CT-2000V

Instruction Manual

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Chapter 7 - Control mode setting

Chapter 8 - Protective Function

Chapter 9 – Others

Chapter 1 - Introduction

1. 1 Preface

Thank you for choosing the CT-2000V 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.

1.2 Inspection upon receiving

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

1. Check that 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.

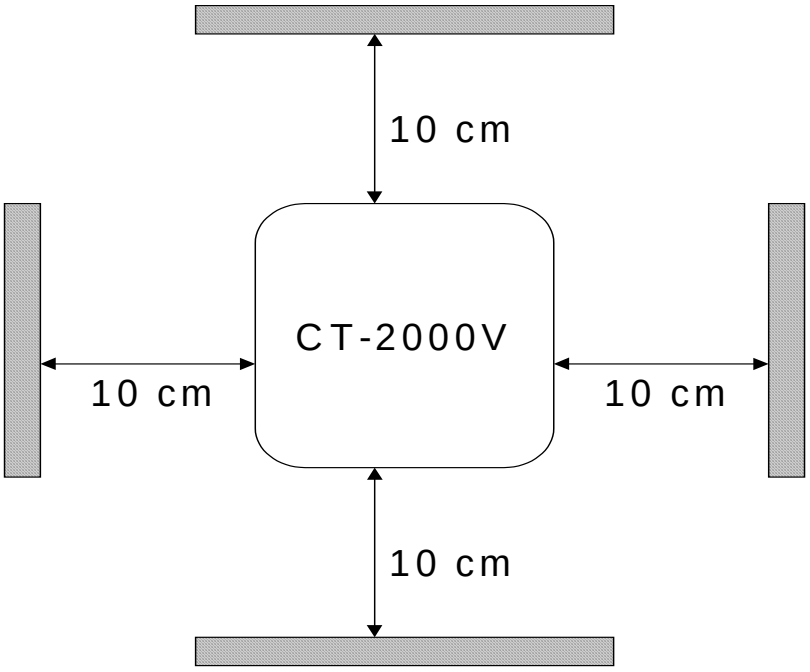
1.3 Storage and installation

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.



Chapter 2 – Wiring diagram

2.1 Wiring

1. Wiring of main 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.

2. 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.

3. Wiring between main circuit and motor:

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

Voltage (V)	Type (CT-2002V-)	NFB (A)	Standard wiring (mm^2)	Voltage (V)	Type (CT-2004V-)	NFB (A)	Standard wiring (mm^2)
220	A75	6	2-5.5	380 | 440	A75	5	2-5.5
	1A5	10	2-5.5		1A5	5	2-5.5
	2A2	15	3-5.5		2A2	7.5	2-5.5
	3A7	20	5.5		3A7	10	3.5-5.5
	5A5	30	5.5-8		5A5	15	3.5-5.5
	7A5	40	8		7A5	20	5.5
	011	60	22		011	30	8-14
	015	80	30		015	40	8-14
	022	120	38		022	60	22
	030	150	38-100		030	80	22
	037	200	38-100		037	100	30
	045	250	60-100		045	120	50
	055	300	100		055	150	38-100
	075	400	100-200		075	200	38-100
	093	500	100-200		093	250	60-100
					112	300	60-100

4. **The** main 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.C.L. to R.S.T. input side under the following circumstance:

A. Where power system capacity is over 500KVA.

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

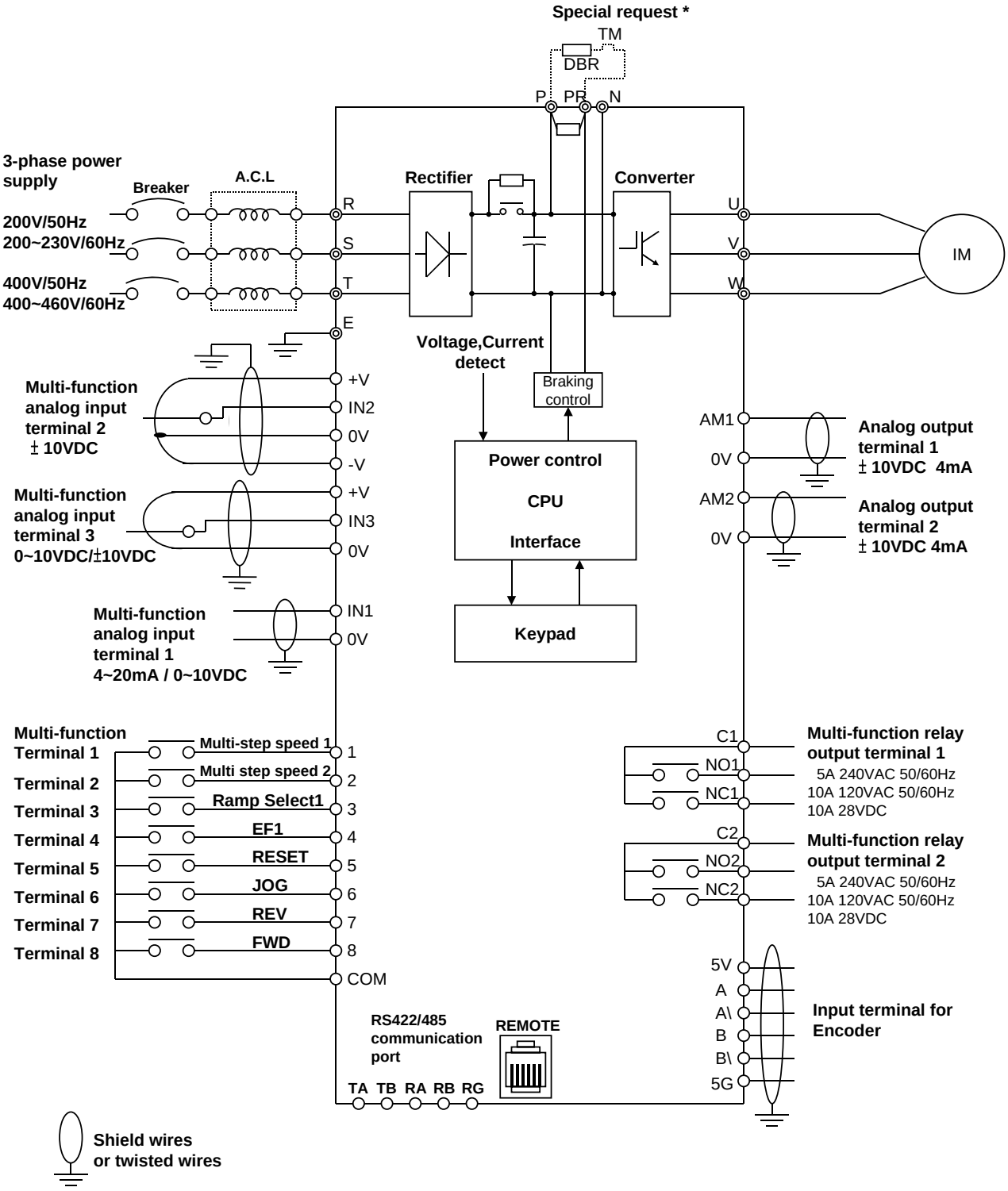
Inductance of Power side from R.S.T of Inverter（A.C.L）:

Voltage (V)	Type (CT-2002V)	Current Value (r.m.s)	Induc-tance	Voltage (V)	Type (CT-2004V-)	Current Value (r.m.s)	Induc-tance
220	A75	6 A	1.8 mH	380 | 440	A75	5 A	4.2 mH
	1A5	10 A	1.1 mH		1A5	5 A	4.2 mH
	2A2	15 A	0.71 mH		2A2	7.5 A	3.60 mH
	3A7	20 A	0.53 mH		3A7	10 A	2.20 mH
	5A5	30 A	0.35 mH		5A5	15 A	1.42 mH
	7A5	40 A	0.26 mH		7A5	20 A	1.00 mH
	011	60 A	0.18 mH		011	30 A	0.70 mH
	015	80 A	0.13 mH		015	40 A	0.53 mH
	022	120 A	0.09 mH		022	60 A	0.36 mH
	030	150 A	70 uH		030	80 A	0.26 mH
	037	200 A	50 uH		037	100 A	0.21 mH
	045	250 A	44 uH		045	120 A	0.18 mH
	055	300 A	35 uH		055	150 A	0.14 mH
	075	400 A	27 uH		075	200 A	0.11 mH
	093	500 A	21 uH		093	250 A	0.10 mH
					112	300 A	70 uH

Note: Inductance value of reactance used in 220V, 380V - 440V are different, do not mix up.

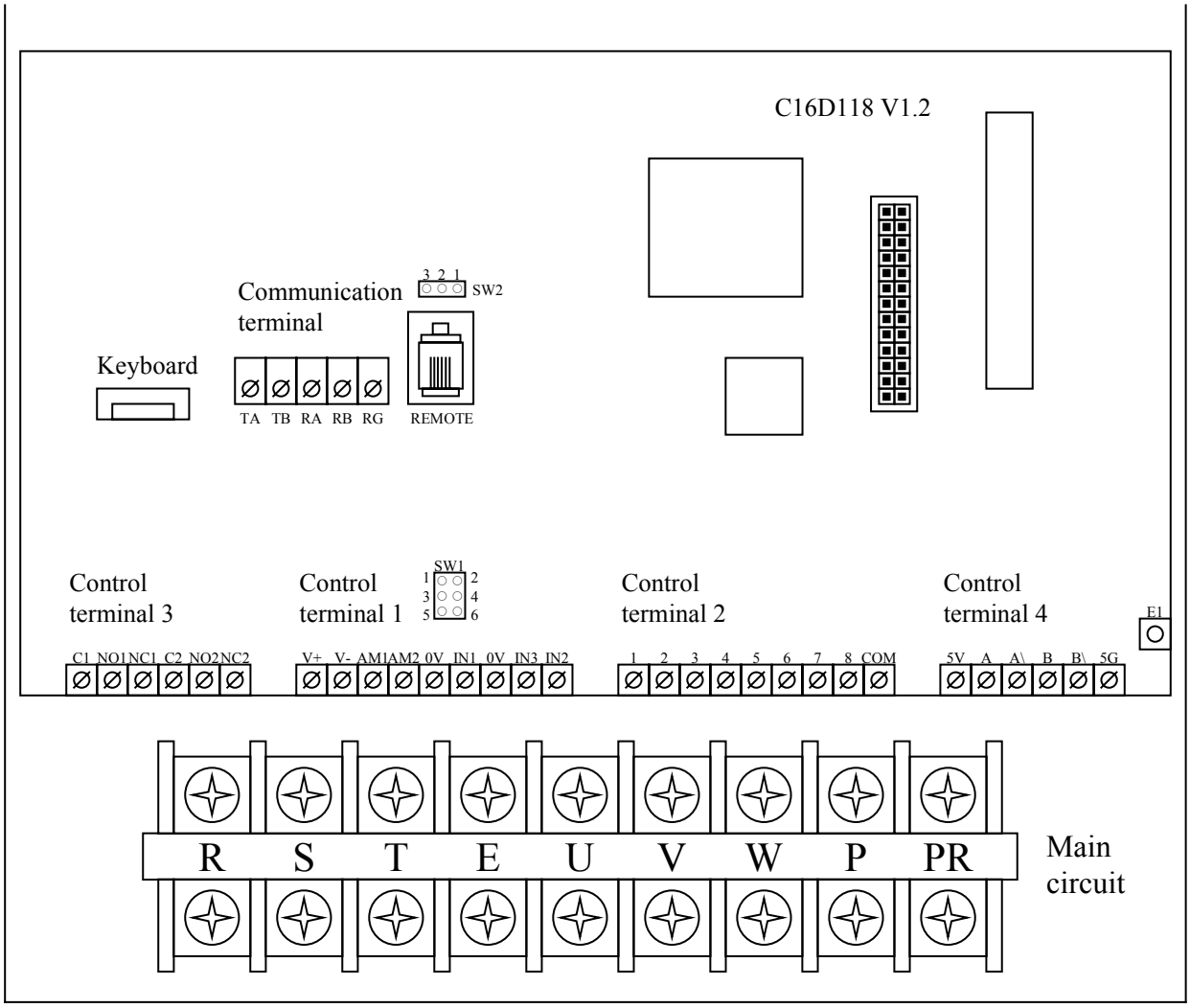
2.2 Standard External Connecting Diagram:

CT-2000V Standard connecting diagram



*** While external is required for DBR,disconnect internal DBR first.**

Control Circuit:



Terminal Specifications

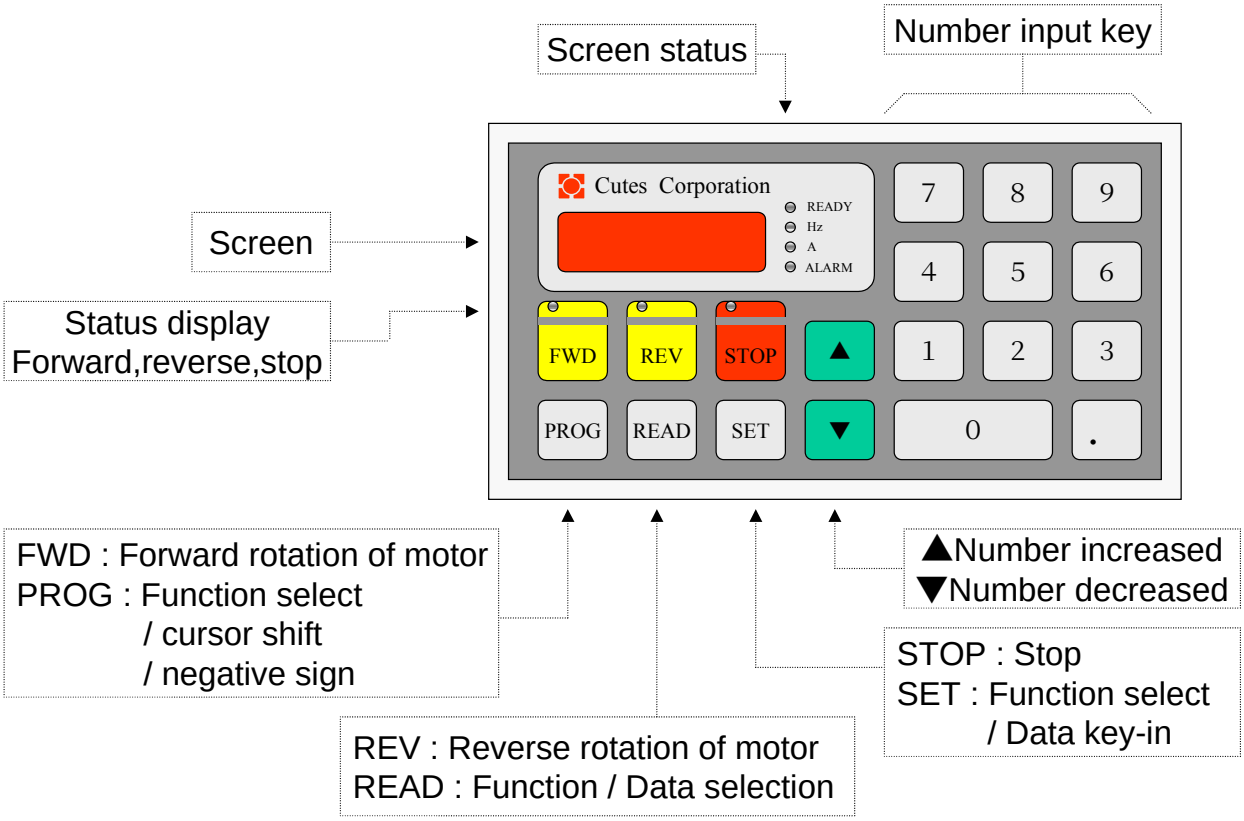
Classification	Terminal symbol	Terminal name	Specification
Main Circuit	R.S.T	AC power input terminal	3-phase AC power input 200V/50Hz , 200~230V/60Hz 400V/50Hz , 400~460V/60Hz
	U.V.W	Inverter output terminal	3-phase induction motor
	E	Ground terminal	Ground terminal of inverter
	P, PR	Breaking resistor connecting terminal	Connected with brake resistor
	P , N	Breaking unit conecting terminal	Connected with brake unit (DBU)
Control Terminal 1	V+	10 VDC	Providing DC voltage +10V 10 mA
	V-	-10 VDC	Providing DC voltage –10V 10 mA
	AM1	Analog output terminal 1	Output DC voltage –10V ~ +10V 4mA maximum
	AM2	Analog output terminal 2	
	0V	0V	Control terminal 1 for grounding
	IN1	Multi-function analog input terminal 1	Input DC current 4 ~ 20mA
	IN2	Multi-function analog input terminal 2	Input DC voltage –10V ~ +10V
	IN3	Multi-function analog input terminal 3	Input DC voltage 0V ~ 10V
Control Terminal 2	COM		Control terminal 2 for grounding
	1	Multi-function Terminal 1	Multi-function Terminal
	2	Multi-function Terminal 2	Multi-function Terminal
	3	Multi-function Terminal 3	Multi-function Terminal
	4	Multi-function Terminal 4	Multi-function Terminal
	5	Multi-function Terminal 5	Multi-function Terminal
	6	Multi-function Terminal 6	Multi-function Terminal
	7	Multi-function Terminal 7	Multi-function Terminal
	8	Multi-function Terminal 8	Multi-function Terminal
Control Terminal 3	C1 NO1 NC1	Multi-function relay output Terminal 1	Multi-function relay output Terminal 250VAC, 30VDC, 5A
	C2 NO2 NC2	Multi-function relay output Terminal 2	Multi-function relay output Terminal 250VAC, 30VDC, 5A
Control terminal 4	5V	Power input of Encoder	Providing DC voltage 5V
	A	Input of A phase	Signal input of A phase encoder
	A\	Input of A\ phase	Signal input of A\ phase encoder
	B	Input of B phase	Signal input of B phase encoder
	B\	Input of B\ phase	Signal input of B\ phase encoder
	5G	0V of encoder	Grounding of encoder
	E1	Grounding terminal	Shield ground

Terminal Specifications (continuous)

Classification	Terminal symbol	Terminal name	Specification
Comm. terminal	TA	RS422/485 TA terminal	RS422 TA or RS485 A terminal
	TB	RS422/485 TB terminal	RS422 TB or RS485 B terminal
	RA	RS422 RA terminal	RS422 RA terminal
	RB	RS422 RB terminal	RS422 RB terminal
	RG	Gound terminal	Comm. terminal for grounding
	Remote	Remote keypad terminal	Conneting remote keypad

Chapter 3 – Keypad Operation

3.1 Function list mode



Under the **Function list mode**, the utility remarks of each key are shown below:

Key name	**Description**
FWD	Forward
REV	Reverse
STOP	Stop / Reset
PROG	Function switch (increasing in cycle)
SET	Function switch (decreasing in cycle)
READ	Change to **Data input mode**
▲	Increasing of parameter number
▼	Decreasing of parameter number
Number button	Key in numbers

Ex: If the function code is in C2-00 (C2 represents the second function ; 00 represents the parameter 0 in the second function menu).

PROG key:

Screen		Screen	
C2-00	Press PROG to	C3-00	Switch the second function to the third function.

SET key:

Screen		Screen	
C2-00	Press SET to	C1-00	Switch the second function to the first function.

▲ key:

Screen		Screen	
C2-00	Press ▲ to	C2-01	Switch the parameter 0 to the parameter 1.

▼ key:

Screen		Screen	
C2-01	Press ▼ to	C2-00	Switch the parameter 1 to the parameter 0.

READ key:

Screen		Screen	
C2-01	Press READ to	60.00	Display the contents of the parameter 1

Ex: Use the number key to switch function and select the parameters directly.

Switch the first function to the fourth function.

Screen		Screen	
C1-00	Press • to	C	Select the function .

PS: After pushing the first number key or •, ▲▼ keys become disabled.

Screen		Screen	
C	Press 4 to	C4-00	Switch to the fourth function.

PS: Screen displays Err if the pushing number does not have the corresponding function.

Screen		Screen	
C4-00	Press 27 to	C4-27	Jump to the parameter 27.

PS1: Press READ and then display the data of the parameter 27. If there is no parameter 27, the screen displays Err.

PS2: Continue to press number key that will make the last number move forward and numbers before the last one will disappear.

3.2 Data input mode

Under the condition of **Data input mode**, the utility remarks of each key are shown below:

Key name	**Description**
FWD	Forward
REV	Reverse
STOP	Stop / Reset
PROG	Cursor moves to left (in cycle) / Negative sign
SET	Data input
READ	Back to **Function list mode** / Clear numbers
▲	Data increasing
▼	Data decreasing
Number key	Key in numbers

Ex: If the function code is in C1-00, try to make 30.00Hz in speed reference.

Screen		Screen	
C1-00	Press READ to	0.00	The content of parameter 0, and the number of right side is flashing.

PS: The cursor is on the position where it flashes.

Use ▲▼ key for data inputting:

Screen		Screen	
0.00	Press PROG 3 times to	00.00	The cursor moves to the left with three digit, and the fourth number is flashing.
00.00	Press ▲ 3 times to	30.00	The fourth number changes from 0 → 1 → 2 → 3, flashing.
30.00	Press SET to	30.00	Input data, screen display 30.00 → C1-00 → 30.00 → C1-00

PS: If the value exceeds the range of parameters, the screen shows Err.

If you do not want to input the data, you can leave by pressing READ key before pressing SET button.

Use number keys for input data:

Screen		Screen	
0.00	Press 3 to	3	Input the 1st number, no flash.
3	Press 0 to	30	Input the second number, no flash.
30	Press SET to	30.00	Input data, screen display 30.00 → C1-00 → 30.00 → C1-00

PS1: If the value exceeds the range of parameters, the screen shows Err.
PS2: After pressing the first number, ▲▼ keys are disabled and PROG key becomes negative sign

If you do not want to input the data, you can clear by pressing READ button before pressing SET key.

Use number key to input the data with negative sign and point:

Ex: Input C1-10 as -0.25

Screen		Screen	
0.00	Press 0 • or • to	0.	Input the first number, no flash.
0.	Press 2 to	0.2	Input the second number, no flash.
0.2	Press 5 to	0.25	Input the third number, no flash.
0.25	Press PROG to	- 0.25	Input the negative sign.
- 0.25	Press SET to	- 0.25	Input data, screen display -0.25 → C1-10 → -0.25 → C1-00

PS1: If there is no negative number in the parameter range, PROG key is disabled.
PS2: If the value exceeds the range of parameters, the screen shows Err.

If you do not want to input the data, you can clear by pressing READ button before pressing SET key.

Chapter 4 – Operation Test

4.1 Operation Test

1. Inspection before commissioning

Please take care of following issues:

a. Is the wiring correct? Especially, check the input and output terminals.
b. Is there a short circuit or ground connection on external wiring?
c. Make sure there is no loosening of screws
d. Check external sequence control circuit.
e. Check Voltage of Power supply.

2. Commissioning

According to the following procedure to perform commissioning, and confirm the operation status.

a. Basic performance testing

(1) Conect power supply.
(2) Screen indicates the pilot lamp of C1-00，STOP、READY、ALARM lighting.
(3) Press FWD key，motor start running. Frequency is 10Hz.
(4) Press STOP key，motor stop.

b. Changing-frequency test

(1) Same with the above procedures (1)、(2)、(3)
(2) Press READ key on panel to input data, Input frequency reference.
(3) Press SET key, the motor rotates by new frequency reference.
(4) Repeat(2)、(3) to increase or decrease frequency.

Note:

1. Is the performance direction of motor correct? （Changing any two of U.V.W output terminals to change motor operation direction.）
2. Is there any noise or vibration on motor?
3. Dose the motor run smoothly during acceleration and deceleration?
4. Is there any power failure?

Chapter 5 – Common setting

Following sections are common settings of different control models.

5.1 Mulit-function terminal

User sets functions of terminal 1 to terminal 8

5.1-1 Terminal function setting

Function settings of terminal 1 to terminal 8

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-02	Function setting of terminal 1	0~44	1	30	○	
C5-03	Function setting of terminal 2	0~44	1	31	○	
C5-04	Function setting of terminal 3	0~44	1	32	○	
C5-05	Function setting of terminal 4	0~44	1	33	○	
C5-06	Function setting of terminal 5	0~44	1	34	○	
C5-07	Function setting of terminal 6	0~44	1	35	○	
C5-08	Function setting of terminal 7	0~44	1	38	○	
C5-09	Function setting of terminal 8	0~44	1	36	○	

Description: 1. Function table of terminal setting is shown as Sheet 7.1
2. Related parameter in sheet 7.1 can not be adjusted by the keypad if that was controlled by the terminal. But You can see the content of parameter displayed on the keypad.

Sheet 7.1						
Setting value	Description	Terminal closed	Terminal opened	Related parameter	Change during operation	Related chapter
0	Speed reference	From Analog	From Digital	C6-00	○	5.2-2
1	Auxiliary reference 1	From Analog	From Digital	C6-01	○	5.2-2
2	Auxiliary reference 2	From Analog	From Digital	C6-01	○	5.2-2

Sheet 7.1 (Continuous)						
Setting value	**Description**	**Terminal closed**	**Terminal opened**	**Related parameter**	**Change during operation**	**Related chapter**
3	Jog reference	From Analog	From Digital	C6-03	○	5.2-2
4	Torque limit	From Analog	From Digital	C6-04	○	5.2-2
5	Control source of run/stop	Control by terminal	Control by keypad	C6-05	X	5.1-2
6	FWD/REV selection	FWD and REV	FWD only	C6-06	X	5.1-2
7	Time unit of accel./decel.	0.01 second	0.01 second	C6-07	X	5.3-3
8	Holding	Yes	No	C6-08	X	5.3-3
9	Data Lock	Yes	No	C6-09	○	chapter 9
10	PID enable/disable 1	PID active	PID reset	C6-10	○	5.5
11	PID enable/disable 2	PID active	PID reset	C6-11	○	5.5
12	Auxiliary reference 1 sign changed	Sign changed	No	C6-12	X	5.3-1
13	Voltage compensation	Yes	No	C6-13	X	7.1-2
14	Frequency compensation	Yes	No	C6-14	X	7.1-3
15-25	Reservation					
26	Multi-step accel./decel. 1	Refer to 5.3-3			○	5.3-3
27	Multi-step accel./decel. 2				○	
28	Multi-step voltage compensation 1	Refer to 7.1-2 & 7.2-2			X	7.1-2 7.2-2
29	Multi-step voltage compensation 2				X	
30	Multi-step speed reference 1	Refer to 5.3-1			○	5.3-1
31	Multi-step speed reference 2				○	
32	Multi-step speed reference 3				○	
33	Multi-step torque limit 1	Refer to 7.2-1 & 7.3-1			○	7.2-1 7.3-1
34	Multi-step torque limit 2				○	
35	Jog	Jog operation	Normal operation		X	5.3-1
36	FWD/STOP	Forward	Stop		○	5.1-2

Sheet 7.1 (Continuous)						
Setting value	**Description**	**Terminal closed**	**Terminal opened**	**Related parameter**	**Change during operation**	**Related chapter**
37	FWD/REV	Forward	Reverse		○	5.1-2
38	REV/STOP	Reverse	Stop		○	
39	Fault reset	Reset	No		X	
40	UP command	Refer to 5.1-1			○	5.1-1
41	DOWN command				○	
42	External fault signal 1	Coast to stop	No		○	5.1-1
43	External fault signal 2	**Decelerate to stop**	No		○	
44	External fault signal 3	**Emergency stop time 2**	No		○	
45-47	Reserved					
48	Reset integral of PID controller	Reset integral	No		○	
49	Integral holding of PID Controller	Intergral holding	No		○	

Description: Functions of Up, Down commands and external fault signal are listed below. Please refer to related chapters for other functions.

UP and Down commands

	DI=40	DI=41	Description
UP command	1	0	DI=40 and terminal is also closed
Down command	0	1	DI=41 and terminal is also closed
Speed hold	1	0	Both terminals are opened
Speed hold	1	1	Both terminals are closed

Note: 1. The signal is designated as 1 when terminal is closed. The signal is designated as 0 when terminal is opened.
2. If only one terminal is taken as up or down reference, this function doesn't work.
3. The maximum values of up and down commands are the speed references, which set by user.

External fault signal

Description: DI=42, coast to stop when terminal is closed.
DI=43, decelerate to stop according to deceleration time when terminal is closed.
DI=44, emergency stop according to emergency stop time 2 when terminal is closed.

5.1-2 Control method of Run/Stop

Operating source selection: This parameter is used to define the control source of Run/Stop. One is keypad operating; the other one is terminal operating.

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-05	Control source selection	0-1	1	0	X	

Description: Operation control by keypad, set C6-05=0
Forward rotation when FWD button is pressed.
Reverse rotation when REV button is pressed.
Stop when stop button is pressed.

Operation control by terminal, set C6-05=1.

Note: C6-05 is controlled by terminal when terminal function is set as 5.

Terminal control model of Run/Stop

FWD/STOP : control by one terminal

For example: Set C5-09=36. Terminal 8 is defined as FWD/STOP control source.

Forward rotation when terminal 8 is closed.
Stop when terminal 8 is opened

FWD/STOP and **REV/STOP:** control by two terminals

For example: Set C5-09=36, terminal 8 is defined as FWD/STOP control source.
Set C5-08=38, terminal 7 is defined as REV/STOP control source.

Forward rotation when terminal 8 is closed.
Stop when terminal 8 is opened.
Reverse rotation when terminal 7 is closed.
Stop when terminal 7 is opened.

In this control model, only one rotating direction active when two terminals are all closed. The direction depends on which terminal is closed first.

FWD/RES/STOP: control by two terminals

For example: Set C5-09=36, terminal 8 is defined as FWD/STOP control source.
Set C5-08=37, terminal 7 is defined as FWD/REV control source.
Forward rotation when terminal 8 is closed and terminal 7 is opened.
Reverse rotation when terminal 8 and 7 are closed.
Stop when terminal 8 is opened. (There is nothing to do with terminal 7)

FWD/REV selection

This parameter is used to definite rotating direction.

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-06	Forward / Reverse	0~1	1	0	X	

Description: Set C6-06=0, forward rotation only.
Set C6-06=1, forward/reverse rotation.

Note: C6-06 is controlled by terminal only, if terminal function is set as 6.

5.2 Analog input terminals

Specification of Input signals

IN1: 12 bit, 4 ~ 20 mA DC or 0 ~ 10V DC (scale : 0 ~ 4096)
IN2: 14 bit, ±10V DC (scale : -8192 ~ 8192)
IN3: 12 bit, 0V ~ 10V DC or ±10V DC (scale : -4096 ~ 4096)

Parameters about analog input terminals are lised below, **detail information will be explained in following section.**

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-10	Speed reference scale	0.00 ~ 400.00	0.01 Hz	60.00	○	
C5-11	Auxiliary reference 1 scale	0.00 ~ 400.00	0.01 Hz	10.00	○	
C5-12	Auxiliary reference 2 scale	-99.99 ~ 99.99	0.01 Hz	10.00	○	
C5-13	Jog reference scale	0.00 ~ 400.00	0.01 Hz	6.00	○	
C5-14	Torque limit scale	0.0 ~ 250.0	0.1 %	100.0	○	
C5-15	IN1 function setting	0 ~ 5	1	0	X	
C5-16	IN2 function setting	0 ~ 5	1	1	X	
C5-17	IN3 function setting	0 ~ 5	1	4	X	
C5-18	IN1 zero area	0 ~ 20	1	0	○	
C5-19	IN2 zero area	0 ~ 255	1	0	○	
C5-20	IN3 zero area	0 ~ 20	1	0	○	
C5-21	IN1 offset adjustment	-100 ~ 100	1	0	○	
C5-22	IN2 offset adjustment	-200 ~ 200	1	0	○	
C5-23	IN3 offset adjustment	-100 ~ 100	1	0	○	
C5-24	IN1 digital filter	0 ~ 7	1	0	X	
C5-25	IN2 digital filter	0 ~ 7	1	0	X	
C5-26	IN3 digital filter	0 ~ 7	1	0	X	
C6-00	Speed reference selection	0 ~ 1	1	0	○	
C6-01	Auxiliary reference 1 selection	0 ~ 1	1	0	○	
C6-02	Auxiliary reference 2 selection	0 ~ 1	1	0	○	
C6-03	Jog reference selection	0 ~ 1	1	0	○	
C6-04	Torque limit selection	0 ~ 1	1	0	○	
C6-19	Specification selection of IN1	0 ~ 1	1	0	○	
C6-20	Specification selection of IN3	0 ~ 1	1	0	○	

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C7-07	IN1 input value	0 ~ 4096	1			Monitor only
C7-08	IN2 input value	-8192 ~ 8192	1			
C7-09	IN3 input value	-4096 ~ 4096	1			
C7-10	Command (feedback) of IN1 for PID controller	0.0 ~ 100.0	0.1 %			
C7-11	Command (feedback) of IN2 for PID controller	-100 ~ 100.0	0.1 %			
C7-12	Command (feedback) of IN3 for PID controller	0.0 ~ 100.	0.1 %			
C7-13	Speed reference from analog input		0.01 Hz			
C7-14	Auxiliary reference 1 from analog input		0.01 Hz			
C7-15	Auxiliary reference 2 from analog input		0.01 Hz			
C7-16	Jog reference from analog input		0.01 Hz			
C7-17	Torque limit from analog input		0.1 %			

5.2-1 Signal adjustments of analog input terminals

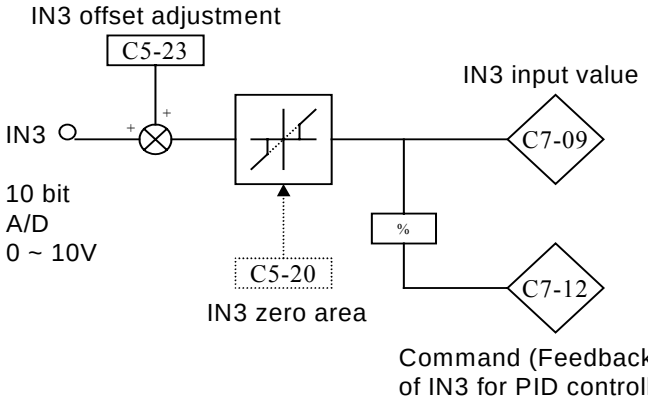
Function table for signal adjustments of analog input terminals.

