BEDFORD ®

AC MOTOR SPEED CONTROLLER

B501 Series user manual

Sensorless current vector frequency inverter

PREFACE

Thank you very much for using BEDFORD B501 series high performance sensorless vector.
Read this instruction manual thoroughtly before installation,operation,maintenance and inspection of the inverter.

BDF-501 series high performance sensorless vector have high start torque,auto torque and slippery difference compensation function,stable operation without noises,which also within PID,simple PLC time function and impulse output it can be used in different aspects.With LCD operator, monitoring two parameters at the same time,displaying chinese,english and the copy of parameter function which save the time of debugging,the outside terminal function is flexible,all kinds of method control,many kinds parameter monitor and adjust on line with standard RS-485(MODBUS)communication fuction,PROFIBUS communication card (optional) and meet the users's all kinds of requirements.Energy-saving operation can improve maximum the motor power factor and the efficiency of motor.It also can improve the speed precision within standard PG card and close loop control.

If the inverter which need to be used in CE standard and other similar standard stipulated operation condition,it must install the wireless noise filter.

If meet some unsettlements in the process of using,please contact our dealers ,representatives or us directly.

Remark: Please hand the instruction manual to the end-users ,it will be of great help for their daily operation,mantenance,inspection and troubleshooting..

The safe operation depends on correct transportation,installation and maintenance,please kindly note before beginning to work.

⚠ Indicates a potentially hazardous situation which, if not heeded, could possibly result in death or serious injury.

⚠ Indicates a potentially hazardous situation which, if not heeded, may result in moderate or minor injury and damage to the product or faulty operation.

NOTE FOR SAFE OPERATION

● CONFIRM WHEN GETTING THE PRODUCT

⚠ CAUTION
1.   Please don't install the damage and missing parts inverter.

● INSTALLATION

⚠ CAUTION

1.   In convey,please hand the bottom of the whole machine.
      If just take the panel board,it has the danger of downfall of the whole machine.
2.   Please install the inverter to the metal and apyrous board.
      If install it on the flammable meterial,it has the danger of fire.
3.   When mounting units in an enclosure, install a fan or other cooling device to keep the intake air temperature below 40°C.
      If too heat,it will arose the fire or other accidents.

● WIRING

⚡ WARNING
1.   Please confirm turn off the input power supply before wiring terminals, 2.   Please ask the electrician do the wiring terminals. 3.   Always connect the ground lead E to ground. 4.   When the urgency terminal get through,please note that the action is effective. 5.   Please don't touch the output terminal and connect it to the shell of motor.

⚠ CAUTION
1.   Please confirm the AC main circuit power supply is same to the inverter's related voltage. 2.   Please don't perform a withstand voltage test to the inverter. 3.   Please do the brake resistor and brake unit according to the wiring diagram. 4.   Please tighten the terminal with proper screw. 5.   Never connect the main circuit terminals U, V, W to AC input main power supply. 6.   Never connect the capacitance and LC/RC noise filter to the input circuit. 7.   Please don't connect the electromagnetism switch and electromagnetism connector to the output circuit. 8.   Please don't dismantle the front shell,just only dismantle the terminal shell when wiring.

● TRIAL OPERATION

<table>
<tr><td colspan="1">⚠ WARNING</td></tr>
</table>

⚠ **WARNING**

1. You can close the input power supply after confirming it has install the terminal shell,do not dismantle the shell in power.
2. If the inverter has set the function of restart when power off,please don't close to the machine equipment due to if power on,the inverter will restart all of a sudden.
3. Please connect the urgency stop switch (stop key-press is available only on the way of operator operation setting).

⚠ **CAUTION**

1. Never touch the brake resistor when the two sides's high voltage discharge lead to high temperature.
2. Before operation,be sure the motor and machine's using is within the allowed range.
3. In operation,never check the signal.
4. All the parameters of the inverter have been preset at the factory. Do not change the settings unnecessarily.

● MAINTAINANCE AND INSPECTION

⚠ **WARNING**

1. Please don't tough the connection terminal of the inverter,it has high voltage.
2. Before connection,please note it has install the shell of terminal,when dismantle the shell,be sure turn off the power.
3. Cut off the main circuit,be sure that the irradiance diode is extinct,and then do maintainance and inspection.
4. Never do maintainance and inspection for curbstone technician .

⚠ **CAUTION**

1. Pleaae pay special attention to the operator,control circuit and drive circuit board which install CMOS integrated circuit.
2. In power,please don't alter the connection and dismantle the terminal connection.
3. Please don't check the signal during operation.

● OTHERS

⚠ **WARNING**

1. Never change it by yourself.
2. Wrong connection, improper using and change on one's own lead to the damages are charged by the users.

CONTENTS

Chapter 1 Purchasing Inspection

<div style="border:1px solid black; padding:10px;">

⚠ **CAUTION**

1.   Please don't install the damage and missing parts inverter.

</div>

The products has been test strictly at the factory,however,due to the transportation and other beat all the situation ,please kindly note checking carefully after purchasing the products.

1.1 Inspection Items

Please confirm the followed items after getting the products:

Table 1-1 Confirmation Item

Confirmation Item	Confirmation method
It is same to the product	Please confirm the BDF-B501 lateral nameplate
Whether have some damage parts and places	Check the whole shell to see if it is damage
Check the screw is loose or not	Use the screwdriver to tighten if necessary
The manual,qualification and other parts	BDF-B501 instruction manual and its parts

If there are some exceptional situation, please contact the supplier and our sales department.

1.2 Nameplate Data

1.2.1 Nameplate

Inverter Module ⟶

Input Power Supply ⟶

Rated output ⟶

B501-4007
Spec:AC400V,18A
Rated:7HP(5.5KW)
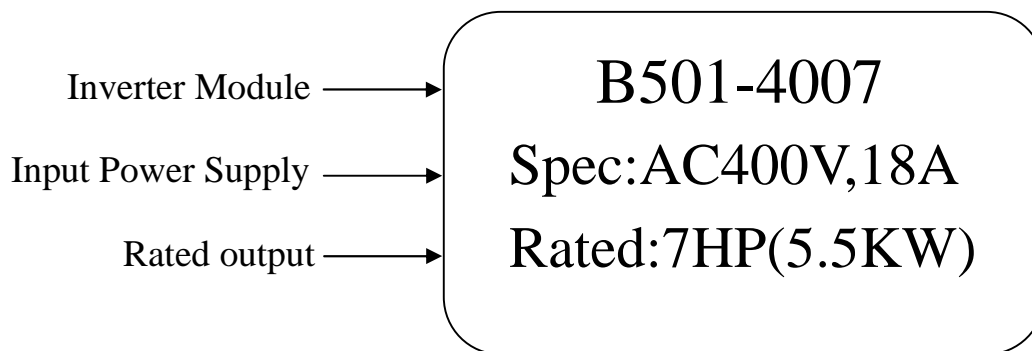
1.2.2 Instruction of Inverter Model

B501 – 4 007

007-7HP/5.5KW MOTOR

4-400V,2-200V

1.3 Parts Instruction

Installation aperture

Keyboard

Model case

Front cover

Fig.1-1 BDF-B501 SERIES INVERTER

Chapter 2 Installation and Wiring

2.1 Exterior Dimension and Installation Dimension (Please refer to the appendix 1)

2.2 The requirements and Managements of Installation Site

⚠ CAUTION
1. In convey, please hand the bottom of the whole machine. If just take the panel board, it has the danger of downfall of the whole machine. 2. Please install the inverter to the metal and apyrous board. If install it on the flammable meterial, it has the danger of fire. 3. When mounting units in an enclosure, install a fan or other cooling device to keep the intake air temperature below 40℃. If too heat, it will arose the fire or other accidents.

Please install BDF-B501 inverter to the followed application site and maintain a proper condition.

2.2.1 Installation Site

Locale installation should meet the followed conditions:

● Good ventilated indoor.

● Ambient temperature-10℃～+40℃, naked inverter temperature is -10℃～+50℃.

● Install it free from high temperature and aquosity,the humidity should lower 90%RH and no rain.

● Never install it on imflammable.

● Install it free from sunlight directly.

● No imflammable, caustic gas and liquid.

● No dust and metallic powder.

● No vibration and firm installation base.

● Install it without excessive oscillation and electromagnetic noise.

● The altitude is 1000m below,please decrease the related output in high altitude,or it the altitude increase 100m it is allowed fall down 0.5°C of the ambient temperature.

2.2.2 Ambient Temperature

In order to improve the inverter's reliable running,please install it in a good ventilated place, if using in a close box please instal a cooling fan or air conditioner to maintain the temperature below 40℃.

2.2.3 Measures

In installation, please take the dustproof cover to the inverter due to some metal chips which are easy to fall down to the inside of inverter.Please take away the dustproof cover when finished the installation.

2.3 The Way and Space of Installation

The series inverter are installed cooling fan to force the cool wind.To make it good,you must install the inverter in a vertical way and keep enough space all around, please refer to the followed picture:
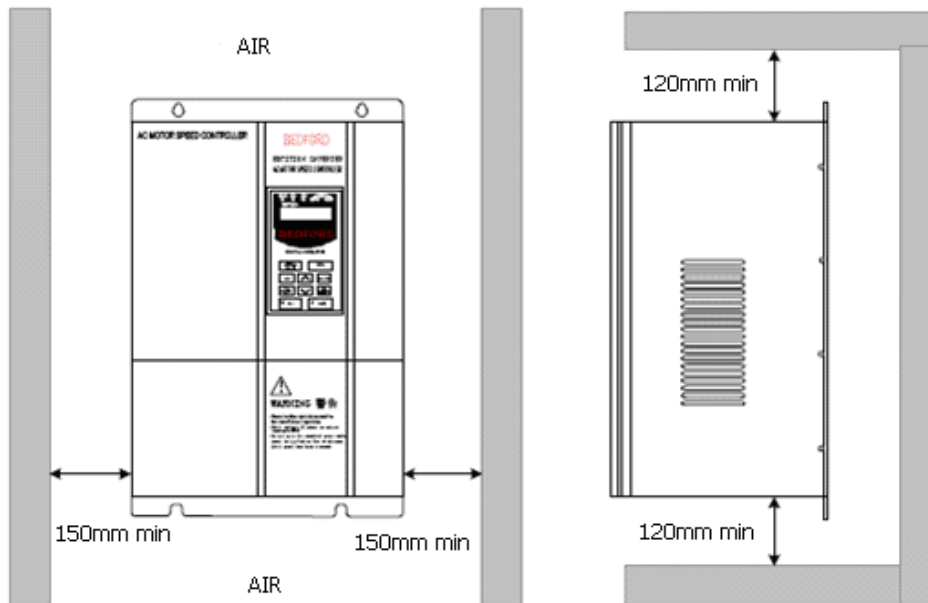
Fig.2-1 BDF-B501 The Way and Space of Installation

2.4 Connection Requirements and Notes

⚡ WARNING
1. Please confirm turn off the input power supply before wiring terminals.
2. Please ask the electrician do the wiring terminals.
3. Always connect the ground lead E to ground.
4. When the urgency terminal get through,please note that the action is effective.
5. Please don't touch the output terminal and connect it to the shell of motor.

⚠ CAUTION
1. Please confirm the AC main circuit power supply is same to the inverter's related voltage.
2. Please don't perform a withstand voltage test to the inverter.
3. Please do the brake resistor and brake unit according to the wiring diagram.
4. Please tighten the terminal with proper screw.
5. Never connect the main circuit terminals U, V, W to AC input main power supply.
6. Never connect the capacitance and LC/RC noise filter to the input circuit.
7. Please don't connect the electromagnetism switch and electromagnetism connector to the output circuit.
8. Please switch motor or industry frequency power supply after stopping the output.
9. If Sn-03 is 7,9,11(2-wire mode)or is 8,10,13(3-wire mode),except parameter setting of Sn-01 and Sn-02,the other parameter setting will return to their initial setting at factory.If the inverter is initially operated in 3-wire mode(Sn-03=8,10,12),the motor will rotate in CCW sense after setting changed to 2-wire mode(Sn-03=7,9,11).Be sure that the terminals 1 and 2 are [OPEN] so as not to harmful to personal or cause any potential damage to machines.

2.5 The Connection of Peripheral Equipment

The Standard Connection Diagram of B501 Series Inverter and Peripheral Equipment
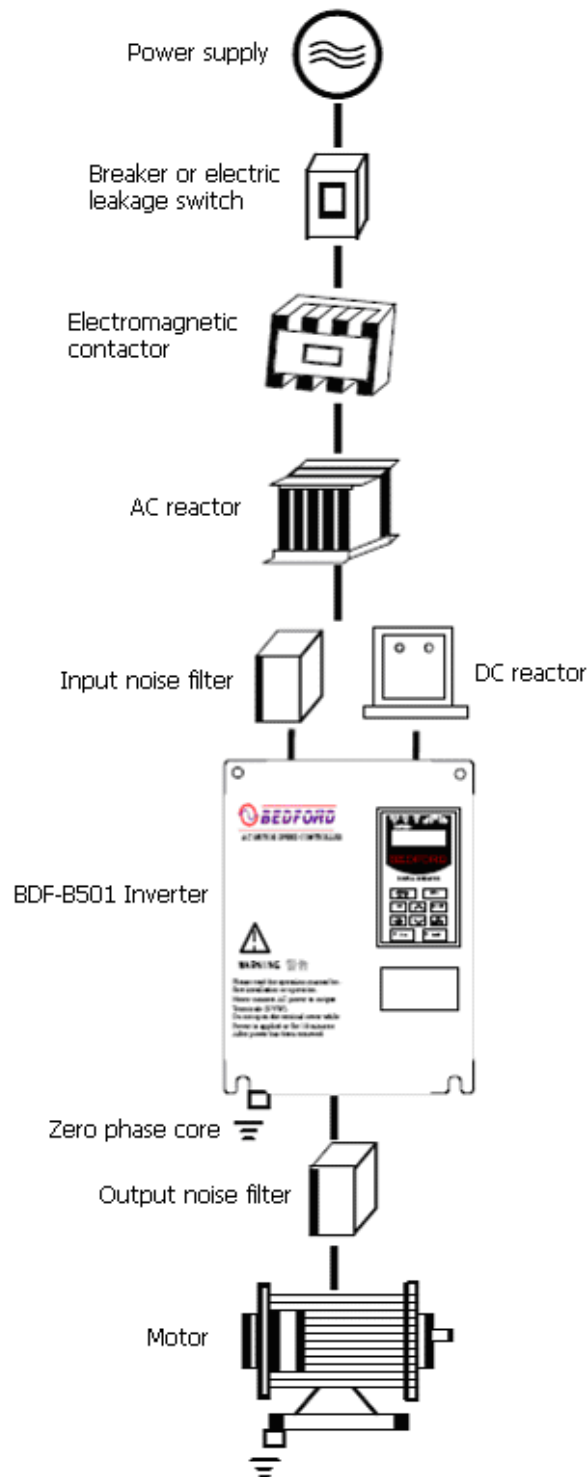
Fig.2-2 The Connection of B501 Inverter and Peripheral Equipment

2.6 The Main Circuit Connection

2.6.1 The Arrangement of Main Circuit Terminal

The main circuit terminal is located on the front inferior.And the medium and small capacity machine are put on the main circuit print board directly.The big capacity machine is installed on the machine

box,its terminal quantity and array location is changed as the difference of function and capacity.Detailed pictures are as follows:
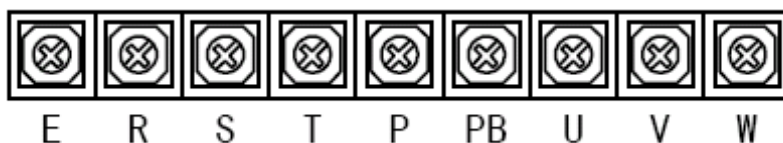
Fig2-3,1.5—3.7KW Standard Main Circuit Terminal

E R S T P PB U V W
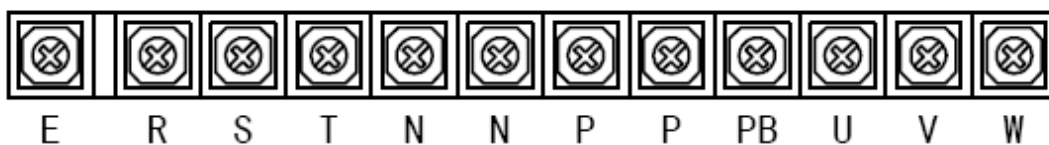
Fig2-4, 5.5—7.5KW Standard Main Circuit Terminal

E R S T N N P P PB U V W
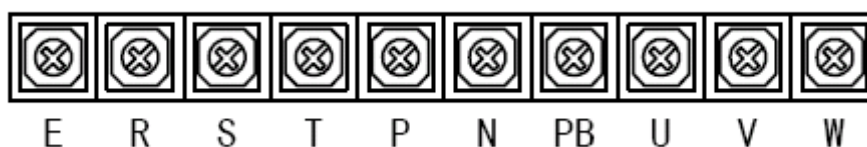
Fig2-5, 11—15KW Standard Main Circuit Terminal

E R S T P N PB U V W
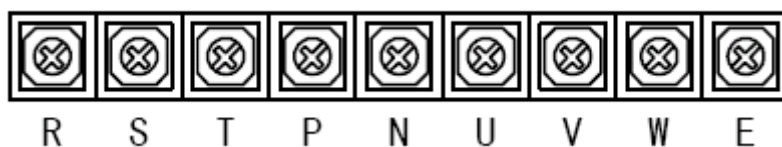
Fig2-6, 18.5—45KW Standard Main Circuit Terminal

R S T P N U V W E
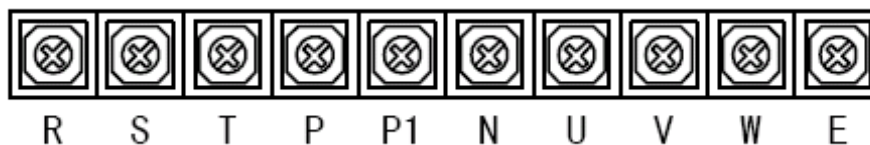
Fig2-7,55KW Standard Main Circuit Terminal

R S T P P1 N U V W E

2.6.2 The Cable Dimension and Terminal of the Main Circuit

Determine the wire size for the main circuit so that the line voltage drop is within 2% of the rated voltage. If there is the possibility of excessive voltage drop due to wire length, use a larger wire (larger diameter) suitable to the required length

Line voltage drop (V) = $\sqrt{3}$ ×*wire resistance (Ω/km) × wire length (m) × current (A) × 10^{-3}*

Table 2-1 The Cable Dimension of the Main Circuit and Screw Terminal Specifications

Model	Terminal Code	Cable Line Spec.	Terminal Code	Cable Line Spec.	Terminal Screw
BDF-B501-4002	R,S,T, U,V,W	2.5	P E PB		M4
BDF-B501-4003	R,S,T, U,V,W	4	P E PB		M4
BDF-B501-4005	R,S,T, U,V,W	4	P E PB		M4
BDF-B501-4007	R,S,T, U,V,W	6	P N E PB		M4
BDF-B501-4010	R,S,T, U,V,W	6	P N E PB		M5
BDF-B501-4015	R,S,T, U,V,W	10	P N E PB	Line spec. $\geqslant$ half of R、S、T、U、V、W	M5
BDF-B501-4020	R,S,T, U,V,W	10	P N E PB		M6
BDF-B501-4025	R,S,T, U,V,W	16	P N E		M6
BDF-B501-4030	R,S,T, U,V,W	16	P N E		M6
BDF-B501-4040	R,S,T, U,V,W	25	P N E		M6
BDF-B501-4050	R,S,T, U,V,W	25	P N E		M8
BDF-B501-4060	R,S,T, U,V,W	35	P N E		M8
BDF-B501-4075	R,S,T, U,V,W	35	P P1 N E		M8

Remark: If the connection line is bigger 30m, you should choice more bigger first gear about the connection specifications

2.6.3 The Instruction of Main Circuit

- Input power supply: R、S、T
- Ground terminal: E
- DC generatrix: P、N
- Connection brake resistance
- Motor connection: U、V、W

2.6.4 The Function of Main Circuit

Please connect correctly according to the corresponding function,the table is as follows:

Table2-2 The Function of Main Circuit

Terminal	Terminal Function
R、S、T	Connect AC power supply input terminal to 3 phase or 1 phase AC power supply
U、V、W	Connect 3 phase AC motor to inverter output terminal
P、N	Connect brake unit connection terminal out,P(+),N(-) of the DC generatrix
P、PB	Connect one brake resistance to P,another to P1
P1、P	Connect DC reactor terminal out,one to P,another to P1
⏚	Grounding lead

2.6.5 The Composing of Main Circuit

1. 5-15kW

18. 5-45kW
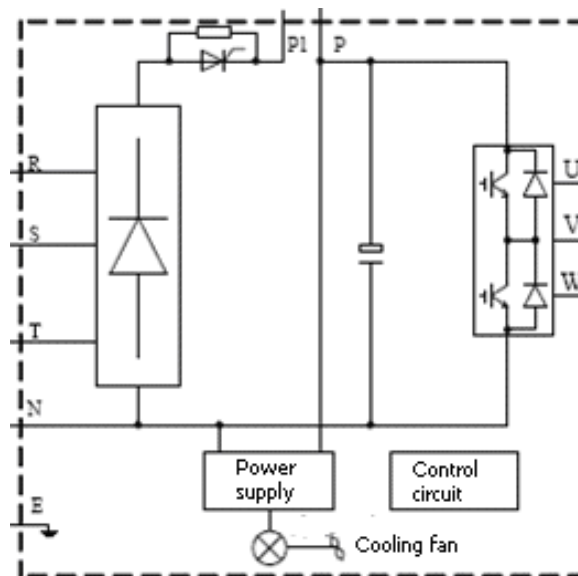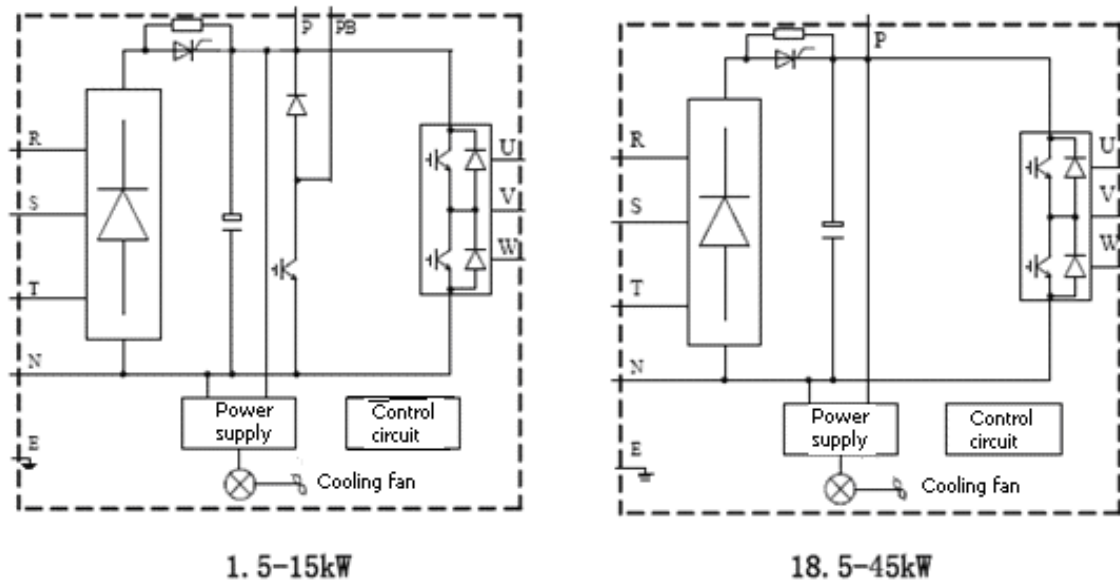
Fig.2-8 the Main Circuit Board of Inverter

2.6.6 The Standard Connection Diagram
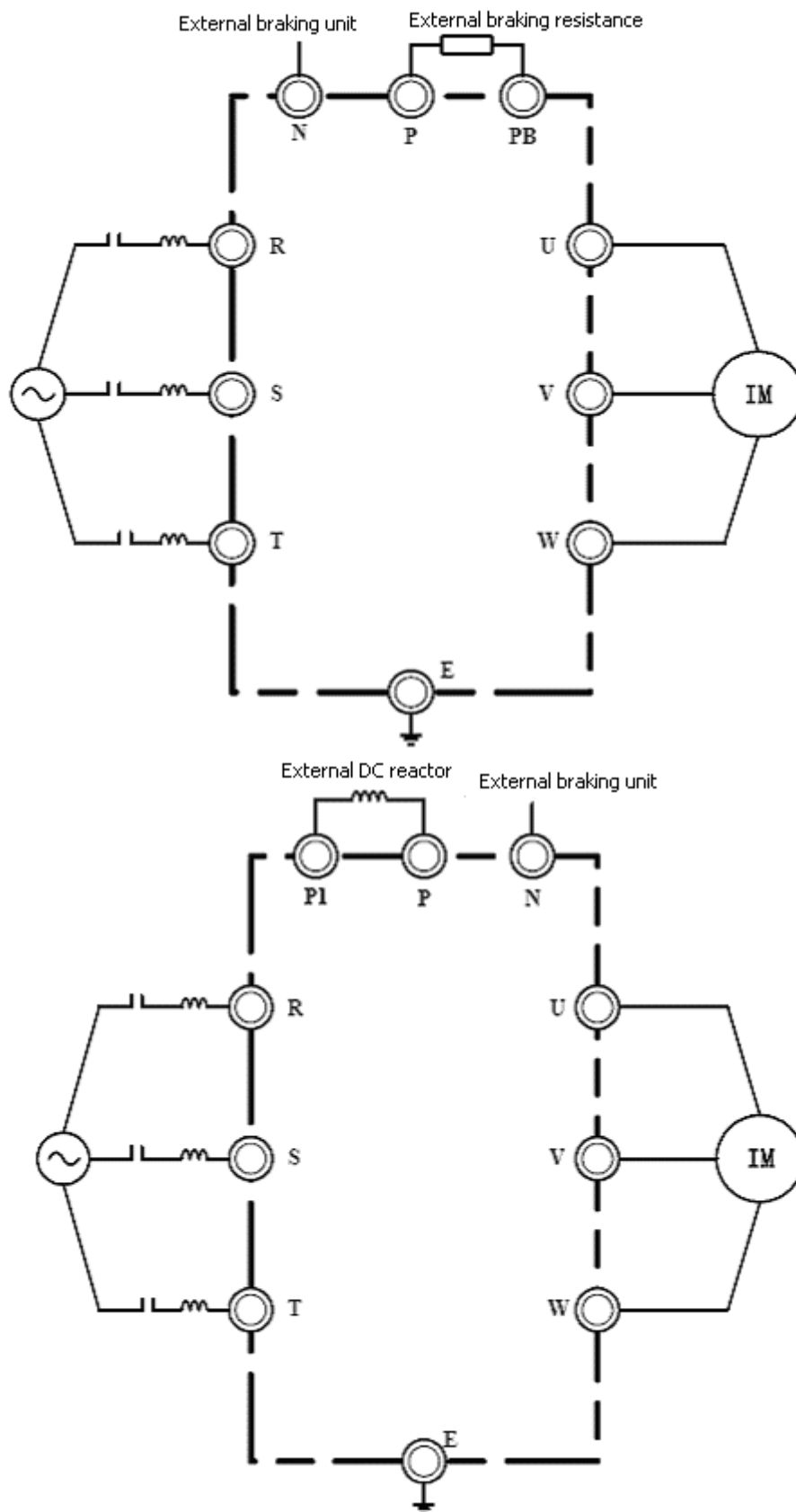
Fig2-9 the Main Circuit Standard Connection of Inverter

2.6.7 The Connection Methods of Main Circuit

The section are mainly introduce the input,output of the main circuit board and the connection way of grounding terminal and some notes.

● **The secund line of main circuit board**

The Installation of Breaker

Please install proper MCCB to the inverter.

① The capacity of MCCB should be 1.5~2 times than inverter's raleted current.

② The time pattern of MCCB should meet the overheat protection of inverter(150% of rated output current for 1 minute, 180% of rated current for 2 seconds)

③ If MCCB work together with two or over tow inverters,connect it with the Fig2-10,please turn off the power supply when connect the fault output relay of the inverter to the power supply contactor.
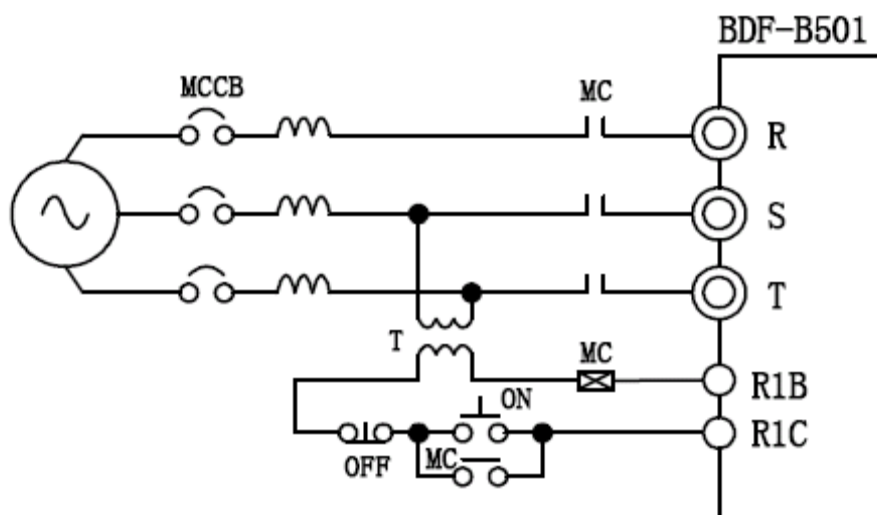
Fig.2-10 Connect Input Breaker

The installation of Electric leakage breaker

Due to the inverter output is high frequency PWM signal so that it will come into being high frequency Electric leakage current,please choose the sensitive current is over 30 MA Y2 delay Electric leakage breaker;If use ordinary Electric leakage breaker,please choose Electric leakage breaker sensitive current is over 20 MA and its action time is over 0.1 seconds.

The connection of terminal line

Input power supply's ordinal is no relevant to the terminal's,you can connect it at random.

The setting of AC reactor or DC reactor

When input power suppy connect a capacitive load,the grid will produce high aiguille current,if don't take measures,the aiguille current may damage the rectifier and function model of the inverter.When the grid exist much high aiguille current,please connect lateral the 3 phase AC reactor on the inverter's power suppy input(optional) or install the DC reactor on the DC reactor terminal.It not only restrains the aiguille current but also improve the power factor.

The setting of surge suppresser

When there is geist load all around (electromagnetic contactor, electromagnetic valve, electromagnetic loop, electromagnetic breaker and on on),please install the surge suppresser.

The setting of power supply noise filter

The power supply can restrain the influence of the grid input noise ,at the same time it also can restrain the harmful to the grid's.The inverter needs special noise filter due to ordinary noise filter's effects is not good.The correct setting picture and wrong setting picture are listed as Fig.2-11 and Fig.2-12 respectively:
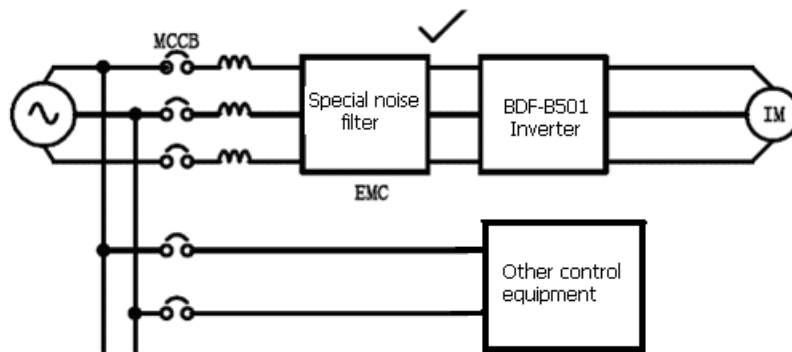
Fig.2-11 the Correct Noise Filter Setting
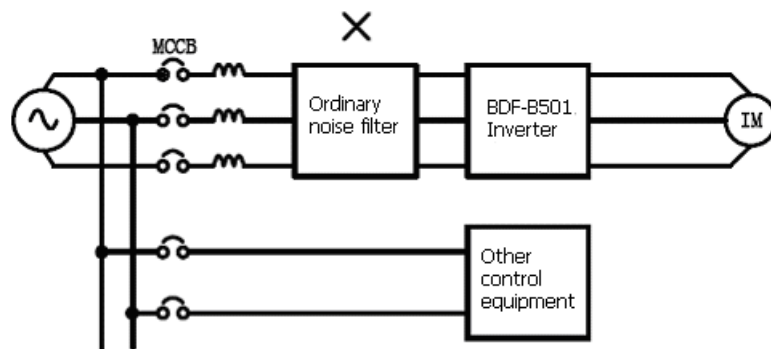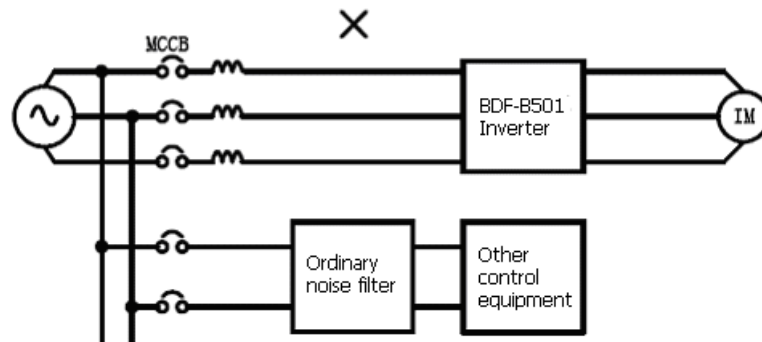
Fig.2-12 the Wrong Noise Filter Setting

● The main circuit output lateral wiring

The wiring between inverter and motor

The inverter's output terminal U、V、W should be connected to the input terminal U、V、W。Be sure the forward run command, the motor do forward run when in running.If the motor is on the reverse run,please take arbitrary two lines of the output terminal U、V、W interchanged which can change the motor's swerve.Use the JOG terminal confirm the forward and reverse .

Never connect he power supply line to the output terminal

Never connect the power supply line to the output terminal.When input power supply to the output terminal,it will damage inner parts of inverter.

Never take the output terminal short circuit or grounding

Never contact the output terminal directly or short circuit the output connection to the cover of inverter,or it will lead to the danger of Electric shock and short circuit.Besides,never short circuit to the output line.

Never use the phase-shift capacitance

Never connect the electrolytic condenser in output circuit or LC/RC filter,or it will cause the damage of inverter.

Never use electromagnetic switch

Never connect the electromagnetic switch in the output circuit and the electromagnetic contactor,or the surge current of inverter will cause the overcurrent protective action and even damage the inner parts of inverter.

The installation of the output lateral noise filter

When connecting the noise filter on the output side of inverter,it can reduce the conduction interference and the radio frequency interfere.

The conduction interference: the electromagnetic induction make the signal conduct noise so that other cntrol equipment do the wrong action at the the same grid.

The radio frequency interfere: the inverter and cable will radiate high frequency electromagentic wave, it will exert an interfere to the nearby wireless equipment lead to the noise during the process of accepting signals.The output lateral noise filter is as follows (Fig.2-13):
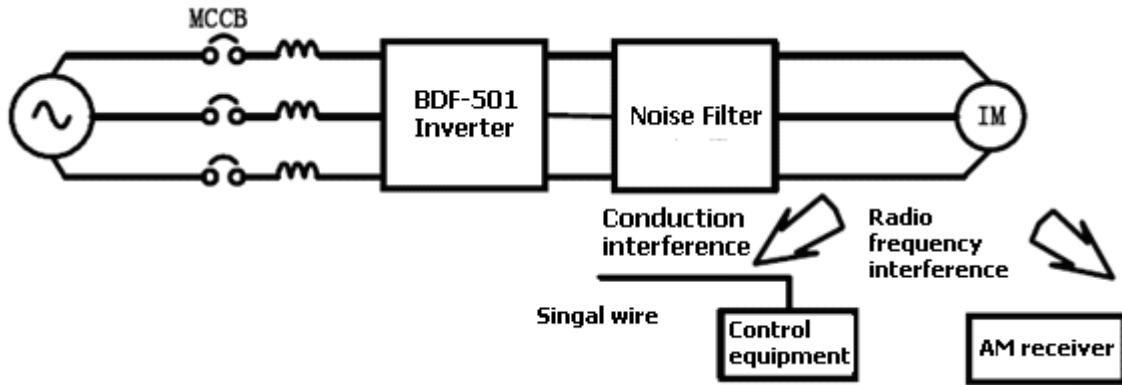
Fig.2-13 The Output Lateral Noise Filter

The conduction interference countermeasure

To restrain the output lateral produce conduction interference except the method of setting noise filter aboved,besides ,you can take all the output line to the grounding metal tube.The interval should be bigger than 30cm between the output connection line and signal line,so the conduction interference will be reduced accordingly.
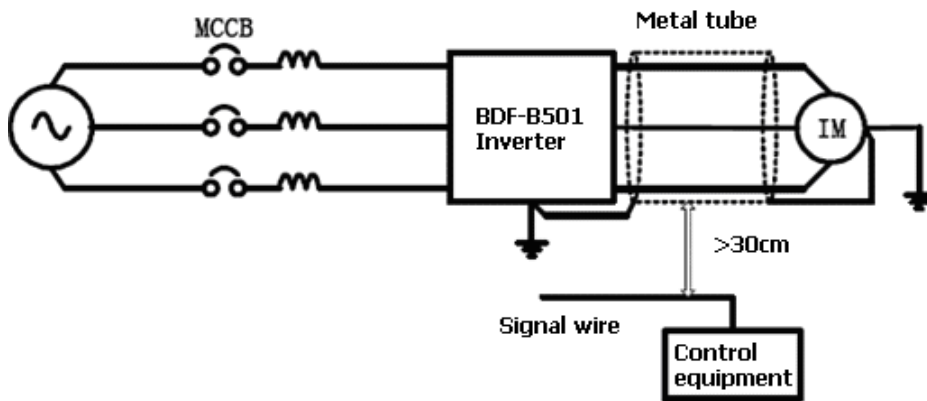
Fig.2-14 Conduction Interference Countermeasures

The radio frequency interfere countermeasure

The input/output connection line and inverter will proudce the radio freqeuncy interfere by themselves,if setting the noise filter two sides of the ouptut and shield with iron vessel,it can reduce the radio frequency interfere.The connection line of the inverter and motor should be as short as possible.Fig.2-15
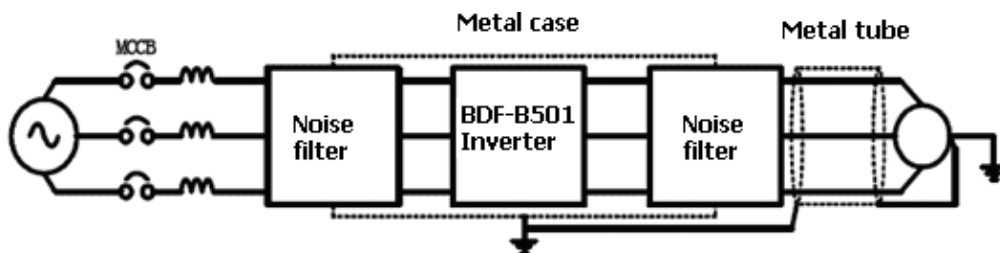
Fig.2-15 The Radio Frequency Measures

The connection distance of inverter and motor

The connection line distance of inverter and motor is long the carrier wave frequency will be high,and its cable's high wave leakage current will increase,causing the bad influence to the inverter and its nearby equipments,so reduce the leakage current as far as possible.

