is inverter output, D control error. 2: PID output is inverter output, D control feedback. 3: PID output is adjustment of inverter output, D control error. 4: PID output is adjustment of inverter output, D control feedback.	0~ 4	0						1A5H	P. 63
B5-02	Proportional control (P)	Set Proportional control of P control.	0.00~ 25.00	1.00						1A6H	P. 64
B5-03	Integral time (I)	Set integral time of I control.	0.0~ 360.0	1.00 sec						1A7H	P. 64
B5-04	Maximum value of Integral control (I)	Set maximum value of integral control, set 100% as maximum frequency.	0.0~ 100.0	100.0 %						1A8H	P. 64
b5-05	Derivative time(D)	Set derivative time of D control.	0.00~ 10.00	0.00 sec						1A9H	P. 64
B5-06	Maximum value of PID output	Set limit value of PID output, set 100% as maximum frequency.	0.0~ 100.0	100.0 %						1AAH	P. 64
B5-07	PID offset adjust	Adjust offset of PID output.	±100.0	0.0%						1ABH	P. 65
B5-08	PID output delay time	Set time of PID output low filter.	0.00~ 10.00	0.00 sec						1ACH	P. 65
b5-09	PID output characteristics selecting	P/D output characteristics of forward/ reverse: 0: Normal. 1: Inverting.	0~1	0						1ADH	P. 65

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
b5-10	PID output gain	Set PID output to enlarge magnification.	0.0~ 25.0	1.0						1AEH	P. 65
B5-11	PID output reverse selecting	0: When PID output is negative, limit output is 0. 1: When PID output is negative is inverting. When set b1-04 to prohibit inverting, output is 0.	0~1	0						1AFH	P. 65
B5-17	PID target value acceleration/ deceleration time	Set PID target value acceleration/ deceleration time, set time to accelerate from 0 to 100%.	0.0~ 25.5	1.00 sec						1B5H	P. 66
B5-18	Position of P controller selecting	0: P control is individual 1: Inaccuracy pass through P control, then enter to I, D control.	0~1	0						1B6H	P. 66
b5-19	PID output delay position selecting	0: PID output delay. 1: D control output delay.	0~1	0						1B7H	P. 65
B5-20	Select control reset	0: Auto clear integration when stop operation. 1: Use terminal to clear integration only.	0~1	0						1B8H	P. 66

B6 : Auto procedure operation

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
B6-01	1st step operation time	1st step operation time.	0~255	0 min						1C0H	P. 69
B6-02	2nd step operation time	2nd step operation time.	0~255	0 min						1C1H	P. 69
B6-03	3rd step operation time	3rd step operation time.	0~255	0 min						1C2H	P. 69
B6-04	4th step operation time	4th step operation time.	0~255	0 min						1C3H	P. 69
B6-05	5th step operation time	5th step operation time.	0~255	0 min						1C4H	P. 69
B6-06	6th step operation time	6th step operation time.	0~255	0 min						1C5H	P. 69
B6-07	7th step operation time	7th step operation time.	0~255	0 min						1C6H	P. 69
B6-08	8th step operation time	8th step operation time.	0~255	0 min						1C7H	P. 69
B6-09	9th step operation time	9th step operation time.	0~255	0 min						1C8H	P. 69
B6-10	10th step operation time	10th step operation time.	0~255	0 min						1C9H	P. 69

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
B6-11	11th step operation time	11th step operation time.	0~255	0 min						1CAH	P. 69
B6-12	12th step operation time	12th step operation time	0~255	0 min						1CBH	P. 69
B6-13	13th step operation time	13th step operation time.	0~255	0 min						1CCH	P. 69
B6-14	14th step operation time	14th step operation time.	0~255	0 min						1CDH	P. 69
B6-15	15th step operation time	15th step operation time.	0~255	0 min						1CEH	P. 69
B6-16	16th step operation time	16th step operation time.	0~255	0 min						1CFH	P. 69
B6-17	Auto procedure control pattern selecting	0:Liner operation (one circle) 1:Liner operation (continuous 1) 2:Liner operation (continuous 2) 3:Preservation. 4:Gradually operation(one circle) 5:Gradually operation (continuous 1). 6:Gradually operation (continuous 2).	0~6	0						1D0H	P. 69
B6-18	Auto procedure control pattern selecting	0: Disable. 1: Reset operation procedure and time to 0.	0~1	0						1D1H	P. 69

