VTDRIVE

User Manual

VT2 Series High Performance Frequency Inverter

Contents

Preface

Thank you for purchasing the VT2 Series AC Drive developed by **VTdrive Technology Limited.** The VT2 Series AC Drive is a general-purpose high performance Current vector control AC Drive. Mainly used to control and adjust the three-phase AC asynchronous motor speed and torque.

VT2 Series uses high-performance vector control technology, Low speed high torque output, Has good dynamic characteristics, Super overload capacity, rich and powerful functions, stable performance. It is used to drive various automation production equipment involving Textile, Paper-making, Wire-drawing, Machine tool, Packing, Food, Fan and Pump.

This manual describes the correct use of the VT2 Series AC Drive, including selection, parameter setting, commissioning, maintenance & inspection. Read and understand the manual before use and forward the manual to the end user.

Notes
◆ The drawings in the manual are sometimes shown without covers or protective guards, to explain the details of the product.
◆ Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
◆ The drawings in the manual are shown for description only and may not match the product you purchased.
◆ The instructions are subjected to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual.
◆ Contact our agents or customer service center if you have problems during the use.

◆ When unpacking, please confirm carefully: The model name of the machine and the AC Drive rating are the same as your order. The packing containing your ordered machine (with product certification), user manual (with product warranty card).

◆ If the product is damaged during transport, If you find that there is some omission or damage, please promptly contact with our company or your supplier for solution.

Chapter 1

Safety Information & Precautions

Chapter 1   Safety information and precautions

Definition of security:

In this manual, the notices are graded based on the degree of danger:

⚠️**DANGER** : indicates that failure to comply with the notice will result in severe personal injury or even death.

⚠️**WARNING** : indicates that failure to comply with the notice will result in personal injury or property damage.

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. VTdrive will assume no liability or responsibility for any injury or loss caused by improper operation.

1.1 Safety Information

Using stage	Safety grade	precautions
Before installation	danger	Do not install the equipment if you find water seepage,component missing or damage upon unpacking. Do not install the equipment if the packing list does not conform to the product you received.
	Warning	Handle the equipment with care during transportation to prevent damage to the equipment. Do not use the equipment if any component is damaged or missing.Failure to comply will result in personal injury. Do not touch the components with your hands. Failure to comply will result in static electricity damage.

During installation	Danger	Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire.
		Do not loosen the fixed screws of the components, especially the screws with red mark.
	Warning	Do not drop wire end or screw into the AC drive. Failure to comply will result in damage to the AC drive.
		Install the AC drive in places free of vibration and direct sunlight
		When two AC drives are laid in the same cabinet, arrange the installation positions properly to ensure the cooling effect.
During installation	Danger	Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents.
		A circuit breaker must be used to isolate the power supply and the AC drive. Failure to comply may result in a fire.
		Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock.
		Tie the AC drive to ground properly by standard. Failure to comply may result in electric shock.
	Terminals	Never connect the power cables to the output terminals (U,V, W) of the AC drive. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the AC drive.
		Never connect the braking resistor between the DC bus WARNING (+) and (-). Failure to comply may result in a fire.
		Use wire sizes recommended in the manual. Failure to comply may result in accidents.

		Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.
Before power-on	Danger	Check that the following requirements are met: - the voltage class of the power supply is consistent with the rated voltage rated voltage class of the AC drive. - The input terminals (R, S, T) and output terminals (U, V, W) are properly connected. No short-circuit exists in the peripheral circuit.The wiring is secured - Failure to comply will result in damage to the AC drive Do not perform the voltage resistance test on any part of the AC drive because such test has been done in the factory. Failure to, drive because such test has been done in the factory. Failure to
	Warning	Cover the AC drive properly before power-on to prevent electric shock. All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents.
After power-on	Danger	Cover the AC drive properly before power-on to prevent electric shock. All peripheral devices must be connected properly under the instructions described in this manual. Failure to comply will result in accidents.
	Warning	Do not touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accidents.

		Do not change the default settings of the AC drive. Failure to comply will result in damage to the AC drive.
During operation	Danger	Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt. Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the AC drive.
	Warning	Avoid objects falling into the AC drive when it is running. Failure to comply will result in damage to the AC drive. Do not start/stop the AC drive by turning the contactor ON/OFF.Failure to comply will result in damage to the AC drive.
During maintenance	Danger	Repair or maintenance of the AC drive may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the AC drive. Do not repair or maintain the AC drive at power-on. Failure to comply will result in electric shock. Repair or maintain the AC drive only ten minutes after the AC drive is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury. Ensure that the AC drive is disconnected from all power supplies before starting repair or maintenance on the AC drive. Set and check the parameters again after the AC drive is replaced. All the pluggable components must be plugged or removed only after power-off.

		The rotating motor generally feeds back power to the AC drive. As a result, the AC drive is still charged even if the motor stops, and the power supply is cut off. Thus ensure that the AC drive is disconnected from the motor before starting repair or maintenance on the AC drive.

1.2 General Precautions

1) Requirement on residual current device (RCD)

The AC drive generates high leakage current during running, which flows through the protective earthing (PE) conductor. Thus install a type-B RCD at primary side of the power supply. When selecting the RCD, you should consider the transient and steady-state leakage current to ground that may be generated at startup and during running of the AC drive. You can select a specialized RCD with the function of suppressing high harmonics or a general-purpose RCD with relatively large residual current.

2) High leakage current warning

The AC drive generates high leakage current during running, which flows through the PE conductor. Earth connection must be done before connection of power supply. Earthing shall comply with local regulations and related IEC standards.

3) Motor insulation test

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor windings from damaging the AC drive. The motor must be disconnected from the AC drive during the insulation test. A 500-V mega-Ohm meter is recommended for the test. The insulation resistance must not be less than 5 MΩ.

Input terminals U V W of the motor
Megger
Ground
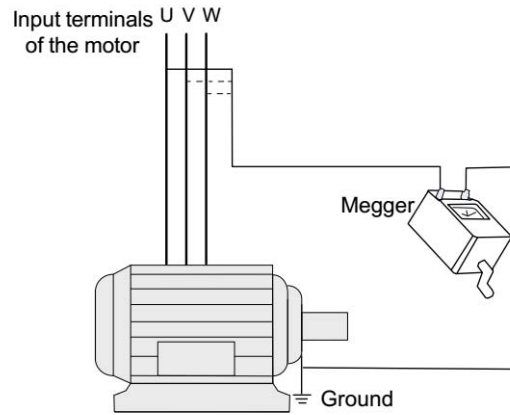
4) Thermal protection of motor

If the rated capacity of the motor selected does not match that of the AC drive, especially when the AC drive's rated power is greater than the motor's, adjust the motor protection parameters on the operation panel of the AC drive or install a thermal relay in the motor circuit for protection.

5) Running at over 50Hz

The AC drive provides frequency output of 0 to 3200 Hz (Up to 300 Hz is supported if the AC drive runs in CLVC and SFVC mode). If the AC drive is required to run at over 50Hz, consider the capacity of the machine.

6) Vibration of mechanical device

The AC drive may encounter the mechanical resonance point at some output frequencies, which can be avoided by setting the skip frequency.

7) Motor heat and noise

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the motor temperature, noise, and vibration are slightly greater than those when the AC drive runs at power frequency (50Hz).

8) Voltage-sensitive device or capacitor on output side of the AC drive

Do not install the capacitor for improving power factor or lightning protection voltage-sensitive resistor on the output side of the AC drive because the output of

the AC drive is PWM wave. Otherwise, the AC drive may suffer transient over-current or even be damaged.

Capacitor or voltage-sensitive resistor
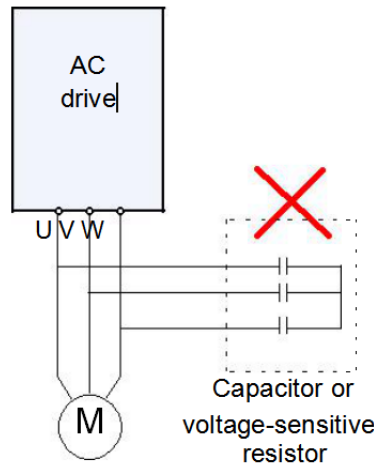
9) Contactor at the I/O terminal of the AC drive

When a contactor is installed between the input side of the AC drive and the power supply, the AC drive must not be started or stopped by switching the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the AC drive.

When a contactor is installed between the output side of the AC drive and the motor, do not turn off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.

Contactor KM

Contactor KM or other switches

380 VAC 50/60 Hz

AC drive

Do not start /stop the AC drive by switching the contactor on /off. If the AC drive has to be operated by the contactor , ensure that the time interval is at least one hour .

Turn on /off the contactor when the AC drive has no output . Otherwise , modules inside the AC drive may be damaged .

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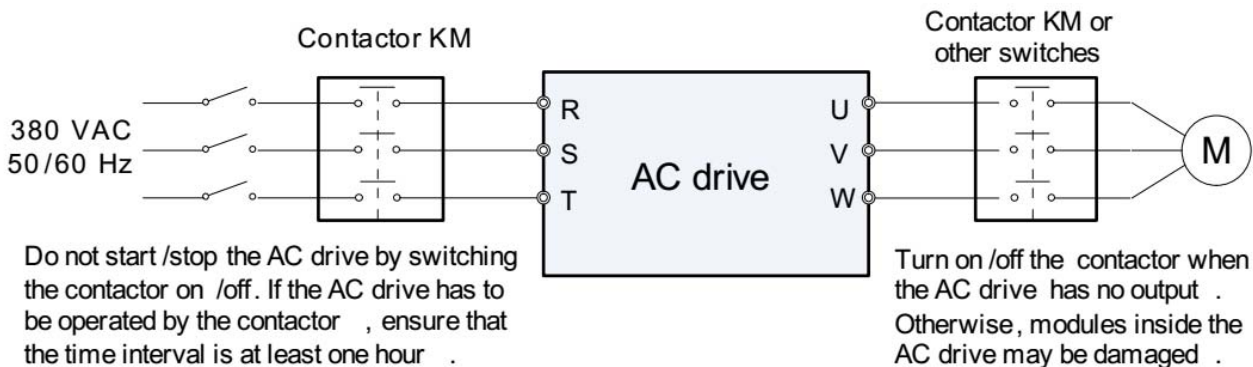
10) When external voltage is out of rated voltage range

The AC drive must not be used outside the allowable voltage range specified in this manual. Otherwise, the AC drive's components may be damaged. If required, use a corresponding voltage step-up or step-down device.

11) Prohibition of three-phase input changed into two-phase input

Do not change the three-phase input of the AC drive into two-phase input. Otherwise, a fault will result or the AC drive will be damaged.

12) Surge suppressor

The AC drive has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when the inductive loads (electromagnetic contactor, electromagnetic relay, solenoid valve, electromagnetic coil and electromagnetic brake) around the AC drive are switched on or off. If the inductive loads generate a very high surge voltage, use a surge suppressor for the inductive load or also use a diode.Do not connect the surge suppressor on the output side of the AC.

13) Temperature and de-rating

The regular using temperature of this VT2 Series AC Drive is - 10℃~ + 50℃ When the temperature more than 50 need to de-rate using,The temperature rises by 1.5% degrees centigrade.

14) Altitude and de-rating

In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to de-rate the AC drive. Contact VTdrive for technical support.

15) Some special usages

If wiring that is not described in this manual such as common DC bus is applied, contact the agent or VTdrive for technical support.

16) Disposal

The electrolytic capacitors on the main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

17) About adaptable Motor

• The standard adaptable motor is adaptable four-pole squirrel-cage asynchronous induction motor. For other types of motor, select a proper AC drive according to the rated motor current.

• The cooling fan and rotor shaft of non-variable-frequency motor are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.

• The standard parameters of the adaptable motor have been configured inside the AC drive. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.

• The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is disconnected from the tested parts.

Chapter 2

Product Information

Chapter 2   Product Information

VTdrive AC Drive s have been tested and inspected before leaving the manufacturer. Before unpacking the product, please check product packaging for shipping damage caused by careless transportation and whether the specifications and type of the product complies with the order. If any questions, please contact the supplier of **VTdrive** products, or directly contact the company.

※Inspect that the contents are complete (VT2 Series AC Drive , operation manual, warranty card, keyboard extension line every each unit.)

※Check the nameplate on the side of the AC Drive to ensure that the product you have received is the right one you ordered.

2.1 Nameplate

Identification	Voltage Level
4T	Three phase 380V
2S	Standard 220V Single Phase
2M	Mini Type of 220V Single Phase
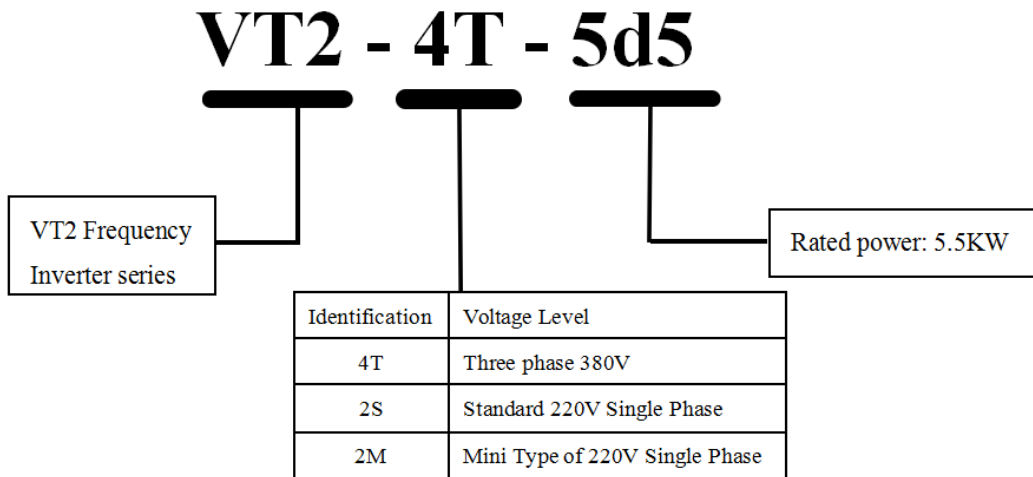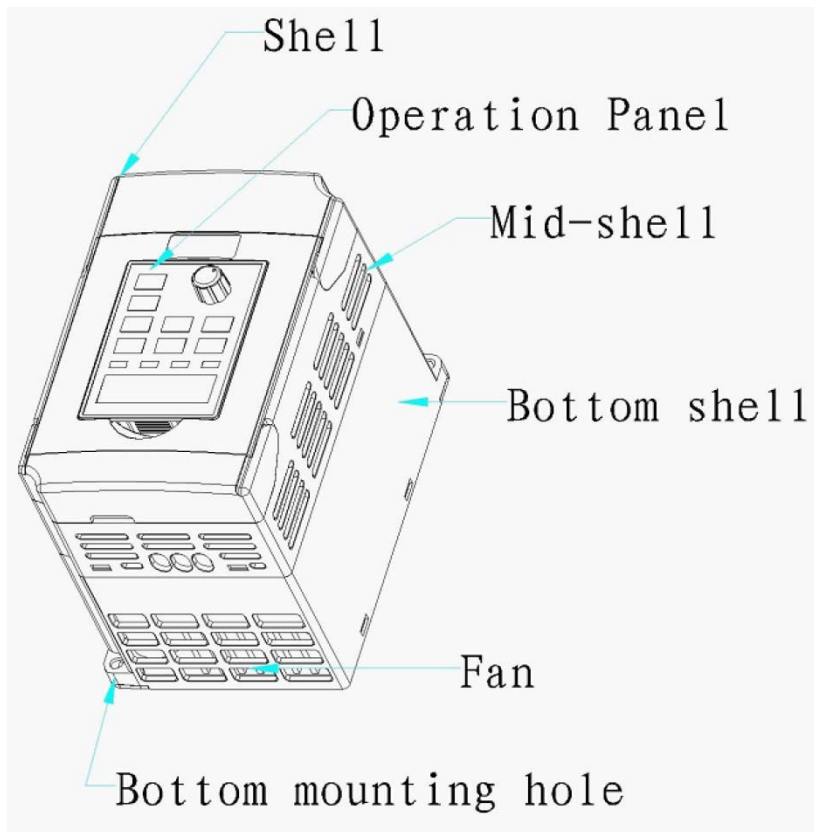
Fig. 2.1

2.2 products series

2.2.1 AC Drive from 0.4kw to 2.2kw /220v(200-240V ac)

AC Drive model	Adapted motor		Rated input current(A)	Shape case
	KW	HP		
VT2-2M-d04	0.4	0.5	2.5	F0
VT2-2M-d75	0.75	1	4	F0
VT2-2M-1d5	1.5	2	7	F0
VT2-2S-d75	0.75	1	4	F1
VT2-2S-1d5	1.5	2	7	F1
VT2-2S-2d2	2.2	3	10	F1

Table 2.2.1

2.2.2 AC Drive from 0.75kw to 500kw /380v(300-500V ac)

AC Drive model	Adapted motor		Rated input current(A)	Shape case
	KW	HP		
VT2-4T-d75	0.75	1	4	F1
VT2-4T-1d5	1.5	2	7	F1
VT2-4T-2d2	2.2	3	10	F1
VT2-4T-4d0	4	5	16	F2
VT2-4T-5d5	5.5	7.5	13	F2
VT2-4T-7d5	7.5	10	16	F2
VT2-4T-011	11	15	25	F3
VT2-4T-015	15	20	32	F3
VT2-4T-018	18.5	25	38	F3
VT2-4T-022	22	30	45	F4
VT2-4T-030	30	40	60	F4
VT2-4T-037	37	50	75	F4
VT2-4T-045	45	60	90	F5
VT2-4T-055	55	70	110	F5
VT2-4T-075	75	100	150	F6
VT2-4T-090	93	125	170	F6
VT2-4T-110	110	150	210	F7
VT2-4T-132	132	175	250	F7
VT2-4T-160	160	210	300	F7
VT2-4T-185	185	250	340	F8
VT2-4T-200	200	260	380	F8
VT2-4T-220	220	300	415	F8
VT2-4T-250	250	350	470	F8
VT2-4T-280	280	370	520	F8
VT2-4T-315	315	400	600	F9
VT2-4T-355	355	420	650	F9
VT2-4T-400	400	530	725	F9
VT2-4T-450	450	600	800	F9
VT2-4T-500	500	700	920	F9

Table 2.2.2

VTDRIVE VT2 Series User-Manual

2.3 products specifications

2.3.1 0.4kw-2.2kw outer shapes & nameplates
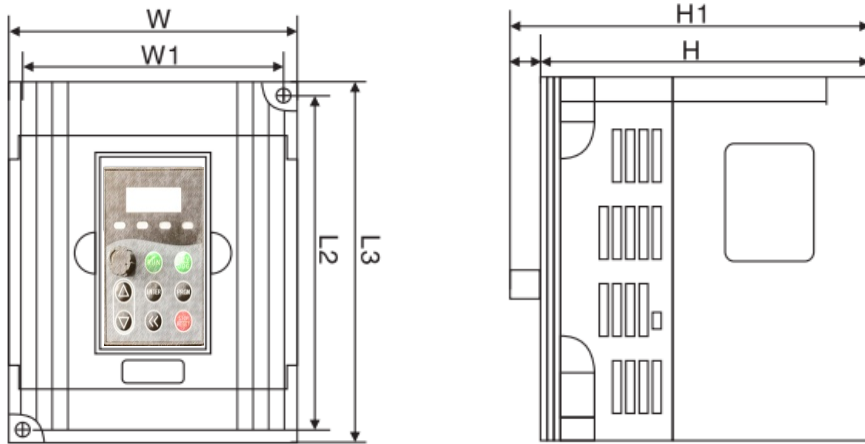
A type keyboard size

2.3.2 4kw-7.5kw outer shapes & nameplates
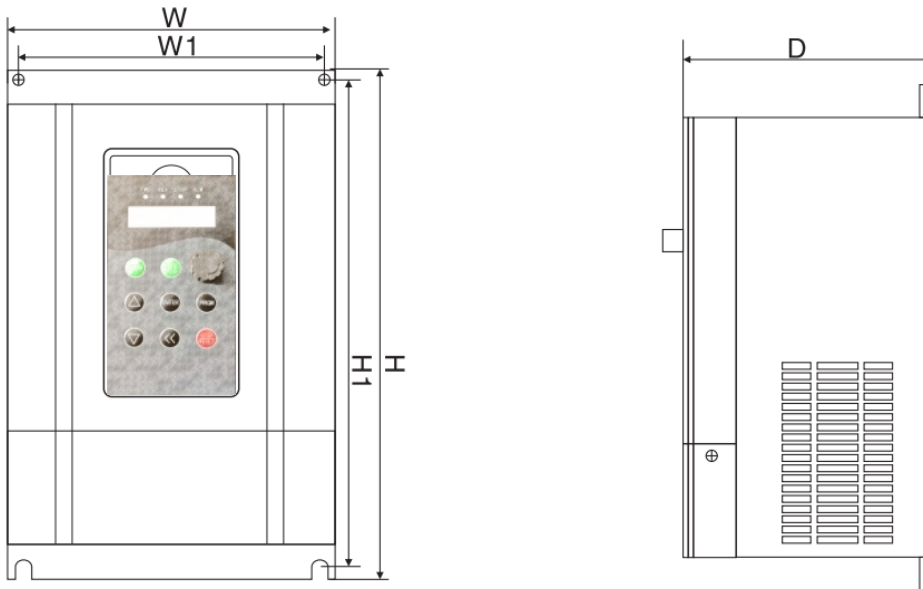
Fig. 2.3.2.1
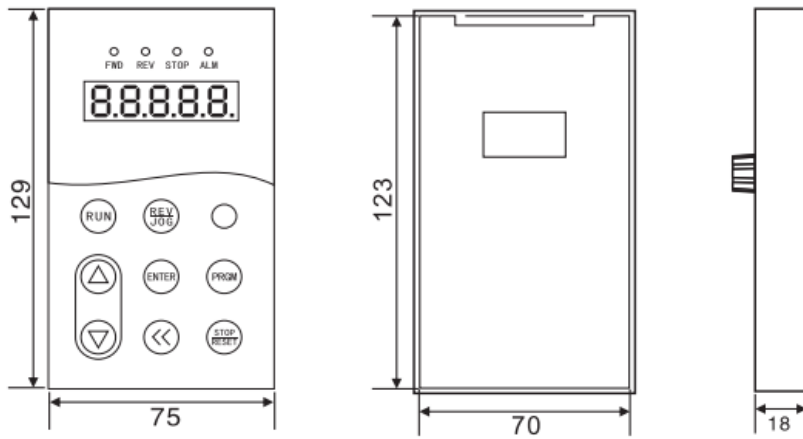
Fig. 2.3.2.2

