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Preface

Thank you for choosing the CT-2000FG/ FP/ E2 inverter unit, this inverter unit is suitable for operating squirrel cage induction motors. This manual is designed to ensure correct and suitable application. Read this manual before attempting to install. If any problem occurred when negligence of manual. Please contact our distributors or sales representatives.

※Application notes

- Please do not touch the circuit boards and components immediately after the power is shut down.
- Wiring is prohibited when power on, please do not check the components and signal on the circuit board when operation.
- Do not fit capacitors to the output side of the inverter in order to improve the power ratio.
- Run a motor that is within the capacity of the inverter unit.
- In case of fitting MC between inverter and motor to control motor operation, then the capacity of inverter must be 6 times the capacity of motor.

Inspection upon receiving

- A. Check that the model, the capacity and power voltage specifications are as ordered.
- B. Check that no damage has occurred during transportation.
- C. Check that none of the internal parts have been damaged or have fallen off.
- D. Check that none of the connectors have been damaged or have fallen off.
- E. Check that there is no loosening of the terminals or screws of each of the parts.

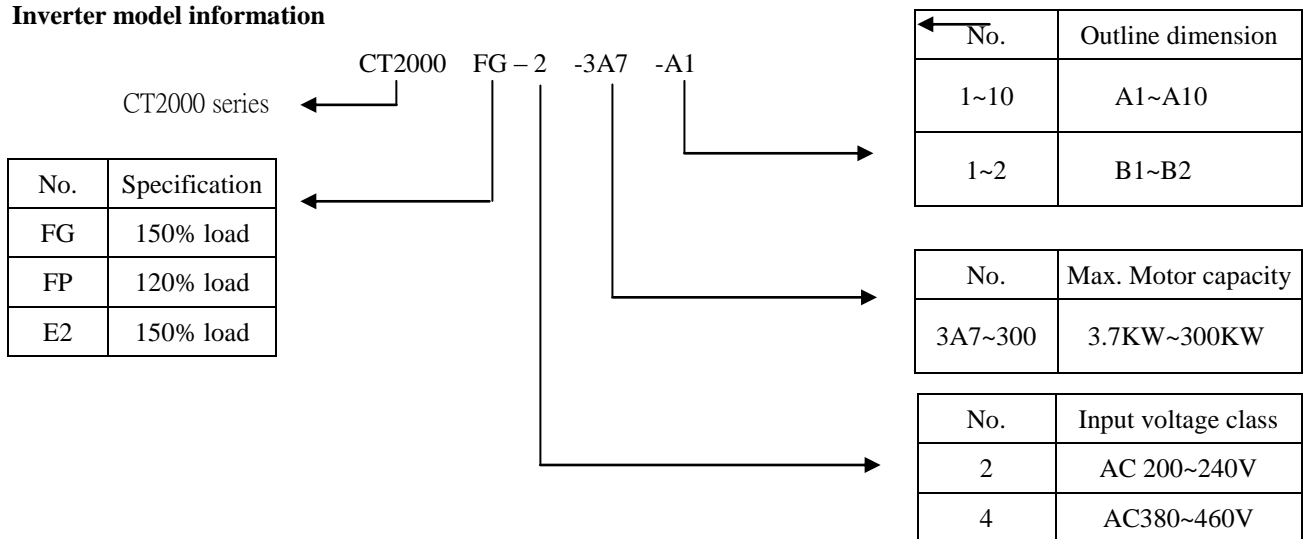
If said problems occurred when negligence of manual. Please contact our distributors or sales representatives

Nameplate information

Example for 5HP/3A7 220V

Inverter model	→	MODEL: CT2000FG-2-3A7-A1	
Input spec.	→	INPUT : 3Φ 220V 50//60HZ 21A	
Output spec.	→	OUTPUT: 3Φ 220V 18A 7.1KVA	
Motor capacity	→	Motor:3.7KW/5HP	Mass:8.0Kg
Lot No.	→	LOT NO:	

Inverter model information

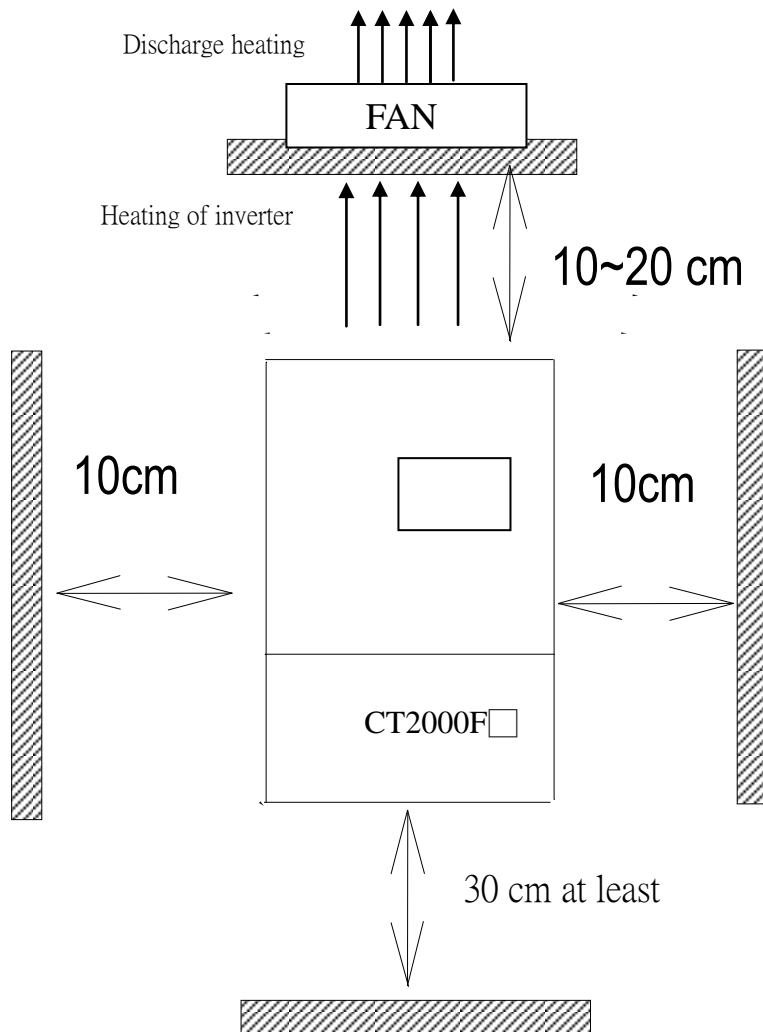


2. Installation and storage ■

Installation and storage

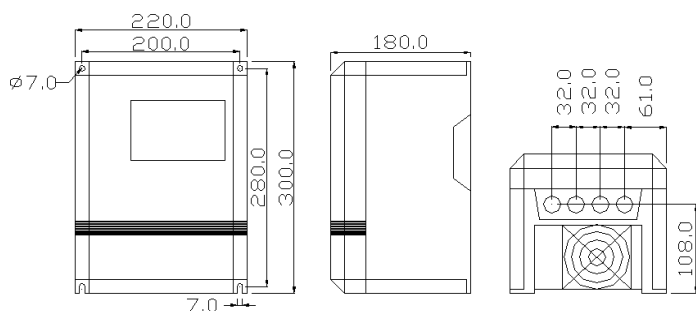
1. Storage: If the equipment is not to be installed immediately, it should be stored in a clean and dry location at ambient temperatures from 20°C to 55°C. The surrounding air must be free of corrosive contaminants. And please input power a time per half year.
2. Installation place: Places where the peripheral temperature is from -10°C to 40°C, 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.
3. Please fix the inverter under the cooling fan if it is installed in the panel. The heating from inverter will be discharged out of the panel to reduce the temperature and get the better effect of ventilation.

Notice : 10HP(contained) and above inverter are installed as following.

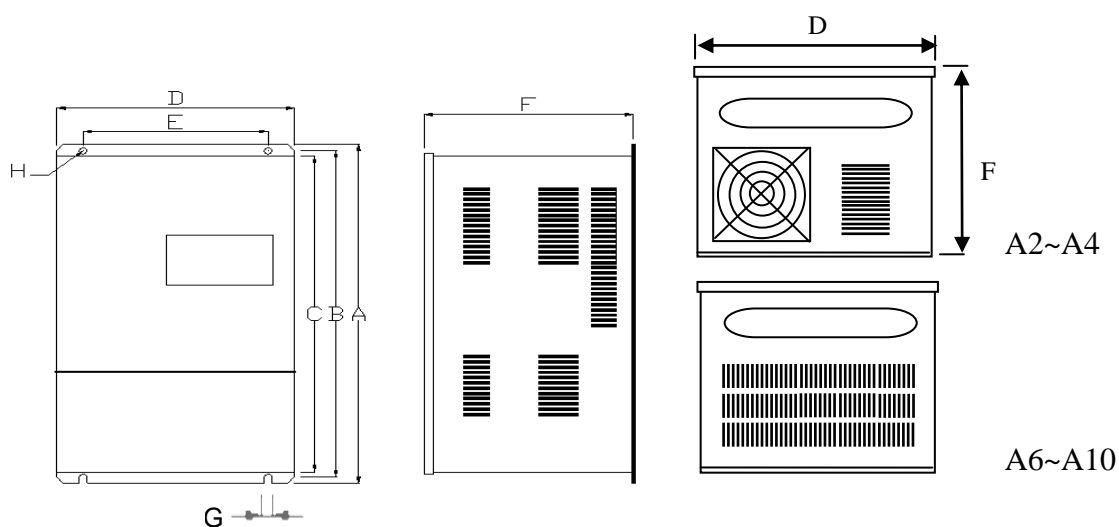


A. FG/FP exterior dimension

◆ Inverter dimensions : (unit:: mm)



A1 Frame
(without LCD keypad)



	A	B	C	D	E	F	G	H
A2	430	414	401	244	190	225	7	Φ7
A3	472	456	441	260	208	258	7	Φ7
A4	492	477	466	283	200	289	7	Φ7
A5	560	546.5	523	330	246	315	7	Φ7
A6	699	679	668	408	270	323	10	Φ10
A7	928	908	872	530	350	323	10	Φ10
A8	1162	1142	1106	530	350	335	10	Φ10
A9	*	*	*	*	*	*	*	*
A10	1480	1460	1415	710	350	415	10	Φ10

(If the specification change not seperately informs)

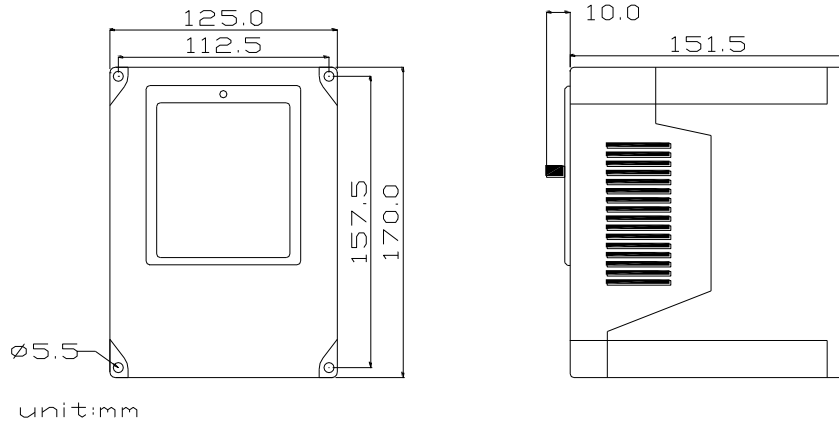
“ * “ means under development

2. Installation and storage ■

B. E2 exterior dimension

◆ Inverter dimensions : (unit:: mm)

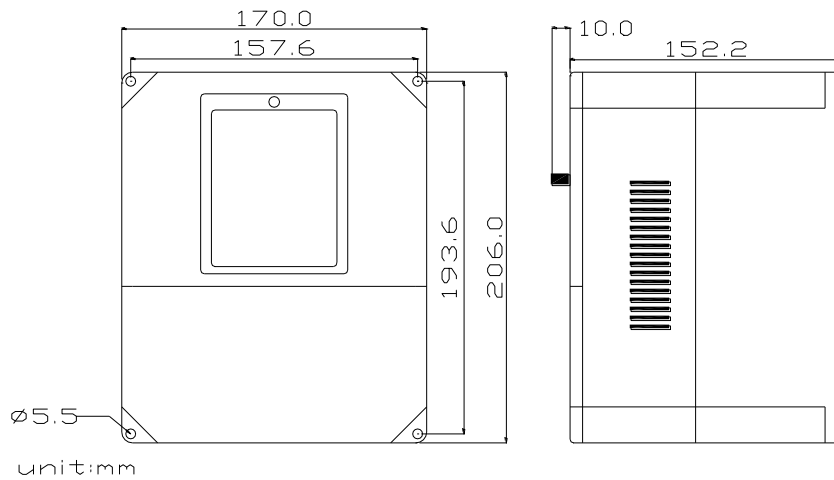
B1 Frame :



220V series : CT2000E2-2-A37、CT2000E2-2-A75、CT2000E2-2-1A5

380V series : CT2000E2-4-A75、CT2000E2-4-1A5

B2 Frame :



220V series : CT2000E2-2--2A2、CT2000E2-2--3A7

380V series : CT2000E2-4--2A2、CT2000E2-4--3A7、CT2000E2-4--5A5

◆ FG standard specification

Control method	V/F vector PWM control
Frequency accuracy	Digital setting : ± 0.01 Analog setting : $\pm 0.5\%$ (35°C)
Frequency resolution	Digital setting : 0.01 HZ Analog setting : (Max. frequency/1024) HZ
Frequency range	0.00 ~ 400.00 HZ
V/F ratio	14 patterns, or any V/F patterns.
Torque boost	Motor autotuning, automatic torque boost (1HZ torque above 150%)
Acce./ Dece. time	0.0 ~ 6000.0 sec. (linear, two-step setting)
Brake	DC, dynamic brake (below 11KW)
Standard feature	150% overload, jogging speed, upper/lower frequency limit setting, 8-step speed setting, multi-step function, RS485/RS422 communication, jump frequency, PID control, multi-function DI & analog input interface
Option card features	Analog-digital IO card (under development)
Frequency setting	Digital setting by keypad, analog setting by keypad (DC 0~10V) , analog setting (DC 0~10V · 4~20mA)
Display	LCD display, 7-segment LED display, frequency, current, voltage, setting value, function, indicators, fault status
Protection	Out of phase, low voltage, over voltage, overload, over current, over heating, subthreshold current
Overload capacity	150% for 1 min, anti-time limit function
Altitude	Indoor, altitude 1,000m or lower,
Ambient Temperature	-10°C ~ 50°C, below 7.5KW (-10°C ~ 45°C)
Vibration	Below 0.5 G
Humidity	Relative between 45% to 90% (No condensing)
Protection structre	Forced air cooling, IP00 (below 7.5KW IP20)

2. Installation and storage ■

FG 200V series

Motor rating (KW)	3.7	5.5	7.5	11	15	18	22	30	37	45	55	75	93	112
Model (CT-2000FG-2)	3A7	5A5	7A5	011	015	018	022	030	037	045	055	075	093	112
Rated current (A)	18	23	33	48	61	75	86	125	150	170	210	278	330	390
Rated capacity (KVA)	7.1	9.2	13.1	19.1	24.3	29.9	34.3	49	60	68	84	111	131	156
Rated input voltage	3 φ 200~230V ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 200~230V ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A1	A1	A1	A2	A3	A4	A4	A5	A5	A6	A6	A7	A7	A7
Weight (kg)	8	9	10	14	20	22	22	45	45	65	65	70	70	70

Motor rating (KW)	131	160												
Model (CT-2000FG-2)	131	160												
Rated current (A)	470	580												
Rated capacity (KVA)	187	231												
Rated input voltage	3 φ 200~230V ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 200~230V ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A8	A8												
Weight (kg)	123	125												

“ * “ means under development
(If the specification change not separately informs)

FG 400V series

Motor rating (KW)	3.7	5.5	7.5	11	15	18	22	30	37	45	55	75	93	112
Model (CT-2000FG-4)	3A7	5A5	7A5	011	015	018	022	030	037	045	055	075	093	112
Rated current (A)	9	13	17.3	24	31	39	52	65	78	93	110	156	180	225
Rated capacity (KVA)	7.1	10.4	13.8	19.1	24.7	31	41.4	51.8	62.1	74	87.6	124	143	180
Rated input voltage	3 φ 380~460 ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 380~460 ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A1	A1	A1	A1	A2	A3	A4	A4	A5	A5	A6	A6	A6	A7
Weight (kg)	9	9	9	9	14	14	23	23	40	46	50	55	60	70

Motor rating (KW)	131	160	187	225	262	315	400	450	560	635				
Model (CT-2000FG-4)	131	160	187	225	262	315	400	450	560	635				
Rated current (A)	260	305	370	460	530	610	700	800	990	1120				
Rated capacity (KVA)	207	243	295	366	422	485	557	637	788	892				
Rated input voltage	3 φ 380~460 ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 380~460 ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A7	A7	A8	A8	A10	A10	A10	A10	A11	G11				
Weight (kg)	93	95	123	123	200	200	200	200	350	*				

“ * “means under development

(If the specification change not seperately informs)

2. Installation and storage ■

◆ FP standard specification

Control method	V/F vector PWM control
Frequency accuracy	Digital setting : ± 0.01 Analog setting : $\pm 0.5\%$ (35°C)
Frequency resolution	Digital setting : 0.01 HZ Analog setting : (Max. frequency/1024) HZ
Frequency range	0.00 ~ 400.00 HZ
V/F ratio	14 patterns, or any V/F patterns.
Torque boost	Motor autotuning, automatic torque boost (1HZ torque above 150%)
Acce./ Dece. time	0.0 ~ 6000.0 sec. (linear, two-step setting)
Brake	DC 、 dynamic brake (below 11KW)
Standard feature	120% overload, jogging speed, upper/lower frequency limit setting, 8-step speed setting, multi-step function, RS485/RS422 communication, jump frequency, PID control, multi-function DI & analog input interface
Option card features	Analog-digital IO card (under development)
Frequency setting	Digital setting by keypad, analog setting by keypad (DC 0~10V) , analog setting (DC 0~10V 、 4~20mA)
Display	LCD display, 7-segment LED display, frequency, current, voltage, setting value, function, indicators, fault status
Protection	Out of phase, low voltage, over voltage, overload, over current, over heating, subthreshold current
Overload capacity	120% for 1 min, anti-time limit function
Altitude	Indoor, altitude 1,000m or lower,
Ambient Temperature	-10°C ~ 45°C
Vibration	Below 0.5 G
Humidity	Relative between 45% to 90% (No condensing)
Protection structure	Forced air cooling, IP00

FP 200V series

Motor rating (KW)	11	15	18	22	30	37	45	55	75	93	112	130	150	187
Model (CT-2000FP-2)	011	015	018	022	030	037	045	055	075	093	112	130	150	187
Rated current (A)	48	61	75	86	125	150	170	210	278	330	390	470	530	700
Rated capacity (KVA)	19.1	24.3	29.9	34.3	49	60	68	84	111	131	156	187	211	279
Rated input voltage	3 φ 200~230V ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 200~230V ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A2	A2	A4	A4	A4	A5	A5	A6	A6	A7	A7	A8	A8	A10
Weight (kg)	14	14	20	22	22	45	46	48	50	70	70	123	123	*

FP 400V series

Motor rating (KW)	11	15	18	22	30	37	45	55	75	93	112	130	150	187
Model (CT-2000FP-4)	011	015	018	022	030	037	045	055	075	093	112	130	150	187
Rated current (A)	24	31	38	47	65	74	93	110	156	180	225	246	290	370
Rated capacity (KVA)	19.1	24.7	30.2	37.4	51.8	59	74	87.6	124	143	180	196	231	295
Rated input voltage	3 φ 380~460 ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 380~460 ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A1	A2	A2	A3	A4	A4	A5	A5	A6	A6	A7	A7	A7	A8
Weight (kg)	10	14	14	20	20	22	40	46	50	55	65	70	93	123

Motor rating (KW)	220	250	315	400	450	560	710	800						
Model (CT-2000FP-4)	220	250	315	400	450	560	710	800						
Rated current (A)	415	506	600	700	800	990	1260	1460						
Rated capacity (KVA)	330	402	478	557	637	788	1003	1163						
Rated input voltage	3 φ 380~460 ±10% , 50 / 60HZ ±5%													
Rated output voltage	3 φ 380~460 ±10%													
Cooling system	Forced air-cooling													
Outline dimension	A8	A8	A10	A10	A10	A11	A11	A11						
Weight (kg)	123	123	200	200	200	350	350	*						

“ * “ means under development

(If the specification change not separately informs)

2. Installation and storage ■

◆ E2 standard specification

Control method	V/F vector PWM control
Frequency accuracy	Digital setting : ± 0.01 Analog setting : $\pm 0.5\%$ (35°C)
Frequency resolution	Digital setting : 0.01 HZ Analog setting : (Max. frequency/1024) HZ
Frequency range	0.00 ~ 400.00 HZ
V/F ratio	14 patterns, or any V/F patterns.
Torque boost	Motor autotuning, automatic torque boost (1HZ torque above 150%)
Acce./ Dece. time	0.0 ~ 6000.0 sec. (linear, two-step setting)
Brake	DC, dynamic brake
Standard feature	150% overload, jogging speed, upper/lower frequency limit setting, 8-step speed setting, multi-step function, RS485/RS422 communication, jump frequency, PID control, multi-function DI & analog input interface
Option card features	Analog-digital IO card
Frequency setting	Digital setting by keypad, analog setting by keypad (DC 0~10V) , analog setting (DC 0~10V · 4~20mA)
Display	LCD display, 7-segment LED display, frequency, current, voltage, setting value, function, indicators, fault status
Protection	Out of phase, low voltage, over voltage, overload, over current, over heating, subthreshold current
Overload capacity	150% for 1 min, anti-time limit function
Altitude	Indoor, altitude 1,000m or lower,
Ambient Temperature	-10°C ~ 50°C, below 7.5KW (-10°C ~ 45°C)
Vibration	Below 0.5 G
Humidity	Relative between 45% to 90% (No condensing)
Protection structure	Forced air cooling, IP20

E2 200V series

Motor rating (KW)	037	075	1.5	2.2	3.7		
Model (CT-2000E2-2)	A37	A75	1A5	2A2	3A7		
Rated current (A)	2.4	4.2	7.4	11.1	18		
Rated capacity (KVA)	0.96	1.8	2.9	4.4	7.1		
Rated input voltage	3 φ 200~230V ±10% , 50 / 60HZ ±5%						
Rated output voltage	3 φ 200~230V ±10%						
Cooling system	Forced air-cooling						
Outline dimension	B1	B1	B1	B2	B2		
Weight (kg)	1.6	1.6	1.6	2.5	2.5		

E2 400V series

Motor rating (KW)	075	15	2.2	3.7	5.5		
Model (CT-2000E2-4)	A75	1A5	2A2	3A7	5A5		
Rated current (A)	2.2	4.0	6.2	9	13		
Rated capacity (KVA)	1.7	3.2	4.9	7.1	10.4		
Rated input voltage	3 φ 380~460 ±10% , 50 / 60HZ ±5%						
Rated output voltage	3 φ 380~460 ±10%						
Cooling system	Forced air-cooling						
Outline dimension	B1	B1	B2	B2	B2		
Weight (kg)	1.6	1.6	2.5	2.5	2.5		

(If the specification change not separately informs)

3. Wiring diagram

Wiring diagram

- ◆ Wiring the master circuit and control circuit
Wire according to the standard connection diagram. On using the external sequence control, please use small signal relay or double terminal relay to avoid relay terminal malfunction.
- ◆ Signal wire
The signal circuit uses either shielded pairs or twisted pairs, should be wired either using a wiring duct separated from that for the power circuit, or with the wiring conduit isolated as much as possible.
- ◆ Wiring between 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 following:

Voltage (V)	Model	NFB (A)	Standard wiring (mm ²)
220	CT2000E2-2-A4	10	2.0
	CT2000E2-2-A75	10	2.0
	CT2000E2-2-1A5	15	2.0
	CT2000E2-2-2A2	20	2.0
	CT2000E2-2-3A7	30	3.5~5.5
	CT-2000FG-2-3A7	30	3.5~5.5
	CT-2000FG-2-5A5	30	5.5~8
	CT-2000FG-2-7A5	40	5.5~8
	CT-2000F□-2-011	60	22
	CT-2000F□-2-015	80	30
	CT-2000F□-2-022	120	38
	CT-2000F□-2-030	150	38~100
	CT-2000F□-2-037	200	38~100
	CT-2000F□-2-045	250	60~100
	CT-2000F□-2-055	300	100
	CT-2000F□-2-075	400	100~200
	CT-2000F□-2-093	500	100~200
	CT-2000F□-2-112	500	100~200
	CT-2000F□-2-131	600	100~200
	CT-2000FP-2-150	800	200
CT-2000FG-2-160	800	200	
CT-2000FP-2-187	800	200~300	

Voltage (V)	Model	NFB (A)	Standard wiring (mm ²)
380 460	CT2000E2-4-A75	10	2.0
	CT2000E2-4-1A5	10	2.0
	CT2000E2-4-2A2	10	2.0
	CT2000E2-4-3A7	15	3.5~5.5
	CT2000E2-4-5A5	15	3.5~5.5
	CT-2000FG-4-3A7	15	3.5~5.5
	CT-2000FG-4-5A5	15	3.5~5.5
	CT-2000FG-4-7A5	20	5.5
	CT-2000F□-4-011	30	8~14
	CT-2000F□-4-015	40	8~14
	CT-2000F□-4-022	60	22
	CT-2000F□-4-030	80	22
	CT-2000F□-4-037	100	30
	CT-2000F□-4-045	120	50
	CT-2000F□-4-055	150	38~100
	CT-2000F□-4-075	200	38~100
	CT-2000F□-4-093	250	60~100
	CT-2000F□-4-112	300	60~100
	CT-2000F□-4-130	300	100
	CT-2000FP-4-150	400	100~200
CT-2000FG-4-160	400	100~200	
CT-2000F□-4-187	500	100~200	
CT-2000FP-4-220	600	100~200	
CT-2000FG-4-225	600	100~200	
CT-2000FP-4-250	800	200	
CT-2000FG-4-262	800	200	
CT-2000FP-4-300	800	200~300	
CT-2000FG-4-315	800	200~300	
CT-2000FG-4-370	900	300	

*CT2000F□

No.	Specification
G	150% load
P	120% load

◆ **AC Reactor (ACL)**

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)	Model	Current value (Ar.m.s)	Inductance
220	CT-2002E2-2-A4	6A	1.8 mH
	CT-2002E2-2-A75	6A	1.8 mH
	CT-2002E2-2-1A5	10A	1.1 mH
	CT-2002E2-2-2A2	15A	0.71 mH
	CT-2002E2-2-3A7	20A	0.53 mH
	CT-2000FG-2-3A7	20A	0.53mH
	CT-2000FG-2-5A5	30A	0.35mH
	CT-2000FG-2-7A5	40A	0.26mH
	CT-2000F□-2-011	60A	0.18mH
	CT-2000F□-2-015	80A	0.13mH
	CT-2000F□-2-018	90A	0.12mH
	CT-2000F□-2-022	120A	0.09mH
	CT-2000F□-2-030	150A	70uH
	CT-2000F□-2-037	200A	50uH
	CT-2000F□-2-045	250A	44uH
	CT-2000F□-2-055	300A	35uH
	CT-2000F□-2-075	400A	27uH
	CT-2000F□-2-093	500A	21uH
	CT-2000F□-2-112	600A	21uH
	CT-2000F□-2-131	600A	17 uH
	CT-2000FP-2-150	600A	17 uH
	CT-2000FG-2-160	600A	17 uH
CT-2000FP-2-187	750A	15 uH	