C1 : Acceleration/ Deceleration time setting

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
C1-01	Acceleration time 1	Multi-step acceleration/ deceleration setting: A: Use external terminal to switch option B: PLC operation and multi-step operation, 1~ 8 (9~ 16) step speed correspond 1~ 8 combinations acceleration/ deceleration time Acceleration: Setting value is 0 and accelerates to maximum speed time Deceleration: Setting value is 0 and Decelerates to maximum speed time.	0.0~ 6000.0	10.0 sec						200H	P. 39
C1-02	Deceleration time 1									201H	P. 39
C1-03	Acceleration time 2									202H	P. 39
C1-04	Deceleration time 2									203H	P. 39
C1-05	Acceleration time 3									204H	P. 39
C1-06	Deceleration time 3									205H	P. 39
C1-07	Acceleration time 4									206H	P. 39
C1-08	Deceleration time 4									207H	P. 39
C1-09	Acceleration time 5									208H	P. 39
C1-10	Deceleration time 5									209H	P. 39
C1-11	Acceleration time 6									20AH	P. 39
C1-12	Deceleration time 6									20BH	P. 39
C1-13	Acceleration time 7									20CH	P. 39
C1-14	Deceleration time 7			100						20DH	P. 39
C1-15	Jog acceleration time									20EH	P. 39
C1-16	Jog deceleration time			1						20FH	P. 39
C1-17	Emergency stop time	Fault detected or deceleration time of external terminal input function " emergency stop"								210H	P. 39
C1-18	Acceleration/ Deceleration time unit	0: 0.01 seconds 1: 0.1 seconds	0~1	1.0						211H	P. 39
C1-19	Acceleration/ Deceleration time switch frequency	Set frequency of automatical switch acceleration/ deceleration. Operation frequency < C1-19 acceleration/ deceleration 4. Operation frequency > C1-19 acceleration/ deceleration 1.	0.0~ 400.0	0.0Hz						212H	P. 39
C1-20	Multi-steps speed/PLC operation Acceleration/ Deceleration pattern	0: Standard 1: 1~8 steps correspond to 1~8 groups of acceleration/ deceleration 9~16 steps correspond to 1~8 groups of acceleration/ deceleration	0~1	0						228H	P. 39

C2: S-curve characteristics

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
C2-01	S-curve time at acceleration	set all S-curve characteristics time at acceleration/ deceleration time start and end. When S-curve characteristics set, the acceleration/ deceleration time will increase.	0.00~ 2.50	0..20 SEC						213H	P. 42
C2-02	S-curve time at acceleration end									214H	P. 42
C2-03	S-curve time at deceleration									215H	P. 42
C2-04	S-curve time at deceleration end									216H	P. 42

C3: Slip characteristics

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
C3-01	Slip compensation gain	Used to improve speed accuracy when operating with a load. Usually setting is nor necessary. Adjust this constant at the following times. ● When actual speed is low, increase the set value. ● When actual speed is high, decrease the set value.	0~2.50	0.00						217H	P. 55
C3-02	Slip compensation delay time	Slip compensation primary delay time is set in ms units. Usually setting is not necessary. Adjust this constants at following times. ● Reduce the setting when slip compesation responsive is slow. ● When speed is not stabilized, increase the setting.	0~ 10000	500 ms						218H	P. 55
C3-03	Restriction of Slip compensation	Set maximum value of slip compensation and motor rated slip to 100%	0~250	200%						219H	P. 55