B type keyboard size

2.3.3　003-009 Case

5.5kw-200kw/220v & 11kw-500kw/380v
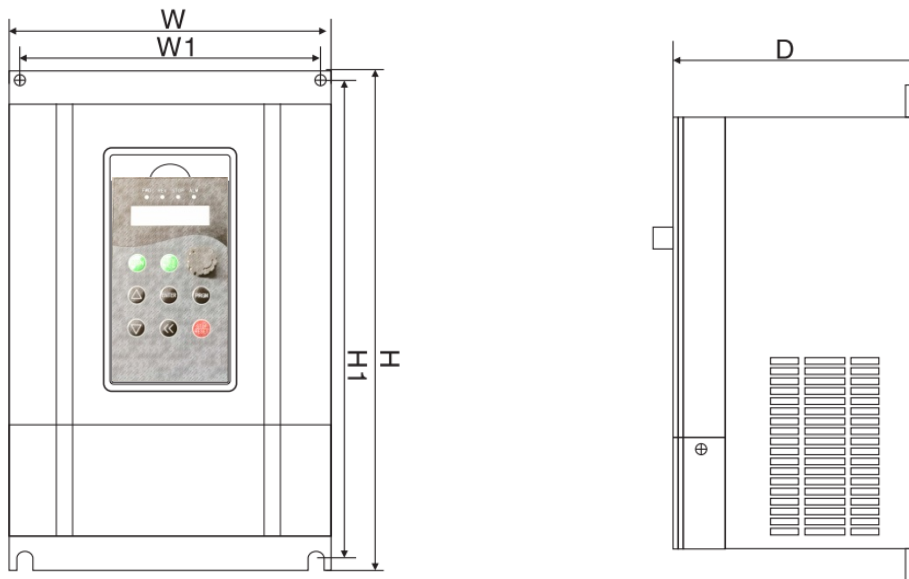
Fig. 2.3.3

2.4 Products specifications

2.4.1 Size 220v-VT2 Series

AC Drive model	0.4kw-2.2kw 220v Single Phase /Three Phase Input & Three Phase Output									
	W (mm)	W1 (mm)	L3 (mm)	L2 (mm)	H (mm)	H1 (mm)	Hole (mm)	N.W. (kg)	G.W. (kg)	Case
M0.4kw-220v M0.75kw-220v M1.5kw-220v	85.5	74	141.5	132	113	123	Ø2	0.8	1	F0
0.75kw-220v 1.5kw-220v 2.2kw-220v	100	92	152	143	116.5	127	Ø2	0.9	1.1	F1

AC Drive models	4kw 220v Single Phase /Three Phase Input & Three Phase Output								
	W (mm)	W1 (mm)	H (mm)	H1 (mm)	D (mm)	D1 (mm)	N.W. (kg)	G.W. (kg)	Case
4kw-220v	130	115	264	244	153	9	2.8	3.5	F2

AC Drive model	5.5kw-200kw 220v Single Phase /Three Phase Input & Three Phase Output								
	H (mm)	W (mm)	D (mm)	H1 (mm)	W1 (mm)	R1 (mm)	N.W. (kg)	G.W. (kg)	Case
5.5kw-220v 7.5kw-220v	397.1	212	190.9	378.2	156.5	Ø7	9.5	11.5	F3
11kw-220v 15kw-220v 18.5kw-220v	463	285	217	447	235	Ø7	11.9	17.8	F4
22kw-220v 30kw-220v	600.1	385.4	267	580	260	Ø9	27	39	F5
37kw-220v 45kw-220v	700	473	311	678	343	Ø10	43	58	F6
55kw-220v 75kw-220v	849	480	389	822.1	369	Ø10	85	98	F7
93kw-220v 110kw-220v 132kw-220v	1060	650	381	1030	420	Ø12	110	132	F8
160kw-220v 185kw-220v 200kw-220v	1361	800	392.5	1300	520	Ø12	230	250	F9

Chart   2.4.1

2.4.2 Size 380v-VT2 Series

AC Drive model	0.75kw-2.2kw 380V Three Phase Input & Three Phase Output									
	W (mm)	W1 (mm)	L3 (mm)	L2 (mm)	H (mm)	H1 (mm)	Hole (mm)	N.W. (kg)	G.W. (kg)	Case
0.75kw-380v 1.5kw-380v 2.2kw-380v	100	92	152	143	116.5	127	Ø2	1	1.5	F1

AC Drive models	4kw-7.5kw 380V Three Phase Input & Three Phase Output									
	W (mm)	W1 (mm)	H (mm)	H1 (mm)	D (mm)	D1 (mm)	N.W. (kg)	G.W. (kg)		Case
4kw-380v 5.5kw-380v 7.5kw-380v	130	115	264	244	153	9	2.9	3.5		F2

AC Drive model	11kw-500kw 380V Three Phase Input & Three Phase Output									
	H (mm)	W (mm)	D (mm)	H1 (mm)	W1 (mm)	R1 (mm)	N.W. (kg)	G.W. (kg)		Case
11kw-380v 15kw-380v 18.5kw-380v	397.1	212	190.9	378.2	156.5	Ø7	9.5	11.5		F3
22kw-380v 30kw-380v 37kw-380v	463	285	217	447	235	Ø7	11.9	17.8		F4
45kw-380v 55kw-380v	600.1	385.4	267	580	260	Ø9	27	39		F5
75kw-380v 93kw-380v	700	473	311	678	343	Ø10	43	58		F6
110kw-380v 132kw-380v 160kw-380v	849	480	389	822.1	369	Ø10	85	98		F7
185kw-380v 200kw-380v 220kw-380v 250kw-380v	1060	650	381	1030	420	Ø12	110	132		F8
280kw-380v 315kw-380v 355kw-380v 400kw-380v 450kw-380v 500kw-380v	1361	800	392.5	1300	520	Ø12	230	250		F9

Chart   2.4.2

2.5   Standard specification

Item		Specifications
Basic function	Control system	High performance of current vector control technology to realize 3 phase asynchronous motor control
	Drive performance	High efficiency driving for induction motor and synchronous motor
	Maximum frequency	Vector control: 0~500Hz V/F control: 0~500Hz
	Carrier frequency	0.5kHz~16kHz; the carrier frequency will be automatically adjusted according to the load characteristics
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency ×0.025%
	Control mode	Open loop vector control(SVC) Closed loop vector control(FVC) V/F control
	Startup torque	G type: 0.5Hz/150%(SVC)；0Hz/180%(FVC) P type: 0.5Hz/100%
	Speed range	1: 100(SVC) / 1: 1000(FVC)
	Speed stabilizing precision	±0.5%(SVC) / ±0.02%(FVC)
	Torque control precision	±5%(FVC)
	Over load capability	G type: 150% rated current 60 seconds; 180% rated current 3 seconds; P type: 120% rated current 60 seconds; 150% rated current 3 seconds
	Torque boost	Auto torque boost function；Manual torque boost 0.1%~30.0%
	V/F curve	Linear V/F, multi-point V/F and square V/F curve (power of 1.2, 1.4, 1.6, 1.8, 2)
	V/F separation	In 2 ways: separation ,semi separation
	Acc. / dec curve	Straight line or S curve acceleration and deceleration mode. Four kinds of acceleration and deceleration time. Acceleration and deceleration time range between 0.0s to 6500s.
	DC brake	DC brake frequency: 0.00Hz to maximum frequency. Brake time: 0.0s to 36.0s, and brake current value: 0.0% to 100.0%.
	Jog control	Jog frequency range: 0.00Hz~50.00Hz. Jog acceleration/deceleration

		time 0.0s~6500.0s.
	Simple PLC and MS speed running	It can realize at maximum of 16 segments speed running via the built-in PLC or control terminal.
	Built-in PID	It is easy to realize process-controlled closed loop control system
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically in the case of change of network voltage.
	Over-voltage/current stall control	It can limit the running voltage/current automatically and prevent frequent over-voltage/current tripping during the running process
	Quick current limit	Minimize the over-current fault, protect normal operation of the AC Drive
	Torque limit & control	"Excavators" characteristics, automatically limit torque during operation, prevent frequent over-current tripping. Closed loop vector mode can realize the torque control.
Personalized	Instantaneous stop non-stop	When instantaneous power off, voltage reduction is compensated through load feedback energy, which could make AC Drive keep running in a short period of time.
	Rapid current limit	To avoid AC Drive frequent over-current fault.
	Virtual IO	5 groups of virtual DI, DO to realize simple logic control
	Timing control	Timing control function: set time range 0Min~6500.0Min
	Multiple motor switch	4 groups of motor parameters, which can realize 4-motor switch control
	Multi-threaded bus support	Support 4 kinds of field bus: RS485, CANlink, CANopen
	Motor overheat protection	Select optional VTdrive C1 analog input DI3x can accept the motor temperature sensor input(PT100、PT1000)
	Multi-encoder support	Support difference, open collector, UVW, rotary transformer, sine cosine encoder etc.
	Programmable PLC	Select optional user programmable card, which can realize secondary development. Programming mode is compatible with VTdrive Company PLC.

	Excellent backend software	Support AC Drive　parameter operation and virtual oscilloscope function. AC Drive　internal state graphic monitor can be realized through virtual oscilloscope.
Running	Running command channel	Three types of channels:　operation panel reference, control terminal reference and serial communication port reference. These channels can be switched in various modes.
	Frequency source	There are totally eleven types of frequency sources, such as digital reference, analog voltage reference , analog current reference, pulse reference , MS speed, PLC, PID and serial port reference.
	Auxiliary frequency source	11 kinds of auxiliary frequency source which can flexible achieve auxiliary frequency tuning, frequency synthesis
	Input terminal	Standard: 6 digital input terminals, DI5 can be used as 100kHz high-speed input pulse. 3 analog input terminals which can be used as 0-10V voltage input or 0~20mA current input. Extended function: 4 digital input terminals;
	Output terminal	Standard: 2 digital output terminals, FM is high-speed pulse output terminal (can be chosen as open circuit collector type), support 0~10kHz square wave signal; 1 relay output terminal; 2 analog output terminals, support 0~20mA output current or 0~10V output voltage; Extended function: 1 digital output terminal; 1 relay output terminal ; 1 analog output terminal, support 0~20mA output current or 0~10V output voltage.
Keyboard operation	LED display	Realize parameter setting, status monitoring function
	OLED display	Optional device, which can offer Chinese / English operating content
	Keyboard potentiometer	Equipped with keyboard potentiometer or coding potentiometer
	Parameter copy	Realize parameter rapid copy through OLED operation panel

	Key lock & function selection	Realize button locking, define operation range for part of buttons to prevent operation fault.
	Protection function	It can implement power-on motor short-circuit detection, input / output phase loss protection, over current protection, over voltage protection, under voltage protection, overheating protection and overload protection.
	Optional parts	OLED operation panel, brake component, multi-function extended card 1.IO extended card 2.user programmable card, RS485 communication card,.communication card, CANlink communication card, CANopen communication card, differential input PG card, UVW differential input PG card, rotating AC Drive PG card, OC input PG card.
Environment	Using place	Indoor, and be free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapor, drip or salt.
	Altitude	Below 1000m
	Ambient temperature	-10 ℃ to +40 ℃ (Derating use when under ambient temperature of 40 ℃ to 50 ℃)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9m/s2 (0.6g)
	Storage temperature	- 10℃~ + 50℃

Chart 2.5

2.6 Braking Unit & Braking resistor list

Voltage (V)	AC Drive Power (KW)	Braking Unit Specification		Braking Rotation 10% ED
		W	Ω	
Single Phase 220V	0.4	80	200	125
	0.75	80	150	125
	1.5	100	100	125
	2.2	100	70	125
	4.0	300	50	125
Three Phase	0.75	150	300	125
	1.5	150	220	125

380V	2.2	250	200	125
	4.0	300	130	125
	5.5	400	90	125
	7.5	500	65	125
	11	800	43	125
	15	1000	32	125
	18.5	1300	25	125
	22	1500	16	125
	30	2500	12.6	125
	37	3700	9.4	125
	45	4500	9.4	125
	55	5500	6.3	125
	75	7500	9.4/2	125
	93	9000	9.4/2	125
	11	11000	6.3/2	125
	132	13000	6.3/2	125
	160	16000	2.5	125
	185	18500	2.5	125
	200	20000	2.5	125
	220	22000	2.5/2	125
	250	25000	2.5/2	125
	280	28000	2.5/2	125
	315	32000	2.5/2	125
	355	34000	2.5/2	125
	400	42000	2.5/2	125
	450	45000	2.5/2	125
	500	52000	2.5/2	125

Chart 2.6

Chapter 3

Installation & Wiring

# Chapter 3   Installation & Wiring

3.1 Mechanical Installation

3.1.1 Installation Environment Requirements

1) Ambient temperature-10℃~50℃.

2) Avoid electromagnetic interference and keep the unit away from the source of interference.

3) Prevent dropping water, steam, dust powder, cotton fiber or fine metal powder from invasion.

4) Prevent oil, salt and corrosive gas from entering it.

5) Avoid vibration. Vibration should be less than 0.6G. Keep away from punching machine etc.

6) Avoid high temperature, moisture or being wetted due to raining, with the humidity below 95%RH (non-condensing).

7) Prohibit the use in the dangerous environment where inflammable or combustible or explosive gas, liquid or solid exists.

3.1.2 Installation Clearance Requirements

The clearance that needs to be reserved varies with the power class of the VT2 Series, as shown in the following figure.

Figure 3.1.2.1 Clearance around the VT2 Series for installation
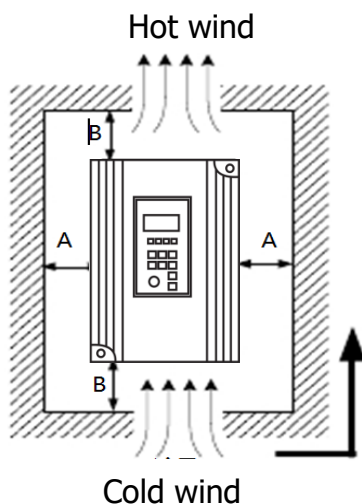
Installation clearance requirements on the VT2 Series AC drives of different power classes

Power Class	Clearance Requirements	
18.5kW~22kW	A≥10mm	B≥200mm
30kW~37kW	A≥50mm	B≥200mm
45kW~110kW	A≥50mm	B≥300mm

Chart 3.1.2

※   When transporting AC Drive , right lifting tools are required to prevent AC Drive from damaging.

※   The number of stacked box of the AC Drive   is not permitted higher than the limit.

　　※　　　Please don't run the AC Drive　if there is damage or lacking of components.

　　※　　　Do not place heavy objects on the AC Drive .

　　※　　　Please prevent screw, cable pieces or other conductive objects or oil inflammable objects invading the AC Drive .

　　※　　　Do not make it fall or have a strong impact.

　　※　　　Confirm if the installation location and object could withstand the weight of the AC Drive .

　　The AC Drive must be installed by wall hooking、indoor room with adequate ventilation, with enough space left between it and the adjacent objects or **retaining board (walls) around, as shown in the picture below:**
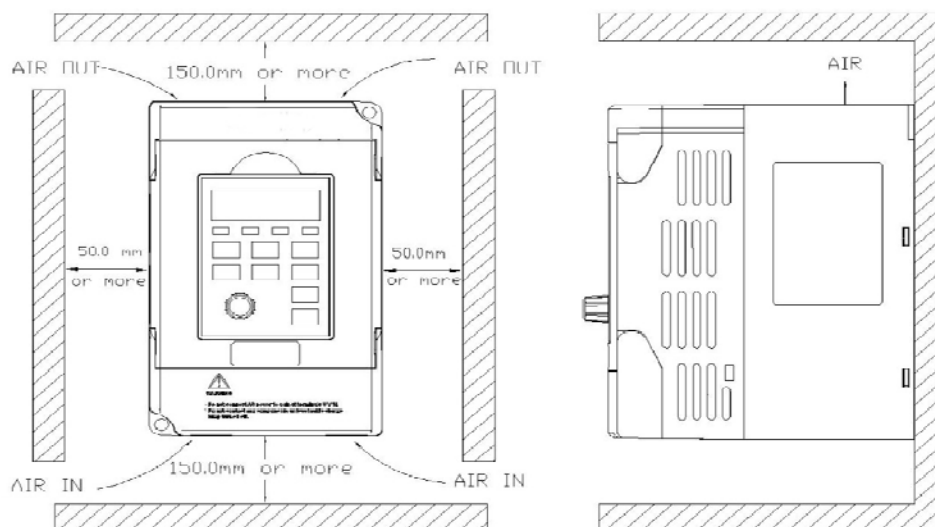
Fig. 3.1.2.2
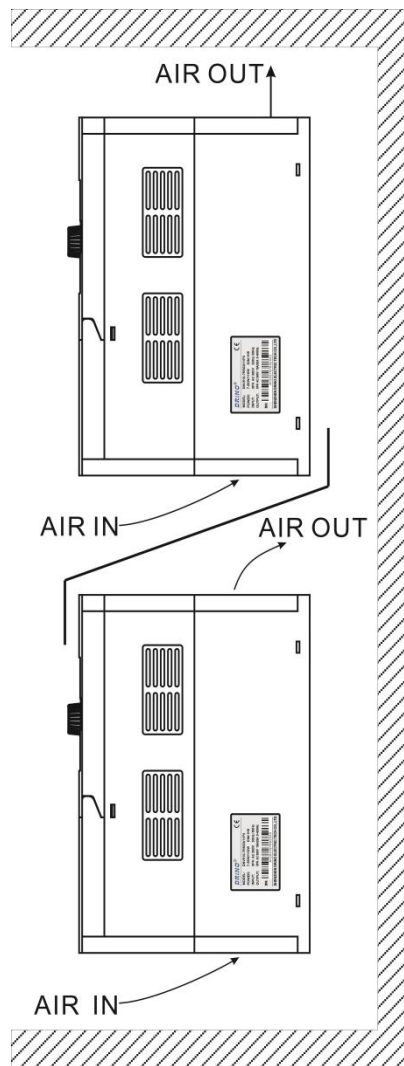
Fig.   3.1.2.3

Heat dissipation problems should be concerned when doing mechanical installation, please mind rules below:

1)   Mounting space is shown in chart 3.1.2, which could ensure the heat sinking space of the AC Drive . However, the heat sinking of other devices in the cabinet shall also be considered.

2)   Install the AC Drive vertically so that the heat may be expelled from the top.

However, the equipment cannot be installed upside down. If there are multiple

AC Drives in the cabinet, parallel installation is better. In the applications where

up-down installation is required, please install the thermal insulating guide plate

referring to the Fig. 3.2.1.2 and 3.1.2.3 for standalone installation and up-down installation.

3) Installing support must be flame retardant materials.

4) It is suggested that cooling cabinet be put outside at places where powder dust exists. Space inside the sealed cabinet shall be large as much as possible.

3.2 Electrical Installation

3.2.1 Description of Main Circuit Terminals

Terminal Name	Function description
R、S、T	Three phase power input terminal
P+、PB	Braking resistance reserved terminal(0.4KW~7.5KW)
U、V、W	Three phase AC output terminal
PE	Earth terminal

Chart . 3.2.1

3.2.2 Caution of Main Circuit wiring

1) Input Power R、S、T:

AC Drive input side connection, no phase sequence requirements.

The specifications and installation methods of the external power wiring should comply with the local regulations and related IEC standards.

Please refer to the following table for power cable wiring:

AC Drive Model		Recommended breaker specifications	Recommended contactor specification	Recommended input side main loop wire (m²)	Recommended output side main loop wire(m²)	Recommended control loop wire(m²)
Single Phase	0.4KW	16	10	2.5	2.5	1.5
	0.75KW	16	10	2.5	2.5	1.5

220V	1.5KW	20	16	4	2.5	1.5
	2.2KW	32	20	6	4	1.5
Three Phase 380V	0.75KW	10	10	2.5	2.5	1.5
	1.5KW	16	10	2.5	2.5	1.5
	2.2KW	16	10	2.5	2.5	1.5
	4KW	25	16	4	4	1.5
	5.5KW	32	25	4	4	1.5
	7.5KW	40	32	4	4	1.5

※This chart is for reference only, not as a standard

Chart　3.2.2.1

VT2 Series AC Drive Lectotype guidance for peripheral electrical components

2) Brake resistance connection terminal（P+）、PB:

● The reference value of the brake resistance selection and the line distance should be less than 5m.Otherwise, the AC Drive may be damaged.

3) AC Drive output side U、V、W:

● The specifications and installation methods of the external power wiring should comply with the local regulations and related IEC standards.

● For power cable wiring, please refer to the wiring shown in Figure 3.2.3.

● The AC Drive　side can not be connected to the capacitor or surge absorber, otherwise it will be caused to protect and even damage.

● When the motor cable is too long, because of the influence of distributed capacitance, it is easy to generate electric resonance, resulting in the insulation failure of motor, or the large leakage current, which makes the AC Drive overcurrent protection. When the length of the motor cable is more than 100m, the AC output reactor must be installed near the frequency converter.