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-18	IN1 zero area	0 ~ 20	1	0	○	
C5-19	IN2 zero area	0 ~ 255	1	0	○	
C5-20	IN3 zero area	0 ~ 20	1	0	○	
C5-21	IN1 offset adjustment	-100 ~ 100	1	0	○	
C5-22	IN2 offset adjustment	-200 ~ 200	1	0	○	
C5-23	IN3 offset adjustment	-100 ~ 100	1	0	○	
C5-24	IN1 digital filter	0 ~ 7	1	0	X	
C5-25	IN2 digital filter	0 ~ 7	1	0	X	
C5-26	IN3 digital filter	0 ~ 7	1	0	X	
C6-19	Specification of IN1	0 ~ 1	1	0	X	
C6-20	Specification of IN3	0 ~ 1	1	0	X	
C7-07	IN1 input value	0 ~ 4096	1			Monitor only
C7-08	IN2 input value	-8192 ~ 8192	1			
C7-09	IN3 input value	-4096 ~ 4096	1			
C7-10	Command (feedback) of IN1 for PID controller	0 ~ 100.0	0.1 %			
C7-11	Command (feedback) of IN2 for PID controller	-100.0 ~ 100.0	0.1 %			
C7-12	Command (feedback) of IN3 for PID controller	-100.0 ~ 100.0	0.1 %			

Description: Flowchart of signal adjustment in IN3 analog input terminal is listed below. Parameters in diamonds stand for display mode only and can not be adjusted. Parameters in squares are for adjusting

IN3 input signal is equal to C7-09 when C5-20=0 and C5-23=0. C5-23 is used to adjust offset when IN3=0V but C7-09 ≠ 0.

C7-12, Command (feedback) of IN3 for PID controller, is equal to (C7-09 / 4096) * 100%



Please refer to Page 30 to 32 for detail examination.

Specification of analog input terminal IN1

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-19	Specification selection of IN1	0 ~ 1	1	0	X	

Description: Setting according to hardware specification.

When SW1 pin3 & pin5 are shorted on control board, specification of IN1 is 4~20mA, C6-19=0.

SW1 pin1 & pin3 are shorted, specification of IN1 is 0~10V, C6-19=1.

Specification of analog input terminal IN3

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-20	Specification selection of IN3	0 ~ 1	1	0	X	

Description: Setting according to hardware specification.

When SW1 pin 4 & pin 6 are shorted on control board,specification of IN3 is 0~10V , C6-20=0.

SW1 pin 2 & pin 4 are shorted, specification of IN3 is –10V~10V, C6-20=1.

Offset adjustment of analog input terminals

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-21	IN1 offset adjustment	-100 ~ 100	1	0	○	
C5-22	IN2 offset adjustment	-200 ~ 200	1	0	○	
C5-23	IN3 offset adjustment	-100 ~ 100	1	0	○	
C7-07	IN1 input value	0 ~ 4096	1			Monitor only
C7-08	IN2 input value	-8192 ~ 8192	1			
C7-09	IN3 input value	-4096 ~ 4096	1			

Description: Because of slight inaccuracy in hardware such as resistance, it might lead to offset between input voltage (current) and designed specification. C5-21, C5-22 and C5-23 are used to adjust above errors.

Adjustment: Take IN2 as an example

1. IN2 grounding.
2. Observe the value of C7-08
3. Set C5-22 as the value of C7-08

4. Back to C7-27 and make sure the value of C7-08 is 0(± 1)

Example: According to above steps, IN2 should be ground first. The value of C7-08 is 44. Please set C5-22 =44 then check the value of C7-08 again. The value should be 0(±1)

Note: 1. Set zero area of analog input terminal to 0 when offset of analog input terminal is adjusted.
2. Input 4mA DC, when IN1 offset is adjusted.

Zero area setting of analog input

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-18	IN1 zero area	0 ~ 20	1	0	○	
C5-19	IN2 zero area	0 ~ 255	1	0	○	
C5-20	IN3 zero area	0 ~ 20	1	0	○	
C7-07	IN 1 input value	0 ~ 4096	1			Monitor only
C7-08	IN 2 input value	-8192 ~ 8192	1			
C7-09	IN 3 input value	-4096 ~ 4096	1			

Description: This function is used to avoid signal floating around 0V.

Setting: Example of IN2.

Set C5-19=50 when signal between +50 and –50 is defined as 0. The value of C7-08 is taken as 0 if IN2 input signal is less than 50.

Command (feedback) of analog input terminals for PID controller

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C7-07	IN1 input value	0 ~ 4096	1			Monitor only
C7-08	IN2 input value	-8192 ~ 8192	1			
C7-09	IN3 input value	-4096 ~ 4096	1			
C7-10	Command (feedback) of IN1 for PID controller	0 ~ 100.0	0.1 %			
C7-11	Command (feedback) of IN2 for PID controller	-100.0 ~ 100.0	0.1 %			
C7-12	Command (feedback) of IN3 for PID controller	0 ~ 100.0	0.1 %			

Description: Command (feedback) stands for the percentage of analog input terminal. For example, if IN2 input value of C7-08 is 4096 and the content of C7-11 would be 50% .

Digital filter of analog input terminals

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-24	IN1 digital filter	0 ~ 7	1	0	X	
C5-25	IN2 digital filter	0 ~ 7	1	0	X	
C5-26	IN3 digital filter	0 ~ 7	1	0	X	

Description: IN1, IN2 and IN3 have built-in digital filters. Time settings of digital filters are shown as follows.

Setting value	Filtering time
0	2 ms
1	4 ms
2	8 ms
3	16 ms
4	32 ms
5	64 ms
6	128 ms
7	256 ms

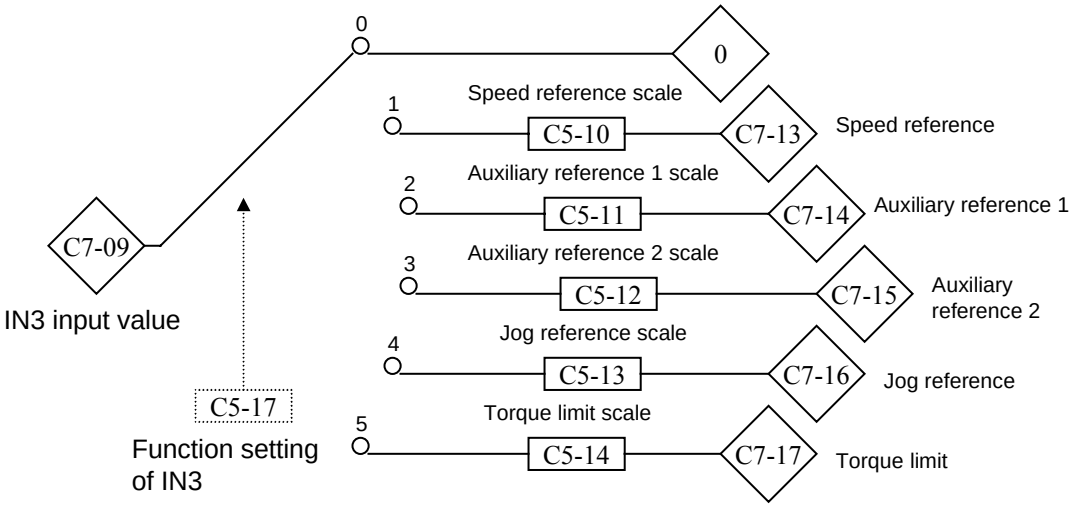
5.2-2 Function settings of analog input terminals

Functions of analog input terminals

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-10	Speed reference scale	0.00 ~ 400.00	0.01 Hz	60.00	○	
C5-11	Auxiliary reference 1 scale	0.00 ~ 400.00	0.01 Hz	10.00	○	
C5-12	Auxiliary reference 2 scale	-99.99 ~ 99.99	0.01 Hz	10.00	○	
C5-13	Jog reference scale	0.00 ~ 400.00	0.01 Hz	6.00	○	
C5-14	Torque limit scale	0.00 ~ 250.00	0.1 %	100.0	○	
C5-15	IN1 function setting	0 ~ 5	1	0	X	
C5-16	IN2 function setting	0 ~ 5	1	1	X	
C5-17	IN3 function setting	0 ~ 5	1	4	X	
C6-00	Speed reference selection	0 ~ 1	1	0	○	
C6-01	Auxiliary reference 1 selection	0 ~ 1	1	0	○	
C6-02	Auxiliary reference 2 selection	0 ~ 1	1	0	○	
C6-03	Jog reference selection	0 ~ 1	1	0	○	
C6-04	Torque limit selection	0 ~ 1	1	0	○	
C7-07	IN1 input value	0 ~ 4096	1			Monitor only
C7-08	IN2 input value	-8192 ~ 8192	1			
C7-09	IN3 input value	-4096 ~ 4096	1			
C7-13	Speed reference		0.01 Hz			
C7-14	Auxiliary reference 1		0.01 Hz			
C7-15	Auxiliary reference 2		0.01 Hz			
C7-16	Jog reference		0.01 Hz			
C7-17	Torque limit		0.1 %			

Description: Flowchart of function setting in IN3 analog input terminal is listed below. Parameters in diamond stand for display mode only and can not be adjusted. Parameters in square are for adjusting.

There are five separate functions from IN3 input signal, which are set by C5-17. Please refer to page 34 to 39 for setting scale of input signal.



Function settings of analog signal input terminals

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-15	IN1 function setting	0 ~ 5	1	0	X	
C5-16	IN2 function setting	0 ~ 5	1	1	X	
C5-17	IN3 function setting	0 ~ 5	1	4	X	

Description: Parameter definition of analog input terminals.

0 : Disable
1 : Speed reference
2 : Auxiliary reference 1
3 : Auxiliary reference 2
4 : Jog reference
5 : Torque limit

Speed reference scale

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-10	Speed reference scale	0.00 ~ 400.00	0.01 Hz	60.00	○	
C6-00	Speed reference selection	0 ~ 1	1	0	○	
C7-13	Speed reference		0.01 Hz			Monitor only

Description: C5-10 is taken as a corresponding speed reference when one of analog input terminals is set as speed reference.

Setting: The value of C5-10 is the corresponding speed reference compare to maximum value of analog input signal.

IN1 input value = 0 ~ 4096
IN2 input value = -8192 ~ 8192
IN3 input value = -4096 ~ 4096

Example: Set C5-10 = 50.00Hz then +50.00 ~ -50.00Hz is taken as a speed reference form IN2.

When input signal of IN2 is 8192, speed reference of C7-13 = 50Hz. If input signal of IN2 is 4096, the value of C7-13 = 25.00Hz .

C6-00=0, speed reference is set by keypad (see p.41)
C6-00=1, speed reference is C7-13 .

Note: C6-00 is controlled by terminal when terminal function is set as 0.

Auxiliary speed reference 1 scale

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-09	Auxiliary speed reference 1	0.00 ~ 400.00	0.01Hz	0.00	○	
C5-11	Auxiliary speed reference 1 scale	0.00 ~ 400.00	0.01Hz	10.00	○	
C6-01	Auxiliary speed reference 1 selection	0 ~ 1	1	0	○	
C7-14	Auxiliary speed reference 1		0.01Hz			Monitor only

Description: C5-11 is taken as a corresponding auxiliary speed reference 1 when one of analog input terminals is set as auxiliary speed reference.

Setting: The value of C5-11 is the corresponding auxiliary speed reference 1 compare to maximum value of analog input signal.

IN1 input value = 0 ~ 4096
IN2 input value = -8192 ~ 8192
IN3 input value = -4096 ~ 4096

Example: Set C5-11 = 30.00Hz then +30.00 ~ -30.00Hz is taken as an auxiliary speed reference 1 form IN2.

When input signal of IN2 is 8192, auxiliary speed reference 1 of C7-14 = 30Hz. If input signal of IN2 is 4096, the value of C7-14 = 15.00Hz .

C6-01=0, auxiliary speed reference 1 is set by keypad (see p.44).
C6-01=1, auxiliary speed reference 1 is C7-14.

Note: C6-01 is controlled by terminal when terminal function is set as 1 .

Auxiliary speed reference 2 scale

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-10	Auxiliary speed reference 2	-99.99 ~ 99.99	0.01Hz	0.00	○	
C5-12	Auxiliary speed reference 2 setting	-99.99 ~ 99.99	0.01Hz	10.00	○	
C6-02	Auxiliary speed reference 2 selection	0 ~ 1	1	0	○	
C7-15	Auxiliary speed reference 2		0.01Hz			Monitor only

Description: C5-12 is taken as a corresponding auxiliary speed reference 2 when one of analog input terminals is set as auxiliary speed reference 2.

Setting: The value of C5-12 is the corresponding auxiliary speed reference 2 compare to maximum value of analog input signal.

IN1 input value = 0 ~ 4096
IN2 input value = -8192 ~ 8192
IN3 input value = -4096 ~ 4096

Example: Set C5-12 = 30.00Hz then +30.00 - -30.00Hz is taken as an auxiliary speed reference 2 form IN2.

When input signal of IN2 is 8192, auxiliary speed reference 2 of C7-15 = 30Hz. If input signal of IN2 is 4096, the value of C7-15 = 15.00Hz .

C6-02=0, auxiliary speed reference 2 is set by keypad (see p.45).
C6-02=1, auxiliary speed reference 2 is C7-15.

Note: 1. C6-02 is controlled by terminal when terminal function is set as 2 .
2. Auxiliary speed reference 2 can't be affected by speed reference limit, rotating direction limit, skip frequency and accel./decel. time.

Jog speed reference scale

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-08	Jog speed reference	0.00 ~ 400.00	0.01Hz	6.00	○	
C5-13	Jog speed reference setting	0.00 ~ 400.00	0.01Hz	6.00	○	
C6-03	Jog speed reference selection	0.1	1	0	○	
C7-16	Jog speed reference		0.01Hz			Monitor only

Description: C5-13 is taken as a corresponding jog reference when one of analog input terminals is set as jog speed reference.

Setting: The value of C5-13 is the corresponding jog speed reference compare to maximum value of analog input signal.

IN1 input value = 0 ~ 4096
IN2 input value = -8192 ~ 8192
IN3 input value = -4096 ~ 4096

Example: Set C5-13 = 10.00Hz then 10.00Hz is taken as a jog speed reference form IN3.

When input signal of IN3 is 2048, jog speed reference of C7-16 = 10Hz. If input signal of IN3 is 1024, the value of C7-16 = 5.00Hz .

C6-03=0, jog speed reference is set by keypad (see p.46).
C6-03=1, jog speed reference is C7-16.

Note: C6-03 is controlled by terminal when terminal function is set as 3.

Torque limit scale

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-14	Torque limit setting	0.0 ~ 250.0	0.1 %	100.0	○	
C6-04	Torque limit selection	0 ~ 1	1	0	○	
C7-17	Torque limit		0.1 %			Monitor only

Description: C5-14 is taken as a corresponding torque limit when one of analog input terminals is set as torque limit.

Setting: The value of C5-14 is the corresponding torque limit compare to maximum value of analog input signal.

IN1 input value = 0 ~ 4096
IN2 input value = -8192 ~ 8192
IN3 input value = -4096 ~ 4096

Example: Set C5-14 =100%, if maximum input voltage of IN3 is the 100% torque limit.

If input signal of IN3 is 2048 and C7-17=100.0%, input signal of IN3 is 1024, the torque limit (C7-17) would be 50.0%.

C6-04=0, torque limit is set by keypad (see p.96).
C6-04=1, the value of C7-16 is the torque limit.

Note: 1. C6-04 is controlled by terminal when terminal function is set as 3.
2. Please refer to page 97, 98 for related torque limit setting.

5.3 Related settings of speed references

Related speed reference setting includes speed reference, multi-step speed, jog reference, auxiliary reference, speed reference limit, skip frequency, accel./decel. curve and stop model. Function table of speed reference setting is listed below; detail information will be explained in following sections. Please also refer to **control diagram 2 & 3** for further information.

Function table of speed references:

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-00	Speed reference 1	0.00 ~ 400.00	0.01 Hz	10.00	○	
C1-01	Speed reference 2	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-02	Speed reference 3	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-03	Speed reference 4	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-04	Speed reference 5	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-05	Speed reference 6	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-06	Speed reference 7	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-07	Speed reference 8	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-08	Jog speed reference	0.00 ~ 400.00	0.01 Hz	6.00	○	
C1-09	Auxiliary speed reference 1	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-10	Auxiliary speed reference 2	-99.99 ~ 99.99	0.01 Hz	0.00	○	
C1-16	Maximum forward speed reference	0.00 ~ 400.00	0.01 Hz	60.00	X	
C1-17	Minimum forward speed reference	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-18	Maximum reverse speed reference	0.00 ~ 400.00	0.01 Hz	60.00	X	
C1-19	Minimum reverse speed reference	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-20	Skip frequency 1	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-21	Bandwidth of skip frequency 1	0.00 ~ 30.00	0.01 Hz	0.00	X	
C1-22	Skip frequency 2	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-23	Bandwidth of skip frequency 2	0.00 ~ 30.00	0.01 Hz	0.00	X	
C1-24	Skip frequency 3	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-25	Bandwidth of skip frequency 3	0.00 ~ 30.00	0.01 Hz	0.00	X	
C6-00	Speed reference selection	0 ~ 1	1	0	○	
C6-01	Auxiliary speed reference 1 selection	0 ~ 1	1	0	○	

Function table of speed references (continuous):

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-02	Auxiliary speed reference 2 selection	0 ~ 1	1	0	○	
C6-03	Jog speed reference selection	0 ~ 1	1	0	○	
C6-12	Auxiliary speed reference 1 (“+”,”-” sign changed)	0 ~ 1	1	0	X	
C7-02	Speed reference F		0.01 Hz			Monitor only
C7-18	Speed reference A		0.01 Hz			
C7-19	Speed reference B		0.01 Hz			
C7-20	Speed reference C		0.01 Hz			
C7-21	Speed reference D		0.01 Hz			
C7-22	Speed reference E		0.01 Hz			

5.3-1 Settings of speed references, multi-step speed functions, auxiliary speed references and jog reference.

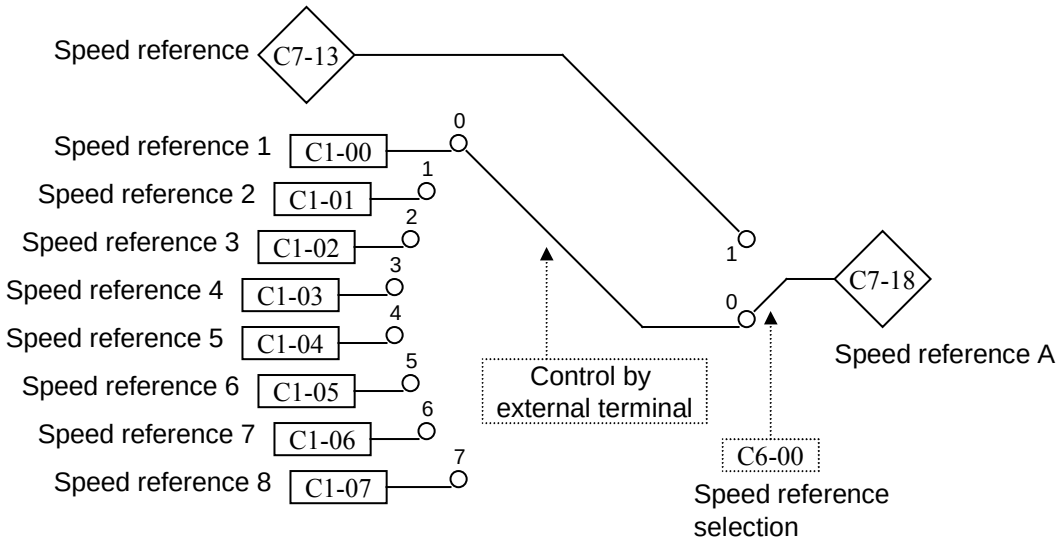
Speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-00	Speed reference 1	0.00 ~ 400.00	0.01 Hz	10.00	○	
C1-01	Speed reference 2	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-02	Speed reference 3	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-03	Speed reference 4	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-04	Speed reference 5	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-05	Speed reference 6	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-06	Speed reference 7	0.00 ~ 400.00	0.01 Hz	0.00	○	
C1-07	Speed reference 8	0.00 ~ 400.00	0.01 Hz	0.00	○	
C6-00	Speed reference selection	0 ~ 1	1	0	○	
C7-13	Speed reference					Monitor only

Description: Flowchart of speed reference setting is listed below. Parameters in diamonds stand for display mode only and can't be adjusted. Parameters in squares are for adjusting.

C6-00=0, speed reference is set by keypad (C1-00 – C1-07).
C6-00=1, speed reference is C7-13.

C7-13 is speed reference of analog input terminal; please refer to page 34 for detail information.



Multi-step speed control models:

There is 9-step speed control available by applying 8 speed references and one speed reference of analog input. Multi-step speed control should be operated with terminal. Example of 9-step speed control is listed below.

Example: Terminals settings are shown as follow when terminal 1 to terminals 4 are taken as multi-step speed control.

Terminal	Parameter	Setting value	Description
Terminal 1	C5-02	30	Multi-step speed 1
Terminal 2	C5-03	31	Multi-step speed 2
Terminal 3	C5-04	32	Multi-step speed 3
Terminal 4	C5-05	0	Selection of analog/digital speed reference

Speed references, which are determined by terminal status, are listed as follows.

Terminal 1	Terminal 2	Terminal 3	Terminal 4	Speed reference A
0	0	0	0	C1-00
1	0	0	0	C1-01
0	1	0	0	C1-02
1	1	0	0	C1-03
0	0	1	0	C1-04
1	0	1	0	C1-05
0	1	1	0	C1-06
1	1	1	0	C1-07
-	-	-	1	C7-13

Note: Signal is designated as 1 when terminal is closed. Signal is designated as 0 when terminal is opened.

Except 9-step speed control, there are 8-step, 5-step, 4-step, 3-step, 2-step also available. Required Settings of above functions are shown as follow.

Control model	Input terminals required	Function setting	Speed reference for using
8-step speed	3 terminals	Multi-step speed reference 1 Multi-step speed reference 2 Multi-step speed reference 3	C1-00 ~ C1-07
5-step speed	3 terminals	Multi-step speed reference 1 Multi-step speed reference 2 Selection of analog/digital speed reference	C1-00 ~ C1-03 C7-13
4-step speed	2 terminals	Multi-step speed reference 1 Multi-step speed reference 2	C1-00 ~ C1-03

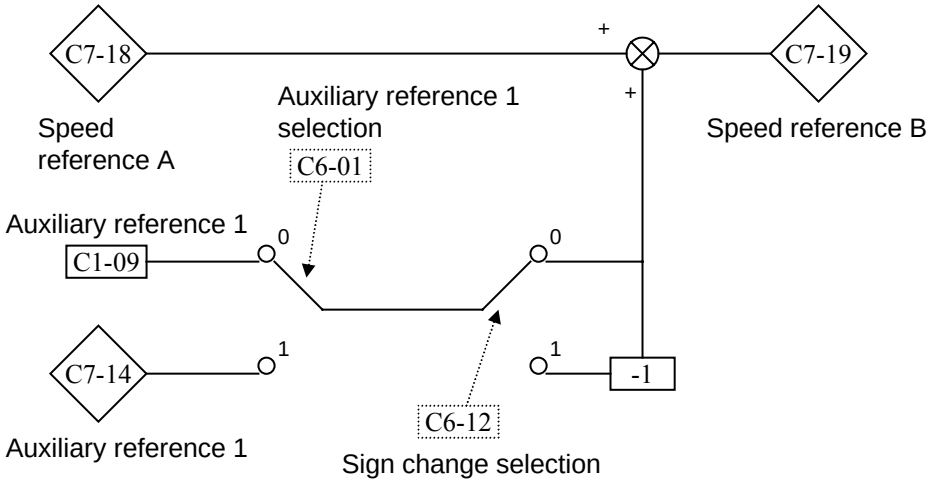
(Continuous)			
Control model	Input terminals required	Function setting	Speed reference for using
3-step speed	2 terminals	Multi-step speed reference 1 Selection of analog/digital speed reference	C1-00 ~ C1-01 C7-13
2-step speed	1 terminal	Multi-step speed reference 1 or Selection of analog/digital speed reference	C1-00 ~ C1-01 C7-13

Auxiliary speed references:

Setting of auxiliary speed reference 1

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-09	Auxiliary speed reference 1	0.00 ~ 400.00	0.01 HZ	0.00	○	
C6-01	Auxiliary speed reference 1 selection	0 ~ 1	1	0	○	
C6-12	Auxiliary speed reference 1 (“+”,”-” sign changed)	0 ~ 1	1	0	X	
C7-14	Auxiliary speed reference 1					Monitor only

Description: Flowchart of auxiliary speed reference 1 setting is listed below. Parameters in diamond stand for display mode only and can not be adjusted. Parameters in square are for adjusting.



C7-14 is the auxiliary speed reference 1 of analog input terminal; please refer to page 35 for detail information.

C6-01=0, auxiliary speed reference 1 is set by keypad (C1-09).
C6-01=1, auxiliary speed reference 1 is C7-14 (page 35).

C6-12=0, auxiliary speed reference 1 remain original input value.
C6-12=1, Sign changed in auxiliary speed reference 1.

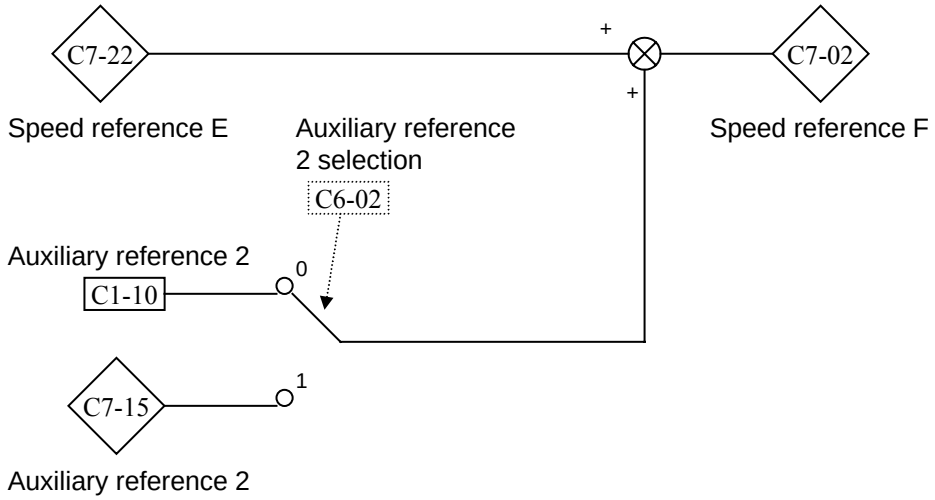
Auxiliary speed reference 1 plus speed reference A (C7-18) equal to speed reference B (C7-19).

Note: 1. C6-01 is controlled by terminal if terminal function is set as 1.
2. C6-12 is controlled by terminal if terminal function is set as 12.

Setting of auxiliary speed reference 2

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-10	Auxiliary speed reference 2	-99.99 ~ 99.99	0.01 HZ	0.00	○	
C6-02	Auxiliary speed reference 2 selection	0 ~ 1	1	0	○	
C7-15	Auxiliary speed reference 2					Monitor only

Description: Flowchart of auxiliary speed reference 2 setting is listed below. Parameters in diamond stand for display mode only and can not be adjusted. Parameters in square are for adjusting.



Auxiliary speed reference 2 plus C7-22, which generated by accel./decel. curve equals C7-02. Auxiliary speed reference 2 is in the final section of flowchart. Hence, auxiliary speed reference 2 isn't affected by speed reference limit, rotating direction limit , skip frequency and accel./decel. time.Please also refer to **control diagram 2 & 3** for further information.

C7-15 is the auxiliary speed reference 2 of analog input terminal; please refer to page 36 for detail information.

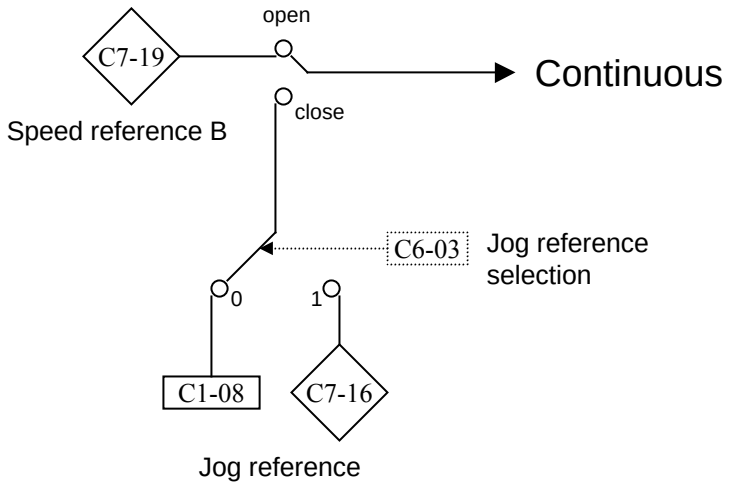
C6-02=0, auxiliary speed reference 2 is set by keypad (C1-09).
C6-02=1, auxiliary speed reference 2 is C7-15.

Note: C6-02 is controlled by terminal if terminal function is set as 2

Jog speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-08	Jog speed reference	0.00 ~ 400.00	0.01 Hz	6.00	○	
C6-03	Jog speed reference selection	0 ~ 1	1	0	○	
C7-16	Jog speed reference					Monitor only

Description: Flowchart of jog speed reference setting is listed below. Parameters in diamond stand for display mode only and can not be adjusted. Parameters in square are for adjusting.



Set terminal function as jog (29) before jog function is selected. Jog speed reference is taken as operating reference when the terminal is closed. Speed reference B is taken as operating reference when the terminal is opened.

C7-16 is the jog speed reference of analog input terminal; please refer to page 37 for detail information.

C6-03=0, jog speed reference is controlled by keypad (C1-08).
C6-03=1, jog speed reference is controlled by analog input signal (C7-16).

Note: 1. Jog speed function is only active when jog terminal modified in the stop model.
2. C6-03 is controlled by terminal if terminal function is set as 3.

5.3-2 Speed reference limits and skip frequency settings

Maximum forward speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-16	Maximum forward speed reference	0.00 ~ 400.00	0.01 Hz	60.00	X	

Attention: The scale will be 0.00 ~400.00 Hz, but do not operate at less minimum forward speed reference (C1-17).

Minimum forward speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-17	Minimum forward speed reference	0.00 ~ 400.00	0.01 Hz	0.00	X	

Attention: The scale will be 0.00 ~400.00 Hz, but do not surpass maximum Forward speed reference (C1-16).

Maximum reverse speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-18	Maximum reverse speed reference	0.00 ~ 400.00	0.01 Hz	60.00	X	

Attention: The scale will be 0.00 ~400.00 Hz, but do not operate at less than minimum reverse speed reference (C1-19).

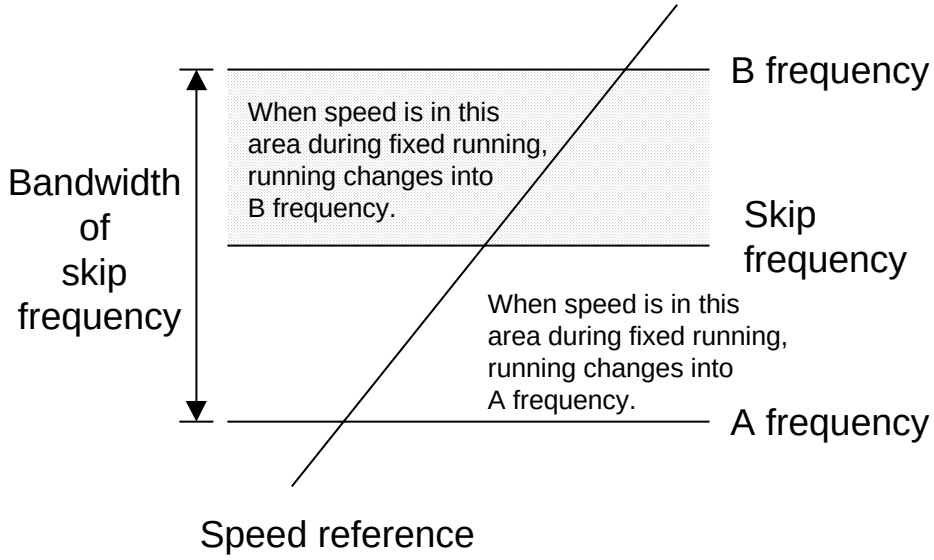
Minimum reverse speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-19	Minimum reverse speed reference	0.00 ~ 400.00	0.01 Hz	0.00	X	

Attention: Scale will be 0.00 ~400.00 Hz, but do not surpass maximum reverse speed reference (C1-18).