C4: Torque characteristics

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
C4-01	torque compensation gain	Set torque compensation gain by magnification. Adequately adjustment need to be done when following situation occurred: 1. This setting value need to be increased when cable is too long. 2. To decrease setting value when motor vibrated. Please adjust output current don't exceed the range of inverter rated output current when low speed spin.	0~2.50	1.00						21AH	P. 54
C4-02	torque compensation lag time	Set ms a unit and set torque compensation one time delay time constant. Adequately adjustment need to be done when following situation occurred: 1: To increase this setting value when motor vibrated. 2: To decrease this setting value when motor response is low.	0~10000	200 ms						21BH	P. 54
C4-03	Unload current adjustment	Increase the value of Unload current when unload current is too large, opposite when too small to collocate C4-04.	30~150	60%							P. 54
C4-04	Torque compensation frequency point	Set torque compensation frequency.	1.5~10	2.50Hz							P. 54

C5: Closed loop control

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
C5-01	Proportional gain of ASR	Set proportional gain of ASR speed control loop.	0.00~300.00	0.2						21CH	P. 59
C5-02	Integral time of ASR	Set integral time of ASR speed control loop.	0.000~10.000	0.200 sec						21Dh	P. 59
C5-06	Proportional gain of ACR	Set proportional gain of ACR speed control loop.	0.00~300.00	0.2						221H	P. 60
C5-07	Integral time of ACR	Set integral time of ACR speed control loop.	0.5~2000.0	15 msec						222H	P. 60
C5-08	Select proportional/ integral of ACR	Select the source of proportional/ integral ACR. 0: Set by C5-06, C5-07 1: The value is detected by use motor automatic detection function.	0~1	0						223H	P. 60

C6: P.W.M. frequency

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
C6-02	Select P.W.M. frequency	Select fixed P.W.M. frequency 0: 2K 1: 4K 2: 5K 3: 8K 4: 10k 5: 12.5K 6: 15K 7~14: 5K 15: Set by C6-03 and C6-04	0~15	2						225H	P. 29
C6-03	P.W.M. frequency maximum	P.W.M. frequency maximum could be set free.	2.0~15.0	12 KHz						226H	P. 29
C6-04	P.W.M. frequency minimum	P.W.M. frequency minimum could be set free.	2.0~15.0	4 KHZ						227H	P. 29

D1: Multi-step function mode

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns 0	1	2	3	Communication address	Page
d1-01	Frequency command 1	Input master speed frequency by keypad.		10.00 Hz						280H	P. 70
d1-02	Frequency command 2	Multi-speed operation frequency.								281H	P. 70
d1-03	Frequency command 3	Multi-speed operation frequency.								282H	P. 70
d1-04	Frequency command 4	Multi-speed operation frequency.								283H	P. 70
d1-05	Frequency command 5	Multi-speed operation frequency.								284H	P. 70
d1-06	Frequency command 6	Multi-speed operation frequency.								285H	P. 70
d1-07	Frequency command 7	Multi-speed operation frequency.								286H	P. 70
d1-08	Frequency command 8	Multi-speed operation frequency.								287H	P. 70
d1-09	Frequency command 9	Multi-speed operation frequency.	0.00~ 400.00	0.00 Hz						288H	P. 70
d1-10	Frequency command 10	Multi-speed operation frequency.								289H	P. 70
d1-11	Frequency command 11	Multi-speed operation frequency.								28AH	P. 70
d1-12	Frequency command 12	Multi-speed operation frequency.								28BH	P. 70
d1-13	Frequency command 13	Multi-speed operation frequency.								28CH	P. 70
d1-14	Frequency command 14	Multi-speed operation frequency.								28DH	P. 70
d1-15	Frequency command 15	Multi-speed operation frequency.								28EH	P. 70
d1-16	Frequency command 16	Multi-speed operation frequency.								28FH	P. 70
d1-17	Jog frequency	Jog frequency when operation.		6.00 Hz						290H	P. 70

d2: Frequency limit

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns 0	1	2	3	Communication address	Page
d2-01	Frequency command upper limit	Setting value is 100% as high frequency, set frequency command limit level.	0.0~ 100.0	100.0 %						291H	P. 43
d2-02	Frequency command lower limit			0%						292H	P. 43