4) Earthing terminal PE:

● The terminals must be reliably grounded, and the grounding wire must be less than 10 Omega. Otherwise, it will result in abnormal or even damage to the equipment work.

- Can not share the ground terminal and the power zero line N terminal.

- The impedance of a grounding conductor must be required to meet the requirements of a large short circuit current that may occur when a fault occurs.

- Protection of grounding conductors must be made of yellow green cable.

5) Requirements for the pre - stage protection device:

- Appropriate protective devices should be installed on the input distribution lines. Protection devices need to provide over current protection, short circuit protection and isolation protection and other functions.

- When selecting protective devices, factors such as power cable current capacity, system overload capacity and short-circuit capability of equipment before power distribution should be considered. Generally, please choose according to recommended values in 3.2.3 table recommendation.

3.2.3 Description of Main Circuit Terminals

※ 1) Description of Main Circuit Terminals of Single-phase AC Drive

T/A	T/B	T/C	AO1	DI5	DI4	DI3	DI2	DI1	COM	GND	AI2	AI1	AM	10V

Mini 0.4kw-1.5kw AC Drive terminal

Chart 3.2.3.1

※ 2) Description of Main Circuit Terminals of Three Phase AC Drive

T/A	T/B	T/C	DI1	DI2	DI3	DI4	DI5	AO1	COM	10V	AM	AI1	AI2	-	+	GND

General 0.75kw-7.5kw AC Drive terminal

Chart 3.2.3.2

T/A1	T/B1	T/A	T/B	T/C	A01	AO2	DI1	DI2	DI3	DI4	DI5	OP
COM	COM	24V	FM	AM	AI1	AI2	10V	GND	GND	-	+	

General 11kw-500kw AC Drive terminal

Chart 3.2.3.3

3.3   Control circuit terminals description

VT2 Series Terminals function description:

Type	Terminal sign	Terminal Name	Function Description
Power supply	+10V-GND	External terminal of 10V power supply	Provide +10V power supply for external units, with maximum output current of 10mA. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1kΩ to 5kΩ.
	+24V-COM	External terminal Of 24V power supply	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminal and the external sensor. Maximum output current: 200mA.
	SP	External power input terminals	When using external signal to drive DI1~DI6 ,SP should be connected to external power supply, connection with +24V as factory default.
Analog input	AI1-GND	Analog input terminal 1	1. Input voltage range: DC 0V to 10V /4mA to 20mA, chosen by jumper J3 on control board. 2. Input impedance: 22kΩ of voltage input, 500Ω of current input.
	AI2-GND	Analog input terminal 2	1. Input range: DC 0V~10V/4mA~20mA, chosen by jumper JP4 on control board. 2. Input impedance: 22kΩ of voltage input, 500Ω of current input.
	AI3-GND	Analog input terminal 3	1. Input range: DC 0V~10V/4mA~20mA, chosen by jumper JP5 on control board. 2. Input impedance: 22kΩ of voltage input, 500Ω of current input. 3. Factory default: J6 connected to 1-2 keyad keyboard potentiometer. If AI3 is needed to be

Digital Input			connected, please jump 2-3. 4. When using extended function card AI3x, please take off J6.
	DI1-SP	Digital Input 1	1. Optical coupling isolation，bipolar input. 2. Input impedance: 4.7kΩ. 3. Electrical level input range: 9V~30V.
	DI2-SP	Digital Input 2	
	DI3-SP	Digital Input 3	
	DI4-SP	Digital Input 4	
	DI5-SP	Digital Input 5	1. Input impedance: 2.4 kΩ.
	DI6-SP	Digital Input 6	-
	HDI DI5-SP	High-speed pulse input terminal	DI5 can be used as high-speed pulse input channel. Maximum input frequency: 100kHz.
Analog output	AO1-GND	Analog output 1	The voltage or current output is determined by jumper J1 on the control panel. Output voltage range: 0V to 10V. Output current range: 0mA to 20mA.
	AO2-GND	Analog output 2	The voltage or current output is determined by jumper J2 on the control panel. Output voltage range: 0V to 10V. Output current range: 0mA to 20mA.
Digital Output	DO1-COM	Digital output 1	Optical coupling isolation, dual polarity open collector output. Output voltage range: 0V to 24V. Output current range: 0mA to 50mA.

	FM-COM	High-speed pulse output	When used as high-speed pulse output , maximum frequency can reach 100kHz. Function code P5.00 as constraints.
Relay output	TB1-TC1	Normally closed	Contact driving capacity: AC250V，3A，COSø=0.4.
	TA1-TC1	Normally open	
Auxiliary interface	J12	Extended function card interface	28 needle terminals , for selectable card please refer to interface configuration, table 3-3.3.
	J13	PG card interface	14 needle terminals , for selectable card please refer to interface configuration, table 3-3.3.
	J7	External keyboard interface	External keyboard.

3.4 Terminal wiring diagram

3.4.1   Single Phase wiring type
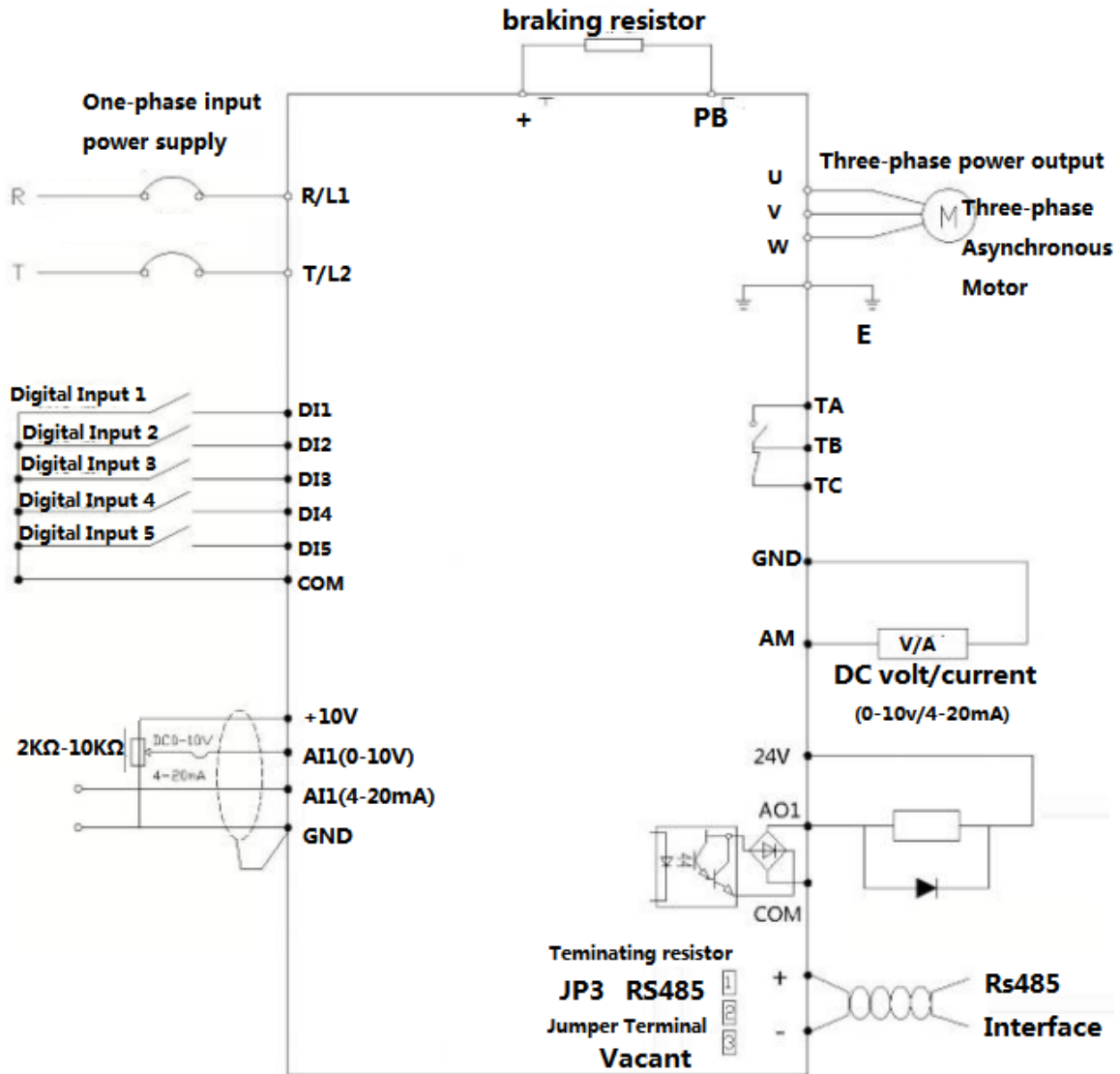
Fig. 3.4.1

3.4.2　Three Phase wiring type

3.4.2.1　General 0.75kw-7.5kw AC Drive wiring type
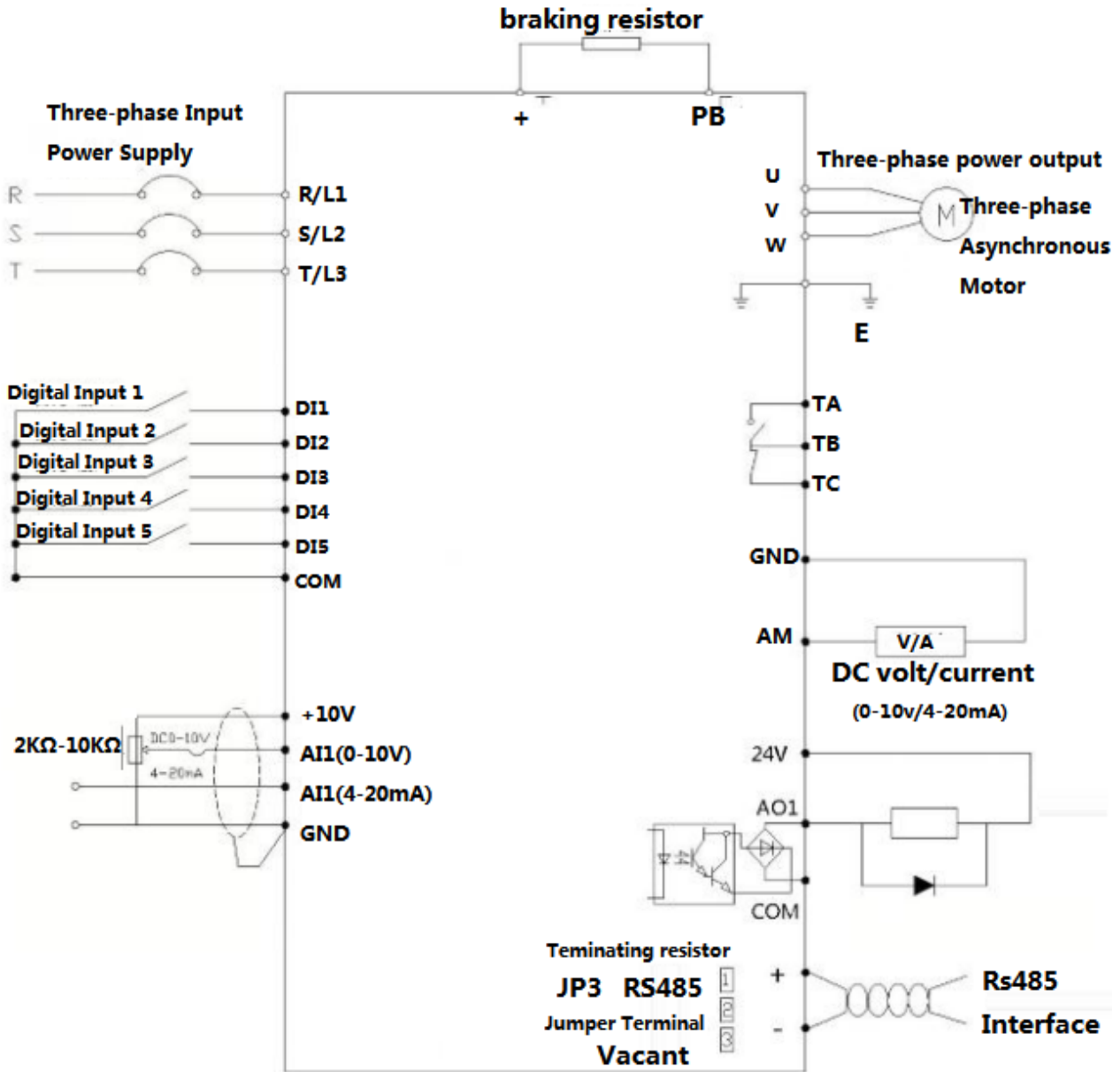
Fig. 3.4.2.1

3.4.2.2   General 11kw-500kw AC Drive terminal wiring type
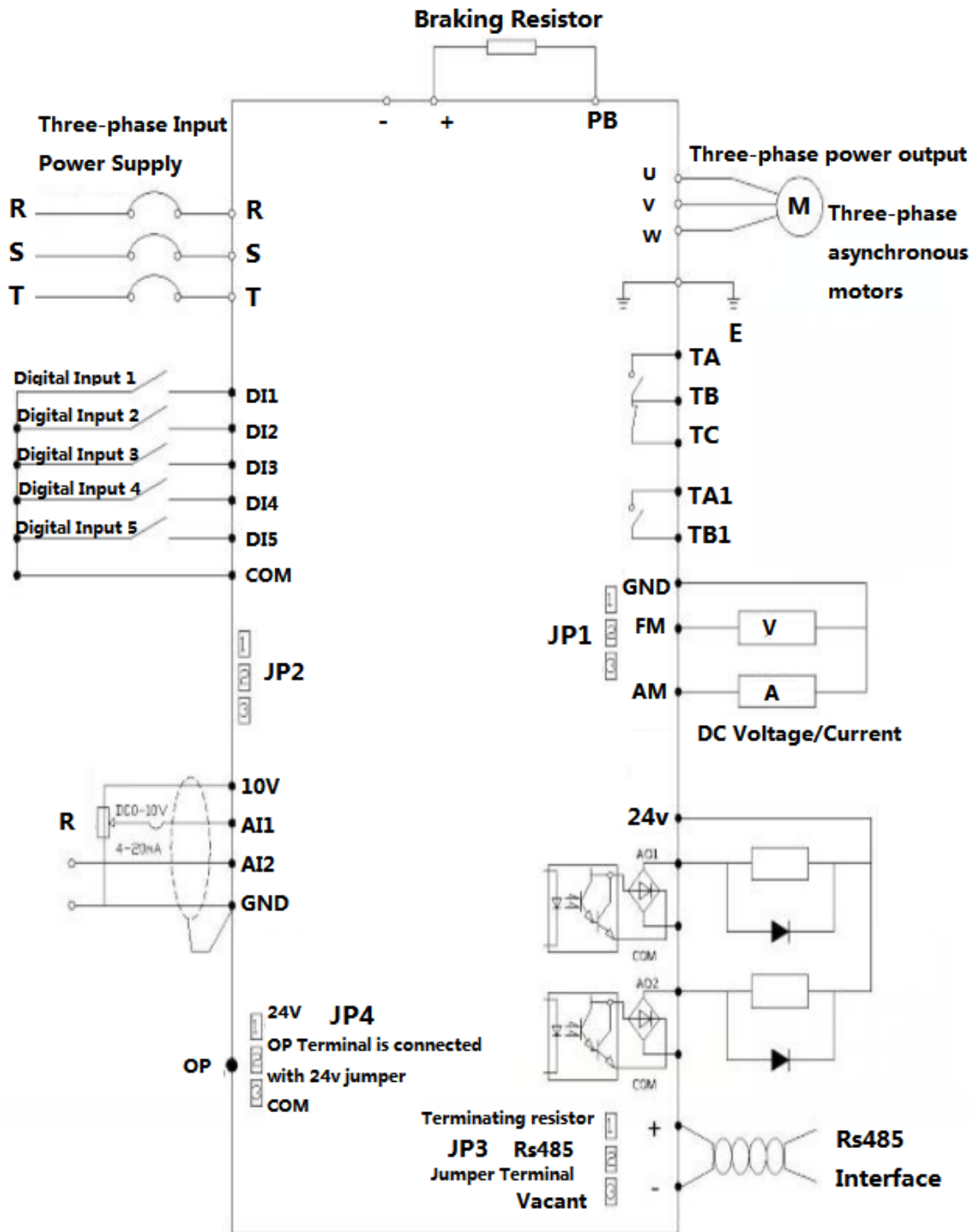
Fig. 3.4.2.2

Chapter 4

Keyboard operation instruction

Chapter 4. Keyboard operation instructions

4.1 Operation Panel

You can modify the parameters, monitor the working status and start or stop the VT2 Series by operating the operation panel, as shown in the following figure.
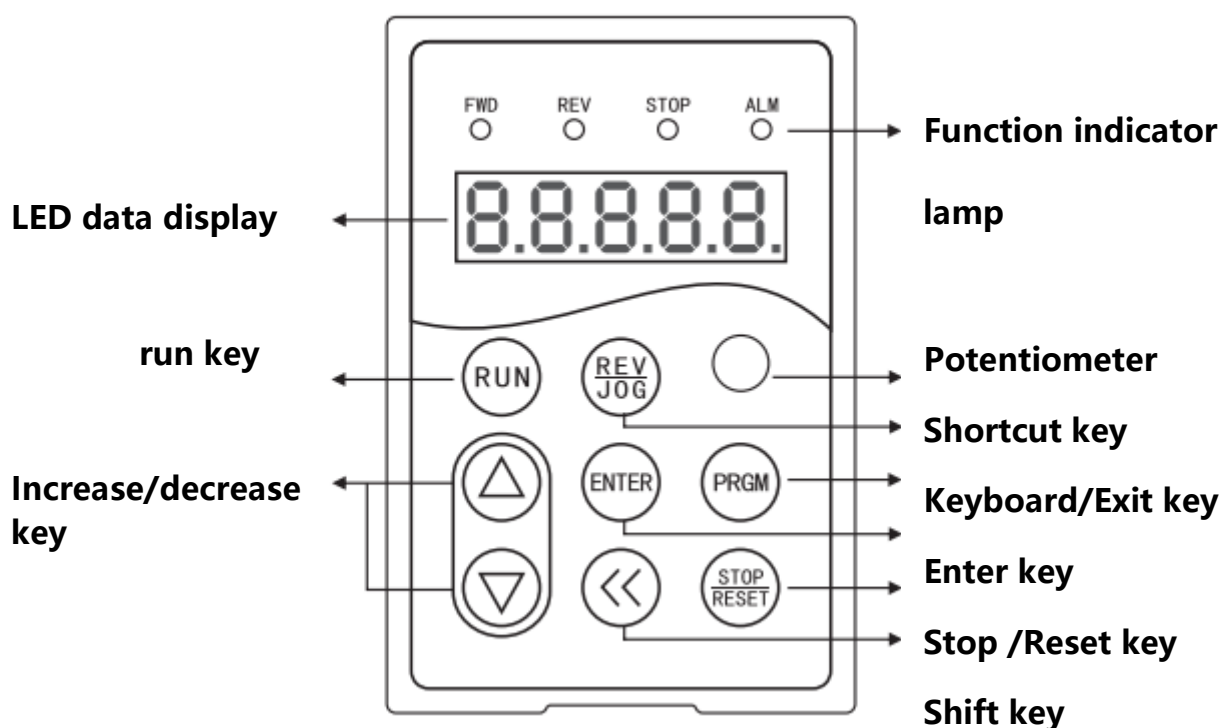
Fig. 4.1.1

4.1.1 **Function indicator lamp instructions**

- FWD: ac drive **forward indicator** lighting

- REV: ac drive **reset indicator** lighting

- STOP: ac drive **pause indicator** lighting

- ALM: ac drive **fault indicator** lighting

4.2 Description of Keys on the Operation Panel

Key sign	Name	Function description
PRGM	Program	Enter or exit Level I menu.
ENTER	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
▲	Increase	Increase the data or the function code.
▼	Decrease	Decrease the data or the function code.
<<	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
RUN	Run	Start the AC drive in the operation panel control mode.
STOP/ RESET	stop/reset	Stop the AC drive when it is in the running state and perform the reset operation when it is in the fault state. The functions of this key are restricted in **P7-02**.
REV/JOG	Multi-function selection	Perform function switchover (such as quick switchover of command source or direction) according to the parameter named **P7-01**.

4.2.1 parameter setting

The three level menus are:

1、   Function code number（Level I）

2、   Function code marking（Level II）

3、   Function code set value（Level III）

Notes: When operating on the three level menu, the Level II can be returned by **PRGM** or **ENT.** The difference between them is: according to **ENT**, set the parameters into the control panel, then return to the level II, and automatically transfer to the next function code: **PRGM** directly returns to the level II, does not store parameters, and stays in the current function code.

E.G.: Change the function code **P6-03** from 00.00 to 05.00:
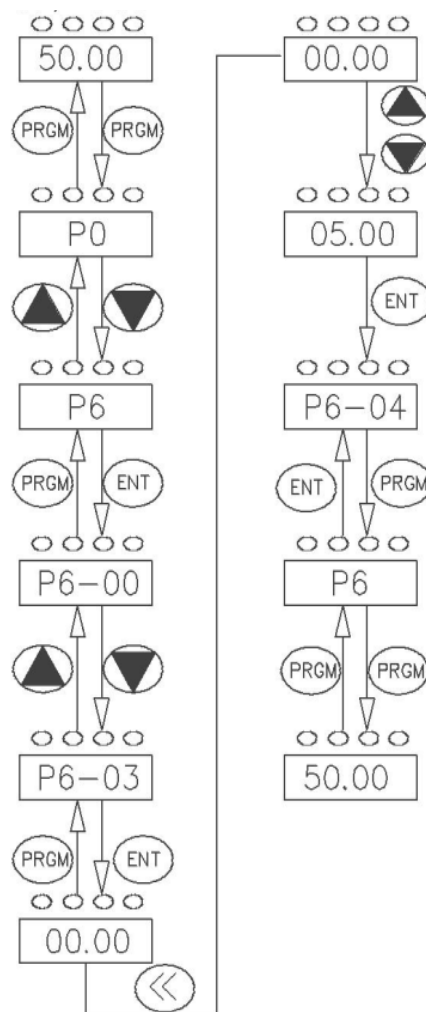
Three level menu operation chart

Fig.   4.2.1

In the state of the level III, if the parameter does not have a flashing bit, it indicates that the function code can not be modified,This may be because:

1.Such a function code is only readable, such as, AC drive model, actually detected parameter and running record parameter.