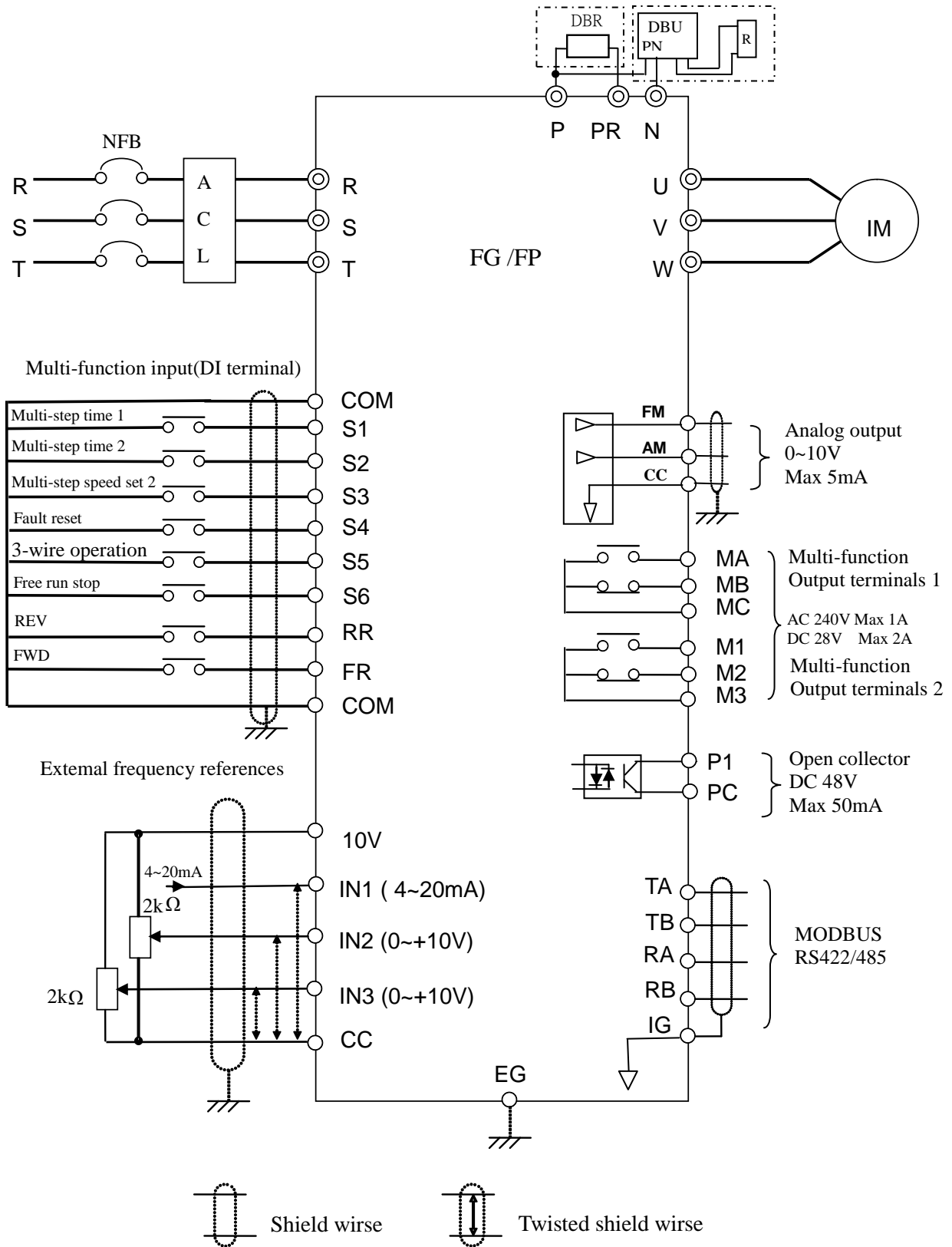
Voltage (V)	Model	Current value (Ar.m.s)	Inductance
380 460	CT-2004E2-4-A75	5A	4.2 mH
	CT-2004E2-4-1A5	5A	4.2 mH
	CT-2004E2-4-2A2	7.5A	3.6 mH
	CT-2004E2-4-3A7	10A	2.2 mH
	CT-2004E2-4-5A5	15A	1.42mh
	CT-2000FG-4-3A7	10A	2.2mH
	CT-2000FG-4-5A5	15A	1.42mH
	CT-2000FG-4-7A5	20A	1.0mH
	CT-2000F□-4 -011	30A	0.7mH
	CT-2000F□-4-015	40A	0.53mH
	CT-2000F□-4-018	50A	0.42mH
	CT-2000F□-4-022	60A	0.36mH
	CT-2000F□-4-030	80A	0.26mH
	CT-2000F□-4-037	100A	0.21 mH
	CT-2000F□-4-045	120A	0.18mH
	CT-2000F□-4-055	150A	0.14mH
	CT-2000F□-4-075	200A	0.11 mH
	CT-2000F□-4-093	250A	0.10mH
	CT-2000F□-4-112	300A	70uH
	CT-2000F□-4-131	300A	70uH
	CT-2000FP-4-150	330A	60uH
	CT-2000FG-4-160	330A	60uH
	CT-2000F□-4-187	380A	50uH
	CT-2000FP-4-220	490A	40uH
	CT-2000FG-4-225	490A	40uH
	CT-2000FP-4-250	660A	30uH
CT-2000FG-4-262	660A	30uH	
CT-2000FP-4-300	660A	30uH	
CT-2000FG-4-315	660A	30uH	

*CT2000F□

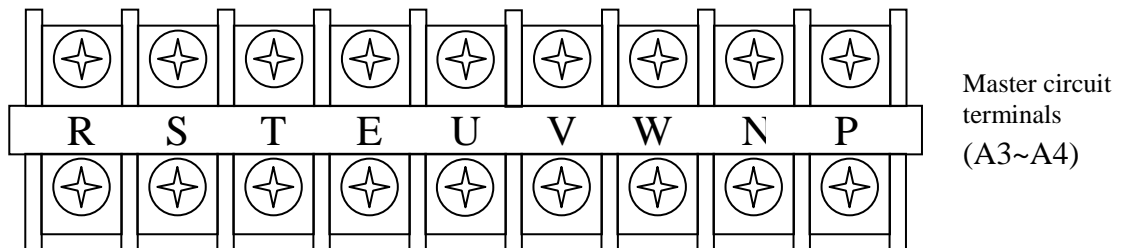
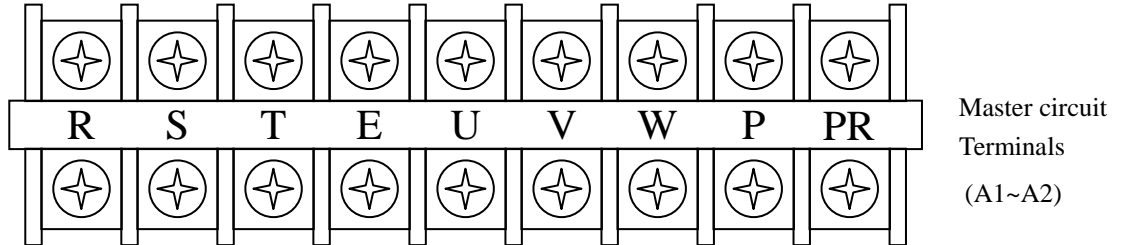
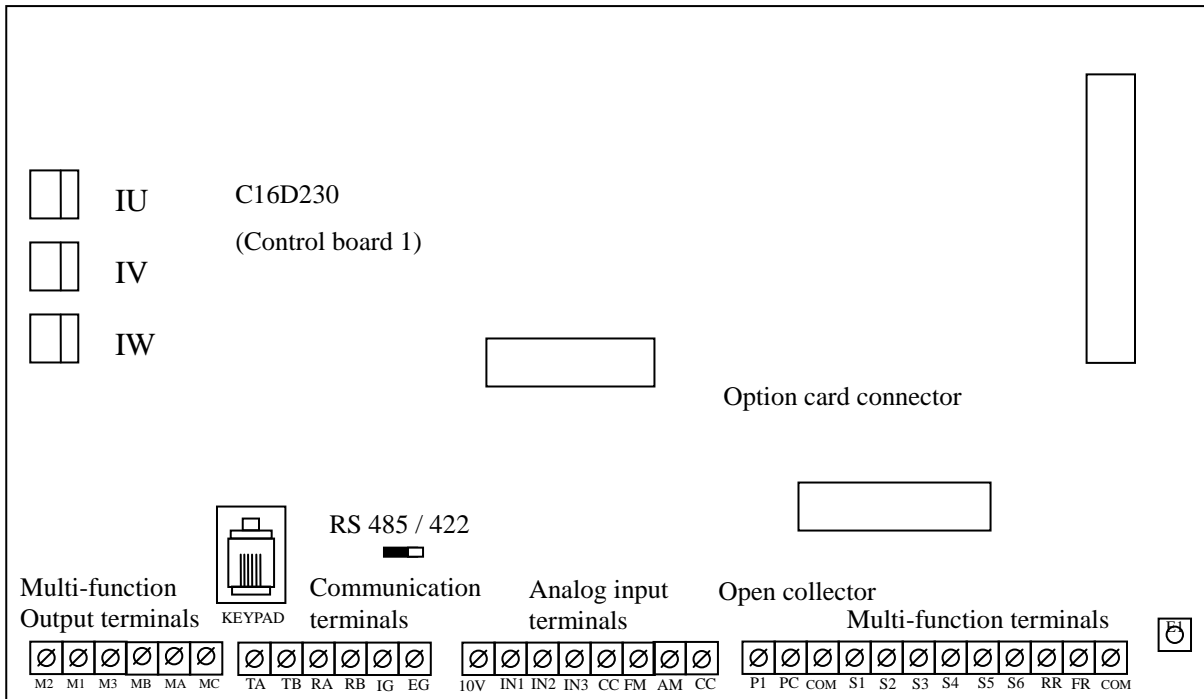
No.	Specification
G	150% load
P	120% load

3. Wiring diagram

◆ Standard external wiring diagram



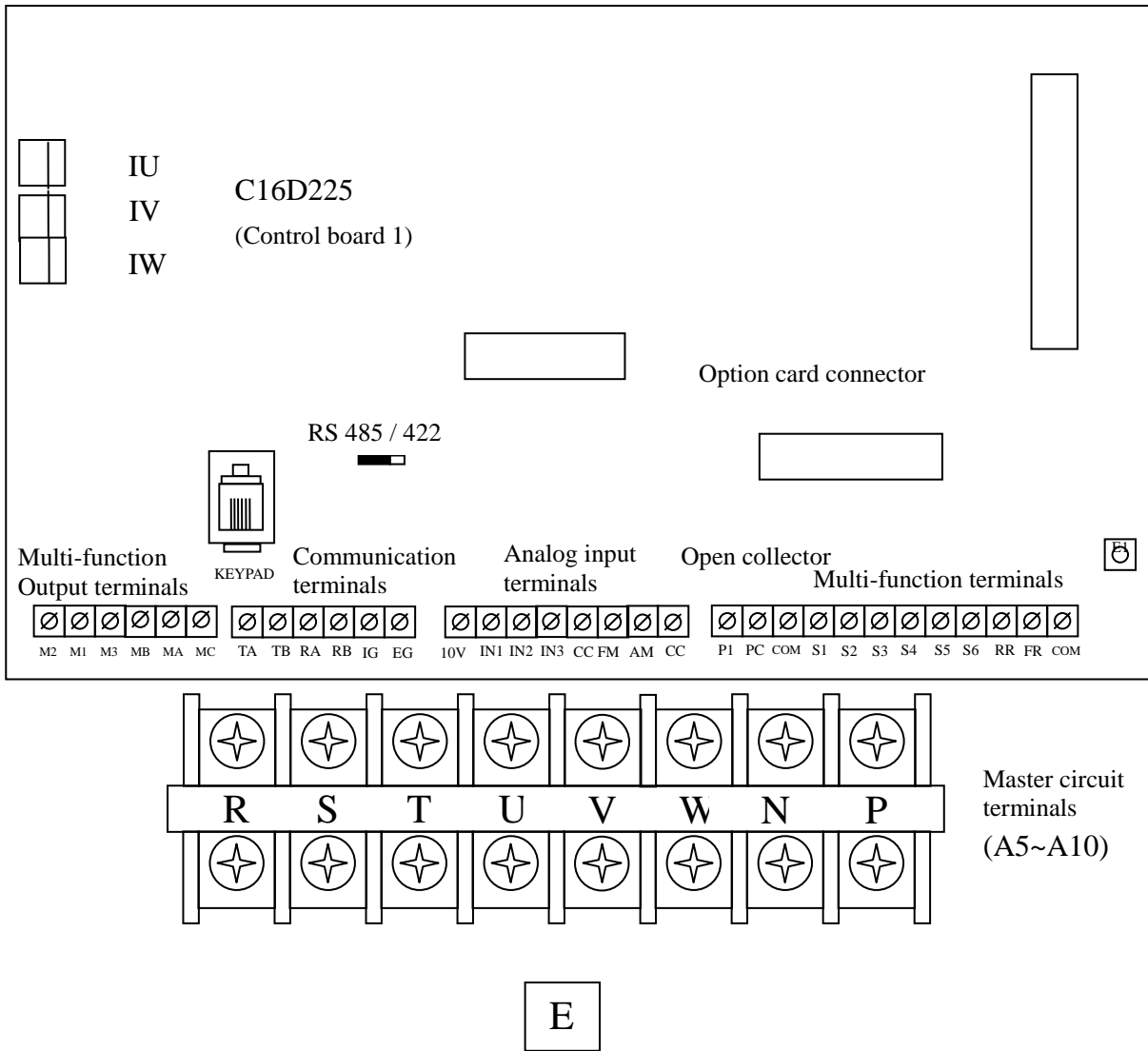
◆ Terminals arrangement :



※C16D230(Control board 2): Under development, applies to new structure.

3. Wiring diagram

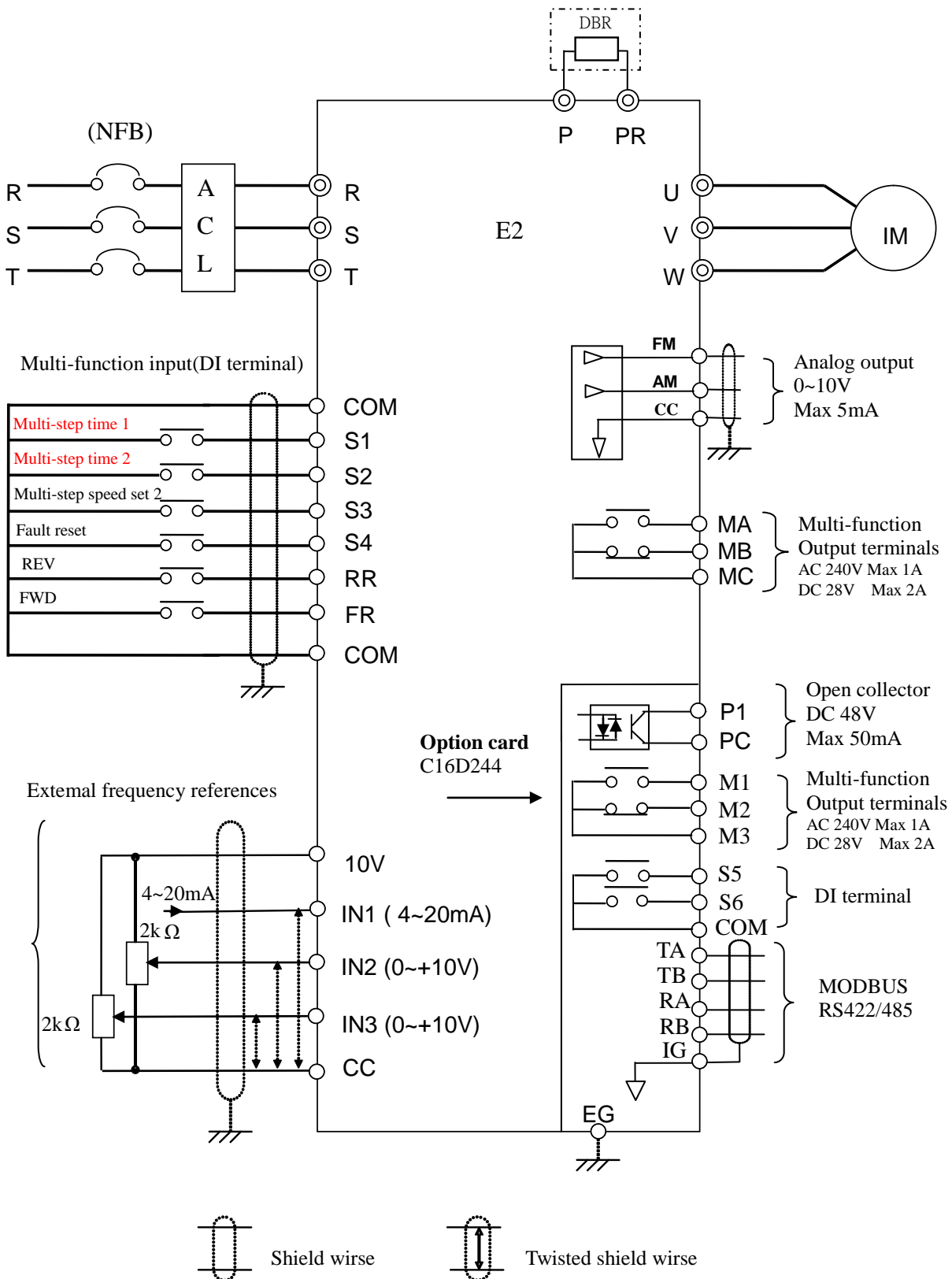
◆ Terminals arrangement :



※C16D230(Control board 2): Under development, applies to new structure

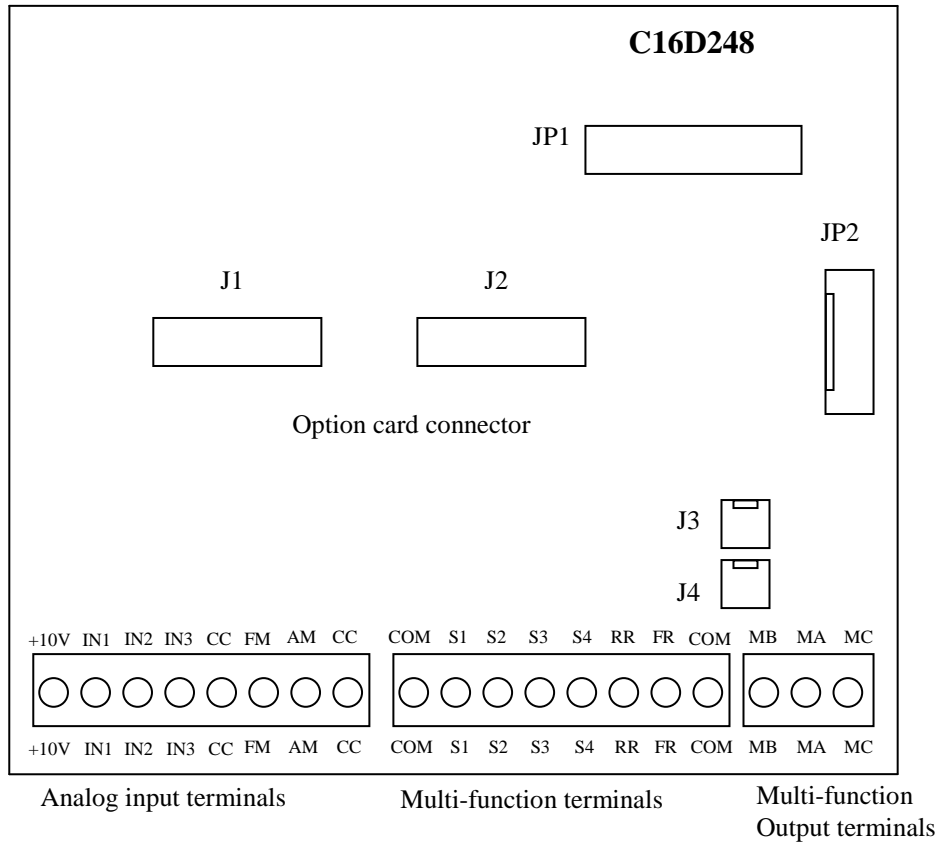
◆ Option card : AI /AO card (Under development)

◆ Standard external wiring diagram



3. Wiring diagram

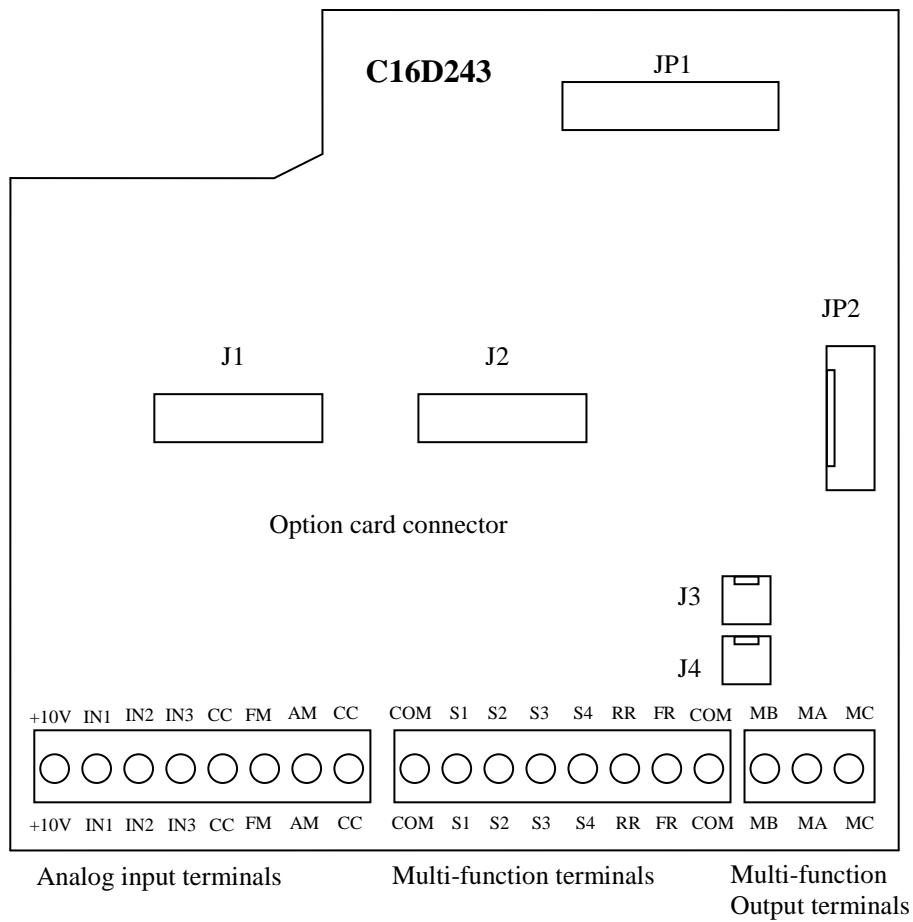
◆ Terminals arrangement



220V series : CT2000E2-2-A37 、 CT2000E2-2-A75 、 CT2000E2-2-1A5

380V series : CT2000E2-4-A75 、 CT2000E2-4-1A5

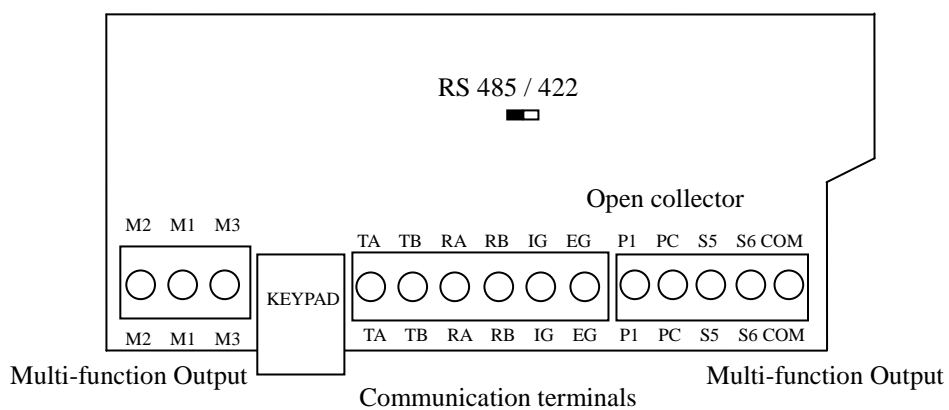
◆ Terminals arrangement



220V series : CT2000E2-2-2A2 、 CT2000E2-2-3A7

380V series : CT2000E2-4-2A2 、 CT2000E2-4-3A7 、 CT2000E2-4-5A5

◆ Option card

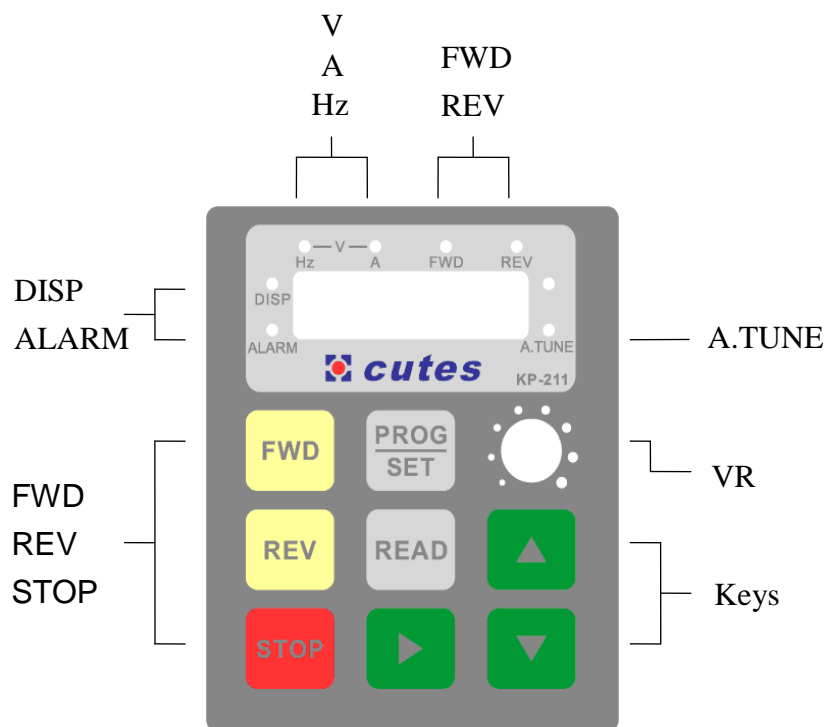


3. Wiring diagram

◆ Terminal Specification:

Classification	Terminal symbol	Terminal name	Specification
Main Circuit	R.S.T	AC power input terminal	3 Φ AC 200~240V 50/60HZ 3 Φ AC 380~460V 50/60HZ
	U.V.W	Inverter output terminal	3-phase induction motor
	E	Ground Terminal	Ground Terminal of inverter
	P、PR	Breaking unit connecting terminal	Connected with brake unit (DBU)
	P、N	Breaking resistor connecting terminal	Connected with brake unit DBU
Analog input/ output terminal	10V	+10V power output	Provide +10VDC 30mA power
	CC	Common of analog input/ output	Common of analog input/ output terminal
	IN1	Multi-function analog input 1	4~20mA input
	IN2	Multi-function analog input 2	0~10V input
	IN3	Main speed analog input 3	0~10V input
	FM	Multi-function analog output	0~10V 5mA output
	AM		
Multi-function analog input terminal	S1	Multi-function analog input terminal 1	DC +24V 8mA Photocoupler isolation
	S2	Multi-function analog input terminal 2	
	S3	Multi-function analog input terminal 3	
	S4	Multi-function analog input terminal 4	
	S5	Multi-function analog input terminal 5	
	S6	Multi-function analog input terminal 6	
	COM	Concurrent of multi-function input terminal	Contact and operation control terminal COM common
Operation control terminal	RR	reverse / stop terminal	ON: reverse , OFF: stop
	FR	forward / stop terminal	ON: forward , OFF: stop
	COM	Operation control terminal	Multi-function input and Operation control terminal common
Multi-function analog output contact	MA、M1	Multi-function output contact A	240VAC Max 1A 28VDC Max 10A
	MB、M2	Multi-function output contact B	
	MC、M3	Multi-function output contact concurrent	
MODBUS Communication terminal	TA	RS422 T+	RS422 T+ or RS485 + terminal
	TB	RS422 T-	RS422 T- or RS485 - terminal
	RA	RS422 R+	RS422 R+
	RB	RS422 R-	RS422 R-
	IG	Shield grounding terminal	Provide shield grounding system 0V
Open-collector output common	P1	Multifunction output connector	Below DC 48V 50mA
	PC	Multifunction output connector common	
Grounding terminal	EG	Shield grounding terminal	Offer shield grounding, applied for analog and input terminal

Keyboard information

◆ **Digital operator key function information**

Key	Name	Function
FWD	Motor run	Motor run forward
REV	Motor run	Motor run reverse
STOP	Stop	Stop the revolution, reset
PROG/ SET	Select function/ Set and save	Switch input mode, set constants Input mode switch, constant setting
READ	Read	Read/ quit constant
▲	Up	Increment
▼	Down	Decrement
▶	Shift	Switch location of cursor
HZ	Frequency	HZ LED means of recent revolution frequency
A	Current	A LED means of recent revolution current
DISP	keypad status	RDY LED means keypad working normally
ALARM	Malfunction display	ALM LED means malfunction occurred
VR	Setting procedure of frequency	Set VR on faceplate
A.TUNE	Autotuning constant	A.TUNE LED means of recent revolution Autotuning

Keyboard information

◆ **Numeric KEYBOARD**

Operator panel parts names and functions

7-segment monitor

1. Displays frequency Cd02=0
- Displays current Cd02=1
- Displays RPM NO2=2
- Displays various readings see Cd02
2. After indicates alarm, ignore Cd02, directly displays failure status

Operation monitor display

Displays forward/reverse/stop status

Operation instruction keys

Control from keyboard
External control operation, stop mode by set Cd04=1

STOP key

1. Stops inverter operation
2. Resets function
3. Resets alarm indication

READY

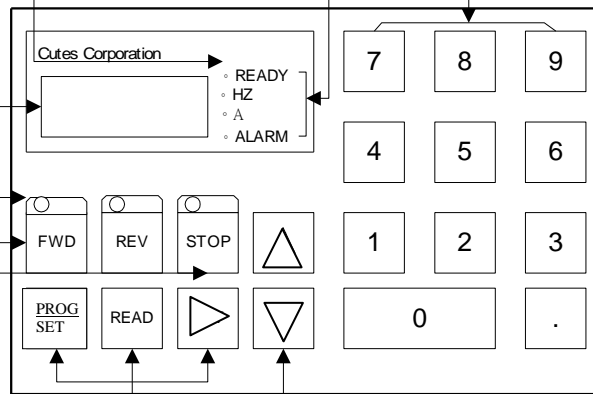
Displays that the panel is ready to accept key input

Monitor mode display

Displays monitor status

Ten-key pad

Data input key



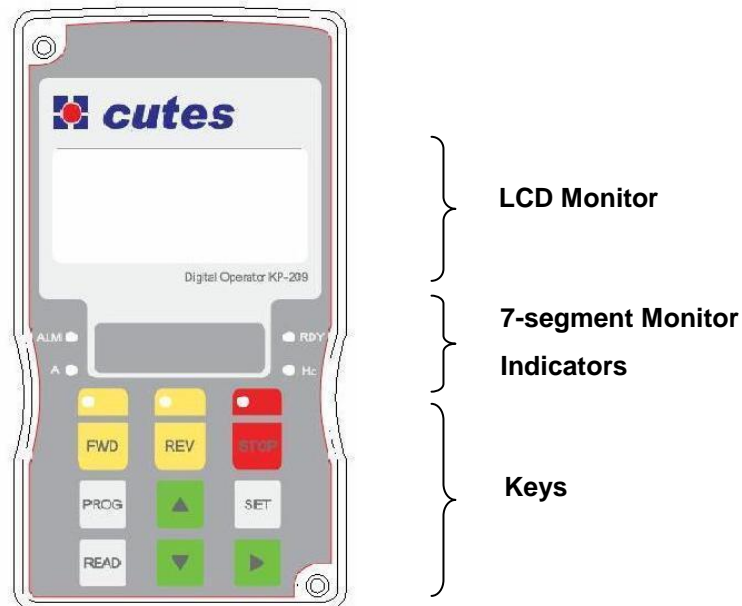
Step keys

1. To change frequency
2. Select function items

Function setting keys

These three keys offer selecting read or setting value of function

Keyboard information

◆ LCD keypad◆ Digital operator key function information

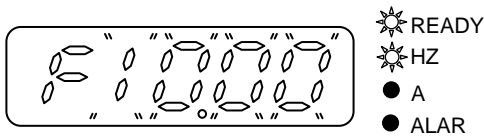
Key	Name	Function
FWD	Motor run	Motor run forward
REV	Motor run	Motor run reverse
STOP	Stop	Stop the revolution, reset
PROG	Select function	Switch input mode, set constants
READ	Read	Read/ quit constant
SET	Set and save	Input mode switch, constant setting
▲	Up	Increment
▼	Down	Decrement
▶	Shift	Switch location of cursor
HZ	Frequency	HZ LED means of recent revolution frequency
A	Current	A LED means of recent revolution current
RDY	keypad status	RDY LED means keypad working normally
ALM	Malfunction display	ALM LED means malfunction occurred

4. Digital Operator

◆ All mode operation

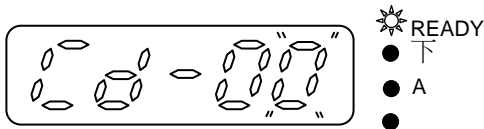
The operation mode of inverter equip monitoring and input modes, this section describes mode and switch between modes.

A. Setting mode selection



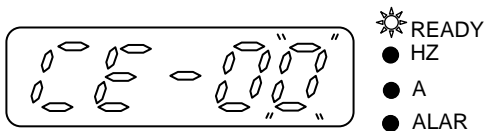
Frequency is shown on the monitor after inputpower, READY and HZ indicator lit.

↓ Press PROG key



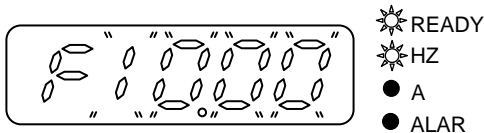
Monitoring item is Cd-00 ◦
Press ▲▼ keys to select user's setting.

↓ Press PROG key



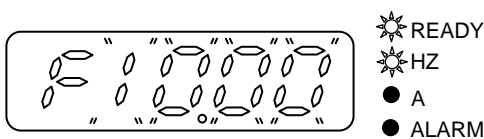
Monitoring item is CE-00 ◦
Press ▲▼ keys to select user's setting.

↓ Press PROG key



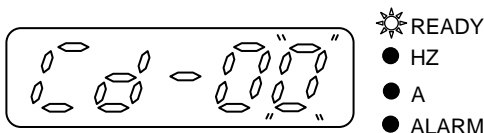
Back to monitoring (HZ)

B. Modify monitoring item



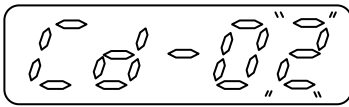
DISP indicator lit means monitoring item. Operation command is shown when stop operation. (HZ LED lit when display is frequency)

↓ Press PROG key



Monitoring item is Cd-00 ◦
Press ▲▼ keys to select user's setting.

↓ Please use ▲、▼、▶ or numeric keys to change figures



- ☀ READY
- HZ
- A
- ALARM

Monitoring item is Cd-02 ◦
Press ▲▼ keys to select monitoring item.

↓ Press READ key



- ☀ READY
- HZ
- A
- ALARM

Enter Cd-02 monitoring item.
Factory value is operation frequency.

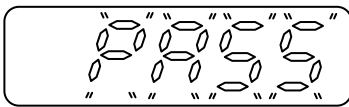
↓ Please use ▲、▼、▶ or numeric keys to change figures



- ☀ READY
- HZ
- A
- ALARM

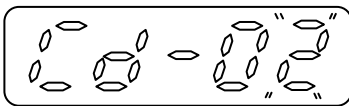
Enter Cd-02 monitoring item.
Modify constant is load current.

↓ Press SET key



- ☀ READY
- HZ
- A
- ALARM

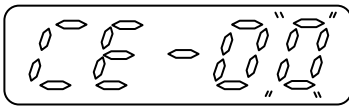
Set constant, indicate "PASS" ◦
Twinkle twice
(Indicate "Err" if set wrong)



- ☀ READY
- HZ
- A
- ALARM

Back to Cd-02

↓ Press PROG key



- ☀ READY
- HZ
- A
- ALARM

Monitoring item is CE-00

↓ Press PROG key

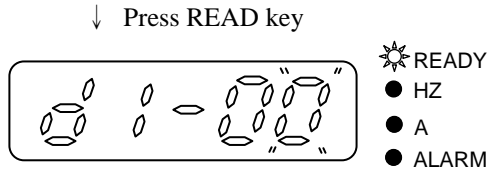


- ☀ READY
- HZ
- ☀ A
- ALARM

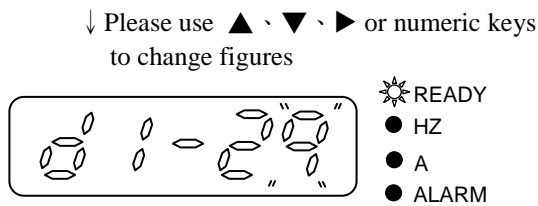
Monitoring item is load current
(No load is A 0.0)

4. Digital Operator

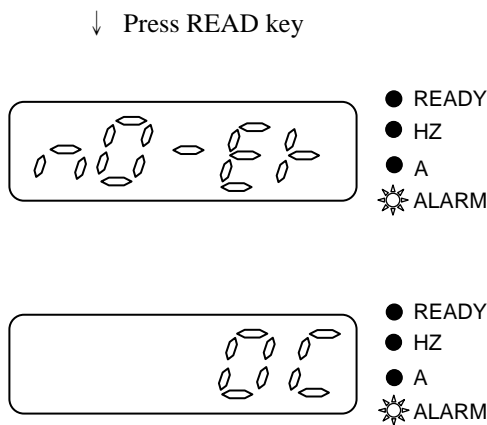
C. Inspect malfunction record and monitoring value



Monitoring item is d1-00 °
 Press ▲、▼、▶ key to modify figure.

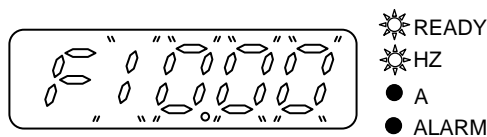


Monitoring item is malfunction record is d1-29.
 (Please refer to the monitoring chart)

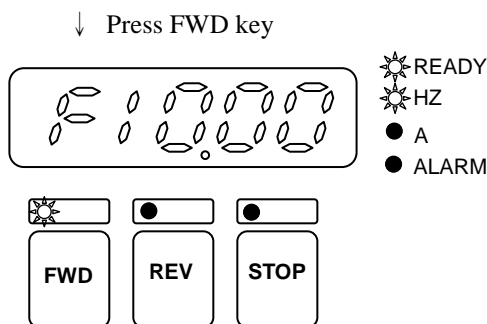


Malfunction record is nOEr means no record.
 OC means over current.

D. Press FWD/ REV key under any status

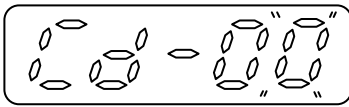


Monitoring item is (HZ).
 Frequency command is shown when stop run.



Press FWD/REV key and enter monitoring mode, monitoring mode is set by Cd-02.
 (FWD/REV indicator lit)

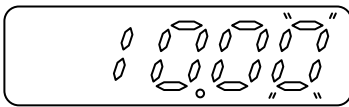
↓ Press PROG key



- ☀️ READY
- HZ
- A
- ALARM

Enter input mode. Press ▲、▼ key or numeric keys to select constant, press ▶ key to shift the cursor. Select it to modify operation frequency.

↓ Press READ key



- ☀️ READY
- ☀️ HZ
- A
- ALARM

Enter input mode. Press ▲、▼ key or numeric keys to select constant.

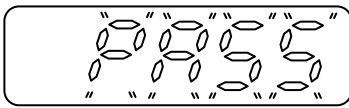
↓ Please use ▲、▼、▶ or numeric keys to change figures



- ☀️ READY
- ☀️ HZ
- A
- ALARM

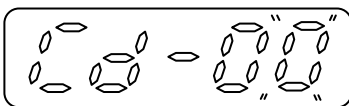
Enter input mode. Press ▲、▼ key or numeric keys to select constant. Modify the frequency is 20.00HZ。

↓ Press SET key



- ☀️ READY
- HZ
- A
- ALARM

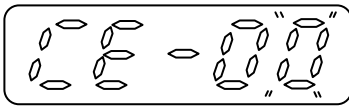
Set constant, indicate "PASS". Twinkle twice (Indicate "Err" if set wrong)



- ☀️ READY
- HZ
- A
- ALARM

Back to Cd-00

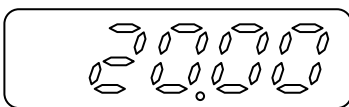
↓ Press PROG key



- ☀️ READY
- HZ
- A
- ALARM

Monitoring item is CE-00

↓ Press PROG key



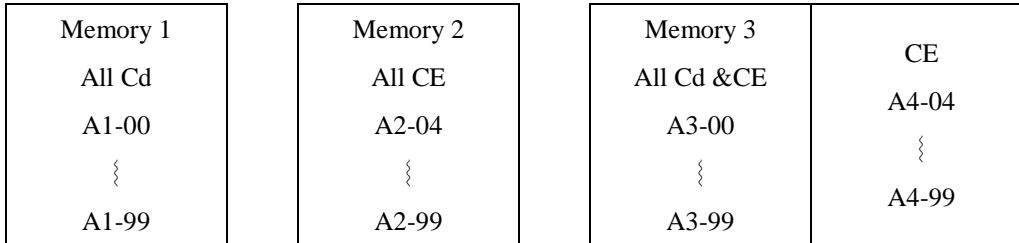
- ☀️ READY
- ☀️ HZ
- A
- ALARM

The inverter output frequency is modified to be 20.00HZ.

4. Digital Operator

◆ LCD keypad Copy *

Press **PROG+** ► Turn on Copy function then press once again to conceal



Memory allocation diagram

Constant information:

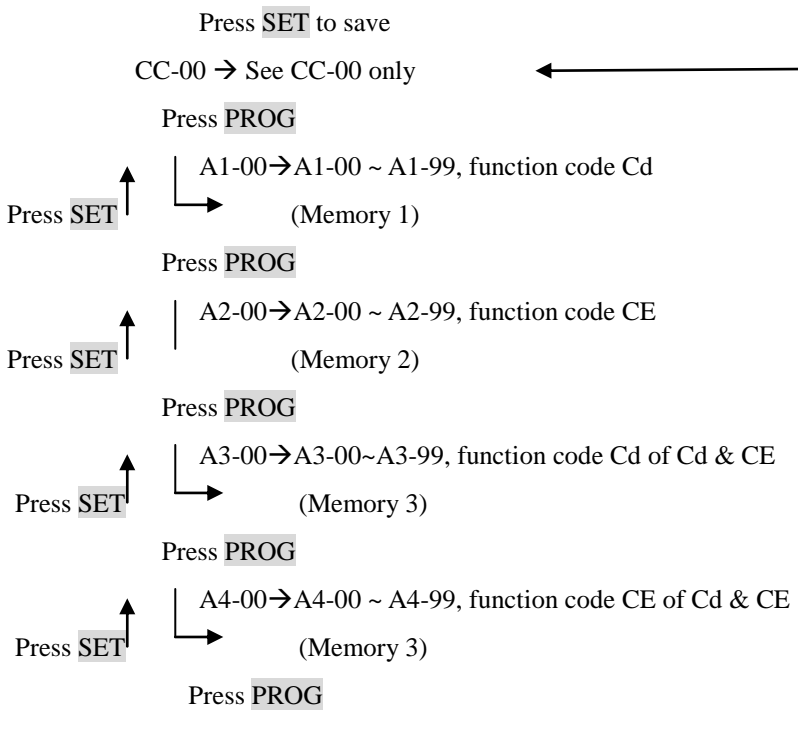
Code No.	Function	Detail of Data	Initial Factory Setting
CC-00	Copy mode	0: Standard mode 1: Reserved 2: Modify Cd and CE on Keypad 3: Copy Cd from Control PCB to Memory 1 of Keypad 4: Copy CE from Control PCB to Memory 2 of Keypad 5: Copy Cd & CE from Control PCB to Memory 3 of Keypad 6: Write Cd (Memory 1) to Control PCB 7: Write CE (Memory 2) to Control PCB 8: Write Cd & CE (Memory 3) to Control PCB	0

※LCD keypad Copy under development

◆ LCD keypad copy operation information

CC-00=0 : Standard Mode

CC-00=2 : Modify Cd & CE on keypad



Press PROG+ ► No function

CC-00=0 or press STOP, return to standard Mode

5. User constants

Index

Motor autotuning	-----	P47	Motor autotuning
Function setting	-----	P49	Frequency setting
		P51	Frequency command selection
		P52	Operation command selection
		P52	Acceleraion/ deceleration time
		P53	Stop method
		P54	Jump frequency
		P54	Start frequency
		P55	DC break
Output/ input terminals	-----	P56	Multi-functional analog input
		P57	Analog output setting
		P58	Multi-functional terminal setting (DI terminal)
		P59	Jog frequency
		P60	Multi-speed frequency command
		P62	Multi-functional relay setting
V/F control	-----	P64	V/F curve selecting
		P67	Frequency command limit
		P68	Torque boost, torque boost gain
		P69	Motor rated current
PID control	-----	P70	PID control
Multi-step function	-----	P74	The physical link
MODBUS	-----	P79	Data structure in communication
Protections	-----	P86	Preventing motor stalling function
		P90	Motor search speed function
		P92	Instantaneous current handling
		P93	Overheating protection
Environment setting	-----	P94	Dynamic brake
		P95	Carrier wave frequency
		P97	Data lock
		P99	Setting LCD keypad functions
		P101	Recovering factory settings

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
Cd-00	Setting frequency	Input master speed frequency by keyboard (frequency command 1)	0.00~400.00	10.00 HZ	Yes	128	P49
Cd-01	Selecting frequency command	0 : Digital input by key board 1 : Analog input 2 : Analog input (lag) 3 : Multi-step function 4 : DI UP/DOMN(2) 5 : Pulse input(*) 6 : Keypad UP/DOMN (1) 7 : Keypad UP/DOMN (2) 8 : Set frequency by terminal VR (E2 only)	0~8	0	No	129	P51
Cd-02	Operation display	0 : Output frequency (contain slip boost) 1 : Output current 2 : RPM 3 : DC BUS voltage 4 : Output voltage 5 : Module temperature 6 : Power factor 7 : Transient power (KW) 8 : KWH	0~8	0	Yes	130	P50
Cd-03	Torque mode	0 : No auto boost 1 : auto boost	0~1	1	No	131	P68
Cd-04	Operation command selecting	0 : Keyboard operation 1 : External terminal (Keyboard stoppable) 2 : MODBUS (Keyboard stoppable) 3 : External terminal (Keyboard unstoppable)	0~3	0	No	132	P52
Cd-05	Set V/F pattern	1~14 : Select from fixed 15 V/F mode. 15 : Set by from Cd51to Cd58 V/F mode.	1~15	2	No	133	P64
Cd-06	Motor rated current	Set motor rated current as inverter current is 100%. Set torque boost gain as ratio.	10.0~100.0	100.0 %	No	134	P69
Cd-07	Torque boost gain	Please adjust well when folling situation occurred. 1 : Increase this value when cable is too long. 2 : Decrease this value when motor is vibrating.	0~2.50	0.3	Yes	135	P68
Cd-08	Acceleration time 1	The time needed for set frequency from 0 HZ to 50 HZ	0~6000.0	10.0 sec	No	136	P52
Cd-09	Deceleration time 1	The time needed for set frequency from 50 HZ to 0 HZ	0~6000.0	10.0 sec	No	137	P52
Cd-10	Acceleration time 2	The time needed for set frequency from 0 HZ to 50 HZ	0~6000.0	10.0 sec	No	138	P52
Cd-11	Deceleration time 2	The time needed for set frequency from 50 HZ to 0 HZ	0~6000.0	10.0 sec	No	139	P52
Cd-12	Frequency command 2	2 nd step frequency command	0~400.00	20.00 HZ	Yes	140	P60
Cd-13	Frequency command 3	3 rd step frequency command	0~400.00	30.00 HZ	Yes	141	P60
Cd-14	Frequency command 4	4 th step frequency command	0~400.00	40.00 HZ	Yes	142	P60

6. Constant tables

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
Cd-15	Jog frequency	Frequency when jog run	0~60.00	5.00 HZ	Yes	143	P59
Cd-16	Start frequency	Set motor start frequency	0.5~60.0	1.5 HZ	No	144	P54
Cd-17	Upper limiter of frequency	Set upper limiter of frequency command	10.00~400.00	60.00 HZ	No	145	P67
Cd-18	Lower limiter of frequency	Set lower limiter of frequency command	0.0~100.00	0HZ	No	146	P67
Cd-19	Acce./ dece. of Joging	The time needed for set frequency from 0 HZ to 50 HZ	0.0~6000.0	1.0S	No	147	P59
Cd-20	Jump frequency 1	Set the middle value of jump frequency, set 0 is invalid.	0~400.00	0HZ	No	148	P54
Cd-21	Jump frequency 2		0~400.00	0HZ	No	149	P54
Cd-22	Jump frequency width	Set jump frequency width	0~20.0	1HZ	No	150	P54
Cd-23	DC break frequency	Start the DC break frequency as HZ when decelerate to stop. Start frequency (Cd16) when Cd23< start the DC break frequency (Cd16).	0.0~20.0	1HZ	No	512	P55
Cd-24	DC break current	Set the inverter rated current as a percentage. Set the DC break time when start. The setting value is 0.00S, and the DC break is invalid when start.	0~100	50%	No	513	P55
Cd-25	DC break time when start	The setting value is 0.00S, and the DC break is invalid when start.	0~10.00	0.00 S	No	514	P55
Cd-26	DC break time when stop	The setting value is 0.00S, and the DC break is invalid when stop.	0~10.00	0.00 S	No	515	P55
Cd-27	Prohibited reverse selectin	0: Reverse 1: Prohibited reverse	0~1	0.00	No	155	P52
Cd-28	Speed search function selecting	0: Invalid 1: MCK feedback 2: Detected current +MCK feedback 3: MCK disconnection start + coast start	0~3	0.00	No	156	P90
Cd-29	TIME	For replay,DOfunction selecting when operation in timing	0~60000	5S	Yes	157	P62
Cd-30	Analog input filter time	Set filtered of analog input terminal time, noise will be filtered, but input reaction will become slow.	1~1000	5	Yes	517	P56
Cd-31	IN1 input gain	Set percentage 100% when input 40mA to correspond selecting function 100%	0.0~1000.0	100.0 %	Yes	518	P56
Cd-32	IN1 function selecting	4~20mA input mode, set IN1 function 0: De-active 1: Analog master speed (1 st speed, frequency command 1) 2: Adding master speed (analog master speed auxiliary command) 3: Master speed gain 4: Auxiliary frequency 2 5: Auxiliary frequency 3 6: DC brake current 7: PID feedback value 8: PID command value	0~8	0	No	519	P56

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
Cd-33	IN1 input bias	Set percentage bias for 4mA when input	±100.0	0.00	Yes	520	P56
Cd-34	IN3 input gain	Set percentage when 10V input Set percentage 100% when set Cd35 correspond selecting function 100%	0.0~1000.0	100.0 %	Yes	521	P56
Cd-35	IN3 function selecting	0~10V input mode setting, set IN3 function 0: De-active 1: Analog master speed (1 st step speed, frequency command 1) 2: Adding master speed (analog master speed auxiliary command) 3: Master speed gain 4: Auxiliary frequency 2 5: Auxiliary frequency 3 6: DC brake current 7: PID feedback value 8: PID command value	0~8	0	No	522	P56
Cd-36	IN3 input bias	Set ercentage bias when 0V input	±100.0	0.00	Yes	523	P56
Cd-37	IN2 input gain	Set ercentage bias when 0V input Set percentage 100% when set Cd38 correspond selecting function 100%	0.0~1000.0	100.0 %	Yes	524	P56
Cd-38	IN2 function selecting	0~10V input mode setting, set IN2 function 0: De-active 1: Analog master speed (first step speed, frequency command 1) 2: Adding master speed (Analog master speed auxiliary command) 3: Master speed gain 4: Auxiliary frequency 2 5: Auxiliary frequency 3 6: DC brake current 7: PID feedback value 8: PID command value	0~8	1	No	525	P56
Cd-39	IN2 input bias	Set ercentage bias when 0V input	±100.0	0.00	Yes	526	P56
Cd-40	Frequency command 5	5 th frequency command	0~400.00	45.00 HZ	Yes	168	P60
Cd-41	Frequency command 6	6 th frequency command	0~400.00	50.00 HZ	Yes	169	P60
Cd-42	Frequency command 7	7 th frequency command	0~400.00	55.00 HZ	Yes	170	P60
Cd-43	Frequency command 8	8 th frequency command	0~400.00	60.00 HZ	Yes	171	P60
Cd-44	Stop mode	Set stop mode when send command 0: Deceleration stop 1: Free run stop 2: Free run stop, but restart after the deceleration time is reached.	0~2	0	No	172	P53
Cd-45	Frequency detect level	Set multifunction relay and DO frequency active point	0~400.00	0.50 HZ	No	173	P62
Cd-46	Speed multiplier/gears ratio	RPM is indicated on the screen	0~150.00	1.00	Yes	174	P94