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d3: Jump frequency

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
d3-01	Jump frequency 1	Set the center values of jump frequencies.								294H	P. 43
d3-02	Jump frequency 2	This function is disable by setting the jump frequency to 0.	0.0~ 400.0	0.0Hz						295H	P. 43
d3-03	Jump frequency 3	Always ensure that the following applies: d3-01 d3-02 d3-03								296H	P. 43
d3-04	Jump frequency width	Set the Jump frequency bandwidth. The jump frequency will be the jump frequency ±d3-04.	0.0~ 20.0	1.0Hz						297H	P. 43

E1: V/f characteristic

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
E1-01	Input voltage	Set input voltage of inverter.	155~ 500	220V						300H	P. 50
E1-03	V/f curve select	0-14: Select from 15 fixed V/F pattern. 15: V/f pattern at will.	0~15	15						302H	P. 50
E1-04	Maximum output frequency		40.0~ 400.0	60.0 Hz						303H	P. 50
E1-05	Maximum voltage		0.0~ 500.0	220.0 V						304H	P. 50
E1-06	Base frequency		0.0~ 400.0	60.0 Hz						305H	P. 50
E1-07	Middle output frequency	Set V/f curve, the following rules must be obeyed when setting: E1-04 E1-06 E1-07 E1-09 E1-05 E1-13 E1-08 E1-10	0.0~ 400.0	3.0Hz						306H	P. 50
E1-08	Middle output voltage		0.0~ 500.0	15.0V						307H	P. 50
E1-09	Minimum output frequency		0.0~ 400.0	0.5Hz						308H	P. 50
E1-10	Minimum voltage		0.0~ 500.0	5.0V						309H	P. 50
E1-13	Base voltage	Motor rated voltage.	0.0~ 500.0	220.0 V						30CH	P. 50

E2: Motor constant

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
E2-01	Motor rated current	Set inverter rated current as 100%, set motor rated current.	10.0~ 200.0	100.0 %						30EH	P. 58
E2-02	Motor slip	Set motor slip magnitude It will be automatic set when motor autotuning.	0.00~ 20.00	2.00 Hz						30FH	P. 58
E2-03	Motor unloading current	Set inverter rated current as 100%, set motor unloading current. It will be automatic set when motor autotuning.	10.0~ 100.0	30.0 %						310H	P. 58
E2-04	The pole of motor	Set motor pole. It will be automatic set when motor autotuning.	2~8	4 pole						311H	P. 58
E2-05	Motor resistance	Set motor resistor. It will be automatic set when motor autotuning.	0.000~ 65.000	0.000						312H	P. 58
E2-06	Motor leakage inductance	Set inverter rated current as 100%. Set voltage decline magnitude that caused by motor leakage inductance. It will be automatic set when motor autotuning.	0.0~ 40.0	0.0%						313H	P. 58

F1: PG (option) setting

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
F1-01	PG pulse	Set PG pulse that be used.	0~20000	1024						380H	P. 82
F1-02	Movement when detected PG breaking (PGO)	Set stop pattern when PG breaking (PGO) were detected: 0: Deceleration stop (Stopped by deceleration time as C1-02). 1: Stop coast. 2: Emergency stop (Stopped by deceleration time as (C1-17). 3: Continuous operation (to protect motor and machine, please don't set during ordinarily time).	0~3	1						381H	P. 83
F1-03	Select movement when over speed occurred	Set stop pattern when over speed were occurred: 0: Deceleration stop (Stopped by deceleration time as C1-02). 1: Stop coast. 2: Emergency stop (Stopped by deceleration time as C1-17). 3: Continuous operation (to protect motor and machine, please don't set during ordinarily time).	0~3	1						382H	P. 83
F1-05	Set PG rotate direction	0: A phase move on is motor forward. 1: A phase move on is motor reverse.	0~1	0						384H	P. 82
F1-08	Detect over speed positioning	Set pattern of OS detection Positioning of F1-08 (Set % a unit, maximum 100%) above frequency and detected OS when continuous exceed setting time of F1-09.	0~120	115%						387H	P. 83
F1-09	Detect over speed time		0.0~2.0	1.0 sec						388H	P. 83
F1-14	Detect PG breaking time	Set sec a unit to set time of PG breaking detection.	0.0~10.0	2.0 sec						38DH	P. 83