2,Such a function code cannot be modified in the running state and can only be changed at stop.

4.2.2 Self learning of motor parameter

The method of obtaining the internal electrical parameters of the controlled motor by the AC Drive has: Dynamic tuning、Static tuning 1、Static tuning 2、Manual input of motor parameters.

The self - learning operation steps of the motor parameters are as follows:

The 1st step: If the motor can completely disconnect with the load, in the case of power failure, the motor will be detached from the mechanical motor and the load part, so that the motor can be freely rotated.

The 2nd step: After power-on, the AC Drive command source **(P0-02)** is selected as the command channel of the operation panel.

The 3rd step: Input the nameplate parameters of the motor (such as P1-00 to P1-05) correctly, please input the following parameters according to the actual parameters of the motor:

Input according to the motor nameplate	Parameter
	P1-00: motor type select **P1-01**: motor rated power
	P1-02: motor rated voltage **P1-03**: motor rated current
	P1-04: motor rated power **P1-05**: motor rated revolving speed

Chart 4.2.2

The 4th step: if it is asynchronous motor, then **P1-37** please select 2 (complete tuning of the asynchronous machine), press ENTER key,meanwhile the keyboard displays TUNE. Then press the RUN key on the keyboard panel, the AC Drive will drive the motor to increase or decelerate, and turn it into operation. The running indicator lights up, and the tuning operation duration is about 2 minutes. When the above display information is gone, it returns to the normal parameter display state, indicating that the tuning is completed.

After this complete tuning, the AC Drive automatically calculates the following parameters of the motor:

Motor	Parameter
	P1-06: Stator resistance of asynchronous motor

	P1-07:　Rotor resistance of asynchronous motor
	P1-08:　The leakage inductance of asynchronous motor
	P1-09:　Induction motor mutual inductance
	P1-10:　Asynchronous motor no-load current

Chart 4.2.3

If the motor can not be completely removed from the load，parameter **P1-37** please choose **3**（asynchronous motor Static tuning 2），Then press the **RUN** key on the keyboard panel to start the tuning of the motor parameters.

Chapter 5

Operation Cases and Descriptions

Chapter 5   Operation Cases and Descriptions

5.1   Keyboard Panel Run, Stop, Up, Down for Speed

Parameter Settings:

P0-02=0 (Factory Default)

P0-03=0 (Digital setting, Frequency setting is Parameter **P0-08**; Power-down does not remember)

P0-03=1 (Digital setting, Frequency setting is Parameter **P0-08**; Power down memory)

Speed Control: Press "▲" key to increase Frequency, "▼" key to decrease Frequency

5.2   Keyboard start, stop; keyboard potentiometer for speed control

Parameter Settings:

P0-02=0 (Factory Default)

P0-03=4 (Factory Default)

Start, stop: press "RUN" key FWD indicator light On to Run; press "STOP / RESET" key to stop;

If you want the keyboard to Forward and Reverse, set **P7-01 = 2** and press the (REV / JOG) key. REV indicator light On.

Speed control: panel potentiometer knob (clockwise frequency increase, counterclockwise is the opposite)

5.3   External terminal Run, Stop; External potentiometer for Speed

Parameter Settings:

P0-02=1   P0-03=2

Start, stop: "**DI1-COM**" short-circuit frequency "FWD" indicator light On;

"**DI2-COM**" short-circuit "REV" indicator light On;

The AC Drive stops when the **DI1-DI2** terminal is disconnected from **COM**.

Speed control: Rotate the external potentiometer（**10V   AI1   GND**）

If the AC Drive is powered up, set **P8-18 = 0** (start protection selection)

5.4   External terminal Run, Stop; external analog voltage signal speed control (0-10V)

Parameter Settings:

P0-02=1   P0-03=2

Start, stop: "**DI1-COM**" short-circuit frequency "FWD" indicator light On;

"**DI2-COM**" short-circuit "REV" indicator light On;

The AC Drive stops when the **DI1-DI2** terminal is disconnected from **COM.**

Speed control: Analog voltage signal (**AI1 GND**- "0-10V or 0-5V voltage signal)

Analog voltage signal linearity adjustment parameters in the **P4-13 --- P4-17**, generally do not need to adjust

5.5   External terminal Run, Stop; External analog current signal speed (4-20MA)

Parameter Settings:

P0-02=1   P0-03=3

Start, stop: "**DI1-COM**" short-circuit frequency "FWD" indicator light On;

"**DI2-COM**" short-circuit "REV" indicator light on;

The AC Drive stops when the **DI1-DI2** terminal is disconnected from **COM**.

Speed control: Analog current signal (AI2 GND- "4-20MA analog current signal)

Analog current signal linearity adjustment parameters in the P4-18 --- P4-22, generally do not need to adjust.

5.6   External terminal up, down key to control speed

Panel Start:

Parameter Settings:

P0-02=0   P0-03=0   P4-00=6   P4-01=7

Start and stop: Press "RUN" key FWD operation indicator light On, press (REV / JOG) key REV indicator light (set **P7-01 = 2**); Press (STOP / RESET) to stop the AC Drive.

Speed control: (**DI1 --- COM**) Short-circuit speed increases, (**DI2-COM**) short-circuit speed decreases

External start:

Parameter Settings:

P0-02=1   P0-03=0   P4-00=6   P4-01=7   P4-02=01   P4-02=02

Start, stop: "**DI3-COM**" shorted FWD indicator light On, the AC Drive is running;

"**DI4-COM**" shorted REV indicator light On, the AC Drive is running; otherwise the AC Drive stops.

Speed control: (**DI1-COM**) Short-circuit speed increases, (**DI2-COM**) Short-circuit speed decreases.

If you need frequency memory function: **P0-23=1**

5.7   Multi-speed setting of AC Drive

Panel Start:

P0-02=0   P0-03=6   P4-00=12   P4-01=13   P4-02=14   P4-00=15

(P4 parameter group definition multi-speed function, 12 for multi-step speed 1, 13 for multi-step speed 2, 14 for multi-speed 3, 15 for multi-speed 4; 4 terminals can be combined into 16 speeds)

Start, stop: press "RUN" key, FWD indicator light On, AC Drive run; press REV/JOG key, REV indicator light on, (Set **P7-01=2**); Press STOP/RESET key, AC Drive stops.

External start:

P0-02=1   P0-03=6   P4-00=12   P4-01=13   P4-02=14   P4-03=15   P4-04=01

Start, Stop: "**DI1-COM** "terminal short-circuit to start operation, disconnect the AC Drive to stop running.

Speed control: Define the multi-speed terminal and **COM** short circuit, AC Drive display frequency.

Multi-speed table:

4 multi-segment instruction terminals can be combined into 16 states, The 16 states correspond to 16 instruction sets, as shown in Table 1:

Table 1 Multi-segment Instruction Function Description

K4	K3	K2	K1	Instruction set	Corresponding parameters
OFF	OFF	OFF	ON	Multi - segment instruction 1	PC-01
OFF	OFF	ON	OFF	Multi - segment instruction 2	PC-02
OFF	OFF	ON	ON	Multi - segment instruction 3	PC-03
OFF	ON	OFF	OFF	Multi - segment instruction 4	PC-04
OFF	ON	OFF	ON	Multi - segment instruction 5	PC-05
OFF	ON	ON	OFF	Multi - segment instruction 6	PC-06
OFF	ON	ON	ON	Multi - segment instruction 7	PC-07

ON	OFF	OFF	OFF	Multi - segment instruction 8	PC-08
ON	OFF	OFF	ON	Multi - segment instruction 9	PC-09
ON	OFF	ON	OFF	Multi - segment instruction 10	PC-10
ON	OFF	ON	ON	Multi - segment instruction 11	PC-11
ON	ON	OFF	OFF	Multi - segment instruction 12	PC-12
ON	ON	OFF	ON	Multi - segment instruction 13	PC-13
ON	ON	ON	OFF	Multi - segment instruction 14	PC-14
ON	ON	ON	ON	Multi - segment instruction 15	PC-15

Chart 5.7.1

When the frequency source is selected as multi-speed,function code **PC-00~PC-15** 100.0%, corresponds to the maximum frequency **P0-10.** Multi-segment instructions in addition to multi-speed function, but also can be used as a PID source, Or as a voltage source for V / F separation control, to meet the need to switch between different setpoints.

Table 1   Acceleration / deceleration time selection terminal function description

Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameters
OFF	OFF	Acceleration time 1	P0-17、P0-18
Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameters
OFF	ON	Acceleration time 2	P8-03、P8-04
ON	OFF	Acceleration time 3	P8-05、P8-06
ON	ON	Acceleration time 4	P8-07、P8-08

Chart   5.7.2

5.8   AC Drive PID function application (Air compressor, water pump and other constant pressure load applications)

Parameter settings:

P0-02=0 or 1 (Panel start or external start)

P0-03=8   (The frequency given is PID)

PA-00=0   (PID Given source)

PA-01   (PID Given value---- Set according to the size of the pressure gauge or transmitter range and the actual needs)

PA-02=0 or 1   (PID Feedback source----- Select 0 General External Remote Pressure Gauge; Select 1 General External Pressure Transmitter)

Wiring:

Remote pressure gauge: 10V   AI1   GND

Pressure Transmitters: 10V   AI2 or 24V   AI2; Shor circuit COM and GND

5.9   The keyboard is running display the parameter settings

Parameter setting:

P7-03 (LED Running display parameters)

Note: This parameter sets the display status of the AC Drive in the running state (BIT00-----BIT15, total 16 states)，With 4 hexadecimal representation, One bit hexadecimal means 4-bit binary (2 is represented by 0 1, 0 indicates that this state is not displayed，1 indicates that this status is displayed.)

For example, **P7-03=H**.000F,means BIT00----BIT03 is   "1111"   -----BIT00—BIT03 These four states can be displayed in the running state, you can switch through the " 《" button; (Binary 1111 is represented by hexadecimal "F"). That is, the frequency converter in the running state shows the operating frequency, set frequency, bus voltage, output voltage.

5.A   The keyboard only shows the speed

Parameter setting:

P7-03=H.4000

P7-06=6(Indicates that the motor is a 2-pole motor，Speed display 3000)

P7-06=3.000(Indicates that the motor is a 4-pole motor，Speed display 1500)

P7-06=2.000　(Indicates that the motor is a 6-pole motor，Speed display 1000)

Note:

1. H.4000 Convert to binary is "0100　0000　0000　0000" ie: BIT14=1
 (BIT14= Load speed display)；

2. Because we drag the motor is generally asynchronous motor, there is a slip or the load itself involves a change in the speed ratio, so the **P7-06** parameter settings are generally set to a few points, let it more accurately reflect the actual load speed.

Chapter 6

Function Code Table

Chapter 6   Function Code Table

Group P and Group A are standard function parameters. Group U includes the monitoring function parameters.

The symbols in the function code table are described as follows:

"☆":   The parameter can be modified when the AC drive is in either stop or running state.

"★":   The parameter cannot be modified when the AC drive is in the running state.

"●":   The parameter is the actually measured value and cannot be modified.

"*":   The parameter is factory parameter and can be set only by the manufacturer.

6.1   Standard Function Parameters

Function code	Name	Setting Range	Factory Setting	property
P0 group Standard Function Parameters				
P0-00	GP type display	-	-	★
P0-01	Motor control mode	0: Speed sensorless vector control (SFVC) 1: Closed-loop vector control (CLVC) 2: Voltage/Frequency (V/F)	2	★
0: Speed sensorless vector control It refers to the open-loop vector control that is generally applied to high performance control field. One inverter can only drive one motor. E.g.: machine tool, centrifugal machine, fiber drawing machine, injection molding machine' load etc. **1: Speed sensor vector control** It refers to the closed-loop vector control and encoder must be added to the motor end.				

Inverter must be matching with the same type PG card of the encoder. This control mode is suitable for high precision speed control or torque control field. One inverter can only drive one motor. E.g.: high speed papermaking machinery , hoisting machinery , elevator' load etc.

2: V/F control

V/F control mode is suitable for fields that load demand is not high or one inverter can drive multiple motors. E.g.: draught fan, pump' load etc.

Tips: Motor parameters must be indentified before choosing vector control mode. Only accurate motor parameters can play the advantage of vector control mode. Users can get better performance by adjusting speed regulator group P2 parameters(motor 2,motor 3,motor 4 respectively for group A2,A3,A4)

FVC is generally used for permanent magnet synchronous motor, while part of the small power applications can select V/F control mode. VT2 Series support specific models of permanent magnet synchronous motor sensorless vector control mode. Please refer to VT2 users manual and dedicated users manual for using method.

P0-02	Command source selection	0: Operation panel control (LED off) 1: Terminal control (LED on) 2: Communication control (LED blinking)	0	☆

Inverter control commands include : run, stop, forward rotation (FWD), reverse rotation (REV), forward jog (FJOG), reverse jog (RJOG), etc.

0: Operation panel command channel ("LOCAL/REMOT" LED off);

Perform running command control with RUN, MF.K and STOP/RESET keys on the operation panel.

1: Terminal command channel ("LOCAL/REMOT" LED on);

Perform running command control with multifunctional input terminals such as FWD, REV, FJOG, RJOG, and so on.

2: Serial port communication command channel ("LOCAL/REMOT" LED flashing).

The running command is given by the host computer via the communication mode. When the item is chosen, it must be equipped with communication card(Modbus RTU、Profibus DP card、CANlink card、 users programmable control card or CANopen card and so on).

For the communication protocol, please refer to "PD communication function group" and supplementary explanation of corresponding communication card for details. Supplementary explanation for communication card is allotted with communication card. This manual contains a brief description of communication card.

P0-03	Main frequency source X	0: Digital setting (non-retentive at power failure)	4	★

	selection	1: Digital setting（Pre-frequency as P0-08，UP/DOWN could be changed，retentive at power failure） 2: AI1 3: AI2 4: Keyboard potentiometer 5: reserved 6: Multi-reference 7: simple PLC 8: PID 9: Communication setting		

This parameter is used to select the main reference frequency input channel. Totally 10 main reference frequency channels:

0: Digital setup(power off without memory) Initial value of set frequency equals to P0-08 "preset frequency". User can change inverter set frequency value through keyboard ∧ key and ∨ key (or multi-function input terminal UP,DOWN). Inverter power on after powered off, frequency set value restored to P0-08 "Preset frequency".

1: Digital setup(power off with memory) Initial value of set frequency equals to P0-08 "preset frequency". User can change inverter set frequency value through keyboard ∧ key and ∨ key (or multi-function input terminal UP,DOWN). Inverter power on after powered off, frequency set value restored to the value that equals to setup of last power off time.Correction is memorized through keyboard ∧ key and ∨ key or terminal UP,DOWN. What needs to be reminded is, P0-23 is "Digital setup frequency memory selection". P0-23 is used to select correction whether to be memorized or cleared and is relevant to stop, irrelevant to power off memory, please pay attention during operation.

2: AI1

3: AI2

4: AI3(Potentiometer) Frequency is determined by analog input terminal. VT2 Series control board offers 3 analog input terminal(AI1，AI2，AI3), optional device VTdrive C1 card can offer 1 isolated analog input terminal (AI3x).

AI1，AI2，AI3 can be chosen as 0V~10V voltage input as well as 4mA~20mA current input by the jumper J3，J4，J5 on control board. AI3x is -10V~10V voltage input, jumper J6 should be disconnected. AI1、AI2、AI3 input voltage value has a corresponding relationship with target frequency, users can choose them at will. VT2 series offers 5 groups of corresponding relation curve, which 3 of them are linear relationship(2-point correspondence), 2 of them are 4-point

correspondence(any curve among them). User can set through P4 group or A6 function code. Function code P4-33 is used to set AI1~AI3 3-channel analog input. Choose 1 curve among the 5 respectively. For specific correspondence please refer to P4、A6 groups.

5: Pulse setup(DI5) Pulse setup is set through terminal pulse. Signal standard: voltage range 9V~30V, frequency range 0kHz~100kHz. Set pulse can be only input through multi-function input terminal DI5. Relationship between DI5 input pulse frequency and corresponding settings is set through P4-28~P4-31. It is linear relationship(2-point correspondence). Pulse input 100.0% refers to the percentage of P0-10 .

6: MS command MS command running mode is set through different combination mode of digital input DI terminal. There are 4 MS command terminals with 16 status of VT2 series. PC group function codes correspond to 16 "MS command" , "MS command" is percentage relativing to P0.10 (maximum frequency). When digital input terminal DI is used as MS command terminal, user should set through P4 group. For specifications please refer to P4 group.

7: Simple PLC When frequency source is set to 7, running frequency source can be switched to any frequency command during 1~16.

User can set frequency command retention time and acceleration/deceleration time respectively. For specifications please refer to PC group .

8: PID Running frequency is the output of PID control process. Generally used for field process closed-loop control.

When PID is chosen, user should set relevant parameters of PA group "PID function" .

9: Communication setup Communication setup refers to main frequency source that setting through communication method of position machine. VT2 series support 4 kinds of communication modes: Modbus、Profibus DP、CANopen、CANlink. 4 kinds of communication can not be used at the same time. Communication card should be installed during the use of communication.4 kinds of communication cards are optional. User can select to buy according to the needs, and set parameter P0-28 correctly.

P0-04	Auxiliary frequency source Y selection	0: Digital setting (non-retentive at power failure) 1: Digital setting (Pre-frequency as P0-08, UP/DOWN could be changed, retentive at power failure) 2: AI1 3: AI2 4: Keyboard potentiometer	0	★

		5: reserved 6: Multi-reference 7: simple PLC 8: PID 9: Communication setting		

When the auxiliary frequency source is used as independent frequency reference channel (i.e. frequency source switching from X to Y), it is used in the same way as the relative specifications of P0-03.

When the auxiliary frequency source is used as overlap reference (i.e. frequency source selection switching from X plus Y or X to X plus Y), it has special points as follows:

When the auxiliary frequency source is digital reference, the preset frequency (P0-08) is nonsensical, and it needs to adjust the main reference frequency through the keys "∧" and "∨" of the keyboard (or UP and DOWN of multifunctional input terminals).

When the auxiliary frequency source is analog input reference (AI1、AI2、AI3) or pulse input reference, 100% of input setup is relative to the auxiliary frequency source range, and can be set through P0-05 and P0-06.

When the frequency source is pulse input reference, it is similar to the analog value.

Prompt: There is difference between the auxiliary frequency source Y selection and the main frequency source X setup value. That is to say, P0.03 and P0.04 cannot use the same frequency reference channel.

P0-05	Auxiliary frequency source Y range selection	0: Relative to maximum frequency 1: Relative to frequency source X	0	☆
P0-06	Auxiliary frequency source Y range	0% ~ 150%	100%	☆

When the frequency source selection is frequency overlap reference(P0-07 is set to 1、3 or 4), it is used to determine the adjustment range of auxiliary frequency source. P0-05 is used to determine the relative object within the range. If it is relative to main frequency, that range will vary with the main frequency X.

P0-07	Frequency source stacking selection	Unit's digit Frequency source selection 0: Main frequency source X. 1: Main / auxiliary operation result (10bit determine operation	00	☆

		relationship) 2: Switching between X & Y 3: Switching between X & option 1 4: Switching between Y & option 1 Ten's digit : Relationship between main / auxiliary frequency source 0: Main+auxiliary 1: Main-auxiliary 2: MAX(main frequency source X, auxiliary frequency source Y) 3: MIN(main frequency source X, auxiliary frequency source Y)		- 61 -

This parameter is used to select frequency setup channel, and of realizing frequency setup through the compound of main frequency X and auxiliary frequency Y.

1bit : Frequency source selection

0: Main frequency source X ,Main frequency source X is the target frequency.

1: Main / auxiliary operation result is target frequency, operation relationship see "10 bit" for details.

2: Switching between main frequency source X and auxiliary frequency source Y

When terminal 18 (frequency switching) is invalid, main frequency X is target frequency. On the contrary, auxiliary frequency Y is the target frequency.

3: Switching between main frequency X and main / auxiliary operation result

When terminal 18 (frequency switching) is invalid, main frequency X is target frequency. On the contrary, auxiliary frequency Y is the target frequency.

4: Switching between auxiliary frequency Y and main / auxiliary operation result

When terminal 18 (frequency switching) is invalid, auxiliary frequency Y is the target frequency. On the contrary, main frequency X is target frequency.

10bit: Relationship between main/auxiliary frequency source

0: Main frequency source X + auxiliary frequency source Y

Operation result of main + auxiliary is target frequency. It realizes frequency stacking set function.

1: Main frequency source X - auxiliary frequency source Y

Operation result of main - auxiliary is target frequency.

2: MAX(main frequency source X, auxiliary frequency source Y)

Choose bigger absolute value of the two as target frequency

3: MIN(main frequency source X, auxiliary frequency source Y)

Choose smaller absolute value of the two as target frequency.

Besides, when frequency source is main & auxiliary operation, users can set offset frequency through P0-21. By stacking offset frequency on main & auxiliary operation result, it could flexible cope with all kinds of needs .

P0-08	Preset frequency	0.00Hz ～Max frequency（P0-10）	50.00Hz	☆

When set the frequency source to "digital setting" or "terminal UP/DOWN", the parameter value is the initial value of the inverter frequency digital setting.