The relationship between the connection distance of the inverter and motor and the carrier wave is table 2-3 as shown below:

Table 2-3 The connection distance and carrier wave frequency of inverter and motor

Cable length	<30m	30m~50m	50m~100m	≥100m
Carrier wave	15kHZ Max	10Khz Max	5Khz Max	2.5kHz Max
Cn-34	(Cn-34=6)	(Cn-34=4)	(Cn-34=2)	(Cn-34=1)

● **Grounding**

① Connect the ground terminal E to the grounding.

    220V class: the third grounding (a ground resistance less than 100Ω)

    380V class: special for the third grounding (a ground resistance less than 10Ω)

② Do not share the ground wire with other devices, such as welding machines or power tools.

③ Always use a gound wire that complies with the technical standards on electrical equipment and minimize the length of ground wire.

④ When using more than one inverter, be careful and don't loop the ground wire in a circuit, as shown below Fig.2-14.
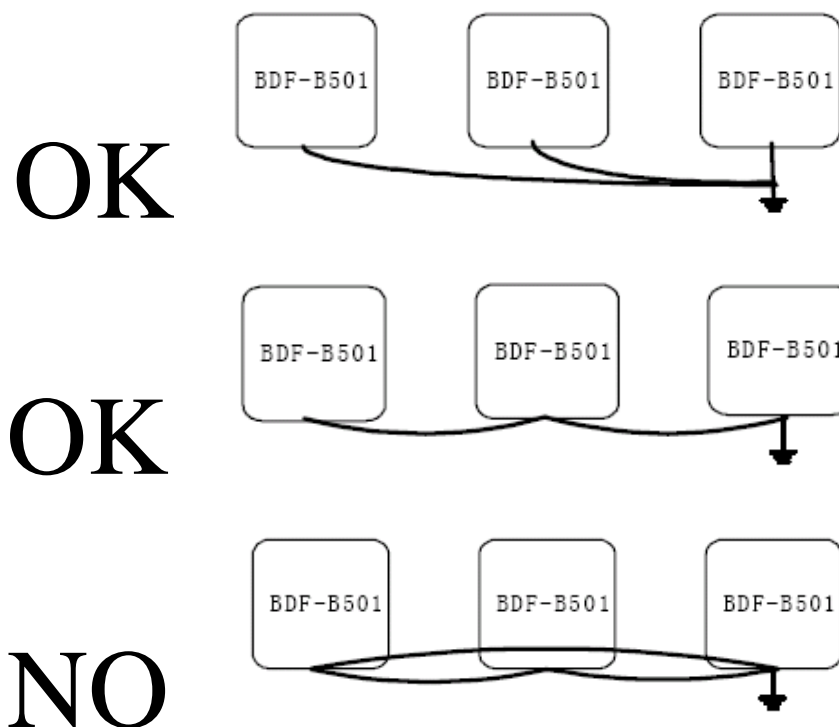
Fig.2-14 The method of a ground wire

● **The installation of brake resistance**

To carry out the soon brake of motor,it is allowed to install the brake resistance of the B501 series 15kw below and the setting is ascending brake is available.The P and PB terminal is connect to the brake resistance,please do not connect it to other terminals.The installation is shown as Fig.2-15.
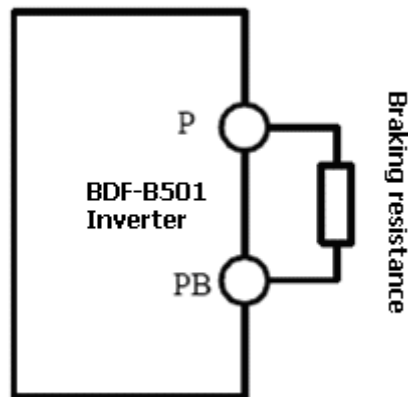
Fig.2-15 The Installation of Brake Resistance

2.7 The Connection of Exterior Terminal

2.7.1 The Cable Dimension and Terminal of the Control Circuit

The torque relationship between control circuit connection terminal dimesion and screw tighten as shown Table2-4 below.

Table2-4 The terminal connection line dimension

Lead wire (mm^2)	Terminal screw	Dimension	Torque(N・m)
0.5	M3.5	0.75~3.5	0.8
0.75		0.75~3.5	
1.25		1.25~3.5	
2		2~3.5	

2.7.2 The Function of Exterior Terminal

The terminal arrangement is shown as below (Fig.2-16).
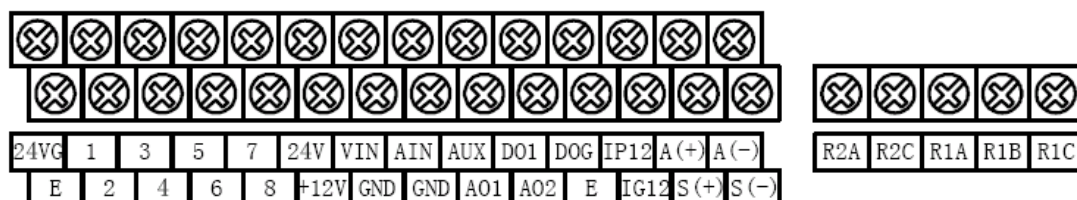
Fig.2-16 Exterior Terminal Arragnement

<table>
<tr><td colspan="3" align="center">⚠ CAUTION</td></tr>
<tr><td colspan="3">● Exterior terminal VIN,AIN please refer to Sn-24.
● Terminal 15V(12V)'s output current is 20Ma.
● Multi-function analog output A01,A02 is special connect to the ammeter,please don't make it as reactive control to analog output signal.</td></tr>
</table>

<p align="center">Table 2-5 External terminal function</p>

Type	Terminal	Terminal function	
Swith signal input	1	Forward operation-STOP signal	
	2	Reverse operation-STOP signal	
	3	External fault input	
	4	Fault reset	
	5	Multi-function input terminal	3-wire operation,Local/Remote control,Multi-speed select,ACC/DCC choice,ACC/DCC Halting,Base block,Overheat Warn,PID control,DC braking,Speed search,Up/Down function,PG speed control,External fault,Timer function,Multi-function analog input setting
	6		
	7		
	8		
	24VG	Sink Common Point (Locate the short jumper of TP2 in SINK position)	
	24V	Source Common Point (Locate the short jumper of TP2 in SOURCE position)	
	E	Connection to Shield Signal Lead (Frame Ground)	
Analog input signal	+12V	Speed setting for power	
	VIN	VIN Master speed Voltage Reference (0~10V)	
	AIN	Master speed Current Reference (4~20mA)	
	AUX	AuxiliaryAnalog Input: Auxiliary frequency Command, Frequency Gain, Frequency Bias, Overtorque Detection, Output Voltage Bias, ACC/DEC Ramp, DC-Brake Current, Stall Prevention Current Level during Running Mode, PID Control, Lower-Bound of Frequency Command,Frequency-Jump-4, etc	
	GND	Analog Signal Common	
PG feedback	IP12	External Power Source For PG Feedback Use	
	IG12		
	A(+)	Phase-ASignal Input of PG	
	A(-)		
Analog outpu signal	A01	Analog Multifunction Output Port:Frequency Command, Output Frequency, Output Current, Output Voltage, DC Voltage, PID Controlled Value,Analog Command Input of VIN,AIN orAUX(2mA Max	
	A02		
	GND	GND Common Lead forAnalog Port	
Switch output signal	R1A	Relay Contact Output A(Multi-function output terminal)	Same function as D01,D02
	R1B	Relay Contact Output B(Multi-function output terminal)	
	R1C	Relay Contact Common	

	D01		Digital Multi-Function(Open Collector)Output:During-Running, Zero-speed, Agreed-frequency,Agree-frequency-setting,Frequency-Output,Inverter-Operation-Ready, Undervoltage-Detection, Base-BlockOutput, Run Source, Frequency command, Overtorque Detection, Frequency Command Invalid, Fault, Undervoltage, Overheat, Motor Overload, Inverter Overload, During-Retry, Communication-Fault, Timer-Function-Output.
	D02	R2A	
		R2C	
	DOG		Common Terminal of Open Collector Transistor
Data communication	S(+)		RS-485 Communication interface
	S(-)		

2.7.3 The Inverter Connection Diagram equal or less than 15KW Specification
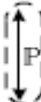
Fig.2-17 The Inverter Connection Diagram Equal or Less Than 15KW Specification

Remark：

 * 1:Install MC is mainly used for avoiding Fault restart or drop power restart,so the Fault output B terminal should connect to the MC control circuit.

 * 2: ⌐⌐ Shield wire, ⌐P⌐ Shield twisted wire

 * 3:The terminal ①～⑧ can be set as SINK or SOURCE interface,when setting SINK interface,the short jumper of TP2 must be set to SINK position,and when setting SOURCE interface,the short jumper of TP2 must be set to SOURCE position.

2.7.4 The Inverter Connection Diagram equal or over 18.5KW Specification
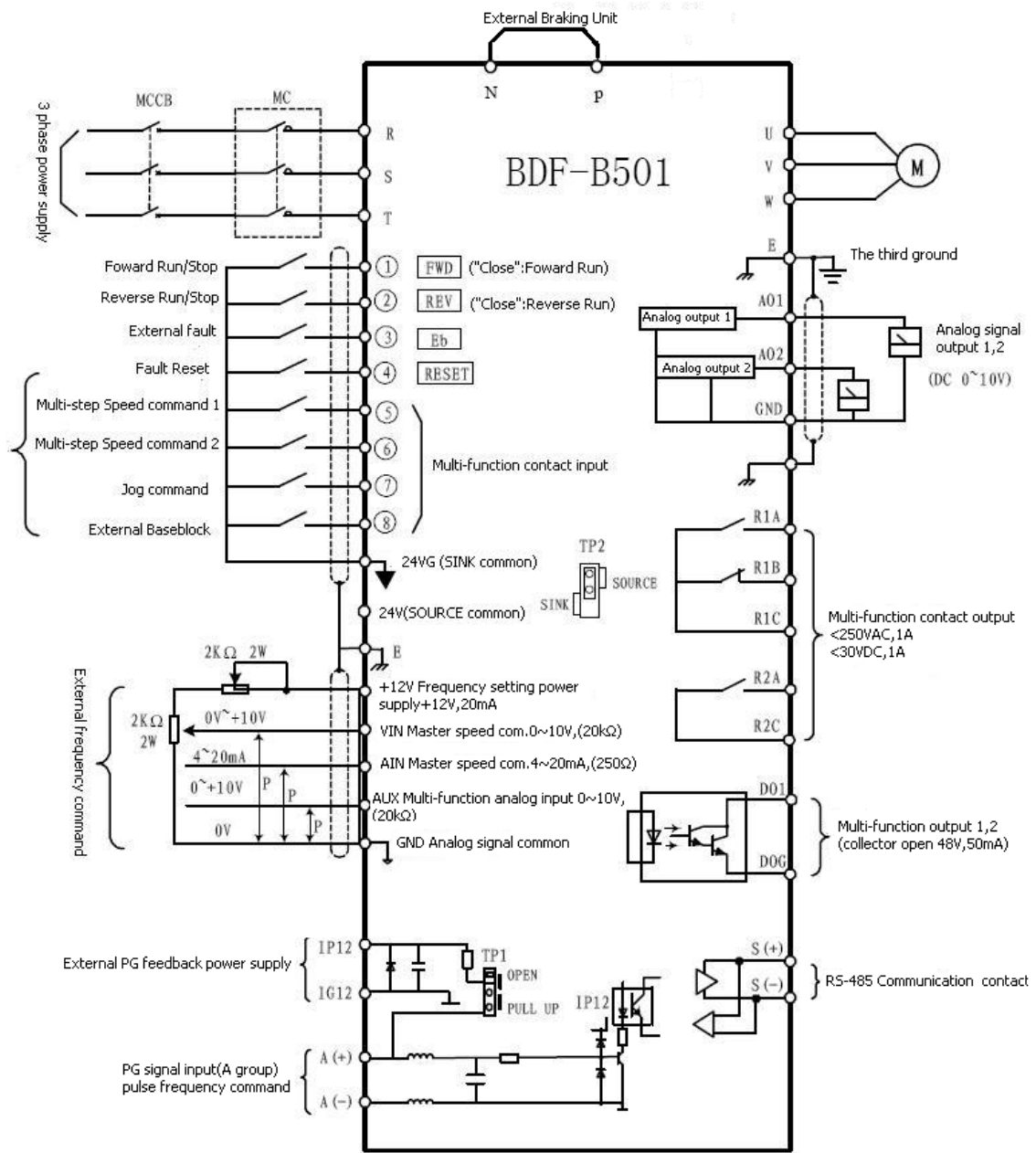
Fig.2-18 The Inverter Connection Diagram equal or over 18.5KW Specification

Remark:

* 1:Same as 15 KW or below

* 2:P1 and P have been used the electric line short circuit at the factory,if need DC reactor out,you should remove the electric line. 18.5kw~45kw no P1 terminal.

* 3:55kw machine no main circuit PB terminal,which only can connect brake unit outside.

* 4: ⌐⌐ Shield wire, ↕P↕ Shield twisted wire

＊5: The terminal ①～⑧ can be set as SINK or SOURCE interface,when setting SINK interface,the short jumper of TP2 must be set to SINK position,and when setting SOURCE interface,the short jumper of TP2 must be set to SOURCE position.

2.7.5 Connection Notes of Control Circuit

●Connect control circuit wiring to the main circuit wiring,separating other high-power lines.

● Use the twisted-pair or shield twisted-pair cables for control circuits to prevent operating faults.Process the cable ends as shown in Fig.2-19.The max.wiring distance should not exceed 50 meter.
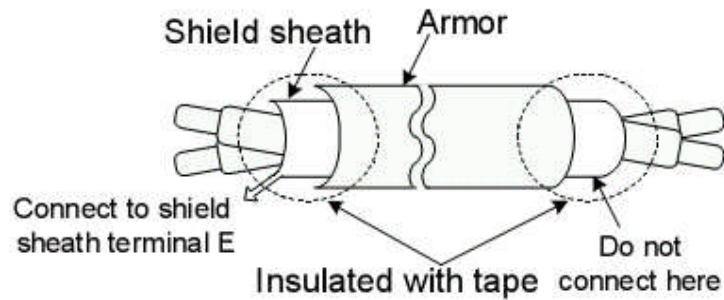
Fig.2-19 Processing the Ends of Twisted-pair Cables

When the digital multi-function output terminals connect serially to an external relay, an anti-parallel freewheeling diode should be applied at both ends of relay, as Fig.2-20 shown below.
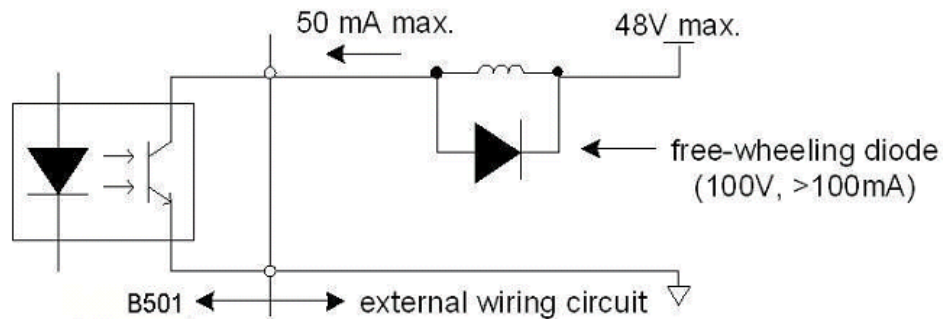
Fig.2-20 The Optical-couplers Connect to External Inductive Load

● Never connect the shield reticle to other signal line and equipment cover,you can use the insulating tape seal the naked shield reticle.

● The output terminal R1A,R1B,R1C,R2A,R2C should be wired to terminal ①～⑧ respectively.

2.8 Wiring Inspection

Please note that checking the wiring after finishing the connection.

● Check the wiring is wrong or not

● Whethr some left screw and wire thread residue inside of the equipment.

● Whether the screw is loose.

● Whether terminal part's nake line short circuit to other terminal.

Chapter 3 Handing and Running

⚠️ **WARNING**

1. You can close the input power supply after confirming it has install the terminal shell, do not dismantle the shell in power.
2. If the inverter has set the function of restart when power off, please don't close to the machine equipment due to if power on,the inverter will restart all of a sudden.

⚠️ **CAUTION**

1. Never touch the brake resistor when the two sides's high voltage discharge lead to high temperature.
2. Before operation, be sure the motor and machine's using is within the allowed range.
3. In operation, never check the signal.
4. All the parameters of the inverter have been preset at the factory. Do not change the settings unnecessarily.

3.1 Operator Display and Handling

BDF-B501 series inverter take use of LCD Chinese and English display operator which has two model: DRIVE mode and PRGM mode,when the interver is stopped, DRIVE mode or PRGM mode can be selected by PRGM pressing the key ⬛PRGM/DRIVE⬛.In DRIVE mode, the operation is enabled. Instead, in the PRGM mode, the parameter settings for operation can be changed but the
Operation is not enabled.The component names and function are shown as below.
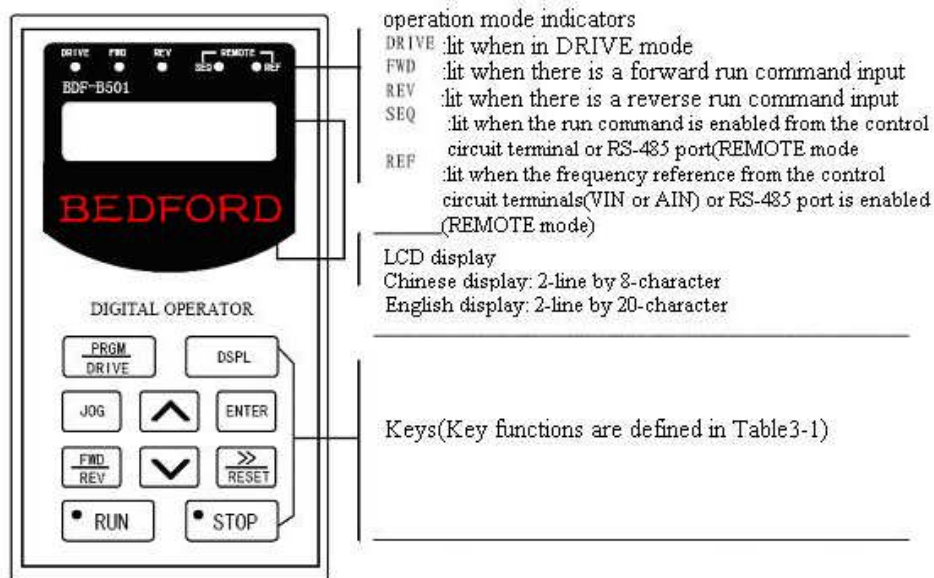
Fig.3-1 BDF-B501 Operator

• **Remote/Local switch function key:**

Local operation mode:--run command is controlled by operator input (SEQ LED extinguished)

--frequency command is controlled by operator input (REF LED extinguished)

Remote operation mode:--run command is controlled by external terminal (Sn-04=1) or RS-485 communication interface(Sn-04=2)input (SEQ LED light)

--frequency command is controlled by external terminal(Sn-05=1) or RS-485 communication interface(Sn-05=2)input(REF LED light).

Table3-1 Operation key function

Key	Name	Function
PRGM/DRIVE	PRGM/DRIVE Key	Switches over between program mode (PRGM) and drive mode(DRIVE).
DSPL	DSPL Key	Display operation status
JOG	JOG Key	Enable jog operation from LCD digital operator in operation (DRIVE).
FWD/REV	FWD/REV Key	Select the rotation direction from LCD digital operator.
>> / RESET	RESET Key	Set the number of digital for user constant settings. Also it Acts as the reset key when a fault has occurred.
∧	INCREMENT Key	Select the menu items, groups, functions, and user constant name,and increment setv alues.
∨	DECREMENT Key	Select the menu items, groups, functions, and user constant key name, and decrement set values.
ENTER	ENTER Key	Select the menu items, groups, functions, and user constants name, and set values (EDIT). After finishing the above action, press the key (ENTER).
•RUN	RUN Key	Start inverter operation in (DRIVE) mode when the digital operator is used.The LED will light.
•STOP	STOP Key	Stop B501 series operation from LCD digital operator. The STOP key can be enabled or disabled by setting the parameter Sn-07 when operating from the control circuit terminal.

RUN, STOP indicator lights or blinks to indicate the 3 operating status:

$\dot{\Box}$ ON $\breve{\Box}$ BLINK   ● OFF
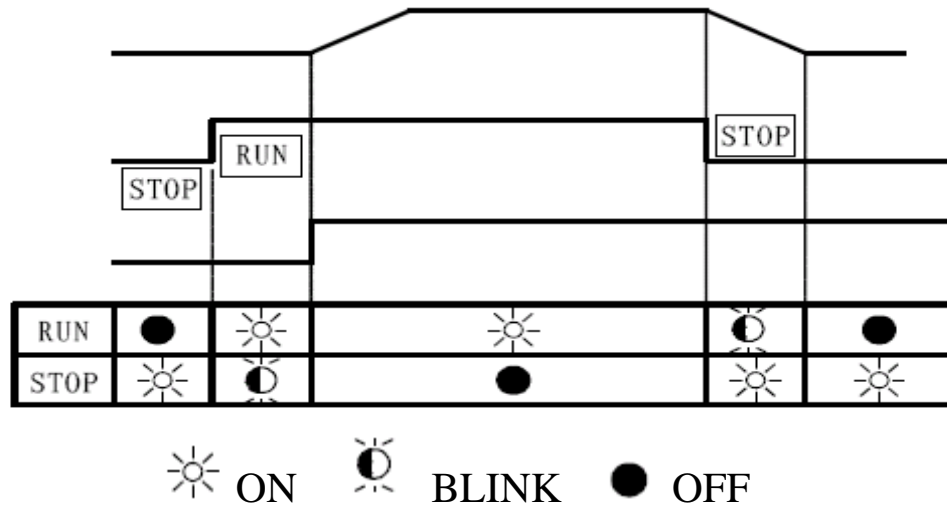
3.2 Display contents in DRIVE mode and PRGM mode
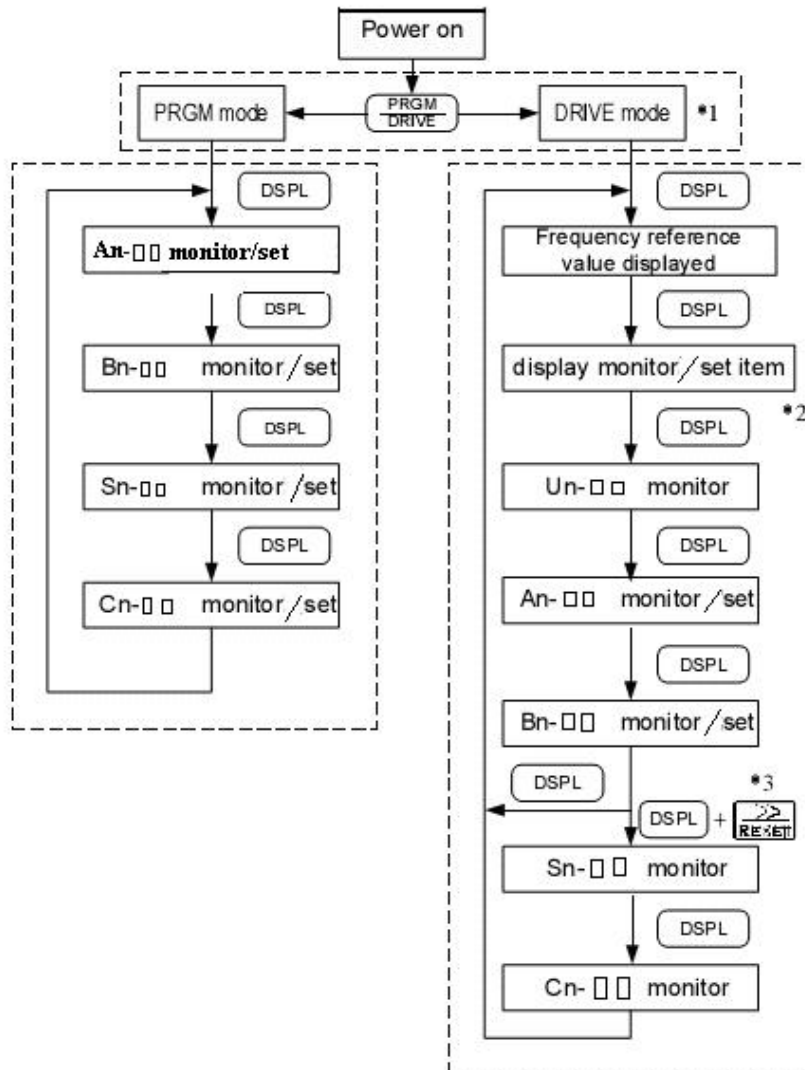
*1 When power on,the inverter system immediately enters into DRIVE mode.Press the $\boxed{\begin{smallmatrix}\text{PRGM}\\\text{DRIVE}\end{smallmatrix}}$ DRIVE Key,the system will switch into PRGM mode.If the fault occurs,press the $\boxed{\begin{smallmatrix}\text{PRGM}\\\text{DRIVE}\end{smallmatrix}}$ DRIVE Key and enter into DRIVE mode to monitor the corresponding Un-□□ contents.If a fault occurs in the DRIVE mode,the corresponding fault will be displayed.Press the RESET Key $\boxed{\begin{smallmatrix}\gg\\\text{RESET}\end{smallmatrix}}$ and reset the fault.

*2 The monitored items will be displayed according to the settings of Bn-12 and Bn-13.

*3 When in the DRIVE mode,press the $\boxed{\text{DSPL}}$ key and $\boxed{\begin{smallmatrix}\gg\\\text{RESET}\end{smallmatrix}}$ key at the same time,the setting values of Sn-and Cn-□□ will only be displayed for monitoring but not for changing or setting.

3.3 Parameter Instruction

All parameters of B501 have 4 groups of user parameters:

Parameters	Description
An-□□	Frequency command
Bn-□□	Parameter groups can be changed during running
Sn-□□	System parameter groups(can be changed only after stop)
Cn-□□	Control parameter groups(can be changed only after stop)

The parameter setting of Sn-03(operation status)will determin if the setting value of different parameter groups are allowed to be changed or only to be monitored,as shown below:

Sn-03	DRIVE mode		PRGM mode	
	To be set	To be monitored	To be set	To be monitored
0[*1]	An,Bn	Sn,Cn	An,Bn,Sn,Cn	-
1	An	Bn,Sn, Cn[*2]	An	Bn,Sn,Cn

*1 Factory setting

*2 When in DRIVE mode,the parameter groups Sn,Cn can be only monitored if the $\boxed{\begin{smallmatrix}\gg\\\text{RESET}\end{smallmatrix}}$ key and $\boxed{\text{DSPL}}$ key are to be pressed simultaneously.

*3 After a few trial and adjustment,the setting value Sn-03 is set to be "1"so as not be modified at random.

3.4 Operator Handling and Running

Notes:
Before operation: *Control parameter Cn-01 value must be set as the AC input voltage value.*
For example: *Cn-01=380 if the AC input voltage value is 380*

●This example will explain the operating of B501 Series according to the following time chart.
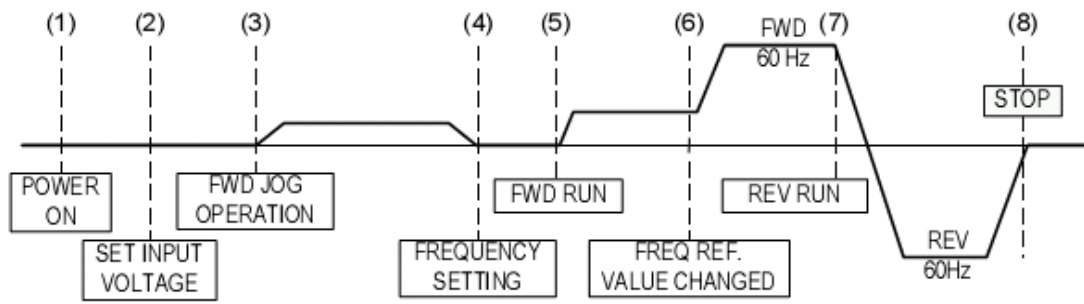
Fig.3-2 Operator Operation

● Example of operator operation

Description	Operation	Operator Display	Remark
(1) When power on — Display frequency command		Fre.com. 000.00Hz BDF	
↓ Select PRGM mode	[PRGM/DRIVE]	An-01- Fre.command 1	LED DRIVE OFF
(2) Input voltage setting (e.g.Input voltage is 380V) — Select control parameter	[DSPL] Press 3 times	Cn-01- Input voltage	
Display Cn-01 setting value	[ENTER]	Cn—01=440.0V Input voltage	
Input voltage setting is 380V	[≫/RESET] [∧] [∨]	Cn—01=380.0V	
↓	[ENTER]	Entry Accepted	Display 0.5 sec Confirm the display
(3) FWD JOG — Select DRIVE mode	[PRGM/DRIVE]	Fre.com. 000.00Hz BDF	LED DRIVE ON
Select output frequency displayed	[DSPL]	Output fre. 0.00Hz Fre.command 0.00Hz	LED FWD ON
Select direction (When power on,initially default FWD)			
JOG Run operation	[JOG]	Output fre. 6.00Hz Fre.command 6.00Hz	
(4) Frequency Setting — Select frequency command displayed	[DSPL] Press 4 times	Fre.com. 000.00Hz BDF	
Change command	[≫/RESET] [∧] [∨]	Fre.com. 015.00Hz BDF	
Set new command	[ENTER]	Fre.com. 015.00Hz BDF	
		Entry Accepted	
Select output frequency displayed	[DSPL]	Output com.0.00Hz Fre.command 15.00Hz	Display 0.5 sec Confirm the display
(5) FWD Run — Run operation	[•RUN]	Output fre. 15.00Hz Fre.command 15.00Hz	LED •RUN ON
(6) Frequency command change — Select frequency command displayed	[DSPL] Press 4 times	Fre.com. 015.00Hz BDF	
Change command	[≫/RESET] [∧] [∨]	Fre.com. 050.00Hz BDF	
Set new command	[ENTER]	Fre.com. 050.00Hz BDF	
		Entry Accepted	
Select frequency command displayed	[DSPL]	Output fre.50.00Hz Fre.command 50.00Hz	Display 0.5 sec Confirm the display
(7) REV Run — Change to REV	[FWD/REV]	Output fre.50.00Hz Fre.command 50.00Hz	LED REV ON
(8) REV Run — Deceleration to Stop	[•STOP]	Output fre. 0.00Hz Fre.command 50.00Hz	LED •STOP ON (Blinking while decel) •RUN

●Example of operator operation(use [∧]and [∨] key to display monitored contents)

Description	Operation	Operator Display	Remark
Display frequency command		Fre.cmd.050.00Hz BDF	
Display monitored contents	DSPL	Fre.cmd. 50.00Hz fre.putput 50.00Hz	
Display output current	[∧]	Fre.cmd50.00Hz,ou tput current12.5A	
Display output voltage	[∧]	Fre.cmd.50.00Hz, output vol. 380V	
Display DC voltage	[∧]	Fre.cmd.50.00Hz,D C vol.510V	
Display output voltage	[∨]	Fre.cmd50.00Hz,ou tput vol.380V	
Select output current	[∨]	Fre.cmd50.00Hz,ou tput current12.5A	

*1 The monitor contents can be selected by the setting of Bn-12 and Bn-13.

Chapter 4 Parameter Setting and Instruction

4.1 Frequency command(in multi-speed operation)An－□□

Table 4-1 Under DRIVE mode,it can be monitored and modified the setting value in running

Parameter No.	Name	LCD Display (English)	Setting Range	Setting Unit	Factory Setting
An-01	Frequency Command1	An-01=000.00HZ Freq. Cmd. 1	0.00～400.00Hz	0.01Hz	0.00Hz
An-02	Frequency Command2	An-02=000.00HZ Freq. Cmd. 2	0.00～400.00Hz	0.01Hz	0.00Hz
An-03	Frequency Command3	An-03=000.00HZ Freq. Cmd. 3	0.00～400.00Hz	0.01Hz	0.00Hz
An-04	Frequency Command4	An-04=000.00HZ Freq. Cmd. 4	0.00～400.00Hz	0.01Hz	0.00Hz
An-05	Frequency Command5	An-05=000.00HZ Freq. Cmd. 5	0.00～400.00Hz	0.01Hz	0.00Hz
An-06	Frequency Command6	An-06=000.00HZ Freq. Cmd. 6	0.00～400.00Hz	0.01Hz	0.00Hz
An-07	Frequency Command7	An-07=000.00HZ Freq. Cmd. 7	0.00～400.00Hz	0.01Hz	0.00Hz
An-08	Frequency Command8	An-08=000.00HZ Freq. Cmd. 8	0.00～400.00Hz	0.01Hz	0.00Hz
An-09	Frequency Command9	An-09=000.00HZ Freq. Cmd. 9	0.00～400.00Hz	0.01Hz	0.00Hz
An-10	Frequency Command10	An-10=000.00HZ Freq. Cmd. 10	0.00～400.00Hz	0.01Hz	0.00Hz
An-11	Frequency Command11	An-11=000.00HZ Freq. Cmd. 11	0.00～400.00Hz	0.01Hz	0.00Hz
An-12	Frequency Command12	An-12=000.00HZ Freq. Cmd. 12	0.00～400.00Hz	0.01Hz	0.00Hz
An-13	Frequency Command13	An-13=000.00HZ Freq. Cmd. 13	0.00～400.00Hz	0.01Hz	0.00Hz
An-14	Frequency Command14	An-14=000.00HZ Freq. Cmd. 14	0.00～400.00Hz	0.01Hz	0.00Hz
An-15	Frequency Command15	An-15=000.00HZ Freq. Cmd. 15	0.00～400.00Hz	0.01Hz	0.00Hz
An-16	Frequency Command16	An-16=000.00HZ Freq. Cmd. 16	0.00～400.00Hz	0.01Hz	0.00Hz
An-17	Frequency Command17	An-17=000.00HZ Freq. Cmd. 17	0.00～400.00Hz	0.01Hz	0.00Hz

*1: The displayed "Setting Unit" can be changed through the parameter Cn-28.

*2:At the factory,the value of "Setting Unit" is 0.01Hz.