6. Constant tables ■

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page	
Cd-47	Multifunction relay 1 output function selecting	0: Timer (act when RUN time reach to Cd29 value) 1: Malfunction 2: Stopping 3: Acceleration 4: Speed agree 5: Deceleration 6: Frequency arrive (operation frequency > Cd45 value) 7: Current arrive (compares to Cd85 and Cd86 value) 8: Overheat (Cd82) predict action 9: OL malfunction action 10: x	0~10	1	No	175	P62	
Cd-48	Multifunction relay 2 output function selecting		0~10	1	No	176	P62	
Cd-49	DO output function selecting		0~10	8	No	177	P62	
Cd-50	Torque boost delay time	The torque boost delay time is set in ms units. Set torque boost primary delay time constant. Adjust in the following circumstance: 1. When the motor is oscillating, increase the set values. 2. When the responsiveness of the motor is low, decrease the set values.	0~10000	50 msec	No	X	P68	
Cd-51	Motor rated voltage	Each factory value of each model	50.0~500.0	By spec.	No	527	P67	
Cd-52	Motor rated frequency	Set V/F curve, please adhere the following rules: $Cd53 \geq Cd52 > Cd55 \geq Cd57$ $Cd54 \geq Cd51 > Cd56 \geq Cd58$	10.0~400.0	60.0 HZ	No	528	P67	
Cd-53	Maximum output frequency		10.0~400.0	60.0 HZ	No	529	P67	
Cd-54	Maximum voltage		10.0~500.0	By spec.	No	530	P67	
Cd-55	Middle output frequency		0.0 ~ 400.0	3.0 HZ	No	531	P67	
Cd-56	Middle output current		0.0 ~ 500.0	By spec.	No	532	P67	
Cd-57	Minimum output frequency		0.0 ~ 400.0	0.5 HZ	No	533	P67	
Cd-58	Minimum output voltage		0.0 ~ 500.0	By spec.	No	534	P67	
Cd-59	Unload current adjusting (FG only)		Increase the values when unload current is bigger, Decrease the values when it is lower. Collocate Cd-60 to adjust.	30~150	60 %	No	X	P68
Cd-60	Torque boost frequency (FG only)		Set torque boost operation frequency	1.5~10	2.50 HZ	No	X	P68
Cd-61	Selecting PWN frequency		Select fixed PWM frequency: 0: 2k 1: 3k 2: 3.5k 3: 4k 4: 5k 5: 6k 6: 7k 7: 8k 8~15: 4k 15: Set by Cd62 and Cd63	0~15	2	No	189	P95

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
Cd-62	Maximum PWM frequency setting	Settable PWM maximum frequency freely (operation frequency will be higher)	2.0~8	6k	No	190	P95
Cd-63	Minimum PWM frequency setting	Settable PWM minimum frequency freely (operation frequency will be lower)	2.0~8	3k	No	191	P95
Cd-64	Dynamic braking mode	Set brake mode 0: operation when run 1: no operation when speed is the same	0~1	1	No	192	P94
Cd-65	Dynamic braking voltage positioning	Set 20V equal to 350+20=370Vdc DB on	0~40	20V	No	198	P94
Cd-66	Instantinitial field time	Instantinitial field time when start motor.	00~20.00	0.2S	No	193	P96
Cd-67	Fine tune DC Bus standard score	Adjust the standard score of DC Bus	± 15.0	0V	No	195	P94
Cd-68	Stall preventive function in accel.	0: Invalid 1: Valid	0~1	1	No	535	P86
Cd-69	Stall preventive level in accel.	Set rated current as 100% for stall preventive leveling acceleration	30~200	* %	No	536	P86
Cd-70	Stall prevention limit during acceleration	In accordance with Cd70 setting value when inverter operation is over motor rated frequency to reduce stall prevention limit during acceleration	30~100	50 %	No	537	P87
Cd-71	Stall prevention limit during deceleration	0: Invalid 1: Valid	0~1	1	No	538	P87
Cd-72	Over current voltage active point	Over voltage protection function active point	0~50	20	No	199	P87
Cd-73	Constant speed stall prevention during operation	0: Invalid 1: Decelerate by deceleration time 2 (Cd11)	0~1	1	No	539	P88
Cd-74	Constant speed stall preventive level during operation	Set rated current as 100% for constant speed stall preventive level	30~200	* %	No	540	P88
Cd-75	Input voltage active point	Set input voltage (RST)	155~500	By spec.	No	541	P89
Cd-76	Speed search active current	When Cd28=2 is valid (please reduce setting value when unable to restart)	0~200	120 %	No	542	P90

* FG : 160% ; FP : 125%

6. Constant tables ■

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
Cd-77	Speed search deceleration time	When Cd28=2 is valid	0.1~10.0	2.0S	No	543	P90
Cd-78	Speed search waiting time	When Cd28=2 is valid	0.0~20.0	0.2S	No	544	P90
Cd-79	Momentary power loss direction	0: Invalid 1: Valid, restart when power recovered in time of (Cd80), detect low voltage of master power when exceeded. 2: Movement of CPU is valid, restart when power recovered (Cd80 will not be considered)	0~2	0	No	545	P92
Cd-80	Momentary power loss boost time	Restart valid time limit when set Cd79=1	0~2.0	0.1S	No	546	P92
Cd-81	Output voltage recover time	From 0V to recover is time of maximum output voltage when set restart	0.1~20.0	3S	No	547	P92
Cd-82	Overheating forecast detection level	Set Cd84 as 100% for level of detecting overheating forecast for inverter	50~100	90%	No	548	P93
Cd-83	Motion when overheating forecast detection	0: Deceleration stop 1: Coast stop 2: Emergency stop 3: Continuous operation	0~3	3	No	549	P93
Cd-84	Temperature protection level	Set °C as unit for detecting level of inverter overheating Software protection is invalid when set 100°C (OH is only hardware protection)	20~100	85°C	No	550	P93
Cd-85	Current hysteresis range	Set hysteresis range when relay (Cd47、Cd48) and DO (Cd49) current detected	2~20	2%	Yes	551	P63
Cd-86	Current detect level	Set current detect level when current detected	30~150	100%	Yes	552	P63
Cd-87	Analog output filter time	Set filter time of analog output terminal to eliminate the noise in effect. Input reaction will become slow.	50~1000	100ms	Yes	553	P57
Cd-88	Analog output 1 (FM) bias	Set voltage bias value of operation frequency analog output, 10V is 100%。	±10.0	0.0%	Yes	554	P57
Cd-89	Analog output 1 (FM) gain	Set voltage amplify magnification of operation frequency analog output	0.00~2.50	1.00	Yes	555	P57
Cd-90	Analog output 2 (AM) bias	Set voltage bias value of operation current analog output, 10V is 100%	±10.0%	0.0%	Yes	556	P57
Cd-91	Analog output 2 (FM) gain	Set voltage amplify magnification of operation frequency analog output	0.00~2.50	1.00	Yes	557	P57

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
Cd-92	Multifunction terminal S1 function	0: 3-wire operation control 1: Multi-step speed 1	0~21	9	No	558	P58
Cd-93	Multifunction terminal S2 function	2: Multi-step speed 2 3: Multi-step speed 3	0~21	10	No	559	P58
Cd-94	Multifunction terminal S3 function	4: Reserved 5: JOG frequency	0~21	2	No	560	P58
Cd-95	Multifunction terminal S4 function	6: Forward JOG 7: Reverse JOG	0~21	8	No	561	P58
Cd-96	Multifunction terminal S5 function	8: Auto restart attempts 9: Multi-steps acceleration time	0~21	1	No	562	P58
Cd-97	Multifunction terminal S6 function	10: Multi-steps deceleration time 11: PID control disable	0~21	19	No	563	P58
Cd-98	Lock data	12: PID integration control reset 13: PID integration control maintain	0~2	2	Yes	564	P97
Cd-99	Initialize data	14: PIDsoft start 15: Switch PID error input characteristics	0~5	0	No	565	P101
		16: Not used 17: PLC reset					
		18: Emergency stop 19: Coast stop					
		20: Electrical adjustable speed UP 21: Electrical adjustable speed Down					
		0: Lock data (read only) 1: Data is variable (simple)					
		2: Data is variable					
		0: invalid 1: Only recover PLC constant					
		2: Recovering Factory value, uncontain PLC constant					
		3: Recovering Factory value, uncontain motor and PLC constant					
		4: All constants recover factory value					
		5: Eliminate malfunction record					

6. Constant tables

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
CE-00	Slip boost gain (FG only)	To upgrade the speed accuracy when drive to load Adjust this constant at the following times 1. Increase setting value when speed is lower than target value 2. Decrease setting value when speed is higher than target value	0~2.50	0	Yes	X	P69
CE-01	Slip boost delay time (FG only)	Slip boost primary delay time is set in ms unit Adjust this constant at the following times 1. Reduce the setting when slip boost responsive is slow 2. When speed is not stabilized, increase the setting	0~10000	500 ms	No	X	P69
CE-02	Slip boost limit (FG only)	Set maximum limit value of slip boost Set motor rated slip is 100% °	0~250	200 %	No	X	P69
CE-03	Electrical adjustable speed Stop restart attempts	0: Self-protection setting value 1: (Cd18) frequency minimum limit value is recovered under stop status	0~1	0	No	X	P50
CE-04	Password input	Set user password	0~9999	0	No	X	P97
CE-05	1 st step speed setting	Multi-step function control 1 st step speed setting	0~400.00	0 HZ	Yes	233	P74
CE-06	2 nd step speed setting	Multi-step function control 2 nd step speed setting	0~400.00	0 HZ	Yes	234	P74
CE-07	3 rd step speed setting	Multi-step function control 3 rd step speed setting	0~400.00	0 HZ	Yes	235	P74
CE-08	4 th step speed setting	Multi-step function control 4 th step speed setting	0~400.00	0 HZ	Yes	236	P74
CE-09	5 th step speed setting	Multi-step function control 5 th step speed setting	0~400.00	0 HZ	Yes	237	P74
CE-10	6 th step speed setting	Multi-step function control 6 th step speed setting	0~400.00	0 HZ	Yes	238	P74
CE-11	7 th step speed setting	Multi-step function control 7 th step speed setting	0~400.00	0 HZ	Yes	239	P74
CE-12	8 th step speed setting	Multi-step function control 8 th step speed setting	0~400.00	0 HZ	Yes	240	P74
CE-13	9 th step speed setting	Multi-step function control 9 th step speed setting	0~400.00	0 HZ	Yes	241	P74
CE-14	10 th step speed setting	Multi-step function control 10 th step speed setting	0~400.00	0 HZ	Yes	242	P74
CE-15	11 th step speed setting	Multi-step function control 11 th step speed setting	0~400.00	0 HZ	Yes	243	P74

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
CE-16	12 th step speed setting	Multi-step function control 12 th step speed setting	0~400.00	0 HZ	Yes	244	P74
CE-17	13 th step speed setting	Multi-step function control 13 th step speed setting	0~400.00	0 HZ	Yes	245	P74
CE-18	14 th step speed setting	Multi-step function control 14 th step speed setting	0~400.00	0 HZ	Yes	246	P74
CE-19	15 th step speed setting	Multi-step function control 15 th step speed setting	0~400.00	0 HZ	Yes	247	P74
CE-20	16 th step speed setting	Multi-step function control 16 th step speed setting	0~400.00	0 HZ	Yes	248	P74
CE-21	1 st step time setting	Multi-step function control 1 st step time setting	0~255	0	No	249	P75
CE-22	2 nd step time setting	Multi-step function control 2 nd step time setting	0~255	0	No	250	P75
CE-23	3 rd step time setting	Multi-step function control 3 rd step time setting	0~255	0	No	251	P75
CE-24	4 th step time setting	Multi-step function control 4 th step time setting	0~255	0	No	252	P75
CE-25	5 th step time setting	Multi-step function control 5 th step time setting	0~255	0	No	253	P75
CE-26	6 th step time setting	Multi-step function control 6 th step time setting	0~255	0	No	254	P75
CE-27	7 th step time setting	Multi-step function control 7 th step time setting	0~255	0	No	255	P75
CE-28	8 th step time setting	Multi-step function control 8 th step time setting	0~255	0	No	256	P75
CE-29	9 th step time setting	Multi-step function control 9 th step time setting	0~255	0	No	257	P75
CE-30	10 th step time setting	Multi-step function control 10 th step time setting	0~255	0	No	258	P75
CE-31	11 th step time setting	Multi-step function control 11 th step time setting	0~255	0	No	259	P75
CE-32	12 th step time setting	Multi-step function control 12 th step time setting	0~255	0	No	260	P75
CE-33	13 th step time setting	Multi-step function control 13 th step time setting	0~255	0	No	261	P75
CE-34	14 th step time setting	Multi-step function control 14 th step time setting	0~255	0	No	262	P75
CE-35	15 th step time setting	Multi-step function control 15 th step time setting	0~255	0	No	263	P75
CE-36	16 th step time setting	Multi-step function control 16 th step time setting	0~255	0	No	264	P75
CE 37-46	Reserved						

6. Constant tables ■

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
CE-47	Multi-step function mode (continuous operation) selecting	Select liner or gradually operation method	0~6	0	No	275	P76
CE-48	Multi-step function mode reset	Reset procedure and time to zero	0~1	0	Yes	276	P76
CE 49-53	Reserved						
CE-54	Select PID control	0: invalid 1: PID output is inverter output, D control error 2: PID output is inverter output, D control feedback 3: PID output is adjustment of inverter output, D control error 4: PID output is adjustment of inverter output, D control feedback	0~4	0	No	282	P71
CE-55	Proportional control (P)	Set ratio gain of P control	0~25	1.0	Yes	283	P72
CE-56	Integral time (I)	Set integral time of I control	0~360	1.0	Yes	284	P72
CE-57	Maximum value of Integral control (I)	Set maximum value of integral time, set maximum frequency as 100%	0~100	100	Yes	285	P72
CE-58	Derivative time (D)	Set derivative time of D control	0~10	0	Yes	286	P72
CE-59	Maximum value of PID output	Set limit value of PID output, set maximum frequency as 100%	0~100	100	Yes	287	P72
CE-60	PID offset adjust	Adjust offset of PID output	±100	0	Yes	288	P72
CE-61	PID output delay time	Set low-pass filter time of PID output	0~10	0	Yes	289	P72
CE-62	PID output characteristics selecting	PID output forward/ reverse characteristics 0: Normal 1: Inverting	0~1	0	No	290	P72
CE-63	PID output gain	Set amplify magnification of PID output	0.0~25.0	1.0	No	291	P72
CE-64	PID output reverse selecting	0: Limit output is 0 when PID output is negative 1: PID output is negative when reverse, output is 0 when set Cd27= 1	0~1	0	No	292	P72
CE-65	PID command acceleration/ deceleration time	Set PID command acceleration/ deceleration time, setting value is the time that accelerates from 0 to 100%	0.0~25.5	0.0	No	293	P73

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address	Page
CE-66	Position of P controller selecting	0: P control independence 1: Enter I、D controller after error passed by P controller	0~1	0	No	294	P73
CE-67	PID output delay position selecting	0: PID output delay 1: D control output delay	0~1	0	No	295	P73
CE-68	Select I control reset	0: Clear I control integral value when stop operation 1: Use terminal to eliminate integral	0~1	0	No	296	P73
CE-70	Serial communication position	Set address of inverter	0~240	1	Yes	209	P80
CE-71	Serial communicationspeed	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps	0~3	3	No	210	P80
CE-72	Serial communication feedback time	Set the time of inverter from received data to start replying data	2~65	2mS	No	211	P81
CE-74	Parity bit Check	0: Invalid 1: Odd Parity bit 2: Even Parity bit	0~2	0	No	213	P81
CE-75	LCD permutation selecting	Select LCD display method 0: 2 combinations 1: 4 combinations 2: 8 combinations	0~2	0	No	X	P99
CE-76	LCD group selecting	Set LCD display contents function	0~3	0	No	X	P99
CE-80	Low voltage demonstration	0: maintains the LU-B demonstration 1: Not maintains the LU-B demonstration	0~1	1	不可	X	P89
CE-81	IN1 transform magnification value	Screen indicates kg value	0.0~50.0	10.0	No	X	P100
CE-82	Motor slip (FG only)	Set motor rated slip This constant is automatically set during autotuning	0.00 ~ 20.00	2.00 HZ	No	X	P97
CE-83	Motor Noload current (FG only)	Set inverter rated current as 100% and motor Noloadcurrent This constant is automatically set during autotuning	10.0 ~ 100.0	30.0 %	No	X	P97
CE-84	Motor pole (FG only)	Set motor pole This constant is automatically set during autotuning	2~8	4 pole	No	X	P97
CE-85	Motor leakage inductance (L.S) (FG only)	Set motor rated as 100% and the voltage drop due to motor leakage inductance This constant is automatically set during autotuning	0.0~40.0	0 %	No	X	P97
CE-86	Motor resistance (RS)	Set motor resistance This constant is automatically set during autotuning	0.000 ~ 65.000	By spec.	No	X	P97
CE-87	Loading selecting	0: 150% overload (heavy duty model) 1: 120% overload (light duty model)	0~1	1	No	X	P97

6. Constant tables ■

Code No.	Function	Description	Setting value	Factory setting	Change during operation	Modbus Address.	Page
CE-88	AUTOTUNE mode	0 : Rotational mode 1 : UnRotational mode 1 2 : UnRotational mode 2	0~2	2	No	X	P47
CE-89	V/F boost setting	Set percentage of automatic adjust V/F curve low speed boost	0~100	45%	No	X	P47
CE-90	Motor rated voltage	Process autotuning by motor nameplate to set all constants of motor	0.0 ~ 500.0	By spec.	No	X	P47
CE-91	Motor rated current		10.0 ~ 200.0	100%	No	X	P47
CE-92	Motor rated frequency		0.0 ~ 400.0	By spec.	No	X	P47
CE-93	Motor pole		2~8	4	No	X	P47
CE-94	Motor rated RPM		0~7200	1750	No	X	P47
CE-95	Motor Noload current		Collocate unrotational mode adjustsetting	10~100	45%	No	X
CE-96	Restore initialize value of motor voltage	0: 380V 1: 415V 2: 440V 3: 460V (except 220V series)	0~3	0	No	X	P89
CE-97	Restore initialize value of motor frequency	0: 50HZ 1: 60HZ (220V series is fixed 60HZ)	0~1	0	No	X	P89
CE-98	User password	For Cd-98 Lock data	0~9999	0	不可	X	P97
CE-99	HP setting	Set by specification of inverter	0~63	By spec.	No	X	X

Monitoring status

Code No.	Function	Modbus Address.
d1-01	Output frequency (contain slip boost)	64
d1-02	Output current	65
d1-03	Frequency command	66
d1-04	DC BUS voltage	67
d1-05	Output voltage	68
d1-06	DI terminal status	69
d1-07	Module temperature	70
d1-08	RUN status	71
d1-09	RUN command	72
d1-10	Malfunction status	73
d1-14	Power factor	74
d1-15	Transient power (KW)	75
d1-16	KWH	76
d1-14~17	Reserved	77~80
d1-18	IN1(0~20mA)	81
d1-19	IN2(0~10V)	82
d1-20	IN3(0~10V)	83
d1-21	PID command value	84
d1-22	PID feedback value	85
d1-23	PID output value	86
d1-24	PID frequency command modulus	87
d1-25	DSP firmware version	88
d1-26	Interface chip firmward version	89
d1-27	Option card firmware version	90

6. Constant tables ■

Monitoring status

Code No.	Function	Modbus Address.
d1-28	Inverter rated current	91
d1-29	Malfunction record 1	92
d1-30	Malfunction record 2	93
d1-31	Malfunction record 3	94
d1-32	Malfunction record 4	95
d1-33	MCK	96
d1-34	RPM (co-operate Cd46)	97
d1-35	Pressure value (Kg) (IN1 input)	98
d1-36	Reserved	99
d1-37	Days of operation	97
d1-38	Hours and minutes of operation	101
d1-39	Micro-seconds of operation	102
d1-40	Record breakdown number of times	103

◆ Malfunction record

Description: Record malfunction causes to eliminate malfunction situation.

1. Malfunction of Err、Ero、Erc etc. will not be recorded. (P102~103)
2. Memorize the latest four records.
3. Low voltage malfunction will not be recorded when inverter stand by.
4. d1-29~32 only can be read or deleted all by Cd99, user is unable input malfunction record.

◆Autotuning constant

Code No.	Function	Setting value	Factory setting	Change during operation
CE-88	AUTOTUNE mode	0~2	2	X
CE-89	V/F boost setting	0~100	45%	X
CE-90	Motor rated voltage	0.0~500.0	By specification	X
CE-91	Motor rated current	10.0~200.0	100.0%	X
CE-92	Motor rated frequency	0.0~400.0	By specification	X
CE-93	The pole of motor	2~8	4pole	X
CE-94	Motor rated RPM	0~7200	1750rpm	X
CE-95	Motor unload current	10~100	45%	X

Description: Please input CE88~ CE95 constants to proceed motor constant autotuning according to specification of nameplate.

The low speed compensation of V/f curve were set by CE89 to apply to Rotational autotuning (CE88=0), V/f curve will be modified after autotuning. Constant setting is the percentage of low speed star torque.

Select adjustment mode

1. Rotational mode autotuning (CE88=0)

Input specification of nameplate after set CE88=0. When the page of CE-88 constants were operated. The function of autotuning will be processed by pressing FWD this moment, TunE is shown on screen. Motor data is needed by autotuning when motor run.

2. Stationary mode autotuning (CE-88=1)

Input specification of nameplate after set CE-88=1. When the page of CE-88 constants were operated. The function of autotuning will be processed by pressing FWD this moment, TunE is shown on screen. Motor data is needed by autotuning when motor run. (Collocate with CE-95 motor unload current setting)

3. Stationary autotuning for line-to-line resistance only (CE-88=2)

Autotuning can be used to prevent control errors when the motor cable is long or the cable length has changed or when the motor and inverter have different capacities. When keypad is operated through the page of CE-88 constants, press FWD to process autotuning detection motor line-to-line resistor (Cd-78).

Notice: 1. The motor have to be disconnected from machine and a danger never occurs when Rotational mode autotuning is implemented.

2. A machine does not allow motor spontaneously Rotational, please implement Stationary mode autotuning. (CE-88=1)

3. Power will be supplied to the motor when Stationary mode autotuning and stationary for line-to-line resistance are performed even though the motor will not turn. Do not touch the motor until autotuning has been completed.

7. Motor autotuning

Code No.	Function
Cd-55	Middle output voltage
Cd-58	Minimum output voltage
CE-82	Motor slip
CE-83	Motor unload current
CE-84	The pole of motor
CE-85	Motor leakage inductance
CE-86	Motor resistance

Description: Constants Cd55, Cd58, CE82, CE83, CE84, CE85, CE86 will be changed automatically after process motor autotuning.

※ Process motor constant autotuning under CE-88 (AUTOTUNE mode).

◆ **Frequency setting**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd00	Frequency setting	0~400.00HZ	10.00	0

Description: There are 5 methods to change set frequency. Items A~C are methods of panel key operation, items D-E are methods of external terminal input.

A. Keypad VR (Cd01=08) Only E2

B. Use PROG key to input data (Cd01=0)

C. Use ▼、▲ key to input data (Cd01=6、7)

D. Use Multi-Step function to setting (Refer to function CE05 to CE55.)

E. Set external voltage (IN2、IN3)

F. Set external current (IN1)

Notice: Set value should be in accordance with V/F slope (Cd05) and upper limit frequency (Cd17).

Set by function key

A. At display function, press READ and setting (Cd01=0)

	F	1	0.	0	0
PROG	C	d	-	0	0
READ		1	0.	0	0
▲▼▶		3	0.	0	0
SET		3	0.	0	0
	C	d	-	0	0
PROG	C	E	-	0	0
PROG		3	0.	0	0

8. Constant setting by function


B. Use PROG key to input data (Cd01=0)

F	1	0.	0	0
---	---	----	---	---

Numeric key		3	0.	0	0
----------------	--	---	----	---	---

SET		3	0	0	0
-----	--	---	---	---	---

F	3	0	0	0
---	---	---	---	---

Note :  Indicate 7 Segment LED twinkle.

◆ Monitor display

Code No.	Function	Setting value	Factory setting	Change during operation
Cd02	Monitor display	0~8	0	0

Description: Monitoring setting when set operation.

- 0 : Output frequency (contain slip boost)
- 1 : Output current
- 2 : RPM
- 3 : DC BUS voltage
- 4 : Output voltage
- 5 : Module temperature
- 6 : Power factor
- 7 : Transient power (KW)
- 8 : KWH

◆ Operation display

Code No.	Function	Setting value	Factory setting	Change during operation
CE03	Electrical adjustable speed Stop restart attempts	0~1	0	X

Description: set Cd01=4 or 7 to select stop if reset or not.

CE03=0 : No reset electrical adjustable speed when stop to keep setting speed.

CE03=1 : Reset electrical adjustable speed to 0 when stop.

◆ **Frequency command selecting**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd01	Selecting frequency command	0~8	0	X

Description: Constant Cd01 is input way selecting of frequency, selectable items as following:

- 0: Digital input by key board
- 1: Analog input
- 2: Analog input (lag)
- 3: Multi-step function 1
- 4: DI UP/DOMN(2)
- 5: Pulse input (option) *
- 6: Keypad UP/ DOMN (1)
- 7: Keypad UP/ DOMN (2)
- 8: Set frequency by terminal VR (E2 only)

■ **Use keypad to input frequency command**

Input frequency command by keypad after set Cd01=0. Use constant Cd00 to input frequency command when ordinary operation.

■ **Use voltage (current) to input frequency command (analog input IN1~IN3, option cardAI1~2)**

Input frequency command by analog input after set Cd01=1.

Input frequency command (contained lag) by analog input after set Cd01=2.

■ **Input frequency command by multi-step function to set multi-step function**

Set Cd01=3 to execute multi-step function. 16 steps are settable and set each step command by CE05~CE36. (Please refer to page P74)

■ **DI UP/ DOMN**

Set DI terminal to execute frequency UP/ DOMN by Cd92~Cd97 after set Cd01= 4.

Set acceleration/ deceleration by Cd10.

(Please refer to page P58)

■ **Pulse input (option card is underdevelopment)**

Use pulse input terminal of option card to input pulse as frequency after set Cd01=5.

■ **Keypad UP/DOMN**

Set frequency by ▲、▼ UP/ DOMN of keypad after set Cd01= 6

Set acceleration/ deceleration by Cd10.

■ **Keypad UP/DOMN**

Set frequency by ▲、▼ UP/ DOMN of keypad and DI terminal after set Cd01= 7.

Set acceleration/ deceleration by Cd10.

■ **Set frequency by terminal VR**

Set frequency by terminal VR after set Cd01=8. (E2 only)

8. Constant setting by function ■

◆ Operation command selecting

Code No.	Function	Setting value	Factory setting	Change during operation
Cd04	Operation command setting	0~3	0	X
Cd27	Prohibited reverse selecting	0~1	0	X

Description: Cd04=0: keypad control :

Use FWD、REV、STOP key of keypad to execute inverter operation.

Cd04=1: External terminal control (stoppable by keypad) :

Use operation control terminal to execute inverter operation. Stoppable by keypad (STOP).

Cd04=2: MODBUS communication :

Use MODBUS communication to execute operation. (page 74)

Cd04=3: External terminal control (No keypad stop) :

Use operation control terminal to execute operation. No keypad stop (STOP) ◦

Cd27=0 to execute reverse by keypad (REV) ◦

Cd27=1 unable to execute reverse by keypad (REV)

Notice : CD27 prohibits reverse selecting, only restricts keypad control.