P0-09	Running direction	0: Same direction 1: Reverse direction	0	☆

Modification of this parameter can change the rotary direction of the motor without changing any other parameters, which is equivalent to the role of switching the rotary direction through adjusting any two lines of the motor (U, V and W).

When needing to change the rotary direction of the motor, users can modify this parameter rather than adjust the wiring of the motor.

Caution: When the function code is restored to the factory default value, this parameter value is restored to 0, which should be used prudently in the applications where the motor rotary direction is not allowed to change.

P0-10	Max frequency	50.00Hz ～ 500.00Hz	50.00Hz	★

When analog input, pulse input(DI5), MS command etc are used as frequency source, their respective 100% are relatively calibrated through P0-10.

VT2 series maximum frequency could reach 3200Hz. Users can set decimal digits of frequency command through P0-22 to balance the index of frequency command resolution and frequency input range.

When P0-22 is set to 1, frequency resolution ratio is 0.1Hz, P0-10 setting range is 50.0Hz~3200.0Hz; When P0-22 is set to 2, frequency resolution ratio is 0.01Hz, P0-10 setting range is 50.00Hz~320.00Hz.

P0-11	Source of frequency upper limit	0: setting by P0-12 1: AI1 2: AI2 3: Keyboard potentiometer 4: reserved 5: communication setting	0	★

It defines the source of frequency upper limit. Frequency upper limit comes from digital setup (P0-12) or analog input channel. When upper limit is set through analog input, 100% of analog input corresponds to P0-12.

E.g.: When winding control field is in the torque control mode, to avoid material break phenomenon, users can set upper limit frequency through analog value. When running frequency reaches value of upper limit , inverter maintains operation at the upper limit frequency.

P0-12	Frequency upper limit	Frequency lower limit (P0-14) to maximum frequency (P0-10)	50.00Hz	☆
P0-13	Frequency upper limit offset	0.00Hz ~ Max frequency (P0-10)	0.00Hz	☆

When upper limit is set through analog value or PULSE setup, P0-13 will be used as analog value offset. The addition of offset frequency and analog setup value of frequency upper limit is used as the final setup value of frequency upper limit.

P0-14	Frequency lower limit	0.00Hz ~ frequency upper limit (P0-12)	0.00Hz	☆

When the running frequency of the inverter is lower than the frequency lower limit, it can select to run at frequency lower limit or stop the inverter. Refer to P8-14 function code for details.

P0-15	Carrier frequency	0.5kHz ~ 16.0kHz	6	☆

This function is used to adjust the carrier frequency of the inverter. By adjusting the carrier frequency, the motor noise can be reduced, the resonance of the mechanical system can be avoided, so that the leakage current to the ground and the interference of the inverter can be reduced.

When the carrier wave frequency is low, the output current higher harmonic component will be increased, the motor loss will be increased, and the motor temperature rise will also be increased. When the carrier wave frequency is high, the motor loss is reduced, and the motor temperature rise is reduced, but the inverter loss and inverter temperature rise will be increased, and thus the interference will be increased.

The adjustment of carrier frequency will influence the following items on the performance:

Carrier frequency	Low high
Motor noise	Big small
Output current waveform	Poor well
Motor temperature rise	High low
Inverter temperature rise	Low high
Leakage current	Small large
Radiation interference	Small big

Different power of inverter is set with different carrier frequency by the factory. Though user could modify it , attention should be paid: if carrier frequency is set higher than the factory set value, it will lead to inverter radiator temperature rise increasing. User should take inverter derating use, or there will be danger of overheating alarm.

P0-16	Carrier frequency adjusting with temperature	0: NO 1: YES	1	☆

Carrier frequency adjusting with temperature refers to the detecting of radiator temperature. When the temperature is high , carrier frequency automatically decreased to reduce the inverter temperature rise. On the contrary , when the temperature is low, carrier frequency gradually restored to the set value. This function could help to reduce the chance of inverter overheating alarm.

P0-17	Acceleration time 1	0.0s ~ 6500.0s	20	☆
P0-18	Deceleration time 1	0.0s ~ 6500.0s	20	☆

The acceleration time means the time t1 needed for the inverter to accelerate from 0Hz to the reference frequency (P0-25).

The deceleration time means the time t2 needed for the inverter to decelerate from the reference frequency (P0-25) to 0Hz.

The description of acceleration and deceleration time are as shown in Fig.6-1:
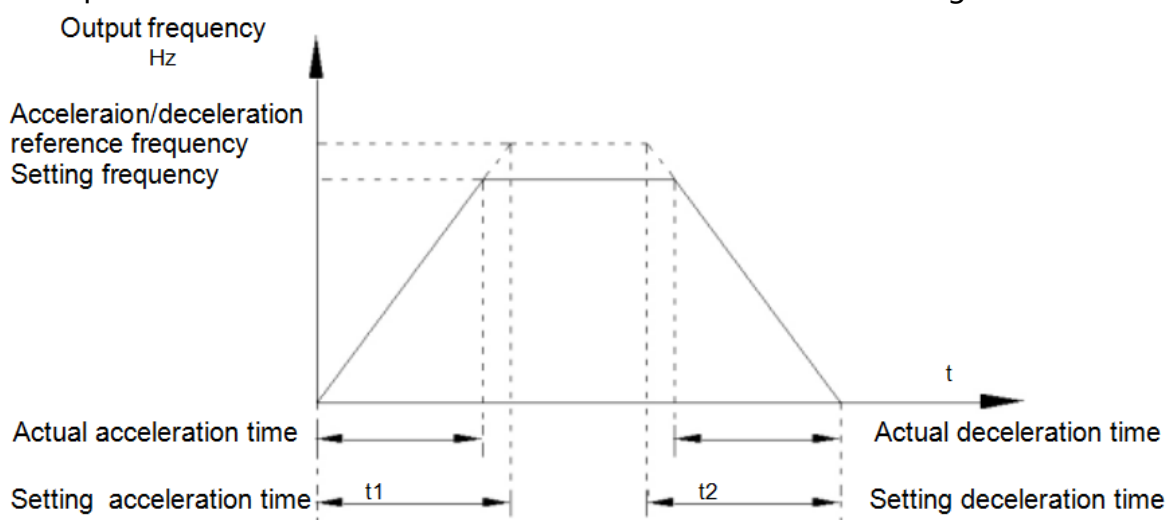
Fig.6-1 Acceleration/deceleration time schematic diagram

VT2 series totally offers 4 groups of speed-up/speed-down time for selection, you can shift through digital input terminal DI, 4 groups of them are shown as follows:

GROUP 1: P0-17、P0-18;

GROUP 2: P8-03、P8-04; GROUP 3: P8-05、P8-06; GROUP 4: P8-07、P8-08.				
P0-19	Acc./dec. time unit	0: 1 s 1: 0.1 s 2: 0.01 s	1	★

VT2 series offers 3 kinds of speed-up /speed down time unit to meet the need of all kinds of scene. Respectively for 1 second、0.1 seconds and 0.01 seconds.

Caution: Decimal places as well as corresponding acceleration/deceleration time of the 4 groups may be changed when modifying this function parameter, special attention should be paid in the process of application.

P0-21	Auxiliary frequency source offset frequency	0.00Hz ~ Max frequency(P0-10)	0.00Hz	☆

It is valid only at the time of main/auxiliary operation is chosen. When frequency source is main / auxiliary operation(P0-21 as offset frequency) ,it could make frequency set more flexible by stacking offset frequency on main & auxiliary operation as the final frequency set value.

P0-22	Frequency command resolution	1: 0.1HZ 2: 0.01Hz	2	★

This parameter is used to determine all the function code resolution which is relevant to frequency. Frequency resolution is 0.1Hz , VT2 series maximum output frequency can reach 3200Hz. While frequency resolution is 0.01Hz, VT2 series maximum output frequency is 320.00Hz.

Caution: Parameter (relating to frequency) decimal digits and corresponding frequency value will change through modifying P0-22. Special attention should be paid during operation.

P0-23	Digital setup frequency memory selection upon stop	0: Without memory 1: memory	0	☆

This function is only valid when frequency source is digital setup.

0: Without memory Upon power fault or stop of the inverter, set the frequency value back to the setup value of "Preset Frequency" (P0-08). Frequency modification which set through keyboard "∧"、"∨" or terminal UP、DOWN is cleared.

1: Memory Digital setup frequency is the retention that reserved at last stop time.

Keyboard "∧"、 "∨" or terminal UP、DOWN to make the correction valid.

P0-24	-	-	-	-
P0-25	Acceleration / deceleration reference frequency	0: Maximum frequency(P0.10) 1: Setting frequency 2: 100Hz	0	★

Acceleration / deceleration time means the time needed for the inverter varying from 0Hz to the frequency of P0-25, Fig6-1 is acceleration / deceleration time schematic diagram.

When P0-25 is chosen to 1, acceleration / deceleration time is connected with set frequency. If set frequency change frequently, the motor acceleration will change, attention should be paid in applications.

P0-26	Frequency UP/DOWN reference upon running	0: Running frequency 1: Setting frequency	0	★

This parameter is only valid when frequency source is digital setting.

To select (through keyboard ∧、∨ key or terminal UP/DOWN) the modifying method of set frequency, namely, target frequency is increasing/decreasing based on the running frequency or setting frequency. The difference between the two settings become apparently in inverter acceleration and deceleration process.

P0-27	Command source & frequency source binding	Unit's digit: Operation panel command bound frequency source selection 0: Without binding 1: Digital setup frequency source 2: AI1 3: AI2 4: AI3(Potentiometer) 5: Reserved 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setup Ten's digit : Terminal command bound frequency source selection Hundred's digit: Communication	0	☆

		command bound frequency source selection Thousand's digit: Self-running bound frequency source selection		
It defines bound combination between 3 running command channels and 9 frequency setup channels, which is easy to achieve synchronous switching. Frequency setup channels above have the same definition with P0-03 "main frequency source X selection", please refer to P0-03 for details. Different running command channels can bind the same frequency setup channel. When the command source is valid during command source & frequency source binding, set frequency source of P0-03~P0-07 is invalid.				
P0-28	Communication expansion card	0: Modbus communication card 1: Profibus.DP communication card 2: CANopen communication card 3: CANlink communication card	0	☆
VT2 series offers 4 kinds of communication mode. All of the 4 need to be equipped with optional communication card .And they can not be used at the same time. P0-28 is used to set the type of the optional communication card. When user replace the communication card , P0-28 should be properly set.				

P1 group Motor parameter				
Function code	Name	Setting Range	Factory Setting	property
P1-00	Motor type selection	0: General asynchronous motor 1: Variable frequency asynchronous motor	0	★
P1-01	Rated power	0.1kW ~ 1000.0kW	Model dependent	★
P1-02	Rated voltage	1V ~ 2000V	Model dependent	★
P1-03	Rated current	0.01A ~ 655.35A (AC drive power≤55kW) 0.1A ~ 6553.5A (AC drive power>55kW)	Model dependent	★
P1-04	Rated frequency	0.01Hz ~ Max frequency	50Hz	★
P1-05	Rated revolving speed	1rpm ~ 65535rpm	Model dependent	★

Function codes above are motor nameplate parameters. No matter VF control or vector control is the chosen mode, users should accurately set the relating parameter according to the motor nameplate. For better VF or vector control performance, users should tune the motor parameter. The accuracy of the regulation results has intimate relationship with the accuracy of set motor nameplate parameters.

P1-06	Asynchronous motor stator resistance	0.001Ω~65.535Ω (AC drive power≤55kW 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent	★
P1-07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (AC drive power≤55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent	★
P1-08	Asynchronous motor leakage inductance	0.01mH~655.35mH (AC drive power≤ 55kW) 0.001mH~65.535mH (AC drive power> 55kW)	Model dependent	★
P1-09	Asynchronous motor mutual inductance	0.1mH~6553.5mH (AC drive power≤ 55kW) 0.01mH~655.35mH (AC drive power> 55kW)	Model dependent	★
P1-10	Asynchronous motor no load current	0.01A~P1-03 (AC drive power≤ 55kW) 0.1A~P1-03 (AC drive power > 55kW)	Model dependent	★

P1-06~P1-10 are parameters for asynchronous motor. Generally, motor nameplate doesn't contain such parameters, users can get them through inverter auto tuning. Among them, 3 parameters (P1-06~P1-08) can be get through "asynchronous motor static tuning", while all the 5 parameters as well as encoder phase, current loop PI etc can be get through "asynchronous motor complete tuning". When change the motor rated power (P1-01) or motor rated voltage (P1-02), inverter would automatically modify the P1-06~P1-10 parameter value and restore them to common standard of Y series motor parameter. If the asynchronous motor is unable to be tuned, users could input above parameters with factory offered motor value.

P1-11	P1-11~P1-36	-	-	-
P1-37	Tuning selection	0: Without operation	0	★

		1: Asynchronous static tuning 1 2: Asynchronous complete tuning 3: Synchronous static tuning 2 4: Synchronous complete tuning		
P2 group Vector control function group				
Function code	Name	Setting Range	Factory Setting	property
P2-00	Speed loop proportional gain 1	1 ～ 100	30	☆
P2-01	Speed loop proportional gain 1	0.01s ～ 10.00s	0.50s	☆
P2-02	Switching frequency1	0.00 ～ P2-05	5.00Hz	☆
P2-03	Speed loop proportional gain 2	1 ～ 100	20	☆
P2-04	Speed loop integration time 2	0.01s ～ 10.00s	1.00s	☆
P2-05	Switching frequency 2	P2-02 ～ Max frequency	10.00Hz	☆

Users could choose different speed loop PI parameters under different running frequency. When running frequency is less than the switching frequency(P2-02), adjusting parameters for speed loop PI are P2-00 and P2-01. When running frequency is greater than the switching frequency (P2-02), adjusting parameters for speed loop PI are P2-03 and P2-04. Speed loop PI parameters between switching frequency1 and switching frequency2 are two groups of linear switching. As shown in fig.6-2:
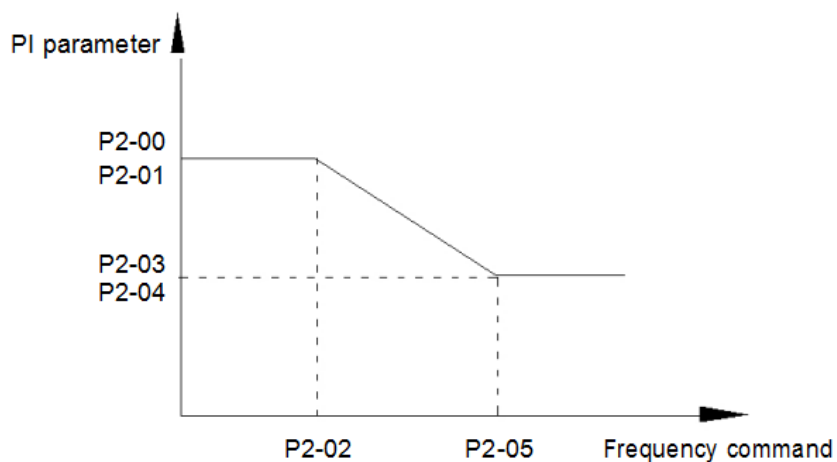

Fig. 6-2 PI parameter schematic diagram

Users can adjust vector control speed dynamic response characteristics through setting proportional coefficient and integration time of the speed regulator. Both increasing proportional gain and reducing integration time can accelerate the speed loop dynamic response. But excessive proportional gain or insufficient integration time may led to system oscillation.

Suggestions for regulating method: If the factory parameters can not meet the requirements, users can fine-tuning it on the basis of factory value parameters. First increase the proportional gain to restrain system oscillation, then reduce integration time so that system has fast response characteristic and smaller overshoot.

Notice: Improper PI parameter setting may lead to excessive speed overshoot , even voltage fault during overshoot drop.

P2-06	Vector control slip gain	50% ~ 200%	100%	☆

This parameter is used to adjust motor steady speed precision for zero-speed sensor vector control mode. Please turn up the parameter value when with load motor running in low speed. On the contrary, when the with load motor running in high speed, please turn down the parameter value.

This parameter is also used to adjust the output current value with the same load for speed sensor vector control.

P2-07	Speed-loop filter time	0.000s ~ 0.100s	0.015s	☆

In vector control mode, speed-loop regulator outputs torque current command. P2-07 is used to filter the torque command. Generally speaking, the parameter needs not to be modified. Users could properly increase the filtering time when speed fluctuation is relatively big, and decrease the value when motor oscillation occurs. If filtering time is small, inverter output torque might fluctuate greatly, but response speed will be fast.

P2-08	Vector control over-excitation gain	0~200	64	☆

In the process of inverter deceleration, over-excitation control can restrain the rising of bus voltage to avoid over-voltage fault. The larger the over-excitation gain, the stronger the suppression effect.In applications where over-voltage alarming easily occurs during deceleration process, users should increase over-excitation gain. Excessive over-excitation gain may lead to output current increasing, users should balance it during application. It is recommended that over-excitation gain is set to 0 in applications where inertia is small, motor decelerates without voltage rising. For applications with braking resistor, 0 is also

recommended for over-excitation gain.

P2-09	Torque upper limit digital setup in speed control mode	0: function code (P1-10)setting 1: AI1 2: AI2 3: AI3(Potentiometer) 4: reserved 5: Communication setup 6: MIN(AI1,AI2) 7: MAX(AI1,AI2) 1-7 Full range correspondence o P1-10	0	☆
P2-10	Torque upper limit digital setup in speed control mode	0.0% ~ 200.0%	150.0%	☆

In speed control mode, inverter maximum torque output is controlled by torque upper limit. Range for 1-7 selections of P2-09 are corresponding to the setting range of P2-10. P2-09 is used to select torque upper limit source. When P2-09 is set through analog, PULSE setup, communication setup, which 100% corresponding to P2-10. 100% of P2-10 is the rated torque of the inverter.

P2-11	P2-11—P2-12	Reserved	Reserved	
P2-13	Excitation regulation proportional gain	0 ~ 60000	2000	☆
P2-14	Excitation regulation integration gain	0 ~ 60000	1300	☆
P2-15	Torque regulation proportional gain	0 ~ 60000	2000	☆
P2-16	Torque regulation integration gain	0 ~ 60000	1300	☆

Vector control current-loop PI regulation, which is automatically obtained after asynchronous motor complete tuning or synchronous motor complete tuning. It generally needs not to be modified.

Caution: Integration regulator of current loop directly set integration gain without taking

integration time as the dimension. Excessive current loop PI gain may lead oscillation to the entire control loop circuit. If current oscillation or torque fluctuation is relatively big, users could manually turn down the PI proportional gain or integration gain.

Function code	Name	Setting Range	Factory Setting	property
P2-17	Speed loop integration attribute	Unit's digit:　integral separation 0: Invalid 1: Valid	0	☆

	P3 group V/F control parameter			
Function code	Name	Setting Range	Factory Setting	property
P3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: Power of 1.2 V/F 4: Power of 1.4 V/F 6: Power of 1.6 V/F 8: Power of 1.8 V/F 9: reserved 10: VF complete separation mode 11: VF semi separation mode	0	★

This parameter defines the V/F setup mode so as to meet the requirements of various load characteristics.

0: Linear V/F.　It is suitable for the ordinary constant torque load.

1: Multi-point V/F　It is suitable for special loads such as dehydrator and centrifugal machine. It can be self-defined. Refer to the description of functional codes of Group F1-07 to F1-12 for details.

2: Square V/F　It is suitable for centrifugal loads such as fan and pump.

3~8: These are relation curve situated between linear V/F curve and square V/F curve.

9: Reserved

10: VF complete separation mode　,Inverter output frequency and output voltage are mutually independent. Output frequency is decided by frequency source, while output voltage is decided by P3.13 (VF separation voltage source). VF complete separation mode is generally applied in induction heating, inverter power supply, torque motor control fields etc.

11: VF semi separation mode　In this case, V is proportional to F. Proportional relationship can be set by the voltage source P3-13. The relationship between V&F is connected with P1 group(motor rated voltage and rated frequency).

Suppose that voltage source input is X (X from 0~100%), the V,F relationship is:

		V/F=2*X*(Motor rated voltage)/(Motor rated frequency)		
P3-01	Torque boost value	0.0%: （automatically Torque boost ） 0.1% ~ 30.0%	Model dependent	☆
P3-02	Torque boost cut-off frequency	0.00Hz ~Max frequency	50.00Hz	★
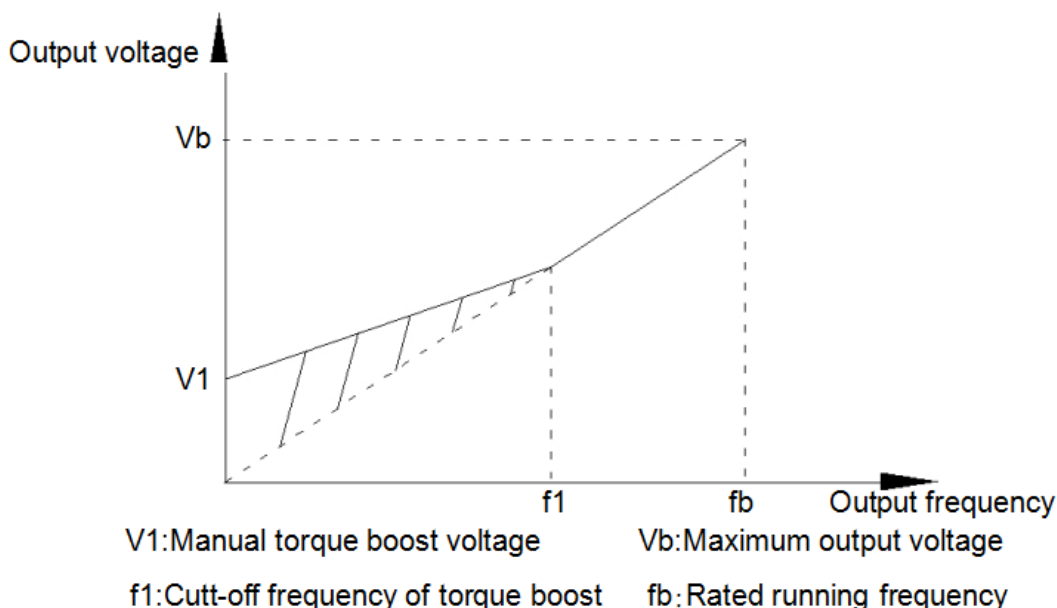
Fig. 6-3 Manual torque boost schematic diagram

To compensate the low frequency torque characteristics of V/F control, boost compensation should be made to inverter low frequency output voltage.