Settings of skip frequency

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-20	Skip frequency 1	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-21	Bandwidth of skip frequency 1	0.00 ~ 30.00	0.01 Hz	0.00	X	
C1-22	Skip frequency 2	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-23	Bandwidth of skip frequency 2	0.00 ~ 30.00	0.01 Hz	0.00	X	
C1-24	Skip frequency 3	0.00 ~ 400.00	0.01 Hz	0.00	X	
C1-25	Bandwidth of skip frequency 3	0.00 ~ 30.00	0.01 Hz	0.00	X	



Description: This function is used to avoid mechanic resonance of motors. When the speed reference of motor falls within the setting range of skip frequency, the real operation reference will change to frequency A or B; however, there is no effect during acceleration or deceleration.

Example: Set the jump frequency 1 (C1-20) = 15.00Hz, the bandwidth of skip frequency 1 (C1-21) = 1.00Hz, when

14.5 Hz＜speed reference≦15 Hz, the speed reference changes to 14.5 Hz.

15 Hz＜speed reference＜15.5 Hz, the speed reference changes to 15.5 Hz.

There is no effect during acceleration or deceleration.

5.3-3 Accel./Decel. functions, multi-step accel./decel. curves, stop model settings

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-00	Accel/Decel. function setting	0 ~ 3	0	0	X	
C4-01	Acceleration time 1	0.00 ~ 600.00	0.01 sec	5.00	○	
C4-02	Deceleration time 1	0.00 ~ 600.00	0.01 sec	5.00	○	
C4-09	Emergency stop time 1	0.00 ~ 600.00	0.01 sec	5.00	○	
C4-10	Emergency stop time 2	0.00 ~ 600.00	0.01 sec	5.00	○	
C4-11	Jog acceleration time	0.00 ~ 600.00	0.01 sec	5.00	○	
C4-12	Jog deceleration time	0.00 ~ 600.00	0.01 sec	5.00	○	
C4-31	S curve time 1 (accel. start)	0.00 ~ 2.55	0.01 sec	0.20	X	
C4-32	S curve time 2 (accel. end)	0.00 ~ 2.55	0.01 sec	0.20	X	
C4-33	S curve time 3 (Decel. start)	0.00 ~ 2.55	0.01 sec	0.20	X	
C4-34	S curve time 4 (Decel. end)	0.00 ~ 2.55	0.01 sec	0.20	X	
C6-07	Time unit of accel./decel.	0 ~ 1	1	0	X	

Note: 1. The setting range is from 0.0 to 6000.0 sec when the setting unit of accel./decel. time is 0.1sec.

2. At a setting of accel./decel time, it will take time of your setting to reach 50Hz.

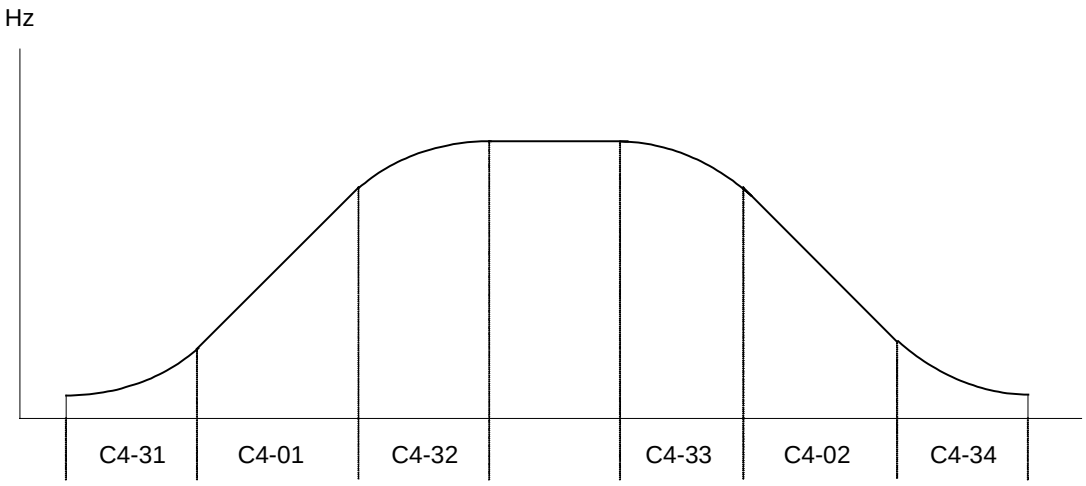
Time unit of acceleration/deceleration

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-07	Time unit of accel./decel.	0 ~ 1	1	0	No	

Description: C6-07=0, time unit of acceleration/deceleration is 0.01 second.
C6-07=1, time unit of acceleration/deceleration is 0.1 second.

S curve Accel. / Decel. time

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-31	S curve time 1 (accel. start)	0.00 ~ 2.55	0.01 sec	0.20	X	
C4-32	S curve time 2 (accel. end)	0.00 ~ 2.55	0.01 sec	0.20	X	
C4-33	S curve time 3 (Decel. start)	0.00 ~ 2.55	0.01 sec	0.20	X	
C4-34	S curve time 4 (Decel. end)	0.00 ~ 2.55	0.01 sec	0.20	X	



Function settings of acceleration and deceleration

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-00	Function settings of accel. and decel.	0 ~ 3	0	0	X	

Description: There are four models of function setting of acceleration and deceleration

Setting value	Start	Operation	Stop	Holding	Timer	Remark
0	Accel. time	Accel./decel. time	Decel. time	Yes	No	Accel./decel. time is jog accel./decel. time when jog operation.
1			Emergency stop time1	Yes	No	
2			Coast to stop	No	No	
3			Coast to stop	No	Yes	

Multi-step accel./decel. functions

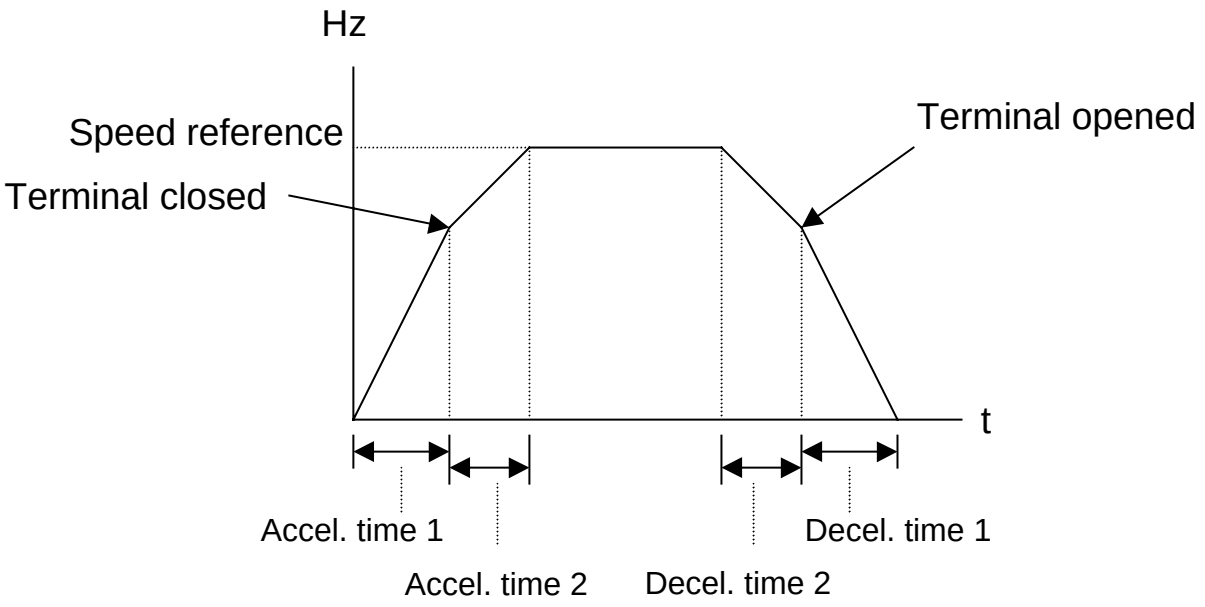
Time settings of acceleration and deceleration are shown as follows:

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-01	Acceleration time 1	0.00 ~ 600.00	0.01sec	5.00	○	
C4-02	Deceleration time 1	0.00 ~ 600.00	0.01sec	5.00	○	
C4-03	Acceleration time 2	0.00 ~ 600.00	0.01sec	5.00	○	
C4-04	Deceleration time 2	0.00 ~ 600.00	0.01sec	5.00	○	
C4-05	Acceleration time 3	0.00 ~ 600.00	0.01sec	5.00	○	
C4-06	Deceleration time 3	0.00 ~ 600.00	0.01sec	5.00	○	
C4-07	Acceleration time 4	0.00 ~ 600.00	0.01sec	5.00	○	
C4-08	Deceleration time 4	0.00 ~ 600.00	0.01sec	5.00	○	

Note: 1. The setting range is from 0.0 to 6000.0 sec when the setting unit of accel./decel. time is 0.1sec.
2. At a setting of accel./decel time, it will take time of your setting to reach 50Hz.

Description: Only one set of acceleration/deceleration is adopted in general application. If more then one set is requested, it need controller by terminal.

Example 1: Set one terminal as control terminal of multi-step accel./decel. 1(26), and accel./decel. 1 and accel./decel. 2 are used.



Note: Set C4-00=1, decelerate according to emergency stop time 1 when stop.

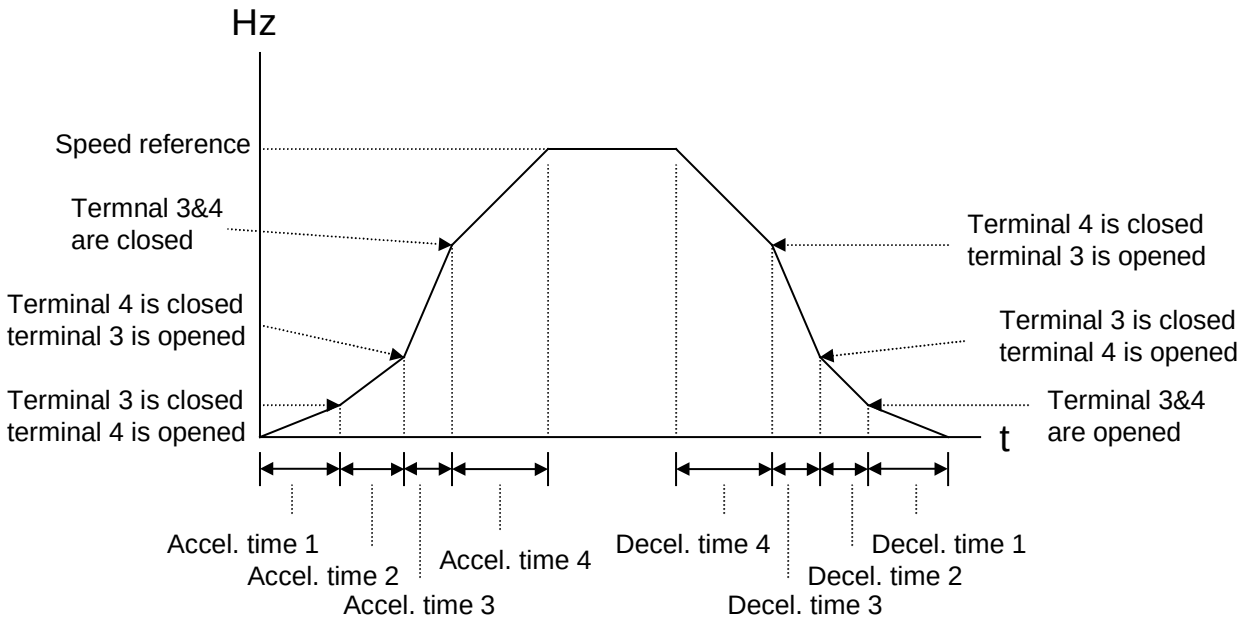
Example 2: Set two terminals as control terminal if 4 set of accel./decel. are used.
For example, designate terminal 3 and terminal 4 as control terminals of multi-step accel./decel. 1&2. (C5-04=26,C5-05=27),

Accel./decel. 1 is adopted if terminal 3 & 4 are opened.

Accel./decel. 2 is adopted if terminal 3 is closed and terminal 4 is opened.

Accel./decel. 3 is adopted if terminal 4 is closed and terminal 3 is opened.

Accel./decel. 4 is adopted if terminal 3 & 4 are closed.



Note: Set C4-00=1, decelerate according to emergency stop time 1 when stop.

Stop Mode

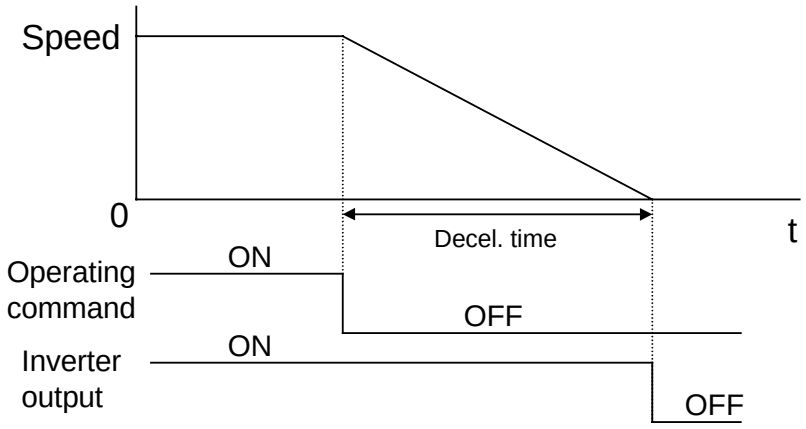
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-00	Accel. and decel. function setting	0 ~ 3	1	0	X	

Description: According to setting of C4-00, there are four models of stop,

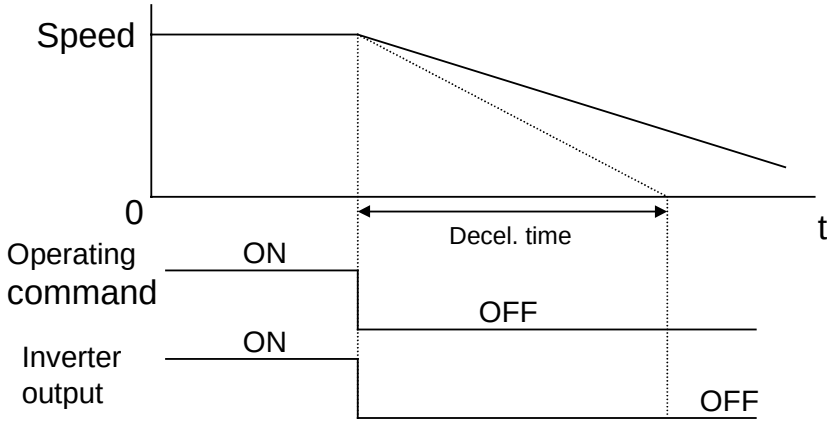
Setting value	Start	Operation	Stop	Holding	Timer	Remark
0	Accel. time	Accel./decel. time	Decel. time	Yes	No	Accel./decel. time is jog accel./decel. time when jog operation.
1			Emergency stop time1	Yes	No	
2			Coast to stop	No	No	
3			Coast to stop	No	Yes	

Stop models are illustrated as follow:

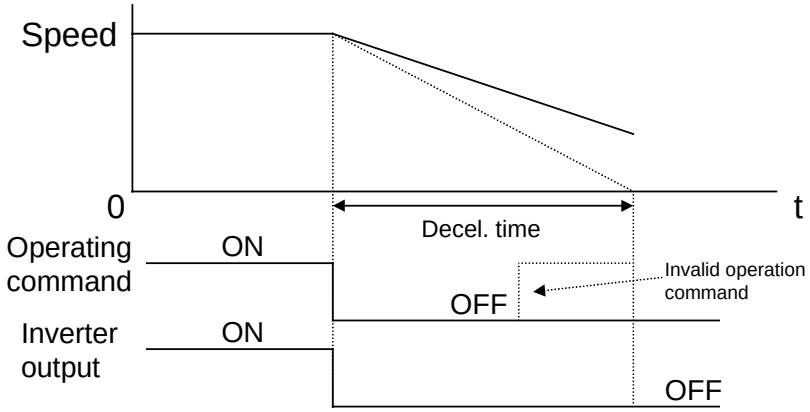
Decelerate to stop: Decelerate to stop according to decel. time.



Cost to stop: Inverter stop output after operating command is turned off.



Cost to stop with timer: Inverter stop output after operating command is turned off. Operating command isn't accepted before the end of deceleration time.

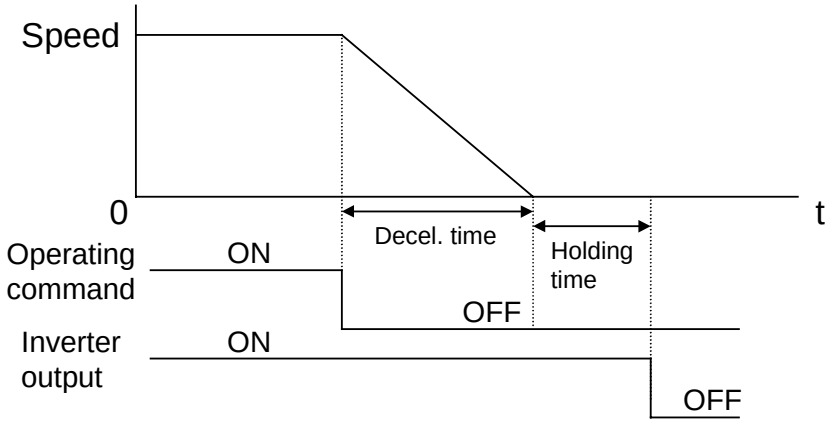


Decelerate to stop with holding: Holding is active in the end of deceleration and will be disabled when holding time is finished.

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-18	Time of holding	0.00 ~ 300.00	0.01 sec.	0.1	X	
C6-08	Holding	0 ~ 1	1	0	X	

Description: C6-08=0, holding disabled.
C6-08=1, holding enable.

This function is only applied when vector control. Inverter output voltage to motor from speed reference =0 to end of timer. Because output torque can be generated upto 150% when speed reference=0, it can reduce time of stop in high inertia system to meet customer's needs.



5.4 Multi-function output settings

This chapter includes analog output terminals and relay output terminals. Following is the detail description of above functions.

5.4-1 Analog output terminals

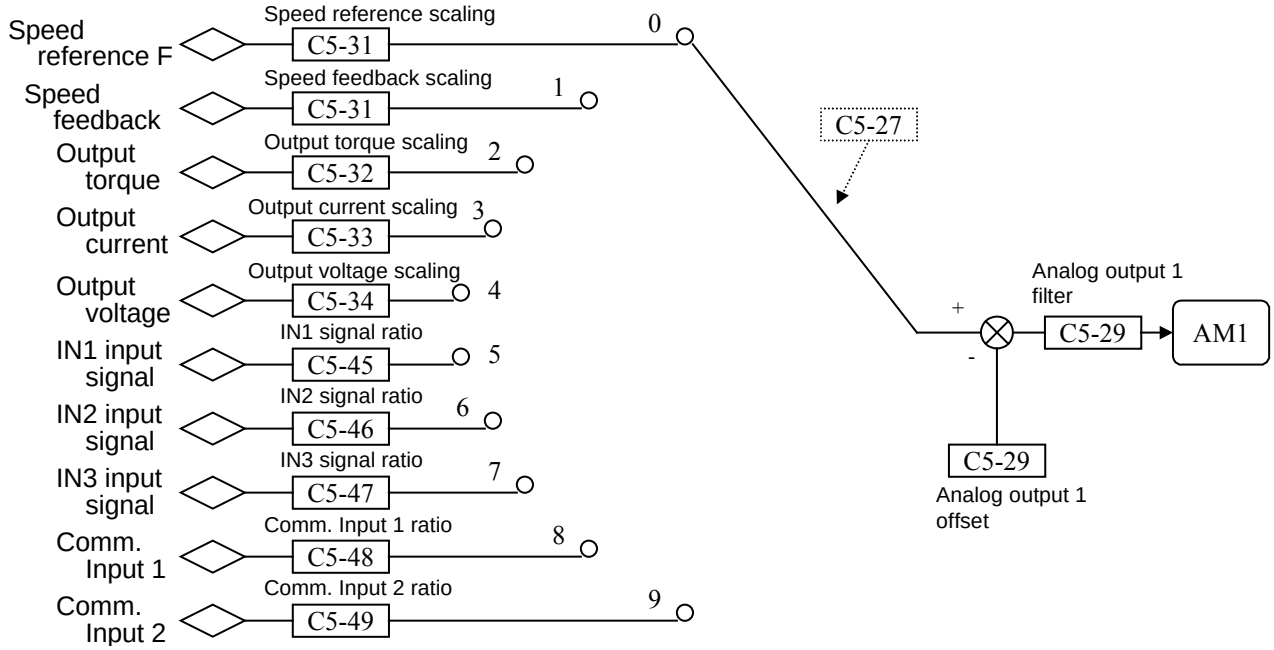
CT2000V provides two sets of analog output in DAC 12 bit. The output specification is ± 10VDC.

Function table of analog outputs

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-27	Function setting of analog output 1	0 ~ 9	1	0	○	
C5-28	Function setting of analog output 2	0 ~ 9	1	0	○	
C5-29	Offset of analog output 1	-2047 ~ 2047	1	0	○	
C5-30	Offset of analog output 2	-2047 ~ 2047	1	0	○	
C5-31	Speed reference scaling	0.10 ~ 400.00	0.01 Hz	60.00	○	
C5-32	Output torque scaling	0.1 ~ 250.0	0.1 %	100.0	○	
C5-33	Output current scaling	10.0 ~ 250.0	0.1%	100.0	○	
C5-34	Output voltage scaling	10.0 ~ 250.0	0.1%	100.0	○	
C5-41	AM1 digital filter	0~6	1	4	X	
C5-42	AM2 digital filter	0~6	1	4	X	
C5-45	Ratio of IN1 input to analog output	10.0~500.0	0.1%	100.0	○	
C5-46	Ratio of IN2 input to analog output	10.0~500.0	0.1%	100.0	○	
C5-47	Ratio of IN3 input to analog output	10.0~500.0	0.1%	100.0	○	
C5-48	Ratio of comm. Input 1 to analog oupt	0~5000	1	2000	○	
C5-49	Ratio of comm. Input 2 to analog oupt	0~5000	1	2000	○	

Description: Following flowchart illustrates AM1 function settings of analog outputs. The diamonds stand for digital data and parameters in squares are for setting.

According to the setting of C5-27, there are ten functions in analog output. User could set the scaling of output signal. Please refer to page 55 to 61 for detail information.



Analog output function settings

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-27	Function setting of analog output 1	0 ~ 9	1	0	○	
C5-28	Function setting of analog output 2	0 ~ 9	1	0	○	

Description: The range of analog output is -10V ~ +10V. Selective functions is shown as follow:

Setting value	Output signal
0	Speed reference F
1	Speed feedback
2	Output torque
3	Output current
4	Output voltage
5	IN1 input
6	IN2 input
7	IN3 input
8	Comm. input 1
9	Comm. Input 2

Offset settings of analog output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-29	Offset of analog output 1	-2047 ~ 2047	1	0	○	
C5-30	Offset of analog output 2	-2047 ~ 2047	1	0	○	

Description: This resolution of analog output is 12bit (±2047 = -10V ~ 10V). The setting unit is 4.885mV

Example: If the analog output offset test by meter is 0.12V, C5-29 should be set as 24 or 25. Because 0.12V*1000 / 4.885mV =24.56 25.

Analog output scaling setting of speed reference and speed feedback

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-31	Speed reference scaling	0.10 ~ 400.00	0.01Hz	60.00	○	

Description: C5-31 is used to define analog output scaling setting of speed reference and speed feedback.

Calculation: Speed reference *(10V / value of C5-31) = actual output voltage.
Speed feedback *(10V / value of C5-31) = actual output voltage.

Example: Set C5-31=60Hz to define output signal equal to 10V when speed reference at 60Hz. If speed reference equal to 30Hz, than output signal is 5V.

30Hz * (10V / 60Hz) = 5V.

If speed reference is above 60Hz, the output signal is 10V only.

Analog output scaling setting of torque output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-32	Output torque scaling	0.10 ~ 250.0	0.1%	100.00	○	

Description: C5-32 is used to define analog output scaling of torque output.

Calculation: Torque output *(10V / value of C5-32) = actual output voltage.

Example: Set C5-32=100% to define output signal equal to 10V when torque output is 100%. If torque output equal to 50%, than output signal is 5V.

50% * (10V / 100%) = 5V.

If output torque is above 100%(setting value), the output signal is only 10V.

Analog output scaling setting of output current

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-33	Output current scaling	0.10 ~ 250.0	0.1 %	100.00	○	

Description: C5-33 is used to define analog output scaling of output current.

Calculation: Output current *(10V / value of C5-33) = actual output voltage.

Example: Set C5-33=100% to define output signal equal to 10V when output current is 100%. If output current equal to 50%, than output signal is 5V.

50% * (10V / 100%) = 5V.

If output current is above 100%(setting value), the output signal is only 10V.

Analog output scaling setting of output voltage

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-34	Output voltage scaling	0.10 ~ 250.0	0.1%	100.00	○	

Description: C5-34 is used to define analog output scaling of output voltage.

Calculation: Output voltage *(10V / value of C5-33) = actual output voltage.

Example: Set C5-34=100% to define output signal equal to 10V when output voltage is 100%. If output voltage equal to 50%, than output signal is 5V.

50% * (10V / 100%) = 5V.

If output voltage is above 100%(setting value), the output signal is only 10V.

Ratio setting of analog input IN1 to analog output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-45	Ratio of IN1 input to analog output	10.0 ~ 500.0	0.1%	100.00	○	

Description: C5-45 is used to define the ratio of analog input IN1 to analog output.

Calculation: (Analog input IN1(%) / value of C5-45)*10V = actual output voltage.

Example: Set C5-45=100% to define output signal equal to 10V when analog input IN1 is 100%. If analog input IN1 equal to 50%, than output signal is 5V.

50% * (10V / 100%) = 5V.

Ratio setting of analog input IN2 to analog output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-46	Ratio of IN2 input to analog output	10.0 ~ 500.0	0.1%	100.00	○	

Description: C5-46 is used to define the ratio of analog input IN2 to analog output.

Calculation: (Analog input IN2(%) / value of C5-46)*10V = actual output voltage.

Example: Set C5-46=100% to define output signal equal to 10V when analog input IN2 is 100%. If analog input IN2 equal to 50%, than output signal is 5V.

50% * (10V / 100%) = 5V.

Ratio setting of analog input IN3 to analog output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-47	Ratio of IN3 input to analog output	10.0 ~ 500.0	0.1%	100.00	○	

Description: C5-47 is used to define the ratio of analog input IN3 to analog output.

Calculation: (Analog input IN3(%) / value of C5-47)*10V = actual output voltage.

Example: Set C5-47=100% to define output signal equal to 10V when analog input IN3 is 100%. If analog input IN3 equal to 50%, than output signal is 5V.

50% * (10V / 100%) = 5V.

Ratio setting of communication input 1 to analog output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-48	Ratio of comm. Input1 to analog output	100 ~ 5000	1	2000	○	

Description: C5-48 is used to define the ratio of communication input 1 to analog output.

Calculation: (communication input 1 / value of C5-48)*10V = actual output voltage.

Example: Set C5-48=2000 to define output signal equal to 10V when communication input 1 is 2000. If communication input 1 equal to 1000, than output signal is 5V.

1000 * (10V / 2000) = 5V.

Ratio setting of communication input 2 to analog output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-49	Ratio of comm. Input2 to analog output	100 ~ 5000	1	2000	○	

Description: C5-49 is used to define the ratio of communication input 2 to analog output.

Calculation: (communication input 2 / value of C5-49)*10V = actual output voltage.

Example: Set C5-49=2000 to define output signal equal to 10V when communication input 2 is 2000. If communication input 2 equal to 1000, than output signal is 5V.

1000 * (10V / 2000) = 5V.

Digital filter of analog output terminals AM1,AM2

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-41	AM1 digital filter	0 ~ 6	1	0	X	
C5-42	AM2 digital filter	0 ~ 6	1	0	X	

Description: AM1 and AM2 have built-in digital filters. Time settings of digital filters are shown as follows.

Setting value	Filtering time
0	1 ms
1	2 ms
2	4 ms
3	8 ms
4	16 ms
5	32 ms
6	64 ms

5.4-2 Relay output

Relay output seletion

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-35	Relay output 1 selection	0 ~ 15	1	1	○	
C5-36	Relay output 2 selection	0 ~ 15	1	11	○	

Description: The minimum pulse width of relay output terminal is 128ms. Options of output are shown the below table:

Setting Value	Function	Active	
		NO – C	NC - C
0	None	opened	closed
1	Drive error	closed	opened
2	Overload error	closed	opened
3	Acceleration	closed	opened
4	Deceleration	closed	opened
5	Constant Speed	closed	opened
6	Rotating direction reference	closed (reverse rotation)	opened
7	Output torque direction	closed (negative torque)	opened
8	Speed Limit	closed	opened
9	Torque Limit	closed	opened
10	Re-generation	closed	opened
11	Run	closed	opened
12	Run	opened	closed
13	Drive error	opened	closed
14	Speed reference pass over 1	closed	opend
15	Speed reference pass over 2	closed	opend

Speed reference pass over point setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-43	Pass over point 1	0.00~400.00	0.01Hz	30.00	○	
C5-44	Pass over point 2	0.00~400.00	0.01Hz	30.00	○	

Description: When relay function equals to 14,and speed reference is higher or equal to value of C5-43,then relay 1 acted.

5.5 PID controller

Function table of PID loops

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-19	Source selection of PID command	0 ~ 3	1	0	X	
C4-20	Source selection of PID feedback	0 ~ 3	1	0	X	
C4-21	PID command	-100.0 ~ 100.0	0.1%	50.0	○	
C4-22	PID output limit	0.0 ~ 100.0	0.1%	100.0	X	
C4-23	PID speed reference setting	0.00 ~ 300.00	0.01Hz	30.00	○	
C4-24	PID proportional gain (P)	0.0 ~ 15.0	0.1 times	2.0	○	
C4-25	PID integral time (I)	0.00 ~ 2.50	0.01sec	0.2	○	
C4-26	PID differential time (D)	0.00 ~ 2.50	0.01sec	0	○	
C4-28	PID integral limit	0.0 ~100.0	0.1%	100.0	X	
C4-29	PID command accel/decel time	0.0 ~ 25.5	0.1sec	5.0	○	
C4-30	PID output accel/decel time	0.0 ~ 10.0	0.01sec	0.00	○	
C6-10	PID enable/disable 1	0 ~ 1	1	0	○	
C6-11	PID enable/disable 2	0 ~ 1	1	0	○	
C6-24	Differential position select	0 ~ 1	1	0	X	
C7-10	Command (feedback) of IN1 for PID controller	0.0 ~ 100.0	0.1%			Monitor only
C7-11	Command (feedback) of IN2 for PID controller	-100.0 ~ 100.0	0.1%			
C7-12	Command (feedback) of IN3 for PID controller	0.0 ~ 100.0	0.1%			
C7-23	PID speed reference					

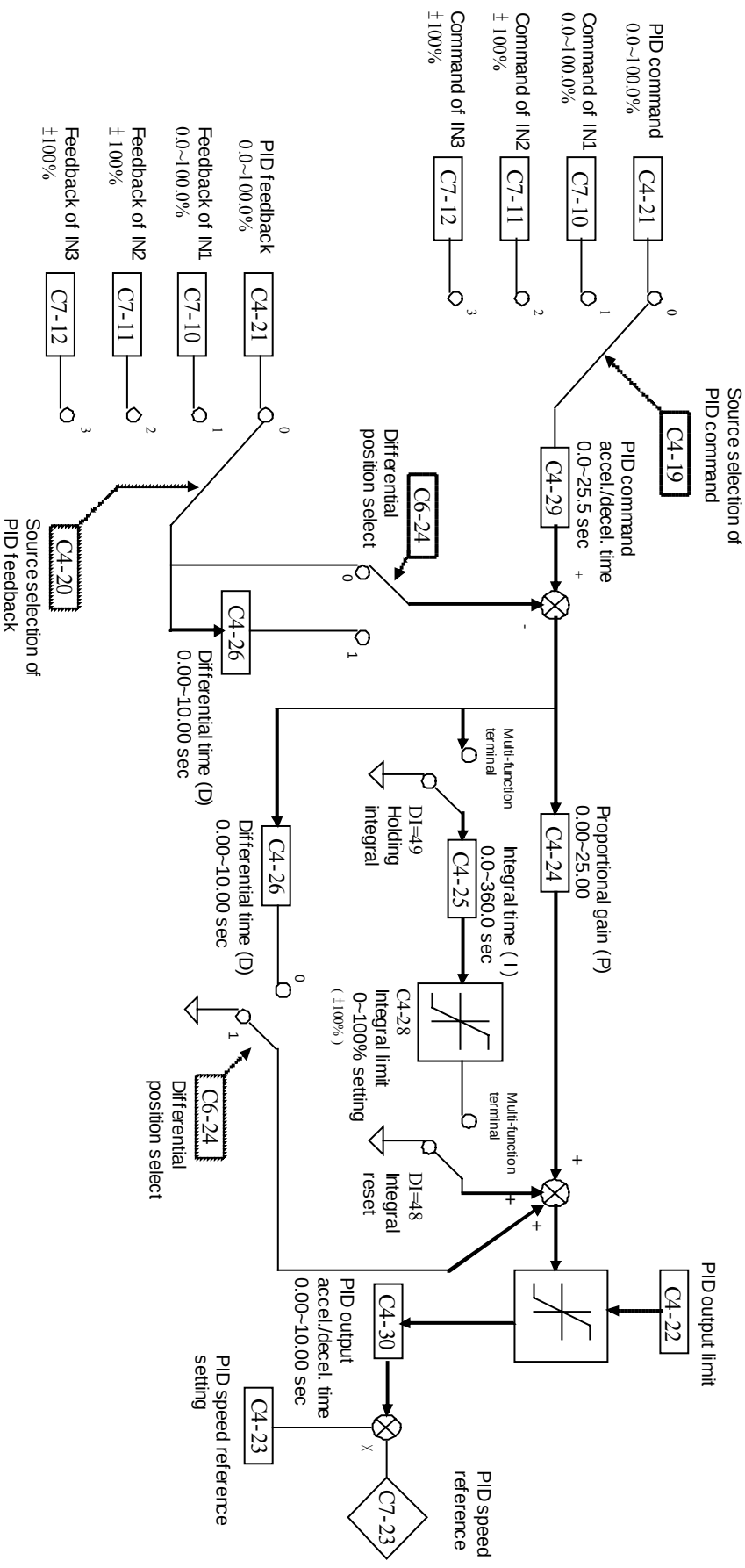
Description: Flowchart of PID controller setting is listed below. Parameters in diamonds stand for display mode only and can not be adjusted. Parameters in squares are for adjusting.