4.2 The Parameter Can be Changed during Running Bn－□□

Table 4-2 Under DRIVE mode, the parameter group can be monitored andmodified during running

Parameter NO.	Name	LCD display (English)	Setting range	Setting Unit	Factory Setting
Bn-01	Acceleration Time 1	Bn-01= 0010.0s Acc. Time 1	0.0～6000.0s	0.1s	10s
Bn-02	Deceleration Time 1	Bn-02= 0010.0s Dec. Time 1	0.0～6000.0s	0.1s	10s
Bn-03	Acceleration Time 2	Bn-03= 0010.0s Acc. Time 2	0.0～6000.0s	0.1s	10s
Bn-04	Deceleration Time 2	Bn-04= 0010.0s Dec. Time 2	0.0～6000.0s	0.1s	10s
Bn-05	Analog Frequency Cmd. Gain (Voltage)	Bn-05= 0100.0% Voltage Cmd. Gain	0.0～1000.0%	0.1%	100.0%
Bn-06	Analog Frequency Cmd. Bias (Voltage)	Bn-06= 000.0% Voltage Cmd. Bias	-100.0%～100.0%	0.1%	0.0%
Bn-07	Analog Frequency Cmd Gain. (Current)	Bn-07= 0100.0% Current Cmd. Gain	0.0～1000.0%	0.1%	100.0%
Bn-08	Analog Frequency Cmd Bias (Current)	Bn-08= 000.0% Current Cmd. Bias	-100.0%～100.0%	0.1%	0.0%
Bn-09	Multi-Function Analog Input Gain	Bn-09= 0100.0% Multi_Fun. ~Gain	0.0～1000.0%	0.1%	100.0%
Bn-10	Multi-Function Analog Input Bias	Bn-10= 000.0% Multi_Fun. ~Bias	-100.0%～100.0%	0.1%	0.0%
Bn-11	Auto Torque Boost Gain	Bn-11= 0.5 Auto_Boost Gain	0.0～2.0	0.1	0.5
Bn-12	Monitor 1	Bn-12= 01 Display: Freq.Cmd.	1～18	1	1
Bn-13	Monitor 2	Bn-13= 02 Display: O/P Freq.	1～18	1	2
Bn-14	Multi-Function Analog Output AO1 Gain	Bn-14= 1.00 ~Output AO1 Gain	0.01～2.55	0.01	1.00
Bn-15	Multi-Function Analog Out AO2 Gain	Bn-15= 1.00 ~Output AO2 Gain	0.01～2.55	0.01	1.00
Bn-16	PID Detection Gain	Bn-16= 01.00 PID Cmd. Gain	0.01～10.00	0.01	1.00
Bn-17	PID Proportional Gain	Bn-17= 01.00 PID P_gain	0.01～10.00	0.01	1.00
Bn-18	PID integral time	Bn-18= 10.00s PID I_Time	0.00～100.00s	0.01s	10.00s

Parameter NO.	Name	LCD display (English)	Setting range	Setting Unit	Factory Setting
Bn-19	PID Differential Time	Bn-19= 0.00s PID D_Time	0～1.00s	0.01s	0.00s
Bn-20	PID Bias	Bn-20= 0％ PID Bias	0～109%	1%	0%
Parameter NO.	Name	LCD display (English)	Setting range	Setting Unit	Factory Setting
Bn-21	1st_Step Time Under Auto_Run Mode	Bn-21= 0000.0s Time 1	0.0～6000.0s	0.1s	0.0s
Bn-22	2nd_StepTime Under Auto_Run Mode	Bn-22= 0000.0s Time 2	0.0～6000.0s	0.1s	0.0s
Bn-23	3rd_Step Time Under Auto_Run Mode	Bn-23= 0000.0s Time3	0.0～6000.0s	0.1s	0.0s
Bn-24	4th_Step Time Under Auto_Run Mode	Bn-24= 0000.0s Time 4	0.0～6000.0s	0.1s	0.0s
Bn-25	5th_Step Time Under Auto_Run Mode	Bn-25= 0000.0s Time 5	0.0～6000.0s	0.1s	0.0s
Bn-26	6th_Step Time Under Auto_Run Mode	Bn-26= 0000.0s Time 6	0.0～6000.0s	0.1s	0.0s
Bn-27	7th_Step Time Under Auto_Run Mode	Bn-27= 0000.0s Time 7	0.0～6000.0s	0.1s	0.0s
Bn-28	8th_Step Time Under Auto_Run Mode	Bn-28= 0000.0s Time 8	0.0～6000.0s	0.1s	0.0s
Bn-29	9th_Step Time Under Auto_Run Mode	Bn-29= 0000.0s Time 9	0.0～6000.0s	0.1s	0.0s
Bn-30	10th_Step Time Under Auto_Run Mode	Bn-30= 0000.0s Time 10	0.0～6000.0s	0.1s	0.0s
Bn-31	11th_Step Time Under Auto_Run Mode	Bn-31= 0000.0s Time 11	0.0～6000.0s	0.1s	0.0s
Bn-32	12th_Step Time Under Auto_Run Mode	Bn-32= 0000.0s Time 12	0.0～6000.0s	0.1s	0.0s
Bn-33	13th_Step Time Under Auto_Run Mode	Bn-33= 0000.0s Time 13	0.0～6000.0s	0.1s	0.0s
Bn-34	14th_Step Time Under Auto_Run Mode	Bn-34= 0000.0s Time 14	0.0～6000.0s	0.1s	0.0s
? Bn-35	15th_Step Time Under Auto_Run Mode	Bn-35= 0000.0s Time 15	0.0～6000.0s	0.1s	0.0s
Bn-36	16th_Step Time Under Auto_Run Mode	Bn-36= 0000.0s Time 16	0.0～6000.0s	0.1s	0.0s
Bn-37	Timer Function On_Delay Time	Bn-37= 0000.0s ON_delay Setting	0.0～6000.0s	0.1s	0.0s

Parameter NO.	Name	LCD display (English)	Setting range	Setting Unit	Factory Setting
Bn-38	Timer Function On_Delay Time	Bn-38= 0000.0s OFF_delay Setting	0.0～6000.0s	0.1s	0.0s
Bn-39	Energy_Saving Gain	Bn-39= 0000.0s Eg.Saving Gain	50～150%	1%	100%
Bn-40	Monitor 3	Bn-40=00 Display:Set_Freq.	00～18	1	00
Bn-41	Pulse input upper limit setting	Bn-41=1440Hz Pulse_Mul._Up_Bound	1000～32000Hz	1HZ	1440
Bn-42	Pulse input gain	Bn-41=100.0% Pulse_Mul_Gain	0.0～1000.0%	0.1%	100.0
Bn-43	Pulse input Bias	Bn-41=000.0% Pulse_Mul_Bias	-100.0～100.0%	0.1%	000.0

(1) Accel Time 1 (Bn-01)

(2) Decel Time 1 (Bn-02)

(3) Accel Time 2 (Bn-03)

(4) Decel Time 2 (Bn-04)

‧Set individual acceleration and deceleration times.

‧Accel time: the time required to go from 0% to 100% of the maximum output frequency.

‧Decel tme: the time required to go from 100% to 0% of the maximum output frequency

‧The Accel and Decel time can be set two sector switched via multi-function input terminal⑤～

⑧ .It also an be switched as two sector accel/decel time during running.
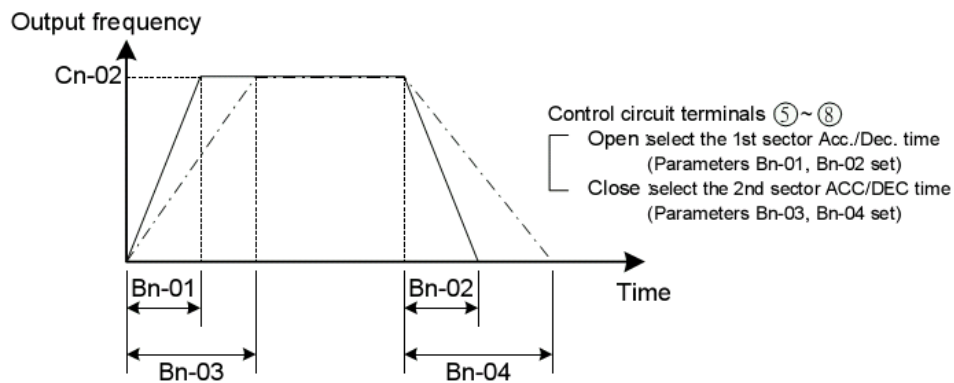
Fig.4-1 Acceleration/Deceleration Time

Remark: 1.To set S-curve time,please refer to Cn-14～Cn-44 parameter instruction.

2.The S-curve time can be set by 4 sectors and be set by Cn-41～Cn-44 parameter respectively.

(5) Voltage input frequency command gain (Bn-05)

(6) Voltage input frequency command bias (Bn-06)

(7) Current input frequency command gain (Bn-07)

(8) Current input frequency command bias (Bn-08)

(9) Current input frequency command gain (Bn-09)

(10) Multi-function analog input gain (Bn-10)

‧Setting the gain and bias according to he corresponding voltage input frequency command,current input frequency command and multi-function analog respectively.
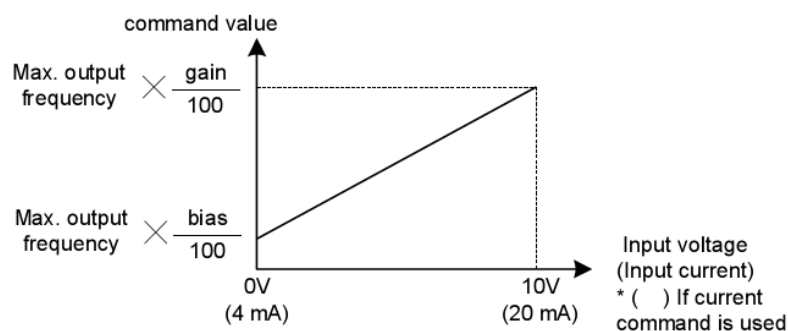
Fig.4-2 Analog Input Gain and Bias Adjutment

(11) Auto torgue boost gain   (Bn-11)

　・The inverter can increase the output torque to compensate the load increase automatically through the auto torque boost function. Then the output voltage will increase. As a result, the fault trip cases can be decreased. The energy efficiency is also improved. In the case that the wiring distance between the inverter and the motor is too long (e.g. more than 100m), the motor torque is a little short because of voltage drop. Increase the value of Bn-11 gradually and make sure the current wil lnot increase too much.Normally, no adjustment is required.
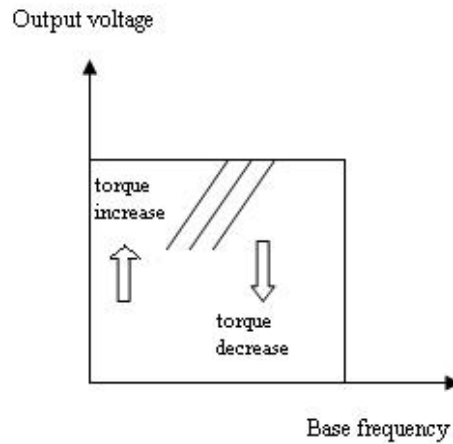
Fig.4-3 Auto Torque Boost Gain

　・If the driven motor capacity is less than the inverter's capacity(Max.appliacable motor capacity),raise the Bn-11 setting value a little.

　・If the motor generates excessive oscillation,lower the Bn-11 setting value.

(12) Monitor 1   (Bn-12)

(13) Monitor 2   (Bn-13)

　・Under DRIVE mode, 2 inverters input/out status can be monitored at the same time,other monitor items can be set through Bn-12 and Bn-13.For detailed situation,please refer to the Table4-1.Example:

(1)　Bn-12=02　Display
　　　Bn-13=01

| Output frequency 15.00Hz |
| Frequency command 15.00Hz |

(2)　Bn-12=03　Display
　　　Bn-13=05

| Output current 21.0A |
| DC voltage 311V |

(3)　Bn-12=11　Display
　　　Bn-13=12

| Input terminal 00101010 |
| Output terminal 00010010 |

Remark: While monitoring, use ⋀ and ⋁ key to show the next lower-row displayed.But the setting of Bn-13 doesn't change.

Table 4-3 Monitor items setting

Setting	Monitoring contents	Setting	Monitoring contents
Bn-12=01	Frequency command	Bn-13=01	Frequency command
Bn-12=02	Output frequency	Bn-13=02	Output frequency
Bn-12=03	Output current	Bn-13=03	Output current
Bn-12=04	Output voltage	Bn-13=04	Output voltage
Bn-12=05	DC voltage	Bn-13=05	DC voltage
Bn-12=06	Terminal VIN	Bn-13=06	Terminal VIN
Bn-12=07	Terminal AIN	Bn-13=07	Terminal AIN
Bn-12=08	Terminal AUX	Bn-13=08	Terminal AUX
Bn-12=09	Analog output(A01)	Bn-13=09	Analog output(A01)
Bn-12=10	Analog output(A02)	Bn-13=10	Analog output(A02)
Bn-12=11	Input terminal	Bn-13=11	Input terminal
Bn-12=12	Output terminal	Bn-13=12	Output terminal
Bn-12=13	Speed feedback	Bn-13=13	Speed feedback
Bn-12=14	Speed compensation	Bn-13=14	Speed compensation
Bn-12=15	PID input	Bn-13=15	PID input
Bn-12=16	PID output(Un-16)	Bn-13=16	PID output (Un-16)
Bn-12=17	PID output(Un-17)	Bn-13=17	PID output (Un-17)
Bn-12=18	Motor speed	Bn-13=18	Motor speed

(14) Multi-function analog output A01 gain   (Bn-14)
(15) Multi-function analog A02 gain   (Bn-15)

Multi-function analog output A01 and A02 can be set their individual voltage level respectively.

| Multi-function analog output A01 (Sn-33 select its output content) | → | 10.0V*Bn-14 | → | ◎ Terminal A01 |

| Multi-function analog output A02 (Sn-34 select the output content) | → | 10.0V*Bn-15 | → | ◎ Terminal A02 |
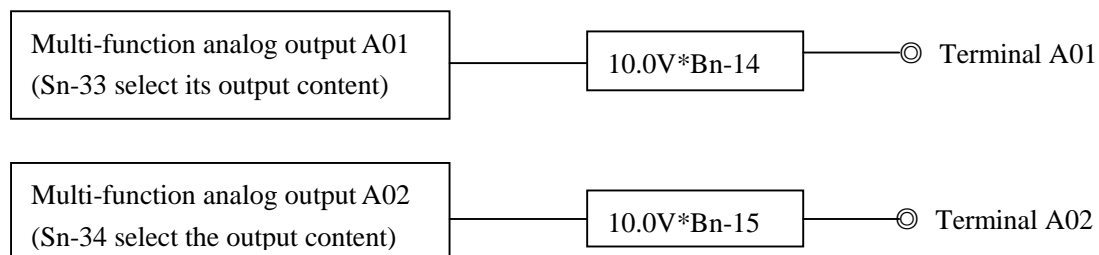
(16) PID inspection gain   (Bn-16)
(17) PID proportion gain (P)setting   (Bn-17)
(18) PID integral time (I) setting   (Bn-18)
(19) PID differential (D) setting   (Bn-19)
(20) PID bias (OFF SET) adjustment   (Bn-20)

‧ The proportion gain P,integral time I and differential D can be adjusted respectively so as to control system.

• Please refer to the APPENDIX 2 about [the adjustment method of PID parameter] to make the control possible to achieve required load response.

• Please refer to the Fig4-4[PID control pane]

• If both target value and output signal are set to 0,adjust the inverter output frequency to zero.
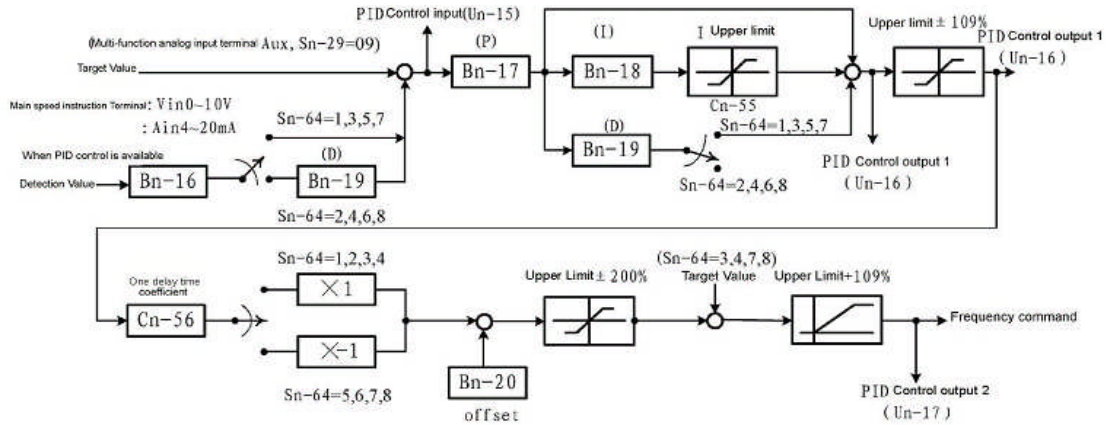
Fig.4-4 PID Control Pane

• Deviation=target value—detected valueX Bn-16

• P's output=Deviation X Bn-17

• I's output=through integral time(Bn-18),I's output value is same to the deviation value,as the differential time,I value increase and its upper limit is controlled by the Cn-55.

• D's output = difference $\times$ $(\dfrac{\text{Bn-19}}{\text{5msec}})$
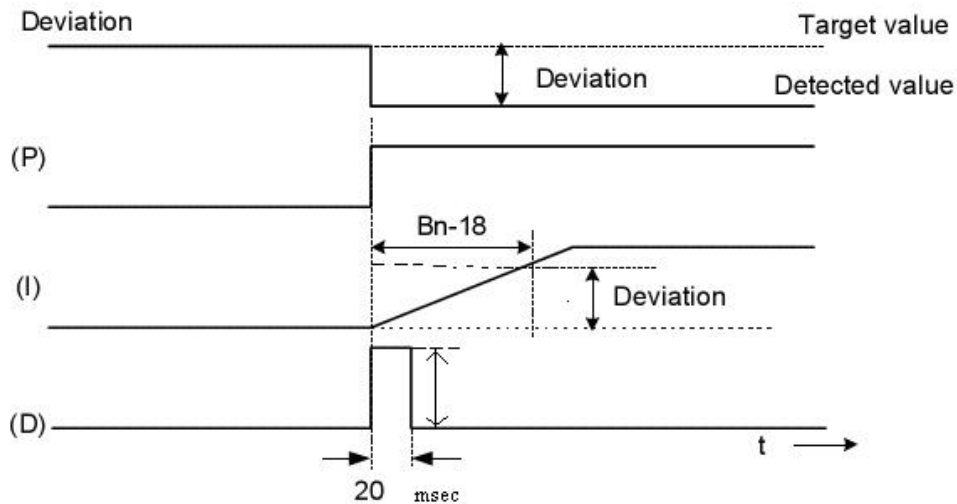
Fig.4-5 Response of PID Control for STEP-shape (deviation) Input

Remark: Whether the PID controller mode is valid or not is subject to the parameter Sn-64,its instructions are as followed:

0: invalid.

1: (Positive pattern) the differential controller's input feedback capacity and frequency command's error value.

2: (Positive pattern) the differential controller's input is feedback capacity.

3: (Positive pattern) referenced frequency plus PID control output, differential controller's input feedback capacity and frequency command's error value.

4: (Positive pattern) referenced frequency plus PID control output, differential controller's input feedback capacity.

5: (Converse pattern) differential controller's input is feedback capacity and frequency command's error value.

6: (Converse pattern) differential controller's input is feedback.

7: (Converse pattern) referenced frequency plus PID control output, differential controller's input feedback capacity and frequency command's error value.

8: (Converse pattern) referenced frequency plus PID control input, differential controller's input is feedback capacity.

(21) Auto run mode time　(Bn-21～Bn-36)

・In auto run mode,the time for individual step is refer to the Sn-44～Sn-60 the selection and setting of auto run mode.

(22) Timer function ON delay time　(Bn-37)
(23) Timer function OFF delay time　(Bn-38)

・Multi-function input terminal ⑤～⑧ (parameter setting Sn-25～28=19) and multi-function output terminal (parameter setting Sn-30～32=21) is set to timer function's delay time.

・It can eliminate the interference of ordinary inspective machine and switch action when setting the ON/OFF delay time (Bn-37/Bn-38) properly.

・ When the timer function input ON times is longer than the value set for Bn-37, the timer function output turns ON.

・ When the timer functon input OFF timers is longer than the value set for Bn-38,the timer function output turns OFF,as shown below:
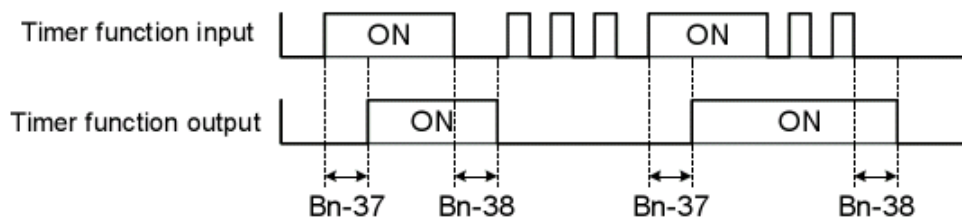
Fig.4-6 Timer Function

(24) Energy-saving gain　(Bn-39)

・Energy-saving coefficient proportion is on the unit 1%,50～150% is its setting range

・Factory setting value is 100%,now the energy-saving is invalid.

・When the setting value is unequal to 100%,the energy-saving is valid.Here the output voltage will decrease or increase according to the energy-saving gain proportion for the aim of energy-saving,however if the setting value too low to out of the peed for the motor.

・The energy saving function is disabled in the PID close-loop control and during acceleration and deceleration.
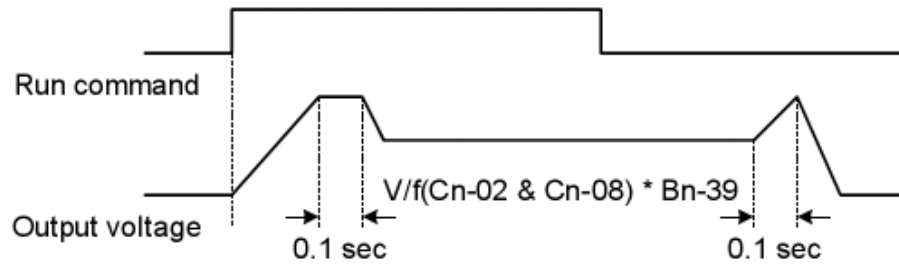
Fig.4-7 Energy-saving Operation

(25) Monitor setting 3   (Bn-40)

・The parameter is mainly for displaying the monitored contents as power on.

・When Bn-40=0,inverter powe on ,the first line will display the frequency command,while the second line display characters [BDF]as shown below:

Frequency command 015.00Hz
BDF

・When Bn-40≠00,that is Bn-40=01～18,as power on it will display the monitored items,the first line displayed contents is subject to the Bn-12 setting value,while the second line displayed contents is subject to the Bn-40 setting value as shown below:

Set   Bn-12 = 01 display
    Bn-40 = 02

Frquency command 15.00Hz
Output frequency00.00Hz

・Bn-40=01～18 parameter description is same with the Bn-12,Bn-13,please refer to the page 4-7 (Table 4-3 monitor items setting)

(26) Pulse input parameter setting (Bn-41～Bn-44)

・Setting Sn-05=3 before starting the pulse input function,please refer to the Sn-05,relevant setting please refer to the picture below:
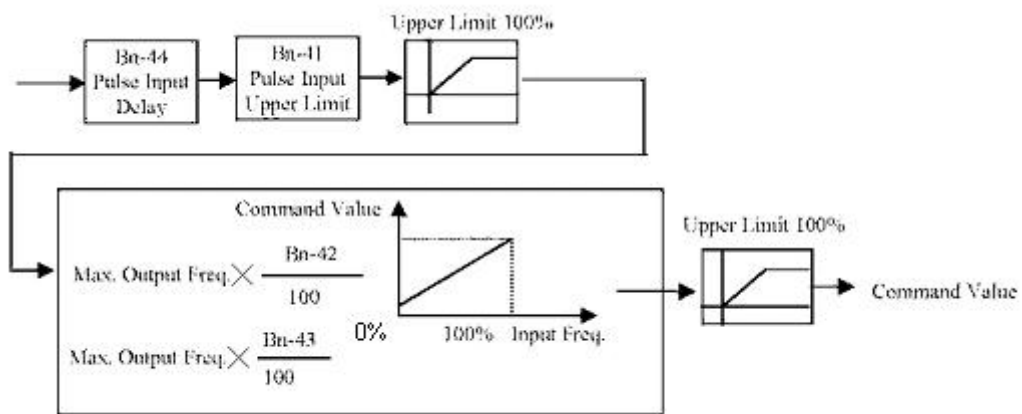
Fig.4-8 Pulse Input

4.3 Control Parameter Cn-□□

Function	Parameter No.	Name	LCD display(English)	Setting range	Seting Unit	Factory Setting
V/F Pattern setting	Cn-01	Input Voltage	Cn-01= 380.0V Input Voltage	300～510.0V	0.1V	380.0V
	Cn-02	Max.output frequency	Cn-02= 050.0Hz Max. O/P Freq.	50.0 ～ 400.0Hz	0.1Hz	50.0Hz
	Cn-03	Max.output voltage	Cn-03= 380.0Hz Max. Voltage	0.1～510.0V	0.1V	380.0V
	Cn-04	Max.voltage frequency	Cn-04= 050.0Hz Max. Volt Frequency	0.1 ～ 400.0Hz	0.1Hz	50.0Hz
	Cn-05	Middle output frequency	Cn-05= 002.5Hz Middle O/P Freq.	0.1 ～ 400.0Hz	0.1Hz	2.5Hz
	Cn-06	Voltage at middle output frequency	Cn-06= 024.1V Middle Voltage	0.1～510.0V	0.1V	24.1
	Cn-07	Min.output frequecy	Cn-07= 001.3Hz Min O/P Freq.	0.1 ～ 400.0Hz	0.1Hz	1.3Hz
	Cn-08	Voltage at min.output frequency	Cn-08= 012.9V Min O/P Freq.	0.1～510.0V	0.1V	12.9
Motor Parameter	Cn-09	Motor related current	Cn-09= *A Motor Rated I	*1	0.1A	Setting as per capacity
	Cn-10	No load current of Motor	Cn-10= 30 ％ Motor No-Load I	0～99%	1%	30%
	Cn-11	Related Slip of Motor	Cn-11= 0.0% Motor Rated Slip	0～9.9%	0.1%	0.0%
	Cn-12	Line-To-Line Resistance Of Motor	Cn-12= *Ω Motor Line R	0～65.535Ω	0.001Ω	Setting as per capacity
	Cn-13	Torque compensation of Core Loss	Cn-13= *W Core Loss	0～65535W	1W	Setting as per capacity
DC Braking Function	Cn-14	DC injection Braking Starting Frequecy	Cn-14= 01.5Hz DC Braking Start F	0.1~10.0Hz	0.1Hz	1.5Hz
	Cn-15	DC braking current	Cn-15= 050％ DC Braking Current	0～100％	1%	50%

Function	Parameter No.	Name	LCD display(English)	Setting range	Seting Unit	Factory Setting
	Cn-16	DC Injection Braking Time At Stop	Cn-16= 00.5s DC Braking Stop Time	0.0～25.5s	0.1s	0.5s
	Cn-17	DC Injection Braking Time At Start	Cn-17= 00.0s DC Braking Start Time	0.0～25.5s	0.1s	0.0s
Frequency Limit	Cn-18	Frequency Command Upper Bound	Cn-18= 100％ Freq.Cmd. Up Bound	0～109％	1%	100%
	Cn-19	Frequency Command Lower Bound	Cn-19= 000％ Freq. Cmd. Low Bound	0～109％	1%	0%
Frequency Jump	Cn-20	Frequency Jump Point 1	Cn-20= 000.0Hz Freq. Jump 1	0.0 ～ 400.0Hz	0.1Hz	0.0Hz
	Cn-21	Frequency Jump Point 2	Cn-21= 000.0Hz Freq. Jump 2	0.0 ～ 400.0Hz	0.1Hz	0.0Hz
Frequency Jump	Cn-22	Frequency Jump Point 3	Cn-22=000.0Hz Freq. Jump 3	0.0 ～ 400.0Hz	0.1Hz	0.0Hz
	Cn-23	Jump Frequency Width	Cn-23= 01.0Hz Freq. Jump Width	0.0～25.5Hz	0.1Hz	1.0Hz
Retry Function	Cn-24	Number of Auto Restart Attempt	Cn-24= 00 Retry Times	0～10	1	0
Stall Prevention	Cn-25	Stall Prevention During Acceleration	Cn-25= 170％ Acc. Stall	30～200％	1%	170％
	Cn-26	Stall Prevention During Running	Cn-26= 160％ Run Stall	30～200％	1%	170％
Comm. Fault detection	Cn-27	Communication Fault Detection Time	Cn-27=01.0s Comm. Flt Det. Time	0.1~25.5s	0.1s	1.0s
Display Unit	Cn-28	LCD Digital Operator Display Unit	Cn-28= 00000 Operator Disp. Unit	0-39999	1	0

Function	Parameter No.	Name	LCD display(English)	Setting range	Seting Unit	Factory Setting
Frequency Agree Detection	Cn-29	Freq. Agree Detection Level During Accel.	Cn-29=000.0Hz Acc. Freq. Det.Level	0.0 ～ 400.0Hz	0.1Hz	0.0Hz
	Cn-30	Freq. Agree Detection Level During Decel.	Cn-30=000.0Hz Dec. Freq. Det. Level	0.0 ～ 400.0Hz	0.1Hz	0.0Hz
	Cn-31	Frequency Agree Detection Width	Cn-31= 02.0Hz F Agree Det. Width	0.1～25.5Hz	0.1Hz	2.0Hz
Over-torque Detection	Cn-32	Overtorque Detection Level	Cn-32= 160％ Over Tq. Det. Level	30～200％	1％	160％
	Cn-33	Overtorque Detection Time	Cn-33= 00.1s Over Tq. Det. Time	0.0～25.5s	0.1s	0.1s
Carrier Frequency	Cn-34	Carrier frequency setting	Cn-34= 6 Carry_Freq Setting	1～6	1	6
Speed Search Control	Cn-35	Speed Search Detection Level	Cn-35= 150％ Sp-Search Level	0～200％	1％	150％
	Cn-36	Speed Search Time	Cn-36= 02.0s Sp-Search Time	0.1～25.5s	0.1s	2.0s
	Cn-37	Min. Baseblock Time	Cn-37= 0.5s Min. B.B. Time	0.5～5.0s	0.1s	0.5s
	Cn-38	V/F Curve in Speed Search	Cn-38= 100% Sp-search V/F Gain	10～100％	1％	100％
Low Voltage Detection	Cn-39	Low Voltage Alarm Detection Level	Cn-39= 200V Low Volt. Det. Level	300～420V	1V	400V
Slip Comp.	Cn-40	Slip Compensation Primary Delay Time	Cn-40= 02.0s Slip Filter	0.0～25.5s	0.1s	2.0s
S-curve time	Cn-41	S-curve Characteristic Time at Accel. Start	Cn-41= 0.0s S1 Curve Time	0.0～1.0s	0.1s	0.0s

Function	Parameter No.	Name	LCD display(English)	Setting range	Seting Unit	Factory Setting
	Cn-42	S-curve Characteristi Time at Accel. End	Cn-42= 0.0s S2 Curve Time	0.0~1.0s	0.1s	0.0s
	Cn-43	S-curve Characteristic Time at Decel. start	Cn-43= 0.0s S3 Curve Time	0.0~1.0s	0.1s	0.0s
	Cn-44	S-curve Characteristic Time at Decel. end	Cn-44= 0.0s S4 Curve Time	0.0~1.0s	0.1s	0.0s
Torque feedback control	Cn-45	PG parameter	Cn-45=0000.0 PG parameter	0.0 ~ 3000.0P/R	0.1P/R	0.0P/R
	Cn-46	Pole no. of motor	Cn-46=04P pole no. of motor	2~32P	2P	4P
	Cn-47	ASR proportional gain 1	Cn-47=0.00 ASP gain 1	0.00~2.55	0.01	0.00
	Cn-48	ASR integral time 1	Cn-48=01.0s ASR gain 1	0.1~10.0s	0.1s	1.0s
	Cn-49	ASR proportional gain 2	Cn-49=0.02 ASR gain 2	0.00~2.55	0.01	0.02
	Cn-50	ASR integral time 2	Cn-50=01.0s ASR integral time 2	0.1~10.0s	0.1s	1.0s
	Cn-51	ASR upper bound	Cn-51=05.0% ASR upper bound	0.1~10.0%	0.1%	5.0%
	Cn-52	ASR lower bound	Cn-52=00.1% ASR lower bound	0.1~10.0%	0.1%	0.1%
	Cn-53	Excessive speed deviation detection level	Cn-53=10% Exc.Sp.Deviat.lev el	1~50%	1%	10%
	Cn-54	Overspeed detection level	Cn-54=110%	1~120%	1%	110%
PID control	Cn-55	PID integral upper bound setting	Cn-55=100%	0~109%	1%	100%
	Cn-56	PID primary delay time constant	Cn-56=0.0s PID delay capacity	0~2.5s	0.1s	0.0s

Function	Parameter No.	Name	LCD display(English)	Setting range	Seting Unit	Factory Setting
Sensorless vector control	Cn-57	Motor line-to-line resistance (R1)	Cn-57=*Ω Motor line-to-line resistance	0.001 ～ 60.000Ω	0.001Ω	Setting as per capacity
	Cn-58	Motor rotor equivalent resistance	Cn-58=*Ω Motor rotor_R	0.001 ～ 60.000Ω	0.001Ω	Setting as per capacity
	Cn-59	Motor leakage inductance	Cn-59=*mH Motor leakage_X	0.1 ～ 200.00mH	0.01mH	Setting as per capacity
	Cn-60	Motor mutual inductance	Cn-60=*Mh Motor mutual_X	0.1 ～ 6553.5mH	0.1mH	Setting as per capacity
	Cn-61	Slip compensation gain	Cn-60=1.00 Slip gain	0.00～2.55	0.01	1.00

*1 The setting range is 10%~200%of the inverter rated current.

(1) Input voltage   (Cn-01)
　　・Set inverter voltage to match power supply voltage at input side.

(2) The V/F curve parameter setting   (Cn-02～Cn-08)
　　・When V/F curve select parameter Sn-02=15(any V/F mode),setting the required V/F pattern at random in Cn-02～Cn-08,factory setting standard is regular linearity V/F curve pattern (that is Cn-05=Cn-07,Cn-06 invalid),as shown below(Fig.4-9):
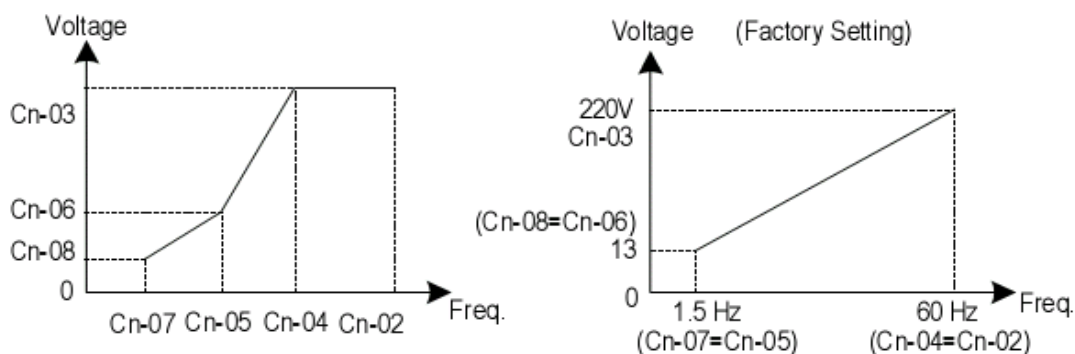
Fig.4-9 V/F Curve Adjustment

　　・In low speed operation(<3Hz),a large torque can be generated by increasing the V/F curve voltage,however,the motor will be hot due to over exci-tation. Based upon the applied load, properly adjust the V/F curve according to the magnitude of monitored current into the motor.
　　・The V/F curve setting value should satisfy the followed relationship,otherwise "V/F curve setting invalid" will display.
　　Max.frequency≥Base frequency≥Mid.frequency≥Min.frequency
　　　(Cn-02)≥(Cn-04)>(Cn-05)≥(Cn-07)
　　Max.voltage≥Mid.voltage≥Min voltage
　　　(Cn-03)≥(Cn-06)>(Cn-08)
　　・When mid.frequency(Cn-05)=min.frequency(Cn-07),the mid.voltage(Cn-06) invalid.

(3) Motor rated current   (Cn-09)
　　・Electronic overload thermal reference current.
　　・The factory setting value depends on the capacity of the inverter.
　　・The setting range is 10%～200% of the inverter's rated output current.
　　・Set the rated current according to the motor's nameplate if not using the 4-pole motor.

(4) Motor no-load current   (CN-10)
　　・Motor no-load current is used in slip compensation control.
　　・Setting range 0～99%,the motor rated current (Cn-09) is 100%.
　　・When the inverter output current is bigger than the motor no-load current(Cn-10),the inverter compensate the output frequency.
　　・As shown below Fig.4-10 the slip compensation function,output frequency f1-f2's speed changed as the load changed.

$$Output\ frequency\ compensation\ value\ =\ \frac{motor\ rate\ slip \times output\ current\ -\ motor\ no\text{-}load\ current}{motor\ rated\ current(Cn\text{-}09)\ -\ motor\ no\text{-}load\ current(Cn\text{-}10)}$$
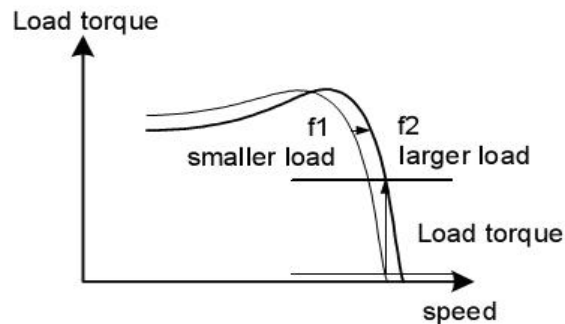
Fig.4-10 Slip Compensation Control

(5) Motor rated slip　(Cn-11)

　　・The setting is used as a reference Fig.4-10 slip compensation control.

　　・The setting range0.0～9.9% on the base frequency (Cn-04).

　　・If in constant power range,the slip will increase linearity multiple,please refer to the Fig 4-10.

　　・If setting Cn-11 to 0.0%,the is no response of output frequency,there is no slip compensation in the cases when the frequency command is less than the Min.output frequency or during regeneration.

$$\text{Motor rated slip}\ (\text{Cn-11setting value}) = \frac{\text{Motor rated frequency(Hz)-[rated rev(rpm) x motor pole(p)]/120}}{\text{Base frequency(Cn-04)}} \times 100\%$$
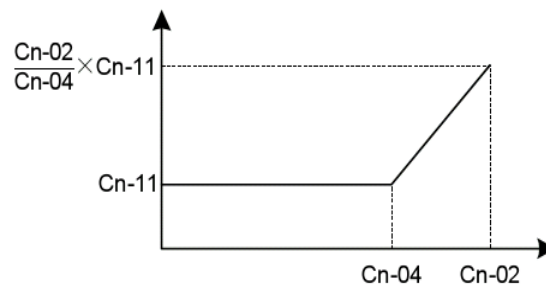
Fig.4-11 Slip Compensation

(6) Motor line-to-line resistance　(Cn-12)

(7) Motor iron-core loss　(Cn-13)

　　・It is for torque compensation control function,the factory setting is vary according the the frequency capacity.

(8) DC braking starting frequency　(Cn-14)

(9) DC braking current　(Cn-15)

(10) DC braking time at stop   (Cn-16)

(11) DC braking time at start   (Cn-17)

　　　•The DC braking function decelerates by applying a DC current to the motor.This happens in the 2 cases:

　　　a. DC braking time at stop: It is used to prevent coasting by inertia when the motor is not completely stopped by normal deceleration when there is a large load. Lengthening the DC braking time (Cn-16) or increasing the DC injection braking current (Cn-15) can shorten the stopping time.

　　　b. DC braking time at start: It is effective for temporarily stopping and then restarting,without regeneration,a motor coasting by inerti.