F2: Option card analog input

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
F2-01	AI1 specification selecting	Input specification of demand selection for enquiry: 0: 0V~ 10V 1: -10V~ +10V	0~1	0						390H	P. 84
F2-02	AI1 function selecting	Set AI 1 function, please refer to multifunction analog input constant.	0~12	0						391H	P. 84
F2-03	AI1 input gain	Set percentage 100% when input 10V to answer selecting function of F2-02 100%.	0.0~ 1000.0	100%						392H	P. 84
F2-04	AI1 input bias	Set percentage of bias when input 0V (or –10V).	±100.0	0.0%						393H	P. 84
F2-05	AI2 specification selecting	Input specification of demand selection for enquiry: 0: 0V~ 10V 1: -10V~ +10V	0~1	0						394H	P. 84
F2-06	AI2 function selecting	Set AI 2 function, please refer to multifunction analog input constant.	0~12	0						395H	P. 84
F2-07	AI2 input gain	Set percentage 100% when input 10V to answer selecting function of F2-06 100%.	0.0~ 1000.0	100%						396H	P. 84
F2-08	AI2 input bias	Set percentage of bias when input 0V (or –10V).	±100.0	0.0%						397H	P. 84
F2-09	AI1 Analog input filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	1.0~ 1000.0	5.0						398H	P. 84
F2-10	AI2 Analog input filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	1.0~ 1000.0	5.0						399H	P. 84

F4: Option card analog input

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
F4-01	AO1 function selecting	Set VOUT terminal function, please refer to U1 function constant.	1~27	1						3B0H	P. 85
F4-02	AO1 output gain	Set voltage enlarge magnification of analog output.	0~ 2.50	1.00						3B1H	P. 85
F4-03	AO2 function selecting	Set VOUT terminal function, please refer to U1 function constant.	1~27	1						3B2H	P. 85
F4-04	AO2 output gain	Set voltage enlarge magnification of analog output.	0~ 2.50	1.00						3B3H	P. 85
F4-05	AO1 output bias	Set voltage bias 10V of analog output to 100%.	-10.0~ 10.0	0%						3B4H	P. 85
F4-06	AO2 output bias	Set voltage bias 10V of analog output to 100%.	-10.0~ 10.0	0%						3B5H	P. 85
F4-07	AO1 output specification	0: 0~ 10V 1: -10V~ =10V	0~2	0						3B6H	P. 85
F4-08	AO2 output specification	0: 0~ 10V 1: -10V~ =10V	0~2	0						3B7H	P. 85
F4-09	A01 Analog output filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	1.0~ 1000.0	5.0						3B8	P. 85
F4-10	A02 Analog output filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	1.0~ 1000.0	5.0						3B9	P. 85

H1: Multi-functions input terminals setting

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
H1-01	Multi-functions terminal DI1 function	0. 3-wire operation control. 1. Multi-steps speed command 1. 2. Multi-steps speed command 2. 3. Multi-steps speed command 3. 4. Multi-steps speed command 4.		16						400 H	P. 44
H1-02	Multi-functions terminal DI2 function	5. Jog frequency selection (JOG). 6. Forward jog (FJOG). 7. Reverse jog (RJOG).		8						401H	P. 44
H1-03	Multi-functions terminal DI3 function	8. Auto restart attempts. 9. Multi-steps acceleration/ deceleration time 1. 10. Multi-steps acceleration/ deceleration time 2.	0~19	1						40 2H	P. 44
H1-04	Multi-functions terminal DI4 function	11. PID control disable. 12. PID integration control reset. 13. PID integration control maintain.		2						40 3H	P. 44
H1-05	Multi-functions terminal DI5 function	14. PID soft start. 15. Switch PID error input characteristics. 16. Not used. 17. PLC reset. 18. Emergency stop. 19. Coast stop.		5						40 4H	P. 44