Description: (continuous)

The source of PID command could be selected by C4-19, and PID feedback by C4-20, keyboard input and analog input IN1~3 are selection.
The Unit of PID command/feedback/output is percentage.
C4-23 is unit conversion, % to Hz. When PID output=100%, PID output frequency is C4-23.

C6-24 is used to decide the position of differential control.
Set 1 act on error, set 0 act on feedback.
Set one of multi-function terminal (DI) as 48, the action of reset integral would be controlled by DI. By this setting, the value of integral would not be reset even if PID controller is stop. You must to reset integral by DI.

Set one of multi-function terminal (DI) = 49, as integral holding. When DI is on, the integral paused. This action is lower than integral rest.


PID command
0.0~100.0%
C4-21
Command of IN1
0.0~100.0%
C7-10
Command of IN2
±100%
C7-11
Command of IN3
±100%
C7-12
Source selection of
PID command
C4-19
PID command
accel./decel. time
0.0~25.5 sec
C4-29
Differential
position select
C6-24
PID feedback
0.0~100.0%
C4-21
Feedback of IN1
0.0~100.0%
C7-10
Feedback of IN2
±100%
C7-11
Feedback of IN3
±100%
C7-12
Source selection of
PID feedback
C4-20
C4-26
Differential time (D)
0.00~10.00 sec
Multi-function
terminal
DI=49
Holding
integral
C4-25
Integral time (I)
0.0~360.0 sec
C4-24
Proportional gain (P)
0.00~25.00
C4-28
Integral limit
0~100% setting
(±100%)
Multi-function
terminal
DI=48
Integral
reset
C4-22
PID output limit
C4-30
PID output
accel./decel. time
0.00~10.00 sec
C4-23
PID speed reference
setting
C7-23
PID speed
reference
C6-24
Differential
position select

Source selection of PID command and feedback

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-19	Source selection of PID command	0 ~ 3	1	0	X	
C4-20	Source selection of PID feedback	0 ~ 3	1	0	X	

Description: There are four types of signal source for PID controller.

0: Keypad setting (C4-21).
1: Command (feedback) of PID controller for IN1 (C7-10).
2: Command (feedback) of PID controller for IN2 (C7-11).
3: Command (feedback) of PID controller for IN3 (C7-12).

The unit of signal sources, which are shown above, is percentage (%).

PID command (feedback): setting by keypad

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-21	PID command	-100.0 ~ 100.0	0.1%	50.0	○	

Description: PID command (feedback) source is controlled by keypad and C4-21 is taken for inputting PID command (feedback).

PID output limit: setting of maximum PID output

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-22	PID output limit	0.0 ~ 100.0	0.1%	100.0	X	

Description: This parameter is used to define the range of PID output limit. The setting value of parameter is a positive number only. The range of PID is from designated positive number to relative negative number. For example, set PID output limit as 70%, the range of PID output limit is +70% ~ -70%.

Setting of PID speed reference

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-23	PID speed reference setting	0.00 ~ 300.0	0.01 Hz	30.00	○	
C7-23	PID speed reference					Monitor only

Description: This parameter is used to define the speed reference when 100% PID controller output. If set C4-23 =50Hz when 70% output of PID controller, C7-23 would be 35Hz because 50Hz * 70%.

Proportional gain, integral and differential time of PID controller

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-24	PID Proportional gain (P)	0.0 ~ 25.0	0.01 times	2.0	○	
C4-25	PID integral time (I)	0.0 ~ 360.0	0.1 sec.	1.0	○	
C4-26	PID differential time (D)	0.0 ~ 10.0	0.01 sec.	0	○	

PID integral limit

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-28	PID integral limite	0.0 ~100.0	0.1%	100.0	X	

Description: You can limit the output of integral in a range by C4-28. This function is only positive, but the limit is included negative. For example, C4-28=70%, the range of integral output is +70% ~ -70%

PID accel./decel. time setting

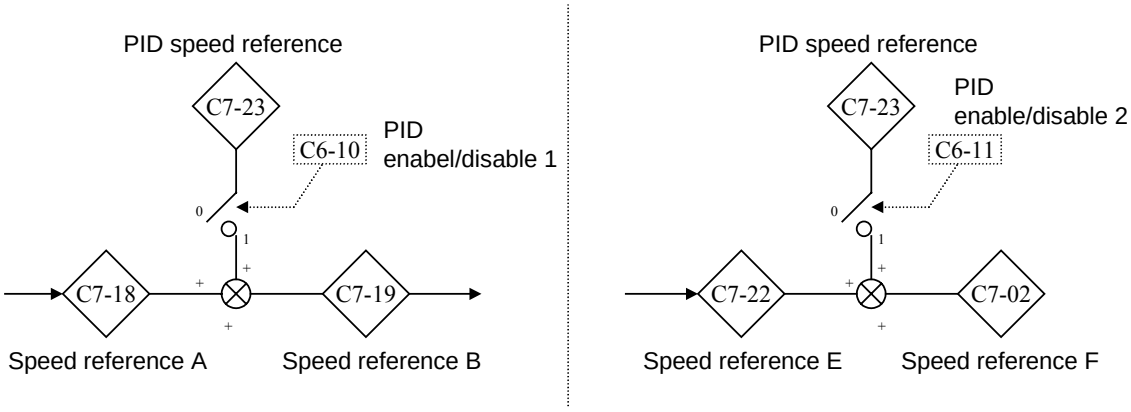
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-29	PID command accel/decel time	0.0 ~ 25.5	0.1sec	5.0	○	
C4-30	PID output accel/decel time	0.0 ~ 10.0	0.01sec	0.00	○	

Description: C4-29 is the accel./decel. time of PID command. When PID output is main speed reference, shorten the normal accel./decel. time and used C4-29 as main accel.decel. time to avoid resonance.
C4-30 is the accel./decel. time of PID output. Normally you don't need to set this function. When the resonance of machine cause by PID control, set a suitable value to avoid.

PID controller enable/disable

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-10	PID enable/disable 1	0 ~ 1	1	0	○	
C6-11	PID enable/disable 2	0 ~ 1	1	0	○	

Description: This parameter is used to set input point of C7-23 PID speed reference. Please check control diagram2 and 3.
PID controller is active after C6-10 or C6-11 is enabled.
Hence, PID controller could be applied when start to operation or during operation. PID is reset when C6-10 or C6-11 is disabled or stops.



Note: 1. C6-10 is controlled by terminal if terminal function is set as 10.
2. C6-11 is controlled by terminal if terminal function is set as 11.

6.1 Basic parameters of motor

Basic parameters of motor

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-00	Motor rated voltage	50.0 ~ 500.0	0.1 V	220.0	X	*1
C2-01	Motor rated frequency	0.00 ~ 320.00	0.01 Hz	60.00	X	*1
C2-02	Motor rated speed	0 ~ 6000	1 rpm	1750	X	*1
C2-03	Motor rated current	30.0 ~ 150.0	0.1 %	100.0	X	*1
C2-04	Poles of motor	2 ~ 14	1 pole	4	X	*1
C2-05	Motor unload current	10.0 ~ 70.0	0.1 %	30.0	X	*2
C2-06	Motor resistance	0 ~ 15.00	0.01Ω	0	X	*2
C2-07	Slip of motor	0.10 ~ 10.00	0.01 Hz	2.00	X	*2
C2-08	Encoder (P/R)	10 ~ 20000	1 pulse	1024	X	*1
C2-09	Starting frequency of weak magnetic control	30.00 ~ 320.00	0.01 Hz	60.00	X	

Note: *1. Parameter settings of motor rated voltage, rated frequency, rated speed, poles and encoder should be according to specifications of nameplate.
***2.** Parameter setting could be completed by autotuning.

Motor rated current

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-03	Motor rated current	30.0 ~ 150.0	0.1 %	100.0	X	

Description: The setting method of motor rated current is based on the percentage specifications of inverter. If the specification of inverter is 18A of rated current, and then function C2-03 is set to 100%; that means, the rated current of motor is 18A. If the motor rated current is 15A, then the function C2-03 must be set to 83.3%.

Calculation: (Motor rated current ÷inverter rated current) ×100%
= Setting value of C2-03.

Motor unloaded current

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-05	Motor unload current	10.0 ~ 70.0	0.1 %	30.0	X	

Description: Motor unload current is motor excitation current which generated in unload operation. Output torque of motor and magnetic saturation curve are affected by this parameter. Hence, C2-05 inputting must according to nameplate of motor.

Setting: The installing method is based on the percentage of rated current of motor (function C2-03). If the specification of the inverter is 18A of rated current, the rated current of motor is 15A, and the function C2-03 is set to 83.3%. If you want to set the unloaded current of motor is 7A, then

(7A / 15A）X100% = 46.6%

Set the function C2-05 to 46.6%.

Calculation: (Motor unload rated current ÷motor rated current) X100%
= Setting value of C2-05.

Motor resistance

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-06	Motor resistance	0.00 ~ 15.00	0.01Ω	0	X	

Description: C2-06 is the sum of line-to-line resistance. This parameter is set by autotuning only.

Motor slip

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-07	Motor slip	0.10 ~ 10.00	0.01 Hz	2.00	X	

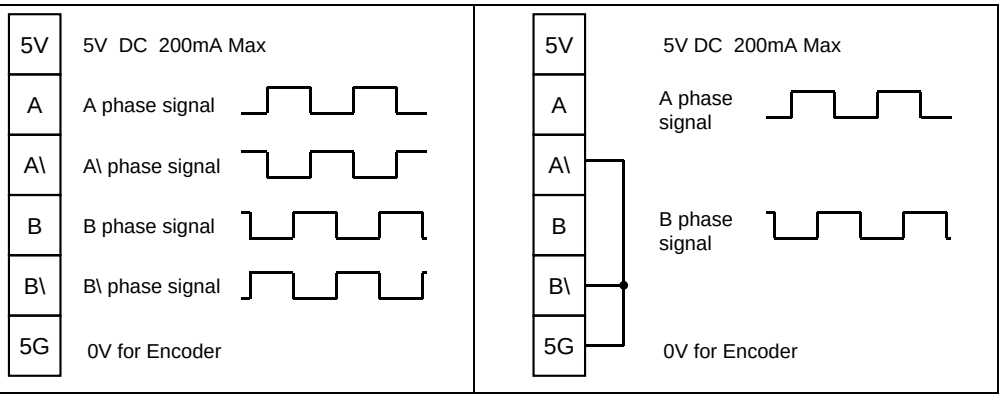
Description: user or autotuning sets this parameter.

Setting: Rated frequency of motor – [(rated speed of motor * pole of motor) / 120]

Encoder setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-08	Encoder (P/R)	10 ~ 20000	1 pulse	1024	X	

Wiring



Starting frequency of weak magnetic control

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-09	Starting frequency of weak magnetic control	30.00 ~ 320.00	0.01 Hz	60.00	X	

Description: This function is designated as weak magnetic control when operating frequency of motor is upon setting value of C2-09.

For avoiding magnetic saturation of motor and maximum voltage limit of drive, we drive motor with weak magnetic control for stable speed when motor speed is beyond motor rated speed. But motor output torque will be reduced while frequency is increased.

6.2 Autotuning

Function table of autotuning

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-00	Motor rated voltage	50.0 ~ 500.0	0.1 V	220.0	X	*1
C2-01	Motor rated frequency	0.00 ~ 320.0	0.01 Hz	60.00	X	*1
C2-02	Motor rated speed	0 ~ 6000	1 rpm	1750	X	*1
C2-03	Motor rated current	30.0 ~ 150.0	0.1 %	100.0	X	*2
C2-04	Pole of motor	2 ~ 14	1 pole	4	X	*1
C6-15	Autotuning enable/disabled	0 ~ 1	1	0	X	

Note: *1. Parameter settings of motor rated voltage, rated frequency, rated speed, poles and encoder should be according to specification of nameplate.
***2** Please refer to page 69 for the setting of motor rated current.

Description: Motor resistance and leakage inductance are detected by autotuning.

Autotuning procedure:

1. Make sure wiring between inverter and motor are correct.
2. Make sure motor is on unload condition. Coupling and reducer are not allowed.
3. Set parameters (C2-00~C2-04) of motor rated voltage, rated frequency, rated speed, rated current and motor pole according to specification of nameplate.
4. Set C6-15=1.
5. Autotuning operation after pressing FWD button.
6. Autotuning operation is finished when “PASS” is shown on screen.Following parameters will be set by autotuning function.

Motor parameter	V/f auto-compensation parameter	Parameters of Vector control
C2-05 motor unload current	C3-07 voltage compensation	C6-15 =0
C2-06 motor resistance	C3-11 frequency compensation	C6-16 auto-setting of ACR
C2-07 motor slip	C6-13 auto-voltage compensation	Proportional gain of current loop(P)
	C6-14 auto-frequency compensation	Integral time of current loop (I)

7. Motor cost to stop when an error is detected during operation and “A Er” is shown on screen. Following parameters will recovery to default value.

Motor parameter	V/f auto-compensation parameter	Parameters of Vector control
C2-05 motor unload current C2-06 motor resistance C2-07 motor slip	C3-07 voltage compensation C3-11 frequency compensation C6-13 voltage compensation setting by user C6-14 frequency compensation setting by user	C6-15 =0 C6-16 ACR setting by user Proportional gain of current loop(P) Integral time of current loop (I)

Note: For your own safety, motor operating in high speed when autotuning is implemented.

Chapter 7 – Control mode setting

Control mode setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-00	Control mode settings	0 ~ 3	1	0	X	

Description: There are four selections of control mode setting:

C5-00 = 0: V/f control (without PG feedback)
1: Vector control (without PG feedback)
2: V/f control (with PG feedback)
3: Vector control (with PG feedback)

7.1 V/F control (without PG feedback)

Function table of V/F control without PG feedback

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-00	Motor rated voltage	50.0 ~ 500.0	0.1V	220.0	X	
C2-01	Motor rated frequency	0.00 ~ 320.00	0.01Hz	60.0	X	
C3-00	V/F curve setting	0 ~ 19	1	0	X	
C3-01	Starting frequency	0.10 ~ 30.00	0.01Hz	1.5	X	
C3-02	Excitation time	0.00 ~ 10.00	0.01sec	0.5	X	
C3-03	DC injection braking time in starting	0.00 ~ 20.00	0.01sec	0	X	
C3-04	DC injection braking frequency in stopping	0.10 ~ 60.00	0.01Hz	1.5	X	
C3-05	DC injection braking time in stopping	0.00 ~ 20.00	0.01sec	0	X	
C3-06	DC injection braking voltage	0.0 ~ 100.0	0.1%	3.0	X	
C3-07	Voltage compensation 1	0.0 ~ 15.0	0.1%	0.6	X	*1
C3-08	Voltage compensation 2	0.0 ~ 15.0	0.1%	1.0	X	
C3-09	Voltage compensation 3	0.0 ~ 15.0	0.1%	1.5	X	
C3-10	Voltage compensation 4	0.0 ~ 15.0	0.1%	2.0	X	
C3-11	Frequency compensation	0.00 ~ 10.00	0.01Hz	2.00	X	*1
C3-12	Middle frequency	0.10 ~ 320.00	0.01Hz	3.00	X	
C3-13	Middle voltage	0.0 ~ 500.0	0.1V	13.2	X	
C3-14	V/F frequency 1	0.10 ~ 320.0	0.01Hz	10.00	X	
C3-15	V/F voltage 1	0.0 ~ 500.0	0.1V	36.6	X	
C3-16	V/F frequency 2	0.10 ~ 320.0	0.01Hz	20.00	X	
C3-17	V/F voltage 2	0.0 ~ 500.0	0.1V	73.3	X	

Function table of V/F control without PG feedback (continuous)

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-18	V/F frequency 3	0.10 ~ 320.0	0.01Hz	30.00	X	
C3-19	V/F voltage 3	0.0 ~ 500.0	0.1V	110.0	X	
C3-20	V/F frequency 4	0.10 ~ 320.0	0.01Hz	40.00	X	
C3-21	V/F voltage 4	0.0 ~ 500.0	0.1V	146.6	X	
C3-22	V/F frequency 5	0.10 ~ 320.0	0.01Hz	50.00	X	
C3-23	V/F voltage 5	0.0 ~ 500.0	0.1V	183.3	X	
C6-13	Switch of voltage compensation	0 ~ 1	1	0	X	*1
C6-14	Switch of frequency compensation	0 ~ 1	1	0	X	*1

Note: *1. Parameter setting could be completed by autotuning.

7.1-1 V/f curve setting

V/F curve settings

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-00	V/F curve setting	0 ~ 19	1	2	X	

Description: There are 19 selections of V/F curve setting:

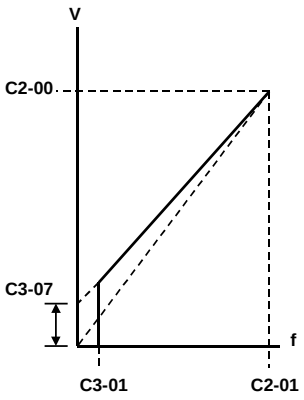
Setting Value	Feature	Application	Specification
0	**Standard curve**	**The curve parameters can be adjusted freely.**	**Free**
1	**Constant torque**	**General usage**	**50Hz**
2			**60Hz**
3			**60Hz, Voltage saturation at 50Hz**
4			**72Hz, Voltage saturation at 60Hz**
5	**Variable torque**	**The inertia load of fan or pump**	**50Hz 1:3**
6			**50Hz 1:2**
7			**60Hz 1:3**
8			**60Hz 1:2**
9	**High starting torque**	**The wiring distance between the inverter and motor is relatively large (greater than 150m)** **A large torque is required at startup (such as heavy axis loads)** **An AC or DC reactor is connected to the Inverter's input or output**	**50Hz, low starting torque**
10			**50Hz, high starting torque**
11			**60Hz, low starting torque**
12			**60Hz, high starting torque**
13	**High-speed operation**	**A fixed voltage is applied at frequencies greater than 60 Hz.**	**90Hz, Voltage saturation at 60Hz**
14			**120Hz, Voltage saturation at 60Hz**
15			**180Hz, Voltage saturation at 60Hz**
16	**Standard curve**	**Parameters of curve can be adjusted freely**	**Free**
17	**Standard curve**	**Parameters of curve can be adjusted freely**	**Free**
18	**Standard curve**	**Parameters of curve can be adjusted freely**	**Free**
19	**Arbitrary curve**	**Arbitrary curve with five turned points; parameters of curve can be adjusted freely**	**Free**

Note: 1. When the setting values are set from 1 to 15, the parameters of curve will change automatically.

2. Characteristic curves of each setting value are shown below.

Standard V/f curve（free-adjusting parameters）

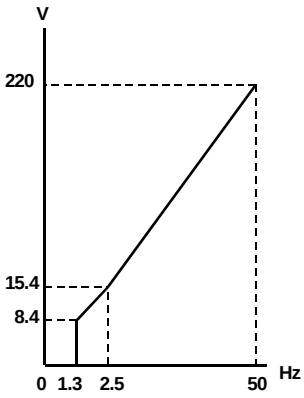
Setting value = 0



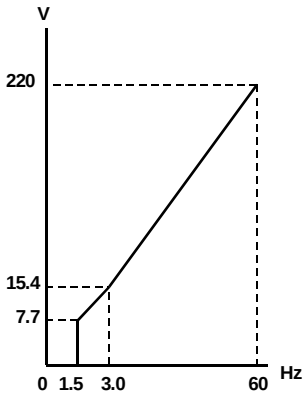
Set parameters of curve: C2-00 rated voltage
C2-01 rated frequency
C3-01 Starting frequency
C3-07 compensated voltage

Constant torque（2.2kw ~ 45kw）

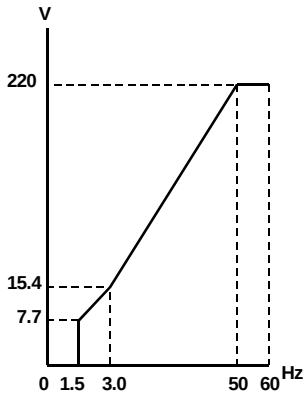
Setting value 1



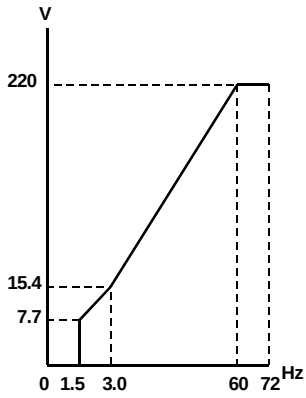
Setting value 2



Setting value 3

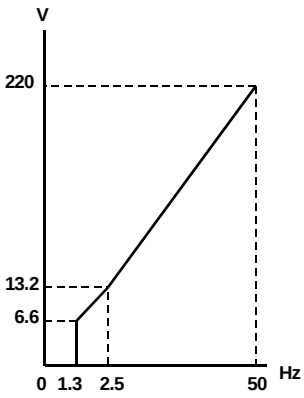


Setting value 4

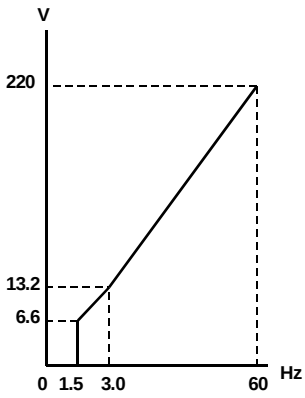


Constant torque（55kw ~ 150kw）

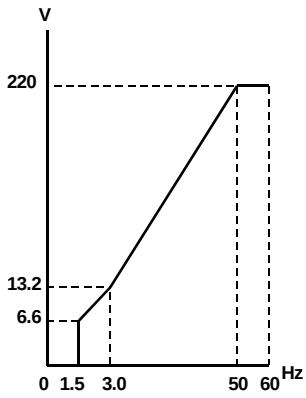
Setting value 1



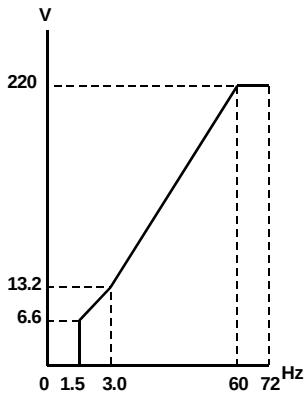
Setting value 2



Setting value 3

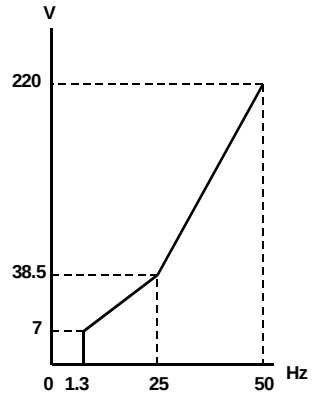
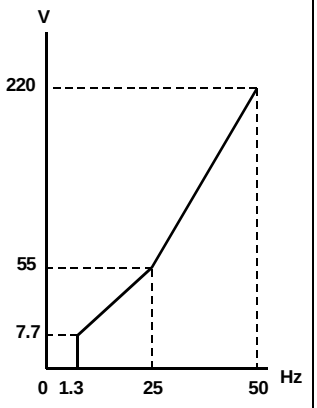
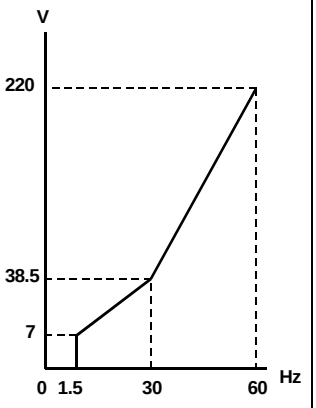
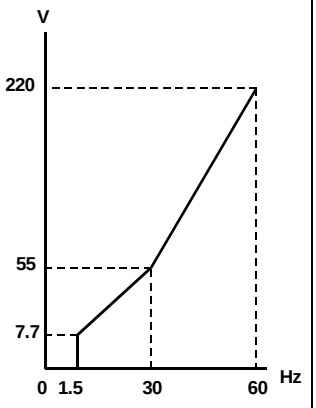


Setting value 4

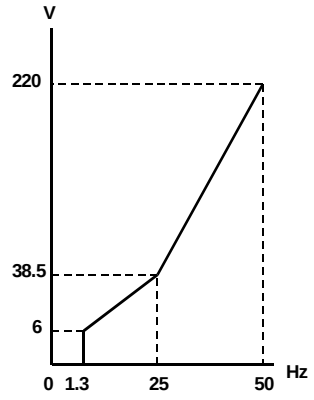
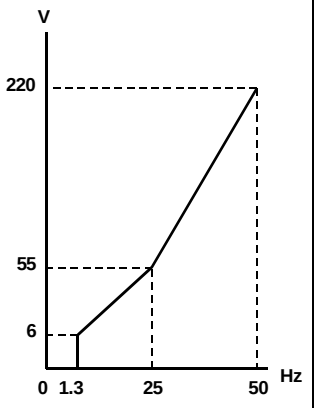
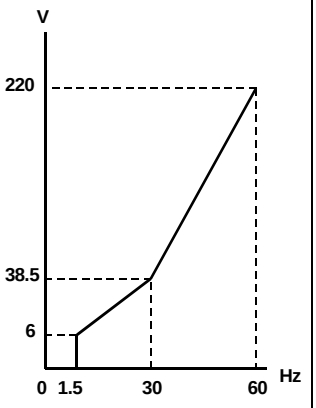
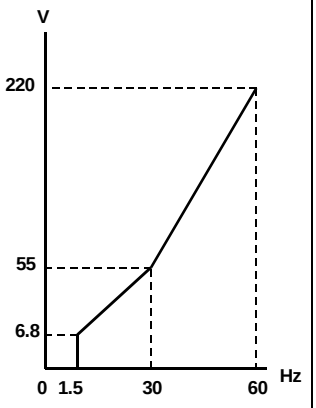


※The above figures show 220V system; when the system is 440V, all voltages on the figures are two times.

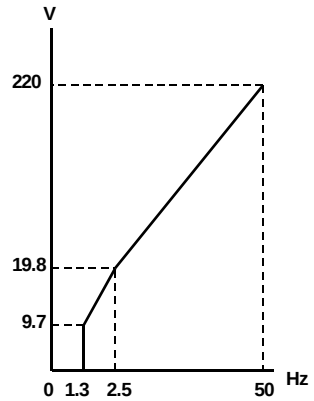
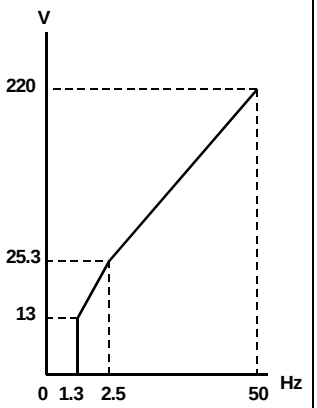
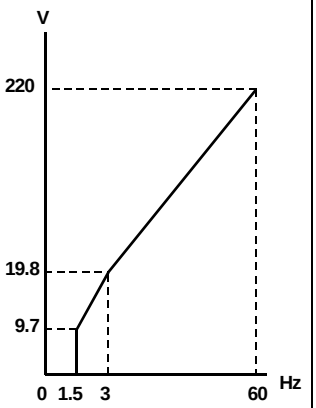
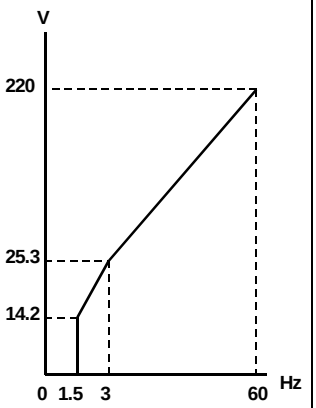
Variable torque（2.2kw ~ 45kw）

Setting value 5	Setting value 6	Setting value 7	Setting value 8
			

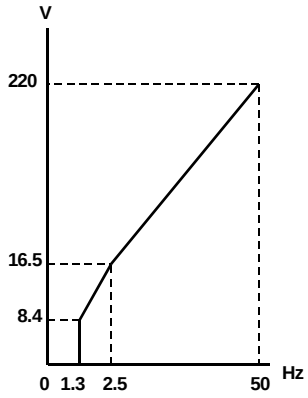
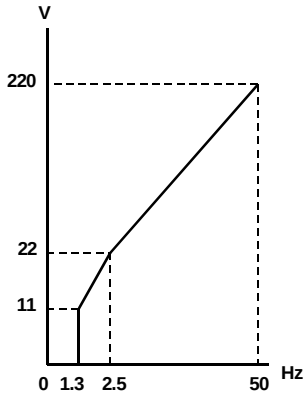
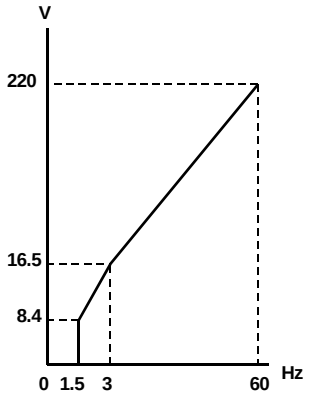
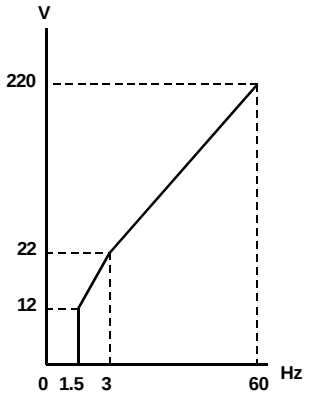
Variable torque（55kw ~ 150kw）

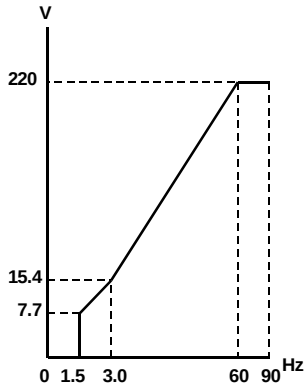
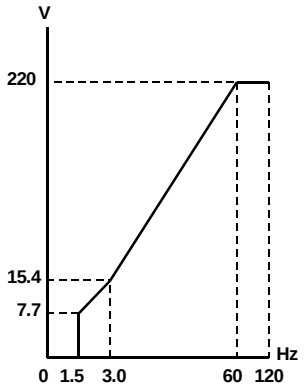
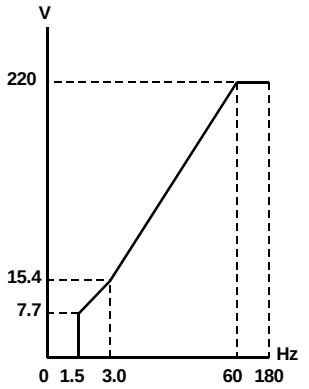
Setting value 5	Setting value 6	Setting value 7	Setting value 8
			

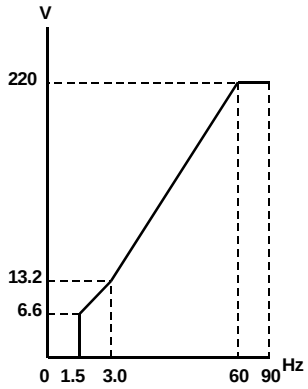
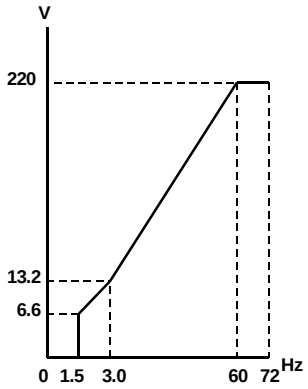
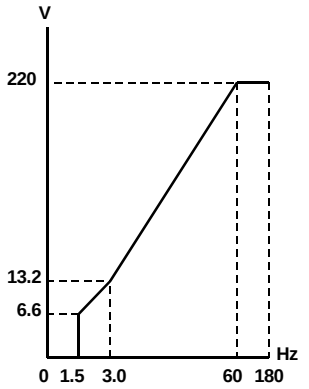
High starting torque（2.2kw ~ 45kw）

Setting value 9	Setting value 10	Setting value 11	Setting value 12
			

※The above figures show 220V system; when the system is 440V, all voltages on the figures are two times.

High starting torque（55kw ~ 150kw）			
Setting value 9	Setting value 10	Setting value 11	Setting value 12
			

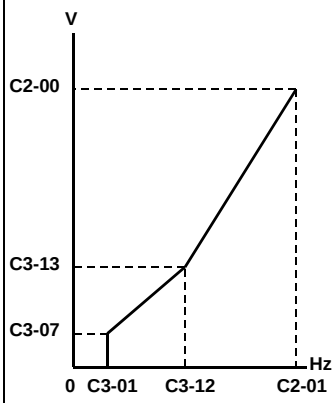
High-speed operation （2.2kw ~ 45kw）			
Setting value 13	Setting value 14	Setting value 15	
			

High-speed operation （55kw ~150kw）			
Setting value 13	Setting value 14	Setting value 15	
			

※The above figures show 220V system; when the system is 440V, all voltages on the figures are two times.