　　　•DC braking function as shown Fig.4-12

　•DC braking current (Cn-15) setting value is on the base of inverter's rated current 100%.

　•When DC braking starting frequency (Cn-14) setting value is lower min output frequency (Cn-07) and take the min.output frequency (Cn-07) as braking starting frequency.

　•Setting 0.0s when DC braking time at stop,do not execute DC braking,the inverter output stop when the output frequency is lower the DC braking starting frequency(Cn-14)

　•Setting 0.0s when DC braking time at start and don't execute the DC braking function but accelerating by the min.output frequency.
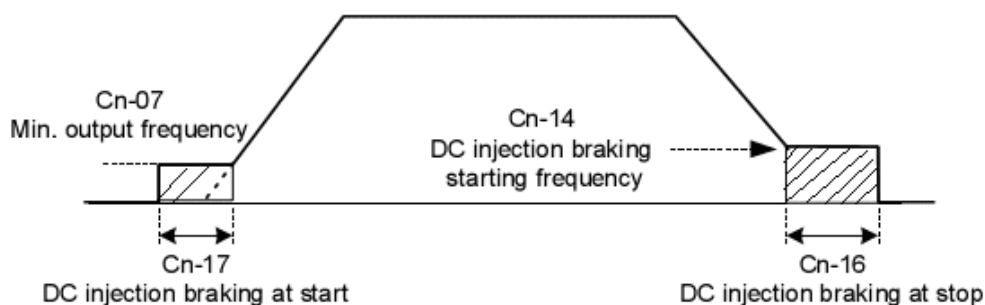
Fig.4-12 DC Braking Function

(12) Frequency command upper bound   (Cn-18)

(13) Frequency command lower bound   (Cn-19)

　•Output frequency can be set upper bound and lower bound.

　•When making the run command,if the frequency command is bigger than the command upper bound,the output frequency should restrain the upper bound value;if the frequency command is less than the command lower bound ,the output command should restrain the lower bound.(lower bound Cn-19>0)

　•Setting frequency upper/lower bound is on the base of max.output frequency(Cn-02)100%.If setting upper/lower Cn-19>Cn-18 will display:frequency restrain setting wrong.
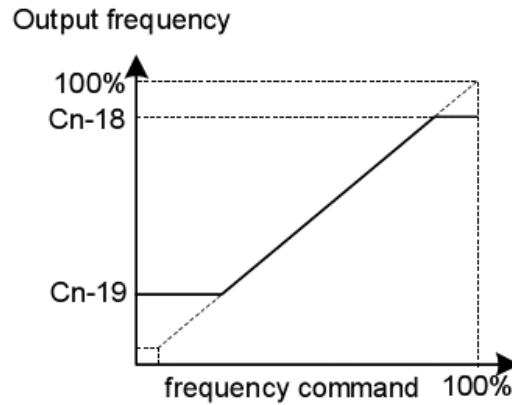
Fig.4-14 Frequency Jump Control

(14) Frequency jump 1　(Cn-20)
(15) Frequency jump 2　(Cn-21)
(16) Frequency jump 6　(Cn-22)
(17) Frequency jump width　(Cn-23)

　・To avoid the machinery inherently libration frequency produced resonance,it can set jump frequency to avoid resonant frequency.
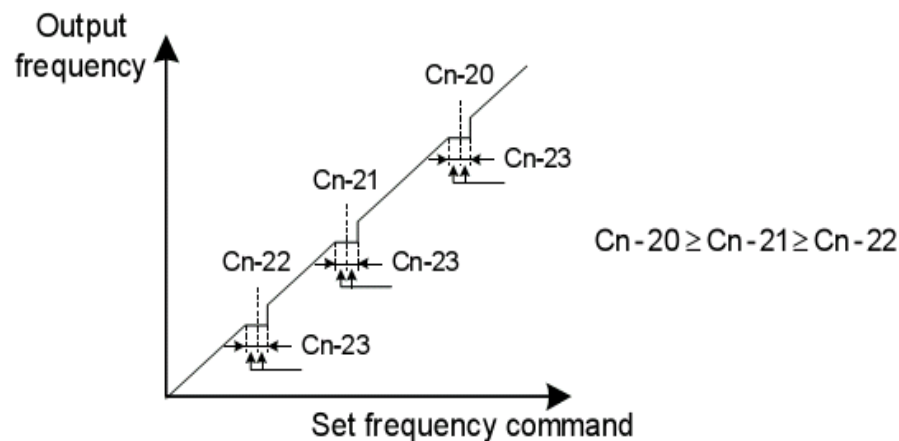
Fig.4-14 Frequency Jump Control

・The motor can't be stable speed run in frequency jump interzone,but if accelerate speed,the output frequency can be stable through the interzone according to the accel/decel time.

・Frequency jump 1～3(Cn-20～Cn-22)setting value is 0.0Hz,the frequency jump function invalid.

・Frequency jump 1～3 setting sequence should be according to the followed principle:
Frequency jump 1(Cn-20)≥Frequency jump 2 (Cn-21)≥Frequency 3 (Cn-22),if not setting in this sequence,it will display [setting error].

・Frequency jump interzone(Cn-23) setting value is 0.01Hz,frequency jump function invalid.

(18) The no. of Abnormity restart　(Cn-24)

・During in run, when produce abnormity situation, the inverter can diagonose the abnormity type and restart automatically.The no.of restart is subject to the parameter Cn-24 setting,max. is 10

times,if setting 0,there is no abnormity type restart auto function.
- Producing such abnormity, Cn-24 setting value can restart auotmatically
  *over-current   *grounding   *over-voltage
- When producing abnormity restart, counter add 1 automatically.But if producing any followed situation,abnormity restart counter reset is 0 (that is abnormity restart times is count from 0)
  a. There is no any abnormity jump more than 10 minutes.
  b. After abnormity action reset (press RESET key or fault reset terminal ③ action)
  c. After turn off the power supply.
- Use the multi-function output terminal (terminal R1A-R1B-R1C,DO1 or R2A-R2C) which can set the signal output in abnormity restart.
- If unnecessory, do not use the abnormity restart function freqeuntly so as not inverter fault.

(19) *Stall prevention level during acceleration   (Cn-25)*
(20) *Stall prevention level during running   (Cn-26)*
- If load too large,the inverter will adjust the output frequency automatically to prevent the motor speed stall.
- Stall prevention function can be divided into stall prevention during acceleration and stall prevention during running.
- Stall prevention during acceleration: when current over Cn-25 setting value in motor acceleration,it will accelerate to run automatically.Please refer to the Fig.4-16.
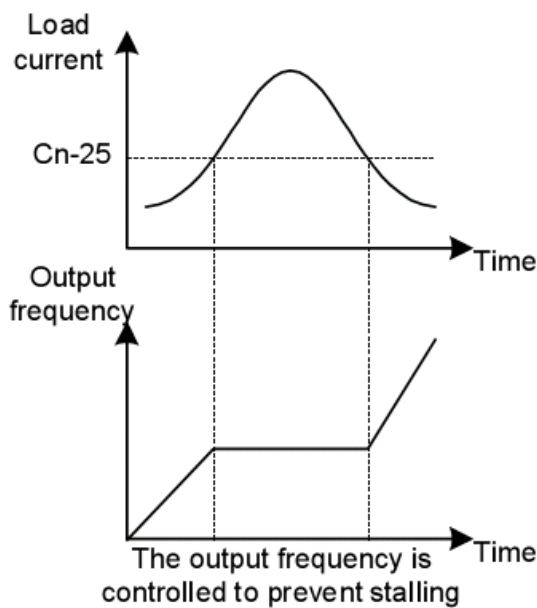
Fig.4-15 Acceleration Stall Prevention Function   Fig.4-16 Run Stall Prevention Function
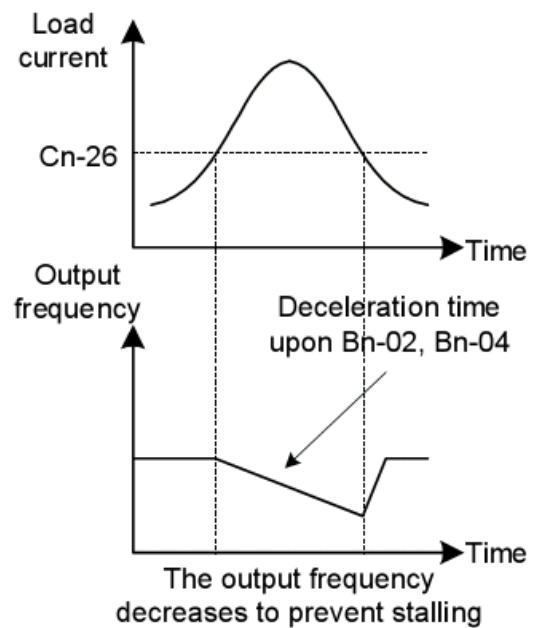
- Cn-25 and Cn-26 setting value on the level of inverter rated current 100%.

(21) *Communication fault detection time (Cn-27)*
- Please refer to BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement.

(22) Operator display unit (Cn-28)

・ Frequency command and display unit setting,its setting range 0～39999 and instructions as Table 4-4:

Table 4-4 Frequency command and display unit setting:

Cn-28 setting value	Setting/Displayed contents		
0	0.01Hz Unit		
1	0.01% Unit		
2～39	Rpm unit.Cn-28 setting value is motor pole(even) Rpm=120Xfrequency command (Hz)/Cn-28		
00040～39999	Set the decimal point position using the value of the fifth digit		
	Setting value	Display	Display proportion
	0004～09999	XXXX	100% speed will be displayed 0200→ Cn-28=00200
	1000～19999	XXX.X	100% speed will display 200.0→ Cn-28=12000(100% speed will display 200.0,60% speed will display 120.0)
	2000～29999	XX.XX	100% speed will display 65.00→ Cn-28=26500(100% speed will display65.00,60% speed will display 39.00)
	3000～39999	X.XXX	100% speed will display 2.555→Cn-28=32555

(23) Frequency agree detection level during acceleration (Cn-29)
(24) Frequency agree detection level during deceleration (Cn-30)
(25) Frequency agree dectection width (Cn-31)

・ Frequency dectection function: Multi-function output terminal (external terminal R1A-R1B-R1C,D01or R2A-R2C),set frequency agree,any frequency agree and output frequency detection signal output.

・ Frequency detection operation is as Table 4-5:

Function	Frequency detection operation	Description
Frequency agree (speed agree)		・ When output freq. is within freq. command +/- freq. Detection width (Cn-31), frequency agree output is "ON". ・ Set Sn-30～ Sn-32 to be "02" for the freq. agree Cn-31setting of frequency agree output.

Function	Frequency detection operation	Description
Setting frequency agree		• After acceleration,the output.fre. reaches the dectection agree level during acceleration (Cn-29) and within fre.agree detection width,agree fre. output is "ON". Set Sn-30～Sn-32=03
Output frequency detection 1		During acceleration,output fre. ≤ fre.agree detection level duing acceleration(Cn-29) and output fre.detection 1 signal is "ON". During deceleration,output frequen ≤ fre.agree detection level during deceleration (Cn-30)and output fre.detection signal 1 is "ON". Set Sn-30～Sn-32=04
Output frequency 2		• During acceleration,output fre. ≥ fre.agree detection level duing acceleration(Cn-29) and output fre.detection 2 signal is "ON". During deceleration,output frequen ≥ fre.agree detection level during deceleration (Cn-30)and output fre.detection signal 2 is "ON". Set Sn-30～Sn-32=05

(26) Overtorque detection level　(Cn-32)

(27) Overtorque detection time　(Cn-33)

　　• Overtorque detection function:Setting the overtorque detection function valid (Sn-12=1～

4),When overload leading fault,the inverter can detect the motor current,if inverter output current $\geq$ overtorque detection level(Cn-32)and last time over the overtorque time (Cn-33),mutlti-function output terminal(external terminal R1A-R2B-R1C,D01 or R2A-R2C) can output the overtorque detection signal.
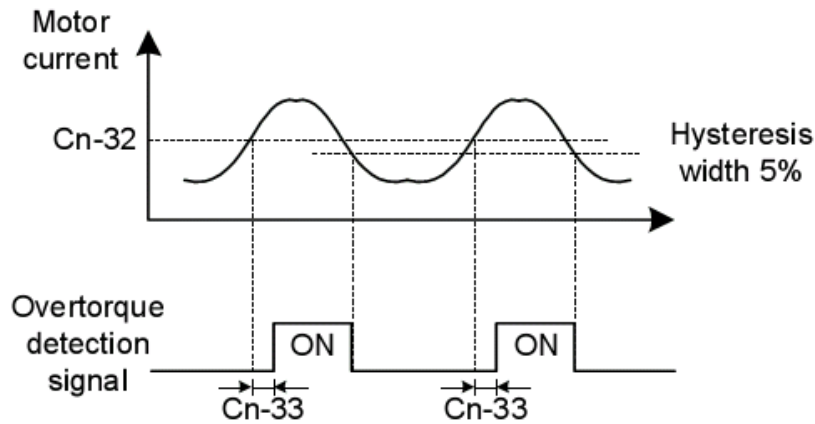
Fig.4-17 Overtorque Detection Function

・Use parameter Sn-12 and set only on the way of frequency agree detect overtorque or detect during running ,and after dectecting overtorque,continue to run or leave off output.

(28) Carrier wave frequency setting   (Cn-34)

・Lower the carrier frequency can decrease the noise interference and leakage current.Its setting is range 1~6(2.5kHz~15kHz)shown below.
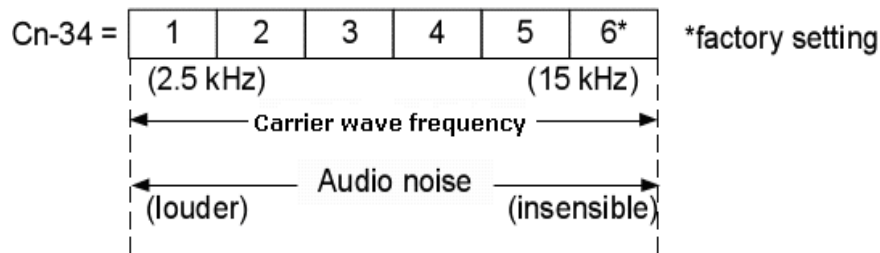
・Usually the carrier wave frequency doesn't need to be adjusted except for the wiring distance is long between inverter and motor,please decrease the carrier wave and leakage current according to the below table:

Wiring distance	<30m	30m~50m	50m~100m	>100m
Carrier frequency(Cn-34)	<15kHz	<10kHz	<55kHz	2.5kHz

(29) Speed search detection level   (Cn-35)
(30) Speed search time   (Cn-36)
(31) Min.baseblock time   (Cn-37)

(32) *Speed search V/F curve gain (Cn-38)*

· Speed search function: The speed search function will search the speed of a frequency coasting motor from the frequency command or max. frequency downward. And it will restart up smoothly from that frequency or max. frequency. It is effective in situations such as switching from a commercial power supply to an inverter without tripping occurred.

· Speed search operation sequence as follows:
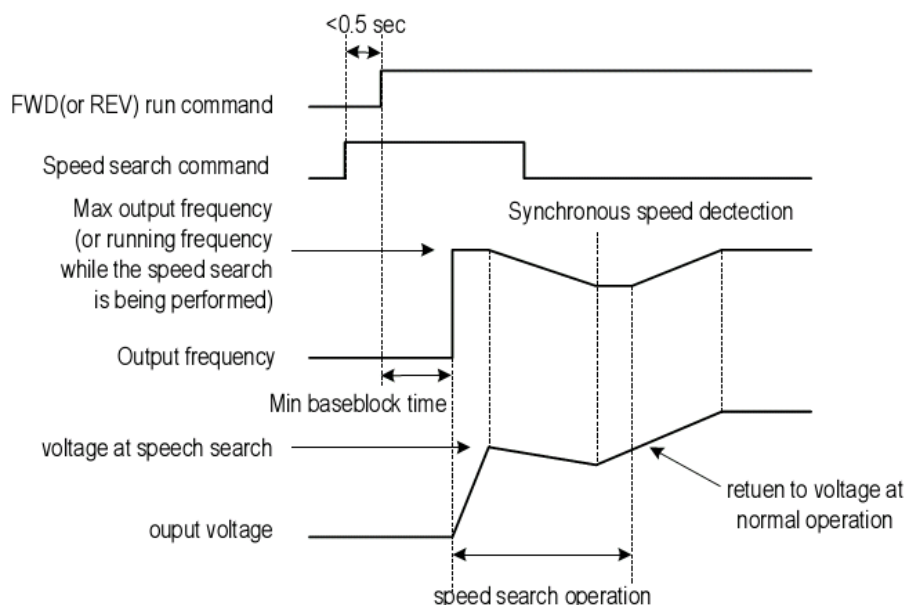
Fig.4-18 Speed Search Operation Sequence

· The speed search command can be set through multi-function contact input terminal⑤、⑥、⑦、⑧input (can be set by Sn-25,Sn-26,Sn-27,Sn-28)

　　When set Sn-25～28=21,speed search operation is affected by the max.frequency.

　　When set Sn-25～28=22,speed search operation is affected by the setting frequency.

· In inverter output baseblock,firstly input speed search command,and then input run command about mix.baseblock time Sn-37,and try to start to search the actural speed of the motor.

· In speed search,when the inverter output current is larger than the speed search operation level(set by parameter Cn-35) and lower the inverter output frequency,however when the inverter output current less than the speed search operation (Cn-35) and judge the output frequency value is the motor's actual rev,the inverter will accelerate or decelerate to the set frequency according to the acceleration or deceleration time.

· In speed search,to prevent the inverter over-current protection operation, decreasing the V/F(Cn-38) of speed search a little,but usually no adjustment.

· Speed search V/F=normal run V/F X Cn-38.

Remark:

1. The speed search operation will be disabled if the speed search command is enacted from the Max. frequency and the setting frequency. (eg.:Sn-25=20, ,Sn-26=21 and multi-function input terminals⑤, ⑥is used at the same time).

2. Make sure that the FWD/REV command must be performed before or at the same time with the

speed search command. A typical operation sequence is shown below.
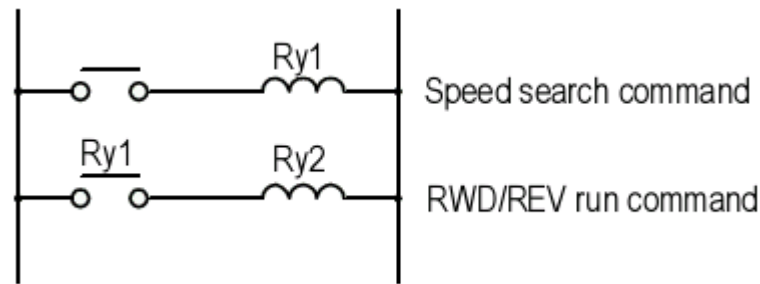
3. *When the speed search and DC braking are set, set the Min.baseblock time (Cn-37). For the Min. baseblock time, set the time long enough to allow the motor's residual voltage to dissipate. If an overcurrent is detected when starting a speed search or DC injection braking, raise the setting Cn-37 to prevent a fault from occurring. As a result, the Cn-37 setting can not be set too small.*

(33) Low voltage detection level　(Cn-39)

‧In priciple there is no need to alter the low voltage detection level (Cn-39).

‧If an external AC reactor is used,it need to decrease the main circuit low voltage detection level,use the parameter Cn-39 to adjust,the setting value is main circuit DC voltage.

(34) Slip compensation delay time　(Cn-40)

‧Slip compensation control function one delay time,setting unit is 0.01s.

‧Usually there is no need to change the parameter setting,when the slip compensation response too slow or the motor rev is unstable,ajust the Cn-40 setting value properly.

‧Slip compensation response too slow, decrease Cn-40 setting value.

‧Motor rev unstable,increase Cn-40 setting value.

(35) S-curve characteristic time at acceleration start　(Cn-41)
(36) S-curve characteristic time at acceleration end　(Cn-42)
(37) S-curve characteristic time at deceleration Start　(Cn-43)
(38) S-curve characteristictime at deceleration end　(Cn-44)

‧Adjust the S curve time during acceleration and deceleration,it can prevent the machinery overload start and impact appearance.

‧ S-curve characteristic time can be set respectively for beginning acceleration,ending acceleration, beginning deceleration and ending deceleration. The relation between these parameters is shown Fig.4-19
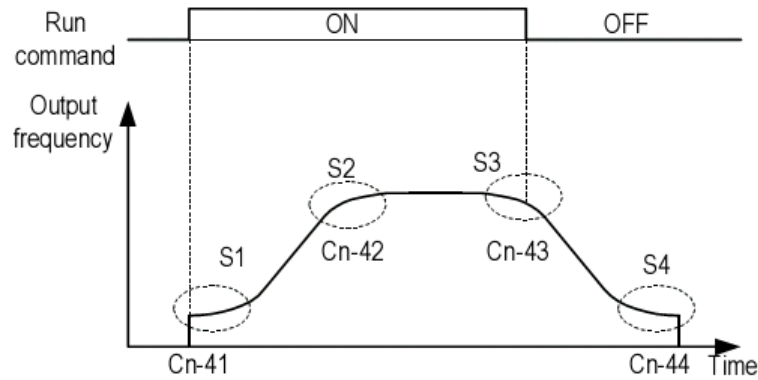
Fig.4-19 S Curve

· Ater S curve time is set,the accerleration time and deceleration time are shown below:

$$\text{Acel.time}=\text{Acel.time 1(or 2)}+\frac{(Cn\text{-}41)+(Cn\text{-}42)}{2}$$

$$\text{Decel.time}=\text{Decel.time 1(or 2)}+\frac{(Cn\text{-}43)+(Cn\text{-}44)}{2}$$

(39) PG parameter   (Cn-45)

It is the number of coder'pulase rotating in one circle.,and the setting unit is 0.1P/R

(40) Motor pole   (Cn-46)

The parameter is set in the unit of pulse.The factory setting is 0.1 P/R.Cn-45 and Cn-46 should be satisfy the followed condition, otherwise an error messenge will display [input error]

$$\frac{2*Cn\text{-}45*Cn\text{-}02}{Cn\text{-}46} < 32767$$

(41) ASR proportin gain 1   (Cn-47)

The ASR proportion gain of output frequency 0%, see Fig.4-20.

(42) ASR integral time 1   (Cn-48)

The ASR integral time of output frequency 0%, see Fig.4-20.

(43) ASR proportion gain 2   (Cn-49)

Output frequency 100%'s ASR proportion gain, see Fig.4-20.

(44) ASR integral time 2   (Cn-50)

Output frequency 100%'s ASR integral time, see Fig.4-20.
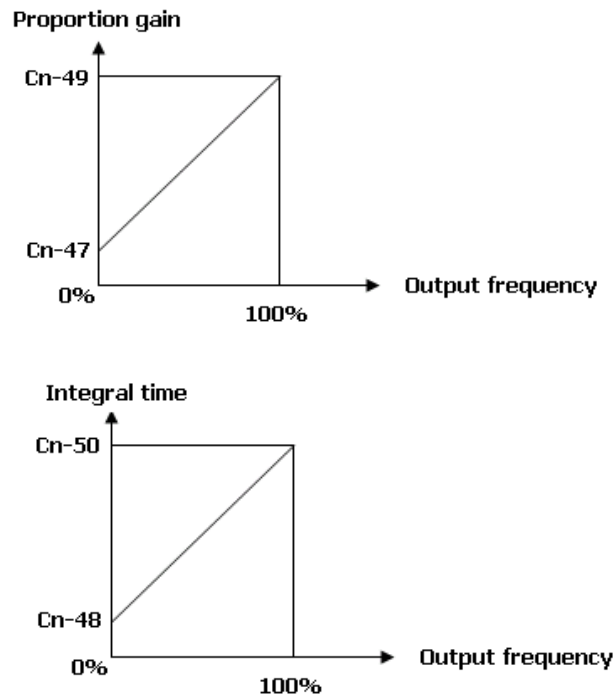
Fig.4-20 The Relationship Between Output Frequency,Proportion Gain and Integral Time

(45) ASR upper bound (Cn-51)

(46) ASR lower bound   (Cn-52)

About the upper bound and lower bound ,please refer to the Fig.4-35.

(47) Excessive speed deviation detection level   (Cn-53)

・Setting excessive speed deviation detection level is on the unit of Cn=02=100%,1%.

・The disposal method of excessive speed deviation detection ,please refer to the parameter Sn-42[PG excessive speed deviation disposal]

(48) Overspeed detection level (Cn-54)

・Setting overspeed detection level is on the unit of Cn-02=100%,1%.

・The disposal method of overspeed detection,please refer to the parameter Sn-43[The disposal of overspeed deviation]

(49) PID integral upper bound (Cn-55)

(50) PID primary delay time constant (Cn-56)

・Please refer to the Fig.4-4[PID control pane]

・PID integral upper bound(Cn-55):When in PID control,I's integral upper bound,setting range0～109%,max.output frequency is 100%,for using there is no need to adjust the setting value.If increasing the setting value of Cn-55 which can improve the integral's control,if can't adjust the integral time (Bn-18) or primary delay time (Cn-56) for decreasing the system vibration,it must reduce the setting value of Cn-55.If Cn-55 too low,it's impossible for the feedback signal to catch the target setting signal.

・PID control primary delay time constant (Cn-56):When in PID control,increasing primary delay time (increase the setting value of Cn-56) can reduce the system vibration after PID control's

frequency command output delay time setting,but the response time will be slow.If the abrasion is too big,incresing the setting value of Cn-56 to avoid oscillation.

(51) *Motor line-to-line resistance R1* *(Cn-57)*
‧ Set standard 4 pole motor at factory about motor line-to-line (including the external wiring)'s resistance value.
‧ It can be gained from motro parameter auto-studying function (Sn-66) or the motor manufacturer.
‧ Increase the setting when the generating torque is not large enough at low speed.
‧ Decrease the setting when the generating torque is extremely high or over-current at low speed.

(52) *Motor rotor equivalent resistance R2* *(Cn-58)*
‧ Set standard 4 pole motor at factory about motor Y-equivalent wiring.
‧ It can be gained from motor parameter auto-studying function (Sn-66) or the motor manufacturer.

(53) *Motor leakage inductance Ls* *(Cn-59)*
‧ Set standard 4 pole motor at factory about the motor leakage inductance capacity.
‧ It can be gained from motor parameter auto-studying function (Sn-66) or the motor manufacturer.

(54) *Motor mutual inductance Lm (Cn-60)*
‧ Set standard 4 pole motor at factory about motor Y-equivalent inductance.
‧ It can be gained from motor parameter auto-studying function (Sn-66) or the motor manufacturer.

(55) *Slip compensation gain* *(Cn-61)*
‧ It is used for adjusting the slip compensation.
‧ Usually,the parameter must change the setting value,if slip compensation is not allowed,adjust the setting value properly.
‧ Increase the setting when motor rev. is lower than setting rev.
‧ Decrease the setting when moror rev. is higher than setting rev.

Note: The induction motor Y-equivalent model.
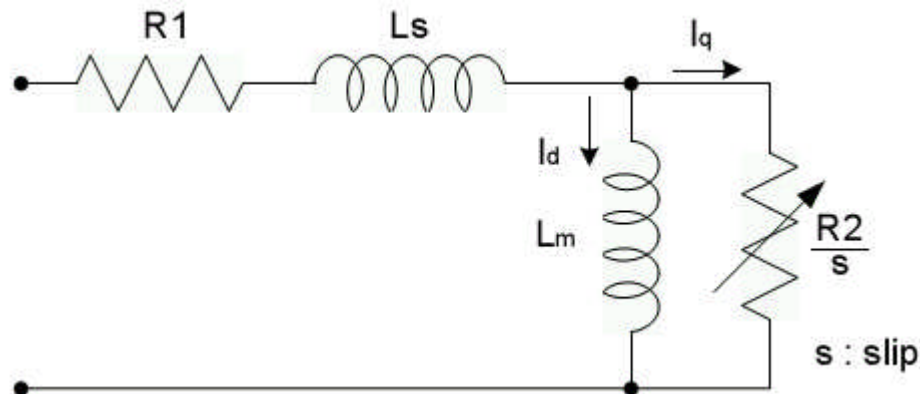
4.4 System Parameter Sn-□□

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
Capacity Setting	Sn-01	Inverter Capacity Setting	Sn-01=001 220V 1HP	Inverter capacity selection	0
V/F Curve	Sn-02	V/F Curve Selection	Sn-02=01 V/F Curve	0~14 : 15 fixed V/F curve pattern 15 : arbitrary V/F pattern selection	0
Operation state	Sn-03	Operator Display	Sn-03= 00 Setting Valid	0 : An-□□, Bn-□□, Cn-□□, Sn-□□ setting & reading enabled 1 : An-□□, setting & reading enabled Bn-□□,Cn-□□,Sn-□□ reading only 2~5 : reserved 6 : clear fault message 7 : 2-wire initialization (220V/440V) 8 : 3-wire initialization (220V/440V) 9 : 2-wire initialization (200V/415V) 10 : 3-wire initialization (200V/415V) 11 : 2-wire initialization (200V/380V) 12 : 3-wire initialization (200V/380V) 13~15 : reserved	0
Operation	Sn-04	Run Source	Sn-04=0	Run source	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
Control Mode Selection		Selection	Run resouce Operator	0 : Operator 1 : Control terminal 2 : RS-485 communication	
	Sn-05	Frequency Command Selection	Sn-05= 0 Ref. Cmd. Operator	Frequency Command 0 : Operator 1 : Control circuit terminal 2 : RS-485 communication	0
	Sn-06	Stop method selection	Sn-06= 0 Dec. Stop	0 : Deceleration to Stop 1 : Coast to Stop 2 : Whole_range braking stop 3 : Coast to Stop with Timer (restart after time Bn-02)	0
	Sn-07	Operator STOP function selection	Sn-07= 0 Stop Key Valid	If operation command from control ter-minal or RS-485 communication port 0 : operator stop key effective 1 : operator stop key not effective	0
	Sn-08	Inhibit REV setting	Sn-08= 0 Allow Reverse	0 : reverse run enabled 1 : reverse run disabled	0
	Sn-09	Output frequency UP/DOWN function	Sn-09= 0 Inhibit UP/DOWN	0 : Reference frequency is changed through the key "UP/DOWN" pressing, later followed by	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				key "ENTER" pressing, and then this output freq. will be acknowledged. 1 : reference frequency will be acknowledged immediately after the key "UP/DOWN" pressing.	
	Sn-10	Frequency Command Characteristics Selection	Sn-10= 0 Ref. Cmd. Fwd. Char.	30.16 or before version set Sn-68=-0--: 0 : Reference command has forward characteristics (0~10V or 4~20mA/0~100%) 1 : Reference command has reverse characteristics (10~0V or 20~4mA/0~100%)	0
	Sn-11	Scanning Times At InputTerminal	Sn-11= 0 Scan Time 5 ms	0 : scan and confirm once per 5 ms 1 : continuously scan and confirm twice per 10 ms	0
	Sn-12	Overtorque Detection ~~Selection~~	Sn-12= 0 Overtorque ~~Invalid~~	0 : Overtorque detection function is not effective. 1 : Overtorque is	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				detected only at frequency_agree; the motor will sustain operation even after the overtorque has been detected 2 : Overtorque is detected only at frequency_agree; the motor will stop after the baseblock time when the overtorque has been detected. 3 : Overtorque is detected during running (ACC, DEC included). The motor will sustain operation even after the overtorque has been detected. 4 : Overtorque is detected during running (ACC, DEC included). The motor will stop after the baseblock time when the overtorque has been detected.	
	Sn-13	Output Voltage Limit Selection	Sn-13= 0 V Limit Invalid	0 : V/F output voltage is limited 1 : V/F output voltage is not limited	0
Protection Charact-	Sn-14	Stall Prevention During Acc.	Sn-14= 1 Acc. Stall	0 : invalid (Too much a torque	1

4-32

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
eristic selection		Function Selection	Valid	may cause the stall) 1 : valid (stop acceleration if current exceeds Cn-25 setting)	
	Sn-15	Stall Prevention during Dec. Function Selection	Sn-15= 1 Dec. Stall Valid	0 : invalid (installed with external brake unit) 1 : valid (no external brake unit used)	1
	Sn-16	Stall prevention during run function selection	Sn-16=1 Run Stall Valid	0:invalid 1:valid –deceleration time1 for Stall prevention during running (no external brake unit used) 2:valid –Deceleration time2 for Stall prevention during running (no external brake unit used)	1
	Sn-17	Fault Retry Setting	Sn-17=0 Retry No O/P	0:Do not output fault retry. (Thef ault contact doesnot operate.) 1:Output fault retry. (The fault contact operates.)	0
	Sn-18	Operation Selection At Power Loss	Sn-18=0 PwrL_to_ON Stop O/P	0:stop running 1:continue to run	0
	Sn-19	Zero Speed Braking Operation Selection	Sn-19=0 Z_brakingInv alid	Zero command braking function 0:Invalid	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				1:Valid	
	Sn-20	External Fault contact (terminal ③) selection	Sn-20=0 Terminal 3A contact	0: a-contact input valid (normally open) 1: b-contact input valid (normally open)	0
	Sn-21	External Fault (terminal ③) Detection selection	Sn-21=0 All Time Ext. Fault	0: detect all time 1: detect only during operation	0
	Sn-22	External Fault operation selection	Sn-22=1 Ext.Fault Free run	0: dec.to stop(upon dec.time1 Bn-02) 1:coast (free run)to stop 2:dec.to stop(upon dec.time1 Bn-04) 3:continue operating	1
	Sn-23	Motor Overload Protection Selection	Sn-23=1 Cold Start Overload	Electronically motor overload protection selection 0:electronically motor overload protection invalid 1:standard motor cold start overload protection characteristics 2:standard motor hot start overload protection characteristics 3:special motor cold start overload protection characteristics 4:special motor	

Function	Parameter NO.	Name	LCD display (English)	Description		Factory setting
				hot start overload protection characteristics		
Analog frequency command function select	Sn-24	External Analog input Frequency Command Characteristic Selection	Sn-24=0 Analog command VIN	Frequency command characteristics Selection at extern alanalog input terminal 0:voltage signal 0~10V(VIN) 1 :curren tsignal 4~20mA(AIN) 2 :addition of voltage signal 0~10V (VIN+AIN) 3 :subtraction of current signal (VIN-AIN)		
Multi-function input contact selection	Sn-25	Multi-function terminal⑤function selection	Sn-25=02 Multi-speed command 1	0 0 ~ 2 5	Terminal ⑤ factory setting is multi-speed command 1	02
	Sn-26	Multi-function terminal⑥function selection	Sn-26=03 Multi-speed command 2	0 1 ~ 2 6	Terminal ⑥ factory setting is multi-speed command 2	03
	Sn-27	Multi-function⑦ function selection	Sn-27=06 Jog command	0 2 ~ 2 7	Terminal ⑦ factory setting is jog command	06
	Sn-28	Multi-function⑧ function selection	Sn-28=07 Acc.and Dec. Switch	0 3 ~ 2 9	Terminal ⑧ factory setting is acc.and dec. time switch	07
Multi-funct	Sn-29	Multi-function analog	Sn-29=00	0	Multi-functio	00

Function	Parameter NO.	Name	LCD display (English)	Description		Factory setting
ion input		input(AUX)function selection	Auxiliary fre.command	0 ~ 1 5	n analog input terminal(Aux)factorry setting is auxiliary frequency command	
Multi-function output signal	Sn-30	Multi-function terminal(R1A-R1B-R1C) function selection	Sn-30=13	0 0 ~ 2 2	Terminal R1A-R1B-R1C factory setting is fault output	13
	Sn-31	Multi-function terminal(D01)function selection	Sn-31=00	0 0 ~ 2 2	Terminal DO1-DOG factory setting output signal during running	00
	Sn-32	Multi-function terminalDO2(R2A-R2C)function selection	Sn-32=01	0 0 ~ 2 2	Terminal R2A-R2C factory setting is zero-speed output signal	01
Multi-function analog output selection	Sn-33	Multi-function analog output(A01)selection	Sn-33=00 TerminalAO1 frequency command	0:Frequency command (10V/max.output frequency)		00
	Sn-34	Multi-function analog output (AO2)selection	Sn-34=01 Terminal A02 output frequency	1:Output frequency(10V/max output frequency) 2:Output current(10V/rated current) 3:Output voltage(10V/input voltage Cn-01) 4:DC voltage(10V/800		01

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				V) 5:External analog command VIN(10V/10V) 6:External analog command AIN(0 ∼ 10V/4 ∼ 20mA) 7:Multi-function analog command Aux(10V/10V) 8:PID control input 9:PID contriol output 1 10:PID control output 2 11:Communication control	
	Sn-35	Pulse Output Multiplier Selection	Sn-35=1 Pulse mult.6	When multi-function output terminal(DO1)is set as pulse signal output 0:1F 1:6F 2:10F 3:12F 4:36F	1
RS-485 communication function	Sn-36	Inverter address	Sn-36=01	Inverter address can be set as 1∼31	1
	Sn-37	RS-485Comm.Baud Rate Setting	Sn-37=1 Baud rate	0:1200bps 1:2400bps 2:4800bps 3:9600bps	1
	Sn-38	RS-485Comm.Trans mission Parity Setting	Sn-38=0 Reversed bit	0:No parity 1:Even parity 2:Odd parity	0
	Sn-39	RS-485 Comm.Fault Stop Selection	Sn-39=0 Fault dec.stop	0:Deceleration to stop(Bn-02) 1:Coast to stop 2:Deceleration tos top(Bn-04)	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				3:Continue to run	
PG speed control	Sn-40	PG speed control function	Sn-40=0 PG invalid	0:No speed control 1:Speed control,accel.and decel.no integral control 2:Speed control ,accel.and decel.integral control	0
	Sn-41	Operation selection at PG Open Circuit	Sn-41=0 PG invalid	0:Deceleration to stop(Bn-02) 1:Stop free 2:Deceleration to stop(Bn-04) 3:Continue to run	0
	Sn-42	Operation PG at large speed deviation	Sn-42=0 1st.Dec Stop	0:Deceleration to stop(Bn-02) 1:Stop free 2:Deceleration to stop(Bn-04) 3:Continue to run	0
	Sn-43	Operation PG at overspeed detection deviation	Sn-43=0 1st.Dec Stop	0:Deceleration to stop(Bn-02) 1:Stop free 2:Deceleration to stop(Bn-04) 3:Continue to run	0
Auto_Run Mode	Sn-44	Operation Mode Selection During Auto_Run	Sn-44= 0 Auto_Run Invalid	0 : Auto_Run mode not effective 1 : Auto_Run mode for one single cycle. (continuing running from the unfinished step if restarting) 2 : Auto_Run mode be performed	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				periodically (continuing running from the unfinished step if restarting) 3 : Auto_Run mode for one single cycle, then hold the speed of final step to run. (continuing running from the unfinished step if restarting) 4 : Auto_Run mode for one single cycle. (starting a new cycle if restarting) 5 : Auto_Run mode be performed periodically (starting a new cycle if restarting) 6 : Auto_Run mode for one single cycle, then hold the speed of final step to run. (starting a new cycle if restarting)	
	Sn-45	Auto_Run Mode Operation Selection 1	Sn-45= 0 Auto_Run Stop	0:Stop (Bn-02) 1:Forward 2:Reverse	0
	Sn-46	Auto_Run Mode	Sn-46= 0		0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
		Operation Selection 2	Auto_Run Stop		
	Sn-47	Auto_Run Mode Operation Selection 3	Sn-47= 0 Auto_Run Stop		0
	Sn-48	Auto_Run Mode Operation Selection 4	Sn-48= 0 Auto_Run Stop		0
	Sn-49	Auto_Run Mode Operation Selection 5	Sn-49= 0 Auto_Run Stop		0
	Sn-50	Auto_Run Mode Operation Selection 6	Sn-50= 0 Auto_Run Stop		0
	Sn-51	Auto_Run Mode Operation Selection 7	Sn-51= 0 Auto_Run Stop		0
	Sn-52	Auto_Run Mode Operation Selection 8	Sn-52= 0 Auto_Run Stop		0
	Sn-53	Auto_Run Mode Operation Selection 9	Sn-53= 0 Auto_Run Stop		0
	Sn-54	Auto_Run Mode Operation Selection 10	Sn-54= 0 Auto_Run Stop		0
	Sn-55	Auto_Run Mode Operation Selection 11	Sn-55= 0 Auto_Run Stop		0
	Sn-56	Auto_Run M0ode Op0eration Sele0ction 12	Sn-56= 0 Auto_Run Stop		0
	Sn-57	Auto0_Run Mode Operation Selection 13	Sn-57= 0 Auto_Run Stop		0
	Sn-58	Auto_Run Mode Operation Selection 14	Sn-58= 0 Auto_Run Stop		0
	Sn-59	Auto_Run Mode Operation Selection 15	Sn-59= 0 Auto_Run Stop		0
	Sn-60	Auto_Run Mode	Sn-60= 0		0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
		Operation Selection 16	Auto_Run Stop		
Other	Sn-61	Applied Torque Mode	Sn-61= 0 Const. Tq. Load	0 : constant torque 1 : variable(quadratic) torque	
	Sn-62	Language Selection	Sn-62= 0 Language:English	0 : English 1 : Traditional Chinese	
	Sn-63	Parameter Copy 0 3-70		0 : not loaded (copied) 1 : upload from digital operator to inverter 2 : download from inverter to digital operator 3 : inspect the EEPROM of digital operator 4 : inspect the EEPROM of inverter	
	Sn-64	PID Function	Sn-64=0 PID Invalid	Before version 30.18: 0 : PID invalid 1 : PID valid After version 30.18: 0 : PID invalid 1 : (Forward characteristics) Deviation is D-controlled. 2 : (Forward characteristics) Feedback value is D-controlled 3 : PID forward	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
				control : frequency reference+PID output, D control of deviation. 4 : PID forward control : frequency reference+PID output, D control of feedback. 5 : (Reverse characteristics) Deviation is D-controlled. 6 : (Reverse characteristics) Feedback value is D-controlled 7 : PID reverse control : frequency reference+PID output, D control of deviation. 8 : PID reverse control : frequency reference+PID output, D control of feedback.	
	Sn-65	Brake Resistor Protection	Sn-65=0 Protect Invalid	0 : Braking resistor protection invalid 1 : Braking resistor protection valid	0
*2 Sensorless Vector Control	Sn-66	Motor Parameters Autotuning Selection	Sn-66=0 AUTO TUNE SEL	0 : Auto tuning invalid 1 : Auto tuning valid	0
	Sn-67	Control Mode	Sn-67=0	0 : V/F control	0

Function	Parameter NO.	Name	LCD display (English)	Description	Factory setting
		Selection	CNTRL MODE SEL	mode (include V/F control with pulse generator feedback) 1 : Sensorless Vector Control Mode	
	Sn-68	Control selection	Sn-68＝0000 Control selection	---1: Output phase lose protection function valid ---0: Output phase lose protection function invalid --1-: Reserved --0-: Reserved (Bit3 function is available for 30.16 and later version) -1--: ±10V analog voltage input function is valid -0--: ±10V analog voltage input function is invalid 1---: Frequency Up/Down hold function valid 0---: Frequency Up/Down hold function invalid	0

(1) Inverter capacity setting (Sn-01)

- The inverter capacity has been set at the facotry according to the following tables about Sn-01.
- When the setting value Sn-01 has been changed, the inverter system parameter settings should be changed based upon the constant torque (CT) load (setting of Sn-61=0)or variable torque(VT)load (Sn-61=1).