H2: Multi-functions output terminals contact

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
H2-02	Multi-functions relay output	0: Operation. 1: Zero speed. 2: Inverter overheat. 3: Drive failure. 4: Overload failure. 5: Acceleration. 6: Deceleration. 7: Speed agree. 8: Frequency arrive 1. 9: Frequency arrive 2. 10: Not used.	0~ 10	0						40cH	P. 46
H2-03	Frequency detect position	Set multi-function relay frequency contact.	0-400	0.5							P. 46

H3: Analog input

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
H3-01	IN3 function selection	Input by next page multi-function analog input constant.	0~12	1						410H	P. 47
H3-02	IN3 input gain	Set percentage 100% when input 10V to correspond selecting function 100% of H3-01.	0.0~1000.0	100.0%						411H	P. 47
H3-03	IN3 input bias	Analog master speed frequency is 100%, set frequency bias when input 0V. Maximum frequency won't be exceeded.	±100.0	0.0%						412H	P. 47
H3-12	IN3 Analog input filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	0.00~2.00	0.00 sec						413H	P. 48
H3-05	IN2 function selection	Set function of IN2, please refer to next page.	0~12	0						414H	P. 48
H3-06	IN2 input gain	Set percentage 100% when input 10V to correspond selecting function 100% of H3-05.	0.0~1000.0	100.0%						415H	P. 48
H3-07	IN2 input bias	Set bias percentage when input 0V.	±100.0	0.0%						416H	P. 48
H3-12	IN2 Analog input filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	0.00~2.00	0.00 sec						417H	P. 48
H3-09	IN1 function selection	Set function of IN1, please refer to next page.	0~12	0						418H	P. 48
H3-10	IN1 input gain	Set percentage 100% when input 10V to correspond selecting function 100% of H3-09.	0.0~1000.0	100.0%						419H	P. 48
H3-11	IN1 input bias	Set bias percentage when input 0V.	±100.0	0.0%						41AH	P. 48
H3-12	IN1 Analog input filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	0.00~2.00	0.00 sec						41BH	P. 48

Multi-functions analog input

No.	Description	Content	Control patterns				Communication address	Page
			0	1	2	3		
0	Not used							
1	Analog master speed (1st speed)	Maximum output frequency.						
2	Plus calculate master speed							
3	Master speed gain	Set acceleration/ deceleration time.						
4	Auxiliary frequency 2 (2nd speed)	Maximum output frequency.						
5	Auxiliary frequency 3 (3rd speed)	Maximum output frequency.						
6	DC braking current	Inverter rated current.						
7	PID feedback value	Maximum output frequency.						
8	PID command value	PID input value.						
9	Forward torque limit	Motor rated torque.						
10	Reverse torque limit	Motor rated torque.						
11	Rebound torque limit	Motor rated torque.						
12	Forward/ reverse torque limit	Motor rated torque.						

H4: Analog output

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
H4-01	VOUT function selection	Set VOUT terminal function, please refer to U1 constant.	1~27	11						41DH	P. 49
H4-02	VOUT output gain	Set analog output to enlarge magnification.	0.00~ 2.50	1.00						41EH	P. 49
H4-03	VOUT output bias	Set voltage bias of analog output, 10V is 100%.	±10.0	0.0%						41FH	P. 49
H4-04	Analog output filter time	Set filtered of analog output terminal time, noise will be filtered, but output reaction will become slow.	0.00~ 2.00	0.00 sec						420H	P. 49

H5: MODBUS communication

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
H5-01	Address(ID)	Set ID of inverter.	1~ 240	31						425H	P.77
H5-02	Transmit speed	0: 1222 bps. 1: 2400 bps. 2: 4800 bps. 3: 9600 bps. 4: 19200 bps.	0~4	3						426H	P.77
H5-03	Parity bit check	0: Disable. 1: Even parity. 2: Odd parity.	0~ 2	0						427H	P.78
H5-06	Communication feedback waiting time	Set time to receive information from inverter to start feedback information.	2~ 65	2 ms						42AH	P.78