Standard V/f curve（free-adjusting parameters）

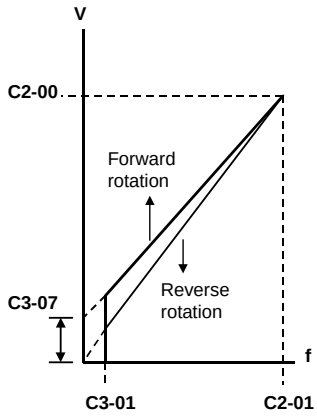
Setting value = 16



Set parameters of curve:
C2-00 rated voltage
C2-01 rated frequency
C3-01 Starting frequency
C3-07 voltage compensation 1
C3-12 middle frequency
C3-13 middle voltage

Standard V/f curve（free-adjusting parameters）

Setting value = 17

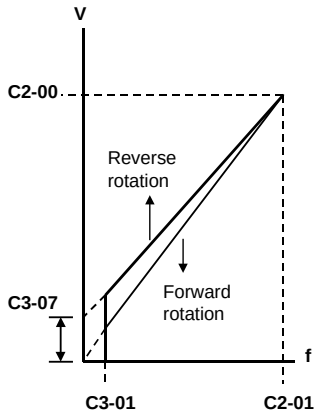


Set parameters of curve:
C2-00 rated voltage
C2-01 rated frequency
C3-01 Starting frequency
C3-07 voltage compensation 1

This setting value uses standard curve with compensated voltage when motor is on forward operation. When motor is on reverse operation, this setting value uses standard curve without compensated voltage.

Standard V/f curve（free-adjusting parameters）

Setting value = 18

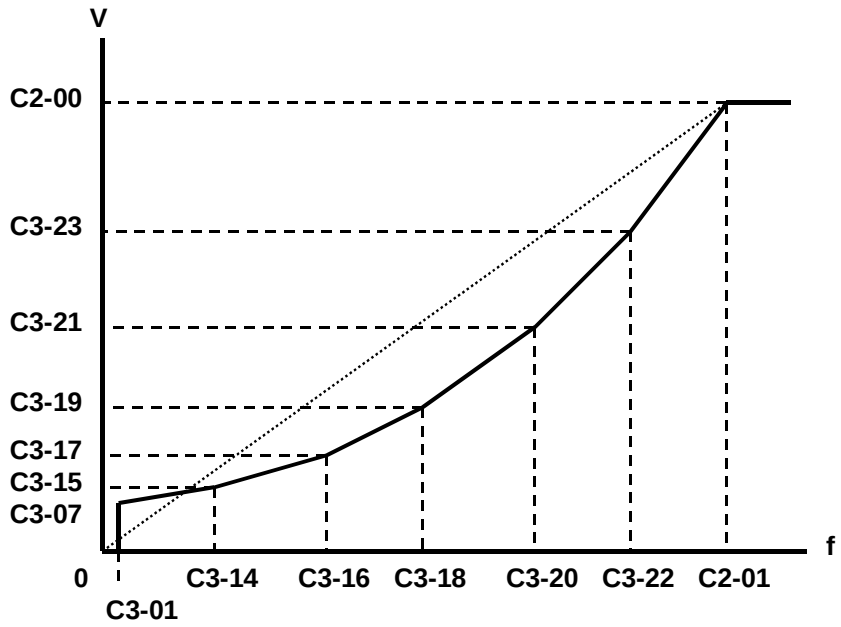


Set parameters of curve:
C2-00 rated voltage
C2-01 rated frequency
C3-01 Starting frequency
C3-07 voltage compensation 1

This setting value uses standard curve with compensated voltage when motor is on reverse operation. When motor is on forward operation, this setting value uses standard curve without compensated voltage.

Arbitrary V/f curve（free-adjusting parameters）

Setting value = 19



Setting parameters of curve:
C2-00 rated voltage
C2-01 rated current
C3-01 starting frequency
C3-07 compensated voltage 1
C3-14 V/f frequency 1
C3-15 V/f voltage 1
C3-16 V/f frequency 2
C3-17 V/f voltage 2
C3-18 V/f frequency 3
C3-19 V/f voltage 3
C3-20 V/f frequency 4
C3-21 V/f voltage 4
C3-22 V/f frequency 5
C3-23 V/f voltage 5

7.1-2 Setting of voltage Compensation

Switch of voltage Compensation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-13	Switch of voltage compensation	0 ~ 1	1	0	X	*1

Description: The switch only works in V/f control without PG feedback.

C6-13=0, Fixed voltage compensation.
C6-13=1; Auto voltage compensation.

Voltage compensation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-07	Voltage compensation 1	0.0 ~ 15.0	0.1%	0.6	X	*1
C3-08	Voltage compensation 2	0.0 ~ 15.0	0.1%	1.0	X	
C3-09	Voltage compensation 3	0.0 ~ 15.0	0.1%	1.5	X	
C3-10	Voltage compensation 4	0.0 ~ 15.0	0.1%	2.0	X	

Description: The torque under the condition of low operation can be improved by compensated voltage, and each V/f curve after being set voltage compensation is shown in 7.1-1.The setting method is the percentage of input of motor rated voltage. For instance, when motor rated voltage is set to 220V and function C3-07 is set to 5%, then the fixed voltage compensation is

220V（motor rated voltage） ×5%（C3-07）= 11V

There are four selections of fixed voltage compensation. In practice, the fixed voltage compensation 1 is often used, and setting the external terminal as switch shall use the other selection. The selections of setting the external terminal to 28, 29 (see p.21) are shown below:

	External terminal set as 28	External terminal set as 29
C3-07	0	0
C3-08	1	0
C3-09	0	1
C3-10	1	1

Note: The terminal is designated as 1 when terminal is closed. The terminal is designated as 0 when terminal is opened.

*1: Parameter setting could be completed by autotuning.

7.1-3 Setting of frequency Compensation

Switch of frequency Compensation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-14	Switch of frequency compensation	0 ~ 1	1	0	X	*

Description: To select the compensated frequency turn on (1) or turn off (0). This switch only works in V/f control without PG feedback.

Frequency compensation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-11	Frequency compensation	0.00 ~ 10.00	0.01Hz	2.00	X	*

Description: The actual torque can be estimated by the feedback current (V/f open loop) or the speed error (V/f close loop) and to adjust the actual output frequency automatically. The setting value is the compensated frequency when the torque is 100%.

Example: If the parameter C3-11 is set to 2Hz, the motor output torque is 100%, and hence the current compensated frequency is 2Hz. If the motor output torque is 50%, then the compensated frequency is 1Hz.

*: Parameter setting could be completed by autotuning.

7.1-4 DC injection breaking and excitation time setting

Function table of DC injection braking and excitation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-01	Starting frequency	0.10 ~ 30.00	0.01Hz	1.50	X	
C3-02	Excitation time	0 .00 ~ 10.00	0.01sec	0.5	X	
C3-03	DC injection braking time in starting	0.00 ~ 30.00	0.01sec	0	X	
C3-04	DC injection braking frequency in stopping	0.10 ~ 60.00	0.01Hz	0.50	X	
C3-05	DC injection braking time in stopping	0.00 ~ 30.00	0.01sec	0	X	
C3-06	DC injection voltage	0.0 ~ 100.0	0.1%	3.0	X	

Time setting of DC injection braking

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-03	DC injection braking time in starting	0.00 ~ 30.00	0.01sec	0	X	
C3-05	DC injection braking time in stopping	0.00 ~ 30.00	0.01sec	0	X	

Description: Setting DC injection breaking time of starting / stopping.

Voltage setting of DC injection breaking

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-06	DC injection voltage	0.0 ~ 100.0	0.1%	3.0	X	

Description: Setting voltage of DC injection breaking. The setting method is the percentage of motor rated voltage（parameter C2-00）.

Example: If the motor rated voltage is 220V and you want to set DC injection voltage = 11V , then

11V ÷220V = 0.05 = 5%

Set the parameter C3-06 to 5%.

Setting of DC breaking frequency in stopping

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-04	DC injection braking frequency in stopping	0.01 ~ 60.00	0.01Hz	0.50	X	

Description: Set the starting frequency of DC breaking when the motor stops.

Setting of starting frequency

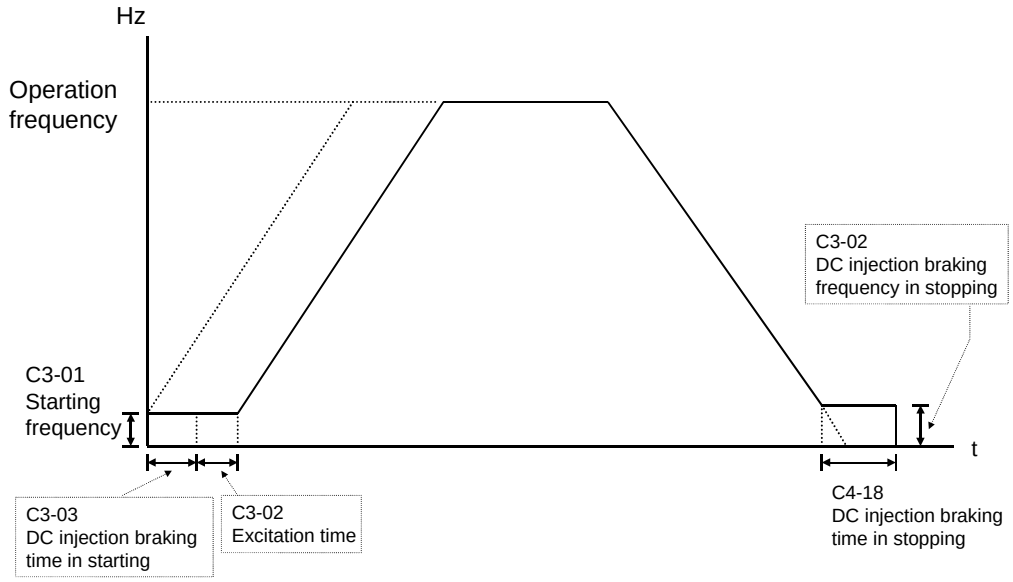
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-01	Starting frequency	0.01 ~ 30.00	0.01Hz	0.50	X	

Description: Set the starting frequency of the motor. If the speed reference is lower than starting frequency, the motor stops running.

Setting of excitation time

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-02	Excitation time	0.01 ~ 10.00	0.01sec	0.50	X	

Description: Setting the starting excitation time of the motor. Excitation frequency and voltage are the starting frequency you set.



7.2 V/F control (with PG feedback): SET C5-00=2

Function table of V/F control with PG feedback

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-12	Torque limit 1	0.0 ~ 250.0	0.1%	150.0	○	
C1-13	Torque limit 2	0.0 ~ 250.0	0.1%	150.0	○	
C1-14	Torque limit 3	0.0 ~ 250.0	0.1%	150.0	○	
C1-15	Torque limit 4	0.0 ~ 250.0	0.1%	150.0	○	
C1-26	ASR error limit	0.00 ~ 100.00	0.01Hz	6.00	X	
C2-00	Motor rated voltage	50.0 ~ 500.0	0.1V	220.0	X	
C2-01	Motor rated frequency	0.00 ~ 320.00	0.01Hz	60.00	X	
C3-00	V/F curve setting	0 ~ 19	1	0	X	*1
C3-01	Starting frequency	0.10 ~ 30.00	0.01Hz	1.5	X	*2
C3-02	Excitation time	0.00 ~ 10.00	0.01sec	0.5	X	*2
C3-03	DC injection braking time in starting	0.00 ~ 20.00	0.01sec	0	X	*2
C3-04	DC injection braking frequency in stopping	0.10 ~ 60.00	0.01Hz	1.5	X	*2
C3-05	DC injection braking time in stopping	0.00 ~ 20.00	0.01sec	0	X	*2
C3-06	DC injection braking voltage	0.0 ~ 100.0	0.1%	3.0	X	*2
C3-07	Voltage compensation 1	0.0 ~ 15.0	0.1V	0.6	X	
C3-08	Voltage compensation 2	0.0 ~ 15.0	0.1V	1.0	X	
C3-09	Voltage compensation 3	0.0 ~ 15.0	0.1V	1.5	X	
C3-10	Voltage compensation 4	0.0 ~ 15.0	0.1V	2.0	X	
C3-11	Frequency compensation	0.00 ~ 10.00	0.01Hz	2.00	X	
C3-12	Middle frequency	0.10 ~ 320.0	0.01Hz	3.00	X	*1
C3-13	Middle voltage	0.0 ~ 500.0	0.1V	13.2	X	*1
C3-14	V/F frequency 1	0.10 ~ 320.00	0.01Hz	10.00	X	*1
C3-15	V/F voltage 1	0.0 ~ 500.0	0.1V	36.6	X	*1
C3-16	V/F frequency 2	0.10 ~ 320.00	0.01Hz	20.00	X	*1
C3-17	V/F voltage 2	0.0 ~ 500.0	0.1V	73.3	X	*1
C3-18	V/F frequency 3	0.10 ~ 320.00	0.01Hz	30.00	X	*1
C3-19	V/F voltage 3	0.0 ~ 500.0	0.1V	110.0	X	*1
C3-20	V/F frequency 4	0.10 ~ 320.00	0.01Hz	40.00	X	*1
C3-21	V/F voltage 4	0.0 ~ 500.0	0.1V	146.6	X	*1
C3-22	V/F frequency 5	0.10 ~ 320.00	0.01Hz	50.00	X	*1
C3-23	V/F voltage 5	0.0 ~ 500.0	0.1V	183.3	X	*1
C4-13	Proportional gain of ASR	0.0 ~ 15.0	0.1 time	2	○	

Function table of V/F control with PG feedback (continuous)

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-14	Integral time of ASR	0.00 ~ 2.50	0.01sec	0.2	○	
C4-17	Speed feedback filter	0 ~ 8	1	5	X	

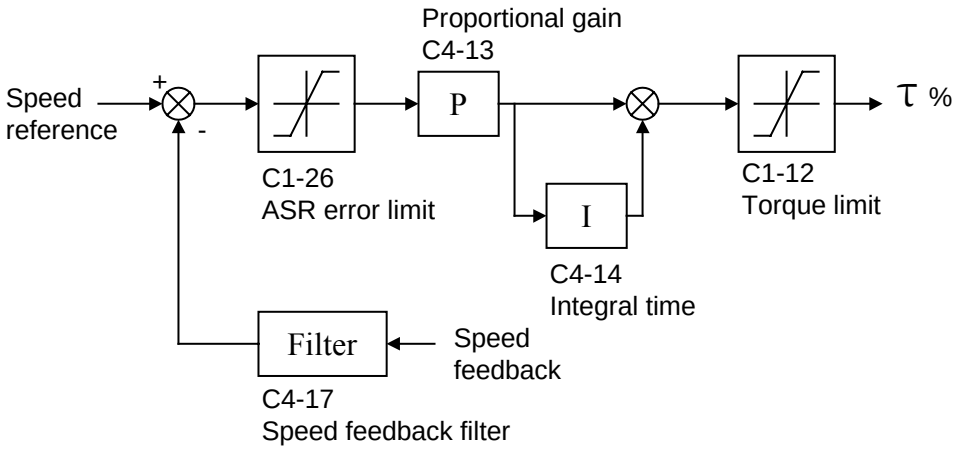
Note: *1. Please refer to 7.1-1 (page 77) for related function setting.
***2.** Please refer to 7.1-4 (page 85) for related function setting.

7.2-1 ASR

Function table of ASR

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-12	Torque limit 1	0.0 ~ 250.0	0.1%	150.0	○	
C1-13	Torque limit 2	0.0 ~ 250.0	0.1%	150.0	○	
C1-14	Torque limit 3	0.0 ~ 250.0	0.1%	150.0	○	
C1-15	Torque limit 4	0.0 ~ 250.0	0.1%	150.0	○	
C1-26	ASR error limit	0.00 ~ 100.00	0.01Hz	6.00	X	
C4-13	Proportional gain of ASR	0.0 ~ 15.0	0.1 time	2	○	
C4-14	Integral time of ASR	0.00 ~ 2.50	0.01sec	0.2	○	
C4-17	Speed feedback filter	0 ~ 8	1	5	X	

Control diagram of ASR



Setting of ASR error limit

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-26	ASR error limit	0.00 ~ 100.00	0.01Hz	6.00	X	

Description: This parameter is used to design maximum torque variation per unit time.

Speed feedback filter

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-17	Speed feedback filter	0 ~ 8	1	5	X	

Description: This parameter is used to reduce sampling error of speed feedback in order to achieve stable status of PI control. But this function would make slow reaction in PI control. The value of C4-17 is the filter time in PI control. The sampling error is reduced if filter time is longer but reaction becomes slowly.

Setting value of C4-17 is shown as follow

Setting value	Filter time of speed feedback	Setting value	Filter time of speed feedback
0	**Disabled**	**5**	**32 ms**
1	**2 ms**	**6**	**64 ms**
2	**4 ms**	**7**	**128 ms**
3	**8 ms**	**8**	**256 ms**
4	**16 ms**		

Setting of output torque limit

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-12	Torque limit 1	0.0 ~ 250.0	0.1%	150.0	○	
C1-13	Torque limit 2	0.0 ~ 250.0	0.1%	150.0	○	
C1-14	Torque limit 3	0.0 ~ 250.0	0.1%	150.0	○	
C1-15	Torque limit 4	0.0 ~ 250.0	0.1%	150.0	○	

Description: C1-12 to C1-15 are used to set output torque limit.
Torque limit select by 2 terminals which was shown as follows:

	Designated terminal set as 33	Designated terminal set as 34
Torque limit 1	0	0
Torque limit 2	1	0
Torque limit 3	0	1
Torque limit 4	1	1

Note: The signal is designated as 1 when terminal is closed. The signal is designated as 0 when terminal is opened.

ASR Proportional gain and integral time setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-13	Proportional gain of ASR	0.0 ~ 15.0	0.1 time	2	○	
C4-14	Integral time of ASR	0.00 ~ 2.50	0.01sec	0.2	○	

Description: Use the following procedure to adjust the gain with the mechanical system and actual load connected.

A. Gain adjustment at minimum speed:

1. Motor operates at minimum speed.
2. Increase C4-13 until there is no oscillation.
3. Decrease C4-14 until there is no oscillation.

B. Gain adjustment at maximum speed:

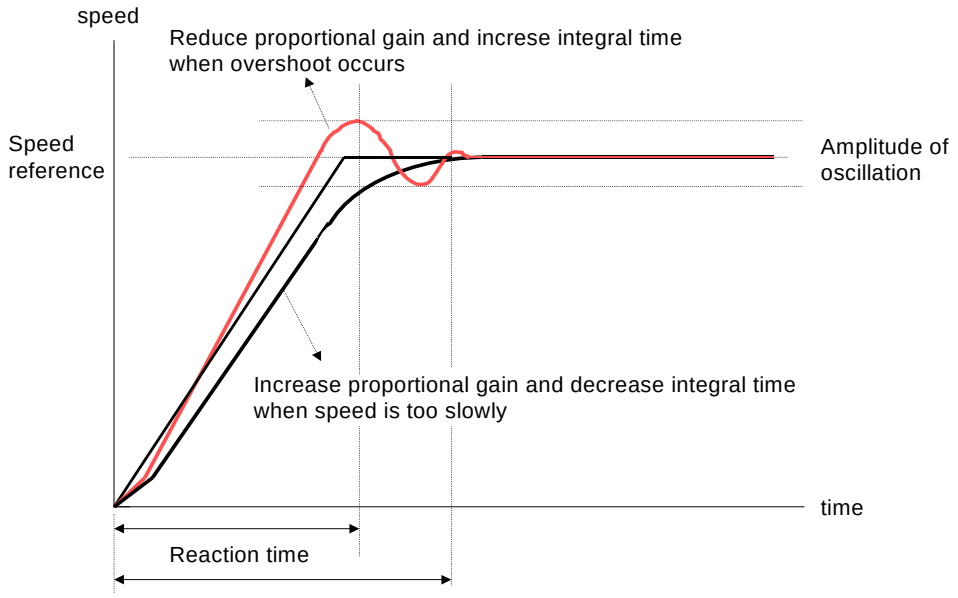
1. Motor operates at maximum speed.
2. Increase C4-13 until there is no oscillation.
3. Decrease C4-14 until there is no oscillation

C. Gain fine adjustment while observing the speed waveform.

1. Output speed waveform and feedback waveforms by using analog output terminals.For example,

   C5-27=0, outputs speed waveform
   C5-28=1, outputs feedback waveform
   C5-31=66.00Hz (Sets C5-31 to 110% if maximum speed for system required is 60Hz)

2.



3. Reduces C1-26, if overshoot can't be improved by gain adjustment.

7.2-2 Voltage Compensation and frequency compensation

Voltage compensation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-07	Voltage compensation 1	0.0 ~ 15.0	0.1V	0.6	X	*1
C3-08	Voltage compensation 2	0.0 ~ 15.0	0.1V	1.0	X	
C3-09	Voltage compensation 3	0.0 ~ 15.0	0.1V	1.5	X	
C3-10	Voltage compensation 4	0.0 ~ 15.0	0.1V	2.0	X	

Description: The torque under the condition of low operation can be improved by compensated voltage, and each V/f curve after being set voltage compensation is shown in 7.1-1.The setting method is the percentage of input of motor rated voltage. For instance, when motor rated voltage is set to 220V and function C3-07 is set to 5%, then the fixed voltage compensation is

220V（motor rated voltage） ㄨ5%（C3-07）= 11V

There are four selections of fixed voltage compensation. In practice, the fixed voltage compensation 1 is often used, and setting the external terminal as switch shall use the other selection. The selections of setting the external terminal to 28, 29 (see p.21) are shown below:

	External terminal set as 28	External terminal set as 29
C3-07	0	0
C3-08	1	0
C3-09	0	1
C3-10	1	1

Note: The terminal is designated as 1 when terminal is closed. The terminal is designated as 0 when terminal is opened.

Frequency Compensation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C3-11	Frequency compensation	0.00 ~ 10.00	0.01Hz	2.00	X	*1

Description: The actual torque can be estimated by ASR and to adjust the actual output frequency automatically. The setting value is the compensated frequency when the torque is 100%.

Example: If the function C3-11 is set to 2Hz, the output torque is 100%, and hence the compensated frequency is 2Hz. If the output torque is 50%, then the compensated frequency is 1Hz.

*1: Parameter setting could be completed by autotuning.

7.3 Vector control (with PG feedback): SET C5-00=3

Function table of Vector control with PG feedback

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-11	Torque model	0 ~ 2	1	0	X	
C1-12	Torque limit 1	0.0 ~ 250.0	0.1%	150.0	○	
C1-13	Torque limit 2	0.0 ~ 250.0	0.1%	150.0	○	
C1-14	Torque limit 3	0.0 ~ 250.0	0.1%	150.0	○	
C1-15	Torque limit 4	0.0 ~ 250.0	0.1%	150.0	○	
C2-00	Motor rated voltage	50.0 ~ 500.0	0.1V	220.0	X	*1
C2-01	Motor rated frequency	0.00 ~ 320.00	0.01Hz	60.00	X	*1
C2-02	Motor rated speed	0 ~ 6000	1 rpm	1750	X	*1
C2-03	Motor rated current	30.0 ~ 150.0	0.1%	100.0	X	*1
C2-04	Pole of motor	2 ~ 14	1 pole	4	X	*1
C2-05	Motor unload current	10.0 ~ 70.0	0.1%	30.0	X	*2
C2-06	Motor resistance	0 ~ 15.00	0.01Ω	0	X	*2
C2-07	Motor slip	0.10 ~ 10.00	0.01Hz	2.00	X	*2
C2-08	Encoder (P/R)	10 ~ 20000	1 pulse	1024	X	*1
C2-09	Starting frequency in weak magnetic control	30.00 ~ 320.00	0.01Hz	60.00	X	
C4-13	Proportional gain of ASR	0.0 ~ 15.0	0.1 time	2	○	
C4-14	Integral time of ASR	0.00 ~ 2.50	0.01sec	0.2	○	
C4-15	Proportional gain of ACR	0.0 ~ 15.0	0.1 time	5.0	X	
C4-16	Integral time of ACR	0 ~ 250	1 ms	10	X	
C4-18	Holding time	0.00 ~ 300.00	0.01sec	0.1	X	*3
C6-08	Holding	0 ~ 1	1	0	X	*3
C6-15	Autotuning	0 ~ 1	1	0	X	*4
C6-16	Selection of ACR PI	0 ~ 1	1	0	X	
C7-31	q axle current reference					Monitor only
C7-32	d axle current reference					
C7-33	q axle current feedback					
C7-34	d axle current feedback					
C7-35	q axle voltage reference					
C7-36	d axle voltage reference					

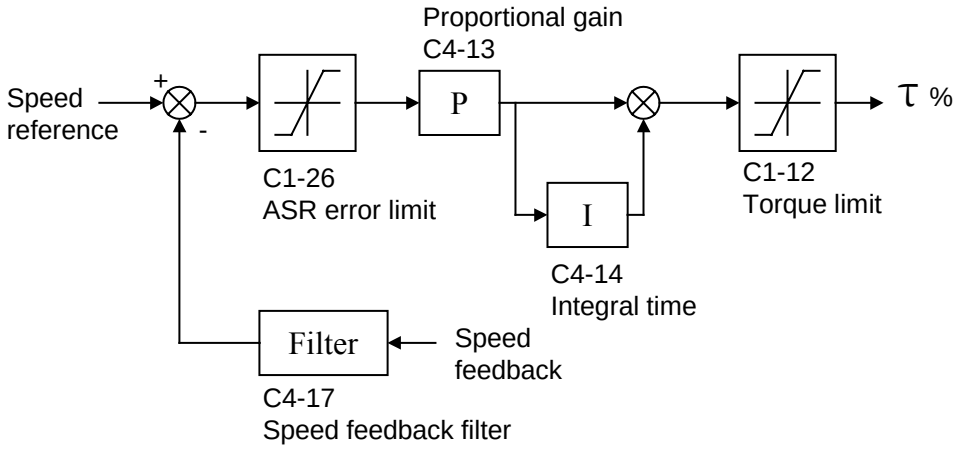
Note:*1. Parameter settings of motor rated voltage, rated frequency, rated speed, poles and encoder should be according to specifications of nameplate.
***2.** Parameter setting could be completed by autotuning.
***3.** Please refer to page.53.
***4.** Please refer to page.72.
***5.** C2 is the parameter of motor. Check page 69 for detail information.

7.3-1 ASR

Function table of ASR

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-11	Torque model	0 ~ 2	1	0	X	
C1-12	Torque limit 1	0.0 ~ 250.0	0.1%	150.0	○	
C1-13	Torque limit 2	0.0 ~ 250.0	0.1%	150.0	○	
C1-14	Torque limit 3	0.0 ~ 250.0	0.1%	150.0	○	
C1-15	Torque limit 4	0.0 ~ 250.0	0.1%	150.0	○	
C1-26	ASR error limit	0.00 ~ 100.00	0.01Hz	6.00	X	
C4-13	Proportional gain of ASR	0.0 ~ 15.0	0.1 time	2	○	
C4-14	Integral time of ASR	0.0 ~ 2.50	0.01sec	0.2	○	
C4-17	Speed feedback filter	0 ~ 8	1	5	X	

Control diagram of ASR



Setting of ASR error limit

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-26	ASR error limit	0.00 ~ 100.00	0.01Hz	6.00	X	

Description: This parameter is used to design maximum torque variation per unit time.

Speed Feedback Filter

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-17	Speed feedback filter	0 ~ 8	1	5	X	

Description: This parameter is used to reduce sampling error of speed feedback in order to achieve stable status of PI control. But this function would make slow reaction in PI control. The value of C4-17 is the filter time in PI control. The sampling error is reduced if filter time is longer but reaction becomes slowly.

Setting value of C4-17 is shown as follow

Setting value	Filter time of speed feedback	Setting value	Filter time of speed feedback
0	**Disabled**	**5**	**32 ms**
1	**2 ms**	**6**	**64 ms**
2	**4 ms**	**7**	**128 ms**
3	**8 ms**	**8**	**256 ms**
4	**16 ms**		

Setting of output torque limit

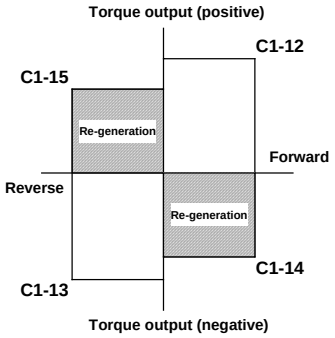
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C1-11	Torque mode	0 ~ 2	1	0	X	
C1-12	Torque limit 1	0.0 ~ 250.0	0.1%	150.0	○	
C1-13	Torque limit 2	0.0 ~ 250.0	0.1%	150.0	○	
C1-14	Torque limit 3	0.0 ~ 250.0	0.1%	150.0	○	
C1-15	Torque limit 4	0.0 ~ 250.0	0.1%	150.0	○	

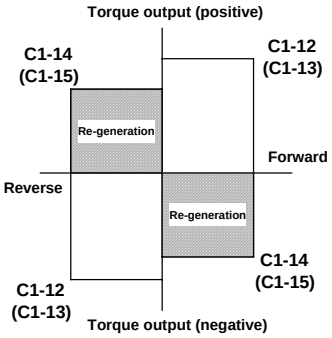
Description: There are three modes of vector control torque limit.

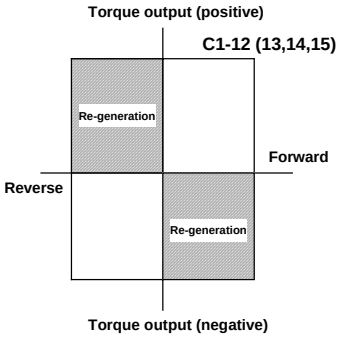
C1-11=0, Torque limits of 4 quarters are set by C1-12 to C1-15.

1, Torque limits of first quarter and third quarter are set by C1-12.Second quarter and forth quarter is set by C1-14.

2, Torque limits of 4 quarters are set by one parameter.

<table>
<tr><th>C1-11 = 0</th><th>C1-11 = 1</th><th>C1-11 = 2</th></tr>
<tr>
<td>


C1-12: Torque limit in forward rotation
C1-13: Torque limit in reverse rotation
C1-14: Re-generation torque limit in forward rotation
C1-15: Re-generation torque limit in reverse rotation
</td>
<td>


C1-12 : Torque limit (C1-13)
C1-14 : Re-generation (C1-15) torque limit
One terminal is taken for parameter exchange
(terminal function=33)
<table>
<tr><th>Group</th><th>terminal</th></tr>
<tr><td>C1-12,C1-14</td><td>0</td></tr>
<tr><td>C1-13,C1-15</td><td>1</td></tr>
</table>
</td>
<td>


C1-12 ~ 15 =Torque limit
Two terminal is taken for parameter exchange
(terminal function=33,34)
<table>
<tr><th>Group</th><th>33</th><th>34</th></tr>
<tr><td>C1-12</td><td>0</td><td>0</td></tr>
<tr><td>C1-13</td><td>1</td><td>0</td></tr>
<tr><td>C1-14</td><td>0</td><td>1</td></tr>
<tr><td>C1-15</td><td>1</td><td>1</td></tr>
</table>
</td>
</tr>
</table>

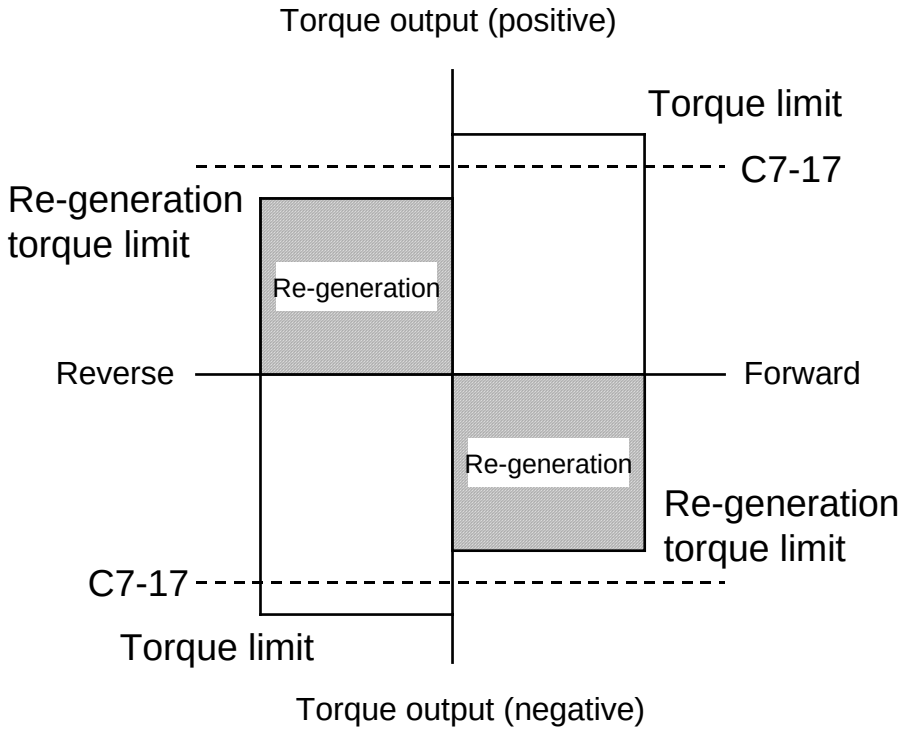
Torque limit from analog input

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-04	Torque limit selection	0 ~ 1	1	0	○	
C7-17	Torque limit		0.1%			

Description: C7-17 is used to define torque limit of analog input terminal. Torque limit is shown as follow when C6-04 sets as 1.