◆ Acceleration/ deceleration

Code No.	Function	Setting value	Factory setting	Change during operation
Cd08	Acceleration 1	0.0~6000.0	10.0	O
Cd09	Deceleration 1	0.0~6000.0	10.0	O
Cd10	Acceleration 2	0.0~6000.0	10.0	O
Cd11	Deceleration 2	0.0~6000.0	10.0	O

Description: Set frequency by the time is needed from 0 HZ to 50 HZ.

$$(T) = \frac{(50 - 0)}{\Delta F} \times T1$$

T1 : time for acceleration/ deceleration

ΔF : Frequency change

For example: Frequency reduce from 50 HZ to 30 HZ, time 1 sec.

$$(T) = \frac{50}{50 - 30} \times 1 = 2.5$$

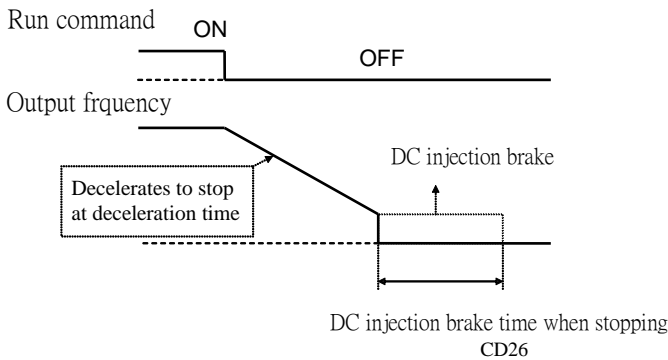
◆ **Stop method selecting**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd44	Stop method selecting	0~2	0	X

Description :

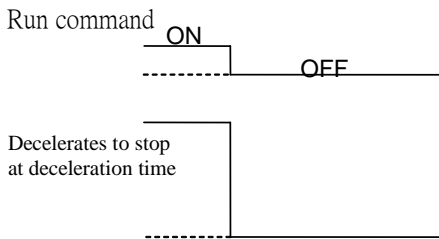
Cd44= 0: Deceleration stop

Set the motor to decelerate to stop according to selecting time after set Cd44= 0, (factory setting: Cd09 deceleration time 1). If DC braking were set when stop, DC braking is proceed when output frequency is lower than Cd23



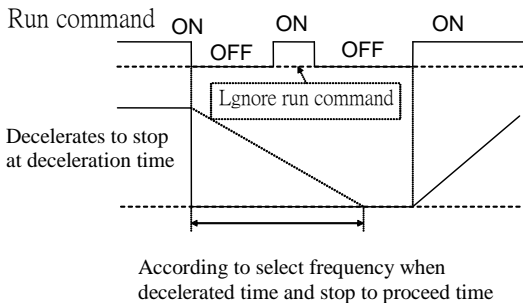
Cd44=1: coast stop

If the stop command is input when set Cd44=1, the inverter output voltage is interrupted, the motor coasts to stop at inertia the load.



Cd44=2 : Coast stop, but restart after the deceleration time is reached.

If the stop command is input when Cd44=2, the inverter output is interrupted to coast the motor to stop. the motor coasts to stop at inertia the load. Run commands are ignored until the time has elapsed. Set timer time by Cd10(acceleration time 2).



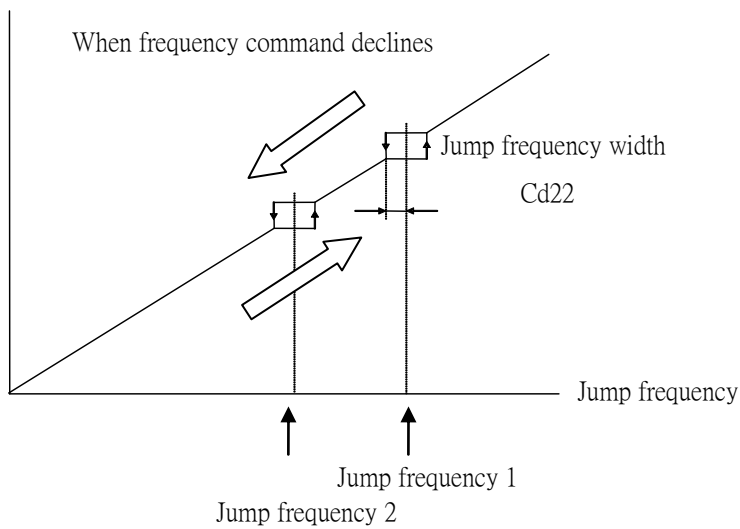
8. Constant setting by function ■

◆ Jump frequency

Code No.	Function	Setting value	Factory setting	Change during operation
Cd20	Jump frequency 1	0.00~400.0	0	X
Cd21	Jump frequency 2	0.00~400.0	0	X
Cd22	Jump frequency width	0.0~20.0	1	X

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

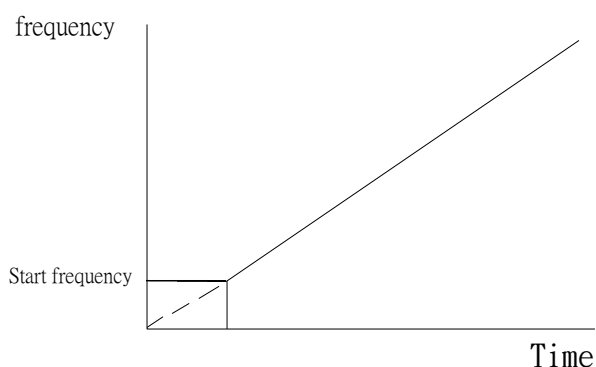
Output frequency



◆ Start frequency

Code No.	Function	Setting value	Factory setting	Change during operation
Cd16	Start frequency	0.5~60.00	1.5HZ	X

Description: Set motor start frequency, settable range of frequency from 0.5HZ to 30HZ, accuracy is 0.01HZ



※**Notice:** The most appropriate for start frequency is from 0.5HZ to 10HZ

◆**DC break**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd23	DC break frequency	0.0~20.0	1.0HZ	X
Cd24	DC break current	0~100	50%	X
Cd25	DC break time when start	0.0~10.0	0.0sec	X
Cd26	DC break time when stop	0.0~10.0	0.0sec	X

Description: Set DC injection brake when start to the motor while it is coasting to stop, to stop the motor and then restart it.

Cd23: Set DC break function when stop. Stop method setting is deceleration stop or all range DC stop, output frequency is smaller than Cd23 and start DC break after input stop operation command.

Cd24: Set DC break current as inverter rated current.

Cd25: Set to 0 to disable the DC injection brake at start.

Cd26: Set to 0 to disable the DC injection brake at stop.

※If setting value of Cd23 less than minimum input frequency, to proceed DC injection brake as minimum output frequency Cd57.

※Set multi-step analog input (Cd32/Cd35 / Cd38)= 6, use analog input as DC break current command, 100% inverter rated current when input 10V (20mA).

9. Output/ input terminals

◆ Multi-functions analog input

Code No.	Function	Setting value	Factory setting	Change during operation
Cd30	Analog input filter time	1~1000	5	O
Cd31	IN1 input gain	0.0 ~ 1000.0	100.0%	O
Cd32	IN1 functions selecting	0~8	0	X
Cd33	IN1 input bias	±100.0	0.0%	O
Cd34	IN3 input gain	0.0 ~ 1000.0	100.0%	O
Cd35	IN3 functions selecting	0~8	0	X
Cd36	IN3 input bias	±100.0	0.0%	O
Cd37	IN2 input gain	0.0 ~ 1000.0	100.0%	O
Cd38	IN2 functions selecting	0~8	1	X
Cd39	IN2 input bias	±100.0	0.0%	O

Description: Set filter time by Cd30. Set filter time longer. The ability of reject noise is stronger. But reaction of input will be corresponsive slower. Please set suitable time by request.

Terminals of IN1 (4~20mA), IN2 (0~+10V) and IN3 (0~+10V) are multi-function analog input, the input specification 10V(20mA) indicates 100%, use Cd31, Cd34 and Cd37 to set enlarge/ reduce magnification, and Cd33、Cd36、Cd39 to set bias %. Cd32、Cd35、Cd38. All functions of multi-function analog input, please refer to [multi-function analog input functions list](#).

Notice: Limits of authority level IN3>IN2>IN1

For example: Set Cd32(IN1) and Cd35(IN3)=1 at the same time, and IN1 will not operate when input IN1.

◆ **Multi-functions analog input functions list**

Code No.	Function	Description
0	De-active	---
1	Analog master speed (1 st step speed)	Frequency command 1
2	Adding master speed	Analog master speed auxiliary command
3	Master speed gain	Analog master speed limit gain
4	Auxiliary frequency 2 (2 nd step speed)	Frequency command 2
5	Auxiliary frequency 3 (3 rd step speed)	Frequency command 3
6	DC braking current	Inverter rated current
7	PID feedback value	Feedback value source
8	PID command value	PID input value

◆ **Analog output setting**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd87	Analog filter time	50~1000	100	O
Cd88	Analog output 1(FM) bias	±10.0	0.0%	O
Cd89	Analog output 1(FM) gain	0.00 ~2.50	1.00	O
Cd90	Analog output 2(AM) bias	±10.0	0.0%	O
Cd91	Analog output 2(AM) gain	0.00 ~2.50	1.00	O

Description: Multi-function analog output can be selected monitoring (d1-xx) to transfer to analog voltage output, when selected one is 100%, output 10V. Please refer to d1 constants, page 38.

The function of Cd87 could be set as the filter time of VOUT. The filter time setting is longer, the capability of reject filter is stronger, but the reaction of input become slow. Please set the adaptable time by user request.

Cd88 · Cd90 can be set analog output bias (output is lower than 0V, output 0V only).

Cd89 · Cd91 can be set analog output enlarge magnification (output exceed 10V, output 10V only).

9. Output/ input terminals ■

◆ Multi-functions terminals setting

Code No.	Function	Setting value	Factory setting	Change during operation
Cd92	Multi-functions terminal S1 function	0~21	9	X
Cd93	Multi-functions terminal S2 function	0~21	10	X
Cd94	Multi-functions terminal S3 function	0~21	2	X
Cd95	Multi-functions terminal S4 function	0~21	8	X
Cd96	Multi-functions terminal S5 function	0~21	1	X
Cd97	Multi-functions terminal S6 function	0~21	19	X

Setting value	Function
0	3-wire operation control
1	Multi-steps speed command 1
2	Multi-steps speed command 2
3	Multi-steps speed command 3
4	Reserved
5	Jog frequency selection (JOG) *
6	Forward jog (FJOG) *
7	Reverse jog (RJOG) *
8	Auto restart attempts
9	Multi-steps acceleration/ deceleration time 1
10	Multi-steps acceleration/ deceleration time 2
11	PID control disable
12	PID integration control reset
13	PID integration control maintain
14	PIDsoft start
15	Switch PID error input characteristics
16	Not used
17	PLC reset
18	Emergency stop by time of Cd11
19	Coast stop
20	Electrical adjustable speed UP
21	Electrical adjustable speed Down

* Only Cd04=1

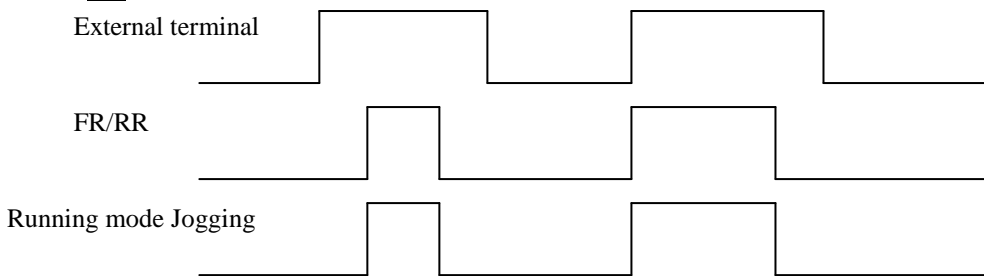
◆ **Jog frequency**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd15	Jog frequency	0.0~60.00	5.00	O
Cd19	Jog acceleration/ deceleration time	0.0~6000.0	1.0sec	O

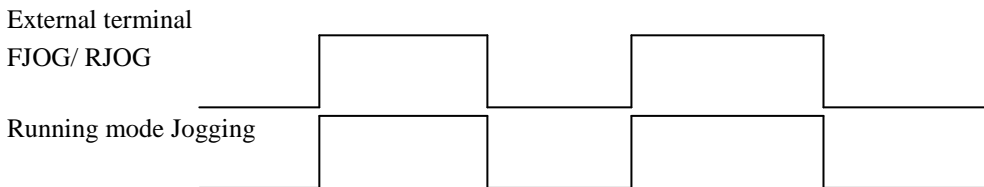
Description: To control jog, must comply external operation Cd04=1, and use external terminal **FR** or **RR** and **COM** shorted, or use FORWARD JOG (FJOG), REVERSE JOG (RJOG).

1. Jog operation is valid only when operation command selects the external operation single mode (eg. Cd04=1) and set Cd92~Cd97=5, jog operation procedures:

1. First put external terminal in, then **FR** (or **RR**)
2. Put external terminal and **FR** (or **RR**) simultaneously, be sure always to put in external terminal before **FR** (or **RR**)



2. When set Cd92~Cd97= 6、7 (FJOG/ RJOG), jog without putting **FR** (or **RR**) in.



Jog acceleration/ deceleration time : set the climbing time of frequency from 0HZ to 50HZ

$$\text{Setting value直 (T)} = \frac{(50 - 0)}{\Delta F} \times T1$$

T1 : Time needed for accelerate / decelerate

ΔF : Frequency changed

9. Output/ input terminals ■

◆Multi-step speeds frequency command

Code No.	Function	Setting value	Factory setting	Change during operation
Cd12	Frequency command 2	0.00~400.00	20.00	O
Cd13	Frequency command 3	0.00~400.00	30.00	O
Cd14	Frequency command 4	0.00~400.00	40.00	O
Cd40	Frequency command 5	0.00~400.00	45.00	O
Cd41	Frequency command 6	0.00~400.00	50.00	O
Cd42	Frequency command 7	0.00~400.00	55.00	O
Cd43	Frequency command 8	0.00~400.00	60.00	O

Description: Set by external terminals S1~S6 and switch every step speed. Each step speed will not be interference, the value never exceeds the maximum range.

Cd12= 2nd step frequency setting
Cd13= 3rd step frequency setting
Cd14= 4th step frequency setting
Cd40= 5th step frequency setting
Cd41= 6th step frequency setting
Cd42= 7th step frequency setting
Cd43= 8th step frequency setting

◆Multi-step speeds contactor

Offer 8-step speeds operation function: set by Cd92~Cd97

Set multi-step speeds must accommodate with external terminal S1~S6 to switch each step speed.

External terminals	Step speed selecting						
	2	3	4	5	6	7	8
Multi-step speeds command 1	○		○		○		○
Multi-step speeds command 2		○	○			○	○
Multi-step speeds command 3				○	○	○	○

Signal ○ means put external terminal

9. Output/ input terminals ■

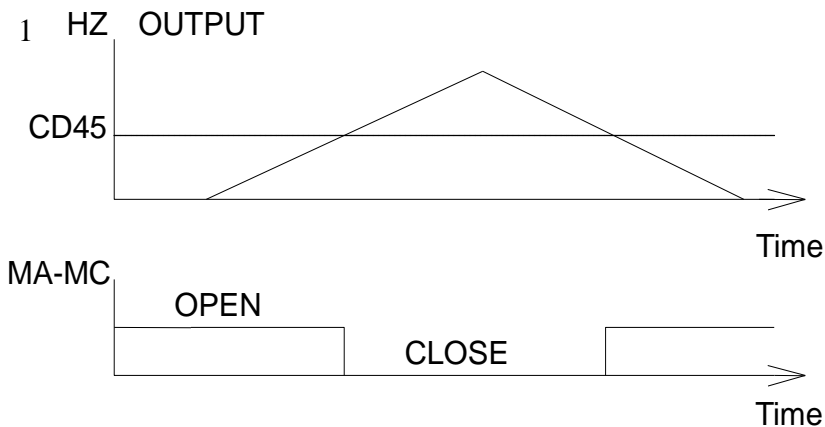
◆Multi-functions relay setting

Code No.	Function	Setting value	Factory setting	Change during operation
Cd29	TIME	0~60000	5	X
Cd45	Frequency detect level	0.00~400.00	0.50	X
Cd47	Multi-functions relay 1 (MA、MB、MC)	0~10	1	X
Cd48	Multi-functions relay 2 (M1、M2、M3)	0~10	1	X
Cd49	Multi-functions relay DO	0~10	8	X

Description: Set multi-functions output contactor function.

Cd29 (TIME): This function must accommodate Cd47, 48=0 setting. When motor starts operation, the time counter is active.

Cd45 (Frequency detect level) : accommodate Cd47, 48=6, Cd45 will appoint the action level.



Cd47, 48 could be set the function by Multi-functions output contactor, please refer to the list:

Setting	Function
0	Time counter (accommodate Cd29)
1	Fault
2	Stop
3	Acceleration
4	Speed reached
5	Deceleration
6	Frequency reached (operation frequency>Cd45)
7	Current reached (compare to Cd85 and Cd86 value)
8	Over heating prediction action(Cd82×Cd84)
9	OL fault action
10	No action

◆ Current detect setting

Code No.	Function	Setting value	Factory setting	Change during operation
Cd85	Current arrearage range	2~20	2%	X
Cd86	Current detect level	30~150	100%	X

Description: Set the action range of current detect.

Current arrearage range: RELAY will jump when Cd47、48、49=7, current is lower than rated current (Cd86—Cd85) value

Current detect level: RELAY will start when Cd47, 48, 49=7, current is over rated current \times Cd86 value.

10. V/F control ■

◆ V/F pattern selecting

Code No.	Function	Setting value	Factory setting	Change during operation
Cd05	Set V/F pattern	1~15	2	X

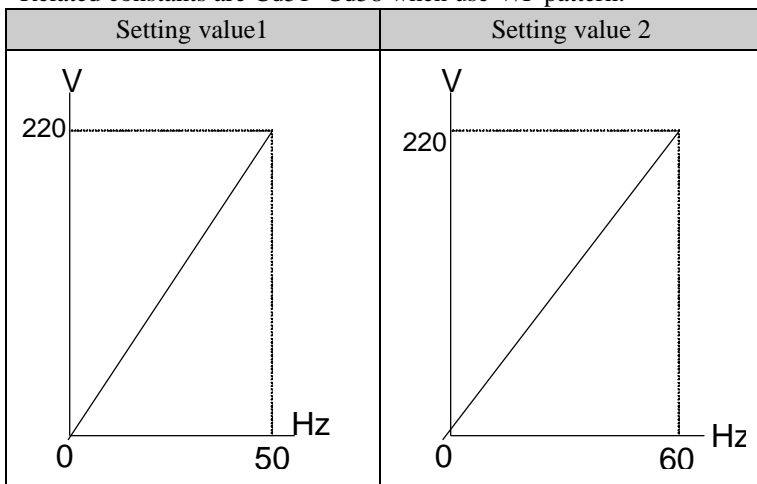
Description:

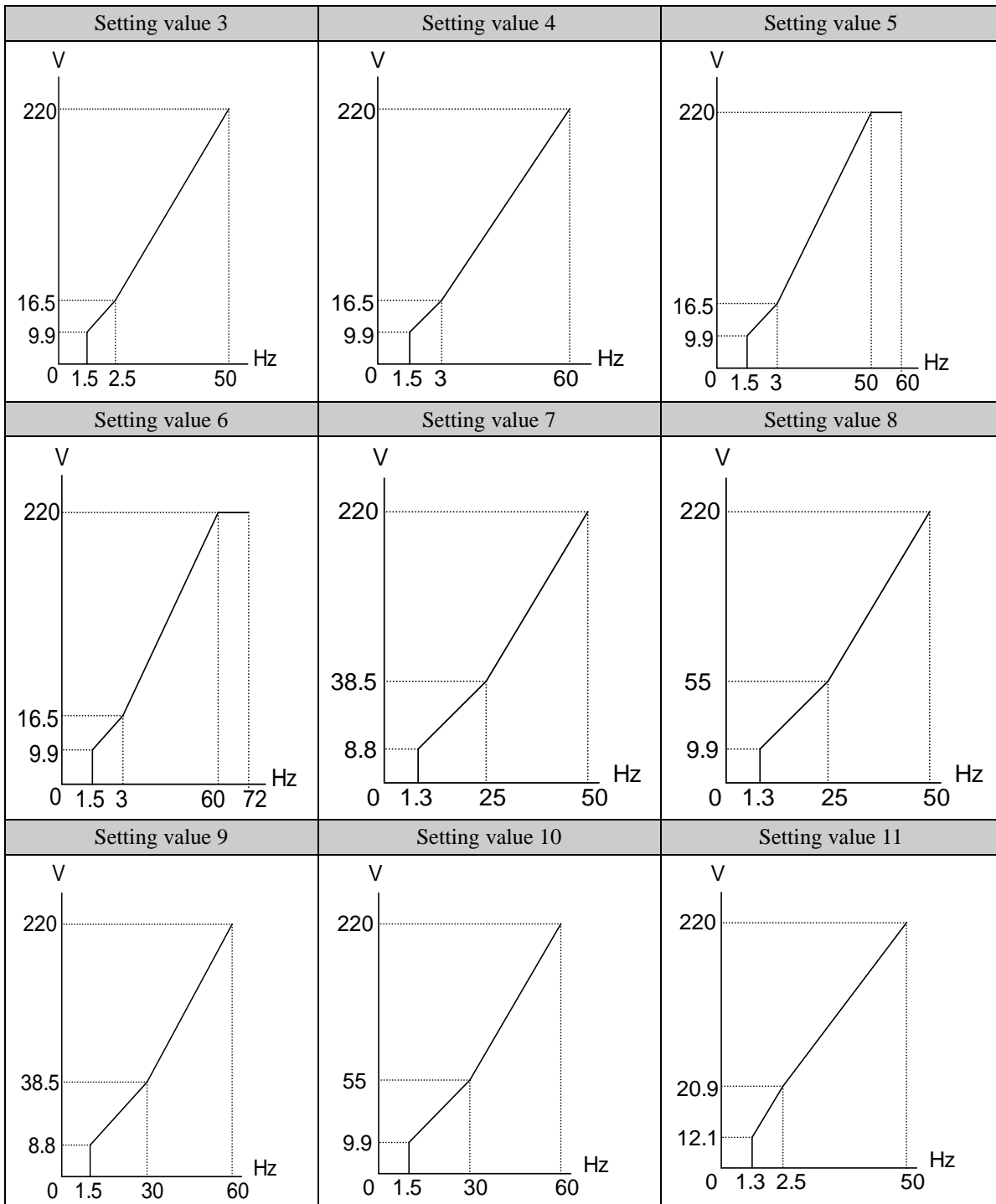
Setting value	Feature	Application	Specification
1	Standard torque	General usage	50HZ
2			60HZ
3	Constant torque	General usage	50HZ
4			60HZ
5			50HZ, 60HZ voltage saturation
6			60HZ, 72HZ voltage saturation
7	Variable torque	The inertia load of fan or pump	50HZ, 3 times decreasing
8			50HZ, 2 times decreasing
9			60HZ, 3 times decreasing
10			60HZ, 2 times decreasing
11	High starting torque	The wiring distance between the inverter and motor is relatively large (greater than 150m). A large torque is required at start up. A reactor is connected to the inverter's input or output side	50HZ, middle starting torque
12			50HZ, high starting torque
13			60HZ, middle starting torque
14			60HZ, high starting torque
15	Arbitrary V/F pattern		Free

Each setting value of V/F pattern is shown below.

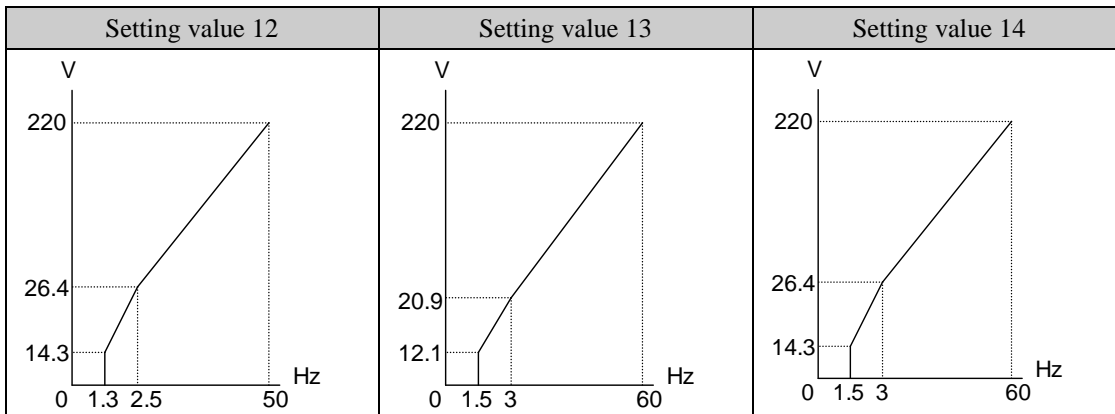
Use 220V as standard in the list, if 380V (Cd51), the voltage in the table which multiplies $380/220=1.727$.

Related constants are Cd51~Cd58 when use V/F pattern.



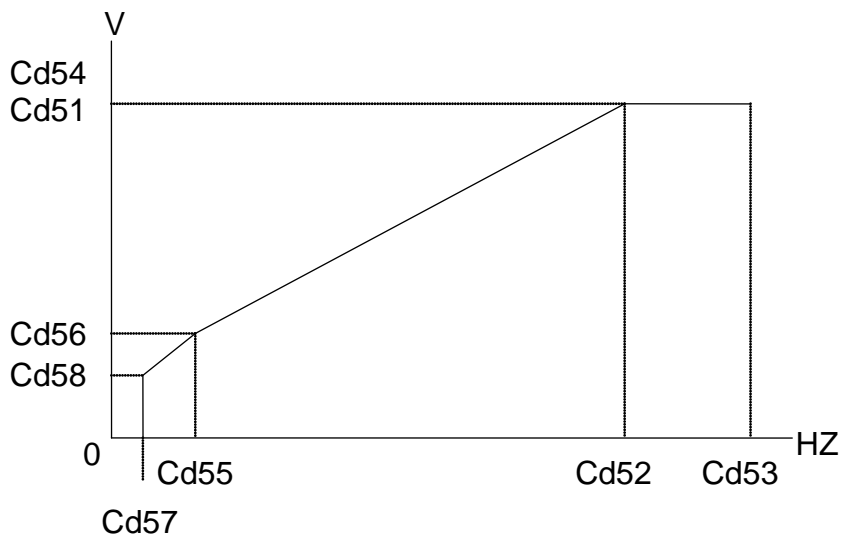


10. V/F control ■



◆ V/F free pattern setting

Setting value 15



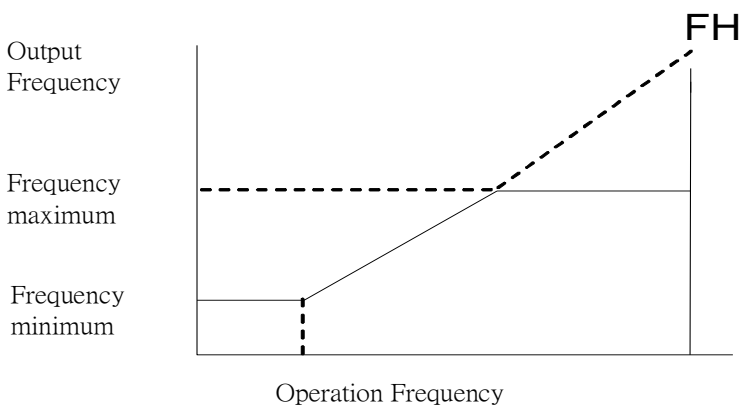
◆ V/F free pattern setting

Code No.	Function	Setting value	Factory setting	Change during operation
Cd51	Motor rated voltage	50.0~500.0	By specification	X
Cd52	Motor rated frequency (FA)	10.0 0~400.00	60.0HZ	X
Cd53	Maximum output frequency (FMAX)	10.00 ~ 400.00	60.0HZ	X
Cd54	Maximum output voltage (VMAX)	10.0 ~500.0	By specification	X
Cd55	Middle output frequency (FB)	0.0 ~400.0	3.0HZ	X
Cd56	Middle output voltage (VC)	0.0 ~500.0	By specification	X
Cd57	Minimum output frequency (FMIN)	0.0 ~400.0	0.5HZ	X
Cd58	Minimum output voltage (VMIN)	0.0 ~500.0	By specification	X

◆ Frequency command

Code No.	Function	Setting value	Factory setting	Change during operation
Cd17	Maximum frequency	10.00~400.00	60.00	X
Cd18	Minimum frequency	0.00~100.00	0.00	X

Description: Set frequency command limit to restrict working frequency when motor is running.