Sn-01 setting value			022		023		024		025		026		027		028	
032CT(Sn-61=0) / VT(Sn-61=1) / Item Name			CT	VT	CT	VT	CT	VT	CT	VT	CT	VT	CT	VT	CT	VT
Inverter rated capacity(KW)			1.5		2.2		3.7		5.5		7.5		11		15	
Inverter rated current (A)			4		4.8		8.7		12		15		24		32	
Max.applicable motor capacity (HP)			2	3	3	3	5.4	7.5	7.5	10	10	15	15	20	20	25
Factory setting	Cn-09	Motor rated current (A)	2.9	4	4	4	7.3	10.2	10.2	12.6	12.6	18.6	18.6	24.8	24.8	31.1
	Cn-12	Motor line-to line resistance(Ω)	9.628	6.333	6.333	6.333	2.735	1.776	1.776	1.151	1.151	0.634	0.634	0.436	0.436	0.308
	Cn-13	Core loss torque compensation(W)	108	142	142	142	208	252	252	285	285	370	370	471	471	425
	Cn-34	Carrier frequency(kHz)	10	5	10	10	10	5	10	10	10	5	10	5	10	5
	Cn-37	Min baseblock time (s)	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Cn-02	V/F curve	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]

Table 4-6 440V Class Inverter Capacity Selection

Sn-01 setting value			029		030		031		032		033		034	
032CT(Sn-61=0) / VT(Sn-61=1) / Item Name			CT	VT	CT	VT	CT	VT	CT	VT	CT	VT	CT	VT
Inverter rated capacity(KW)			18.5		22		30		37		45		55	
Inverter rated current (A)			40		48		64		80		96		128	
Max.applicable motor capacity (HP)			25	30	30	30	40	50	50	50	60	75	75	75
Factory setting	Cn-09	Motor rated current (A)	31.1	36.3	36.3	36.3	48.7	59.0	59.0	59.0	70.5	80.0	80.0	80.0
	Cn-12	Motor line-to line resistance(Ω)	0.308	0.239	0.239	0.239	0.164	0.133	0.133	0.133	0.110	0.074	0.074	0.074
	Cn-13	Core loss torque compensation(W)	425	582	582	582	536	641	641	641	737	790	790	790
	Cn-34	Carrier frequency(kHz)	10	5	10	10	10	5	10	10	10	5	10	5
	Cn-37	Min baseblock time (s)	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Cn-02	V/F curve	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]	01	07[*1]

*1 Use the variable torque patterns when there is a quadratic or cubic relationship between the speed and load, such as in fan or pump applications. The user can properly choose the desired (V/f) patterns (Sn-02=04, 05, 06,or 07) based upon the load torque characteristics.

(2) *V/F curve selection   (Sn-02)*

- Before selecting V/F curve,please confirm the input voltage (Cn-01)
- Sn-02=00～14, V/F curve fixed; Sn-02=15, V/F curve   can use Cn-01～Cn-08 setting freely.

Table 4-7   0.75～1.5KW,220V Inverter V/F Curve (440 class,voltage doubleness value)

	Spec.		Sn-02	V/F curve *1		Spec.		Sn-02	V/F curve *1
Gernery purpose	50Hz		00		*2 High starting torque	50Hz	Low starting torque	08	
							Large starting torque	09	
	60Hz	60Hz staturation	01 15	6		60Hz	Low starting torque	10	
		50Hz staturation	02				Large starting torque	11	
	72Hz		03			90Hz		12	
Decreasing torque(wind turbine,water pump load)	50Hz	Three times decreasing curve	04		Constant capacity run (deceleration)	120Hz		13	
		Two times decreasing curve	05						
	60Hz	Three times decreasing curve	06			180Hz		14	
		Two times decreasing curve	07						

Table 4-8 2.2～30KW,220V Class Inverter V/F Curve (440V Class,Voltage doubleness value is fit for 2.2～55KW)

	Spec.		Sn-02	V/F curve *1		Spec.		Sn-02	V/F curve *1
Gernery purpose	50Hz		00	(00) V 220 / 14 / 7.5 / 0 1.3 2.5 50 (Hz)	*2 High starting torque	50Hz	Low starting torque	08	(09) (08) V 220 15.2 14.6 7.7 7.6 0 1.3 2.5 50 (Hz)
							Large starting torque	09	
	60Hz	60Hz staturation	01 15	(02) (01) (15) V 220 14 7.5 0 1.5 3 50 60 (Hz)		60Hz	Low starting torque	10	(11) (10) V 220 15.2 14.6 7.7 7.6 0 1.5 3 60 (Hz)
		50Hz staturation	02				Large starting torque	11	
	72Hz		03	(03) V 220 14 7.5 0 1.5 3 60 72 (Hz)		90Hz		12	(12) V 220 14 7.5 0 1.5 3 60 90 (Hz)
Decreasing torque(wind turbine,water pump load)	50Hz	Three times decreasing curve	04	(05) (04) V 220 55 38.5 7.5 6.8 0 1.3 25 50 (Hz)	Constant capacity run (deceleration)	120Hz		13	(13) V 220 14 7.5 0 1.5 3 60 120 (Hz)
		Two times decreasing curve	05						
	60Hz	Three times decreasing curve	06	(07) (06) V 220 55 38.5 7.5 6.8 0 1.5 30 60 (Hz)		180Hz		14	(14) V 220 14 7.5 0 1.5 3 60 180 (Hz)
		Two times decreasing curve	07						

*1 When select V/F curve,please consider the following notes:

(1) The voltage and frequency characteristic of motor.

(2)Max.speed of motor

*2 Select high starting torque only in the following conditions:

(1)The power cable length is long(>150m)

(2) Voltage drop at startup is large.

(3) AC reactor is inserted at the input side or output side of the inverter.

(4) A motor with capacity smaller than the maximum applicable inverter capacity is used.

(3) Operation situation setting   (Sn-03)

・Locked (Sn-03=0 or 1)

Whether the parameter can be monited or setting is subject to Sn-03.

Sn-03	DRIVE mode		PRGM mode	
	Set	Only monitor	Set	Only monitor
0	An,Bn	Sn,Cn	An,Bn,Sn,Cn	
1	An	Bn,Sn,Cn	An	Bn,Sn,Cn

・Initialized factory setting of parameter (Sn-03=7～12)

・Initialized factory setting An-□□,Bn-□□,Sn-□□ (except for Sn-01～02 and Sn-61) according to the use of different power supply (220V/440V,60Hz,200V/415V,50Hz or 200V/380V,50Hz),also set terminal ⑤～⑧ to 2-wire or 3-wire operation mode according the difference of Sn-03 setting value.

(4) Run command selection   (Sn-04)

・The input setting method of run command

・When set the external terminal input (Sn-04=1) and run source setting is 2-wire operation(set by the Sn-03),run command is FWD/STOP,REV/STOP. If run source set is 3-wire operation(set by Sn-03),the run command is FORWARD,STOP,FWD/REV.

(5) Frequency command selection   (Sn-05)

・The input setting method of frequency command

(6) Stop method selection   (Sn-06)

・ There are 4 stop methods can be set
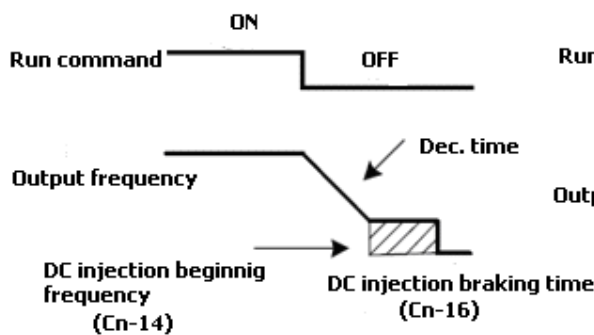
1. Deceleration to stop (Sn-06=0)   *2. Coast to stop (Sn-06=1)*

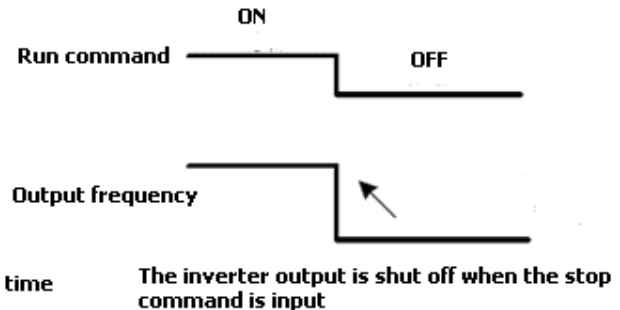

Fig.4-21 Deceleration to Stop   **Fig.4-22 Coast to Stop**

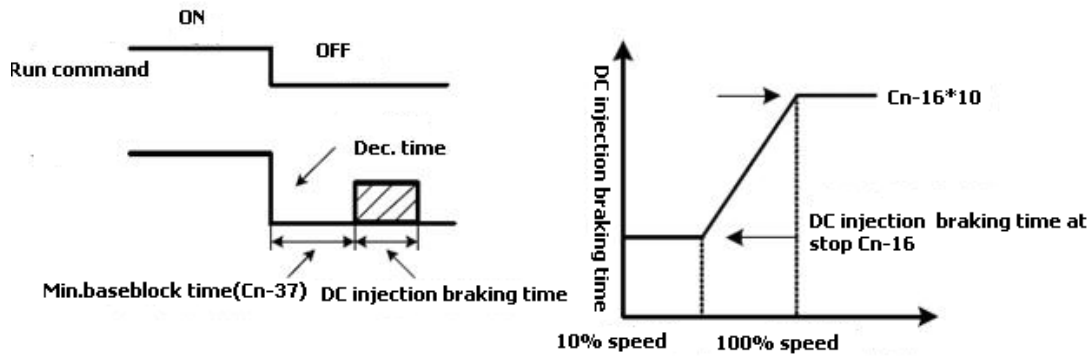*3. Whole range DC injection braking stop (Sn-06=2)*

Fig.4-23 Whole Range DC Injection Braking Stop

- After stop command the min.baseblock time (Cn-37),it begins DC injection braking.
- The DC injection braking time depends on the output frequency of run command baseblock and DC injection braking time (Cn-16)stop.
- If whole range occurs DC injection braking OC (overcurrent),pleae delay min.baseblock time (Cn-37).(After turn off the power of motor, the counter-electromotive force generated by the residual magnetic field in the motor can cause an overcurrent to be detected when DC injection braking stop is applied.
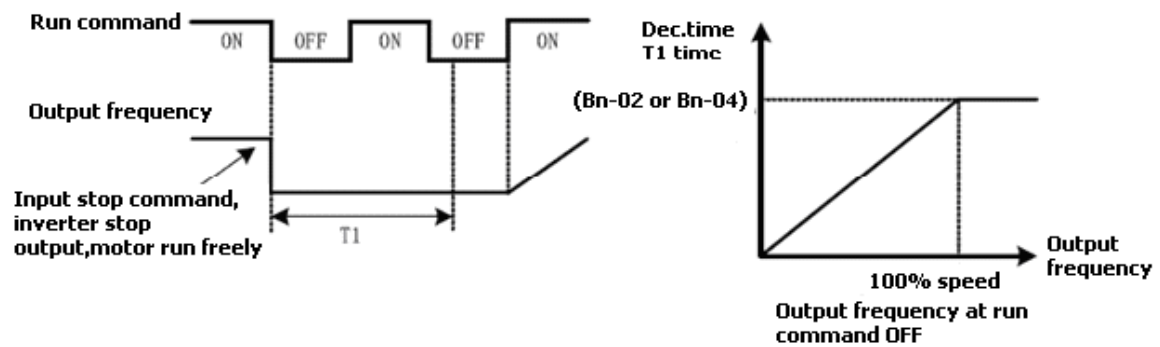
4. Coast to stop with timer (Sn-06=3)

Fig.4-24 Coast to Stop with Timer

- After the stop command is executed,no accept the run command ON or OFF within T1 time.The T1 time depends on the output frequency when run command OFF and the deceleration time (Bn-02 or Bn-04).

(7) Operator STOP function selection   (Sn-07)

- When run command is come from external terminal or RS-485 communication port while the operator STOP valid,invalid setting.

Sn-07=0: valid,when external terminal or RS-485 communication port run,press STOP key during running,and the LED light of STOP key,motor stop according to Sn-07 setting.

Sn-07=1: when external terminal or RS-485 communication port run,press STOP key invalid during running.

(8) Prohibition of REV setting   (Sn-08)

- The motor can't REV when setting prohibition REV (Sn-08=1).

(9) Output frequency UP/DOWN function   (Sn-09)

- Output frequency is operated by output frequency UP/DOWN directly.

Sn-09=0: After alter frequency command by the operator increasing /decreasing

(⌃ / ⌃) required to press ENTER key,and the output frequency will change.

Sn-09=1: Output frequency can be operated as UP/DOWN by increasing/decreasing key directly.If

Press ENTER key,turn off the power supply and recall the power supply,it still can record the frequency command before turnning off the power supply.

· Output frequency is not only operated by the operator as UP/DOWN but also the external multi-function terminal (terminal⑤～⑧)as UP/DOWN.

(10) Frequency command setting (Sn-10)

Analog frequency command (0～10V/4～20mA)forward/reverse characteristics.As shown below:

Forward input characteristic	Reverse input characteristic
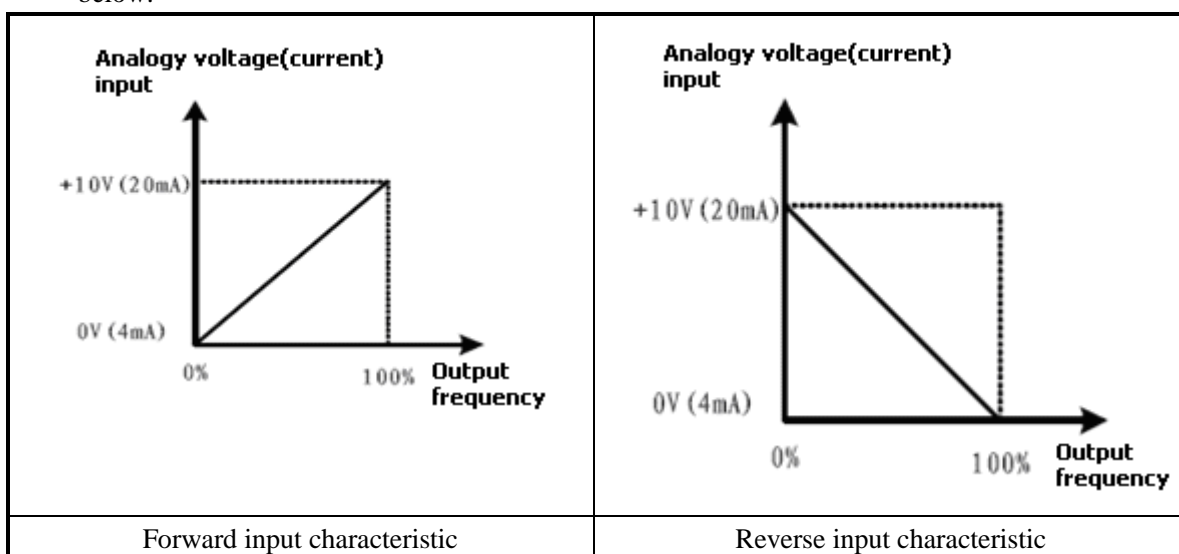
(11) Input terminal scan times (Sn-11)

· Set input terminal (FWD/REV,multi-function terminal)'s response speed.

Sn-11=0: Scan 5ms/time

Sn-11=1: Scan 10ms/time.

(12) Overtorque detection selection (Sn-12)

· When overtorque detection is enabled, be sure to set the value of the overtorque detection level (Cn-32) and the overtorque detection time (Cn-33). An overtorque condition us detected when the current exceeds the overtorque detection level for Longer than the over torque detection time.

Table 4-9 Sn-12 setting value:

Sn-12	Instruction	LCD operator display content
0	Overtorque detection disabled	
1	Detect only during frequency agree. Continue operation after detection.	[overtorque]blinks
2	Detect only during frequency agree.Stop output after detection	[overtorque]display

| 3 | Detect overtorque during running,continue to run after detection | [overtorque]blinks |
| 4 | Detect overtorque during running,stop run after detection | [overtorque]display |

(13) Output voltage limitation selection (Sn-13)

· In low speed region,if setting V/F curve output voltage too high,the inverter will be driven into fault ,so the user can set upper bound of output voltage.
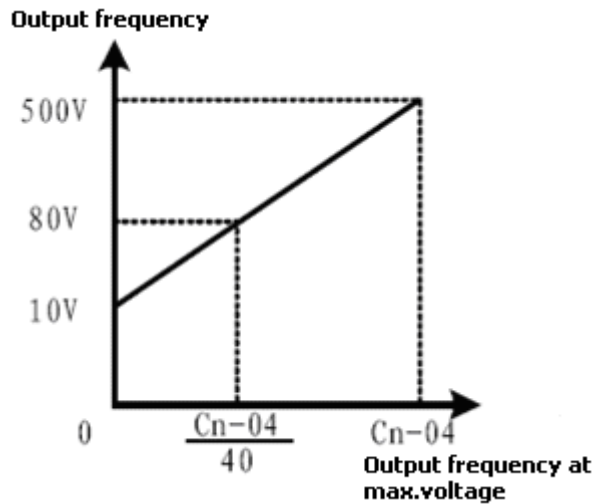

Fig.4-25 Output Voltage Limitation

(14) Stall prevention selection during acceleration (Sn-14)

· Please refer to Cn-25 stall prevention level during acceleration.

(15) Stall prevention selecion during deceleration (Sn-15)

· When there is no external braking resistance,it can provide 20% regenerative braking torque,if load too large and exceed the regenerative braking torque,which need set stall prevention function during deceleration valid (Sn-15=1) or delay deceleration time(Bn-02 or Bn-04) to avoid over-voltage jump.

· Be sure to set disable(Sn-15=0)when add external braking resistance,otherwise braking resistance function invalid.As shown below is the stall prevention operation function during deceleration.
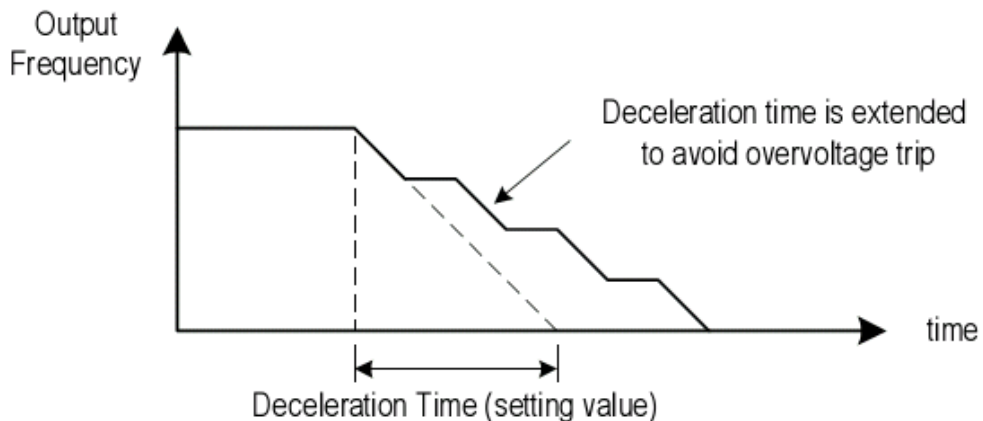
Fig.4-26 Stall Prevention Operation Function during Deceleration (Sn-15=1)

(16) Stall prevention selection during running   (Sn-16)

Please refer to Cn-26 stall prevention operation level.

(17) Operation selection at fault contact during fault retrying   (Sn-17)

・During fault retrying,fault contact operation,no operation setting.

・Fault retrying function please refer to Cn-24.

(18) Operation selection at power loss   (Sn-18)

・Set power momentary restart to run function when power loss occurs(within 2 s)

Sn-18=0: After stop power soon and restart,stop run.

Sn-18=1: After stop power soon and restart,continue to run.

・If power loss time exceeds 2s,it will produce low voltage fault and fault output contact operation,motor coast to stop.

(19) Zero command braking function   (Sn-19)

・When run command and frequency command setting is input by external terminal input (Sn-04=1,Sn-05=1) and input frequency command 0V and the run signal is ON,use the DC braking method to make the motor produce locked torque.

・As shown below,zero command braking function is effective (Sn-19=1),the DC braking current (Cn-15) is restrained 0～20%.Operation sequence is as follows:
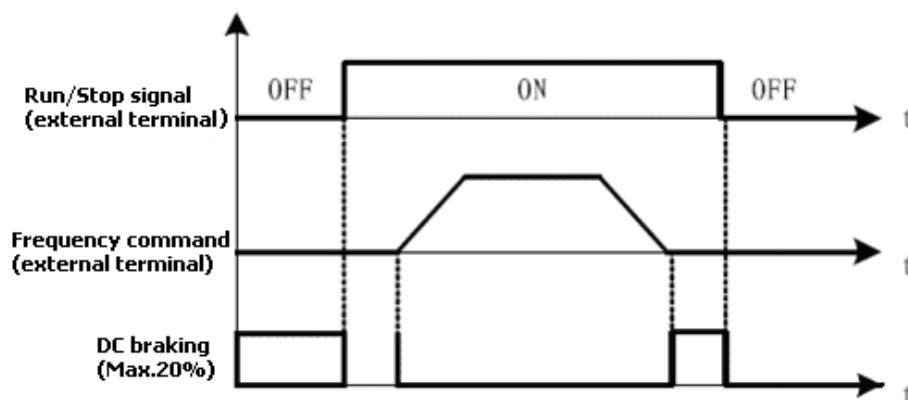
Fig.4-27 Zero Command Braking Function

(20) External fault contact (terminal ③)selection   (Sn-20)
(21) External fault (terminal ③) detection selection   (Sn-21)
(22) External fault operation selection   (Sn-22)

・External fault contact (terminal ③) fault operation,run method disposal selection.

(23) Motor overload protection selection   (Sn-23)

・Electronic overload protection disable.

・Motor overload protection is according to the rated current (Cn-09)setting value for overload time protection level.

・When one inverter drive several motor,motor overhot protection setting is invalid (Sn-23=0)

・When use power supply frequently,please set the hot machinery start protection characteristic (Sn-23=2 or 4).

・Please set standard motor protection characteristic (Sn-23=1 or 2) when there is no forced cooling fan motor due to the heat dissipation capability is lower when in the low speed operation.

・For the motor with forced cooling fan, the heat dissipation capability is not dependent upon the rotating speed.The setting is special for motor protection characteristic (Sn-23=3 or 4).
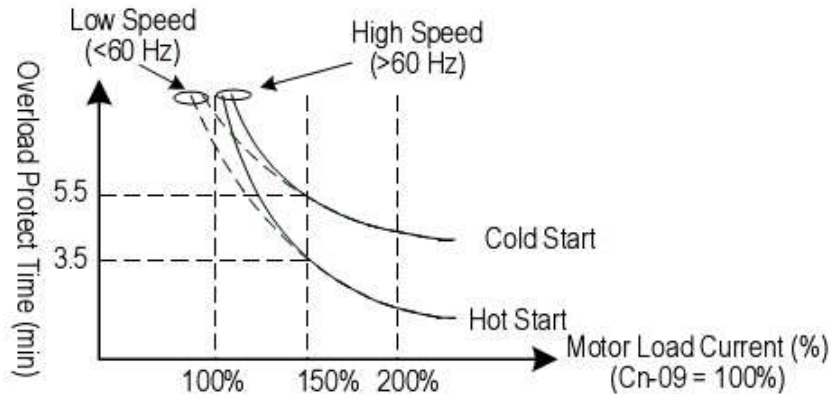

Fig.4-28 Motor Overload Protection Curve

・For protect motor overload of the inverter's electronic heat relay,please set parameter Cn-09 according to the motor nameplate.

(24) External analog frequency command function selection   (Sn-24)

・When frequency command setting is input by external terminal input (Sn-05=1),the main frequency command is input by analog command input terminal VIN (0～10V) and AIN (4～20mA) input,if according to Sn-24 also can select different combination:

Sn-24=0: frequency command is input at VIN (0～10V).

Sn-24=1: frequency command is input at AIN (4～20mA).

Sn-24=2: frequency command is input at VIN and AIN ,that is the addition of (VIN+AIN).

Sn-24=3: frequency command is input at VIN and AIN,that is the difference of (VIN-AIN). However,if (VIN-AIN)<0,the frequency command is 0.

(25) Multi-function input terminal ⑤ function selection (Sn-25)
(26) Multi-function input terminal ⑥ function selection (Sn-26)
(27) Multi-function input terminal ⑦ function selection (Sn-27)
(28) Multi-function input terminal ⑧ function selection (Sn-28)

・The setting of multi-function input,function is shown below table:

Table 4-10 Multi-function input setting

Setting	Function	LCD display(English)	Description
00	FWD/REV command	3-wire run	3-wire operation mode
01	2-wire operation's STOP command	2-wire STOP key	2-wire key operation mode

Setting	Function	LCD display(English)	Description
02	Multi-speed command 1	Multi-speed command 1	Multi-speed frequency command switch
03	Multi-speed command 2	Multi-speed command 2	
04	Multi-speed command 3	Multi-speed command 3	
05	Multi-speed command 4	Multi-speed command 4	
06	Jog command	Jog command	ON: select jog frequency
07	Acc.& dec.switch command	Acc.& dec.switch	OFF: the first stage accel.& decel.time (Bn-01,Bn-02) ON: the second stage accel.& decel.time (Bn-03,Bn-04)
08	External baseblock command (A-contact input)	External baseblock A-contact	ON: inverter output baseblock
09	External baseblock command (B-contact input)	External baseblock B-contact	OFF: inverter output baseblock
10	Inhibit acc.& dec.command	Inhibit acc.& dec.	ON:inhibit acc.& dec. (keep frequency)
11	Inverter overheat warning	Overheat warning	ON:blink display overheat
12	FJOG command	Forward jog	ON:forward jog run
13	RJOG command	Reverse jog	ON:reverse jog run
14	PID integral reset	Integral time reset	ON:reset PID control integral
15	PID control invalid	PID invalid	ON:PID function invalid
16	External fault (A-contact input)	External fault A-contact	ON:external fault input
17	External fault (B-contact input)	External fault B-contact	OFF:external fault input
18	Multi-function analog input setting	Analog input valid	ON:multi-function analog (AUX)valid
19	Timer function input	Timer function	ON-delay/OFF-delay timer input
20	DC braking command	DC braking command	ON:DC braking applied when output frequency less than DC braking start frequency
21	Speed search command 1	Max.fre.speed search	ON: speed search is performed from max.output frequency command
22	Speed search command 2	Setting fre.speed search	ON: speed search is performed from setting frequency command

Setting	Function	LCD display(English)	Description
23	LOCAL/REMOTE control 1	Operator control	OFF: Sn-04,Sn-05 determine run com.and fre.command input method ON:local control(operator control)
24	LOCAL/REMOTE control 2	External terminal control	OFF: Sn-04,Sn-05 determine run com.and fre.command input method ON:local control(external terminal control)
25	RS-485 communication control application	Communication control	PLC application extension use.(Please refer to RS-485MODBUS/PROFIBUS application Manual)
26	No PG speed control	PG invalid	ON:no PG speed control
27	Reset PG speed control integral	PG time invalid	ON:reset PG control integral
28	Frequency UP/DOWN function	UP/DOWN function	Only Sn-28 can set terminal ⑦ to UP command,terminal ⑧ down command
29	Force operation signal	Force operation signal	Only Sn-28 can set

Note:If have the following combination from Sn-25～Sn-28,it will display [Input error]

　　　• The setting value didn't arrange in alphabetical order.

　　　• The setting value 21,22 will be set at the same time (both speed search command)

FWD/REV switch (setting value: 00)

　　　• Operation setting is 3-wire (Sn-03=8,10 or 12),multi-function input terminal ⑤～⑧ function selection setting is 00,it can be 3-wire operation mode,as shown below the setting terminal ⑤ FWD/REV command switch (Sn-25=00)
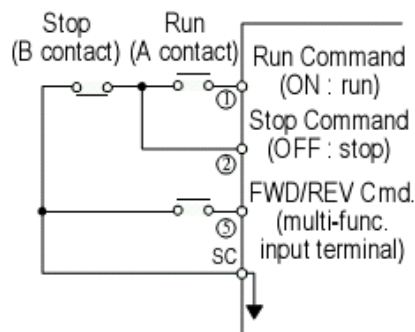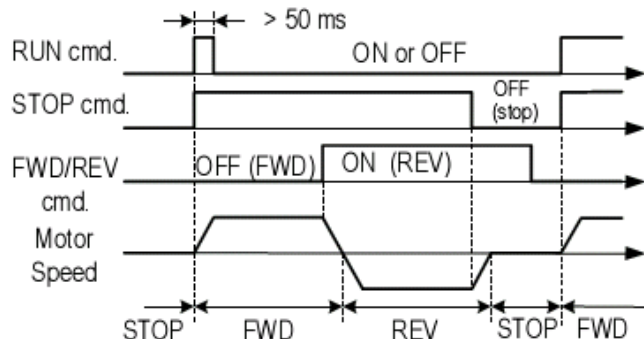

Fig.4-29 3-wire Operation Connection Diagram   Fig.4-30 3-wire Operation Sequence Diagram

2-wire operation STOP command (setting value: 01)

　　　• The standard 2-wire operation connection diagram as Fig.4-31(a),When S1=ON FWD

running,S1=OFF   stop running,when S2=ON REV RUN,S2=OFF stop running.

· When Sn-25=1,2-wire operation has self-sustaining function,which need other STOP command,then stop FWD/REV running operation.As Fig.41(b) shown,there is no need for S1,S2,S3 to use self-sustaining switch,after S1=ON FWD runing and need S3=ON ,then stop running,same with S2.
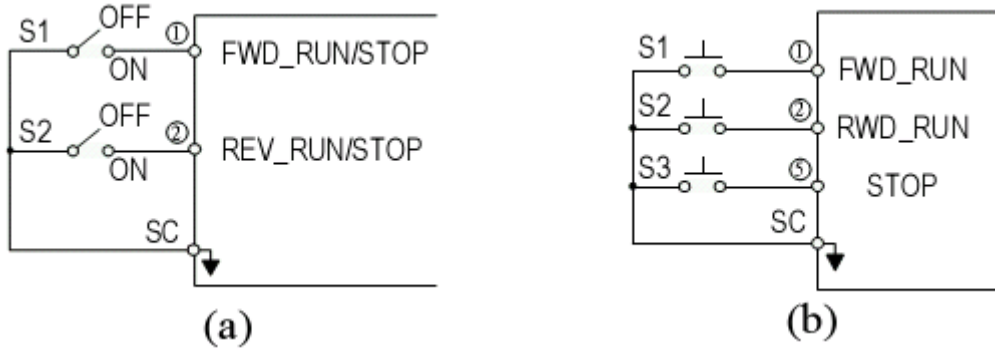

Fig.4-31 The Difference Operation Methods of 2-wire Running

Note: 1. For the other setting value (except "00", "01"), the external operation mode is defaulted as 2-wire mode and no self-sustaining function.

2. When use two or more than 2-wire operation connection,if with terminal ①, ② at the same time,it will display [Input error] and deceleration to stop.When get rid of this,it will return to normal.

Multi-speed command 1 (setting value: 02)
Multi-speed command 2 (setting value: 03)
Multi-speed command 3 (setting value: 04)
Multi-speed command 4 (setting value: 05)
Jog frequency selection (setting value: 06)

· Use multi-speed command 1～4 and jog frequency selection can set Max.16 speed running.