Torque hoist: it will be set according to the percentage of input rated voltage to the inverter. Below are explanations of setting torque increase: When the torque hoist is set as 0.0%, the inverter will adopt auto torque hoist. This parameter can be properly hoisted for small motor, while for large motor; the parameter can be properly decreased. If the torque hoist is set to be too large, the motor may be overheated, and the inverter may be over-current. Torque hoist cut-off frequency: As shown in Fig. 6-3, the torque hoist is valid when the cutoff Frequency below this setting. Otherwise, the torque hoist will be invalid.

P3-03	Multi-point V/F frequency point F1	0.00Hz ~ P3-05	0.00Hz	★
P3-04	Multi-point V/F voltage point V1	0.0% ~ 100.0%	0.0%	★

P3-05	Multi-point V/F frequency point F2	P3-03 ~ P3-07	0.00Hz	★
P3-06	Multi-point V/F voltage point V2	0.0% ~ 100.0%	0.0%	★
P3-07	Multi-point V/F frequency point F2	P3-05 ~ rated frequency (P1-04)	0.00Hz	★
P3-08	Multi-point V/F voltage point V3	0.0% ~ 100.0%	0.0%	★

Six parameters of P3-03 to P3-08 define the multi-point V/F curve.

The setup value of multi-point V/F curve is generally set in accordance with the load characteristics of the motor.

Caution: It must be set as follows: V1 < V2 < V3, F1 < F2 < F3. Fig5.4 is schematic diagram for multi-point V/F curve.

If the voltage is set too high at the time of low frequency, it may cause overheating and even burning of the motor as well as stall over current or over current protection of the inverter.

V1-V3: MS speed V/F 1~3 segment voltage proportion
Vb: Rated motor frequency
F1-F3: MS speed V/F 1~3 segment frequency proportion
Fb: Rated motor running frequency
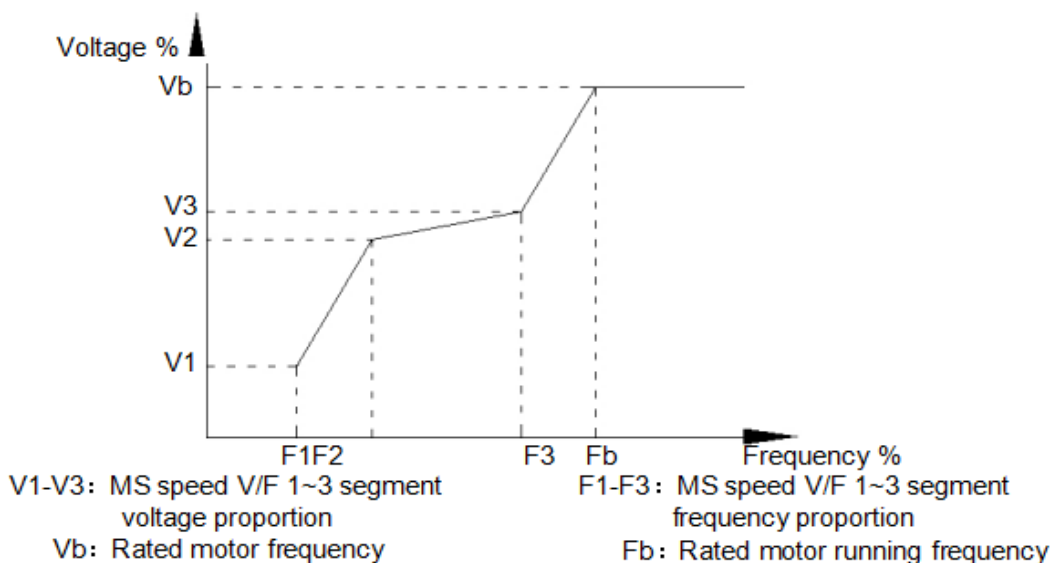
Fig. 6-4
Multi-point V/F curve setup schematic diagram

P3-09	V/F slip compensation gain	0.0% ~ 200.0%	0.0%	☆

This parameter is only valid for asynchronous motor.

VF slip compensation can compensate asynchronous motor speed deviation ,in this way , motor rotary speed could be maintained in basically stable state during load change. In general, 100% corresponds to the rated slip of the motor with rated load. For motor rated slip , it can be get through auto calculation of P1 motor rated frequency and rated revolving speed. The slip compensation gain adjustment may be performed referring to the following principle:

When the load is rated load, and the slip compensation coefficient is set to 100%, the rotary speed of the motor is close to the reference speed.				
3-10	V/F over-excitation gain	0 ~ 200	64	☆
The role of over excitation gain function is to suppress the rise of bus voltage during the inverter deceleration process, thus avoiding occurrence of over voltage fault due to bus voltage exceeding over voltage protection limitation value. The higher the over excitation gain is, more powerfully the suppression effect is. The setting is described as follows: In the applications where over-voltage alarm easily occurs, it needs to improve the over-excitation gain. Excessive over-excitation gain easily lead to increasing of output current .Users should keep the balance during operation. In the applications where the inertia is very low, the over excitation gain is set to 0, while in the applications where there is brake resistor ,the over excitation gain is set to 0 as well.				
P3-11	V/F oscillation suppression gain	0 ~ 100	40	☆
When the motor has no oscillation, please select this gain to 0. Only when the motor has obvious oscillation and does not run normally can the gain be properly increased. The bigger the gain is, the better oscillation suppression result will be. The gain shall be set as small as possible under the condition that the oscillation is suppressed effectively so as to avoid high influences on the V/F operation. Accurate motor rated current and no-load current parameters are required during using oscillation suppression function, or VF oscillation suppression effect will not be excellent.				
3-12	-	-	-	-
P3-13	V/F separation voltage source	0: Digital setting (P3-14) 1: AI1 2: AI2 3: AI3(Potentiometer) 4: reserved 5: MS command 6: Simple PLC 7: PID 8: Communication setup Note: 100.0% corresponding to the rated motor voltage	0	☆
P3-14	V/F separation voltage digital	0V ~ rated voltage	0V	☆

	setup			

VF separation is generally applied to induction heating control, inverter power supply control and torque motor control etc.

In VF separation control mode, output voltage can be set through function code P3-14, analog value, MS command , PLC, PID or communication setup. When P3-13 is nonnumeric setup, each 100% of the setting corresponds to rated motor voltage. When output setting percentage is negative, it's absolute value is the valid setting value.

0: Digital setup

  (P3-14)Voltage is directly set through P3-14.

1: AI1

2: AI2

3: AI3(Potentiometer)

  Voltage is set through analog input terminal.

4: PULSE

pulse setup(DI5) voltage set through terminal pulse. Pulse setup signal specification: voltage range 9V~30V, frequency range 0kHz~100kHz.

5: MS command

  voltage source is MS command. Corresponding relationship between set signal and set voltage is determined through P4 group and PC group.

6: Simple PLC

When voltage source is simple PLC, output voltage is set through PC group parameters.

7: PID

  Output voltage through PID closed loop. For specifications please refer to PA group for PID detailed description.

8: Communication setup

  Communication setup refers to voltage that set by position machine through communication mode. When the above voltage source selection is 1~8, 0~100% corresponds to output voltage 0V~motor rated voltage.

P3-15	Voltage rise time of V/F separation	0.0s ～ 1000.0s Note: It indicates the time for the voltage rising from 0 V to rated motor voltage.	0.0s	☆

P3-15 refers to the time that needed for output voltage varying from 0V to motor rated voltage. As shown in fig.6-5.

Fig. 6-5 VF separation schematic diagram

P3-16	Voltage decline time of V/F separation	0.0s ~ 1000.0s Note: It indicates the time for the voltage rising from 0 V to rated motor voltage.	0.0s	☆
P3-17	Stop mode selection upon V/F separation	0: Frequency and voltage declining to 0 independently 1: Frequency declining after voltage declines to 0	0	☆
P3-18	Over current stall current	50~200%	150%	★
P3-19	Overflow stall	0 : invalid 1 : valid	1	★
P3-20	Over current stall inhibition gain	0~100	20	☆
P3-21	Speed flow compensation coefficient stall action current	50~200%	50%	★
P3-22	Over voltage stall voltage	650.0V~800.0V	730.0V	★
P3-23	Over voltage stall	0 invalid 、1 valid	1	★
P3-24	Over voltage stall	0~100	30	☆

Function code	Name	Setting Range	Factory Setting	property
	suppression frequency gain			
P3-25	Over voltage stall suppression voltage gain	0~100	30	☆
P3-26	Maximum rise frequency limit of over voltage stall	0~50Hz	5Hz	★
P3-27	-	-	-	☆
P4 group　　Input terminal group				
Function code	Name	Setting Range	Factory Setting	property
P4-00	DI1 terminal function selection	0: No function 1: Forward command (FWD) 2: Reverse command (REV)	1	★
P4-01	DI2 terminal function selection	3: Three line running control 4: FWD JOG command　(PJOG) 5: REV JOG command　(RJOG) 6: UP 7: DOWN 8: stop freely	2	★
P4-02	DI3 terminal function selection	9: fault reset (RESET) 10: pause 11: External default normally open input 12: Multi-reference terminal 1	9	★
P4-03	DI4 terminal function selection	13: Multi-reference terminal　2 14: Multi-reference terminal　3 15: Multi-reference terminal　4 16: Acc./dec.time selection terminal 1	12	★
P4-04	DI5 terminal function selection	17: Acc./dec.time selection terminal 2 18: Frequency source switching 19: UP/DOWN setup reset (terminal and keyboard)	13	★

P4-05	Reserved	20: Running command switching terminal 21: Acc./dec forbidden	0	★
P4-06	Reserved	22: PID pause 23: PLC reset 24: Swing frequency pause 25: Counter input	0	★
P4-07	Reserved	26: Counter reset 27: Length counting input 28: Length counting reset 29-31: reserved 32: immediate DC braking 33: External default normally closed input	0	★
P4-08	Reserved	34: Frequency modification enable 35: PID direction reversed 36: External stop terminal1 37: Control command switching terminal 2 38: PID integration suspension 39: Frequency source X and preset frequency switching 40: Frequency source Y and preset frequency switching	0	★
P4-09	Reserved	41: Motor selection terminal 42: reserved 43: PID parameter switching 44: reserved 45: reserved 46: Speed control/ torque control switching 47: emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: 2-line type / 3-line type switching	0	★

		52-59: reserved		

4 multi-segment instruction terminals can be combined into 16 states, The 16 states correspond to 16 instruction sets, as shown in Table 1:

Table 1 Multi-segment Instruction Function Description

K4	K3	K2	K1	Instruction set	Corresponding parameters
OFF	OFF	OFF	ON	Multi - segment instruction 1	PC-01
OFF	OFF	ON	OFF	Multi - segment instruction 2	PC-02
OFF	OFF	ON	ON	Multi - segment instruction 3	PC-03
OFF	ON	OFF	OFF	Multi - segment instruction 4	PC-04
OFF	ON	OFF	ON	Multi - segment instruction 5	PC-05
OFF	ON	ON	OFF	Multi - segment instruction 6	PC-06
OFF	ON	ON	ON	Multi - segment instruction 7	PC-07
ON	OFF	OFF	OFF	Multi - segment instruction 8	PC-08
ON	OFF	OFF	ON	Multi - segment instruction 9	PC-09
ON	OFF	ON	OFF	Multi - segment instruction 10	PC-10
ON	OFF	ON	ON	Multi - segment instruction 11	PC-11
ON	ON	OFF	OFF	Multi - segment instruction 12	PC-12
ON	ON	OFF	ON	Multi - segment instruction 13	PC-13
ON	ON	ON	OFF	Multi - segment instruction 14	PC-14
ON	ON	ON	ON	Multi - segment instruction 15	PC-15

Chart 6-1

When the frequency source is selected as multi-speed,function code **PC-00~PC-15** 100.0%, corresponds to the maximum frequency **P0-10.** Multi-segment instructions in addition to multi-speed function, but also can be used as a PID source, Or as a voltage source for V / F separation control, to meet the need to switch between different setpoints.

Table 2   Acceleration / deceleration time selection terminal function description

Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameters
OFF	OFF	Acceleration time 1	P0-17、P0-18
Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameters
OFF	ON	Acceleration time 2	P8-03、P8-04
ON	OFF	Acceleration time 3	P8-05、P8-06
ON	ON	Acceleration time 4	P8-07、P8-08

Chart 6-2

P4-10	DI filter time	0.000s ~ 1.000s	0.010s	☆

If the digital input terminal malfunction because it is vulnerable to interference ,users could increase the parameter value to enhance the interference immunity. However, this operation may cause reduced sensitivity of the DI terminal.

P4-11	Terminal command mode	0: 2-line type 1 1: 2-line type 2 2: 3-line type 1 3: 3-line type 2	0	★

This parameter defines four different ways of controlling the AC Drive to run via external terminals.

0: Two-wire mode   1: This mode is the most commonly used two-wire mode. The terminals **DI1, DI2** are used to determine the forward and reverse run of the motor. The function code is set as follows:

Function code	Name	Settings	Function description
P4-11	Terminal command mode	0	Two-wire type 1
P4-00	**DI1** Terminal function selection	1	Running Forwbard (FWD)
P4-01	**DI2** Terminal function selection	2	Reverse run (REV)

Chart 6-3

K1	K2	Running Command
0	0	stop
0	1	fwd
1	0	rev
1	1	stop
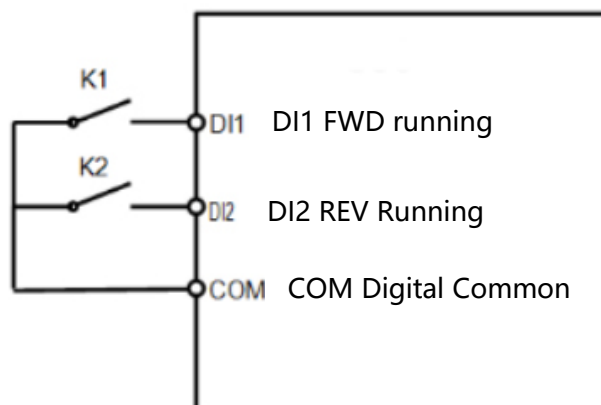
Chart 6-4   **Fig. 6-5 two line control mode 1**

As Figure 6-5 shows, in this control mode, K1 close, the AC Drive is running forward. K2 close, reverse run. K1, K2 are closed or disconnected at the same time, the AC Drive stop running.

1: Two-wire mode   2: In this mode, the **DI1** terminal function is the run enable terminal, The **DI2** terminal function determines the direction of running. The function code is set as follows:

Functi on	Name	Settings	Function description

code			
P4-11	Terminal command mode	1	Two-wire type 2
P4-00	DI1 Terminal function selection	1	Running enable
P4-01	DI2 Terminal function selection	2	Forward and reverse direction of running

Chart 6-5

K1	K2	Running Command
0	0	stop
0	1	fwd
1	0	rev
1	1	stop
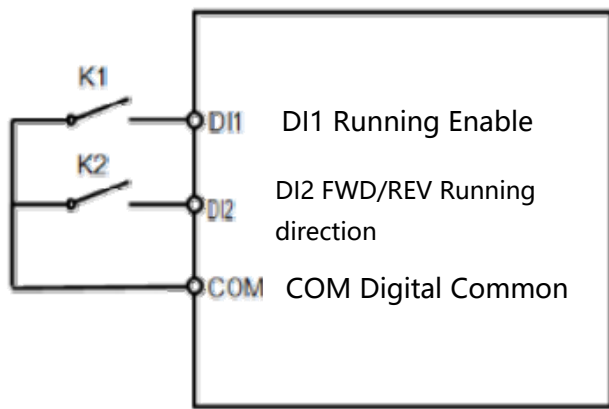
Chart 6-6　　　　　　　　　　**Fig.6-6 Two-line control mode 2**

As Figure 6-6 shows, in this control mode, K1 close, K2 disconnect, the AC Drive is running forward. K2 close, reverse run. K1 disconnected, the AC Drive stop running.

2: Three - wire control mode

1: This mode DI3 is the enable terminal, the directions are controlled by DI1,DI2. The function code is set as follows:

Function code	Name	Settings	Function description
P4-11	Terminal command mode	2	Three-wire type 1
P4-00	DI1 Terminal function selection	1	Forward running (FWD)
P4-01	DI2 Terminal function	2	Reverse running (REV)

	selection		
P4-02	DI3 Terminal function selection	3	Three - wire operation control

Chart 6-7

Fig. 6-7 Three-line control mode 1

As Fig 6-7 shows, in this control mode, when the SB1 button is closed, press the SB2 button to turn the AC Drive forward, press the SB3 button to turn the AC Drive reverse, SB1 button turns off the moment the AC Drive stops. Normal start and run, you must keep the SB1 button closed. SB2, SB3 button command is in the closed action along the entry into force. The operating status of the AC Drive is based on the last button action of the three buttons.

3. Three - wire control mode 2: In this mode, DI3 is the enable terminal, and the run command is given by **DI1**, The direction is determined by the state of **DI2**. The function code is set as follows:

Function code	Name	Settings	Function description
P4 - 00	DI1 Terminal function selection	1	Run enable
P4-01	DI2 Terminal function selection	2	Forward and Reverse direction of running

P4-02	DI3 Terminal function selection	3	Three - wire operation control

Chart 6-8

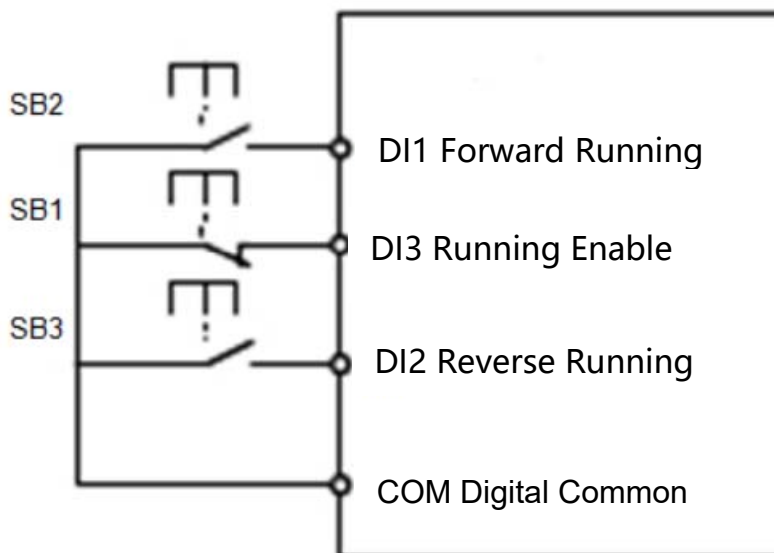| K	Running direction
0	FWD
1	REV
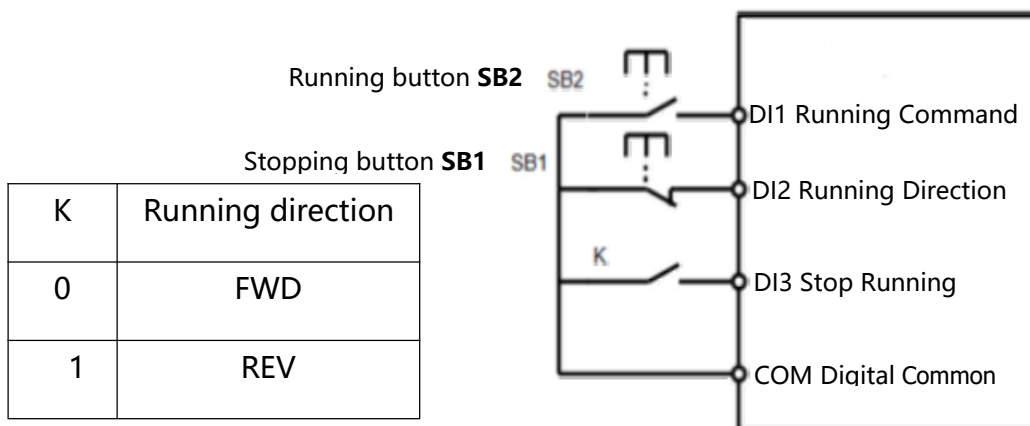
Chart 6-9　　　　　　　**Fig. 6-8 Three-line control mode 2**

As Figure 6-8 shows, in this control mode, when the SB1 button is closed, press the SB2 button to turn the AC Drive running, K disconnected, the AC Drive running forward. K closed, the AC Drive reverse. SB1 button turns off the moment the AC Drive stops. Normal start and run, you must keep the SB1 button closed. SB2 button command is in the closed action along the entry into force.

P4-12	Terminal UP/DOWN variation rate	0.001Hz/s ~ 65.535Hz/s	1.00Hz/s	☆

It is used to set the frequency variation rate (frequency variation per second) when adjusting the set frequency with terminals UP/DOWN. When P0-22 (frequency decimal point) is set to 2, range of P4-12 value is 0.001Hz/s~65.535Hz/s. When P0-22 (frequency decimal point) is set to 1, range of P4-12 value is 0.01Hz/s~655.35Hz/s.