H6: Analog output

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns 0	1	2	3	Communication address	Page
H6-01	Pulse input function	0: Frequency command. 1: PID feedback value. 2: PID target value.	0~2	0						42CH	P. 86
H6-02	Pulse input counting	Set pulse frequency when 100%.	1000~ 32000	1440 Hz						42DH	P. 86
H6-03	Pulse input gain	Set enlarge magnification of pulse input.	0.0~ 1000.0	100.0 %						42EH	P. 86
H6-04	Pulse input bias	Set pulse input when 0.	±100.0	0.0%						42FH	P. 86
H6-05	Pulse input filter	Offset. Set filter time of pulse input.	0.00~ 2.00	0.10 sec						430H	P. 86

L2: Power is restored then restarts automatically after momentary power loss

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns 0	1	2	3	Communication address	Page
L2-01	Momentary power loss direction	0: Disable. 1: Enable, restart when power recovered in time of L2-02, detect low voltage of master power when exceeded. 2: Movement of CPU is enable, restart when power recovered (L2-02 will not be considered).	0~2	0						485H	P. 91
L2-02	Momentary power loss compensation time	Restart enable time limit when set L2-01= 1.	0.0~2.0	0.1 sec						486H	P. 91
L2-04	Voltage recover time	From 0V to recover is time of maximum output voltage when set restart.	0.0~ 20.0	0.3 sec						488H	P. 91

L3: Stall prevention limit during acceleration

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
L3-01	Stall prevention selection during acceleration	0: Disable. 1: Enable.	0~1	1						48FH	P. 87
L3-02	Stall prevention level during acceleration	As inverter rated current is 100%, Set stall prevention level during acceleration.	0~200	150%						490H	P. 87
L3-03	Stall prevention limit during acceleration	Decrease stall prevention limit during acceleration by setting value of L3-03 when inverter run over E1-06.	0~100	50%						491H	P. 88
L3-04	Stall prevention limit during deceleration	0: Disable. 1: Enable.	0~1	1						492H	P. 89
L3-05	Stall prevention selection during operation	0: Disable. 1: Deceleration time 1 (C1-14).	0~1	1						493H	P. 90
L3-06	Stall prevention level during operation	As inverter rated current is 100%, Set s tall prevention level during acceleration.	30~200	150%						494H	P. 90

L7: Torque limit

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
L7-01	Forward torque limit	As motor ,rated torque is 100%, set torque limit value, limit value of 4 quarters could be set by each.	0~250	150%						4A7H	P. 60
L7-02	Reverse torque limit									4A8H	P. 60
L7-03	Torque limit in forward rotation									4A9H	P. 60
L7-04	Torque limit in reverse rotation									4AAH	P. 60

L8: Overheating protection

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
L8-01	Braking transistor overheating protection	0: Without braking resistor overheating protection. 1: With braking resistor overheating protection.	0~1	0							P. 95
L8-02	Inverter overheating forecast detection level	As L8-04 is 100% to set Inverter overheating forecast detection level.	50~100	90%							P. 94
L8-03	Motion when Inverter overheating forecast detection	0: Deceleration stop. 1: Free run stop. 2: Emergency stop. 3: Continuous operation.	0~3	3							P. 94
L8-04	Inverter overheating detection level	Set a unit to set inverter overheating detection level.	50~130	95							P. 94

o1: Torque limit

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
o1-01	Display entries setting when operation	Set display entries of monitoring when operation, set entry as U1-xx.	1~37	2						500H	P. 28
o1-03	Display unit setting	Set display unit of frequency display entries 0.00: 0.01Hz 0.01: 0.01% 0.02: 0.1rpm 0.03~ 600.00: Adjust magnification. Set the number of frequency below the decimal point to display.	0.00~ 150.00	0.00						502H	P. 28