· Multi-speed command 1～4 and jog frequency select multi-speed frequency as follows:

Terminal ⑧ (Sn-28=05)	Terminal ⑦ (Sn-27=04)	Terminal ⑥ (Sn-26=03)	Terminal ⑤ (Sn-25=02)	Select multi-speed frequency
Multi-speed command 4	Multi-speed command 3	Multi-speed command 2	Multi-speed command 1	
0	0	0	0	Fre.command 1 (An-01) [*1]
0	0	0	1	Fre.command 2 (An-02) [*2]
0	0	1	0	Fre.command 3 (An-03)
0	0	1	1	Fre.command 4 (An-04)
0	1	0	0	Fre.command 5 (An-05)
0	1	0	1	Fre.command 6 (An-06)
0	1	1	0	Fre.command 7 (An-07)
0	1	1	1	Fre.command 8 (An-08)
1	1	1	1	Fre.command 16 (An-16)

0:Terminal OFF   1:Terminal ON

・The following picture is multi-speed command and jog frequency selection operation diagram.
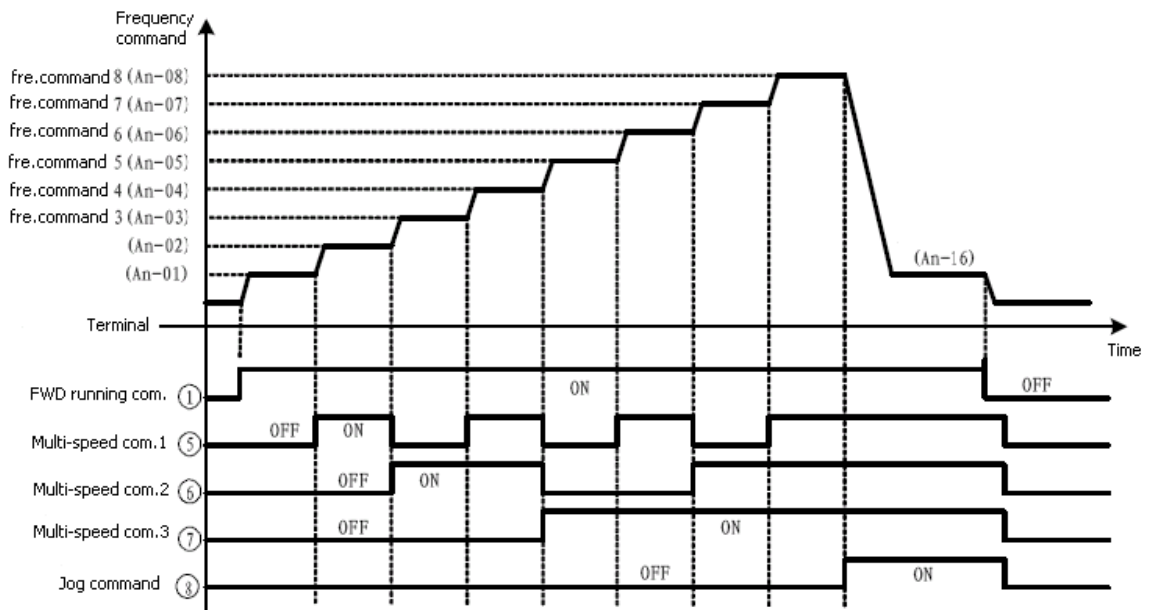

Fig.4-32 16 Step Speed Running Control

*1 When Sn-05=0,main speed frequency command is determined by An-01,however,when Sn-05=1,main frequency is input by analog main speed command (terminal VIN,AIN).

*2　When Sn-29=0,secondary frequency (as Fig.4-32's second frequency setting) is analog input by terminal AUX.,if Sn-29≠0,secondary frequency is set by An-02.

Acc.& dec. time switch (setting value: 07)
   ・Two-speed acc. & dec.time switch control,please refer to 4-4 page two-speed acc. & dec.time setting.

External baseblock (A-contact) (Setting value: 08)
External baseblock (B-contact) (Setting value: 09)
   ・Use external terminal as control inverter baseblock.
   ・During running : As an external baseblock signal is detected,the operator will display a [B.B. Alarm]. Then, the inverter output is blocked. After the baseblock signal is cleared, the motor will resume running according to its then reference signal.
   ・During deceleration: An external baseblock signal is detected,the operator will display a [B.B.Alarm] and the output frequency is reduced to 0,motor run freely.After external signal baseblock,the inverter will in stop mode.

Acc.& dec. ramp hold. (Setting value: 10)
   ・Input acc. & dec.baseblock command,stop acc.7 dec.operation and the output frequency maintained at that time.If running command OFF,release from acc.& dec. prohibition,the inverter decel.to stop.
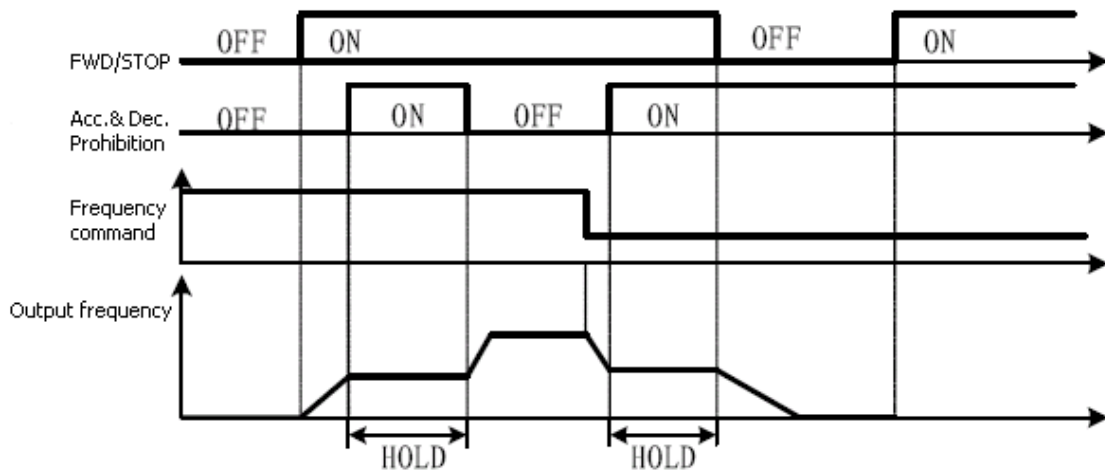
Fig.4-33 Acc.& Dec. Prohibition Operation

Inverter overheat warning (Setting value: 11)

- When input inverter overheat warning signal,operator will display[Overheat Warning],the inverter still can run.When overheat warning signal is OFF,operator return to the primary contents no need to press RESET key.

FWD JOG (FJOG) command (Setting value: 12)
REV JOG (RJOG) command (Setting value: 13)

- FWD/REV jog run
  Setting value=12:FJOG command ON,inverter FWD with jog frequency command (An-17).
  Setting value=13:RJOG command ON,inverter REV with jog frequency command (AN-17).
- During running,when input FJOG or RJOG command,which have priority over other frequency commands.
- The inverter will stop running according to the setting of Sn-06 when FJOG and RJOG are both for more than 500ms.

PID integral reset (Setting value: 14)

- PID control,use multi-function input terminal ⑤～⑧ (parameter Sn-25～28 setting value=14) which can reset integra to 0.

PID control invalid (Setting value: 15)

OFF	PID control valid (close-loop)
ON	PID control invalid (open-loop)

- The function can be a try running switch.Cancel PID function (when multi-function input terminal ⑤～⑧ is ON)as open-loop run or jog running,after finishing as system adjustment,marking in PID control function again.Besides,when there is problem of PID control feedback signal,users can use the function cancel PID control.If PID control invalid,use frequency command as aim signal.
- Whether PID control is disable or not,it also can be set by Sn-64.

External fault A-contact (Setting value: 16)
External fault B-contact (Setting value: 17)

- External fault input will display [External fault input],eg:set terminal ⑥ external fault,when external fault input will display [Error external fault 6]
- Terminal ③,terminal ⑤～⑧ can be exteranl fault input terminal.
- After occuring external fault,the inverter output baseblock and motor coast to stop.

Multi-function analog input setting (Setting value: 18)
- Multi-function analog input (AUX terminal) valid or not both can be control by external terminal.When PID function valid (Sn-64=1),the function invalid.

Timer function input terminal (Setting value:19)

DC injection braking command (Setting value:20)
- DC injection braking is used to prevent the motor from rotating due to inertia or external forces when the inverter is stopped.
- The DC injection braking will be performed and the inverter will be stopped if the DC injection braking input is ON. If a run source or jog command is input, the DC injection braking will be cleared and the motor will begin to run.
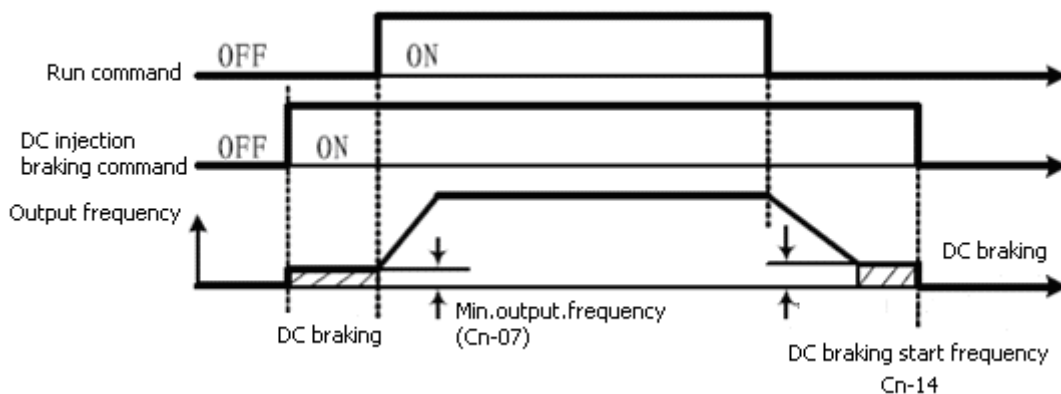- DC injection braking operation is shown Fig.4-34:

Fig.4-34 DC Injection Braking Operation Can be An External Fault Input Terminal

Speed search 1 (Setting value: 21)
Speed search 2 (Setting value: 22)
- Please refer to 4-21 page about speed search function

LOCAL/REMOTE control 1 (Setting value: 23)

OFF	REMOTE control (Run command and frequency command is performed by Sn-04 and Sn-05,input at external terminal or RS-485 communication conatct.The operator REMOTE-REF and SEQ LED light is ON.
ON	LOCAL control,run command and frequency command are controlled by operator,at the same time REMOTE-REF and SEQ LED light is OFF

- The LOCAL/REMOTE switch only under the situation of inverter stop mode.

LOCAL/REMOTE control 2 (Setting value: 24)

OFF	REMOTE control (Run command and frequency command is performed by Sn-04 and Sn-05,input at external terminal or RS-485 communication conatct.The operator

	REMOTE-REF and SEQ LED light is ON.
ON	LOCAL control,run command and frequency command are controlled by operator,at the same time REMOTE-REF and SEQ LED light is OFF

‧The LOCAL/REMOTE switch only under the situation of inverter stop mode.

RS-485 communication control application (Setting value: 25)

‧When use RS-485 communication control,multi-function input terminal ⑤～⑧ can replace PLC application's expansion contact.(Please refer to BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement)

No PG speed control (Setting value: 26)
Reset PG speed control integral value (Setting value: 27)

‧Whether accept adscititious PG control compensation capacity ,using external terminal control,which also can clean integral value out.
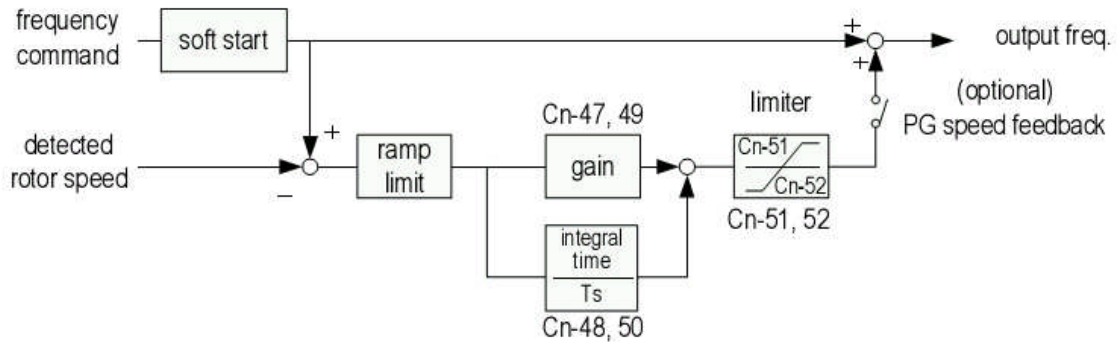

Fig.4-35 PG Speed Control Pane

Frequency UP/DOWN function (Setting value: 28)

‧The inverter can use either operator and external multi-function input terminal (terminal ⑦ and ⑧) as output frequency UP/DOWN control,please refer to the output frequency UP/DOWN function.

‧ Firstly,setting run command and frequency command (external terminal input Sn-4=1,Sn-5=1),after resetting Sn-28=28(terminal ⑦ change to frequency UP function automatically,the primary function invalid),then entering into external input terminal ⑦ and ⑧ as output frequency UP/DOWN control.

‧Operation sequence is as follows:

External terminal⑦=UP function	ON	OFF	OFF	ON
External terminal⑧=DOWN function	OFF	ON	OFF	ON
Run status	Acc.(UP)	Dec.(DOWN)	Constant(HOLD)	Constant(HOLD)

terminal ① or ② FWD=REV

terminal ⑦   UP

terminal ⑧   DOWN

upper limit

output freq.

lower limit

D1 H U   H   D H U   H   D D1 H U U1 H D D1 H

U = UP (ACC) status   U1 = bounded from upper_limit while ACC

D = DOWN (DEC) status   D1 = bounded from lower_limit while DEC
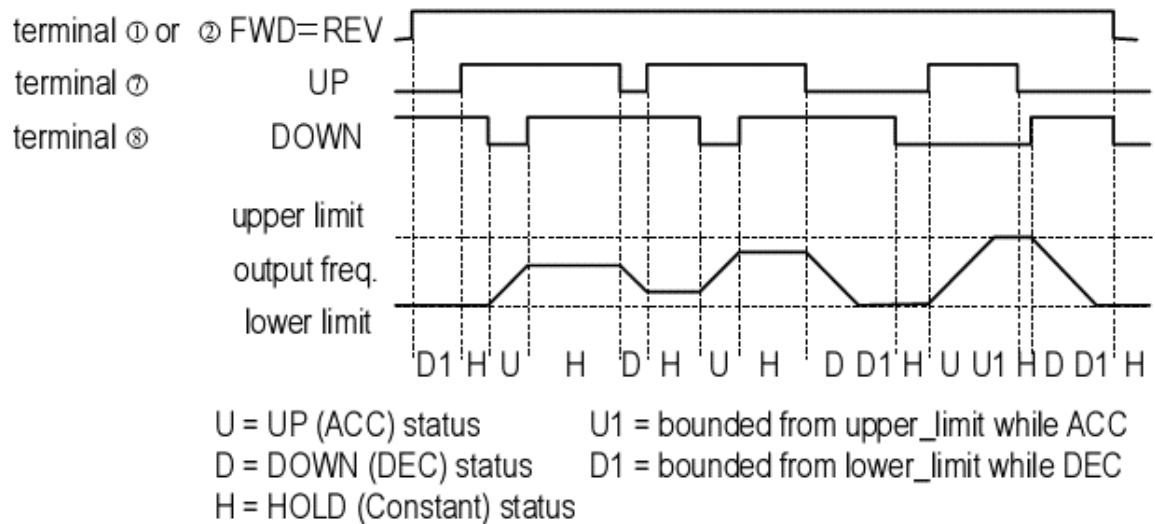
H = HOLD (Constant) status

Fig.4-36 Frequency UP/DOWN Control

‧Only Sn-28 can set frequency UP/DOWN function.

‧When setting frequency UP/DOWN function,input FWD/REV command,even if no UP/DOWN command the inverter run according to the lower limit (Cn-19).

‧If set the forth value to 1 of Sn-68,in HOLD status,when power supply OFF ,it can memory HOLD output frequency.After restarting power supply and the run command is ON,the memory output frequency run.

‧UP/DOWN run invalid in auto run mode.

‧In UP/DOWN running,if input jog command which have priority than others.

‧In UP/DOWN running,PID function disabled.

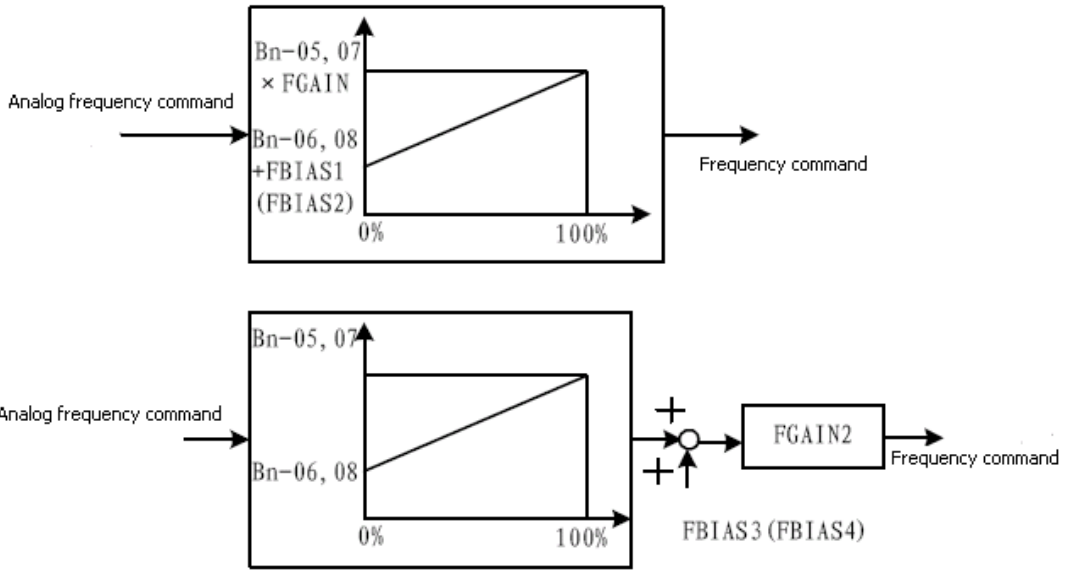### (29) Multi-function analog input function selection (Sn-29)

Use Sn-29 to select multi-function analog input terminal (AUX) function.As table shown below:

Table 4-11 Multi-function Analog Input Function

| Setting value	Function	LCD display	Description(Output the 100% contents of 10V
00	Auxiliary frequency command	Auxiliary frequency command	(Max.output frequency)
01	Frequency command gain(FGAIN)	Command gain 1	Total gain=(Bn-05,Bn-07)XFGAIN
02	Frequency command bias 1(FBIAS1)	Command bias 1	Total bias=(Bn-06,Bn-08)+FBIAS1
03	Frequency command bias 2 (FBIAS2)	Command bias 2	Total bias=(Bn-06,Bn-08)+FBIAS2
04	Overtorque detection level	Overtorque level	Change overtorque detection level according to analog input voltage (0～10V),the Cn-32 invalid
05	Output voltage(VBIAS)	Output voltage	Total output voltage=V/F curve voltage+VBIAS

Setting value	Function	LCD display	Description(Output the 100% contents of 10V
06	Shorten acc.&dec.time(TK)	Acc.& dec.coeff.	Real acc.& dec.time=Acc.& dec.time (Bn-01～04)/TK
07	DC braking current	DC braking current	Adjust DC braking current (0～100%) according to analog input voltage (0～10V).The inverter rated current =100%,and DC braking current Cn-15 invalid.
08	Stall prevention level during running	Run still level	Adjust stall prevention operation level during running (30%～200%) according to analog input voltage (1.5V～10V).The inverter rated rated current=100%,and the Cn-26 invalid.
09	PID control reference input	PID command	Multi-function analog input (terminal AUX) used as PID reference input.Set input (0～10V),please refer to 4-5 page[PID control pane]
10	Frequency command lower limit	Frequency command lower limit	Adjust frequency command lower limit(0～100%) according to analog input voltage(0～10V),the max output frequency(Cn-02)=100%.Real frequency command lower limit according Cn-19 or the bigger frequency command lower limit of multi-function analog input
11	Jump frequency setting 4	Frequency jump 4	Set jump frequency 4(use the function set the forth jump frequency except Cn-20～Cn-23)according to analog input voltage (0～10V)
12	RS-485 communication control application	Communication control	The analog value of AUX(0-1024/0-10V) can be read Through RS-485 communication.
13	Frequency command gain 2 (FGAIN)	Command gain 2	Adjust analog frequency command gain and bias according to the setting of Bn-05,06(or Bn-07,08)
14	Frequency command bias 3 (FBIAS1)	Command bias 3	
15	Frequency command bias 4 (FBIAS2)	Command bias 4	

・Multi-function analog input AUX can provide two group Gain,Bias that is Sn-29=1〜3 and 13-15,the following is the gain and bias diagram.
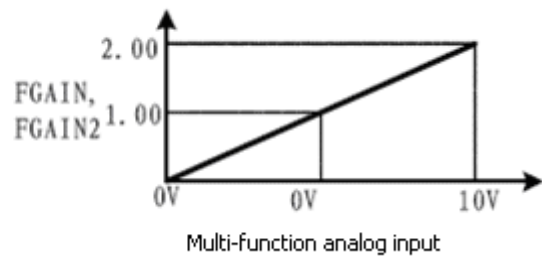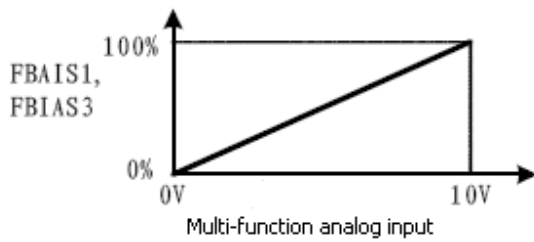

・Multi-function analog input characteristic
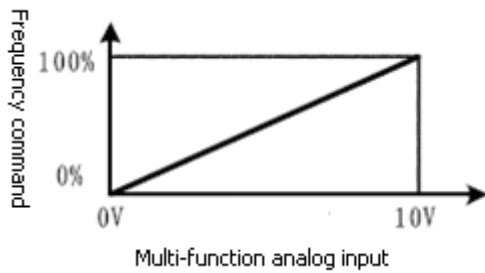
(1) Sn-29=00   *(2) Sn-29=01,13*

(3) Sn-29=02,14   *(4) Sn-29=03,15*
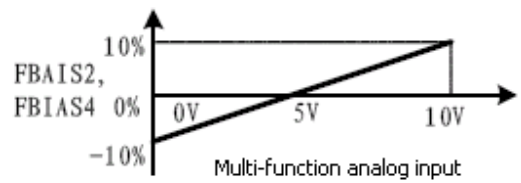
(5) Sn-29=04   *(6) Sn-29=05*
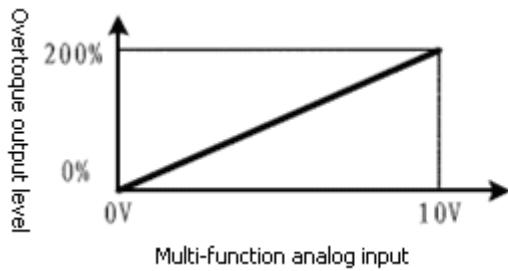
(7) Sn-29=06   *(8) Sn-29=07*
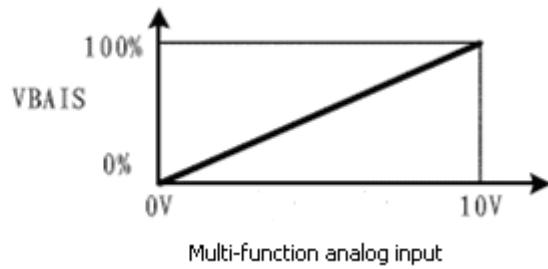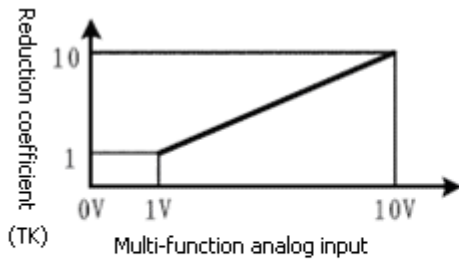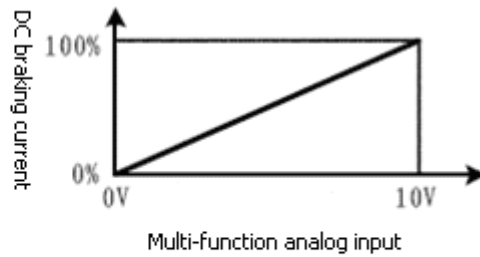
$$\text{Real ACC.\& DEC. time} = \frac{\text{ACC.\& DCC time(Bn-01}\sim\text{04)}}{\text{Deduction coefficient (TK)}}$$

(9) Sn-29=08   *(10) Sn-29=09*
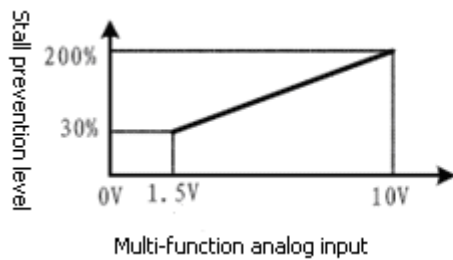
Terminal AUX used as PID control reference input (0～10V).Please refer to 4-7,appendix-3PID control signal input

(11) Sn-29=10   *(12) Sn-29=11*
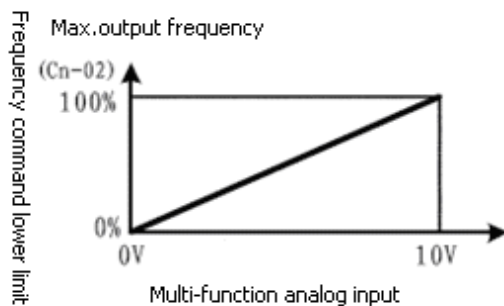
(13) Sn-29=12:RS-485 communication application used as analog input signal reading
(Please refer to BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement)

(30) Multi-function output terminal (R1A-R1B-R1C)function selection (Sn-30)

(31) Multi-function output terminal (DO1-DOG)function selection　(Sn-31)

(32) Multi-function output terminal (R2A-R2C)function selection　(Sn-32)

The setting of multi-function output terminal, function is shown below:

Table 4-12 Multi-function output terminal function

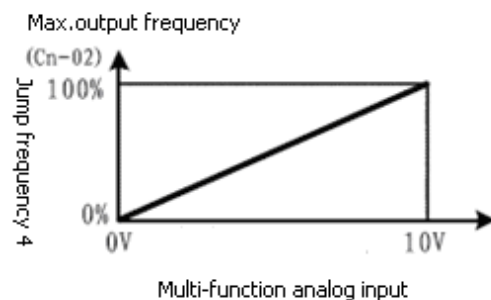| Setting value	Function	LCD display	Description
00	Running	Running	ON:Running
01	Zero speed	Zero speed	ON:Zero speed
02	Frequency agree	Frequency agree	ON:Frequency command-Cn-31≤ Output frequency≤frequency command+Cn-31
03	Setting frequency agree	Setting frequency agree	ON:Cn-29-Cn-31≤Output frequency≤Cn-29+Cn-31
04	Output frequency detection 1	Frequency detection 1	ON:While ACC. →Cn-29≥Output frequency≥-Cn-29 While DEC. → Cn-30 ≥ Output frequency ≥ -Cn-30frequency detection width Cn-31
05	Output frequency detection 2	Frequency detection 2	ON:While ACC. → Output frequency≥Cn-29(or≤-Cn-29)
06	Inverter ready	Run ready OK	ON:Ready
07	Under Low vol.detec.	Low vol.detec.	ON:Low vol.detec.
08	Output baseblocked	Output baseblocked	ON:Output baseblocked
09	Run command mode	Run command operator operation	ON:Run command is controlled by operator (LOCAL mode)
10	Fre. command mode	Main speed command operator operation	ON:Fre.command is controlled by operator (LOCAL mode)
11	Overtorque detection	Overtorque detection	ON:Overtorque detected
12	Fre.com.invalid	Fre.com.invalid	ON:Fre.com.invalid
13	Fault	Fault	ON:Fault
14	Pulse signal output	Pulse signal output	Only set by Sn-31(terminal DO1-DOG)
15	Low voltage warning	Low voltage warning	ON:Low voltage warning
16	Inverter overheat	Inverter overheat	ON:Inverter overheat
17	Motor overload	Motor overload	ON:Motor overload
18	Inverter overload	Inverter overload	ON:Inverter overload
19	Fault retry	Fault retry	ON:Fault retry
20	RS-485 communication fault	RS-485 fault	ON:RS-485 communication fault
21	Timer function output terminal	Timer function	Signa delay output terminal(.v.s timer function)

Setting value	Function	LCD display	Description
22	RS-485 communication control application	Communication control	Output contact expansion application (Please refer to BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement)

・Running (Setting value:00)

OFF	Run command OFF,inverter is no voltage output
ON	Run command ON or OFF,but residues output exsits

・Zero speed (Setting value:01)

OFF	Output frequency $\geq$ Min.output frequency (Cn-07)
ON	Output frequency < Min.output frequency (Cn-07)

・Frequency agree (Setting value:02)

・Setting frequency agree (Setting value:03)

・Output frequency detection (Setting value:04)

・Output frequency detection (Setting value:05)

　Please refer to frequency detection function

・Inverter run ready (Setting value:06)

・Low-voltage detection (Setting value:07)

　The DC voltage of main circuit is lower than low voltage detection level (Cn-39),output contact ON.

・Output baseblocked (Setting value:08)

・Run command mode (Setting value:09)

OFF	The operator's REMOTE-SEQ light when in Remote mode (Sn-04=1or2,or multi-function input terminal ⑤～⑧ setting Local/Remote control 1 or Local/Remote control 2 when the terminal is OFF)
ON	The REMOTE-SEQ is OFF when run command is set by operator in Local mode (Sn-04=0 or multi-function input terminal ⑤～⑧ setting Local/Remote control 1 when the terminal is ON)

・Frequency command mode (Setting value:10)

OFF	The operator's REMOTE-SEQ light when in Remote mode (Sn-05=1or2,or multi-function input terminal ⑤～⑧ setting Local/Remote control 1 or Local/Remote control 2 when the terminal is OFF)
ON	The REMOTE-SEQ is OFF when run command is set by operator in Local mode (Sn-05=0 or multi-function input terminal ⑤～⑧ setting Local/Remote control 1 when the terminal is ON)

・Overtorque detection (Setting value:11)

　Please refer to the overtorque detection function.

‧Frequency command invalid (Setting value:12)

Run command ON and frequency command value is 0,output contact ON.

‧Fault (Setting value:13)

When inverter detection fault,output contact ON but output contatct no operation if the inverter communication fault.

‧Pulse signal output (Setting value:14)

Only multi-function terminal DO1-DOG (setting parameter Sn-31) used as pulse signal output.Do1 is the output contact of Open-Collector photo-couple,and its pulse output frequency is set by parameter Sn-35.Its wiring is shown below:
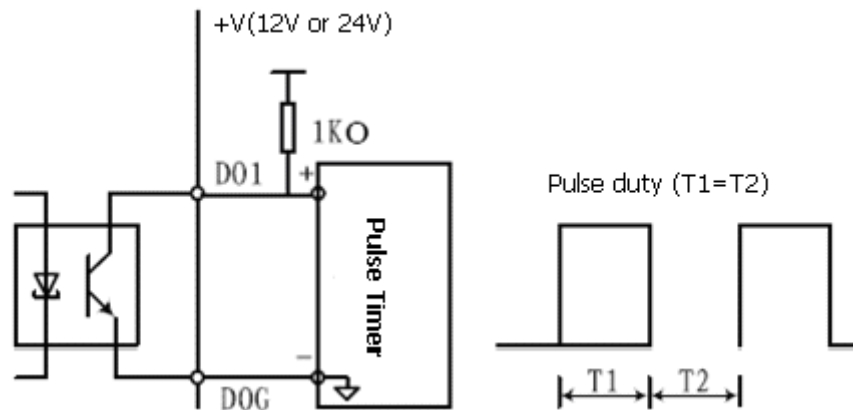
Fig.4-37 Pulse Signal Output

‧Low voltage warning (Setting value:15)

Output contact ON when the main circuit DC voltage is lower than low voltage detection level. Low voltage warning level: 400VDC.

‧Inverter overheat (Setting value:16)

Output contact ON when inverter overheat.

‧Motor overload (Setting value:17)

Output contact ON when motor overload.

‧Inverter overload (Setting value:18)

Output contact ON when inverter overload.

‧Fault restart (Setting value:19)

Please refer to fault restart function (Cn-24).Output contact ON when restart.

‧RS-485 communication fault (Setting value:20)

‧Timer function output terminal (Setting value:21)

If the multi-function input terminals⑤~⑧ are set as the timer input terminals (Sn-25－ 28= 19)， the signal will be output through the corresponding multi-function output terminals with the specified ON-delay and OFF-delay, as shown below:

Fig.4-38 Timer Function Input/Output Signal

・RS-485 communication control application (Setting value:22)

The multi-function output terminal can be used to replace PLC application expansion contact if using RS-485 communicaiton control.

(Please refer to BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement)

(33) Multi-function analog output (A01)　(Sn-33)

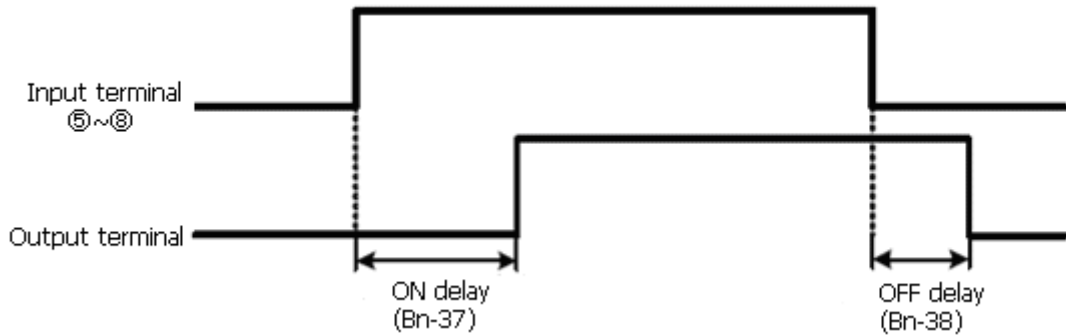*(34) Multi-function analog output (A02)　(Sn-34)*

・ Multi-function analog output,there is 11 items of monitored content as follows:

Sn-33,Sn-34 setting	Monitored content	Description	
		Input	Output
00	Frequency command	0～Max.frequency	0～10V
01	Output frequency	0～Max.frequency	
02	Output current	0～Rated current	
03	Output voltage	0～Rated voltage	
04	DC voltage	220 class: 0～400V 440 class: 0～800V	
05	VIN analog command	0～10V	
06	AIN analog command	4～20mA	
07	AUX analog command	0～10V	
08	PID input capacity	0～Max.frequency	
09	PID output capacity 1	0～Max.frequency	
10	PID output capacity 2	0～Max.frequency	
11	Communication control	0～100%	

Note 1:The multi-function analog output A01,A02 is controlled by external controller if set Sn-33,34=11,please refer to [BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement]

・Use multi-function analog output gain (Bn-14 and Bn-15) to adjust multi-function analog the output voltage of A01,A02 respectively.

(35) Pulse output multiplication-gain selection　(Sn-35)

・When set multi-function (D01) to pulse output(Sn-31=14).Change output pulse frequency to the multiplication of inverter output frequency according to the setting value of Sn-35.

・Example:If Sn-35=0,the pulse outpout is 50 pulse /second (duty=50%) when inveter output

frequency is 50Hz.
・Please refer to page 4-50 pulse signal output.
・Sn-35 setting pulse multiplication is as follows:

Sn-35 Setting	Pulse output frequency	Applicable frequency range
0	1F:1X inverter output frequency	3.83～400.0Hz
1	6F:6X inverter output frequency	2.56～360.0Hz
2	10F:10X inverter output frequency	1.54～210.0Hz
3	12F:12X inverter output frequency	1.28～180.0Hz
4	36F:36X inverter output frequency	0.5～60.0Hz

(36) Inverter address (Sn-36)

(37) RS-485 communication baud rate setting (Sn-37)

(38) RS-485 communication parity setting (Sn-38)

(39) RS-485 communication fault stop method (Sn-39)

・The BDF-B501 inverter has a built-in RS-485 port for monitoring inverter status and reading the parameter setting.Unde rthe remote mode operation,the inverter status and the parameter settings can be monitored. Moreover, the user can change the parameter ssetting to control the motor operation.

・BDF-B501 series will use MODBUS protocol to communicate with external units by means of the cable line form RS-485 port.

The parameter definition is as follows:

Sn-36: Inverter address,set the range 1～31

Sn-37=0:1200bps (data communication speed,bit/sec)

    =1:2400bps

    =2:4800bps

    =3:9600bps

Sn-38=0:no parity

    =1:even parity

    =2:odd parity

Sn-39=0:Deceleration to stop (In RS-485 communication fault)according to Bn-02

    =1:Coast to stop

    =2:Deceleration to stop in deceleratino time

    =3:Continue to run (Stop if press STOP key)

・Every data stream has a data length of 11 bits : 1 start bit， 8 data bits， 1 parity bit and 1 stop bit.If Sn-38=0,the parity bit is1.

・There are three different commands used for communication between inverter and external units.

 (1) Read command: External controller can read inveter inside data.

 (2) Write command:External controller can write memory data to inverter to control inverter operation.

 (3) Circuit test command:Test the communication circuit wiring situation between external controller and inverter.

・Change the setting value of Sn-36,Sn-37,Sn-38 will be effective in the next start time after turning off the inverter.

• Do not make the DRIVE/PRGM mode while writing the data into inverter.

• For more details of RS-485 ,please refer to [BDF-B501 RS-485 MODBUS/PROFIBUS communication agreement]

(40) PG speed control function selection (Sn-40)

• Sn-40=0: No speed control function

1: Enable PG feedback speed control,no integral control in ACC.& DEC.

2: Enable PG feedback speed control, integral control in ACC & DEC.