C7-17 and C1-12 ~ 15 are valid torque limits. The actual torque limit is the smallest one.

For example, the torque limit is C7-17 when forward rotation and output torque is positive (first quadrant). The torque is re-generation torque limit not C7-17 when forward rotation and output torque is negative.

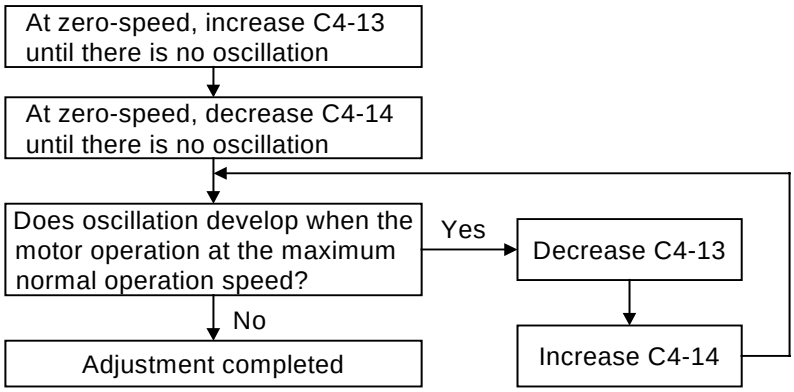


ASR Proportional gain and integral time setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-13	Proportional gain of ASR	0.0 ~ 15.0	0.1 time	2	○	
C4-14	Integral time of ASR	0.00 ~ 2.50	0.01sec	0.2	○	

Description: Use the following procedure to adjust the gain with the mechanical system and actual load connected.

A.

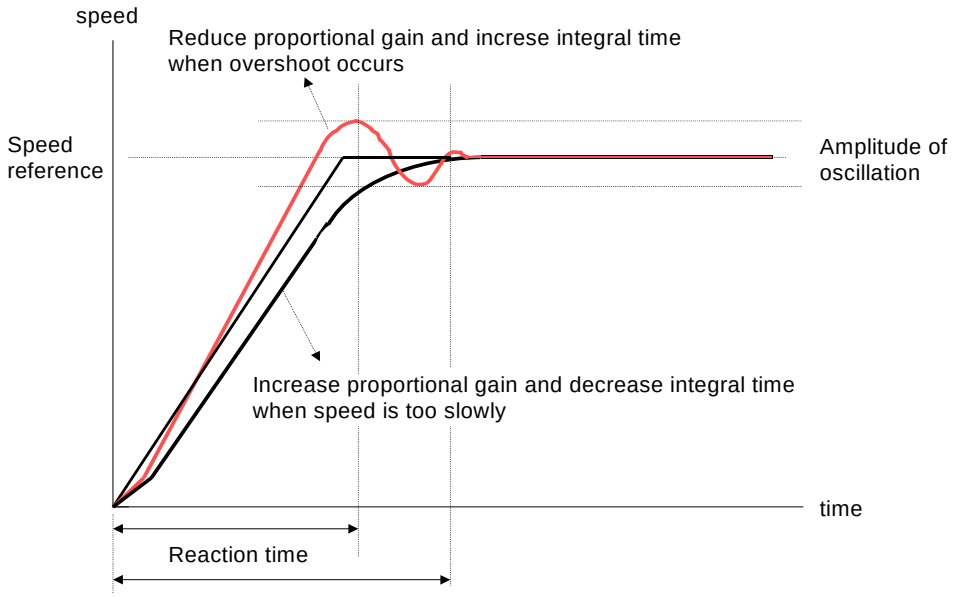


B. Gain fine adjustment while observing the speed waveform.

1. Output speed waveform and feedback waveforms by using analog output terminals.For example,

   C5-27=0, outputs speed waveform
   C5-28=1, outputs feedback waveform
   C5-31=66.00Hz (Sets C5-31 to 110% if maximum speed for system required is 60Hz)

2.



3. Reduces C1-26, if overshoot can't be improved by gain adjustment.

7.3-2 ACR

Related setting of ACR

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-15	Proportional gain of ACR	0.0 ~ 15.0	0.1 time	5.0	X	
C4-16	Integral time of ACR	0.00 ~ 250	1 ms	10	X	
C6-16	Gain selection	0 ~ 1	1	0	X	

Description: Proportional gain and Integral time of ACR could be set by autotuning function or be set by user.

C6-16 =0 : gain set by user.
=1 : gain set by autotuning.

Note: If autotuning can't be completed or can't be proceed to autotuning, please set C6-16 =0.

8.1 Protective function

Function table of Protective function

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-10	Overload protective level	101.0 ~ 250.0	0.1%	150.0	X	
C2-11	Overload detecting time	0.0 ~ 120.0	0.1sec	60.0	X	
C2-12	Overload detecting function	0 ~ 10	1	4	X	
C2-13	Stall preventive level in acceleration	0.0 ~ 250.0	0.1%	180.0	X	
C2-14	Stall preventive function in acceleration	0 ~ 1	1	1	X	
C2-15	Stall preventive level in constant speed	0.0 ~ 250.0	0.1%	180.0	X	
C2-16	Stall preventive function in constant speed	0 ~ 3	1	1	X	
C2-17	Stall preventive function in deceleration	0 ~ 1	1	1	X	
C2-18	Overheat protective function	0 ~ 5	1	3	X	
C2-19	Re-generation time	0.1 ~ 300.0	0.1sec	10.0	X	
C2-20	Re-generation function	0 ~ 4	1	3	X	
C2-21	Over-speed detecting level	0.00 ~ 320.00	0.01Hz	100.0	X	
C2-22	Over-speed detecting time	0.0 ~ 120.0	0.1sec	2.0	X	
C2-23	Over-speed protective function	0 ~ 5	1	3	X	
C2-28	Encoder line opened detecting time	0.0~25.0	0.1sec	2.0	X	
C2-29	Encoder line opened protective function	0~10	1	2	X	
C2-30	Encoder direction error detecting time	0.0~25.0	0.1sec	2	X	
C2-31	Encoder direction error protective function	0~5	1	1	X	
C2-32	Power input phase-lacking protective function	0~5	1	1	X	
C2-33		50.0 ~ 150.0	0.1%	100.0		
C7-26	Failure record 1					Monitor only
C7-27	Failure record 2					
C7-28	Failure record 3					
C7-29	Failure record 4					
C7-30	Parameter failure record					

8.1-1 Overload Protective Function

Function table of overload protections

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-10	Overload protective level	101.0 ~ 250.0	0.1%	150.0	X	
C2-11	Overload detecting time	0.0 ~ 120.0	0.1sec	60.0	X	
C2-12	Overload protective function	0 ~ 10	1	6	X	
C2-33	Overload protective function	50.0 ~ 150.0	0.1%	100.0	X	

Description: When the motor works over rated load, overheat will happen on the motor. To avoid the motor from being damaging for the reason of overheat, the Inverter will automatically stop when the motor continuously works under overload condition.

Setting method: (Overload current ÷motor rated current) ×100% = C2-10

Overload detecting function	
C2-12	description
0	Disabled
1	Detecting in constant speed operation only. Motor keeps running after alarm message is detected.
2	Detecting in operation. Motor keeps running after alarm message is detected.
3	Detecting in constant speed operation only. Motor coast to stop after alarm message is detected.
4	Detecting in operation. Motor coast to stop after alarm message is detected.
5	Detecting in constant speed operation only. Motor decelerates to stop according to deceleration time after alarm message is detected.
6	Detecting in operation. Motor decelerates to stop according to deceleration time after alarm message is detected.
7	Detecting in constant speed operation only. Motor decelerates to stop according to emergency time 1 after alarm message is detected.
8	Detecting in operation. Motor decelerates to stop according to emergency time 1 after alarm message is detected.
9	Detecting in constant speed operation only. Motor decelerates to stop according to emergency time 2 after alarm message is detected.
10	Detecting in operation. Motor decelerates to stop according to emergency time 2 after alarm message is detected.

Example: Inverter rated current = 18A, motor rated current = 15A, if you want to set overload current is 22.5A and detecting time is 60 sec, then

C2-03 = (15A ÷18A) X100% = 83.3%
C2-10 = (22.5A ÷15A) X100% = 150%
C2-11 = 60 sec.

The setting value of C2-10 is 150%, that means, when the motor current continuously works on 150%, the Inverter will stop after 60 sec.

If the motor current continuously works on 120%, then

(150% - 100%) X60 sec = (120% - 100%) XT sec ,
T = 150 sec.

The Inverter will stop after 150 sec.

8.1-2 Stall prevention

Stall prevention in acceleration

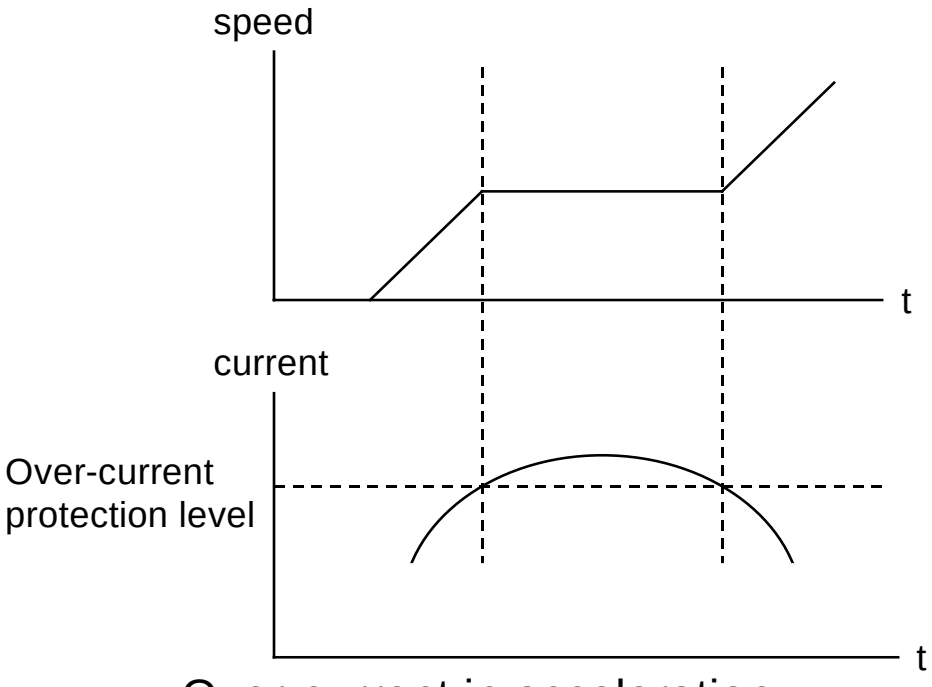
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-13	Stall preventive level in acceleration	0.0 ~ 250.0	0.1%	180.0	X	
C2-14	Stall preventive function in acceleration	0 ~ 1	1	1	X	

Description: When the motor speeds up rapidly, motor current will be abruptly increased because the variation of voltage is too fast that may lead to Over Current Failure（OC）.

When current exceeds C2-13 in acceleration, motor stop acceleration and keep constant speed until the current is less than limit.

Setting method: (Stall preventive current ÷motor rated current) ×100%
= C2-10

Stall preventive function in acceleration	
C2-14	description
0	Disabled
1	Constant speed operation after detecting



Over-current in acceleration

Stall prevention in constant speed operation

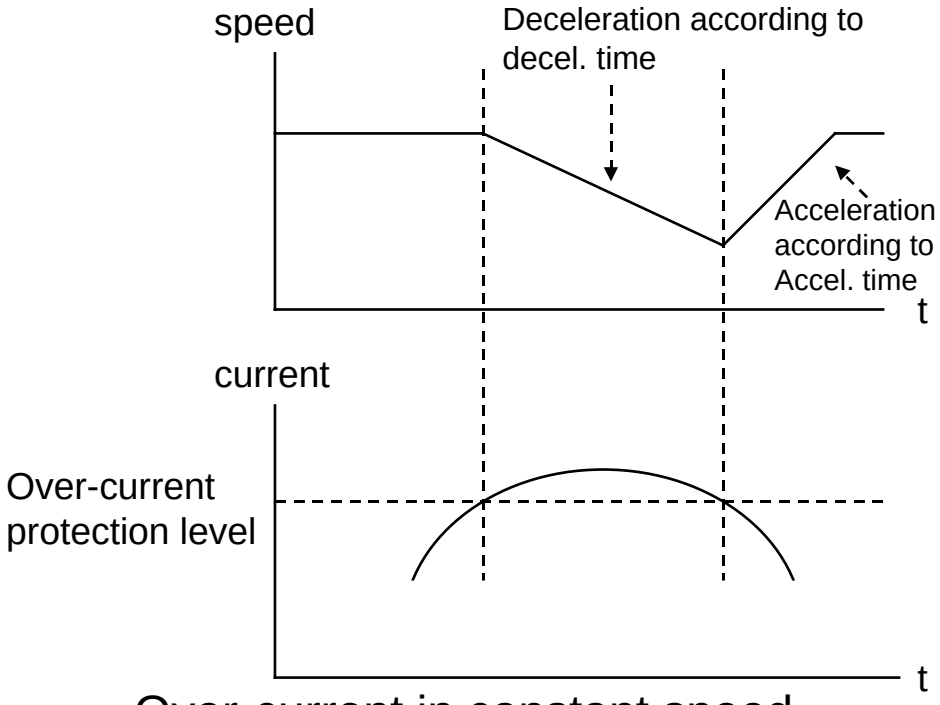
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-15	Stall preventive level in constant speed operation	0.0 ~ 250.0	0.1%	180.0	X	
C2-16	Stall preventive function in constant speed operation	0 ~ 3	1	1	X	

Description: If load were abruptly increased under constant speed, motor current would increase rapidly and lead to current failure (OC).

If load is abruptly increased under constant speed and motor current surpasses over-current protective point, the motor speed will be lower until motor current returns to its' normal value. The motor will accelerate to its' original reference again.

Setting method: (Stall preventive current ÷motor rated current) ×100%
= C2-15

Stall preventive function in acceleration	
C2-16	description
0	Disabled
1	Deceleration according to deceleration time after detecting
2	Deceleration according to Emergency stop time 1 after detecting
3	Deceleration according to Emergency stop time 2 after detecting



Over-current in constant speed

Stall prevention in deceleration

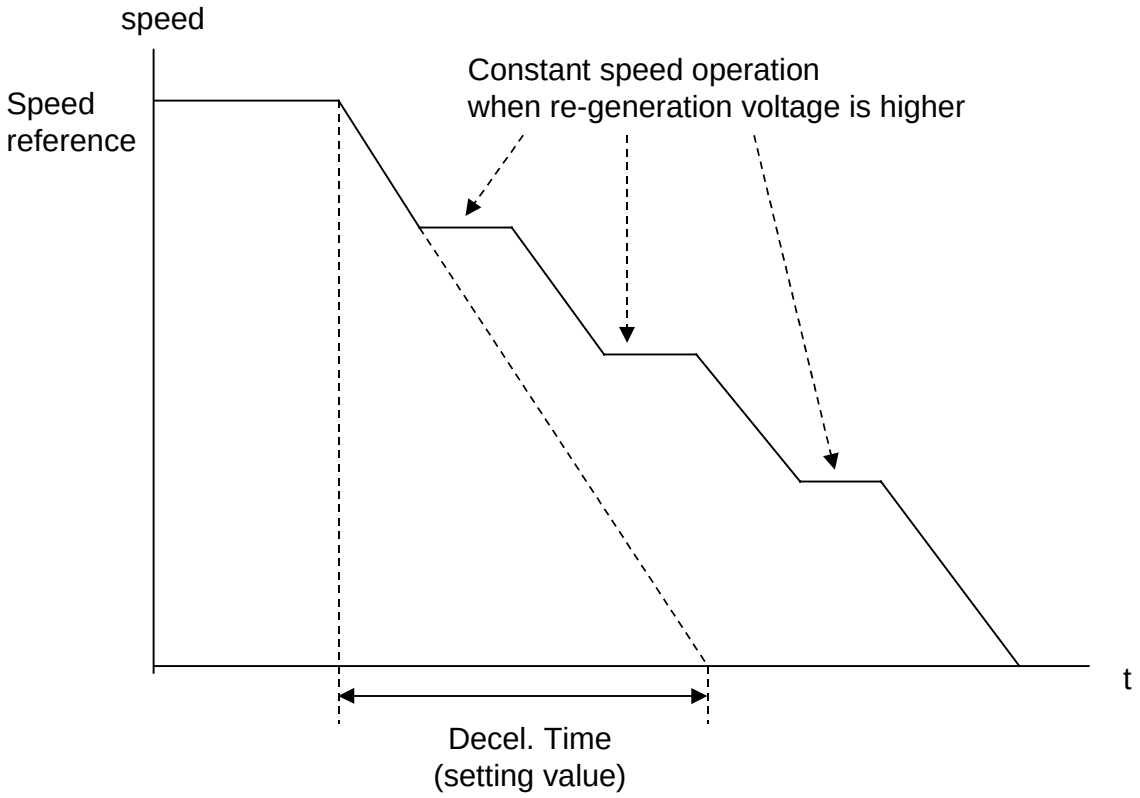
Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-17	Stall prevention in deceleration	0 ~ 1	1	1	X	

Description: When motor is performing urgent decel., re-generation may rise to over-voltage limit and may lead to over voltage failure（OV）. Setting this function can avoid OV happening during decel., but the actual decel. time of motor will be longer.

You can turn off this function when you are using breaking resistor or DBU for re-generation.

Setting method:

Stall preventive function in deceleration	
C2-17	description
0	Disabled
1	Constant speed operation after detecting



8.1-3 Overheat prevention

Overheat prevention

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-18	Overheat prevention	0 ~ 5	1	3	X	

Description:

Overheat prevention	
C2-18	description
0	Disabled
1	Motor keeps running after alarm message is detected.
2	Motor coast to stop after alarm message is detected.
3	Motor decelerates to stop according to deceleration time after alarm message is detected.
4	Motor decelerates to stop according to emergency stop time 1 after alarm message is detected.
5	Motor decelerates to stop according to emergency stop time 2 after alarm message is detected.

8.1-4 Re-generation

Re-generation function

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-20	Re-generation function	0 ~ 4	1	3	X	

Description: For avoiding over voltage in decelerating rapidly, we use braking resistance to consume re-generation power.

Setting method:

Re-generation function	
C2-20	description
0	Disabled
1	Detection in constant speed with overheat alarm. Time limit according to C2-19.
2	Detection in constant speed without time limit.
3	Detection in operation with overheat alarm. Time limit according to C2-19.
4	Detection in operation without time limit.

Time setting of re-generation

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-19	Re-generation time	0.1 ~ 300.0	0.1 sec	10.0	X	

Description: This parameter is used to set re-generation time. To avoid overheat of braking resistance, re-generation will disable if re-generation time beyond setting value. But inverter keeps going. It takes 8 times setting value when re-generation function turns on again after disable.

Note: Re-generation is available below 15HP in 220V series and 20HP in 380V. Beyond above capacity, please connect DBU.

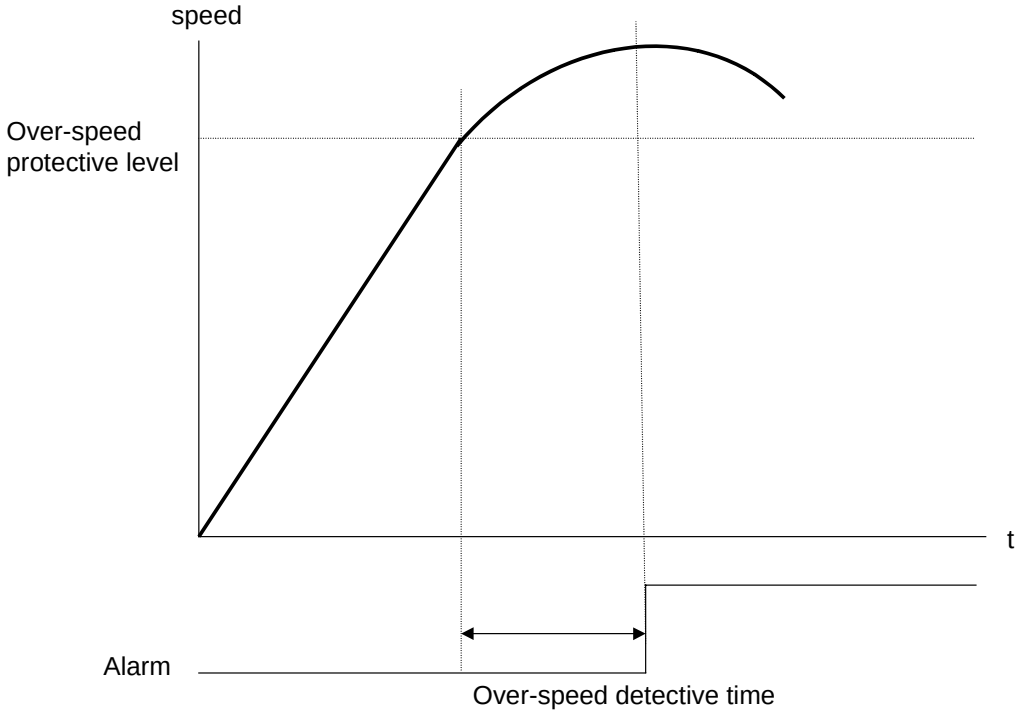
8.1-5 Over Speed Protective Function

Over speed protective functions

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-21	Over-speed detection level	0.0 ~ 320.0	0.01Hz	100.0	X	
C2-22	Over-speed detection time	0.0 ~ 120.0	0.1sec	2.0	X	
C2-23	Over-speed protective function	0 ~ 5	1	3	X	

Description: When the r.p.m. of motor exceeds over-speed protective level and the constant time of motor reaches to over-speed detective time, the inverter will proceed function of C2-23.

Over-speed protective function	
C2-23	description
0	Disabled
1	Motor keeps running after alarm message is detected.
2	Motor coast to stop after alarm message is detected.
3	Motor decelerates to stop according to deceleration time after alarm message is detected.
4	Motor decelerates to stop according to emergency stop time 1 after alarm message is detected.
5	Motor decelerates to stop according to emergency stop time 2 after alarm message is detected.



8.1-6 Encoder failure detect

Encoder line-opened protective function

Para-meter	Description	Setting Range	Min setting unit	Default value	Change during operation	Remarks
C2-28	Encoder line opened detecting time	0.0 ~ 25.0	0.1sec	2.0	X	
C2-29	Encoder line opened protective function	0 ~ 10	1	2	X	

Description: When encoder line-opened time over C2-28, the inverter will act as setting of C2-29 accordingly.

Detecting enable when motor is running.

C2-29 setting value	Description
0	Disable
1	Motor keeps running after alarm message is detected.
2	Motor coast to stop after alarm message is detected.
3	Motor decelerates to stop according to deceleration time after alarm message is detected.
4	Motor decelerates to stop according to emergency stop time 1 after alarm message is detected.
5	Motor decelerates to stop according to emergency stop time 2 after alarm message is detected.

Detecting enable when motor is running and operating frequency is higher than starting frequency C3-01.

C2-29 setting value	Description
6	Motor keeps running after alarm message is detected.
7	Motor coast to stop after alarm message is detected.
8	Motor decelerates to stop according to deceleration time after alarm message is detected.
9	Motor decelerates to stop according to emergency stop time 1 after alarm message is detected.
10	Motor decelerates to stop according to emergency stop time 2 after alarm message is detected.

Encoder direction error protective function

Para-meter	Description	Setting Range	Min setting unit	Default value	Change during operation	Remarks
C2-30	Encoder direction error detecting time	0.0 ~ 25.0	0.1sec	2.0	X	
C2-31	Encoder direction error protective function	0 ~ 10	1	2	X	

Description: When the direction of encoder feedback is different to operating direction and it is continous over the time of C2-30, the inverter will act as setting of C2-31 accordingly.

C2-31 setting value	Description
0	Disable
1	Motor keeps running after alarm message is detected.
2	Motor coast to stop after alarm message is detected.
3	Motor decelerates to stop according to deceleration time after alarm message is detected.
4	Motor decelerates to stop according to emergency stop time 1 after alarm message is detected.
5	Motor decelerates to stop according to emergency stop time 2 after alarm message is detected.

8.1-7 Power input phase-lacking protective function

Power input phase-lacking protective function

Para-meter	Description	Setting Range	Min setting unit	Default value	Change during operation	Remarks
C2-32	Power input phase-lacking protective function	0 ~ 5	1	2	X	

Description: When power input phase lacking, inverter can still operating. But it will damage power units within the inverter, inverter should be stopped and resolve the casues. If system not allow free run during malfunction, it should decelerate to stop and resolve the casues. This function is only available on 380VAC~460VAC inverters.

C2-32 setting value	Description
0	Disable
1	Motor keeps running after alarm message is detected.
2	Motor coast to stop after alarm message is detected.
3	Motor decelerates to stop according to deceleration time after alarm message is detected.
4	Motor decelerates to stop according to emergency stop time 1 after alarm message is detected.
5	Motor decelerates to stop according to emergency stop time 2 after alarm message is detected.

8.2 Failure Description

8.2-1 Parameter failures

Display	Description	Checking Item	Trouble Shooting	Remarks
Err	Operation error	Is operation order correct?	Please follow the correct operation order.	
ErC	Memory for parameter saving error	To cut off power and re-install	To replace control board	
LdE	Reading error for all parameter			To return to factory value when re-install
LdEA	Parameter reading error for C1			
LdEb	Parameter reading error for C2			
LdEC	Parameter reading error for C3			
LdEd	Parameter reading error for C4			
LdEE	Parameter reading error for C5			
LdES	Parameter reading error for C6			
LdS	Parameter reading error for factory for special purpose		Please consulate with our service engineer	

8.2-2 Failures in driving

Display	Description	Checking Item	Trouble Shooting	Remarks
OCS	Output short circuit or ground detected	Is output side of UVW short circuit or grounding?	To test motor insulation with High resistance meter	
OC	Over-current error（230%）	Is accel. and decel. time too shortt? Is variation of load too wide?	Increase accel. and decel. time;To lighten load	
OC A	Over-current in acceleration			
OC U	Over-current in constant speed	Is variation of load too wide?	To lighten load	
OU	Over voltage error	Decel. time is rapid, re-generation voltage Is too high, power is too high.	To increase decel. time, to enhance breaking ability	
OU d	Over voltage in deceleration			
LU A	Power input pahse-lacking,inverter keeps going.	Does power source lacking phase or does not have any input?	Check power source and wiring.	
LU b	Power input phase-lacking,inverter stop.	Does power source lacking phase or does not have any input?	Check power source and wiring.	
UU	Low Power error	Power is too low, DC voltage detective error	To improve supply power, to replace control board	
PLU	Low Power error			
OL A	Overload error, inverter keep going	Does motor continue operating under over load?	Lighten load and enlarge capacities of motor and inverter	
OL b	Overload error, inverter stop			
OS A	Over speed error, inverter keep going	Wrong settings of encoder, poles of motor and system	Re-examine parameter and systme	Close-loop Vector control is effective
OS b	Over speed error, inverter stop			
EE O	Encoder error	Is the encoder unconnected or error?	Re-wiring, to replace encoder	
EE d	Encoder direction error	To examine encode wiring direction	Re-wiring	
OH A	Overheat, inverter keep going	Cooling fan stop, atmosphere temperature, Overload operation of motor.	Change fan, cooling atmosphere temperature, lighten load	
OH b	Overheat, inverter stop			

Failures in driving (continuous)

Display	Description	Checking Item	Trouble Shooting	Remarks
dbOH	Overheat on DBR	Breaking time is too long. Is breaking capacity suitable?	To change breaking capacity, To increase decel. time	
A Err	Autotuning error	Is wiring correct? Is there a load on shaft of motor?	Check wiring, load of motor shaft, or set parameters by user	
EF A	External error 1		Solve external failure.	
EF b	External error 2		Solve external failure.	
EF C	External error 3		Solve external failure.	
Er 1	Communication disconnection between keyboard and control board		To lower interference	
Er 2				

8.2-3 Failure recorders

Failure recoders

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C7-26	Failure Recorder 1					Monitor only
C7-27	Failure Recorder 2					
C7-28	Failure Recorder 3					
C7-29	Failure Recorder 4					
C7-30	Parameter failure Recorder					

Description: The inverter can record 4 times of latest failure in driving status and 1 time of parameter failures . You can survey it from C7-26 to C7-30. Input 8456 in C5-38 then all failures could be reset.

9.1 P.W.M frequency and Password setting

P.W.M. frequency setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-01	P.W.M. frequency	0 ~ 5	1	2	X	

Description: The settable P.W.M. frequencies are

Setting value	P.W.M frequency
0	2 KHz
1	4 KHz
2	5 KHz
3	8 KHz
4	10 KHz
5	12 KHz

Password input

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-38	Password	0 ~ 9999	1	0	○	

Description: This parameter is used to input password. For example, input “8456” for failure record resetting.

9.2 Data lock and saving

Data lock

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-09	Data lock	0 ~ 1	1	0	X	

Description: Using the code function can prevent from freely changing by non-professional worker.

Setting value = 0 : data locked is ineffective.
Setting value = 1 : data locked is effective.

Only parameters in level 1 are locked. Parameters in level 0 are adjusted. Please check function table for parameters' levels.

Parameter recovering factory value

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-40	Parameter recovering factory value	0 ~2	1	0	X	

Description: By this function, some or all of the parameters can be returned to its' factory value. About the factory value, please check Function Table. When use this function, "LOAD " would show twice on display.

C5-40 set value =1, the parameter values listed below, will not returned to factory value. Other values will return to factory value.
C2-00-C2-08 motor parameters
C3-07, C30-08 Volltage compensation.
C3-11 Frequency compensation.
C5-21-C5-23 IN1~3 Offset adjustment.

C5-40 set value=2 , all values returned to factory value.

9.3 Display setting

Display setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C5-37	Display Setting	0 ~ 6	1	2	○	

Description: When the keyboard is useless for six sec under operation condition, or push FWD、REV、STOP on the keyboard, show the value of Display function option (C7-XX) you appoint .

Setting value	Display
0	Output current
1	Output voltage
2	Speed reference F
3	Speed feedback
4	Output torque
5	Slip
6	DC bus voltage

Note: If the user gets into （C7） directionally, the above-mentioned function won't happen until the user leave off （C7）.

Unit of speed display

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-17	Unit of speed display	0 ~ 1	1	0	X	

Description: Display item C7-02 speed reference F, and C7~03 speed feedback, the unit display can be Hz or rpm.

Value=0 unit display is Hz.
=1 unit display is rpm.

Multiple of speed display

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C4-27	Multiple of speed display	0.0 ~ 100.0	0.01	1.00	○	

Description: Display item C7-02 is speed reference F, and C7~03 is speed feedback, the unit display set as rpm, you may adjust display multiple by C4-27.

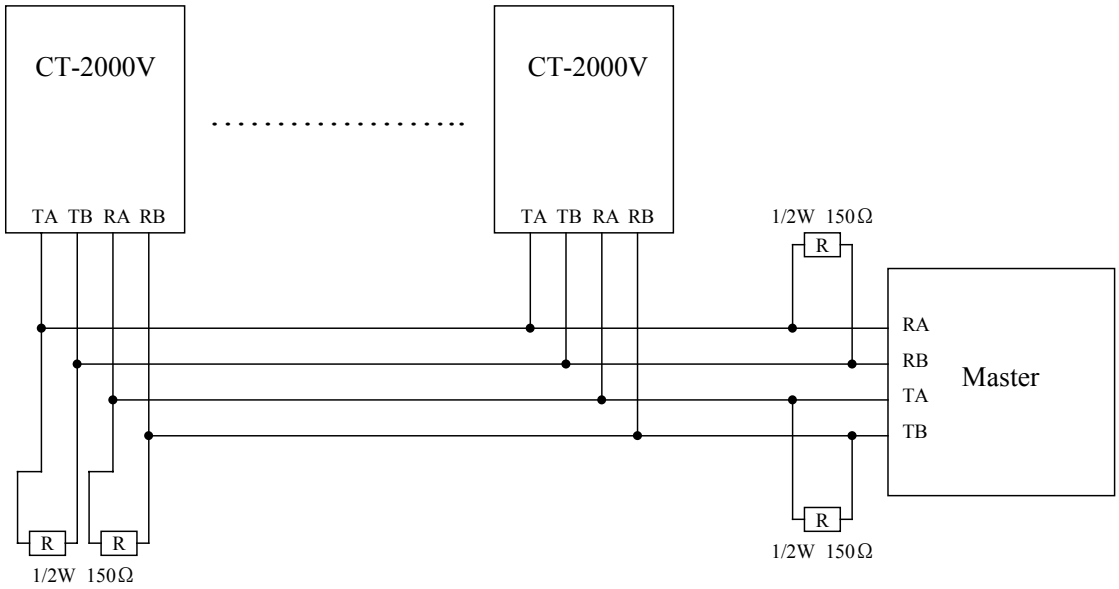
Example: If motor actual speed is 1200rpm, but linear speed is 1/2 of motor speed, please set C4-27 as 0.50, display show 600.