P4-13	AI curve 1 minimum input	0.00V ~ P4-15	0.00V	☆
P4-14	AI curve 1 minimum input corresponding setup	-100.0% ~ +100.0%	0.0%	☆

P4-15	AI curve 1 maximum input	P4-13 ~ +10.00V	10.00V	☆
P4-16	AI curve 1 maximum input corresponding setup	-100.0% ~ +100.0% ■	100.0%	☆
P4-17	AI1 filter time	0.00s ~ 10.00s	0.10s	☆
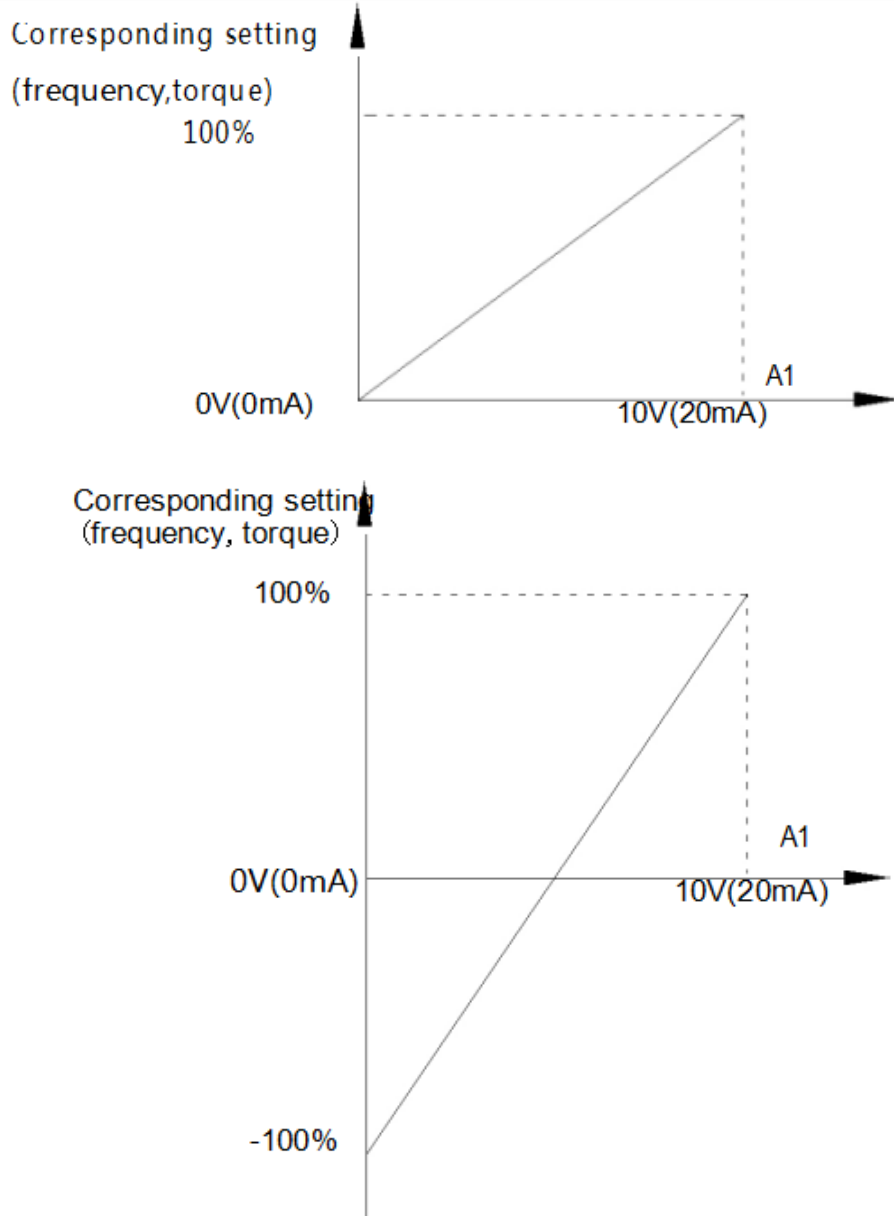
Fig. 6-9 Relationship between analog input and setup value

The parameters mentioned above define the relationship between analog input

voltage and the analog input setup value.

When analog input voltage exceeds the setup "maximum input" limit, analog voltage is calculated as "maximum input" .Similarly, when analog input is smaller than the setup "minimum input" , analog voltage is calculated as minimum input or 0.0% according to the setting of P4-34.

AI used as current input terminal : 1mA current equals to 0.5V voltage.

AI input filtering time is used to set AI1 software filtering time. When field analog quantity is vulnerable, please increase the filtering time so that analog quantity tends to be stable. But excessive filtering time will lead to slow response time to analog detection. User should balance it according to practical application cases.

In various application cases, the nominal value corresponding to 100% of analog reference will be different. Refer to specific application description for the specific value.

Figure 5-9 shows typical setup cases.

P4-18	AI curve 2 minimum input	0.00V ~ P4-20	0.00V	☆
P4-19	AI curve 2 minimum input corresponding setup	-100.0% ~ +100.0%	0.0%	☆
P4-20	AI curve 2 maximum input	P4-18 ~ +10.00V	10.00V	☆
P4-21	AI curve 2 maximum input corresponding setup	-100.0% ~ +100.0%	100.0%	☆
P4-22	AI2 filter time	0.00s ~ 10.00s	0.10s	☆

For function and usage of curve 2, please refer to description of curve 1.

P4-23	P4-23—P-32 reserved	Reserved	Reserved	
P4-33	AI curve selection	Unit digit: AI1 curve selection 1: curve 1（2 point，see the P4-13 ～ P4-16） 2: curve 2（2 point，see the P4-18 ～ P4-21） 3: curve 3（2 point，see the P4-23 ～ P4-26） 4: curve 4（4 point，see the A6-00 ～ A6-07） 5: curve 5（4 point，see the A6-08 ～ A6-15） Tens'　digit: AI2 curve selection，same as unit digit. Hundreds'　digit: reserved	321	☆

This group of parameters are used to set　　relationship between　DI5 pulse frequency and it's corresponding settings.

Pulse　frequency　can　be　only　input　to the　inverter through　DI5 channel．This function　group's applications are similar to curve 1, please refer to the description of curve 1.

| P4-34 | A1 below minimum input setup selection | Unit's digit : AI1 below minimum input setup selection
0:　Min input setting
1: 0.0%
Ten's digit: AI2 below minimum input setup selection，same as AI1
Hundred's digit: AI3 below minimum input setup selection，same as AI1 | 000 | ☆ |

This function code is used to determine analog quantity corresponding setup when analog input voltage below the setup of minimum input.

The 1bit, 10bit, 100bit of the function code are corresponding to the analog input AI1、AI2、AI3 respectively. If the bit is set to 0 and AI is below the minimum setup , the analog input setup is the curve "minimum input corresponding setup"（P4-14、P4-19、P4-24）. If the bit is set to 0 and AI is below the minimum setup , the analog quantity corresponding setup is

0.0%.				
P4-35	DI1 delay time	0.0s ～ 3600.0s	0.0s	★
P4-36	DI2 delay time	0.0s ～ 3600.0s	0.0s	★
P4-37	DI3 delay time	0.0s ～ 3600.0s	0.0s	★

Only DI1, DI2, DI3 are able to set equipment delay time.

They are used to set delay time to inverter DI terminal state change.

P4-38	DI terminal valid mode selection 1	0: high level valid 1: low level valid Unit's digit: DI1 Ten's digit: DI2 Hundred's digit: DI3 Thousand's digit: DI4 Ten thousand's digit: DI5	00000	★

It is used to set digital input terminal effective mode.

High level valid: Connection between COM and corresponding DI is valid, disconnection invalid.

Low level valid: Connection between COM and corresponding DI is invalid,disconnection valid.

P5 group Output terminal (changeable)				
Function code	Name	Setting Range	Factory Setting	property
P5-00	AO1 terminal output mode selection	0: Pulse output(FMP) 1: Switch output(FMR)	0	☆

FM is programmable multiplex terminal, which can be used as high speed pulse output terminal (FMP) or open collector switching output terminal (FMR).

When P5-00 is set to 0, maximum output frequency can reach 10kHz , please refer to P5-06 for related description.

P5-01	AO1 selection (open collector output terminal)	0: No output 1: AC Drive in operation 2: Output fault(Stop fault) 3: Frequency level detection FDT1 output 4: Frequency arrival 5: Null speed operation (stop without output) 6: Motor overload pre-alarm 7: AC Drive overload pre-alarm 8: Setup counting value arrived	0	☆
P5-01	Relay output selection (TA1.TB1.TC1)	9: Designated counting value arrived 10: Length arrived 11: PLC circulation end 12: Total running time arrived 13: Frequency limit 14: Torque limit 15: RUN ready	0	☆
P5-02	Expansion card relay output selection(TA2.TB2.TC2)	16: AI1>AI2 17: Frequency upper limit arrived 18: Frequency lower limit arrived (stop without output)	0	☆
P5-03	DO1 output selection(open collector output terminal)	19: Undervoltage state output 20: Communication setup	0	☆
P5-04	Expansion card DO2 output selection	21: Reserved 22: Reserved 23: Null speed operation 2 (Stop with output) 24: Total power-on time arrival 25: Inspection level of FDT2 frequency 26: Frequency 1 arrival output 27: Frequency 2 arrival output	0	☆

		28: Current 1 arrival output 29: Current 2 arrival output 30: Timing arrival output 31: AI1 excessive input 32: Load off 33: Reverse running 34: Zero current state 35: Module temperature arrival 36: Output excessive current 37: Frequency lower limit arrival (output valid when stop) 38: Alarm output 39: Motor over temperature alarm 40: The running time arrival 41: fault output (is the free stop fault also no-output when under-voltage)		- 91 -
P5-05	P5-05—P5-06	Reserved	Reserved	☆
P5-07	AM output function selection	0: running frequency 1: setting frequency 2: output current 3: output torque (Absolute value of torque) 4: output power 5: output voltage	0	☆
P5-08	FM output function selection	6: reserved 7: AI1 8: AI2 9: reserved 10: length 11: Counting value 12: Communication setup 13: Motor revolving speed 14: Output current (100.0%	1	☆

		means 1000.0A) 15: output voltage (100.0% means 1000.0V) 16: output torque (actual value of torque)		

FMP terminal output pulse frequency range: 0.01kHz~P5-09(FMP maximum frequency output), P5-09 could vary from 0.01kHz to 100.00kHz. AO1, AO2 output ranges from 0V to 10V, or 0mA to 20mA.

P5-09	FMP maximum output frequency	0.01kHz~100.00kHz	50.00kHz	☆

When the multifunctional terminal output function selects FMP pulse output, it can set the maximum frequency value of output pulse.

P5-10	AM zero offset	-100.0% ~ +100.0%	0.0%	☆
P5-11	AM gain	-10.00 ~ +10.00V	1.00V	☆
P5-12	PM zero offset	-100.0% ~ +100.0%	0.0%	☆
P5-13	PM gain	-10.00 ~ +10.00V	1.00V	☆

Function codes above are generally used to modify the zero drift of the analog output and also be used to define required AO output curves. If b represents zero offset, k represents gain, Y represents actual output, and X represents standard output, the actual output is calculated as follows: Y=kX+b .AO1, AO2 zero offset coefficient 100% corresponds to 10V (20mA).

For example, if the analog output is the running frequency, and it is expected to output 8V (16mA) when the frequency is 0, and output 3V (6mA) at the maximum frequency, the standard output 0V to 10V shall be modified to 8V to 3V output. As per the above formula, AO zero offset coefficient shall be set to "80%", while A0 gain shall be set to "-0.50".

P5-14	P5-14—P5-16	reserved	Reserved	-
P5-17	AO1 output delay time	0.0s ~ 3600.0s	0.0s	☆
P5-18	RELAY1 output delay time	0.0s ~ 3600.0s	0.0s	☆

P5-19	RELAY2 output delay time	0.0s ~ 3600.0s	0.0s	☆
P5-20	AO2 output delay time	0.0s ~ 3600.0s	0.0s	☆
P5-21	FM output delay time	0.0s ~ 3600.0s	0.0s	☆

Set output terminal FMR, relay 1, relay 2, DO1 and DO2 delay time that begins from status changing to real output changing.

P5-22	AO output terminal valid state selection	0: Positive logic 1: Negative logic Unit's digit: AO1 Ten's digit: delay 1 Hundred's digit: relay 2 Thousand's digit: AO2 Ten thousand's digit: reserved	00000	☆

Define output terminal FMR、Relay 1、Relay 2、DO1 and DO2 output logic.

0: Positive logic Digital output terminals and the corresponding public end connected as effective state, disconnect for invalid state.

1: Negative logic Digital output terminals and the corresponding public end connected as invalid state, disconnect for effective state.

P5-23	-	-	-	★

P6 group Start/stop control				
Function code	Name	Setting Range	Factory Setting	property
P6-00	Start mode	0: Direct startup 1: Revolving speed tracking startup 2: Pre-excitation startup (AC asynchronous motor)	0	☆

0: Direct startup:

When the DC brake time is zero, it starts at the startup frequency.

When the DC brake time is non-zero value, it can perform DC brake before start. It is suitable for the applications where small inertia may cause reverse rotation at the time of startup.

1: Revolving speed tracking startup:

The inverter firstly judges the revolving speed and direction of the motor and then starts at the frequency corresponding to the tracked rotation velocity of the motor, and performs smooth startup of the motor in rotation without impact. It is suitable for the applications where large inertia is restarted due to transient power shutdown. In order to ensure the performance of the rotation velocity tracking startup, motor parameters (Group P1) should be set correctly.

2: Asynchronous pre-excitation startup

It is only valid for asynchronous motor , and is used to establish magnetic field before motor operation. For pre-excitation current, pre-excitation time please refer to function code P6.05 and P6.06.

If pre-excitation time is set to 0, the pre-excitation process will be cancelled ,and start with start frequency. If pre-excitation time is not set to 0, inverter first pre-excitation then starup. In this way, motor dynamic response performance is promoted.

P6-01	Revolving speed tracking mode	0: start from stop frequency 1: start from zero speed 2: start from maximum frequency	0	-

In order to complete the rotation speed tracking process in the shortest period, it can select the mode of inverter tracking the rotation velocity of motor:

0: Track downward from the frequency at the time of stop, which is generally selected at first.

1: Track upward from zero frequency, which is used when the inverter is restarted upon long period of power shutdown.

2: Track downward from the maximum frequency, which is generally used for power

P6-02	Revolving speed tracking mode	1-200	20	☆

In the mode of revolving speed tracking startup, it is used to select the speed of rotation tracking. The higher the parameter value is, the faster the tracking velocity is, but too higher value may cause unreliable tracking.

P6-03	Start frequency	0.00Hz ~ 10.00Hz	0.00Hz	☆
P6-04	Start frequency lasting time	0.0s ~ 100.0s	0.0s	★

To ensure the torque at the time of startup, proper startup frequency shall be set. In addition, in order to set up magnetic flux when waiting for the startup of the motor, the startup frequency shall remain for a certain period of time before accelerating to the setup frequency. Start frequency P6-03 is not affected by the lower frequency limit. If the frequency reference value (frequency source) is lower than the startup frequency, the inverter cannot start and will be in standby status. In positive&negative switching process, start frequency holding time does not work. Start frequency holding time is not included in the acceleration time, but included in the simple PLC running time.

Example 1:

P0-03 = 0 means the frequency source is digital reference. P0-08 = 2.00Hz means the digital setup frequency is 2.00Hz. P6-03 = 5.00Hz means the start frequency is 5.00Hz. P6-04=2.0s means that the start frequency holding time is 2.0s.

In this case, the inverter will be in the standby status and its output frequency is 0Hz.
Example 2:

P0-03 = 0 means the frequency source is digital reference. P0-08 = 10.00Hz means the digital setup frequency is 10.00Hz. P6-03 = 5.00Hz means the start frequency is 5.00Hz. P6-04 = 2.0s means that the start frequency holding time is 2.0s.

In this case, the inverter accelerates to 5.00 Hz and remains for 2 seconds, and then

accelerates to the setup frequency 10Hz.

P6-05	Start dc braking current /pre-excitation current	0% ~ 100%	50%	★
P6-06	Start dc braking time /pre-excitation time	0.0s ~ 100.0s	0.0s	★

Pre-excitation is used to establish asynchronous motor magnetic field before startup, which would improve response speed. Start dc current braking is only valid when it is direct startup. Inverter first carries out dc braking according to the setup of start dc current braking , and then carries out operation after start dc braking time. If dc braking time is set to 0, inverter directly start without dc braking. The bigger the dc braking current is , the greater the braking force is. If start mode is asynchronous motor pre-excitation start, inverter first establish magnetic field through pre-excitation current setup, then start to run after pre-excitation time. If set pre-excitation time to 0, inverter would directly start without pre-excitation process. Start dc braking current/pre-excitation current is the relative percentage of rated current.

P6-07	Acceleration/ deceleration mode	0: straight acc. /dec. Time 1: S curve acc. /dec. mode A 2: S curve acc. /dec. mode B	0	★

It is used to select the frequency change mode during the inverter start and stop **process. 0: Straight acceleration/ deceleration**

The output frequency increases or decreases along the straight line. VT2 series inverter provides 4 types of acceleration/deceleration time. It can select acceleration/ deceleration time via the multifunctional digital input terminals.

1: S-curve acceleration/ deceleration mode A

The output frequency increases or decreases along the straight line. S curve is generally used in the applications where start and stop processes are relatively gentle, such as elevator and conveyor belt. The acceleration / deceleration time is consistent with the

straight acceleration/ deceleration time. Function codes of P6.08 and P6.09 can be respectively defined the time proportion of starting-segment and finishing-segment for S-curve acceleration/ deceleration.

2: S-curve acceleration/ deceleration mode B

In the acceleration/ deceleration curve, the motor rated frequency fb is always the point of inflexion on S-curve. As shown in 5-12. S curve is generally used in the applications where the high-speed area above the rated frequency as well as short-time acceleration/ deceleration. When set frequency is above the rated frequency, acceleration/ deceleration time is:

P6-08	Initial-segment time proportion of S-curve	0.0% ~ (100.0%-P6-09)	30.0%	★
P6-09	Finishing-segment time proportion of S-curve	0.0% ~ (100.0%-P6-08)	30.0%	★

Function code of P6-08 and P6-09 can be respectively defined the time proportion between the S-curve initial-segment and finishing-segment for S-curve acceleration/ deceleration A. They are required to meet the standard of P6-08+P6-09≤100.0%.

t1 in the Fig.6-10 is the parameter defined by P6-08, in this period of time which the changing slope of output frequency is becoming larger and larger. t2 is defined by parameter P6-09, in this period of time which the changing slope of output frequency change to zero. The changing slope of output frequency is fixing within the time of t1 and t2.
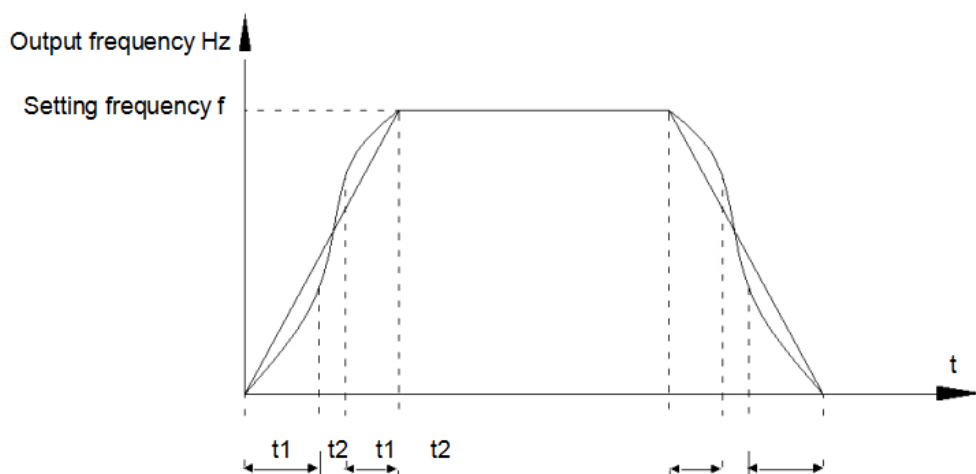
Fig.6-10 S-curve acceleration/deceleration schematic diagram A
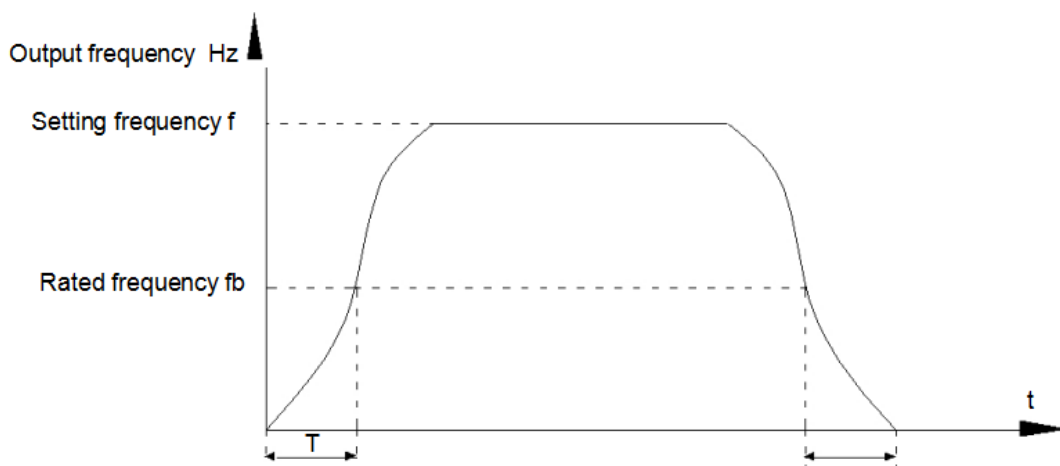
Fig.6-11 S-curve acceleration/deceleration schematic diagram B

P6-10	Stop mode	0: decelerating stop 1: free stop	0	☆

0: Deceleration to stop When the stop command is valid, the inverter will decelerate to stop according to the setup deceleration time.