(41) Operation selection at PG opens (Sn-41)
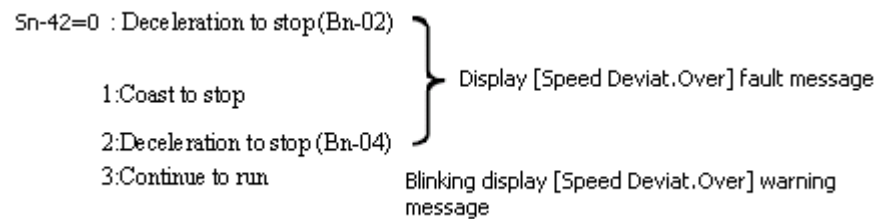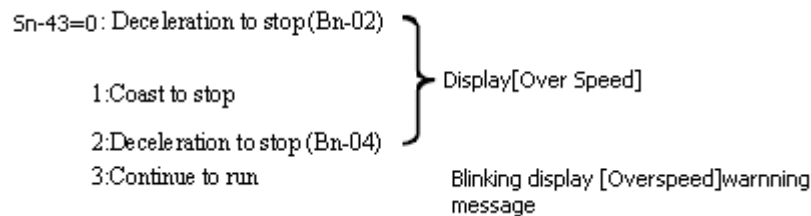
Sn-41=0: Deceleration to stop(Bn-02) ⎫

1:Coast to stop   ⎬ Display [PG OPEN] fault message

2:Deceleration to stop (Bn-04) ⎭

3:Continue to run

\
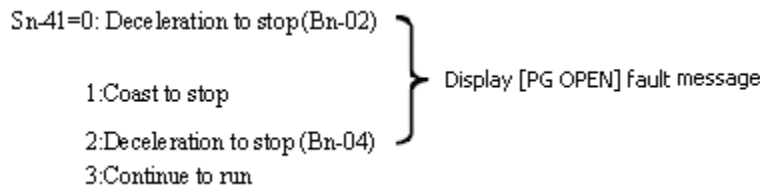
(42) The disposal of PG speed deviation over (Sn-42)

Sn-42=0 : Deceleration to stop(Bn-02) ⎫

1:Coast to stop   ⎬ Display [Speed Deviat.Over] fault message

2:Deceleration to stop (Bn-04) ⎭

3:Continue to run   Blinking display [Speed Deviat.Over] warning message

(43) PG overspeed detection (Sn-43)

Sn-43=0: Deceleration to stop(Bn-02) ⎫

1:Coast to stop   ⎬ Display[Over Speed]

2:Deceleration to stop (Bn-04) ⎭

3:Continue to run   Blinking display [Overspeed]warnning message

(44) Auto run mode selection (Sn-44)

(45) Auto run mode setting (Sn-45～Sn-60)

• Auto run mode selection and run: use multi-speed frequency command 1～16 (An-01～An-16) and auto run mode time parameter (Bn-21～Bn-36) to work in auto run mode selection (Sn-44),which can be used simply PLC running operation mode.The speed running direction used parameter Sn-45～60

• When set in auto run mode,the run direction is set by operator,multi-function input terminal or RS-485 is ineffective.

• When set in auto run mode,the multi-speed command 1～4 of multi-function input terminal ⑤～⑧,frequency UP/DOWN are ineffective,but input FJOG,RJOG command,the JOG has priority of others (refer to Sn-25～28).

• The examples of all kinds of auto run mode are as follows:

(a) Single cycle running (Sn-44=1,4)

The inverter finishes a cycle according to the setting run mode,and then stop running.

eg: Sn-44=1(or 4) Sn-45～47(FWD) Sn-48=2 (REV) Sn-49～60=0

An-01=15Hz   An-02=30Hz   An-03=50Hz   An-04=20Hz

Bn-21=20s Bn-22=25s Bn-23=30s Bn-24=40s

An-05～16=0Hz Bn-25～36=0s
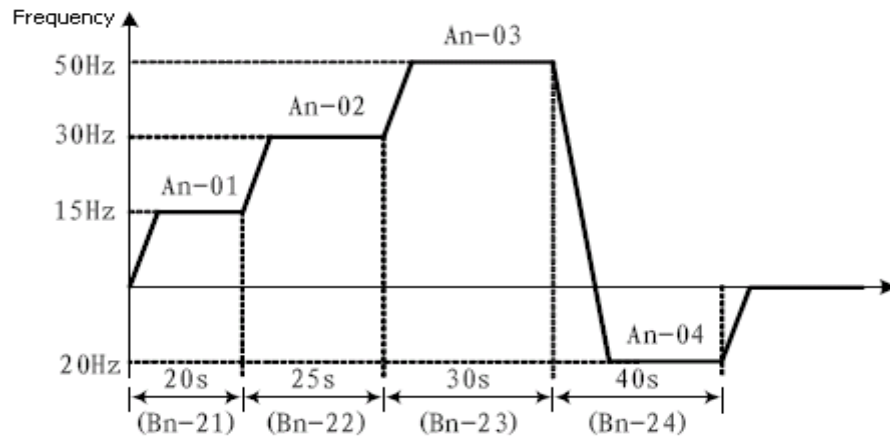
(b) Periodic running (Sn-44=2,5)

The inverter finishes a cycle according to the setting run mode,then repeat the same periodic.

eg: Sn-44=2 (or 5) An-01～16,Bn-21～36,Sn-45～60 fixed value is same with (a)
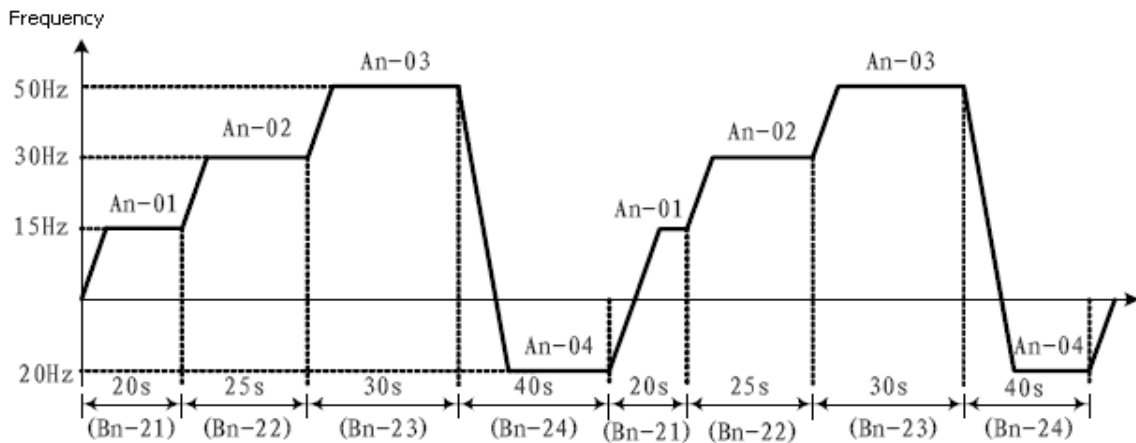
(c) When a single cycle over,continue to run as the last speed

The inverter finshing a cycle according to the setting run mode,continue to run as the last speed.

Eg:Sn-44=3(or 6),Sn-45～48=1(FWD),Sn-49～60=0

An-01～16,Bn-21～36:the setting value is same with (a)

・Set Sn-44=1～3,restart after stop,it will continue to run from the unfinished step according to the setting of Sn-44.

Set Sn-44=4～6,restart after stop,it will begin a new cycle and continue running according to the setting of Sn-44.

Sn-44	1～3	4～6
Output frequency		

・Auto run mode ACC & DEC time according to Bn-01,Bn-02
・If the setting value of Bn-21~Bn-36 is zero,the auto run mode disabled.

(46) Use load (Sn-61)

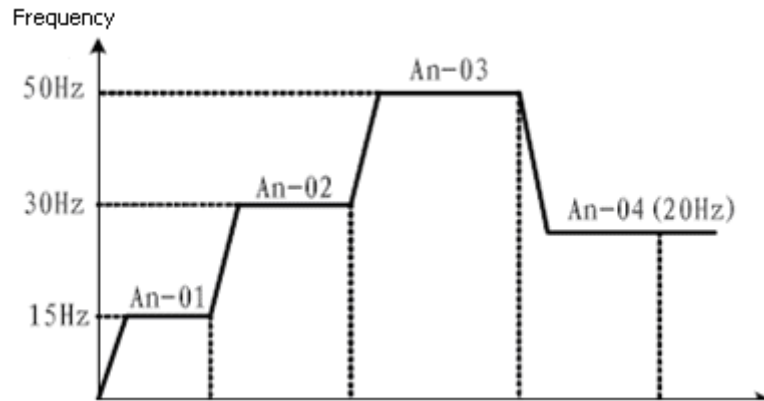・According to different sites,the BDF-B501 can be set constant torque load (CT:Sn-61=0) and variable torque (VT:Sn-61=1).Select the corresponding relevant parameter according to different setting load without manual-method setting. (Please refer to Sn-01[The capacity setting of inverter].

(47) LCD operation language selection (Sn-62)

・LCD digital operator can be set Chinese (Sn-62=1) and English (Sn-62=0)

(48) Parameter copy (Sn-63)

・Except the inverter's operation and display of the BDF-B501 LCD operator,the operator can be used for inverter's parameter copy and data storage function for inside EEPROM memorizer.Besides,for BDF-B501 inverter,used as parameter data storage (download) and upload.
・LCD operator also can test inveter main control board's EEPROM.

・Sn-63=0: No action

Sn-63=1:Data upload (operator→inveter),during data pass time,operator LED run as deasil.

Sn-63=2:Data download (inveter→operator),during data pass time,operator LED run as widdershins.

Sn-63=3: Inspect the operator inside EEPROM memorizer is fault or not,the operator LED grouding blinks during the inspection .

Sn-63=4: Inspect the operator inside EEPROM memorizer is fault or not,the operator LED is OFF during the insection.

・For the modification of different inverter,please according to the followed steps to avoid the parameter copy failure.

1. Firstly,inspect the operator inside EEPROM memorizer (Sn-63=3) and then inspect the Sn-63=4 to see the memorizer between them is right or not.

2. Copy the inverter parameter data to LCD operator(Sn-63=2).

3. Upload and copy the parameter settings of LCD digital operator to other inverter's EEPROM(Sn-63=1).

(49) PID function valid/invalid setting   (Sn-64)

・For PID function valid/invalid can use multi-function terminal ⑤～⑧ (parametr Sn-25～28=15)to control except for using the parameter Sn-64.

(50) Braking resistance protection valid/invalid setting   (Sn-65)

・Sn-65=0: Protection disable

=1: Protection enable

・When use high frequency braking resistance,please set braking resistance protection valid (Sn-65=1).

(51) Motor parameter auto-autotuning   (Sn-66)

・The AUTOTUNE feature can be used to identify and store the motor's parameters

・Sn-66=0: Autotuning

=1:Start autotuning

(52) Control mode   (Sn-67)

・Setting inverter control mode.

・Sn-67=0: V/F control mode

=1: Sensorless vector control mode.

(53) Control selection   (Sn-68)

・The function setting is adopt byte edit mothod,every byte (Y)represent one function,if byte (Y) setting is zero reprent the function invalid ,and if the setting is 1 represent the function valid.

・Byte 1 (---Y) is corresponding to the setting of output lack of phase protection function.if set 1,the inverter will stop to output in producing lack of phase fault in output side.

・Byte 2 (--Y-)reservation,set it will be no action.

・Byte 3 (-Y--)reservation,set it will be no action

・Byte 4 (Y---)can be set or not after power off,memory frequency UP/DOWN function's output

frequency is in HOLD .If set 1,it will keep the output frequency of last memory before power off.If set 0,no memory.About frequency UP/DOWN function,please refer to Sn-28=28 parameter setting instruction.

4.5 Monitoring parameter Un-□□

Parametr No.	Function	LCD display (English)	Min. Unit	Description	Multi-function analog output level
Un-01	Fre.comm and	Un-01=60.00Hz Fre.command	0.01 Hz	Display frequency command,the displayed unit is determined by Cn-28	10V/Max.output frequency
Un-02	Fre.comm and	Un-02=60.00Hz Output fre.	0.01 Hz	Display output frequency,the displayed unit is determined by Cn-28	10V/Max.output frequency
Un-03	Outp.curre nt	Un-03=12.5A Output current	0.1A	Display inverter's output current	10V/Inverter rated current
Un-04	Outp.volta ge	Un-04=440.0V Output vol.	0.1V	Display inverter's output voltage	10V/220V or 440V
Un-05	Main cuicuit DC voltage	Un-05=510.0V DC voltage	0.1V	Display inverter's main circuit DC voltage	10V/400V or 800V
Un-06	External analog command VIN(0～10V)	Un-06=100% Vol.analog com.	0.1%		10V/100%
Un-07	External analog command AIN (4～20mA)	Un-07=100% current analog command	0.1%		20mA/100%
Un-08	Multi-func tion analog input command AUX	Un-08=100% Multi-function analog com.	0.1%		10V/100%
Un-09	External analog input command	Un-09=100% Terminal A01 analog	0.1%		10V/100%

Parametr No.	Function	LCD display (English)	Min. Unit	Description	Multi-function analog output level
	A01 output	output			
Un-10	External analog A02 output	Un-10=100% Terminal A02 analog output	0.1%		10V/100%
Un-11	Input terminal	Un-11=00000000 Input terminal status	-		-
Un-12	Output terminal	Un-12=00000000 Output terminal status	-		-
Un-13	PG speed feedback	Un-13=100.0%	0.1%	100.0%=Max.output frequency	10V/Max.output frequency
Un-14	PG speed control compensation	Un-14=10.0%	0.1%	100.0%=Max.output frequency	10V/Max.output frequency
Un-15	PID control input	Un-15=100% PID input	0.01%	100.0%=Max.output frequency	10V/Max.output frequency
Un-16	PID control output 1	Un-16=30.0% PID output	0.01%	100%=Max.output frequency	10V/Max.output frequency

Parametr No.	Function	LCD display (English)	Min. Unit	Description	Multi-function analog output level
		1			
Un-17	PID control output 2	Un-17=100 % PID output 2	0.01 %	100%=Max.output frequency	10V/Max.output frequency
Un-18	Fault message 1	Overcurrent Fault message 1	-	Fault message occurred now	-
Un-19	Fault message 2	Overcurrent Fault message 2	-	Fault message occurred last time	-
Un-20	Fault message 3	Overheat Fault message 3	-	Fault message occurred last two time	-
Un-21	Fault message 4	Inverter overload Fault message 4	-	Fault message occurred last three time	-
Un-22	The parameter of time period btween last fault and the nearest fault	Un-22=2400Hr Last fault run time	1Hr	After fault will reset, accumulated time will be cleared	-
Un-23	Frequency command while fault occurred	Un-23=2400Hr Run accumulated when occurs fault	0.01 Hz	-	-
Un-24	Frequency command while fault occurred	Un-24=60.00Hz Output frequency when occurs	0.01 Hz	-	-

Parametr No.	Function	LCD display (English)	Min. Unit	Description	Multi-function analog output level
		fault			
Un-25	Output current while fault occurs	Un-25=12.5 A Output current when occurs fault	0.1A	-	-
Un-26	Output voltage while fault occurs	Un-26=400. 0V Output voltage while occurs fault	0.1V	-	-
Un-27	DC voltage while occurs fault	Un-27=520. 0V	0.1V	-	-
Un-28	Input terminal status while fault occurs	Un-28=000 00000 Input terminal status	-	Same as Un-11,display terminal status	-
Un-29	Output terminal status while fault occurs	Un-29=000 00000 Output terminal while fault	-		-
Un-30	Time elapsed After power-on	Un-30=100 Hr	1Hr	Display total time elapsed after power ON	-
Un-31	Run accumulat ed time	Un-31=2Hr Run accumulate d time	1Hr	Accumulated inverter run time	-
Un-32	Soft version number	Un-30=000 01	-	(Manufacturing use)	-

Parametr No.	Function	LCD display (English)	Min. Unit	Description	Multi-function analog output level
Un-33	Feedback motor speed	Un-33=000 00rpm Motor speed	1rpm	Display motor speed while PG Feedback is set.	10V/Motor speed

• *Frquency command*   *(Un-01)*

• *Output frequency*   *(Un-02)*

• *Output current*   *(Un-03)*

• *Output voltage command*   *(Un-04)*

• *The main circuit DC voltage*   *(Un-05)*

Through the setting of Sn-33,Sn-34,the aboved contents can be displayed by the multi-function analog output terminal (A01,A02)output 0～10V voltage signal.

• *External analog command VIN*   *(Un-06)*

The parameter can monitor external analog command VIN terminal voltage (0～100%/0～10V), and the external analog command voltage is also can be output by multi-function analog output terminal A01 or A02 (Sn-33=05 or Sn-34=05).

The analog command is PID feedback when PID control is enable.Please refer to page 4-7[PID control pane] and appendix 3 [PID wiring diagram]

• *External analog command AIN*   *(Un-07)*

The parameter can monitor external analog command AIN terminal current (0～100%/4～20 mA) ,and the external analog command voltage is also can be output by multi-function analog output terminal A01 or A02 (Sn-33=07 or Sn-34=07).

The analog command is PID feedback when PID control is enable.Please refer to page 4-7[PID control pane] and appendix 2 [PID wiring diagram]

• *Multi-function analog input command AUX*   *(Un-08)*

The parameter can monitor multi-function analog input command AUX terminal voltage (0～100%/0～10V), which is also can be output by multi-function analog output terminal A01 or A02 (Sn-33=07or Sn-34=07)

The analog command is PID control target value when PID control is enable.Please refer to page 4-7 [PID control pane] and appendix 3 [PID wiring diagram]

• *External analog A01,A02 output*   *(Un-09,Un-10)*

The parametr can monitor multi-function analog output A01 and A02 terminal voltage (0～10V).And the output gain can be adjusted by Bn-14 or Bn-15 (adjust the gain of A01 or A02 respectively).About he output item, please set according to Sn-33,Sn-34(set A01,A02 respectively).

• *Input terminal status*   *(Un-11)*

Be used to monitor input terminal ①～⑧ ON/OFF status.

• *Output terminal status*   *(Un-12)*

Be use to monitor output terminal R1A-R1C,D01-D0G(or R2A-R2C)'s ON/OFF status.

• *PG speed feedback and PG speed control compensation*   *(Un-13,Un-14)*

The parameter Un-13,Un-14 will monitor PG feedback control signal including speed feedback and speed compensation and so on if PG feedback control.

• *PID control input*   *(Un-15)*
• *PID control output 1*   *(Un-16)*
• *PID control output 2*   *(Un-17)*

Please refer to page 4-7 [PID control pane] ,use Un-15,16,17 to monitor the change,besides,it also can use multi-function analog output A01,A02 (Please refer to the setting of Sn-33,Sn-24).

• *Fault message 1*   *(Un-18)*
• *Fault message 2*   *(Un-19)*
• *Fault message 3*   *(Un-20)*
• *Fault message 4*   *(Un-21)*

These parameters are used to display the fault messages whenever the fault occurred. The user can take proper action for trouble-shooting based upon the displayed message.

• *The cumulative operation time setting*   *(Un-22)*

The cumulative run time before the latest fault occurred,the cumulative time range 0～65535hr.

• *The frequency command while fault occurred*   *(Un-23)*
• *The output frequency while fault occurred*   *(Un-24)*
• *The output current while fault occurred*   *(Un-25)*
• *The output voltage while fault occurred*   *(Un-26)*
• *The DC voltage while fault occurred*   *(Un-27)*
• *The input terminal status while fault occurred*   *(Un-28)*
• *The output terminal status while fault occurred* *(Un-29)*

The above parameters will display the inverter status when the fault occurred lately.The contents of parameters Un-15~21 will be cleared after the faults have been cleared and the system reset again.

• *The cumulative time whenever the input power is ON*   *(Un-30)*

The parameter will record the cumulative operation time from power-on to power-off.Its value is 0~65536 Hr.If the value exceed 65536,it will restart from 0 again.

• *Cumulative operation time*   *(Un-31)*

The parameter will record the cumulative operation time from power-on to power-off. Its value is 0~65536 Hr. If the value exceeds 65536, it will restart from 0 again.

• *Soft version number*   `*(Un-32)*

The parameter is used for refering the inverter's soft version.

• *The motor speed while PG feedback   (Un-33)*

The parameter can monitor coder feedback's motor speed when on PG control.

Chapter 5 Fault Display and Troubleshooting

5.1 Gerneral

The BDF-B501 Series have the protective and warning self-diagnostic functions.The fault message is displayed into two types:

(1) Fault

(2) Waring and self-diagnostic function.When occurs fault,the fault reason will be displayed on operator and the fault contact output terminal (R1A-R1B-R1C,D01 or R2A-R2C) action at the same time,the inverter stop to output.However,if occurs warning function action,and the operator blinks displaying the warnng contents(except some cases),the fault contact output terminal action.

5.2 Error Message and Troubleshooting

A. Error message

LCD display	Fault contentS	Fault contact	Error causes	Action to be taken
Fault output fault	Occur output lack of phase fault,the output motor wiring broken circuit	Operation	• The output terminal motor wiring broken circuit • Current sensor fault • IGBT fault	• Check output terminal motor wiring • Check the current sensor is fault or not • Check IGBT is fault or not
Fault DC vol.low	The main circuit vol.is lowen than the low vol.	Operation	• Power capacit is too samll • Voltage drop due to wiring resistance • A motor of large capacity connected to the same power system has been started. • Defective electromagnetic contractor	• Check power voltage and wiring • Check power capacity and power system
Fault overcurrent	The inverter output current becomes approx. 200% and above the inverter rated current.	Operation	• ACC time is too short • Inverter output short circuit and grounding • Motor capacity is bigger than inverter's capacity • Drive special	• Delay acc time • Check output wiring

LCD display	Fault contentS	Fault contact	Error causes	Action to be taken
			motor	
Fault grounding short circuit	Inverter output grounding (grounding current approx. 50% and above the inveter rated current	Operation	• Motor dielectric strenth is insufficient • Load wiring is insufficient	• Check the motor wiring resistance • Check the output terminal wiring
Fault overvoltage	Overvoltage protection (In deceleration,main circuit DC voltage is too high)	Operation	• Dec.time is too short • Power voltage is too high	• Delay dec.time • Install braking resistance
Fault overheat	Radiator overheat	Operation	• Cooling fan fault • Ambient temperature is too high • Clogged filter	• Check cooling fan,filter and ambient temperature
Fault motor overload	Overload detection (protection motor) of inverter's inside electronic heat-relay	Operation	• Overload,low-f requency run long time • Improper V/F curve selection	• Measure the temperature rise of the motor • Decrease the output load • Set proper motor rated current (Cn-09)
Fault inverter overload	The electronic thermal sensor detects inverter overload while the output current exceeds 112% of rated value. (inverter protection)	Operation	• Set motor rated current (Cn-09)improper	• If reset run testing,it is easy to damage the inverter before fault removed
Fault overtorque	Overtorque detection(protect machinery)output current≥The setting value Cn-26 overtorque detection	Operation	• Machine load fault	• Check machine operation • Set proper overload detection level (Cn-26)
Fault	External fault of terminal ③	Operation	• External terminal	• Use

LCD display	Fault contentS	Fault contact	Error causes	Action to be taken
external fault 3			③,⑤,⑥,⑦,⑧ fault signal input	parameter Un-11 to confirm fault singal terminal • Detect the input terminal fault situation
Fault external fault 5	External fault of terminal ⑤			
Fault external fault 6	External fault of terminal ⑥			
Fault external fault 7	External fault of terminal ⑦			
Fault external fault 8	External fault of terminal ⑧			
Fault EEPROM	EEPROM fault	Operation	• Disturbance of external noise • Excessive impact and vibration	• Reset EEPROM by running Sn-03 • Replace the control board if the fault can't be cleared.
	EEPROM(BCC,number)insufficient			
Fault A/D	CPU inside A/D fault	Operation		
Fault PG overspeed	PG overspeed	Operation	• ASR parameter setting improper • Overtorque detection level setting incorrect	• Confirm ASR level and relevant paramter
Fault PG open	PG open	Operation	• PG wiring contact improper or open-circuit	• Check PG wiring
Fault speed deviat.over	Spee deviation over	Operation	• ASR parameter setting improper	• Confirm ASR level and relevant parameter
Fault braking resistance overheat	Low-frequency braking resistance overheat	Operation	• The load side produce much energy exceeds the low-frequency braking resistance's braking ability	• Delay dec.time • Use high frequency braking resistance
Fault	MODBUS communication fault	Operation	• External noise	• Check all

LCD display	Fault contentS	Fault contact	Error causes	Action to be taken
RS-485 interrupt			• Excessive vibration impact • Communication cable contact improper	parameter (including Sn-01,Sn-02) • Restart,if still fault,please contact to us • Check the communication cable whether the contact is good or not

B.Warning and self-diagnose function

LCD display	Fault contents	Fault contact	Error causes	Action to be taken
Alam inverter overload (blinking)	Inverter overload,inside timer action after resetting(protection inverter)	No operation	• Inverter overload reset less than 5 minutes	• Inverter overload reset,alarm release automatically and powern on 5 minutes in STOP
Alarm DC voltage over-low (blinking)	Detect main circuit DC voltage is too low whlie no output of inverter	No operation	• Power voltage drop	• Use voltage meter measure the main circuit DC voltage,if too low,adjust the power voltage
Alarm overvoltage (blinking)	Detect main circuit DC voltage is too high while on ouput of inverter	No operation	Power voltage rise	• Measure main circuit DC voltage ,if too high ,adjust power voltage
Alarm overheat (blinking)	The overheat alarm signal input of external terminal	No operation	• Overload • Cooling fan fault • Ambient temperature is too high • Clogged filter	• Check cooling fan,filter and ambient temperature
Alarm overtorque (blinking)	The inverter output current is bigger than overtorque detection level(Cn-26),and	No operation	• Machine operation fault	• Check machine operation • Set proper verload detection

LCD display	Fault contents	Fault contact	Error causes	Action to be taken
	continue to run after setting Sn-12 to overtorque detection			level (Cn-32)
-	Acceleration stall prevention function	No operation	• Acc.& Dec.time are too short • Heavy load • Excessive load impact occurs while operating	• Adjust acc.& dec time • Check the load status
Alarm External fault (blinking)	FWD/REV command are simultanedouly detected by a period of 500ms.(inverter stop according to the setting method (Sn-04)	No operation	• Run procedure set improper • 3-wire/2-wire selection improper	• Check the system circuit wiring • Confrim the system parameter setting Sn-25 ~ Sn-28 again
Alarm RS-485 baseblock (blinking)	MODBUS communication fault,but inverter continue to run	No operation	• Disturbance of external noise • Big vibration impact • Communication cable contact improper	• Check all the parameter(including Sn-01,Sn-02) • Restart,if still fault,please contact to us. • Check communication cable whether the contact is good or not
Communication fault	Transmission fault of digital operator	No operation	• Comm. between digital operator and inverter has not been established after system starts for 5 seconds • Communication is established after system starts, but transmission fault occurs for 2 seconds.	• Re-plug the connector of digital operator • Replace the control board
Alarm baseblock (blinking)	External baseblock input signal operation (inverter stop output and motor coast to stop)	No operation	• External baseblock input terminal (terminal ③)'s external signal operation	• External baseblock signal removed,inverter excutes speed search function

LCD display	Fault contents	Fault contact	Error causes	Action to be taken
Alarm input incorrect	Inverter capacity setting (Sn-01)improper	No operation	• KVA data setting unconformity	• Setting proper KVA (noto the difference between 220V class and 440V class)
	Multi-function input terminal setting incorrect (Sn-25 ～ Sn-28)	No operation	• The value of Sn-25~Sn-28 is not in ascending order(Ex Sn-25=05, Sn-28=02, those are improper setting). • Set speed search command of 21 and 22 simultaneously.	• Set these values by order (the value of Sn-25 must be smaller than those of Sn-26, 27, 28) • Command 21 and 22 can not be set on two multi-function-input contacts simultaneously.
	V/F curve parameter setting incorrect (Cn-02～Cn-08)	No operation	• The setting value Cn-02 ～ Cn-08 do not satisfy Fmax≥FA〉FB≥Fmin	• Adjust the setting value
	Parameter setting incorrect (Cn-18,Cn-19)	No operation	Upper limit and low limit setting incorrect don't satisfy Cn-19≤Cn-18	• Adjust the setting value
	PID settting improper	No operation	• Start PID and the frequency command is provided by external terminal,but for no setting PID target is provided by AUX terminal Eg:Sn-05=1,Sn-64=1,but Sn-29≠1	• Setting Sn-29=9
Alarm overspeed (blinking)	Excessive speed (operation remains)	No operation	• ASR parameter setting improper • Overtorque detection level setting incorrect	• Confirm ASR level and relevant parameter
Alarm PG open (blinking)	PG open (continue to run)	No operation	PG wiring contact improper or open-circuit	• Check PG wiring
Alarm speed deviation over	Excessive speed deviation (Continue to run)	No operation	• ASR parameter setting improper • Speed deviation level	• Check ASR and speed deviation level and relevant

LCD display	Fault contents	Fault contact	Error causes	Action to be taken
			setting incorrect	parameter
Load fail	Error during upload and download	No operation	• Bad communication during operatorand inverter.The connector is not properly connected.	• Check if the connector is not properly connected.
EEPROM fault	Operator's EEPROM fault	No operation	• Operator EEPROM fault	• Disable load function of operator
Upload incorrect	Data incorrect during communication from the operator to inverter	No operation	• Incorrect data format • Communication noise	• Download the data to the operator firstly • Check if the connector is properly connected
Download incorrect	Data incorrect during communication from the operator to inverter	No operation	• Communication noise	• Check if the connector is properly connected
Alarm auto tun-error	Under sensorless vector control mode,motor parameter autotuning error	No operation	• Inverter and motor capacity are not matched • Motor load unbalance	• Check if the motor and inverter capacity is same • Check motor wiring and load status

Chapter 6 The Peripheral Equipment

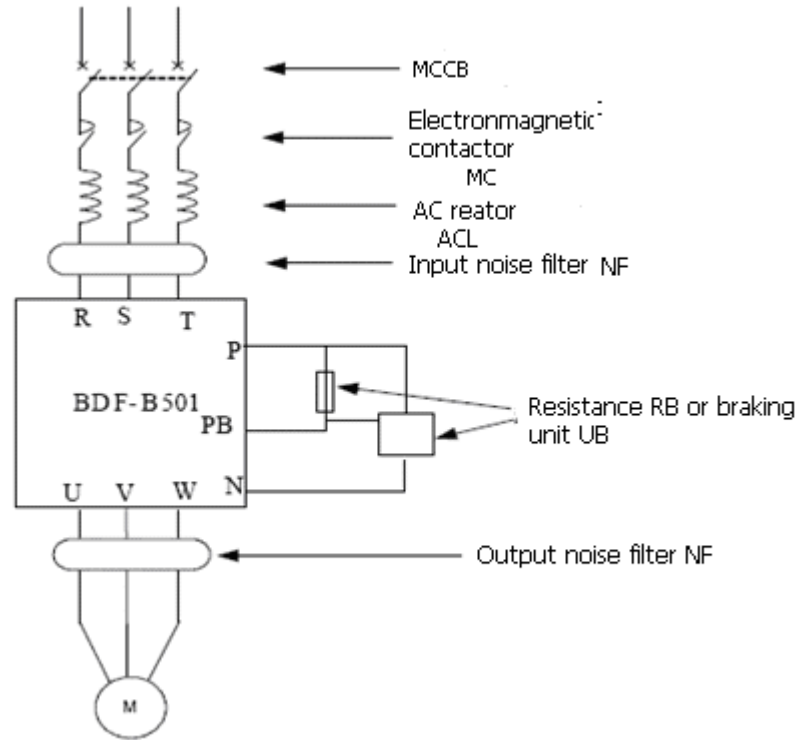## 6.1 Peripheral Equipment and Connection Diagram

Fig.6-1 Peripheral Equipment Wiring Diagram

6.2 The Function Instruction of Peripheral Equipment

6.2.1 AC reactor

AC reactor can restrain inverter input current high disturbance and improve the power FCT factor,so you are suggested to use AC reactor for the followed status:

● The proportion between power capacity and inverter capacity should be over 10:1.

● Connect the controlling silicon load or power FCT factor compensation device with switch control.

● The big difference balance of 3 phase voltage. (≥3%).

Table 6-1 The General Specification AC Reactor

Voltage (V)	Power (KW)	Current (A)	Inductance (mH)	Power (KW)	Current (A)	Inductance (mH)
380	1.5	4.8	4.8	75	165	0.13
	2.2	6.2	3.2	93	195	0.11
	3.7	9.6	2.0	110	224	0.09
	5.5	14	1.5	132	262	0.08
	7.5	18	1.2	160	302	0.06
	11	27	0.8	185	340	0.06
	15	34	0.6	200	385	0.05
	18.5	41	0.5	220	420	0.05

Voltage (V)	Power (KW)	Current (A)	Inductance (mH)	Power (KW)	Current (A)	Inductance (mH)
	22	52	0.42	245	470	0.04
	30	65	0.32	280	530	0.04
	37	80	0.26	315	605	0.04
	45	96	0.21	355	660	0.03
	55	128	0.18	400	750	0.03

6.2.2 Lifeward Brake Unit and Brake Resistance

The series machines are set lifeward braking function below 15KW,if need increase braking torque only connect braking resistance outside.However,over 18.5KW machines which have no such function,if need increase braking torque,it need to connect braking resistance outside,which including control department,drive department and release power resistance.About the control department ,please adjust according to the inverter's overvoltage protection operation.If installing overheat protection for release power department,you are suggested to connect the control contact to main control circuit.

When general braking torque is 100%,please refer to the followed braking resistance and power:

Voltage (V)	Motor power (KW)	Resistance (Ω)	Resistance power (KW)	Motor power (KW)	Resistance (Ω)	Resistance power (KW)
	1.5	400	0.25	18.5	30	4
	2.2	250	0.25	22	30	4
	3.7	150	0.40	30	20	6
380	5.5	100	0.50	37	16	9
	7.5	75	0.80	45	13.6	9
	11	50	1	55	20/2	12
	15	40	1.5			

6.2.3 Electric leakage Protector

Due to the inside of inverter,motor and input/output wire have grounding static electricity capacitor and the series inverters are low-noise for using high carrier wave .So inverter 's grounding electric leakage is big and more obviously for big capacity machine,sometimes even lead to wrong operation protection circuit.

If meet the above questions,decrease the carrier wave proper and shorten the wire,besides,install electric leakage protector.Several notes if install and use electric leakage protector:

Set the electric leakage protector to inverter input side and put it to the back of MCCB would be proper.

The electric leakage protector's operation current should be 10 times than that under industry frequency power ,no use inverter leakage current (the amount of connection,wireless noise filter,motor and electric leakage current).

Chapter 7　Maintainance

⚠ WARNING

1. Please don't tough the connection terminal of the inverter,it has high voltage.
2. Before connection, please note it has install the shell of terminal, when dismantle the shell,be sure turn off the power.
3. Cut off the main circuit, be sure that the irradiance diode is extinct, and then do maintainance and inspection.
4. Never do maintainance and inspection for curbstone technician.

⚠ CAUTION

1. Pleaae pay special attention to the operator,control circuit and drive circuit board which install CMOS integrated circuit.
2. In power, please don't alter the connection and dismantle the terminal connection.
3. Please don't check the signal during operation.

7.1 Maintainance

Due to inverter is the product integrated with electric and electronic technology and micro-electronics,so has the two characteristics of industry equipment and micro-electronics equipment.The change of ambient enviroment,such as,temperature,humidity,smog and so on,also the inside electric accessories aging of inverter factor will lead to all kinds of fault of inverter.So,for long and better using the product,please do daily inspection and regular maintainace (one time/six month) is necessary.

7.1.1 Daily maintainance

Please confirm the followed items before start the inverter:

● Whether the motor has fault sound or viabration
● Whether overheat fault of inverter and motor
● Whether ambient temperature is too high
● Whether the load current-mteter is same with before
● Whether run normal of inverter's cooling fan

Table 7-1 Daily Inspect Contents and Notes:

Number	Inspection item	Inspection depart.	Inspection item	Standard
1	Display	LED monitor	Whether display fault or not	Confirm according to the using status
2	Cooling system	Wind turbine	Whether running flexible or not ,or whether has fault voice	No fault
3	Entity	Inner case	Temperature rise,fault	No fault

			voice,different flavour	
4	Using enviroment	Ambient enviroment	Humidity,temperature,dust, poisonous gas	According to the stipulation of 2.2 clause
5	Voltage	Input/Output terminal	Input/Output voltage	According to the appendix technolog specification
6	Load	Motor	Temperature rise,fault voice,vibration	No fault

7.1.2 Regular Maintainance

Be sure turn off the power supply and wait the monior no display and main circuit power supply black-out up to 5 minutes when do regular maintainance,and then do inspection to avoid the capacitor remainder power of inverter hurt maintainanceman.The checking contents is shown in Table 7-2:

Table 7-2 Regular Checking Contents

Inspection item	Inspection content	Countermeasure
Main circuit terminal,control circuit terminal screw	Whether the screw is loosen or not	Tighten the screws
Radiator	Dust or not	Blow off the dust with 4～6kg/cm2 pressure
PCB printing circuit	Dust or not	Blow off the dust with 4～6kg/cm2 pressure
Cooling fan	Whether running flexible,or has fault voice and vibration	Replace the cooling fan
Power accessories	Dust or not	Blow off the dust with 4～6kg/cm2 pressure
Electrolytic condenser	Whether change color,different flavor,bubbling,leakage liquid and so on	Replace electrolytic condenser

During inspection,do not disassemble or sway the electronic accessories at random,never draw connecting insert at random,or it may lead to inverter can't work on the rails or display fault status,even lead to accessories fault or the damage of main switch accessories IGBT.

The user should be note that different meters may measure big different results in measuring.You are recommend to use moving and iron voltage meter to measure input voltage,and use bridge voltage meter to measure output voltage.Measure input/output current with princer amperemeter and power with dynamoelectric watt meter.If condition is not available,adopt the same meter to measure and take notes for the sake of comparing.

If make undee testing,you are suggested to use oscillograph which scan frequency is over 40MHz;if make transient undee,it would be better if use over 100MHz oscillograph.Also be sure the insulation of power and air.

Due to the product has done electric insulating and power intensity test,so there is no need for user do such test.Moreover,every such test on inverter will reduce the level of product's insulating and compression resistance ability,improper test will lead to fault of inverter.If indeed do such test,please operate by the skilled technician.

Prohibit using megameter to test,but can use multimeter high-resistance to test.For 380V class product's grounding insulating resistance no less than 4MΩ,the contro circuit's grounding insulating resistance no less than 1MΩ.

7.1.3 Replace the accessories regularly

To make inverter long and reliable operation,do regular maintainance for the use lifetime of inverter's inside electronic accessories.The inverter electronic accessories using lifetime is different according to ambient enviroment and using condition.For general continuing use,replace according to the followed stipulation also consider the using enviroment,load status and the current situation of inverter and so on. Table 7-3 showned is only provided for the maintainace and maintainance period of user as a reference.