9.4 Serial communication

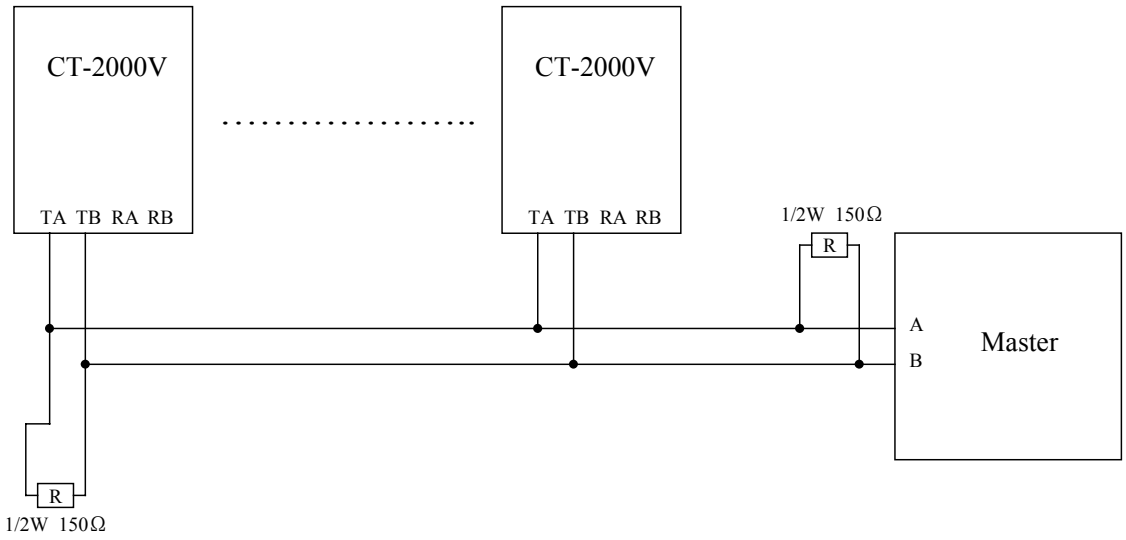
This product built in with standard RS422/RS485 communicate port , support international standard MODBUS protocol, user can montior single or many inverters by using PLC, PC, industrial computer or other equipment which support MODBUS protocool.

9.4.1 Physical link

The wiring of this product can use either RS422(4 wires) or RS485(2 wires), by jumper SW2. When use RS422(4 wires), the “REMOTE” socket cannot connect to any device.



RS422 wiring diagram



RS485 wiring diagram

Wiring selection

Wiring	SW2
RS422	pin 1,2 shorted
RS485	pin 2,3 shorted

9.4.2 Communication setting

Communication address setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-24	Comm. Address	1 ~ 240	1	240	X	

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

Modbus Protocol and communication mode setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-25	Frame format	0 ~ 7	1	0	X	

Description: The meaning of setting value is listed below

Setting value	Frame format
0	MODBUS RTU 8, N, 1
1	MODBUS RTU 8, E, 1
2	MODBUS RTU 8, O, 1
3	MODBUS RTU 8, N, 2
4	MODBUS ASCII 7, E, 1
5	MODBUS ASCII 7, O, 1
6	MODBUS ASCII 7, N, 2
7	MODBUS ASCII 8, N, 1

Communication baud rate setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-26	Baud rate	0 ~ 4	1	2	X	

Description: Available baud rate setting

Setting value	Frame format
0	2400 bps
1	4800 bps
2	9600 bps
3	19200 bps
4	38400 bps

Communication response time setting

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C2-27	Response time	2 ~ 255	2ms	10	X	

Description: When inverter receive a data, it will send the response data after C2-27 time, it is used mainly when Master process speed slower or TE single delay time of two wires commuication.

Comm. data storage

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-18	Comm. data storage	0 ~ 1	1	0	○	

Description: When writing a data to inverter by comm. , the data is only in RAM , if turn off the inverter, this data will lose. Set C6-18=1 before writing a data to inverter can let it saves in EEPROM. After this action, C6-18 will be clear as 0 automaticlly.

Comm. CRC check

Para-meter	Description	Setting Range	Unit	Default value	Change during operation	Remarks
C6-23	Comm. CRC check	0 ~ 1	1	0	○	

Description: C6-23=0, MODBUS RTU Mode CRC check operative.
C6-23=1, No CRC check.

9.4.3 Data structure in communication

This product support MODBUS RTU and MODBUS ASCII protocol. In ASCII mode, every byte of the data will transfer to two ASCII code. Ex. If byte data is 63H, It will be 36H, 33H in ASCII code.

Hex	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H	38H	39H	41H	42H	43H	44H	45H	46H

This product support function code **03H** and **06H** in MODBUS protocol.

Function 03H : Read holding registers

Read 2 data from registers in an inverter at slave address = 11H , the data address are continuous and the beginning address is 0480H, the ASCII MODE data frame are listed as below.

ASCII mode

Query		
Field name	Example	ASCII code
Header	':' (colon)	3AH
Slave address	11H	31H
		31H
Function	03H	30H
		33H
Sart address Hi	04H	30H
		34H
Start address Lo	80H	38H
		30H
No. of register Hi	00H	30H
		30H
No. of register Lo	02H	30H
		32H
LRC error check	66H	36H
		36H
Trailer	CR	0DH
	LF	0AH

Response		
Field name	Example	ASCII code
Header	':' (colon)	3AH
Slave address	11H	31H
		31H
Function	03H	30H
		33H
Byte count	04H	30H
		34H
1st Data Hi	03H	30H
		33H
1st Data Lo	E8H	45H
		38H
2nd Data Hi	00H	30H
		30H
2nd Data Lo	06H	30H
		36H
LRC error check	F7H	46H
		37H
Trailer	CR	0DH
	LF	0AH

In response data frame, Byte count is the total numer of bytes from register, every data length is 16 bits, therefore, in example, master read two continus data from registers started at 0480H, and slave resonse 4 bytes.

LRC generation:

1. Add all bytes in the message, excluding the starting ‘colon’ and ending CRLF, Add them into an 8-bit filed so that carries will be discard.
2. Subtract the final field value from FF hex (all 1’s), to produce the ones-complement.
3. Add 1 to produce the twos-complement.

Ex. From above query frame 11H+03H+04H+80H+00H+02H=81H, to produce the ones-complement=66H.

Function 03H : Read holding registers

Read 2 data from registers in an inverter at slave address = 11H , the data address are continuous and the beginning address is 0480H, the RTU MODE data frame are listed as below.

RTU mode

Field name	Example
Slave address	11H
Function	03H
Sart address Hi	04H
Start address Lo	80H
No. of register Hi	00H
No. of register Lo	02H
CRC error check Lo	C6H
CRC error check Hi	43H

Field name	Example
Slave address	11H
Function	03H
Byte count	04H
1st Data Hi	03H
1st Data Lo	E8H
2nd Data Hi	00H
2nd Data Lo	06H
CRC error check Lo	EBH
CRC error check Hi	80H

CRC Generation

Generating a CRC

Step 1	Load 16-bit register with FFFF hex (all 1’s). Call this the CRC register.
Step 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.
Step 3	Shift the CRC register one bit to the right(toward the LSB), zero filling the MSB. Extract and examine the LSB.
Step 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).
Step 5	Repeat Step 3 and 4 until eight shifts have been performed. When this Is done, a complete eight-bit byte will have been processed.
Step 6	Repeat Step 2…5 for next eight –bit byte of the message. Contiune doing this untill all bytes have been processed. The final contents of the CRC register is the CRC value.