10. V/F control

◆ Torque mode

Code No.	Function	Setting value	Factory setting	Change during operation
Cd03	Torque mode	0~1	1	X

Description: Set initial torque automatic compensation function.

Cd03=0 Automatic torque compensation de-active, set boost by Cd07.

Cd03=1 Initial torque boost active, set maximum boost by Cd07.

◆ Torque compensation gain

Code No.	Function	Setting value	Factory setting	Change during operation
Cd07	Torque compensation gain	0.0~2.5	0.3	X
Cd50	Torque compensation delay time	0~10000	50 msec	X
Cd59	Noload current adjust (FG only)	30~150	60%	X
Cd60	Torque compensation frequency (FG only)	1.5~10	2.50 HZ	X

Description: Torque compensation is automatic function of increasing torque when the load of motor is detected too high. To measure the resistant of motor is demanded to use this function. Please use the automatic measure of motor or input known the resistant of motor CE86 °

Setting precaution:

1. Frequency torque compensation will run when operation frequency exceeds Cd60 which be set
2. Increase the value of Cd59 when unload current is too large, opposite when too small to collocate Cd60.
3. Increase gain of C4-01 when motor start and the torque is not enough.
4. Over current occurred when start, please decrease gain of Cd07.
5. Current exceed rated current when motor idled, and decrease gain of Cd07.
6. Vibration occurred when motor rotated, and decrease gain Cd07 or increase delay time Cd50.
7. Please collocate with slip compensation when operated rated speed under 3HZ is demanded.
8. Torque compensation is invalid when the resistant of motor is CE86=0 or torque compensation gain Cd07=0, operated by set V/f curve.

◆ Slip compensation setting

Code No.	Function	Setting value	Factory setting	Change during operation
CE00	Slip compensation gain (FG only)	0~2.50	0	O
CE01	Slip compensation delay time (FG only)	0~10000	500 ms	X
CE02	Restriction of Slip compensation (FG only)	0~250	200 %	X

Description:

When motor load is larger, the motor slip is higher, in the meantime, the rotate speed of motor axle will be reduced, and frequency command inconsistent. Slip compensation is slip were brought by motor capacity and use increase output frequency to make actuality rotate frequency of motor to close to frequency command. The compensation method is motor rated slip CE82 multiply frequency CE00 and add to output frequency. Due to compensation demand motor rated slip CE82 that detected by autotuning or input by the specification on nameplate.

$$\text{Slip (HZ)} = \text{rated frequency (HZ)} - \text{rated rpm (rpm)} \times \text{pole} / 120$$

Setting precaution :

1. Slip compensation is invalid when set gain of CE00 to 0.
2. In the status of loading to measure motor speed and gradually adjust gain. Increase gain when speed is too low, on the contrary to decrease gain.
3. Shrink delay time CE00 when the reaction of slip compensation is too low. Increase delay time CE01 when speed is unstable.

◆ Motor rated current

Code No.	Function	Setting value	Factory setting	Change during operation
Cd06	Motor rated current	10.0~100.0	100%	X

Description: Set motor overload protective current, in order to avoid motor failure because of overload. Set value=100, please calculate the following formula:

$$\text{Set Value} = \text{Motor rated current} / \text{Inverter rated current} \times 100$$

Ex. Use inverter with 3.7KW(5HP) to drive motor with 2.2KW(3HP)

$$\text{Inverter rated current} = 17.4\text{A}$$

$$\text{Motor rated current} = 8\text{A}$$

$$\text{Set Value} = 8 / 17.4 \times 100 = 46\%$$

11. PID control ■

◆ **PID control**

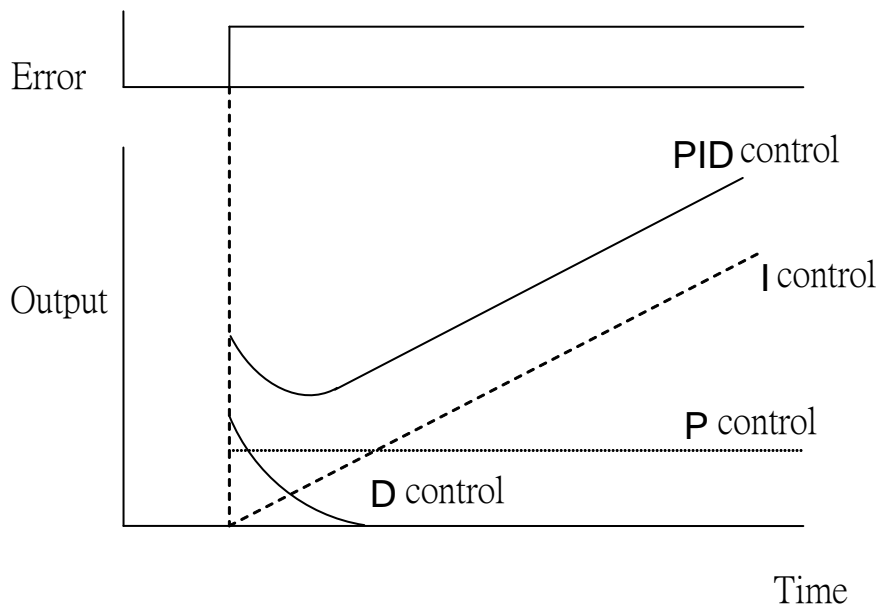
PID control is a method of making the feedback value match the set target value. By combining proportional control (P) · integral control (I) and derivative control (D), you can even control targets that you want to reach status.

The characteristics of the PID control operations as below :

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

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

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



PID control motion

■ **PID control application**

The following table shows example of PID control application using inverter:

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

◆ PID control method selecting

Code No.	Function	Setting value	Factory setting	Change during operation
CE54	Select PID control	0~4	0	X

Description : CE54 is PID control method selecting, select as following:

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

◆ PID target value setting methods

Target value setting methods as following:

Setting method	Description	Priority
Main speed frequency	Set analog input as feedback value, 10V is100%, use gain and bias setting to adjust. Set Cd32/ 35/ 38=8.	1
Analog input	Set analog terminal input of encoder card as target value.	2
P.W.M. input	Set pulse input as target value.	3
Encoder card input	Set main frequency as target value, maximum frequency is 100%.	4

◆ PID feedback value setting value

Feedback value setting methods as following:

Setting method	Description	Priority
Analog input	Set analog input as feedback value, 10V is100%, use gain and bias setting to adjust. Set Cd32/ 35/ 38=7.	1
Encoder card input	Set analog terminal input of encoder card as target value.	2
Pulse input	Set pulse input as target value.	3

11. PID control ■

◆PID adjustment methods

Use PID control when target value is fixed, observe feedback wave and proceed adjustment.

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

Code No.	Function	Setting value	Factory setting	Change during operation
CE55	Proportional control (P)	0.00~25.00	1.00	O
CE56	Integral time (I)	0.0~360.0	1.0sec	O
CE58	Derivative time(D)	0.00~10.00	0.00sec	O

◆PID output limit

Code No.	Function	Setting value	Factory setting	Change during operation
CE57	Maximum value of Integral control (I)	0.0~100.0	100.0%	O
CE59	Maximum value of PID output			O

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

◆PID output adjust

Code No.	Function	Setting value	Factory setting	Change during operation
CE60	PID offset adjust	±100.0	0.0%	O
CE61	PID output delay time	0.00~10.00	0.00sec	O
CE62	PID output characteristics selecting	0~1	0	X
CE63	PID output gain	0.0~25.0	1.0	X
CE64	PID output reverse selecting	0~1	0	X

Description: Set CE60 as % to PID output offset.

Set CE61 to PID output delay time.

Set CE62 to PID output enlarge magnification.

Set CE63 to PID output polarity, when polarity is set to 1.

Set CE64 to select PID output whether inverting, when inverted is set to 1.

◆ **PID command acceleration/ deceleration time**

Code No.	Function	Setting value	Factory setting	Change during operation
CE65	PID target value acceleration/ deceleration time	0.0~25.5	0.0sec	X

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

Notice: Due to PID output will pass by acceleration/ deceleration of Cd8, 9. If mechanical quassation was caused by setting CE65 and acceleration/ deceleration. User can reduce constant to avoid quassation.

◆ **Select position of P controller**

Code No.	Function	Setting value	Factory setting	Change during operation
CE66	Position of P controller selecting	0~1	0	X
CE67	PID delay position selecting	0~1	0	X

Description: Use CE66 to select position of P controller.

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

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

Use CE67 to select PID delay position.

PID output delay when setting value is 0.

D controls output dealy when setting value is 1.

◆ **Select step of I controller reset**

Code No.	Function	Setting value	Factory setting	Change during operation
CE68	Select I control reset	0~1	0	X

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

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

Reset command must be controlled by multi-functions input terminal (set multifunctions input Cd92~ 97 to 12).

12. Multi-step function mode ■

◆Multi-step function control frequency setting

Code No.	Function	Setting value	Factory setting	Change during operation
CE05	1 st step speed setting	0.0~400.0	0.0HZ	O
CE06	2 nd step speed setting			
CE07	3 rd step speed setting			
CE08	4 th step speed setting			
CE09	5 th step speed setting			
CE10	6 th step speed setting			
CE11	7 th step speed setting			
CE12	8 th step speed setting			
CE13	9 th step speed setting			
CE14	10 th step speed setting			
CE15	11 th step speed setting			
CE16	12 th step speed setting			
CE17	13 th step speed setting			
CE18	14 th step speed setting			
CE19	15 th step speed setting			
CE20	16 th step speed setting			

Description: Set multi-step function control speed frequency.

◆ Multi-step function time setting

Code No.	Function	Setting value	Factory setting	Change during operation
CE21	1 st step time setting	0~255	0 min	X
CE22	2 nd step time setting			
CE23	3 rd step time setting			
CE24	4 th step time setting			
CE25	5 th step time setting			
CE26	6 th step time setting			
CE27	7 th step time setting			
CE28	8 th step time setting			
CE29	9 th step time setting			
CE30	10 th step time setting			
CE31	11 th step time setting			
CE32	12 th step time setting			
CE33	13 th step time setting			
CE34	14 th step time setting			
CE35	15 th step time setting			
CE36	16 th step time setting			

Description: Set multi-step function control time.

12. Multi-step function mode ■

◆ Multi-step function mode reset

Code No.	Function	Setting value	Factory setting	Change during operation
CE48	Multi-step function mode reset	0~1	0	X

Description: Memorized of current operation step and time (in sec) while shut down or power failure. Step and time reset to 0 when set CE48=1.

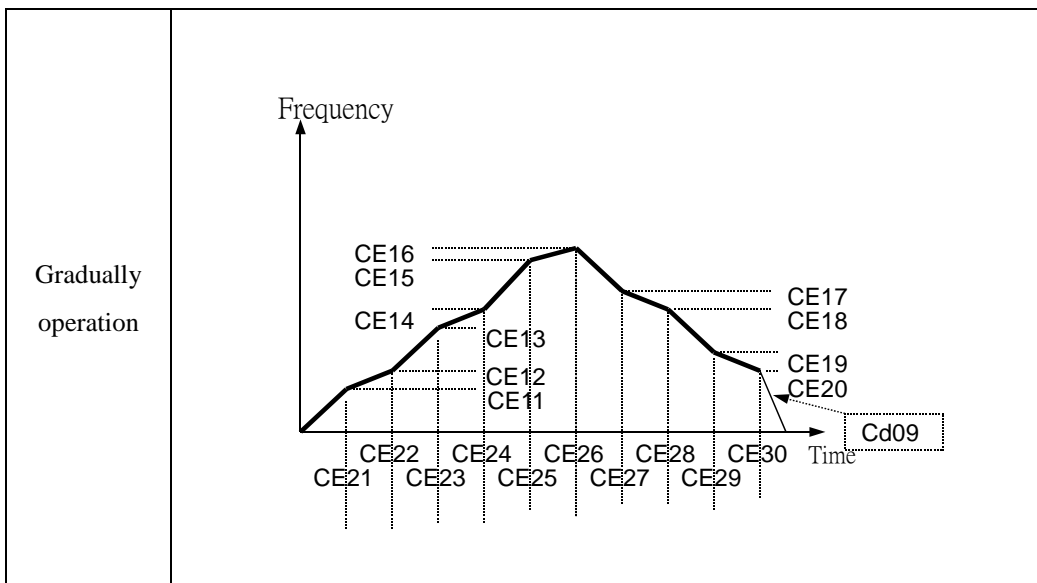
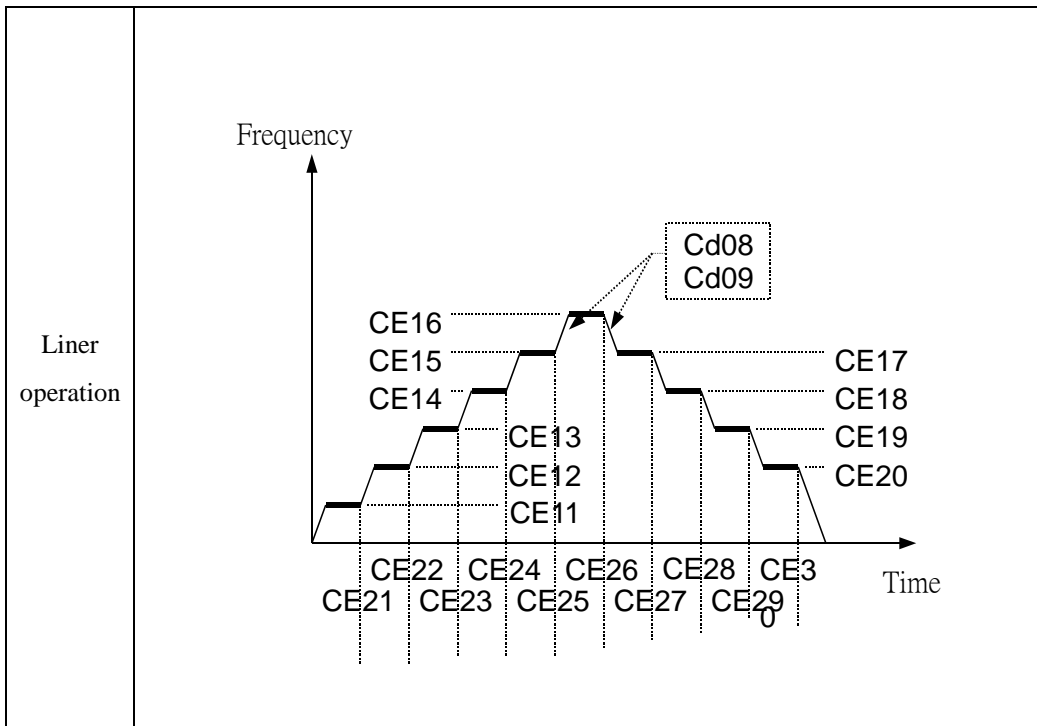
Notice: External terminal 6 set to RST function, when RST connect with COM, it will reset the records and steps time to 0.

◆ Multi-step function mode selecting

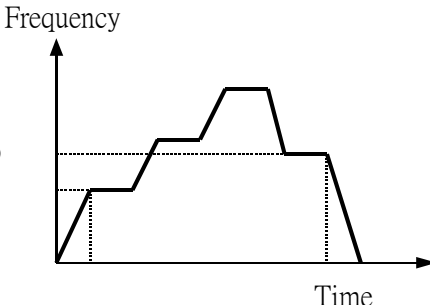
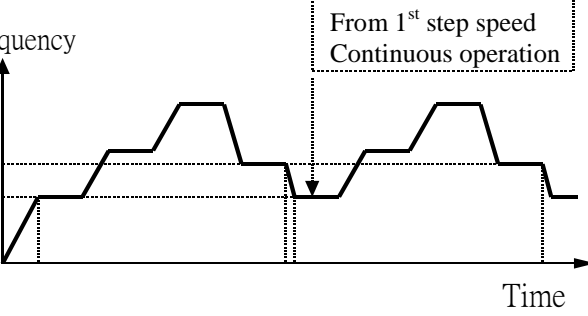
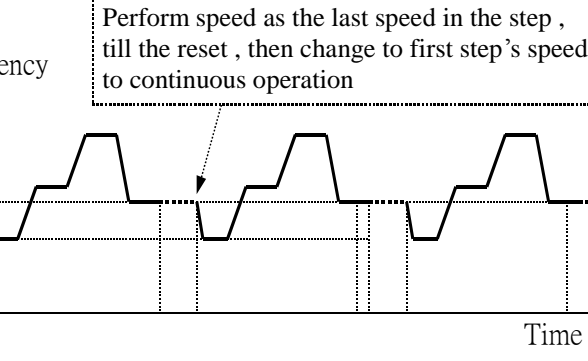
Code No.	Function	Setting value	Factory setting	Change during operation
CE47	Multi-step function mode selecting	0~6	0	X

Description: Select operation modes on speed variation when process control switch from previous step to next step.

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



12. Multi-step function mode ■



<p>Not continuous operation</p>	
<p>Continuous operation</p>	
<p>Continuous operation , perform speed as the last speed in the step till the reset</p>	

◆ **MODBUS communication**

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

■ **The physical links**

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

422/485 setting	
	
RS422	RS485

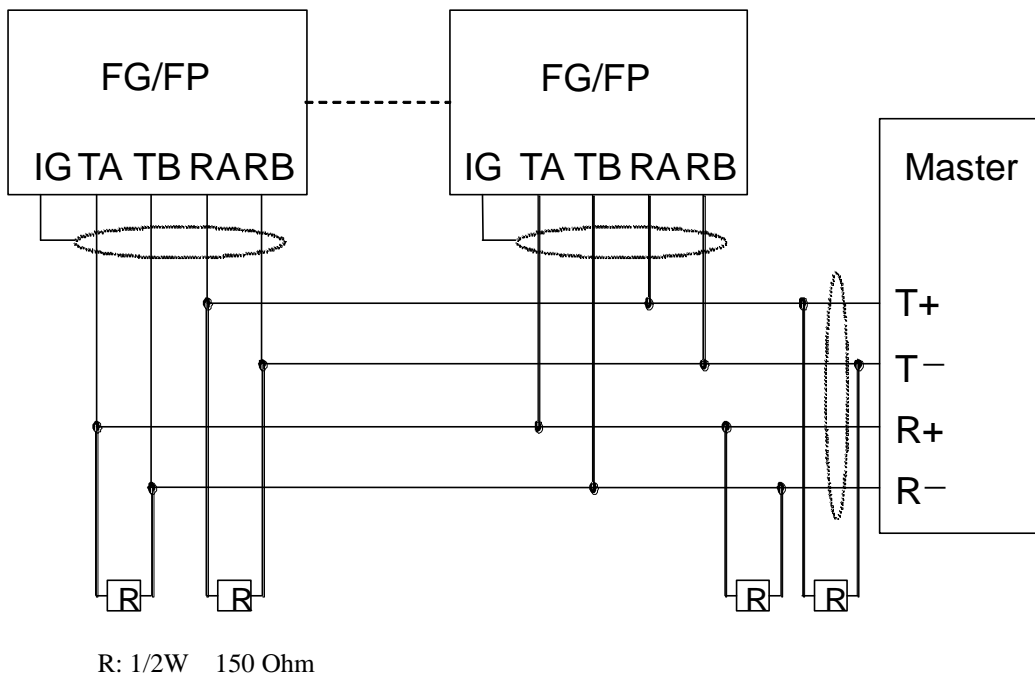


Fig. RS422 The physical links

■ The physical links (continued)

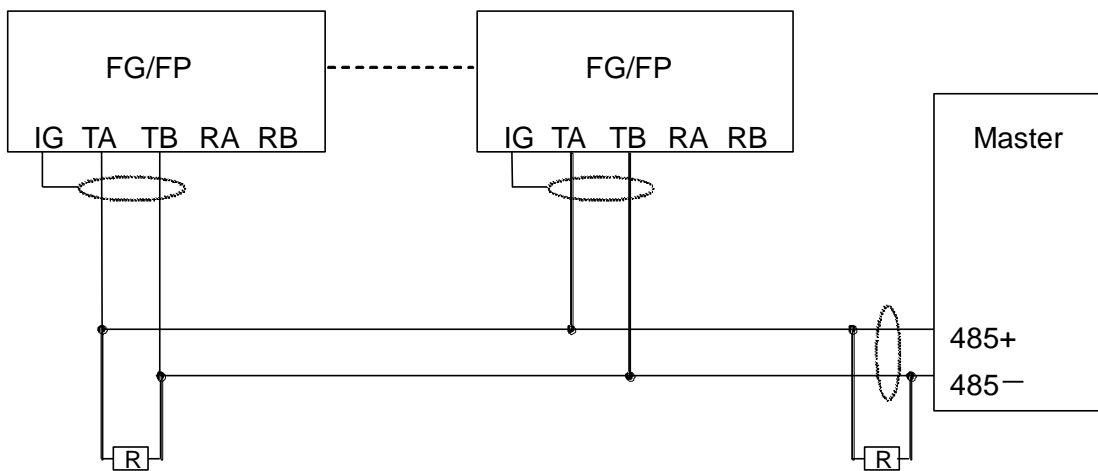


Fig. RS485 The physical links

■ Related constants

Code No.	Function	Setting value	Factory setting	Change during operation
CE70	Address(ID)	0~240	240	X

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

Code No.	Function	Setting value	Factory setting	Change during operation
CE71	Baud rate	0~3	3	X

Description: available baud rate setting

Setting value	Buad rate	Setting value	Buad rate
0	1200 bps	2	4800 bps
1	2400 bps	3	9600 bps

Code No.	Function	Setting value	Factory setting	Change during operation
CE72	Communication respond wating time	2~65	2ms	X

Description: When inverter receive a data, it will send the response data after CE72 time, it is used mainly when Master process speed slower or TE single delay time of two wires communication.

Code No.	Function	Setting value	Factory setting	Change during operation
CE74	Parity bit check	0~2	0	X

Description : Setting value

0: disable

1: even parity bit

2: odd parity bit

◆ **MODBUS communication command**

Function	Data	Setting	MODBUS Address
Operation command (d1-09)	FR	1	72
	RR	3	
	STOP	4	

◆ **MODBUS communication command**

Function	Data	Setting	MODBUS Address
Operation status (d1-08)	Stand by	12	71
	Forward	3	
	Reverse	15	
	Forward standing by	1	
	Reverse standing by	13	
	Forward is modified to reverse	5	
	Reverse is modified to forward	7	

13. MODBUS communication ■

◆ MODBUS communication malfunction status list

Function	Data	Setting	MODBUS Address
Operation status (d1-10)	NONE	0	73
	OC	1	
	OU	2	
	OH-A	6	
	OH-b	7	
	OL-A	8	
	OH	19	
	Fb	21	
	OCPn	23	
	OCPd	24	
	OCPA	25	

■ Data structure

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

Function 03H: Read holding registers

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

RTU Mode:

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

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

Function 06H: write single register

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

RTU Mode:

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

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

CRC Generation :

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

CRC Generation (continued):

Pseudo code for generating a CRC-16 :

```

CONST ARRAY BUFFER    /* data , ex: 11h, 03h, 00h,6bh,00h,02h */
CONST WORD POLYNOMIAL = 0a001h    /* X16 = X15 + X2 + X1 */
/* SUBROUTINE OF CRC CALCULATE 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;
    }
  };
};
};

```

14. Protective function ■

◆ Stall protective function

Code No.	Function	Setting value	Factory setting	Change during operation
Cd68	Stall prevention selection during acceleration	0~1	1	X
Cd69	Stall prevention level during acceleration	30~200	125%	X

Description : When a heavy load is placed on the motor or acceleration time is too short during acceleration. Due to current output too much to lead inverter to over current, it can prevent from motor stall. The inverter will stop accelerating when output current exceeds Cd69 during acceleration.

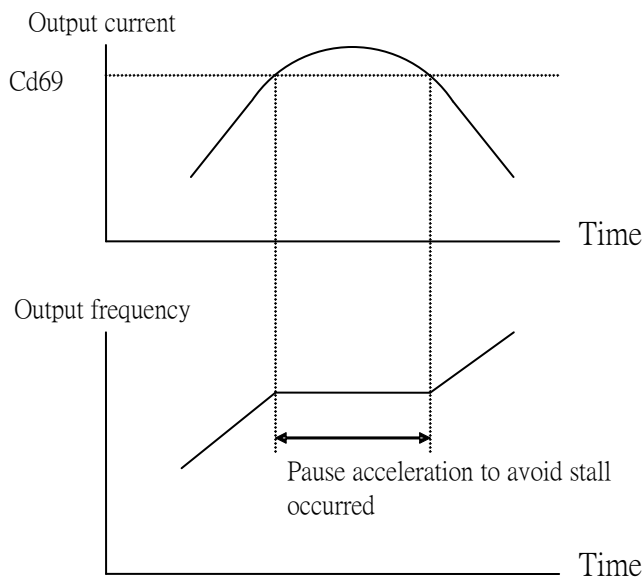
Cd68= 0, invalid

= 1, valid

Cd69: setting method : Set inverter rated current to 100%.