Table 7-3 The Replacing Time of Inverter's Accessories

Accessories name	Standard replacing year
Cooling fan	2～3 years
Electrolytic condenser	4～5 years
Printing circuit board	5～8 years

7.2 Storage and Safekeeping

No use immediately when purchasing inverter ,need long-turn or temporary storage should do several as follows:

1. Put inverter to the stipulated temperature,humidity range and no moist,dust,metal dust and have good air site.
2. It needs make power test if no use over 1 year for the sake of resetting main circuit electrolytic condenser's characteristics.During in charge,using pressure regulator adjust inverter's input voltage to rated voltage slowly and the in charge time should be 1～2 hours at least.
3. The aboved test should be done one time per year at least.

Appendix:

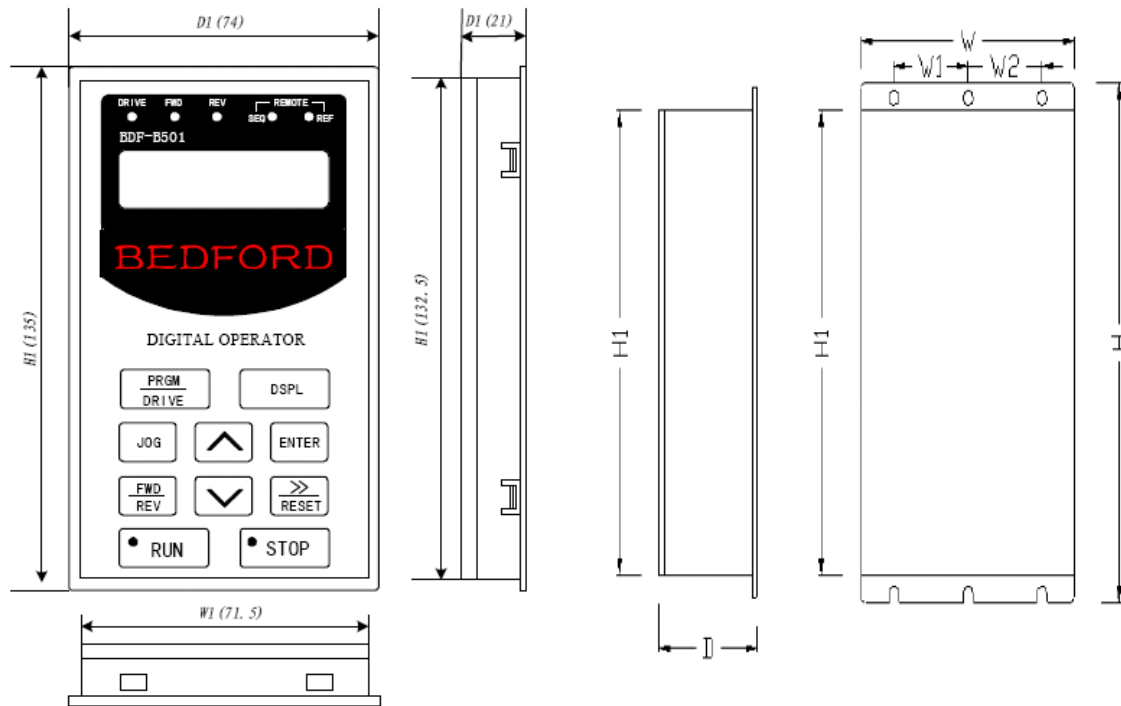## Appendix 1 Exterior Dimension and Installation Dimension
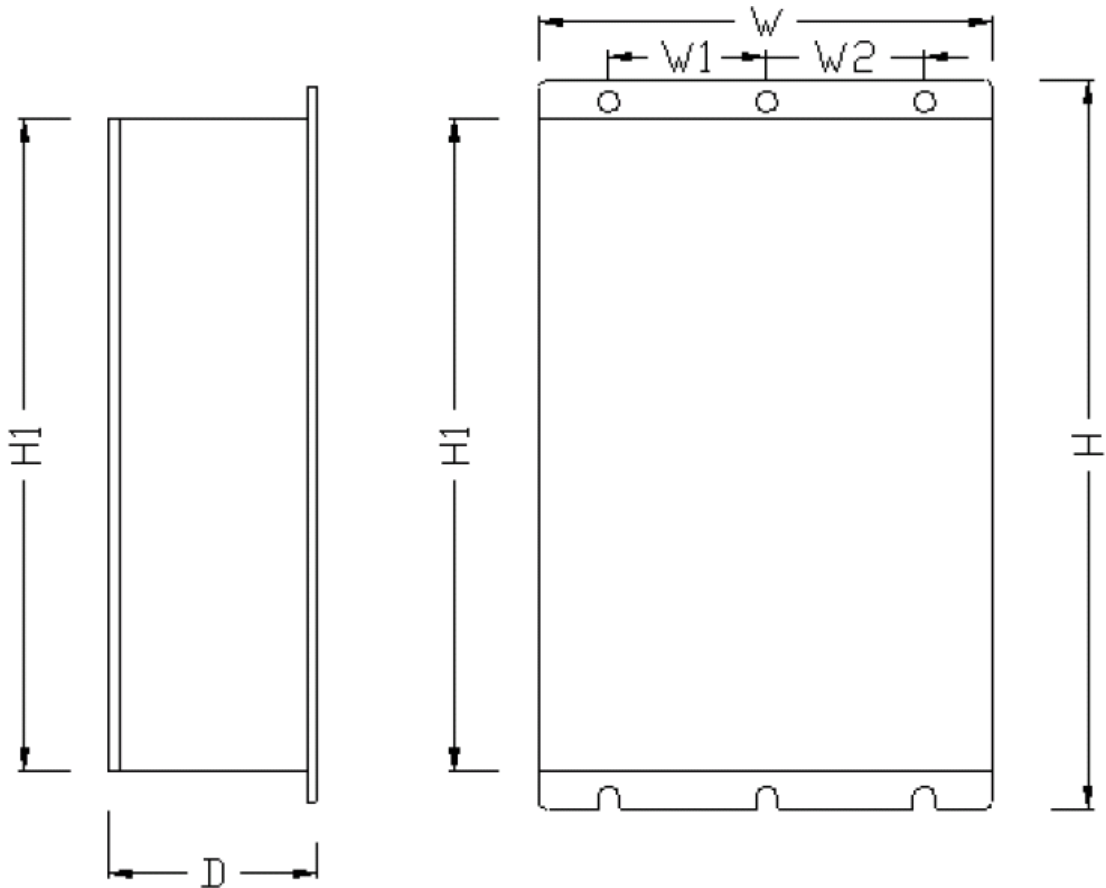

Fig A:Digital Operator Exterior Dimension　　**Fig B: The Exterior Dimension and Installation Dimension Equal or Less than 30KW**

BDF-B501 Table of exterior dimension and installation dimension equal or less than 30KW

Spec.(KW)	W	W1	W2	H	HI	D	D
0.75-5.5	168	110		312	301	197	∅ 6
7.5-11	238	130		366	352	235	∅ 8
15-30	278	170		554	538	265	∅ 8

Fig.3 The Exterior Dimesion and Installation Dimession Equal or Less than 37KW

BDF-B501 Table of exterior dimesion and installation dimession equal or less than 37KW

Spec.(KW)	W	W1	W2	H	H1	D	d
37-45	324	120	120	640	624	295	$\emptyset$ 8
55-75	390	120	120	770	750	325	$\emptyset$ 10
93	548	200	200	810	792	325	$\emptyset$ 12
110-132	658	250	250	950	932	355	$\emptyset$ 12
160-300	Cabinet						

Appendix 2 The Ajustment Methods of PID Parameter

Use the following procedure to activate PID control and then adjust it while monitoring the response.

a. Adjust PID control parameter

1. Start PID control function

2. Increase the proportion gain P(Bn-17)setting value as far as possible without creating oscillation.

3. Decrease the integral time I(Bn-18)setting value as far as possible without creating oscillation.

4. Increase the derivation time D(Bn-19)setting value as far as possible without creating oscillation.

## b. The parameter inching adjustment of PID

・After selecting PID parameter,and then do inching adjustment.

・If overshoot occurs, shorten the derivative time(D) and lengthentheintegraltime(I).
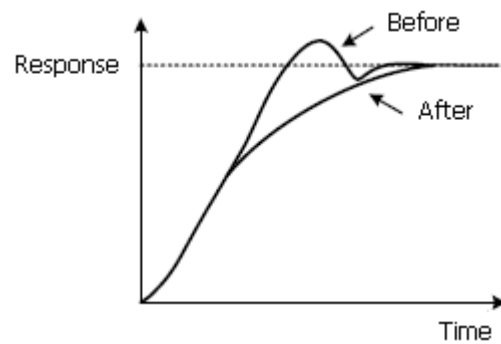
・To rapidly stabilize the control conditions even when overshooting occurs, shorten the integral time (I) and lengthen the derivative time(D).
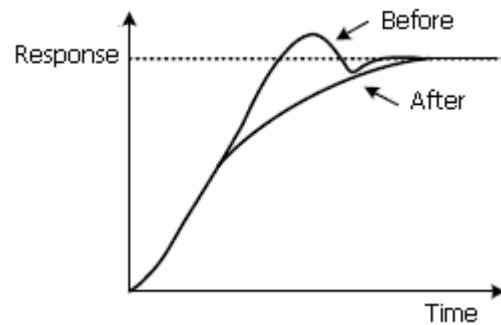
・If oscillation occurs with a longer cycle than the integral time (I) setting, it means that the integral operation is strong. The oscillation will be reduced as the integral time(I) is lengthened.
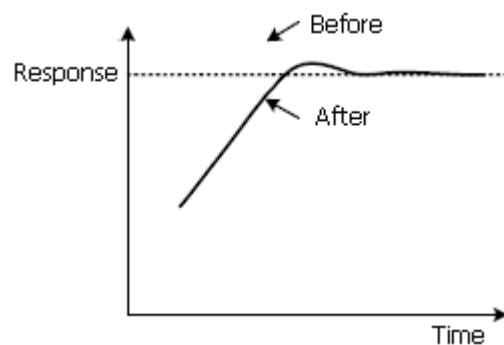
・If oscillation cycle is short and approx. the same as the derivative time (D) setting, it means that the derivative operation is strong. The oscillation will be reduced as the derivative time (D) is shortened. If even setting the derivative time (D) to 0.00 cannot reduce oscillation, then either decrease the proportional gain (P) or raise the PID primary delay time constant.
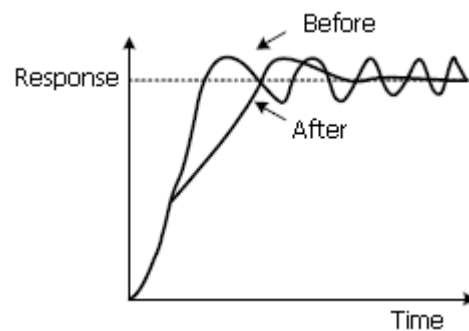
Appendix 3 The Complementarity Instruction of PID Control Pane Chart

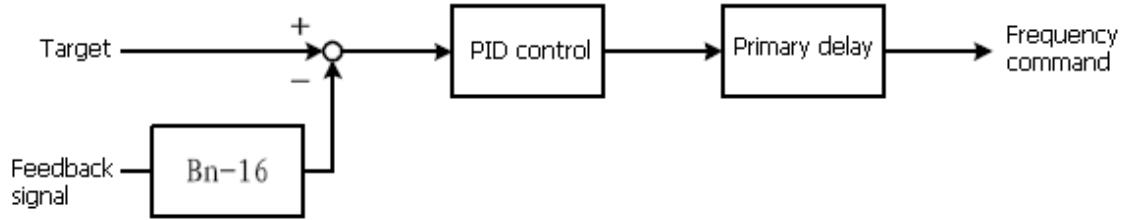The complementarity of PID control pane is shown bellow:

Fig D PID Control Pane

Instruction:

1. Target signal is come from digital operator and can be set by RS-485 communication port or multi-function analog input terminal AUX (parameter Sn-05).If target signal is provided by analog input terminal AUX,not only set Sn-05=1 but also need set Sn-29=9,otherwise it will display [Input error].

2. The detection value can be input by VIN terminal (Sn-24=0,voltage command $0\sim10V$) or AIN terminal (Sn-24=1,current command $4\sim20mA$)

3. Target signal is come from AUX terminal,and the wiring diagram is as follows: (Sn-05=1,Sn-29=09)
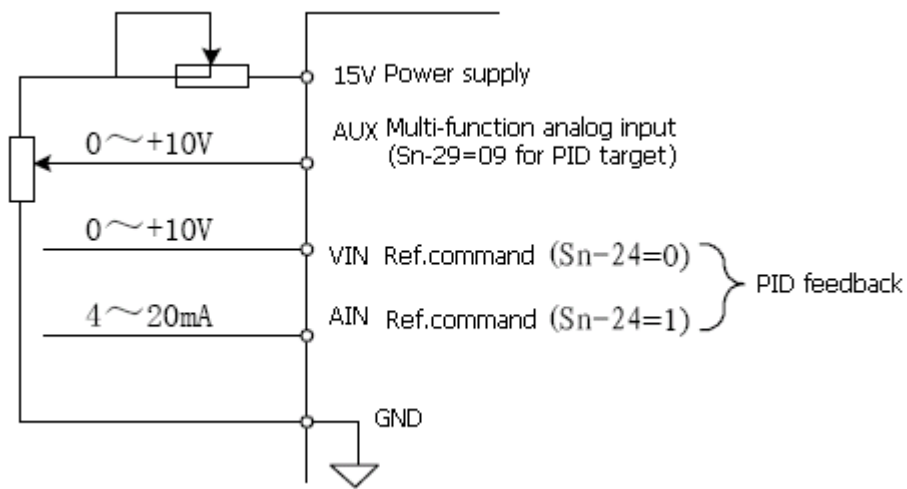

Fig E PID wiring diagram

4. About PID relevant parameter setting,please refer to page 4-8,4-9.

Appendix 4 PG Feedback Wiring Circuit Diagram

The BDF-B501 has a built-in PG interface,no external PG feedback option is needed.But an independent feedback interface power supply (IP12,IG12)should be provided from external source.
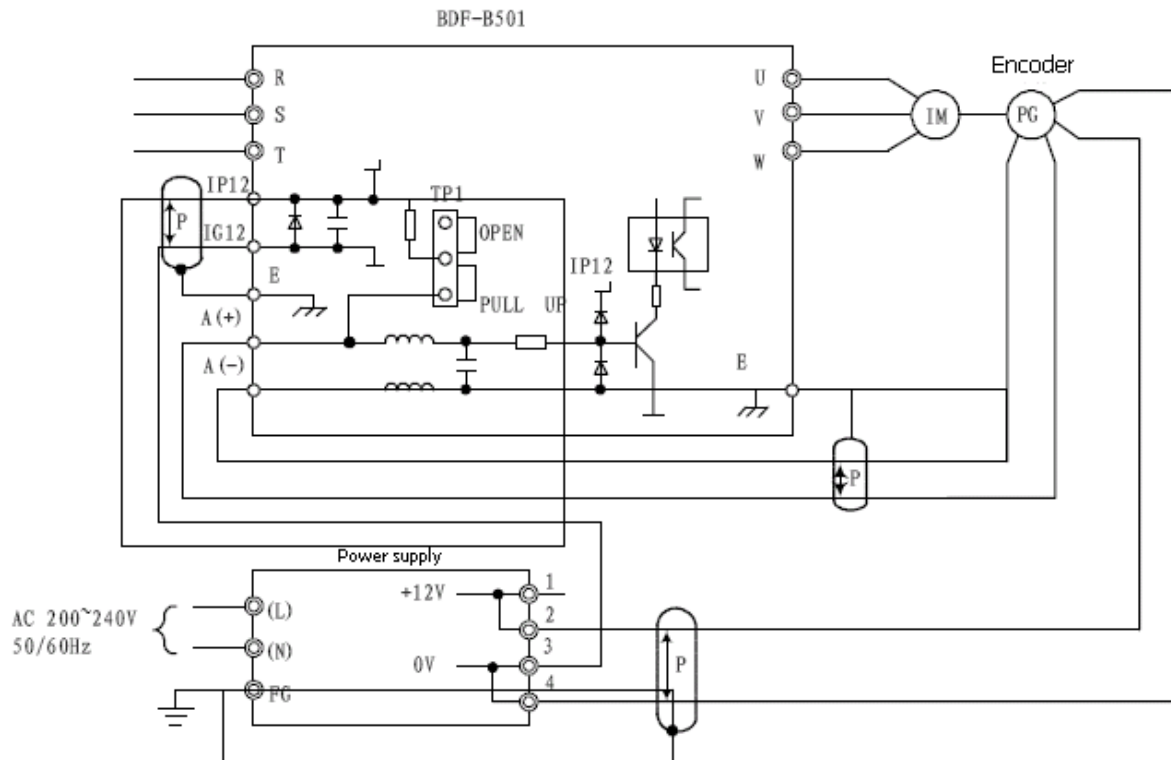

Fig.F PG Feedback Wiring Diagram

Note:

1. [symbol] Isolated twisted cable wire.

2. The instruction of PG wiring terminal.

Signal name	Function
A(+)	PG signal input,input level (H:4～12V, L:≤1V)
A(-)	Max.input frequency<32767Hz
IP12	External PG control power (+12V ±10%,max.40mA)
IG12	
+12V	Power supply (+12V ±10%,min.0.5A)
0V	
E	Grounding terminal

3. Coder (PG)only can use open collector or complementary interface.

4. When use open collector coder,the TP1 jump should be set in PULL UP location (factory standard setting).However,when use complementary coder,the TP1 jump should be set in OPEN position.

5. Use twisted cable wire between PG and inverter,and the wiring distance should be less than 50m.

Appendix 5 Example for RS-485 Communication Interface Wiring

·BDF-B501 communication port (terminal (S+),(S-))communicate with external adopting MODBUS communication agreement.The PROFIBUS-DP communication is possible if use external PROFIBUS option card (BDF-B501-SP card).

The communication system application wiring between MODBUS and PROFIBUS-DP is as follows:

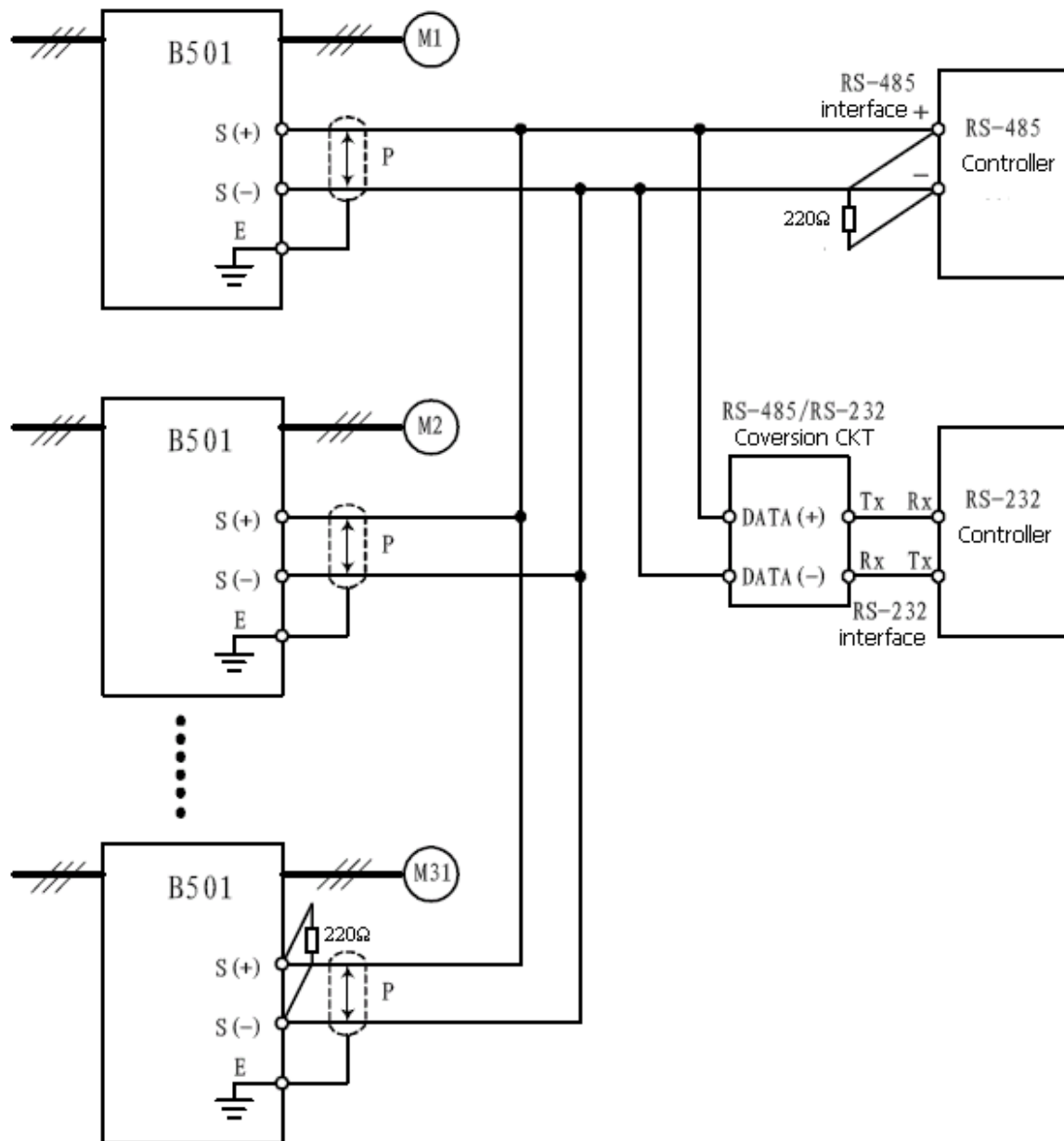**a. The wiring of MODBUS communication agreement**

Fig G   MODBUS Communication Wiring Diagram

Note:

1. Connect B501-RS-485 communication interface directly if system controller has RS-485 interface.But if no RS-485 interface,only has RS-232 interface need RS-485/RS-232 conversion card,and then has the communication of RS-485 interface.

2. A MODBUS Host Controller can drive the network with no more than 31 drivers connected, using MODBUS communication standard. If the driver(e.g., B501 Series drive) is at the end of the network,

it must have the terminating resistors 220Ω at both terminals.

3. Please refer to [BDF-B501 RS-485 communication agreement]

b. Example for PROFIBUS communication agreement wiring

For PROFIBUS-DP communication need external PROFIBUS conversion card,the MA-SP card can be installed the main control circuit board directly using BDF-B501SP card which need DC24 power supply.
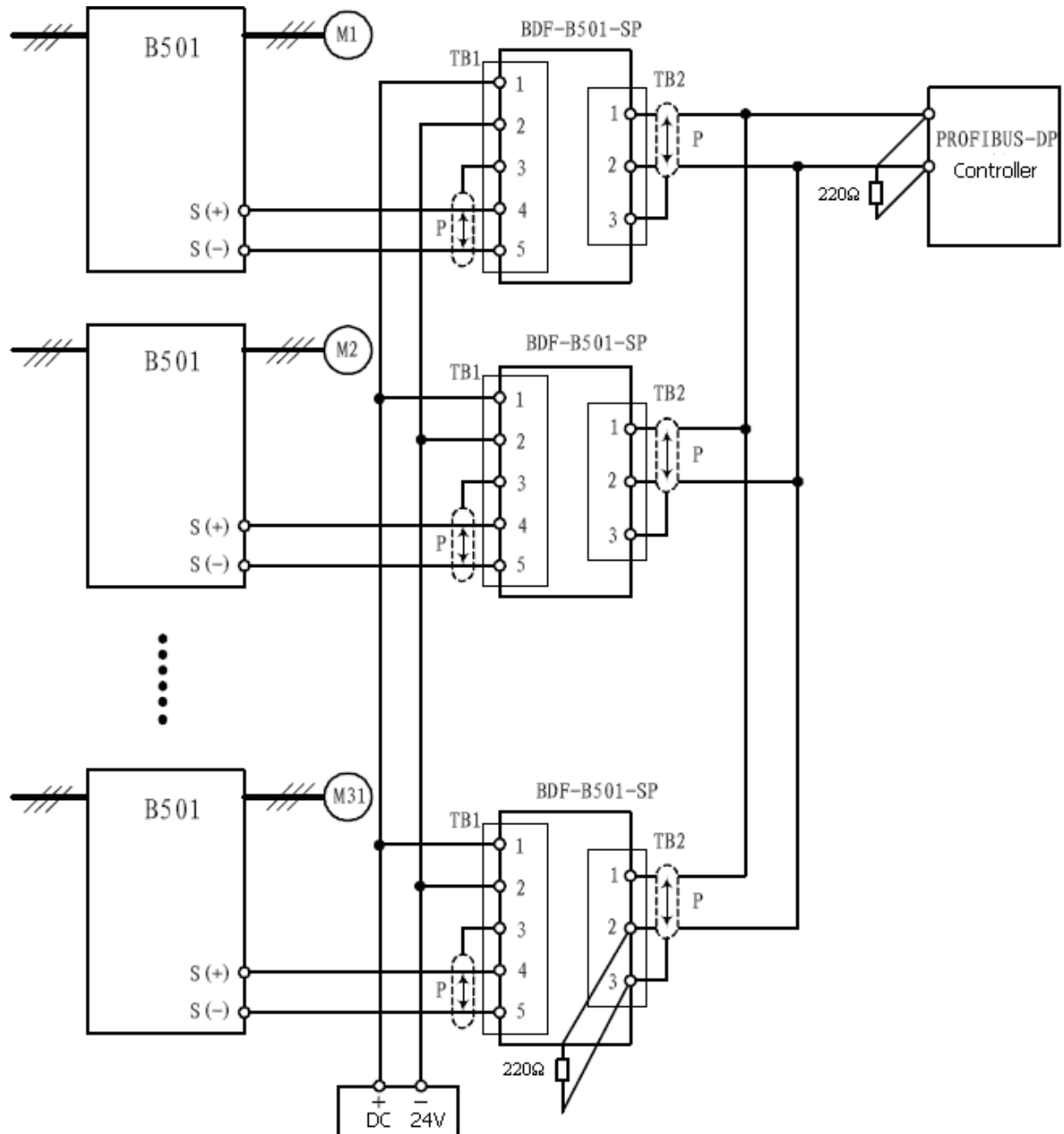

Fig H PROFIBUS Communication Wiring Diagram

Note:

1. An BDF-B501-SP will consume 24W(24V,100mA).Choose the proper DC24V power supply to meet system capaicty based upon the station number.

2. A MODBUS Host Controller can drive the network with no more than 31 drivers connected, using

MODBUS communication standard. If the driver(e.g., B501 Series drive) is at the end of the network, it must have the terminating resistors 220Ω at both terminals.
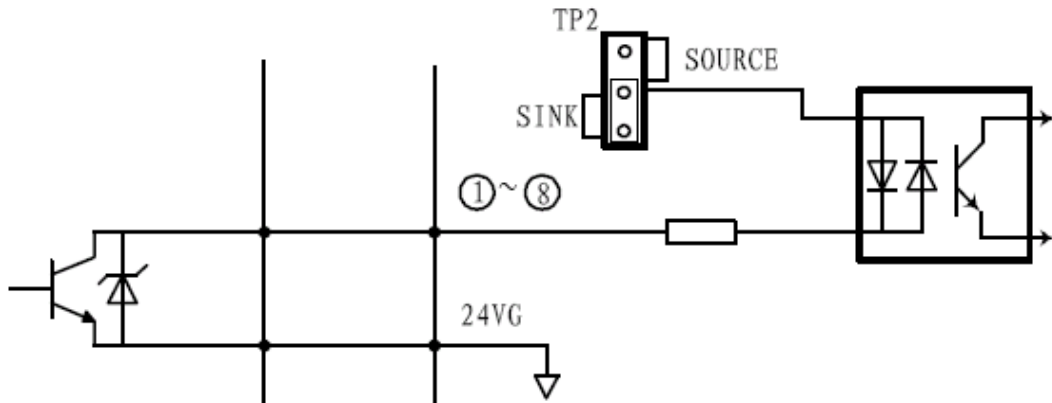
3. Please refer to [BDF-B501 RS-485 communication agreement].

Appendix 6 Example for SINK/SOURCE Terminal Interface Connection

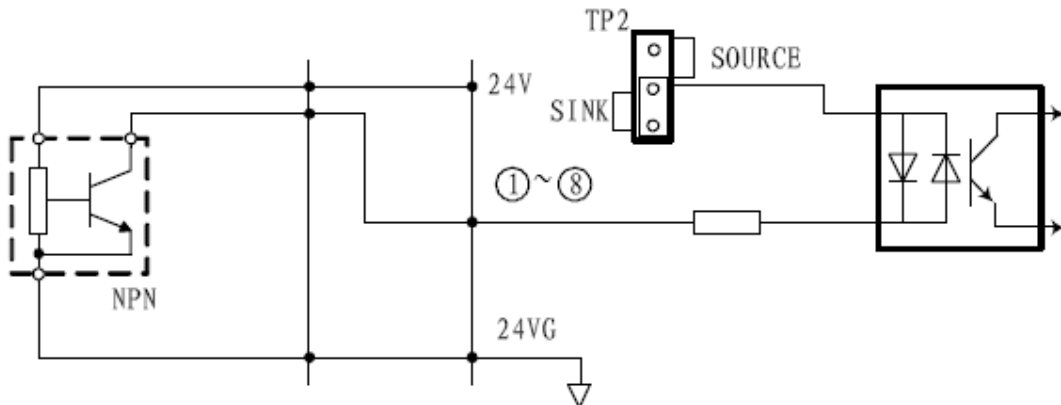・The BDF-B501 terminal ①～⑧ terminal can be set SINK or SOURCE interface.

a.SINK wiring:TP2 jump to SINK position.

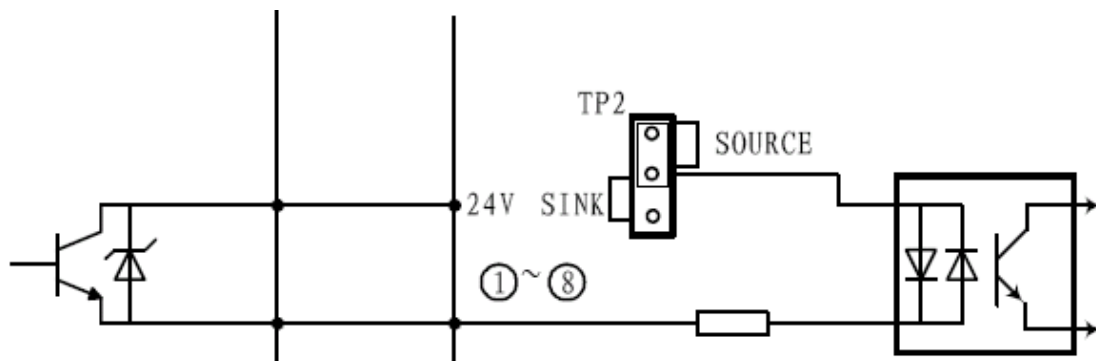・Using audion (open collector) as operation signal standard wiring"

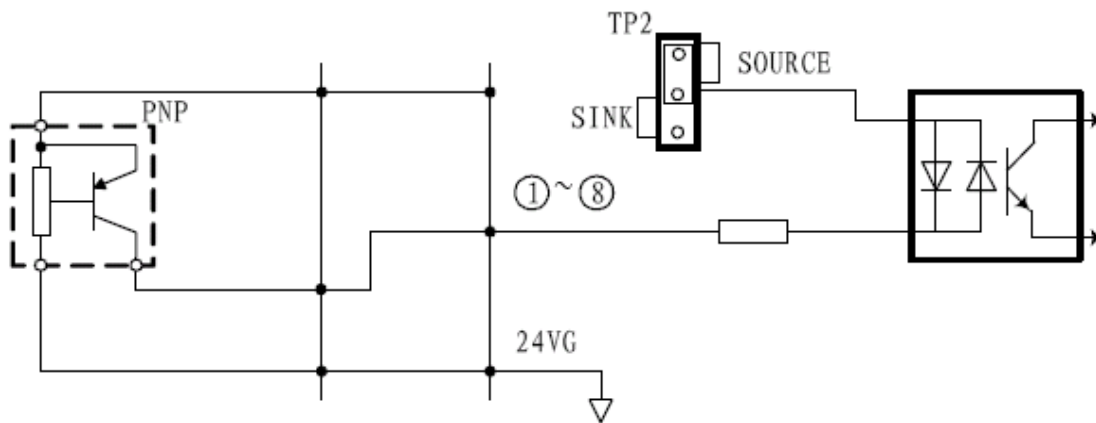・Using NPN (SINK)to detect as operation signal standard wiring:

b. SOURCE interface wiring:TP2 jump to SOURCE position.

・Use audion (open collector)as operation signal standard wiring:

• Use PNP (SOURCE)to detect as operation signal standard wiring:

Appendix 7 The study of Motor Parameter and the Operation Steps of Sensorless Vector Control

BDF-B501 control mode can be divided into V/F control mode (Sn-67=0) and sensorless vector control mode (Sn-67=1).At first,confirm inverter capacity is matched with motor power when use sensorless vector control mode.If it is the initial operation can do motor parameter autotunning to get correct motor parameter.The motor autotunning steps are shown as below:

1. Detect and confirm the inverter capacity is equivalent to the motor power(the difference should be less than 2 class),and whether the motor load is removed or not,the wiring of inverter and motor is correct or not.

2. After confirming everything is right,switch inverter operator to PRGM mode.

3. Input according motor nameplate:motor rated voltage (Cn-03) and motor rated frequency (Cn-04)

4. Set the start autotunning mode (Sn-66=1).

5. Switch operator to DRIVE mode again,and then press RUN key.

6. In normal cases,inverter enters into motor parameter autotunning mode,the motor will stop running after 25 seconds,and the RUN key LED is ON,the STOP key LED blinking,stop with pressing STOP key.If fault during the process in motor parameter autotunning,press the STOP key terminate autotunning.

7. Press the STOP key finally and return to the normal mode,the inverter will measure the motor paramter Cn-57,Cn-58,Cn-60 and record it for sensorless vector control.

Sensorless vector control opeartion steps and adjustments:

1. Confirm inverter capacity and motor paramter is correct or not firstly,if initial operation can be used as autotunning to get motor parameter or known motor parameter can be set according to parameter:motor rated voltage (Cn-03),motor rated frequency (Cn-04),motor line-to-line resistance (Cn-57),motor rotor resistance (Cn-58),motor equal leakage induction(Cn-59),motor equal induction(Cn-60).

2. Set Sn-67=1 that is enter into sensorless vector control mode.

3. If the motor low speed is not big enough,increase the motor line-to-line resistance;on the contrary,if low speed torque is too big,decrease the line-to-line resistance (Cn-57).

4. If motor fact speed is lower the setting speed,increasing the slip compensaton gain (Cn-16);on the contrary,if motor fact speed is higher than setting speed,decreasing the slip compensation gain (Cn-16).

5. If speed is unstable and the load is big,increasing the slip compensation dalay time (Cn-40);on the contrary,when load is small,decreasing the slip compensation delay time (Cn-40).

Appendix 8 BDF-B501 Technology Specifications

Item		Specifications													
Output	Rated output voltage	Max.output voltage is same with power supply input voltage													
	Applica. motor power (KW)	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	
	Rated output current (A)	4	4.8	8.7	12	15	24	32	40	48	64	80	96	128	
	Quota	100% constant													
	Max.overload current	150% / minute,180%/2 seconds													
Power	Voltage,frequency	3 phase 380/415V 50/60Hz													
	Allowed changed voltage	+10%～-15%													
Control characteristics	Operation method	LCD operator,Chinese/English display and paramter copy function													
	Control method	SPWM control,V/F+PG control,sensorless vector control													
	Frequency control range	0.1-400Hz													
	Frquency accuracy (temperature changing rate)	Digital command：±0.01%(-10°C～+40°C) Analog command：±0.1%(25°C±10°C)													
	Speed control accuracy	±0.1%(V/F+PG feedback), ±0.5%(sensorless vector control)													
	Setting frequency resolution	Digital command0.01Hz;analog command 0.05Hz/50Hz													
	Output frequency resolution	0.01Hz													
	Oveload capacity	150% of rated output current for 1 minute													
	Frequency setting signal	0～+10V(20KΩ)4～20mA(250Ω),and pulse frequency command													
	Acc.& Dec. time	0.0～6000.0s(Acc.& Dec.time can be set respectively)													
	Braking torque	About 20%,additional braking resistance can reach up to 125%													
	Voltage/Frequency patterns	15 preset V/F patterns optional and any V/F characteristic setting													
	Main control function	Immediately restart,PID control,auto torque compensation,slip compensation,RS-485 communication function,speed feedback control,simple PLC function,2 group analog analog output contact													
	Other function	Power tiime and run time cumulation record,4 groupsfault record and the latest fault record,energy-saving function setting,Up/Down operation,MODBUS communication format,pulse multiple output,any unit display,Local/Remote switch key,SINK/SOURCE input interface optional.													
Protection function	Motor overload (OL1)	Electronic heat relay overload curve protection													
	Overcurrent(OC)and output short circuit(SC)protection	Over 200% of rated output current													
	Inverter overload(OL2)	Rated output about 150% for 1 minute stop(150% for 2 minute can													

		custom-made)
	Overvoltage(OV)	Main circuit DC voltage is about over 410V (220V class)and 820V(440V class),motor run and stop
	Under voltage(UV)	Main circuit DC voltage is about under 200V(220 class)and 400V(440 class),motor run and stop
	Auto power OFF restart	Power OFF more than 15ms
	Overheat protection(OH)	Detect by temperature sensor
	Stall prevention	Operation can be set acceleration,running,deceleration enable/disable
	Overheat protection (GF)	Use current sensor protection
Enviroment	Input phase protection loss(IPL)	Input phase loss protection operation,motor coast to stop
	Output phase protection loss(OPL)	Output phase loss protection operation,motor coast to stop
	Ambient temperature	-10°C～40°C
	Humidity	20～90%RH(protected from frost)
	Storage temperature	-20°C～+60°C
	Using site	Indoor (non-corrosive gas,dust sites)
	Installation site	Under 1000m altitude without corrosive gas,dust and direct shunlight
	Vibration	Below 20Hz:9.8m/s2(0.2g)
	Protection level	0.75～7.5KW:IP20;above 11KW:IP10
	Cooling method	Strong cooling method
	Coder	Built-in PG card interface, open-collector interface and complementary optional
	Select accessories	PROFIBUS communication card