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;
        };
    };
};
```

Function 06H : Write single register

Write a data as 1000(03e8h) to the register which is at address 0480H in an inverter at slave address = 11H,the ASCII MODE data frame are listed as below.

ASCII mode

Query		
Field name	Example	ASCII code
Header	‘’:’ (colon)	3AH
Slave address	11H	31H
		31H
Function	06H	30H
		36H
Data address Hi	04H	30H
		34H
Data address Lo	80H	38H
		30H
Data content Hi	03H	30H
		33H
Data content Lo	E8H	45H
		38H
LRC error check	7AH	37H
		41H
Trailer	CR	0DH
	LF	0AH

Response		
Field name	Example	ASCII code
Header	‘’:’ (colon)	3AH
Slave address	11H	31H
		31H
Function	06H	30H
		36H
Data address Hi	04H	30H
		34H
Data address Lo	80H	38H
		30H
Data content Hi	03H	30H
		33H
Data content Lo	E8H	45H
		38H
LRC error check	7AH	37H
		41H
Trailer	CR	0DH
	LF	0AH

Function 06H : Write single register

Write a data as 1000(03e8h) to the register which is at address 0480H in an inverter at slave address = 11H,the RTU MODE data frame are listed as below.

RTU mode

Field name	Example
Slave address	11H
Function	06H
Data address Hi	04H
Data address Lo	80H
Data content Hi	03H
Data content Lo	E8H
CRC error check Lo	8BH
CRC error check Hi	3CH

Field name	Example
Slave address	11H
Function	06H
Data address Hi	04H
Data address Lo	80H
Data content Hi	03H
Data content Lo	E8H
CRC error check Lo	8BH
CRC error check Hi	3CH

9.4.4 Group and Global Broadcast function.

(1) Group Broadcast

User can use this function to control certain group of inverter at the same time. When master send out group address data, the slave inverters will react when receive order, but will not send any signal back to master.

(2) Global Broadcast

User can use this function to control all inverters at the same time. When master global broadcast, all slaves inverters will react after receive order, but will not send any signal back to master.

Group and Global broadcast address should be recognized refer to table as below, when the group and global broadcast address is in use.

There are 240 addresses in total for inverter setting, which means it can connect up to 240 inverters at the same time, and provide 1 Global Broadcast address 15-group address. Each group address can control up to 16 inverters, and user can set it.

Group	Individual Address	Group address	Global address
Group1	1…16	241	0
Group 2	17…32	242	0
Group 3	33…48	243	0
Group 4	49...64	244	0
Group 5	65...80	245	0
Group 6	81…96	246	0
Group 7	97…112	247	0
Group 8	113...128	248	0
Group 9	129...144	249	0
Group 10	145...160	250	0
Group 11	161...176	251	0
Group 12	177...192	252	0
Group 13	193...208	253	0
Group 14	209...224	254	0
Group 15	225...240	255	0

9.4.5 Exception Response

When an inverter is doing communication, if the communication data frame is corect but the content in the frame is uncorrect, the inverter will send an exception code in response, and set the MSB of the function code to 1. This makes the function code value in an exception code value in an exception response and can examine the data fied for the exception code.

RTU mode

Field Name	Example
Slave address	11H
Function	86H
Exception code	02H
CRC error check Lo	C2H
CRC error check Hi	64H

ASCII mode

Field Name	Example	ASCII code
STX	:	3AH
Slave address	11H	31H
		31H
Function	86H	38H
		36H
Exception code	02H	30H
		32H
LRC error check	67H	36H
		37H
End	CR	0DH
	LF	0AH

Exception code

code	Description
01	Function code error
02	Data address error
03	Data content error
04	Data can not modified
09	LRC/CRC check error
14	Not ASCII Mode character in data frame
15	Slave address error
16	End error (ASCII Mode)

9.4.6 Parameter address

The chart below is common parameter address, please refer function table page 133-144 for other CT2000V parameter address.

address	Para-meter	Description		Setting Range	Unit	status	remark
000H	C1-00	Speed reference 1	Master speed reference from keyboard setting	0.00~400.00	0.01Hz	R/W	
001H	C2-26	Baud rate	Baud rate setting	0~4	1	R/W	
03DH		Comm. input 1	communication input to analog output	0~5000	1	R/W	
03EH		Comm. Input 2		0~5000	1	R/W	
03FH		Operation command	0= STOP 1=FWD 2=REW 4=Error Reset		bit	W	
040H		Inverter status	Bit0=motor run(1)/Stop(0) Bit1=command Run(1)/ Stop(0) Bit2=REV(1)/FWD(0) Bit3=JOG(1)/Normal(0) Bit8= accelecrating Bit9= decelecrating Bit10= constant speed		bit	R	
041H		Output frequency	Inverter output frequency	0.00~400.00	0.01Hz	R	
042H	C7-00	Output current	Inverter output current	0.00~400.00	0.01A	R	
043H	C7-02	Speed reference F	Actual speed reference	0.00~400.00	0.01Hz	R	
044H	C7-06	DC BUS voltage	DC BUS voltage	0.0~1000.0	0.1Vdc	R	
045H	C7-01	Output voltage	Inverter output voltage	0.0~500.0	0.1Vac	R	

Specification for 200V series

Motor (KW)	2.2	3.7	5.5	7.5	11	15	22	30	37	45				
Type (CT-2002V-)	2A2	3A7	5A5	7A5	011	015	022	030	037	045				
Rated current (A)	11.1	18	23	33	48	61	86	125	150	170				
Rated capacity (KVA)	4.5	7.1	9.2	13.1	19.1	24.3	34.3	49	60	68				
Input power supply	3φ 220V ±10%, 50/60Hz ±5%													
Output voltage	3φ 200V, 220V, 230V													
Control method	Space Vector P.W.M													
Starting torque	150% / 3Hz (150% / 0 r.p.m Vector control with PG)													
Speed control range	1:100 (1:1000, Vector control with PG)													
Speed control precision	±1% (±0.05%, Vector control with PG)													
Speed response	5Hz (20Hz, Vector control with PG)													
Torque limit	250%, 4 quarters setting													
Frequency precision	Digital setting: ±0.01%, Analog input: ±0.1% (35℃)													
Frequency resolution	Digital setting: 0.01 Hz, Analog input: 0.01 Hz/60 Hz (13 bit + sign)													
Frequency range	0.00 ~ 400.00 Hz													
V/f ratio	15 patterns, or arbitrary curve													
Voltage (torque) compensation	0~15.0% voltage compensation, or automatic voltage compensation													
Accel./decel. time	0.00~6000.0 sec													
Motor braking	100% with DBR			20%										
Standard feature	Autotuning, Jog operaton, Speed reference limit, Skip frequency setting, Multi-step speed reference setting, DC injection braking, PID controller, Analog output (12bit), Serial communication.													
Display	7-segmnet LED displays: Frequency, Voltage, Current, Torque, Function list, Setting value, Fault status.													
Protective function	Low power, Over voltage, Stall prevention, Overload, Over current, Overheat, Over speed, Encoder error.													
Overload capacity	150% 60sec,adjustable													
Altitude	Indoor, below 1000meter altitude													
Ambient temperature	-10℃ ~ 40℃ (50℃ with covers removed)													
Vibration	Below 0.5G													
Humidity	Relative humidity between 45% and 90% (non-condensing)													
Protective feature	Fan ventilation													
	Closed			Half closed										
Weight (kg)	8	8	9	14	14	20	30	45	60	60				

Specification for 400V series

Motor (KW)	2.2	3.7	5.5	7.5	11	15	22	30	37	45	55	75		
Type (CT-2004V-)	2A2	3A7	5A5	7A5	011	015	022	030	037	045	055	075		
Rated current (A)	6.2	9	13	17.3	24	31	52	65	71	93	110	156		
Rated capacity (KVA)	4.9	7.1	10.4	13.8	19.1	24.7	41.4	51.8	56.6	74	87.6	124		
Input power supply	3ϕ 380V ~ 440V ±10%, 50/60Hz ±5%													
Output voltage	3ϕ 380V, 415V, 440V													
Control method	Space Vector P.W.M													
Starting torque	150% / 3Hz (150% / 0 r.p.m Vector control with PG)													
Speed control range	1:100 (1:1000, Vector control with PG)													
Speed control precision	±1% (±0.05%, Vector control with PG)													
Speed response	5Hz (20Hz, Vector control with PG)													
Torque limit	250%, 4 quarters setting													
Frequency precision	Digital setting: ±0.01%, Analog input: ±0.1% (35℃)													
Frequency resolution	Digital setting: 0.01 Hz, Analog input: 0.01 Hz/60 Hz (13 bit + sign)													
Frequency range	0.00 ~ 400.00 Hz													
V/f ratio	15 patterns, or arbitrary curve													
Voltage (torque) compensation	0~15.0% voltage compensation, or automatic voltage compensation													
Accel./decel. time	0.00~6000.0 sec													
Motor braking	100% with DBR			20%										
Standard feature	Autotuning, Jog operaton, Speed reference limit, Skip frequency setting, Multi-step speed reference setting, DC injection braking, PID controller, Analog output (12bit), Serial communication.													
Display	7-segmnet LED displays: Frequency, Voltage, Current, Torque, Function list, Setting value, Fault status.													
Protective function	Low power, Over voltage, Stall prevention, Overload, Over current, Overheat, Over speed, Encoder error.													
Overload capacity	150% 60sec,adjustable													
Altitude	Indoor, below 1000meter altitude													
Ambient temperature	-10℃ ~ 40℃ (50℃ with covers removed)													
Vibration	Below 0.5G													
Humidity	Relative humidity between 45% and 90% (non-condensing)													
Protective feature	Fan ventilation													
	Closed			Half closed										
Weight (kg)	9	9	9	14	14	18	35	38	40	46	50	65		

Parameter Group C1: Speed reference & torque limit.

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
00	Speed reference 1	0.00~400.00	0.01Hz	10.00	○	0	480H	Master speed reference.	p.42
01	Speed reference 2	0.00~400.00	0.01Hz	0.00	○	0	481H	Speed reference in multi-step operation.	
02	Speed reference 3	0.00~400.00	0.01Hz	0.00	○	0	482H		
03	Speed reference 4	0.00~400.00	0.01Hz	0.00	○	0	483H		
04	Speed referecne 5	0.00~400.00	0.01Hz	0.00	○	0	484H		
05	Speed reference 6	0.00~400.00	0.01Hz	0.00	○	0	485H		
06	Speed referecne 7	0.00~400.00	0.01Hz	0.00	○	0	486H		
07	Speed reference 8	0.00~400.00	0.01Hz	0.00	○	0	487H		
08	Jog reference	0.00~400.00	0.01Hz	6.00	○	0	488H	Jog reference.	p.47
09	Auxiliary speed reference 1	0.00~400.00	0.01Hz	0.00	○	0	489H	Auxiliary reference 1.	p.36
10	Auxiliary speed reference 2	-99.99~99.99	0.01Hz	0.00	○	0	48AH	Auxiliary reference 2.	p.37
11	Torque model	0~2	1	0	X	1	48BH	0 : 4 quarters with 4 limits 1 : 4 quarters with 2 limits 2 : 4 quarters whit 1 limit	p.95
12	Torque limit 1	0.0~250.0	0.1%	150.0	○	1	48CH	Torque limit of inverter output.	
13	Torque limit 2	0.0~250.0	0.1%	150.0	○	1	48DH		
14	Torque limit3	0.0~250.0	0.1%	150.0	○	1	48EH		
15	Torque limit 4	0.0~250.0	0.1%	150.0	○	1	48FH		
16	Maximum forward speed reference	0.00~400.00	0.01Hz	60.00	X	1	490H	Forward maximum speed limit.	p.48
17	Minimum forward speed reference	0.00~400.00	0.01Hz	0.00	X	1	491H	Forward minimum speed limit.	
18	Maximum reverse speed reference	0.00~400.00	0.01Hz	60.00	X	1	492H	Reverse maximum speed limit.	
19	Minimum reverse speed reference	0.00~400.00	0.01Hz	0.00	X	1	493H	Reserve minimum speed limit.	
20	Skip frequency 1	0.00~400.00	0.01Hz	0.00	X	1	494H	Skip frequency & bandwidth.	p.49
21	Bandwidth of skip frequency 1	0.00~30.00	0.01Hz	0.00	X	1	495H		
22	Skip frequency 2	0.00~400.00	0.01Hz	0.00	X	1	496H		
23	Bandwidth of skip frequency 2	0.00~30.00	0.01Hz	0.00	X	1	497H		
24	Skip frequency 3	0.00~400.00	0.01Hz	0.00	X	1	498H		
25	Bandwidth of skip frequency 3	0.00~30.00	0.01Hz	0.00	X	1	499H		
26	ASR error limit	0.00~100.00	0.01Hz	6.00	X	1	49AH	Speed error limit.	p.95

Parameter Group C2: Motor parameter, protective function & comm. setting.

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
00	Motor rated voltage	50.0~500.00	0.1V	220.0	X	1	500H	Setting according to specification of motor's nameplate.	p.71
01	Motor rated freq.	0.00~320.00	0.01Hz	60.00	X	1	501H		
02	Motor rated speed	0~6000	1 r.p.m	1750	X	1	502H		
03	Motor rated current	30.0~150.0	0.1%	100.0	X	1	503H		
04	Poles of motor	2~14	2 poles	4	X	1	504H		
05	Motor unload current	10.0~70.0	0.1%	30.0	X	1	505H	Setting is completed by autotuning.	p.72
06	Motor resistance	0.00~15.00	0.01Ω	0	X	1	506H		
07	Motor Slip	0.10~10.00	0.01Hz	2.00	X	1	507H		
08	Encoder setting	10~20000	1 pulse	1024	X	1	508H	Setting according to specification of Encoder.	p.73
09	Starting frequency of weak magnetic control	30.00~32.00	0.01Hz	60.00	X	1	509H	Weak magnetic control only in vector control with PG.	p.73
10	Overload protective level	101.0~250.0	0.1%	150.0	X	1	50AH	Set as percentage of motor rated current.	p.102
11	Overload detecting time	0.0~120.0	0.1sec	60.0	X	1	50BH	Time limit of continuous overload.	
12	Overload detecting function	0~4	1	4	X	1	50CH	0: disable 1: detecting in constant speed operation,motor keeps running. 2: detecting in operation,motor keeps running. 3: detecting in constant speed operation,motor coast to stop. 4: detecting in operation,motor coast to stop.	
13	Stall preventive level in acceleration	0.0~250.0	0.1%	180.0	X	1	50DH	Set as percentage of motor rated current.	p.104
14	Stall preventive function in accel.	0~1	1	1	X	1	50EH	0: disable 1: constant speed operation after detecting	
15	Stall preventive level in constant speed operation	0.0~250.0	0.1%	180.0	X	1	50FH	Set as percentage of motor rated current.	p.105
16	Stall preventive function in constant speed operation	0~3	1	1	X	1	510H	0: disable 1: decelerate according to decel. time 2: decelerate according to energency stop time 1 3: decelerate according to energency stop time 2	
17	Stall preventive function in decel.	0~1	1	1	X	1	511H	0: disable 1: constant speed operation after detecting	p.106

Parameter Group C2 (continuous)

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
18	Overheat prevention	0~5	1	3	X	1	512H	0: disable 1: motor keeps running 2: motor coast to stop 3: motor decelerates to stop according to decel. time 4: motor decelerates to stop according to emergency stop time 1 5: motor decelerates to stop according to emergency stop time 2	p.107
19	Re-generation time	0.1~300.0	0.1 sec	10.0	X	1	513H	Time of discharge re-generation.	p.108
20	Re-generation function	0~4	1	3	X	1	514H	0: disable 1: detection in constant speed with time limit & overheat alarm 2: detection in constant speed without time limit 3: detection in operation with time limit & overheat alarm 4: detection in operation without time limit	
21	Over-speed detection level	0.00 ~ 320.00	0.01Hz	100	X	1	515H	Frequency of over-speed.	p.109
22	Over-speed detection time	0.0~120.0	0.1 sec	2.0	X	1	516H	detecting time in over-speed.	
23	Over-speed protective function	0~5	1	3	X	1	517H	0: disable 1: motor keeps running 2: motor coast to stop 3: motor decelerates to stop according to decel. time 4: motor decelerates to stop according to emergency stop time 1 5: motor decelerates to stop according to emergency stop time 2	
24	Communication address	1~240	1	1	X	1	518H	Communication address of inverter.	p.122
25	Frame format	0~7	1	0	X	1	519H	0: MODBUS RTU , 8,N,1 1: MODBUS RTU , 8,E,1 2: MODBUS RTU , 8,O,1 3: MODBUS RTU , 8,N,2 4: MODBUS ASCII , 7,E,1 5: MODBUS ASCII , 7,O,1 6: MODBUS ASCII , 7,N,2 7: MODBUS ASCII , 8,N,1	
26	Baud rate	0~4	1	2	X	1	51AH	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps	

Parameter Group C2 (continuous)

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
27	Response time	2 ~ 255	2ms	10	X	1	51BH	Delay time between transmit and receive data.	p.123
28	Encoder line opened detecting time	0.0 ~ 25.0	0.1sec	2.0	X	1	51CH	Detecting when line opened time over the setting value	p.110
29	Encoder line opened protective function	0~10	1	2	X	1	51DH	0: disable 1: motor keeps running 2: motor coast to stop 3: motor decelerates to stop according to decel. time 4: motor decelerates to stop according to emergency stop time 1 5: motor decelerates to stop according to emergency stop time 2 6: motor keeps running 7: motor coast to stop 8: motor decelerates to stop according to decel. time 9: motor decelerates to stop according to emergency stop time 1 10 motor decelerates to stop according to emergency stop time 2	
30	Encoder direction error detecting time	0.0 ~ 25.0	0.1sec	2.0	X	1	51EH	Detecting when direction error time over the setting value	p.111
31	Encoder direction error protective function	0 ~ 5	1	1	X	1	51FH	0: disable 1: motor keeps running 2: motor coast to stop 3: motor decelerates to stop according to decel. time 4: motor decelerates to stop according to emergency stop time 1 5: motor decelerates to stop according to emergency stop time 2	
32	Power input phase-lacking protective function	0 ~ 5	1	1	X	1	520H	0: disable 1: motor keeps running 2: motor coast to stop 3: motor decelerates to stop according to decel. time 4: motor decelerates to stop according to emergency stop time 1 5: motor decelerates to stop according to emergency stop time 2	p.112

Parameter Group C2 (continuous)

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
33	Start point of overload	50.0 ~ 150.0	0.1%	100.0	X	1	521H	Setting start from start point of overload	p.102

Parameter Group C3: V/f curve setting & function of V/f control.

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
00	V/f curve setting	0~19	1	0	X	1	580H	Selection of V/f curve.	p.78
01	Starting frequency	0.10~30.00	0.01Hz	1.50	X	1	581H	The minimum freq. on starting.	p.86
02	Excitation time	0.00~10.00	0.01sec	0.50	X	1	582H	Excitation time of motor.	
03	DC injection braking time in starting	0.00~60.00	0.01sec	0.00	X	1	583H	Please refer to 7.1-4.	p.86
04	DC injection braking freq. in stopping	0.10~60.00	0.01Hz	0.50	X	1	584H		
05	DC injection braking time in stopping	0.00~60.00	0.01sec	0.00	X	1	585H		
06	DC injection voltage	0.0~100.0	0.1%	3.0	X	1	586H	Setting based on motor rated voltage which is taken as 100%	
07	Voltage compensation 1	0.0~15.0	0.1%	0.5	X	1	587H	This function could increase torque of motor in low freq. operation.Setting base on motor rated voltage that is taken as 100%.	p.84
08	Voltage compensation 2	0.0~15.0	0.1%	0.5	X	1	588H		
09	Voltage compensation 3	0.0~15.0	0.1%	0.5	X	1	589H		
10	Voltage compensation 4	0.0~15.0	0.1%	0.5	X	1	58AH		
11	Freq. compensation	0.00~10.00	0.01Hz	2.00	X	1	58BH	To reduce error between actual speed of motor and reference.	p.85
12	Middle frequency	0.00~320.00	0.01Hz	3.00	X	1	58CH	Middle freq. of V/f curve.	p.82
13	Middle voltage	0.0 ~ 600.0	0.1V	13.2	X	1	58DH	Middle voltage of V/f curve.	
14	V/f frequency 1	0.10~320.00	0.01Hz	10.00	X	1	58EH	Arbitrary V/f curve.	p.83
15	V/f voltage 1	0.0 ~ 600.0	0.1V	36.6	X	1	58FH		
16	V/f frequency 2	0.10~320.00	0.01Hz	20.00	X	1	590H		
17	V/f voltage 2	0.0 ~ 600.0	0.1V	73.3	X	1	591H		
18	V/f frequency 3	0.10~320.00	0.01Hz	30.00	X	1	592H		
19	V/f voltage 3	0.0 ~ 600.0	0.1V	110.0	X	1	593H		
20	V/f frequency 4	0.10~320.00	0.01Hz	40.00	X	1	594H		
21	V/f voltage 4	0.0 ~ 600.0	0.1V	146.6	X	1	595H		
22	V/f frequency 5	0.10~320.00	0.01Hz	50.00	X	1	596H		
23	V/f voltage 5	0.0 ~ 600.0	0.1V	183.3	X	1	597H		

Parameter Group C4: Accel./decel. setting, ASR & ACR PI setting & PID controller

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
00	Function settinf of accel./decel.	0~3	1	0	X	1	600H	Please refer 5.3-3.	p.51
01	Acceleration time 1	0.00~600.00	0.01sec	5.00	○	1	601H	Master accel./decel. time.	
02	Deceleration time 1	0.00~600.00	0.01sec	5.00	○	1	602H		
03	Acceleration time 2	0.00~600.00	0.01sec	5.00	○	1	603H	Multi-step accel./decel. time.	p.52
04	Deceleration time 2	0.00~600.00	0.01sec	5.00	○	1	604H		
05	Acceleration time 3	0.00~600.00	0.01sec	5.00	○	1	605H		
06	Deceleration time 3	0.00~600.00	0.01sec	5.00	○	1	606H		
07	Acceleration time 4	0.00~600.00	0.01sec	5.00	○	1	607H		
08	Deceleration time 4	0.00~600.00	0.01sec	5.00	○	1	608H		
09	Emergency stop time 1	0.00~600.00	0.01sec	5.00	○	1	609H	Decel. time in stopping when C4-00=1.	p.50
10	Emergency stop time 2	0.00~600.00	0.01sec	5.00	○	1	60AH	Decel. time in emergency stop when failure occurs.	
11	Jog accel. time	0.00~600.00	0.01sec	5.00	○	1	60BH	Accel./decel. time in jog operation.	
12	Jog decel. time	0.00~600.00	0.01sec	5.00	○	1	60CH		
13	Proportional gain of ASR	0.0~15.0	0.1 time	2.0	○	1	60DH	PI controller of speed loop.	p.95
14	Integral time of ASR	0.00~2.50	0.01sec	0.2	○	1	60EH		
15	Proportional gain of ACR	0.0~15.0	0.1 time	5.0	X	1	60FH	PI controller of current loop. Only in vector control with PG.	p.100
16	Integral time of ACR	1~250	1 ms	10	X	1	610H		
17	Speed feedback filter	0~8	1	5	X	1	611H	Time of digital filter in speed feedback.	p.95
18	Time of holding	0.00~300.00	0.01sec	0.10	X	1	612H	Only in vector control with PG.	p.55
19	Source selection of PID command	0~3	1	0	X	1	613H	0 = keypad 1 = IN1 2 = IN2 3 = IN3	p.68
20	Source selection of PID feedback	0~3	1	0	X	1	614H		
21	PID command	-100.0~100.0	0.1%	50.0	○	1	615H	PID command or feedback which is set by keypad.	
22	PID output limit	0.0~100.0	0.1%	100.0	X	1	616H	Maximum PID output.	
23	PID speed reference setting	0.00~100.00	0.01Hz	30.00	○	1	617H	Speed reference adjustment when PID output is 100%.	p.69
24	PID proportional gain	0.0~15.0	0.1 time	2.0	○	1	618H	PID controller	
25	PID integral time	0.00~2.50	0.01sec	0.2	○	1	619H		
26	PID differential time	0.00~2.50	0.01sec	0	○	1	61AH		

Parameter Group C4 (continuous)

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
27	Multiple of speed display	0.0~100.0	0.01	1.0	○	1	61BH	Speed display for free adjustment.	p.119
28	PID integral limite	0.0~100.0	0.1%	100.0	X	1	61CH	Integral limit.	p.69
29	PID command accel/decel time	0.0~25.5	0.1sec	5.0	○	1	61DH	Accel./decel. time for PID command.	
30	PID output accel/decel time	0.0~10.0	0.01sec	0.00	○	1	61EH	Accel./decel. time for PID output.	
31	S curve time 1 (accel start)	0.00~2.55	0.01sec	0.20	X	1	61FH	S curve accel./decel. function.	p.51
32	S curve time 2 (accel end)	0.00~2.55	0.01sec	0.20	X	1	620H		
33	S curve time 3 (Decel start)	0.00~2.55	0.01sec	0.20	X	1	621H		
34	S curve time 4 (Decel end)	0.00~2.55	0.01sec	0.20	X	1	622H		

Parameter Group C5: Analog input, Analog output, Relay, terminal setting & others

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
00	Control mode settings	0~3	1	0	X	1	680H	0 = V/f control 1 = Sensorless vecter control 2 = V/f control with PG 3 = Vector control with PG	p.76
01	P.W.M frequency	0~5	1	2	X	1	681H	0 = 2k 1 = 4k 2 = 5k 3 = 8k 4 = 10k 5 = 12k	p.117
02	Function setting of terminal 1	0~49	1	30	○	1	682H	00 = Speed reference selection 01 = Auxiliary reference 1 selection 02 = Auxiliary reference 2 selection 03 = Jog reference selection 04 = Torque limit selection 05 = Control source selection 06 = FWD/REV selection 07 = Time unit of accel./decel. 08 = Holding enable/disable 09 = Data lock/free 10 = PID enable/disable 1 11 = PID enable/disable 2 12 = Auxiliary reference1 sign change 13 = Voltage compensation 14 = Freq. compensation 15 ~ 25 = reserve 26 = Multi-step accel./decel. 1 27 = Multi-step accel.decel. 2 28 = Multi-step volt compensation 1 29 = Multi-step volt compensation 2 30 = Multi-step speed reference 1 31 = Multi-step speed reference 2 32 = Multi-step speed reference 3 33 = Multi-step torque limit 1 34 = Multi-step torque limit 2 35 = Jog operation 36 = FWD/STOP 37 = FR/RR 38 = REV/STOP 39 = Error reset 40 = UP command 41 = DOWN command 42 = External failure signal 1 43 = External failure signal 2 44 = External failure signal 3	p.22
03	Function setting of terminal 2	0~49	1	31	○	1	683H		
04	Function setting of terminal 3	0~49	1	26	○	1	684H		
05	Function setting of terminal 4	0~49	1	42	○	1	685H		
06	Function setting of terminal 5	0~49	1	39	○	1	686H		
07	Function setting of terminal 6	0~49	1	35	○	1	687H		
08	Function setting of terminal 7	0~49	1	38	○	1	688H		
09	Function setting of terminal 8	0~49	1	36	○	1	689H		

Parameter Group C5 (continuous)

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
10	Speed reference scale	0.00~400.00	0.01Hz	60.00	○	1	68AH	Master speed rreference scaling of analog input.	p.35
11	Auxiliary speed reference 1 scale	0.00~400.00	0.01Hz	10.00	○	1	68BH	Auxiliary reference 1 scaling of analog input.	p.36
12	Auxiliary speed reference 2 scale	0.00~99.99	0.01Hz	10.00	○	1	68CH	Auxiliary reference 2 scaling of analog input.	p.37
13	Jog speed reference scale	0.00~400.00	0.01Hz	6.00	○	1	68DH	Jog reference scaling of analog input.	p.38
14	Torque limit scale	0.0~250.0	0.1%	100.0	○	1	68EH	Torque limit scaling of analog input.	p.39
15	IN1 function setting	0~5	1	0	X	1	68FH	0 = Disable 1 = Speed reference 2 = Auxiliary reference 1 3 = Auxiliary reference 2 4 = Jog reference 5 = Torque limit	p.34
16	IN2 function setting	0~5	1	1	X	1	690H		
17	IN3 function setting	0~5	1	4	X	1	691H		
18	IN1 zero area	0~20	1	0	○	1	692H	Please refer 5.2-1	p.31
19	IN2 zero area	0~255	1	0	○	1	693H		
20	IN3 zero area	0~20	1	0	○	1	694H		
21	IN1 offset adjustment	-100~100	1	0	○	1	695H	Analog input offset adjustment	p.30
22	IN2 offset adjustment	-200~200	1	0	○	1	696H		
23	IN3 offset adjustment	-100~100	1	0	○	1	697H		
24	IN1 digital filter	0~7	1	0	X	1	698H	Time of digital filter	p.32
25	IN2 digital filter	0~7	1	0	X	1	699H		
26	IN3 digital filter	0~7	1	0	X	1	69AH		
27	Function setting of analog output 1	0~9	1	0	○	1	69BH	0 = Speed reference 1 = Speed feedback 2 = Output Torque 3 = Output current 4 = Output Voltage	p.57
28	Function setting of analog output 2	0~9	1	0	○	1	69CH		
29	Offset of analog output 1	-2047~2047	1	0	○	1	69DH	Offset of analog output	p.58
30	Offse of analog output 2	-2047~2047	1	0	○	1	69EH		
31	Speed reference scaling	0.10 ~ 400.00	0.01Hz	60.00	○	1	69FH	Scaling of speed reference and feedback in analog output	p.58
32	Output torque scaling	0.1~250.0	0.1%	100.0	○	1	6A0H	Analog output signal scaling	p.59
33	Output current scaling	10.0~250.0	0.1%	100.0	○	1	6A1H		
34	Output Voltage scaling	10.0~150.0	0.1%	100.0	○	1	6A2H		p.60
35	Relay output 1 selection	0~15	1	1	○	1	6A3H	Please refer 5.4-2.	p.64
36	Relay output 2 selection	0~15	1	11	○	1	6A4H		

Parameter Group C5 (continuous)

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
37	Display setting	0~6	1	2	○	1	6A5H	0 = output current 1 = output voltage 2 = speed reference F 3 = speed feedback 4 = output torque 5 = slip 6 = DC bus voltage	p.119
38	Password	0~9999	1	0	○	1	6A6H	Input password	p.117
39	Reserve								
40	Parameter recovering factory value	0~2	1	0	X	1	6A8H	0=disable 1=enalbe 2=enable	p.118
41	AM1 digital flter	0~6	1	4	X	1	6A9H	Analog output filter	p.63
42	AM2 digital filter	0~6	1	4	X	1	6AAH		
43	Pass over point 1	0.00~400.00	0.01Hz	30.00	○	1	6ABH	Relay acted when speed reference is higher or equal to setting value	p.64
44	Pass over point 2	0.00~400.00	0.01Hz	30.00	○	1	6ACH		
45	Ratio of IN1 input to analog output	10.0~500.0	0.1%	100.0	○	1	6ADH	Ratio of analog input to analog output	p.60
46	Ratio of IN2 input to analog output	10.0~500.0	0.1%	100.0	○	1	6AEH		p.61
47	Ratio of IN3 input to analog output	10.0~500.0	0.1%	100.0	○	1	6AFH		
48	Ratio of comm. Input 1 to analog output	100~5000	1	2000	○	1	6B0H	Ratio of comm. Input value to analog output	p.62
49	Ratio of comm. Input 2 to analog output	100~5000	1	2000	○	1	6B1H		

Parameter Group C6: Switch setting.

No	Description	Setting Range	Unit	Default value	Change during operation	Lv.	Comm. address	Information	Related chapter
00	Speed reference selection	0~1	1	0	○	1	700H	0 = Keypad setting 1 = Analog input	p.35
01	Auxiliary reference 1 selection	0~1	1	0	○	1	701H		p.36
02	Auxiliary reference 2 selection	0~1	1	0	○	1	702H		p.37
03	Jog reference selection	0~1	1	0	○	1	703H		p.38
04	Torque limit selection	0~1	1	0	○	1	704H		p.39
05	Control source selection	0~1	1	0	X	1	705H	0 = Keypad 1 = External terminal	p.25
06	Forward/Reverse	0~1	1	0	X	1	706H	0 = Forward only 1 = Forward/Reverse	p.26
07	Time unit of accel./decel.	0~1	1	0	X	1	707H	0 = 0.01 sec 1 = 0.1 sec	p.50
08	Holding	0~1	1	0	X	1	708H	0 = disable 1 = enable	p.55
09	Data lock	0~1	1	0	○	1	709H	0 = disable 1 = enable	p.118
10	PID enable/disable 1	0~1	1	0	○	1	70AH	0 = disable 1 = enable	p.70
11	PID enable/disable 2	0~1	1	0	○	1	70BH	0 = disable 1 = enable	
12	Auxiliary reference1 “+”,”-“ sign changed	0~1	1	0	X	1	70CH	0 = original input 1 = sign changed	p.45
13	Switch of voltage compensation	0~1	1	0	X	1	70DH	0 = disable 1 = enable	p.84
14	Switch of frequency compensation	0~1	1	0	X	1	70EH	0 = disable 1 = enable	p.85
15	Autotune enable/disable	0~1	1	0	X	1	70FH	0 = disable 1 = enable	p.74
16	ACR gain selection	0~1	1	0	X	1	710H	0 = manual 1 = auto	p.100
17	Unit of display	0~1	1	0	X	1	711H	0 = Hz 1 = r.p.m	p.119
18	Comm. data storage	0~1	1	0	○	1	712H	0=no save 1=save to EEPROM	p.123
19	Specification of IN1	0~1	1	0	X	1	713H	0 = 4~20mA 1 = 0~10V	p.30
20	Specification of IN3	0~1	1	0	X	1	714H	0 = 0~10V 1 = -10V ~ 10V	
21	Reserve						715H		
22	Reserve						716H		
23	Comm. CRC check	0~1	1	0	X	1	717H	0= enable 1= disable	p.123
24	Differential position select	0~1	1	0	X	1	718H	0= act on error 1=act on feedback	p.66

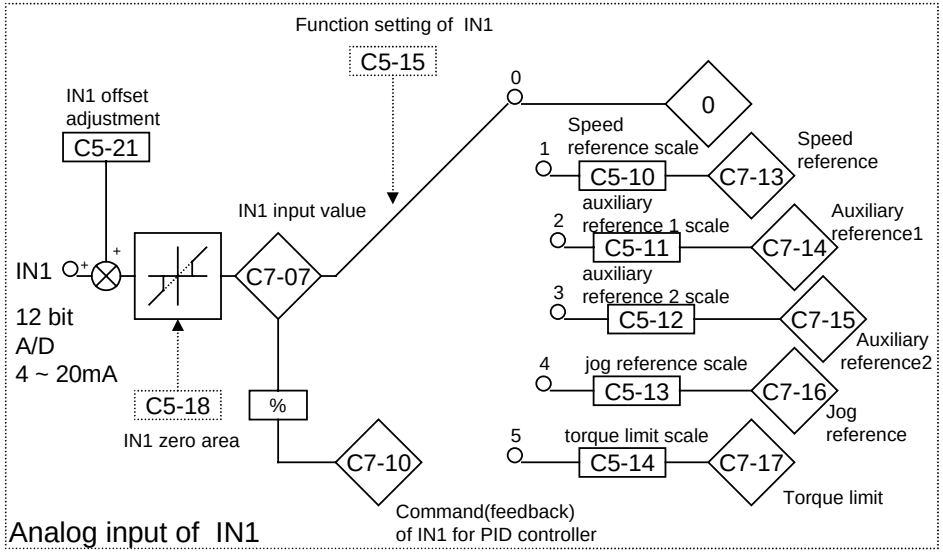
Parameter Group C7: Display mode.

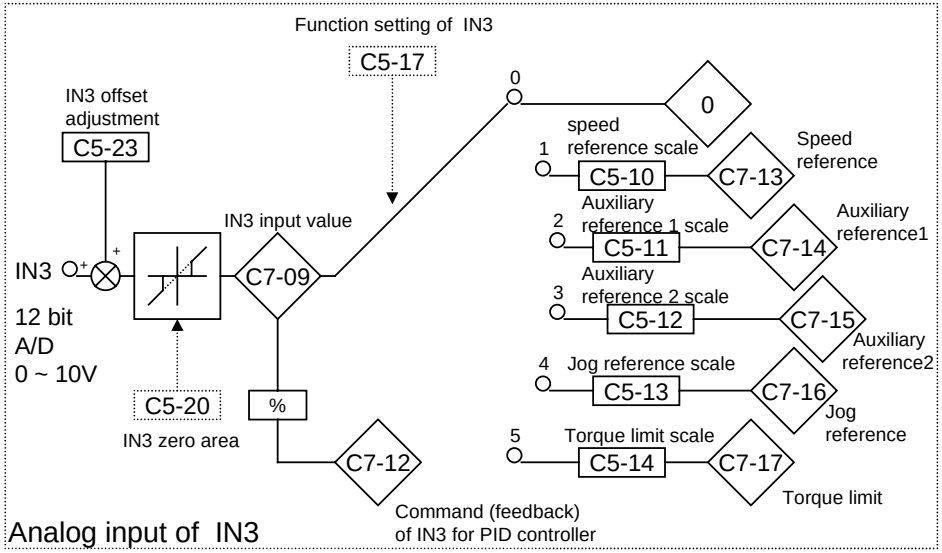
No	Description	Unit	Information	Comm. address	Related chapter
00	Output current	A	Output current of inverter.	780H	
01	Output voltage	VAC	Output voltage of inverter.	781H	
02	Speed reference F	Hz/rpm	Actual speed reference.Unit selected by C6-17.	782H	
03	Speed feedback	Hz/rpm	Average speed per second of motor.Unit selected by C6-17.	783H	
04	Output torque	%	Torque of motor in percentage.	784H	
05	Slip	Hz	Slip frequency.	785H	
06	DC Bus	VDC	Inverter DC bus voltage.	786H	
07	IN1 input value		Analog input of IN1 without scaling process.	787H	5.2
08	IN2 input value		Analog input of IN2 without scaling process.	788H	
09	IN3 input value		Analog input of IN3 without scaling process.	789H	
10	Command (feedback) of IN1 for PID controller	%	(Input value / 2048) x 100%	78AH	5.2-1 5.5
11	Command (feedback) of IN2 for PID controller	%	(Input value / 8192) x 100%	78BH	
12	Command (feedback) of IN3 for PID controller	%	(Input value / 2048) x 100%	78CH	
13	Speed reference from analog input	Hz	Master speed reference of analog input, select by C6-00.	78DH	5.2-2 5.3-1
14	Auxiliary reference 1 from analog input	Hz	Auxiliary reference 1 of analog nput, select by C6-01.	78EH	
15	Auxiliary reference 2 from analog input	Hz	Auxiliary reference 2 of analog nput, select by C6-02.	78FH	
16	Jog reference from analog input	Hz	Jog reference of analog input, select by C6-03.	790H	
17	Torque limit from analog input	%	Torque limit of analog input, select by C6-04.	791H	5.2-2 7.3-1
18	Speed reference A	Hz	Speed reference A in control diagram 2	792H	5.3-1
19	Speed reference B	Hz	Speed reference B in control diagram 2	793H	
20	Speed reference C	Hz	Speed reference C in control diagram 2 & 3	794H	
21	Speed reference D	Hz	Speed reference D in control diagram 3	795H	
22	Speed reference E	Hz	Speed reference E in control diagram 3	796H	
23	PID speed reference	Hz	Speed reference adjustment which is generated by PID controller.	797H	5.5
24	Software version		Software version of inverter.	798H	
25	Input status of external terminal			799H	
26	Failure recorder 1		The latest failure record in driving.	79AH	8.2-2
27	Failure recorder 2		The failure record in driving before the latest.	79BH	
28	Failure recorder 3		The failure record in driving. The 2nd before the latest.	79CH	
29	Failure recorder 4		The failure record in driving. The 3rd before the latset.	79DH	
30	Failure recorder of parameter		The latest failure record of parameter.	79EH	8.2-1

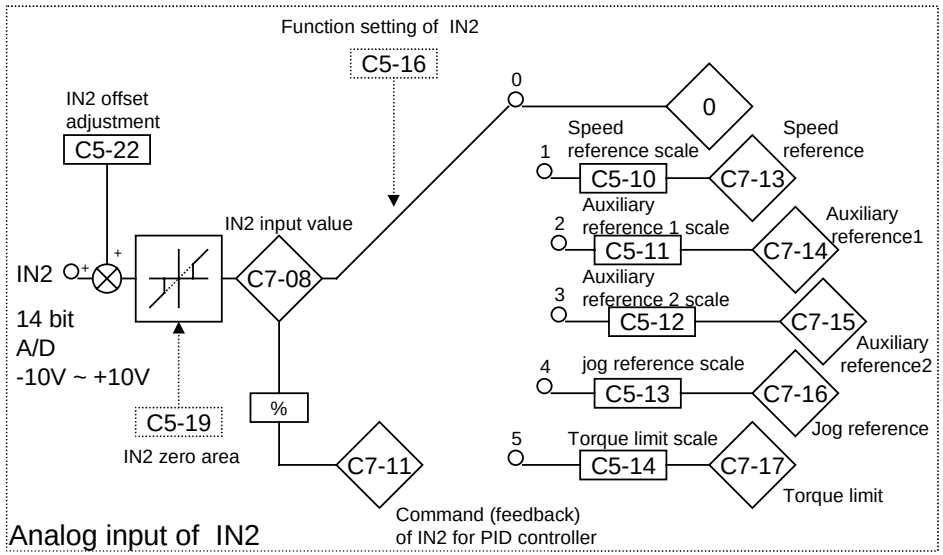
Parameter Group C7 (continuous)

No	Description	Unit	Information	Comm. address	Related chapter
31	q axle current reference	A	Vector control with PG only.	79FH	Control diagram 6
32	d axle current reference	A		7A0H	
33	q axle current feedback	A		7A1H	
34	d axle currenr feedback	A		7A2H	
35	q axle voltage reference	VAC	Vector control with PG only.	7A3H	
36	d axle volatge reference	VAC		7A4H	
37	P gain of ACR	Time	P gain of ACR after autotuning	7A5H	
38	I gain of ACR	ms	I gain of ACR after autotuning	7A6H	
39	Error code of communication		Error code of communication	7A7H	

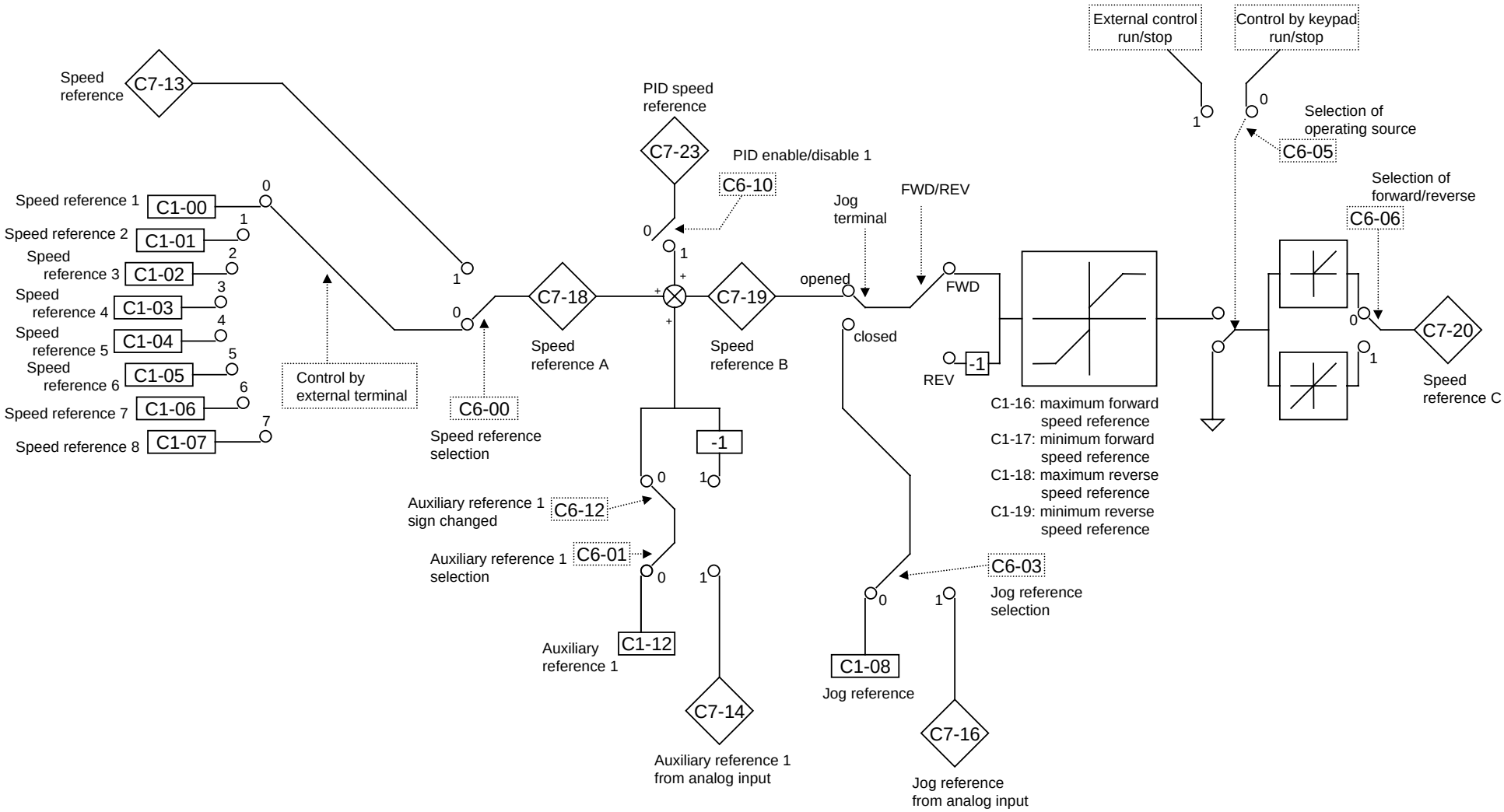
Control Diagram 1



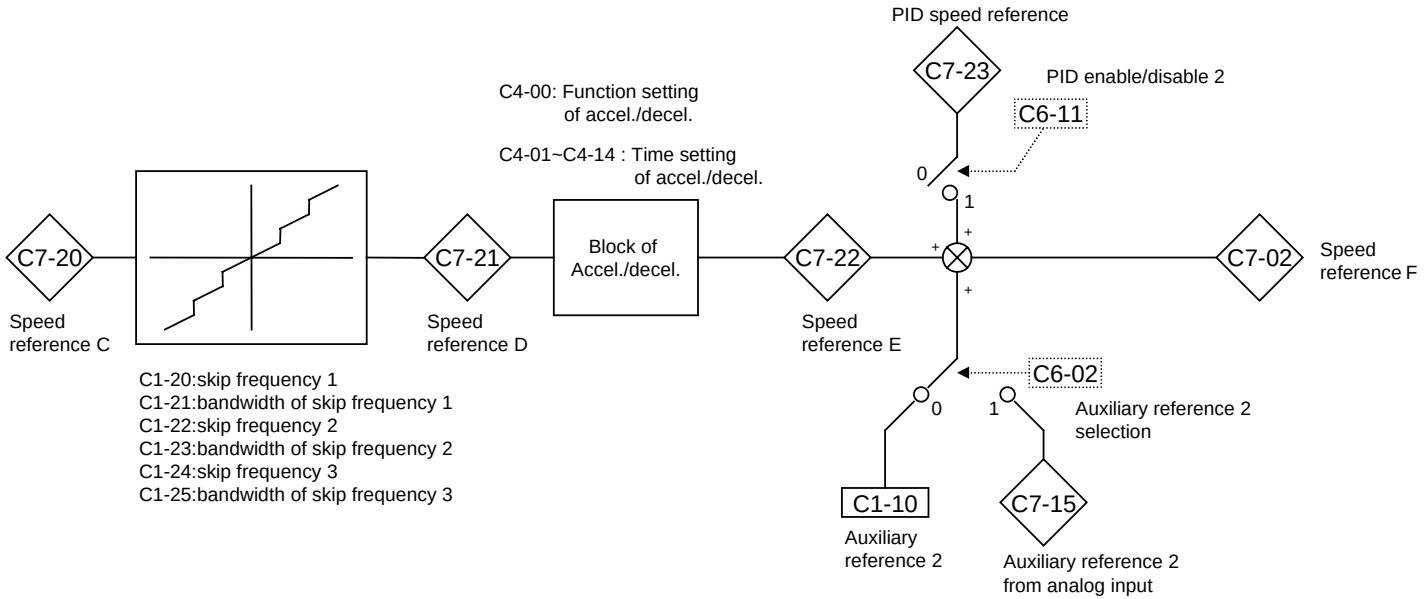




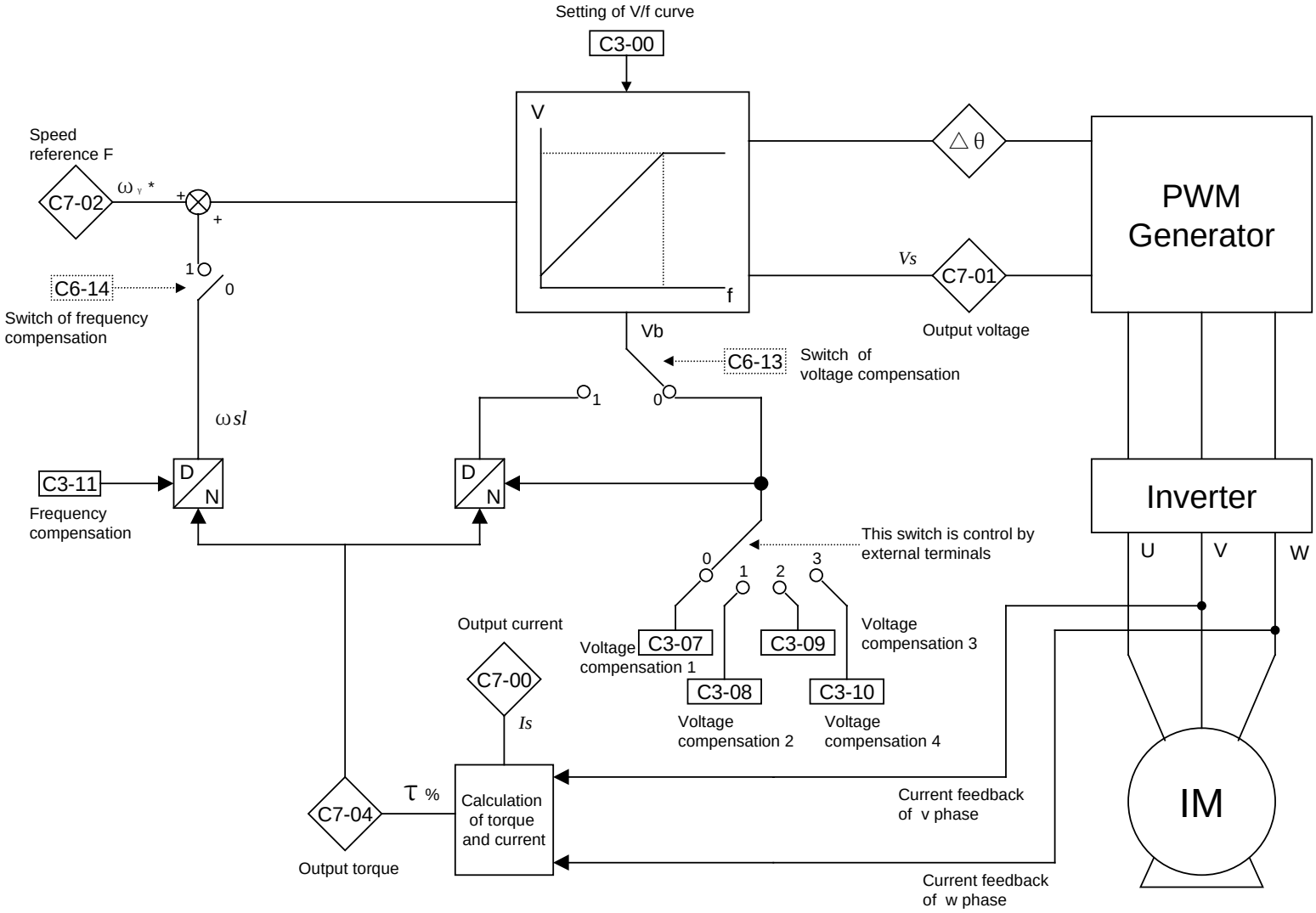
Control diagram 2



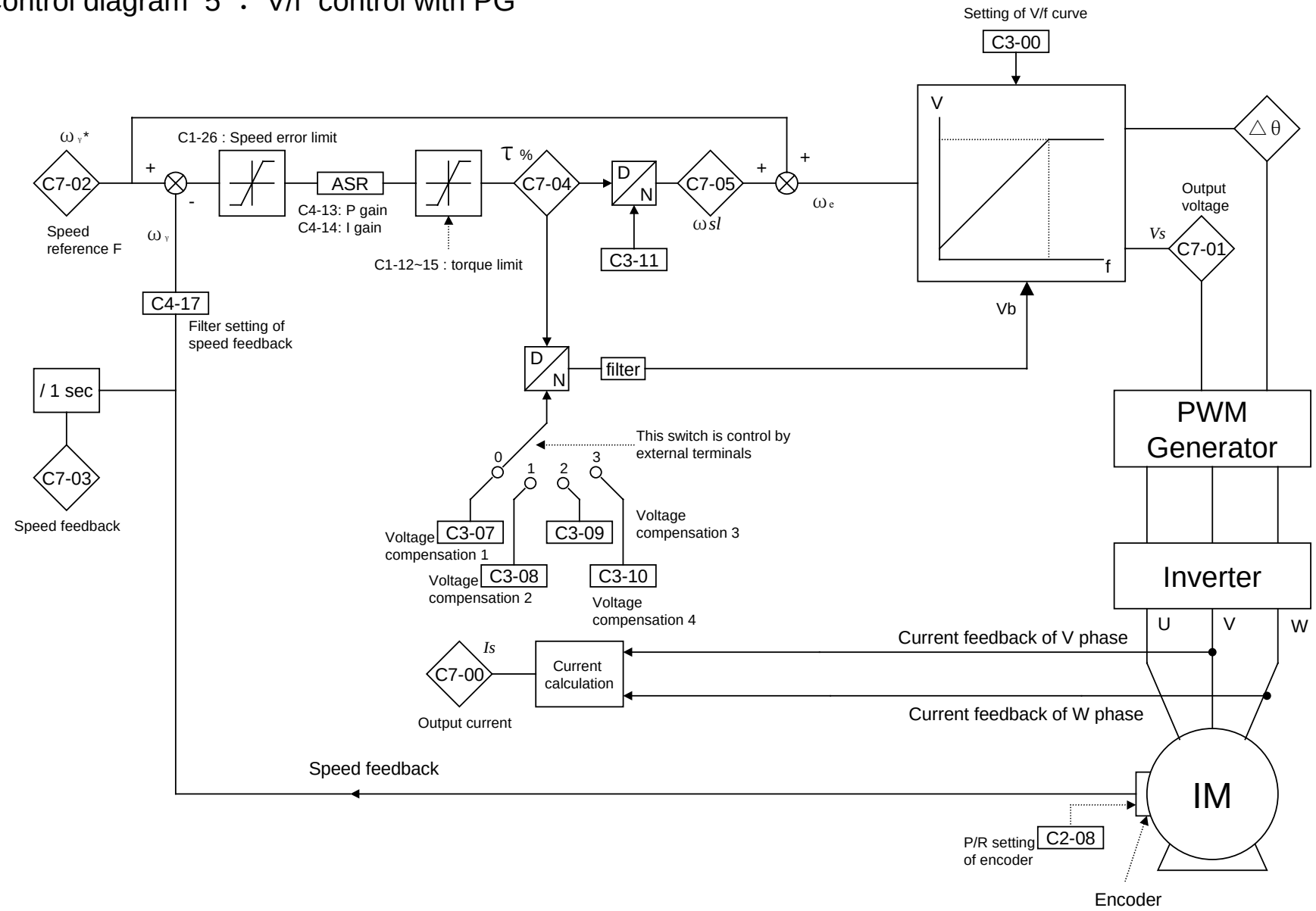
Control diagram 3



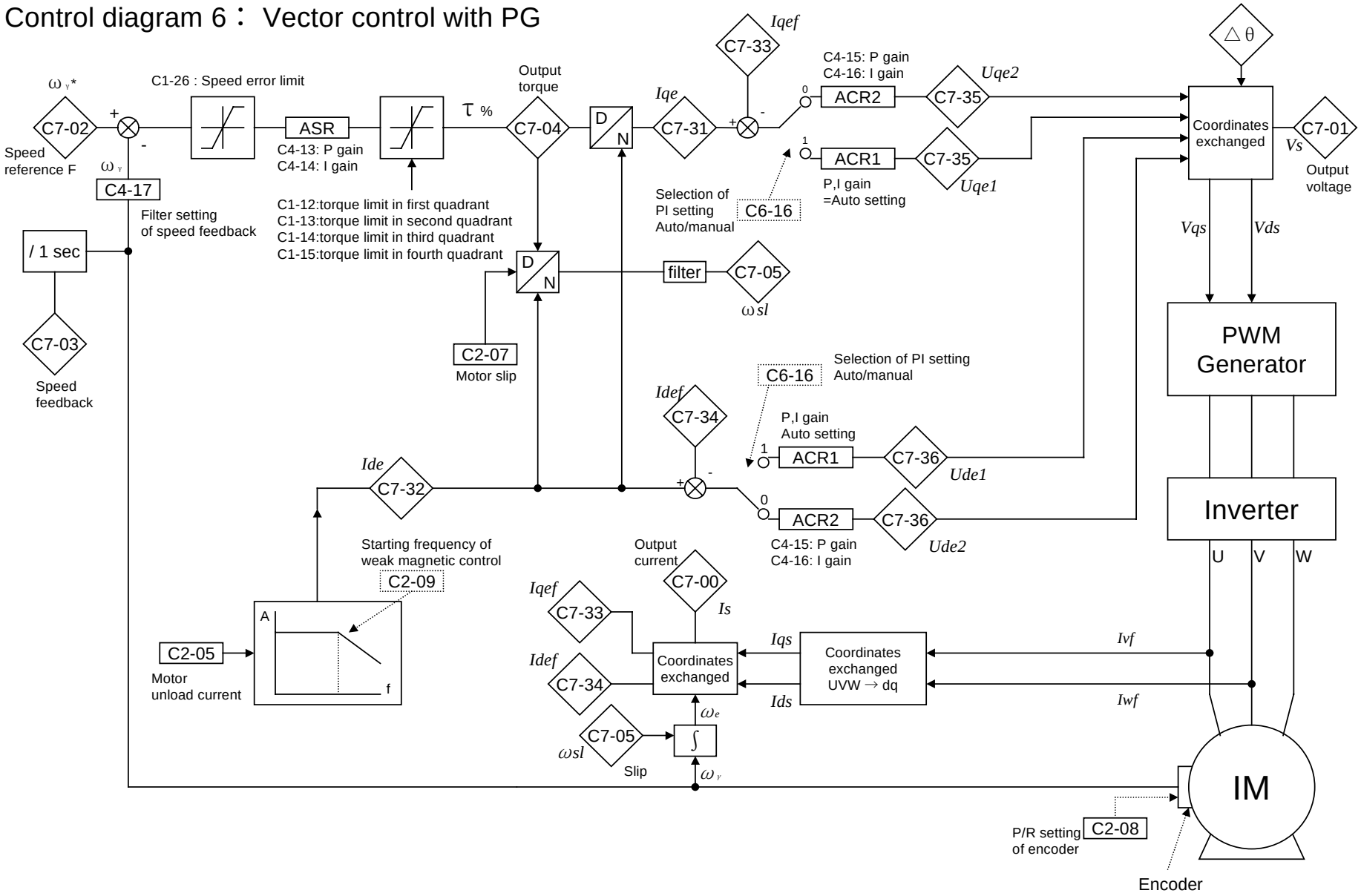
Control diagram 4 ： V/f control without PG



Control diagram 5 ： V/f control with PG



Control diagram 6： Vector control with PG



Control diagram : output terminal