※ CT2000FG Cd69 factory setting value is 160%

CT2000FP Cd69 factory setting value is 125%

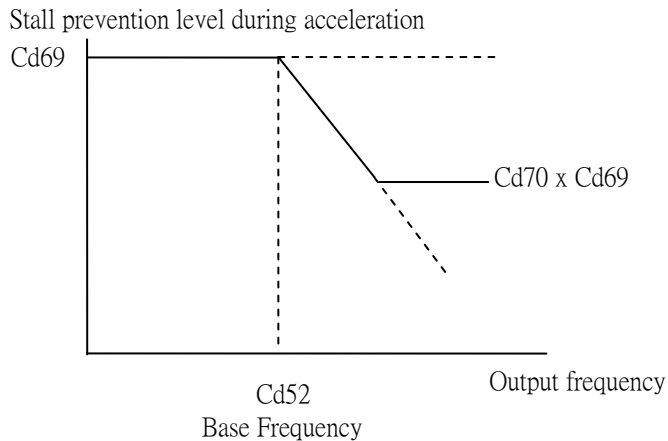


Stall prevention in acceleration

◆ Stall prevention limit during acceleration

Code No.	Function	Setting value	Factory setting	Change during operation
Cd70	Stall prevention limit during acceleration	30~100	50%	X

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

◆ Stall prevention limit during deceleration

Code No.	Function	Setting value	Factory setting	Change during operation
Cd71	Stall prevention limit during deceleration	0~1	1	X
Cd72	Over voltage prevention active point	0~50	20	X

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

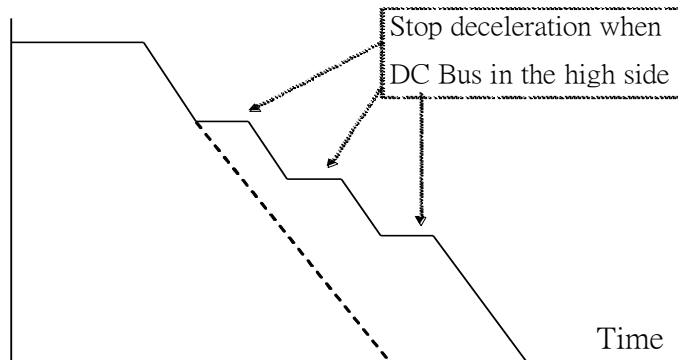
Cd71 =0, invalid
=1, valid

Description : This is to adjust the over voltage protection active point and when over current occurred.

Cd72: Over voltage protection active point : 220V series (20V=355+20=375 Vdc)
380V series (20V=570+20=590 Vdc)

14. Protective function ■

Output frequency



◆ Stall prevention limit during constant speed

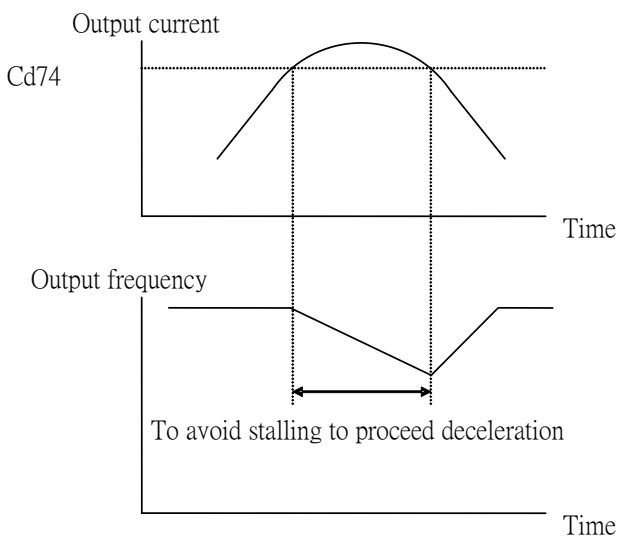
Code No.	Function	Setting value	Factory setting	Change during operation
Cd73	Stall prevention selection during constant speed operation	0~1	1	X
Cd74	Stall prevention level during constant speed operation	30~200	125%	X

Description : A heavy load is placed on the motor when constant operation and makes inverter output current exceed Cd74 setting value. The inverter will automatical reduce output frequency to prevent the motor from stall (OC/OL). When a load disappeared or lightened and makes inverter output current be samller than Cd74 setting value. The inverter will automatical accelerate to work frequency.

Cd73= 0, invalid

= 1, valid, decelerated by Cd11 deceleration time.

Cd74 setting method: Set 100% as inverter rated current.



◆ Speed search function

Code No.	Function	Setting value	Factory setting	Change during operation
Cd75	Input voltage active point	155~500	By spec.	X

Description : The function is setting input voltage.

Cd-75=220 : The inverter is working voltage $220 \times 0.85 = 187 \text{ Vac}$
 Cd-75=380 : The inverter is working voltage $380 \times 0.85 = 323 \text{ Vac}$ (The set not be lower than 310Vac)
 Cd-75=415 : The inverter is working voltage $415 \times 0.85 = 352 \text{ Vac}$ (The set not be lower than 340Vac)
 Cd-75=440 : The inverter is working voltage $440 \times 0.85 = 374 \text{ Vac}$ (The set not be lower than 360Vac)
 Cd-75=460 : The inverter is working voltage $460 \times 0.85 = 391 \text{ Vac}$ (The set not be lower than 376Vac)

◆ Motor rated voltage/ frequency restore initialize

Code No.	Function	Setting value	Factory setting	Change during operation
CE96	Restore initialize value of motor voltage	0~3	0	X
CE97	Restore initialize value of motor frequency	0~1	0	X

Description: CE96 : 0:380V 1 : 415V 2 : 440V 3 : 460V (except 220V series)

CE97 : 0: 50HZ 1: 60HZ (220V series is fixed 60HZ)

※ **Description:** CE96, 97 accommodate to CD99 is the function of recovering factory value, partly or all of constants can be recovered factory value.

◆ Low voltage demonstration

Code No.	Function	Setting value	Factory setting	Change during operation
CE80	Low voltage demonstration	0~1	1	X

Description: If input voltage be lower keypad show LU-b

CE80 =0: maintains the LU-B demonstration

CE80 =1: Not maintains the LU-B demonstration

14. Protective function ■

◆Speed search function

Code No.	Function	Setting value	Factory setting	Change during operation
Cd28	Speed search selection	0~3	0	X
Cd76	Speed search operating current	0~200%	120%	X
Cd77	Speed search deceleration time	0.1~10.0	2.0S	X
Cd78	Speed search waiting time	0.0~20.0	0.2S	X

Description : The speed search function finds the actual speed of motor that is Rotational using inertia, and then starts smoothly from that speed. When restoring power after a temporary power loss or Rotational using inertia fan is enable. There are two ways of speed search by set Cd28.

Cd28= 0, invalid

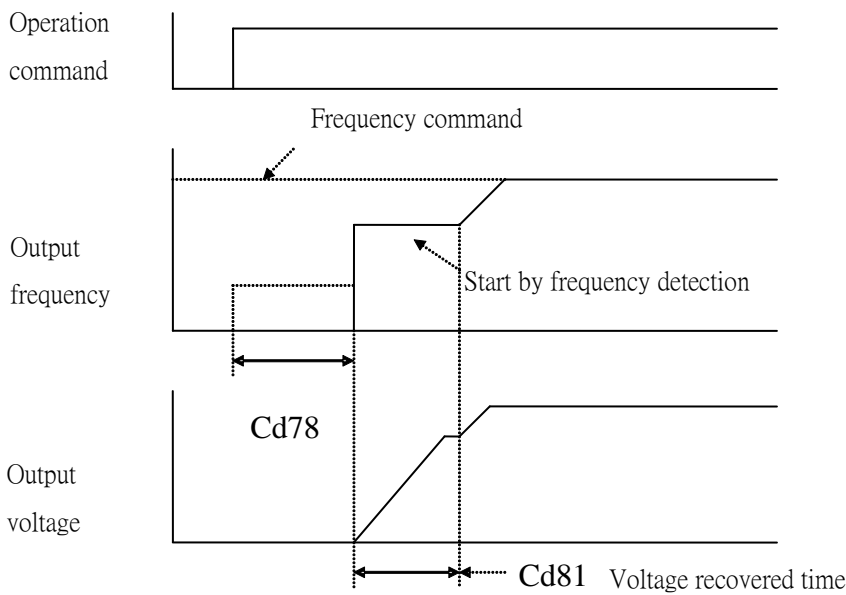
= 1, valid, MCK feedback (above 3HP)

= 2, valid, current detection

= 3, valid, MCK disconnection start+ inertia start

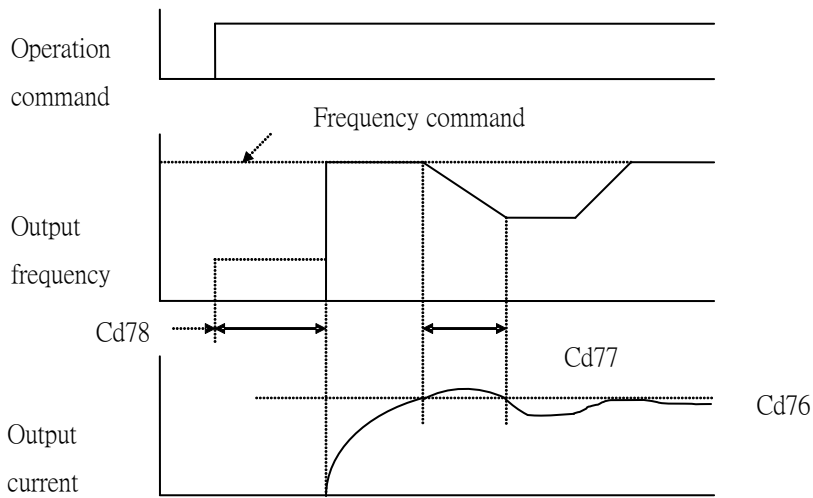
■ Cd28=1

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



■ Cd28=2

Current detect + MCK feedback speed search : Start searching motor speed by frequency command or maximum output frequency, when output current is over 120% rated current in searching and start by decreasing output frequency, after current is lower than 120% rated current, then proceed regular operation.



■ Cd28=3

MCK disconnection start + inertial start: PCB control circuit is unable to operate when disconnection or power voltage is too low. This function is able to automatic search speed and restore setting frequency to operate normal when power reconnection.

14. Protective function ■

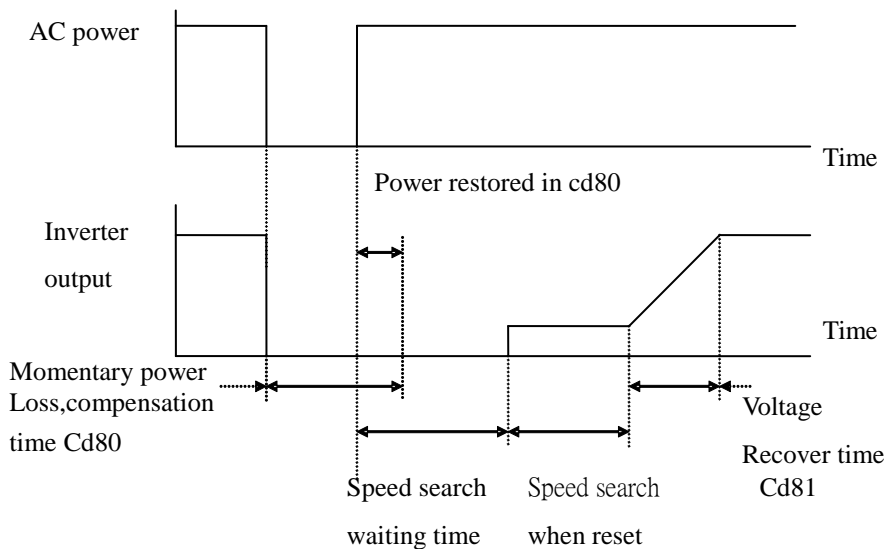
◆ Power is restored then restart automatically after momentary power loss

Code No.	Function	Setting value	Factory setting	Change during operation
Cd79	Momentary power loss direction	0~2	0	X
Cd80	Momentary power loss compensation time	0~2.0	0.1sec	X
Cd81	Voltage recovery time	0.0~20.0	0.3sec	X

Description: If a temporary power loss occurs, user can restart the inverter automatically after power restored to continue motor operation. To restart the inverter after power restored, set Cd79= 1 or 2.

If Cd79= 1, when power is restored within the time set in Cd80, the inverter will restart. If the time is over, UV (under voltage) will be detected.

If Cd79= 2, when power is restored while the control power supply is kept CPU to work, the inverter will resart UV (under voltage) will be cleared automatically. Speed search setting is collocated when use momentary stop and restart.



◆ **Overheating protection**

Code No.	Function	Setting value	Factory setting	Change during operation
Cd82	Inverter overheating forecast detection level	50~100	90%	X
Cd83	Motion when Inverter overheating forecast detection	0~3	3	X
Cd84	Temperature protection level	50~130	85°C	X

Description: Set action when inverter detects action point and overheating.

Set Cd84 to Inverter overheating detection level. OH1 is displayed and inverter will stop free run when it is detected. Cd82 set Inverter overheating forecast level, set Cd84 to 100%. Select operation by Cd83 when overheating forecast occurred.

Cd83 setting value	Description
0	Deceleration stop (Inverter is stopped by set deceleration time)
1	Coast stop
2	Emergency stop (Inverter is stopped by Cd11)
3	Continuous operation, OH b displays overheating forecast

◆ **Motor overload protection**

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

(1) CT2000FG、E2: Set protection point of motor to be 150% of motor rated current, overload time is 60 sec, OLA is displayed when overload occurred, motor stops free run.

(2) CT2000FP: Set protection point of motor to be 120% of motor rated current, overload time is 60 sec, OLA is displayed when overload occurred, motor stops free run.

15. Environment setting

◆Speed multiplier/ gear ratio

Code No.	Function	Setting value	Factory setting	Change during operation
Cd46	Speed multiplier/ gear ratio	0~150.00	1	0

Description: The function shows revolution speed multiplied by a scaling factor on the Display. Comply with d1-34.

Notice:

1. HZ and A LED de-active.
2. RPM = Frequency ×Cd46.
3. If the value overflow, it will show “9999”.

◆DC Bus fine tune

Code No.	Function	Setting value	Factory setting	Change during operation
Cd67	DC Bus fine tune	± 15.0V	0.0V	X

Description: This function is to adjust the calibration of voltage positioning on DC BUS between detected and actual position. The display value is higher when set at bigger figure.

Cd67: 220V series, when setting value > 15V equal to 15V ◦
400V series, can set up to 30V.

◆Dyynnamic break

Code No.	Function	Setting value	Factory setting	Change during operation
Cd64	Dynamic braking mode	0~1	1	X
Cd65	Dynamic braking voltage level	0~40	20	X

Description: Set action level and mode when set dynamic break.

Cd64=0 De-active when operation.

Cd64=1 Dynamic braking can be active during acceleration and deceleration, but not active during constant speed operation.

Cd65(Dynamic braking voltage level) : This function adjusts action point of inverter dynamic break.

For example of 220V series: Set 20V equal to $350+20=370V_{dc}$

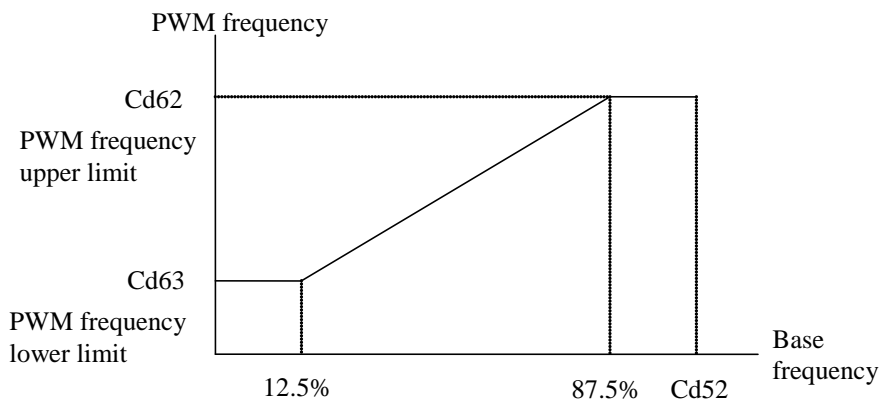
◆ PWM frequency

Code No.	Function	Setting value	Factory setting	Change during operation
Cd61	Select PWM frequency	0~15	2	X
Cd62	PWM frequency upper limit	2.0~8.0	6 KHZ	X
Cd63	PWM frequency lower limit	2.0~8.0	3KHZ	X

Description: Constant CD61 can set PWM frequency, the list as below:

Setting value	PWM frequency	Setting value	PWM frequency
0	2K HZ	5	6K HZ
1	3K HZ	6	7K HZ
2	3.5K HZ	7	8K HZ
3	4K HZ	8~14	4K HZ
4	5K HZ	15	Setting by Cd62, Cd63

PWM frequency will become the variable one when Cd61 setting value is 15, Set maximum value by Cd62, Set minimum value by Cd63. Set Cd62 as fixed PWM frequency when Cd62 < Cd63.

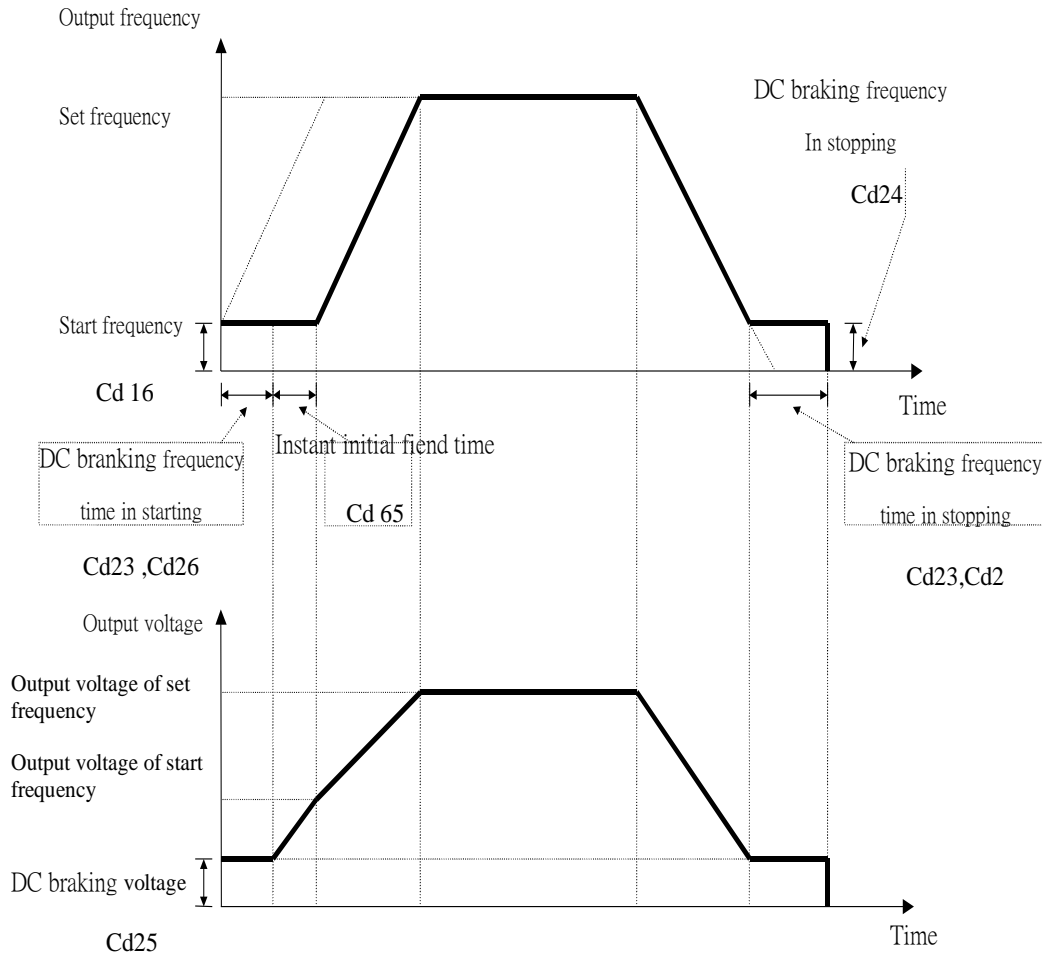


15. Environment setting

◆ Instant initial field time

Code No.	Function	Setting value	Factory setting	Change during operation
Cd66	Instant initial field time	0.00~20.00	0.2	X

This function is to adjust instant initial field current of motor. Shorter of the time, higher of the field current .



◆ Motor specification

Code No.	Function	Setting value	Factory setting	Change during operation
CE82	Motor slip	0.00 ~ 20.00	2.00HZ	X
CE83	Motor Noload current	10.0 ~ 100.0	30.0%	X
CE84	Motor pole	2~8	4 pole	X
CE85	Motor leakage inductance	0.0~40.0	0%	X
CE86	Motor resistance (RS)	0.000 ~65.000	By specification	X
CE87	Select load	0~1	1	X

Description: CE82~86 : The motor values are shown after execute autotuning.
(CE82~85for FG –Type only)

CE87 : Inverter load specification of inverter (FG –Type only)

1: 150% overload (heavy load model)

2: 120% overload (light load moodel)

◆ Data lock

Code No.	Function	Setting value	Factory setting	Change during operation
Cd98	Data lock	0~2	2	X
CE98	User password	0~9999	0	X
CE04	Password input	0~9999	0	X

Information : Data lock to prevent unperfesional operator to input unsuitable data.

Cd98=0 Read only mode: Data lock, but operation frequency could be input by numeric keys or incresement ,
decesment keys.

Cd98=1 Simple mode: Some constants could be read and modified.

Cd98=2 Macrocosm mode: All constants could be read and modified.

◆ Password input

Description: Some environment setting constants can be changed by input password correctly.

■ Read only mode

Constants only could be read, and not modified after set Cd98=0. The rest of constants are locked, beside Cd98, Cd00 frequency command and Cd15 jog frequency could be modified. Select sequence of constants like simple mode at read mode.

If must change other parameters. In function CE04 setting User password (CE98) and setting Cd-98=2.

15. Environment setting

■ Macrocosm mode

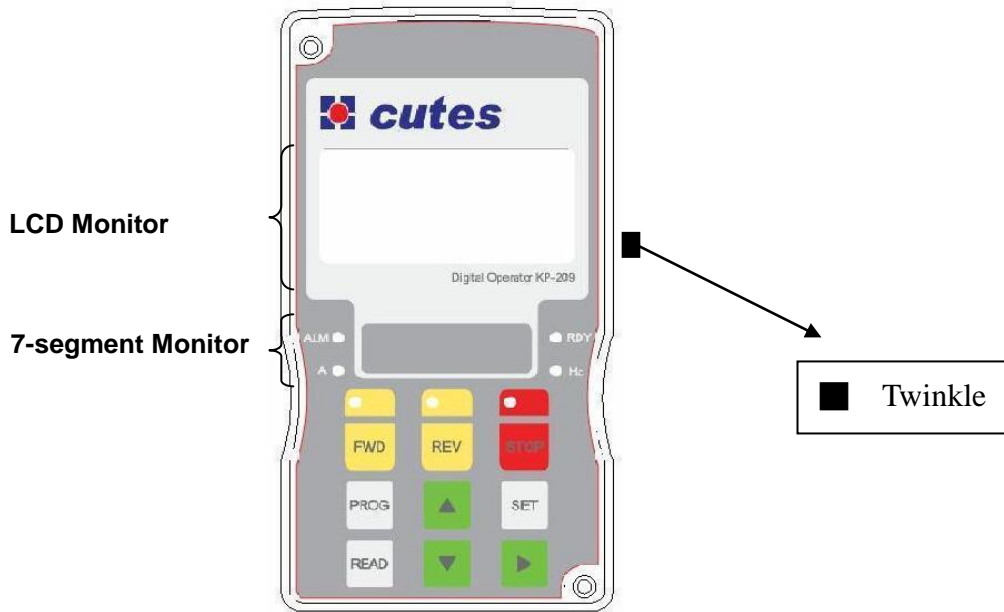
All constants could be read and modified after set Cd98=2.

■ Simple mode

The constant setting were modified to be simple mode after set C98=1. Simple mode provides 20 common use constants for operators to use and modify, the sequence as below:

Sequence	Constant NO.	Constant name	Page
1	Cd00	Frequency setting	P49
2	Cd01	Frequency command selecting	P51
3	Cd02	Operation display content	P50
4	Cd04	Operation command selecting	P52
5	Cd05	V/F curve selecting	P64
6	Cd06	Motor rated current	P69
7	Cd08	Acceleration time 1	P52
8	Cd09	Deceleration time 1	P52
9	Cd12	Frequency command 2	P60
10	Cd13	Frequency command 3	P60
11	Cd14	Frequency command 4	P60
12	Cd15	Jog frequency	P59
13	Cd44	Stop method selecting	P53
14	Cd51	Motor rated voltage	P67
15	Cd53	Maximum output frequency	P67
16	Cd54	Maximum output voltage	P67
17	Cd56	Middle output voltage	P67
18	Cd58	Minimum output voltage	P67
19	Cd61	PWM frequency selecting	P95
20	Cd98	Data lock	P97

◆LCD key function



Description:

1. Use ▲、▼ to switch the content of 7-segment after input power.
2. When monitor LCD display, press ►. ■ twinkle is viewing, press ▲、▼ LCD display is switchable. 7-segment monitor keeps original constant. ■ will not twinkle after press ► again, then use ▲、▼ to 7-segment monitor content.

◆LCD display permutation group

Code No.	Function	Setting value	Factory setting	Change during operation
CE75	LCD permutation selecting	0~2	0	X
CE76	LCD group selecting	0~3	0	X

Description:

- CE75=0 : LCD can show 2 combinations constants
- CE75=1 : LCD can show 4 combinations constants
- CE75=2 : LCD can show 8 combinations constants
- CE76 : Accommodate CE75 to select LCD display group content.