T1: Motor constant autotuning

No.	Description	Content	Setting range	Default value	Change during operation	Control patterns				Communication address	Page
						0	1	2	3		
T1-01	Select adjust mode	0 : Rotational mode. 1 : Unrotational mode 1. 2 : Unrotational mode 2.	0~2	0							P.23
T1-02	V/f compensation set	Set percentage of automatic adjust V/f curve low speed compensation.	0~100	100%						582H	P. 23
T1-03	Motor rated voltage	Process automatic tuning by motor nameplate to set all constants of motor. Set 100% to rated current of inverter when set current.	0.0~500.0	220.0 V						583H	P. 23
T1-04	Motor rated current		10.0~200.0	100.0 %						584H	P. 23
T1-05	Motor rated frequency		0.0~400.0	60.0 Hz						585H	P. 23
T1-06	Pole of motor		2~8	4 pole						586H	P. 23
T1-07	Motor rated RPM		0~7200	1750 rpm						587H	P. 23
T1-09	Motor unload current	Collocate notational mode adjust setting.	10~100	45%							P. 23

U1: Monitoring status

No.	Description	Content	Correspond analog output 10V	Smallest unit	Control patterns				Communication address	Page
					0	1	2	3		
U1-01	Frequency command	Setting of frequency command	Maximum output frequency	0.01Hz					40H	
U1-02	Output frequency	Frequency of actually output							41H	
U1-03	Output current	Output current	Inverter rated current	0.1A					42H	
U1-04	Control mode	Display setting of control mode for present	None	0					43H	
U1-05	Motor speed	Display motor speed pass through PG feedback	Maximum output frequency	0.01Hz					44H	
U1-06	Output voltage	Output voltage	Maximum output voltage	0.1V					45H	
U1-07	DC BUS voltage	Voltage value of DC by power	1000 V	0.1V					46H	
U1-08	Reserved			None					47H	
U1-09	Torque command	Display torque command under vector closed loop control	100% torque	0.1%					48H	
U1-10	DI terminal status	Display input status of DI terminal for present	None	1					49H	
U1-11	Operation frequency	Frequency command after by acceleration/ deceleration	Maximum output frequency	0.01Hz					4AH	
U1-12	Operation status	Display operation status for present	None	1					4BH	
U1-13	Fireware version	Display the fireware of control board for present	None	0.01					4CH	
U1-14	IN1 input value	Input value of analog IN1	8192	1					4DH	
U1-15	IN2 input value	Input value of analog IN2							4EH	
U1-16	IN3 input value	Input value of analog IN3							4FH	
U1-17	PID command value	Command value of PID	100%	0.01%					50H	
U1-18	PID feedback value	Feedback value of PID							51H	
U1-19	PID output value	Output value of PID							52H	

No.	Description	Content	Correspond analog output 10V	Smallest unit	Control patterns				Communication address	Page
					0	1	2	3		
U1-20	Frequency command of PID output	Display absolute value of frequency command is produced by PID loop	Maximum output frequency	0.01 Hz					53H	
U1-21	Speed loop command value	Display input command of speed loop	100%	0.01%					54H	
U1-22	Speed loop feedback value	Display feedback value of speed loop	100%	0.01%					55H	
U1-23	Speed loop error value	Display error value of speed loop	100%	0.01%					56H	
U1-24	iq current	Display q axis current	Inverter rated current	0.1A					57H	
U1-25	id current	Display d axis current							58H	
U1-26	Vq output voltage	Display q axis output voltage	Maximum output voltage	0.1V					59H	
U1-27	Vd output voltage	Display d axis output voltage							5AH	
U1-28	Option card fireware version	Display fireware version of option card	None	0.01					5BH	
U1-29	Module temperature	Display temperature module for present	None	0.1					5CH	
U1-30	Slaver 1 communication rate	The ACR P value after autotunning.	None	0.1%						
U1-31	Slaver 2 communication rate	The ACR I value after autotunning.								

U2: Malfunction record

No.	Description	Content	Correspond analog output 10V	Smallest unit	Control patterns				Communication address	Page
					0	1	2	3		
U2-01	Malfunction record 1	Front once malfunction occurred.	None						53H	
U2-02	Malfunction record 2	The former two times malfunction occurred.							54H	
U2-03	Malfunction record 3	The former three times malfunction occurred.							55H	
U2-04	Malfunction record 4	The former four times malfunction occurred.							56H	