CE76=0	
F output frequency	U output voltage
A output current	H module temperature
Frequency command	M MCK
Pn DC BUS voltage	r RPM

15. Environment setting

CE76=1	
F output frequency	U output voltage
A output current	H module temperature
Frequency command	r RPM
Pn DC BUS voltage	Kg

CE76=2	
F output frequency	H module temperature
A output current	r RPM
Pn DC BUS voltage	D (day)
U output voltage	hr (hr : min)

CE76=3	
F output frequency	H module temperature
A output current	CS $\cos \theta$
Pn DC BUS voltage	Pw power
DI terminal status	KW KW-H

DI terminal status

S1	S2	S3	S4	S5	S6	RR	FR
1	2	4	8	16	32	64	128

◆IN1 transformer magnification value

Code No.	Function	Setting value	Factory setting	Change during operation
CE81	IN1 transform magnification value	0.0~ 50.0	10.0	X

Description: This function is Screen indicates kg value. (IN1*CE81) ◦

◆ Initialize data

Code No.	Function	Setting value	Factory setting	Change during operation
Cd99	Initialize data	0~5	0	X

Setting value	Content
0	Invalid
1	Recover auto procedure operation constant Cd08~Cd11 , CE05~CE20 , CE21~CE36
2	Recovering factory value Uncontain auto procedure operation constant Cd08~Cd11 , CE05~CE20 , CE21~CE36
3	Recovering factory value Uncontain auto procedure operation constant Cd08~Cd11 , CE05~CE20 , CE21~CE36 and motor constant Cd05 , Cd06 , Cd17 , Cd18 , Cd50~Cd58 , Cd75~Cd78
4	All Initialize data recover
5	Eliminate error record

16. Troubleshooting table ■

Description of alarm display indications

Error indication	Description of fault operation	Item for inspection	Processing
Err	Operation error	Was the unit operated as indicated in the manual	Use the correct procedure
ErO	Operation error of internal ROM, RAM	Switch off the power and then apply again	Replace the unit
ErC	Error of internal CPU	Is there a large amount of external noise	Check the contact absorber. Install a noise filter
OCPA	In acceleration instantaneous over current	Was there rapid acceleration	Lengthen the acceleration time
OCPd	In deceleration instantaneous over current	Was there rapid deceleration	Lengthen the deceleration time
OCPn	In constant speed instantaneous over current	Was there any variation in the load	Lengthen the time for the load variations
OC	Over current (200% rated current)	Was there rapid acceleration / deceleration and variation in the load	Lengthen the acceleration and deceleration time and reduce the load
OCS	Output short circuit or ground detected	Is there a short circuit for the output or grounding for the motor	Perform a megger check for the motor
OU	DC link over voltage	Was there fast deceleration, or fast voltage	Lengthen the deceleration time. Investigate the use of the optional DBR
LU	Insufficient voltage detected due to power failure or instantaneous power loss.	Is there a low voltage at power, or internal inverter wiring error	Improve the voltage condition and confirm inverter model
LU A	Insufficient voltage detected due to power failure or instantaneous power loss. And the auto save function is working	Is there a low voltage at power, or internal inverter wiring error	Improve the voltage condition and confirm inverter model
LU b	Insufficient voltage detected due to power failure or instantaneous power loss. And the auto save function is working	Is there a low voltage at power, or internal inverter wiring error	Improve the voltage condition and confirm inverter model
OH	Overheating of the cooling fan detected	<ol style="list-style-type: none"> 1. Cooling fan stops 2. Ambient temperature too hot 3. Motor being overload 	<ol style="list-style-type: none"> 1. Exchange the cooling fan 2. Lower the ambient temperature 3. Check the load conditions
OL	Overload detected for more than one minute	Is the motor being overloaded	Increase the capacity of the inverter and motor
OL b	Over load alarm for more than one minute	Is the motor being overloaded	Increase the capacity of the inverter and motor
PLU	Power voltage too low	Is power voltage too low	Improve power supply condition
Fb	Fuse blown	Is the fuse blown	Change a fuse

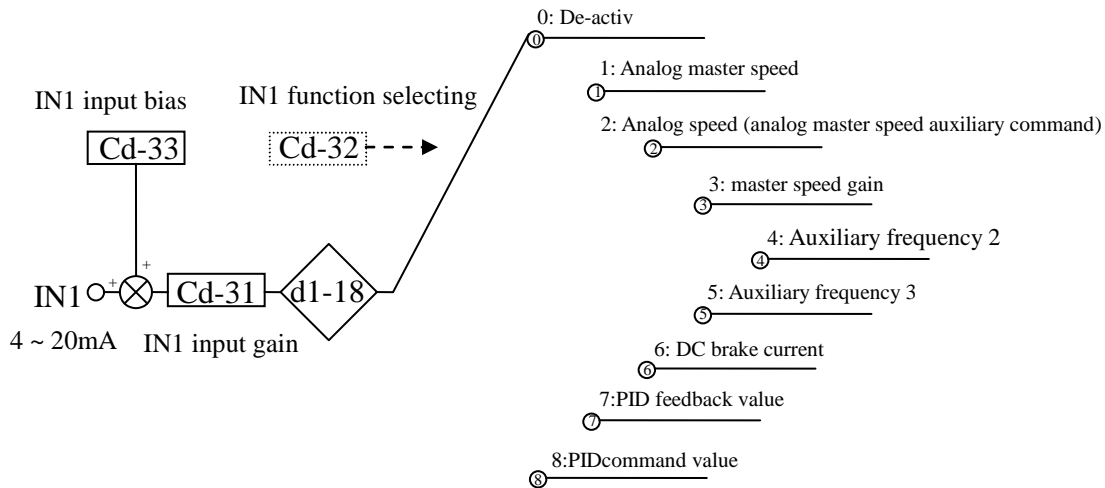
*OL A、OL b : FG Over load 150% 1 Minute、FP Over load 120% 1 Minute

Error indication	Description of fault operation	Item for inspection	Processing
bUOH	DBR overheat detected	Is the braking ratio appropriate	Reduce GD^2 of load or lengthen deceleration time
Free	Emergency switch operation	Check S6 or COM short or not	Open S6 and COM
5Er	Double chips abnormal	Switch off the power and then apply again	Replace the unit
Er3	Keypad communication abnormal	Check the wiring of keypad lost or not	Replace the cable

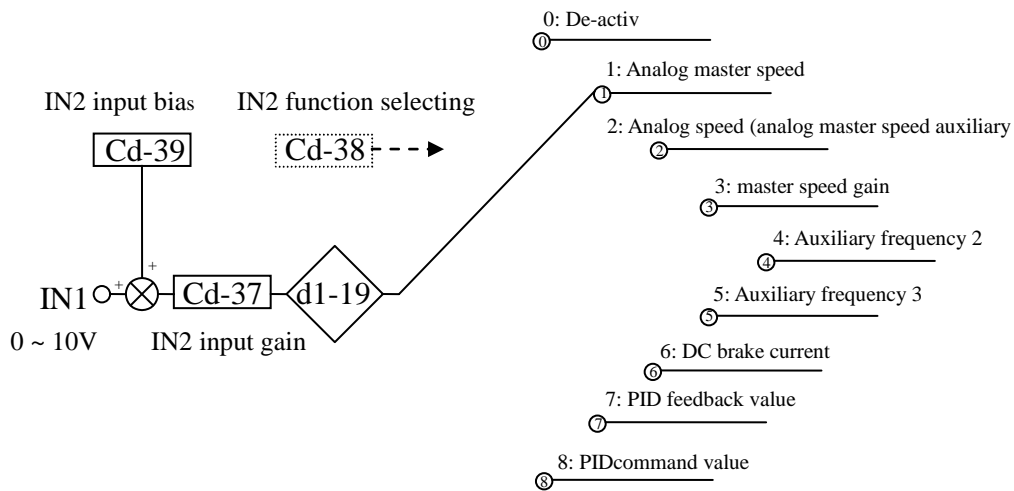
17. Control procedures chart ■

◆ Analog input terminal

Analog input terminal IN1

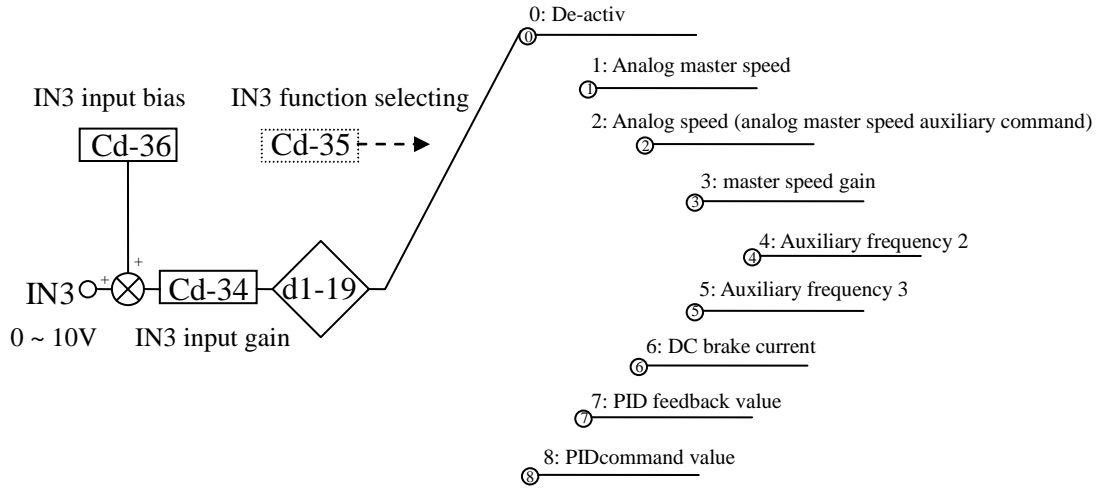


Analog input terminal IN2

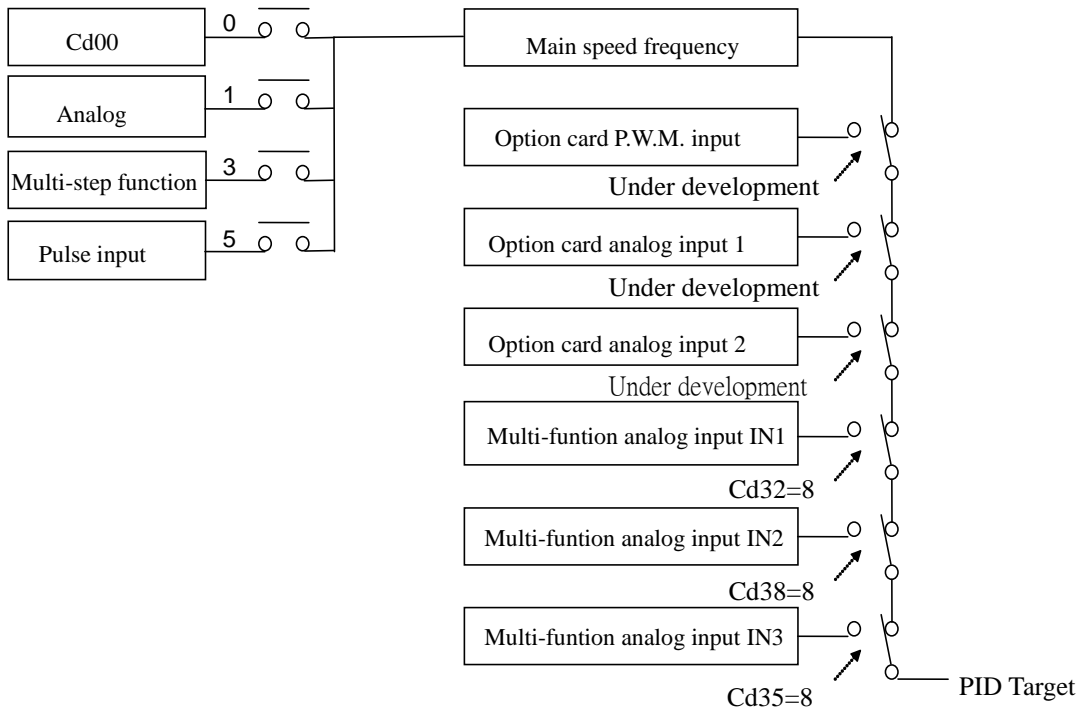


◆ **Analog input terminal**

Analog input terminal IN3

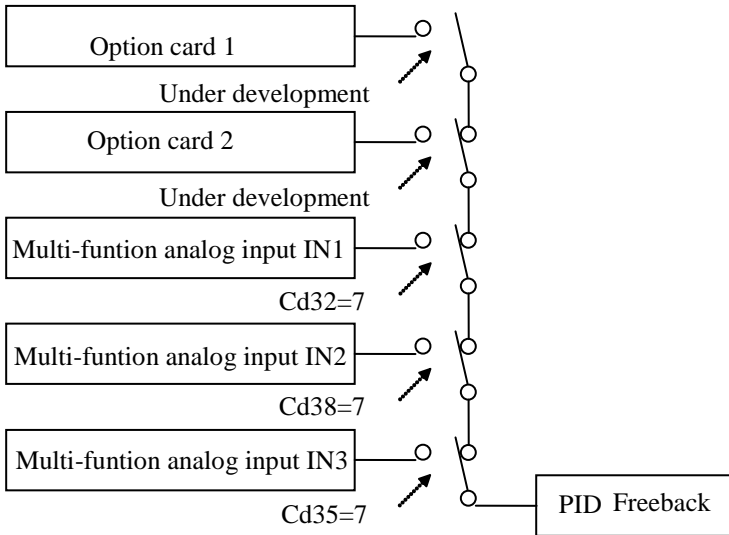


◆ **PID control**

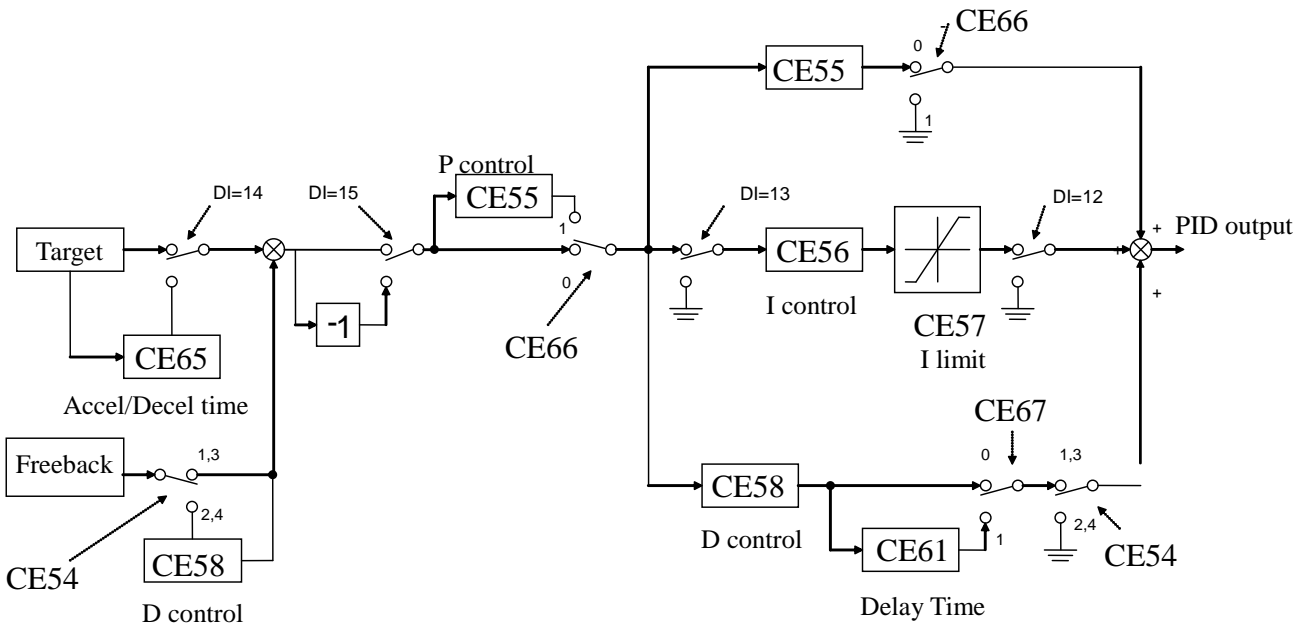


17. Control procedures chart ■

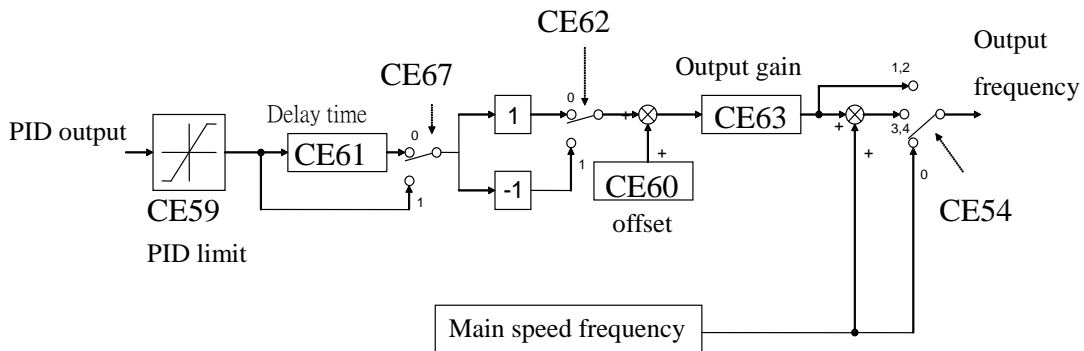
◆ PID control



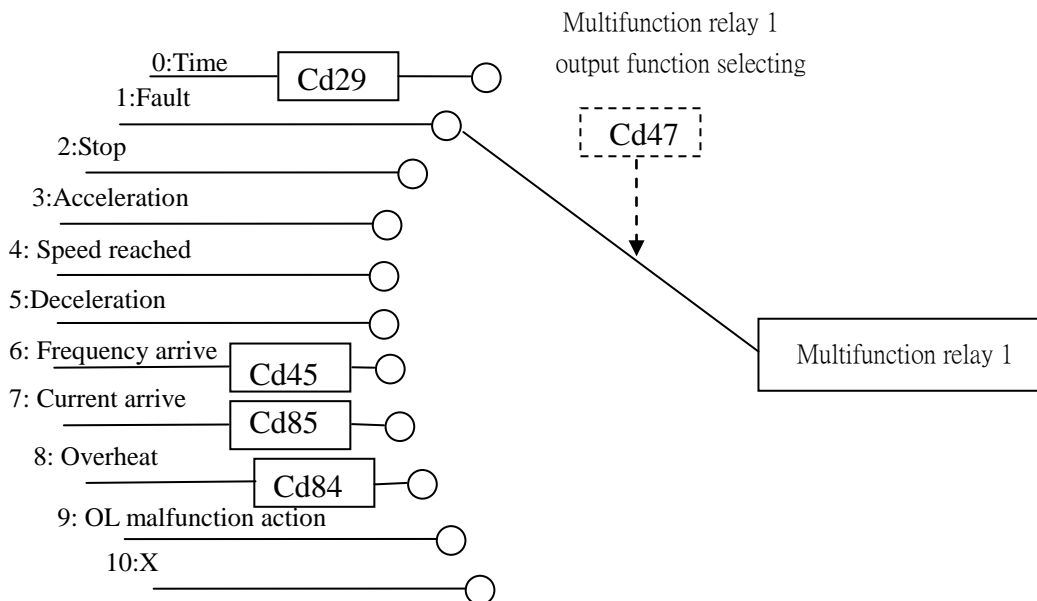
◆ PIDcontrol block 1



◆ PID control block 2

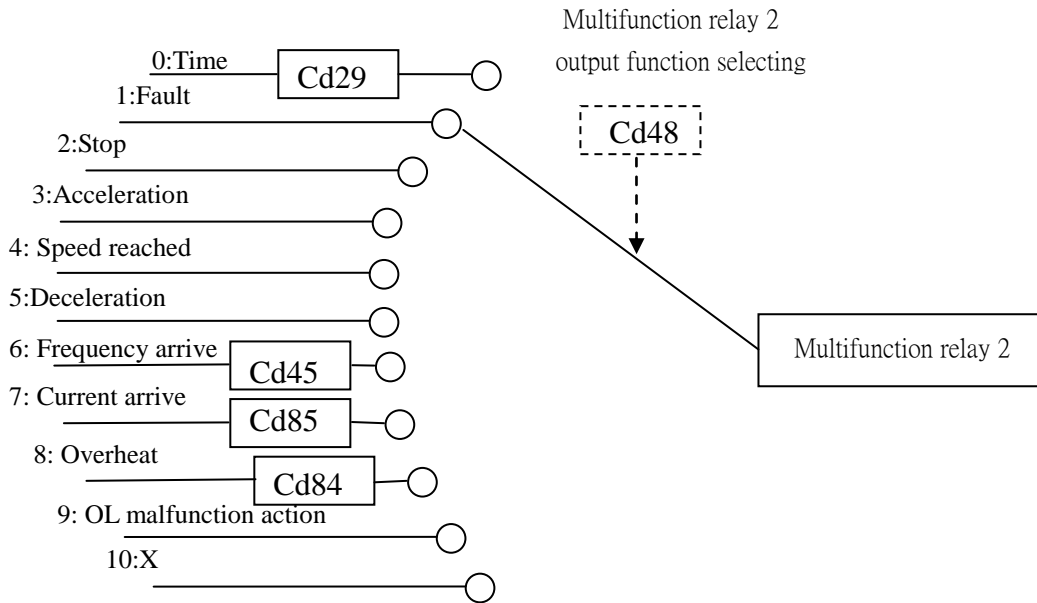


◆ Relay input terminal 1

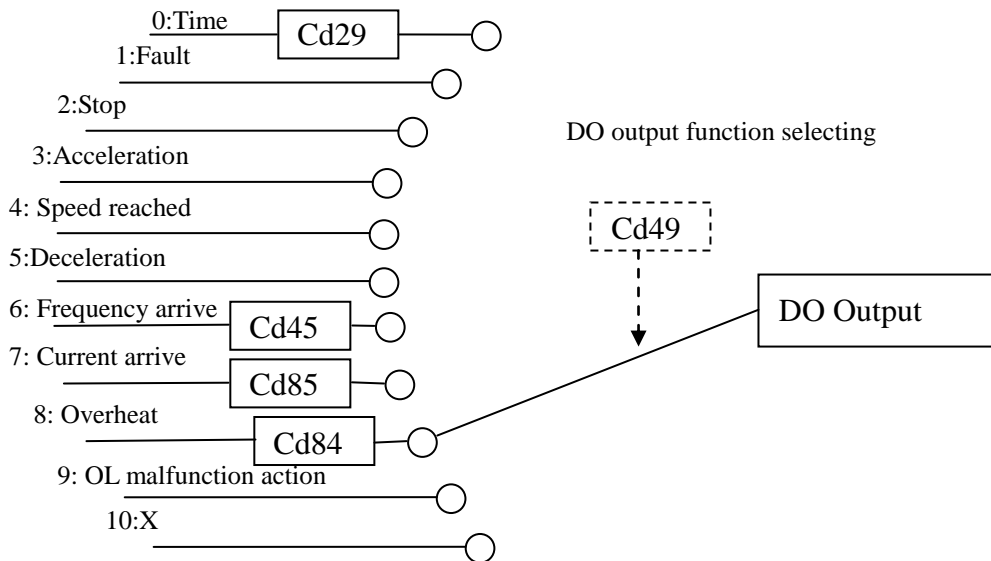


17. Control procedures chart ■

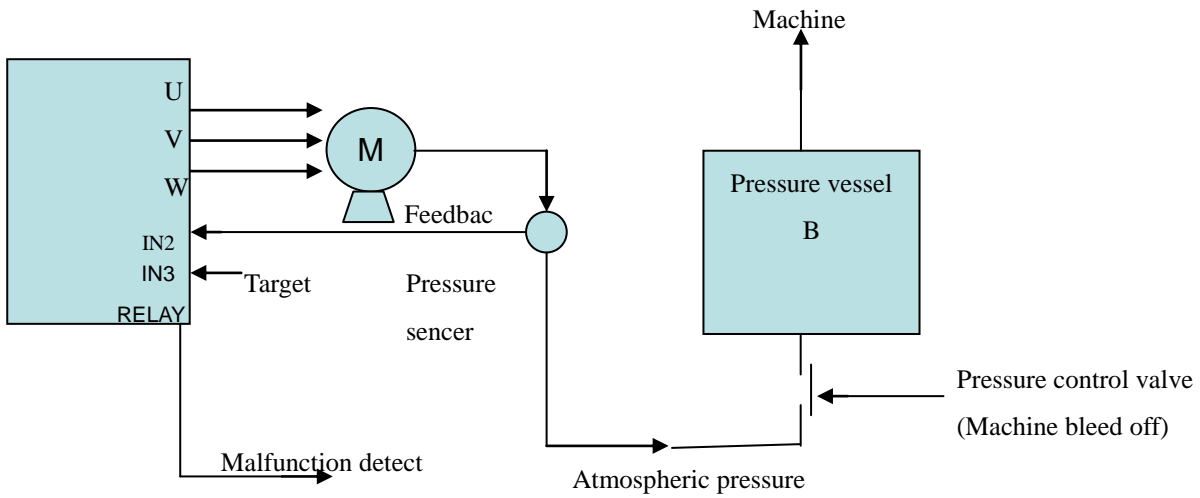
◆ **Relay input terminal 2**



◆ **D0 input terminal**

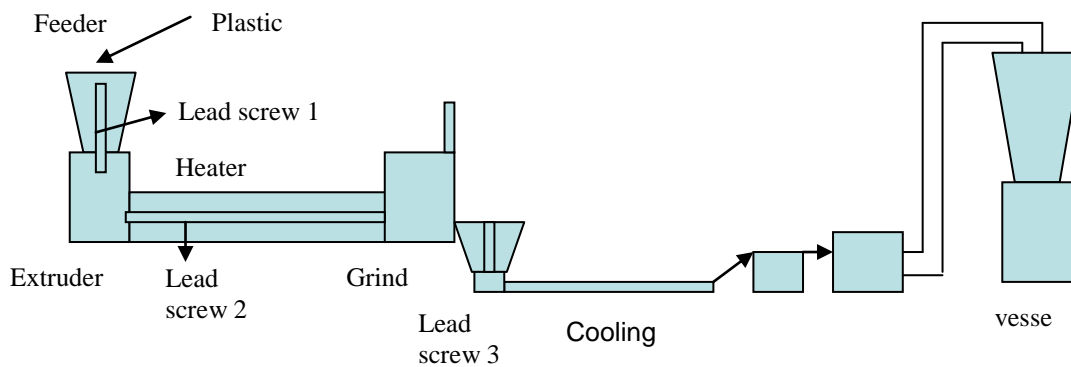


◆ Application of compressor



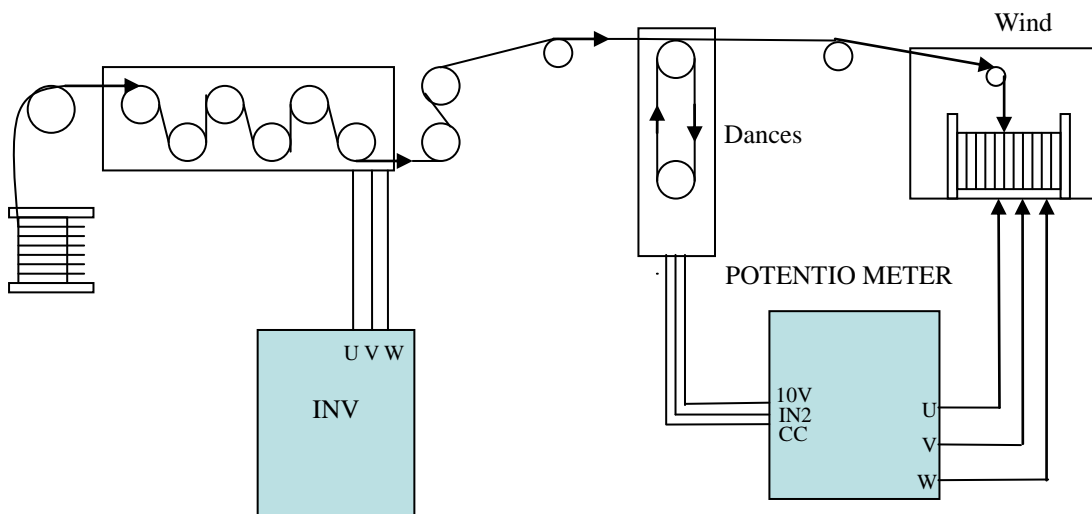
Constant setting : Cd01=0 , Cd04=1 , Cd08=15 , Cd09=15 , Cd18=20 , Cd47=1 , CE54=3 , CE55=5 , CE56=1 , Cd35=8 , Cd38=7

◆ Application of extruder machine



Constant setting : Master inverter setting Cd01=1 , Cd04=1 , Cd08=30 , Cd09=30
Feeder setting: Cd47=7 , Cd85=5 , Cd86=110

◆Application of winding machine



Constant setting :

Master inverter setting Cd01=1 、 Cd04=1 、

Winding machine setting : Please set CE88~95 to autotuning.

Cd01=1 、 Cd04=1 、 Cd35=8 、 Cd36=50 、 Cd38=7 、 Cd44=1 、 CE54=1 、 CE55=0.4 、 CE56=6.6