1: Free stop When the stop command is valid, the inverter will terminate the output immediately and the load will coast to stop according to the mechanical inertia.

P6-11	DC braking initial frequency at stop	0.00Hz ~ MAX Frequency	0.00Hz	☆
P6-12	DC braking waiting time at stop	0.0s ~ 100.0s	0.0s	☆
P6-13	DC braking current at stop	0% ~ 100%	0%	☆
P6-14	DC braking time at stop	0.0s ~ 100.0s	0.0s	☆

DC brake initial frequency at stop: During the process of decelerating to stop, when the running frequency at stop reaches this frequency, it will start the process of DC brake. DC brake waiting time at stop: Prior to the beginning of DC brake at stop, the inverter will terminate the output, and then start DC brake after this delay time. It is used to prevent over current fault due to DC brake which starts at the time of higher velocity. DC brake current at stop: The DC brake quantity added shall be set according to the percentage setting of the rated current of the inverter. The higher the brake current is, more powerful the brake effect is. DC brake time at stop: It refers to the continuous DC brake time. If this DC brake time is set to 0, it indicates that there is no DC brake process, and the inverter will stop according to the setting process of decelerating to stop. The process of DC brake at stop is as shown in Figure below:
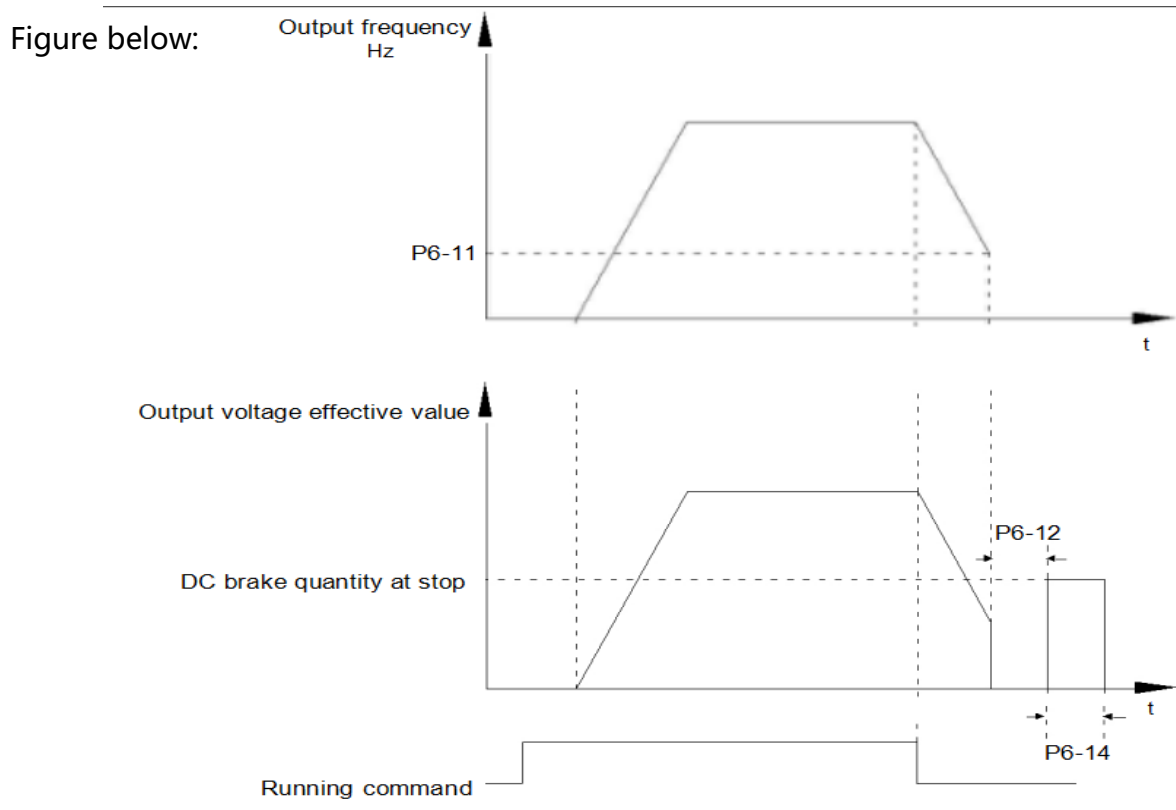
Fig.6-12 DC brake schematic diagram				
P6-15	Brake utilization ratio	0% ～ 100%	100%	☆
It is only valid for the inverter with built-in brake unit. It is used to adjust the duty ratio of the brake unit. When the brake utilization ratio is high, then the duty ratio of brake unit action is high, braking effect is strong. But there will be big fluctuation of inverter bus voltage.				

P7 group Keyboard and display				
Function code	Name	Setting Range	Factory Setting	property
P7-01	REV/JOG selection	0: invalid 1: Switching between operation panel command channel & the remote command channel (terminal command channel or serial port command channel) 2: Switching between FWD & REV rotation 3: Forward jog command 4: Reverse jog command	0	★

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It is used to set the functions of multifunctional MF/REV key.

0: Invalid function

1: Operation panel command channel and remote command channel. It can   perform switching   between   the   current   command   source   and keyboard   control(local operation).The function key is invalid when current command source is keyboard control.

2: Switching between forward & reverse rotation. Switch the rotary direction of the motor via the MF/REV key on the keyboard is only enabled when the command source is "operation panel command".

3: Forward jog. It can perform forward jog (FJOG) operation via the MF/REV key on the keyboard.

4: Reverse jog. It can perform reverse jog (RJOG) operation via the MF/REV key on the keyboard.

P7-02	STOP/RESET function	0: STOP/RES key is only valid when use the keyboard operation mode. 1: STOP/RES key is valid when use any operation mode.	1	☆
P7-03	LED running displayed parameter 1	0000 ~ PPPP Bit00: running frequency 1(Hz) Bit01: setting frequency (Hz) Bit02: Bus. voltage (V) Bit03: output voltage (V) Bit04: output current (A) Bit05: output power (kW) Bit06: output torque (%) Bit07: DI input state Bit08: AM output state Bit09: AI1 voltage (V) Bit10: AI2 voltage (V)	H.401F	☆

		Bit11: reserved Bit12: Counter Bit13: Length Bit14: Load speed display Bit15: PID setting		

If the above parameters need to be displayed during the operation, users can set their corresponding positions to 1 and then convert this binary number into decimal number and set it to P7-03.

P7-04	LED running displayed parameter 2	0000 ~ PPPP Bit00: PID feedback Bit01: PLC phrase Bit02: reserved Bit03: running frequency 2 (Hz) Bit04: The left running time Bit05: AI1 Pre-correction voltage (V) Bit06: AI2 Pre-correction voltage (V) Bit07: reserved Bit08: line speed Bit09: currently power-on time (Hour) Bit10: currently running time (Min) Bit11: reserved Bit12: communication setting value Bit13: reserved Bit14: Main frequency X display (Hz) Bit15: Auxiliary Y display (Hz)	H.0000	☆

If the above parameters need to be displayed during the operation, users can set their corresponding positions to 1 and then convert this binary number into decimal number and set it to P7-04. Running display parameter is used to set paratermers which can be seen under inverter running state. 32 state parameters can be checked at most,you could choose the needed state parameter through

P7-03、P7-04 binary digit, display sequence starts from P7-03 lowest digit order.

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P7-05	LED stopped displayed parameter	0000 ~ PPPP Bit00: setting frequency (Hz) Bit01: Bus. voltage (V) Bit02: DI input state Bit03: AM output state Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit06: reserved Bit07: Counter Bit08: Length Bit09: PLC phrase Bit10: Load speed Bit11: PID setting Bit12: reserved	H.0033	☆
If the above parameters need to be displayed at the time of stop, it can set their corresponding positions to 1 and then convert this binary number into decimal number and set it to P7-05.				
P7-06	Load speed displayed coefficient	0.0001 ~ 6.5000	1.0000	☆
When display of the load speed is necessary, P7-06 is used to adjust the corresponding relationship between inverter frequency output and load speed. For details please refer to P7-12.				
P7-07	AC Drive module radiator temperature	0℃ ~ 120℃	-	●
It is used to display IGBT temperature. Different model's inverter module is set with different IGBT over temperature protection value.				
P7-08	Rectifier module radiator temperature	-	-	●
It is used to display rectifier module temperature.Different model's rectifier module is set with different over temperature protection value.				
P7-09	Accumulative running time	0h ~ 65535h	-	●
It is used to display the accumulated running time of the inverter. When the accumulated				

running time.reaches P8-17 setup running time, the multifunctional digital output terminal(12) will output ON signal.

P7-10	Product ID	-	-	●
P7-11	Software version No.	-	-	●
P7-12	Load speed display decimal digits	Unit's digit: U0-14 number of decimal place 0: 0 decimal place 1: 1 decimal place 2: 2 decimal place 3: 3 decimal place Ten's digit: U0-19/U0-29 number of decimal place 1: 1 decimal place 2: 2 decimal place	21	☆

Decimal point position: It is used to set the number of decimal places of the load speed.For example, if the Load speed display coefficient P7-06 is 2.000,load speed display decimal digits is 2(Two decimal places),when inverter running frequency is 40.00Hz,the load speed will be : 40.00*2.000=80.00(2 decimal digit display). If the inverter is in stopped state, then load speed displays as corresponding set frequency speed.Take set frequency of 50.00Hz as an example, the stop state load speed is: 50.00*2.000=100.00(Two decimal places).

P7-13	Accumulative power-on time	0 ~ 65535 h	-	●

It displays accumulative power-on time since leaving the factory. When it reaches the set power-on time (P8-17) , multi-function digital output (24) ON signal.

P7-14	Accumulative power	0 ~ 65535 kw/h	-	●

It displays the inverter accumulative power consumption.

P8 Group Auxiliary functions				
Function code	Name	Setting Range	Factory Setting	property
P8-00	JOG running frequency	0.00Hz ~ MAX frequency	2.00Hz	☆
P8-01	JOG acceleration time	0.0s ~ 6500.0s	20.0s	☆

P8-02	JOG deceleration time	0.0s ~ 6500.0s	20.0s	☆

It defines the reference frequency and acc. / dec. time of the inverter at the time of jogging. The jog process is started and stopped according to direct startup mode(P6-00=0) and decelerate to stop mode(P6-10=0).

P8-03	Acceleration time 2	0.0s ~ 6500.0s	20.0s	☆
P8-04	Deceleration time 2	0.0s ~ 6500.0s	20.0s	☆
P8-05	Acceleration time 3	0.0s ~ 6500.0s	20.0s	☆
P8-06	Deceleration time 3	0.0s ~ 6500.0s	20.0s	☆
P8-07	Acceleration time 4	0.0s ~ 6500.0s	0.00s	☆
P8-08	Deceleration time 4	0.0s ~ 6500.0s	0.00s	☆

VT2 series offers 4 groups of speed-up/speed-down time,P0-17/P0-18 and 3 groups above.P8-03 to P8-08 parameters have the same definition with P0-17 and P0-18. You can switch to choose the 4 groups through different combination of DI multi-function digital input terminal. For specific using method, please refer to function code P4-01~P4-05 for details.

P8-09	Hopping frequency 1	0.00Hz ~ MAX frequency	0.00Hz	☆
P8-10	Hopping frequency 2	0.00Hz ~ MAX frequency	0.00Hz	☆
P8-11	Hopping frequency amplitude	0.00Hz ~ MAX frequency	0.01Hz	☆
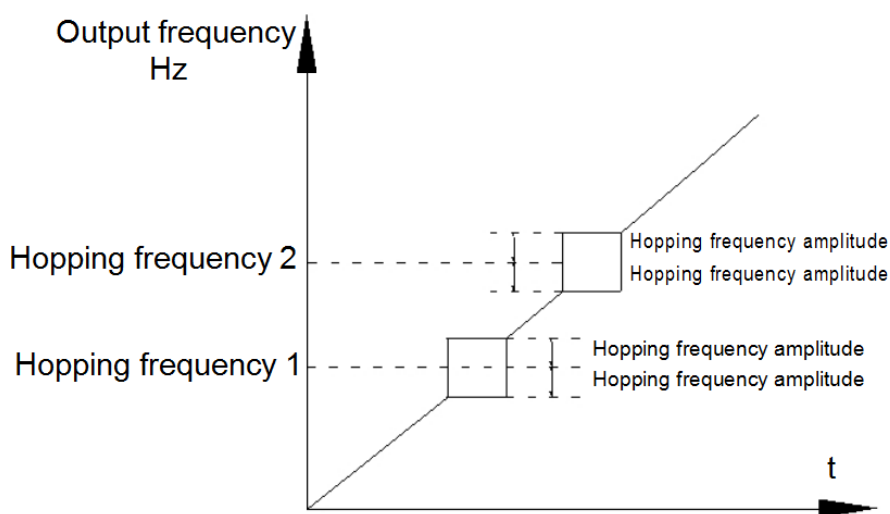
Fig.6-13 Skip frequency schematic diagram

When set frequency is within the range of hopping frequency, the actual running frequency will run close to the set frequency of hopping frequency. Inverter can avoid load mechanical resonance by setting hopping frequency.

 VT2 series can set 2 hopping frequency points, if both of them are set to 0, then the hopping frequency function is canceled. Hopping frequency and hopping frequency amplitude schematic is shown in Fig 6-13.

P8-12	Dead zone time of forward & reverse rotations	0.0s ~ 3000.0s	0.0s	☆

It refers to the transit time at the 0Hz output point when the inverter switches between forward rotation and reverse rotation. As shown in figure 6-14.

 Fig.6-14 Rotation dead zone time schematic diagram

P8-13	Reverse rotation control	0: allowed 1: forbidden	0	☆

 It is used to set if the inverter could run in reverse rotation state. If reverse rotation is not

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P8-14	Set frequency below lower limit running mode	0: Run with frequency lower limit 1: stop 2: No speed running	0	☆

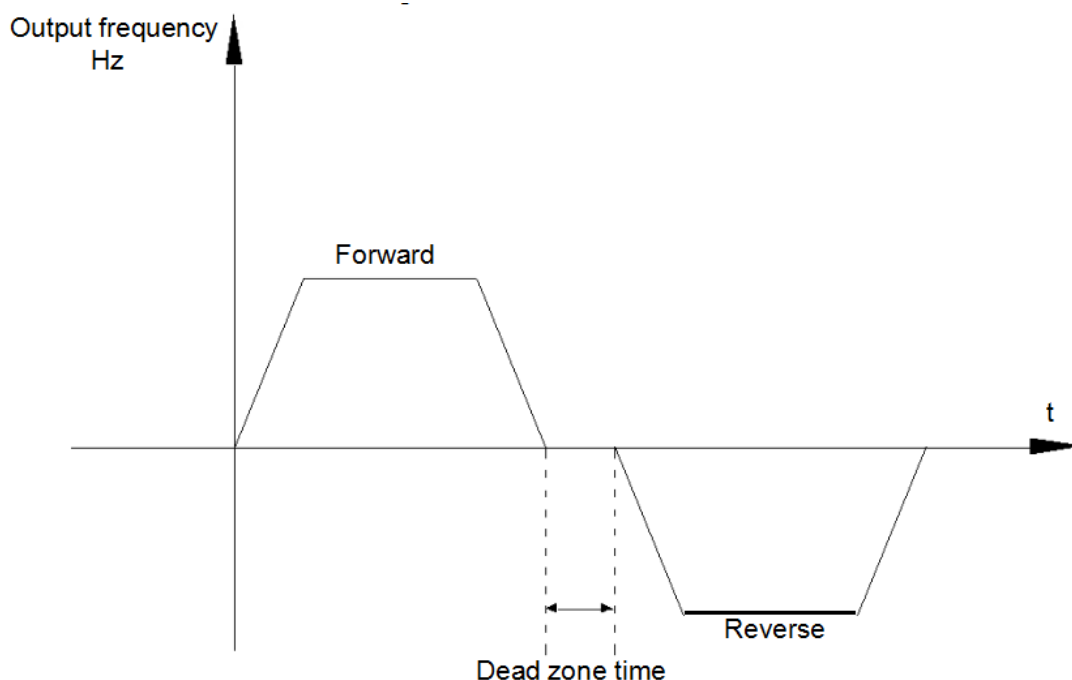It is used to select the running status of the inverter when the set frequency is lower than the frequency lower limit. VT2 series offers 3 kinds of running mode to meet all kinds of applications.

P8-15	Droop control	0.00Hz ~ 10.00Hz	0.00Hz	☆

It is used for load distribution when multiple motors drive the same load.

Droop control refers to inverter output frequency decreasing with added load. In this way, motor with heavy load output frequency decrease more, which could decrease the motor load to realize multiple motor load uniformity . This parameter is the output frequency declining value with rated output load.

P8-16	Accumulative power-on time arrival setup	0h ~ 65000h	0	☆

When the accumulative power on time (P7-13) reaches the P8-16 set value, inverter multi-function digital DO would output ON signal.

E.g.: Inverter outputs fault alarm after 100-hour power-on time:

Virtual terminal DI1 function: user-defined fault1: A1-00=44;

Virtual terminal DI1 valid state: from virtual DO1: A1-05=0000;

Virtual terminal DO1 function: power-on time arrived : A1-11=24;

Set cumulative power-on time to 100 hours: P8-16=100.

When accumulative power-on time reaches 100 hours, inverter outputs fault number 26= E.ArA.

P8-17	Accumulative running time arrival setup	0h ~ 65000h	0	☆

When the accumulated running time (P7-09) reaches this set running time, the digital output terminal DO outputs the ON signal of running time arrival.

P8-18	Start protection selection	0: No protect 1: protect	0	☆

This parameter is used to improve the safety protection coefficient.

If it is set to 1, it has two functions:

If running command is valid upon power on (E.g.: Closed-state before terminal running command power on), inverter will not respond to the running command. Users should first cancel running command, after running command coming into valid again, the inverter then responds. If running command is valid upon inverter fault reset, inverter will not respond to the running command. Running protection status can be eliminated after cancelling the running command. This can prevent the dangers caused by the automatic running of the motor under unexpected condition.

P8-19	Frequency detection value (FDT1)	0.00Hz ~ MAX frequency	50.00Hz	☆
P8-20	Frequency detection hysteresis value (FDT1)	0.0% ~ 100.0% (FDT1 level)	5.0%	☆
P8-21	Frequency arrival detection amplitude	0.0% ~ 100.0% (MAX frequency)	0.0%	☆

When inverter running frequency is in certain target frequency ,multi-function terminal DO outputs ON signal. P8-21 is used to set frequency arrival detection amplitude, percentage relativing to the maximum frequency. Frequency arrival schematic diagram is shown in Fig 6-16.

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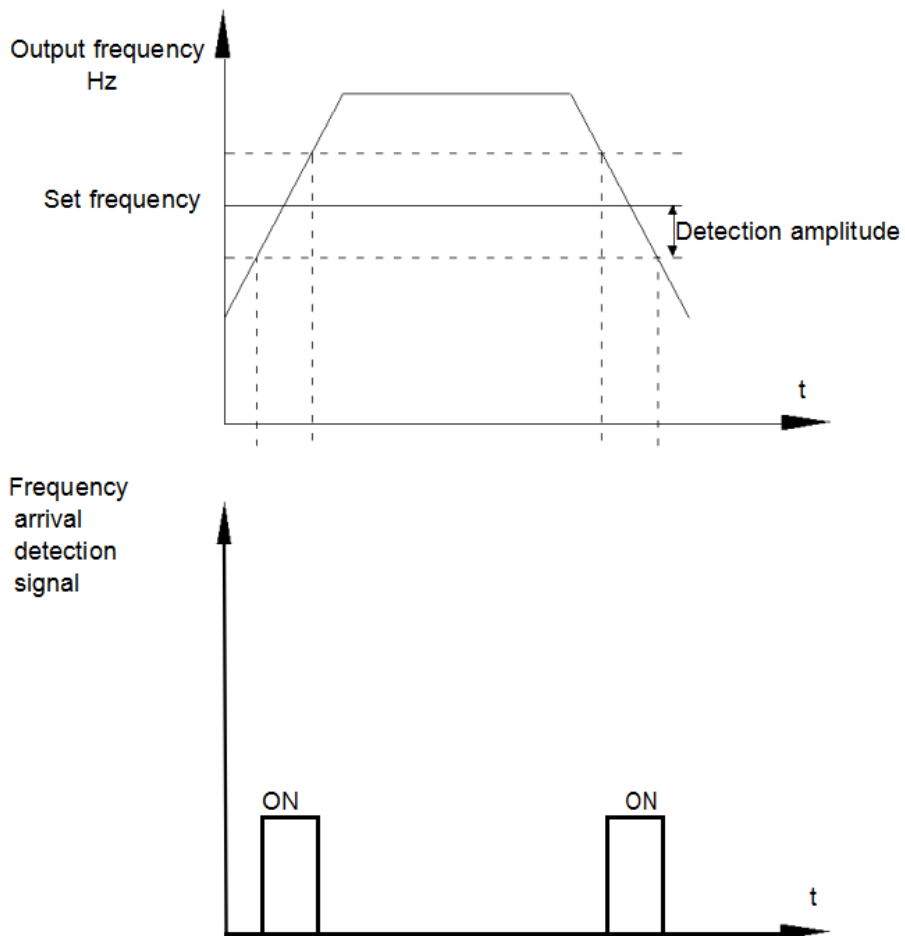
Fig.6-16 Frequency arrival detection amplitude schematic diagram

P8-22	Acc./dec. hopping frequency validity	0: invalid 1: valid	0	☆
It is used to set whether hopping frequency is effective during process of acceleration/deceleration. P8-22 =1: Actual running frequency will skip the setting frequency boundary when running within the range of hopping frequency.				
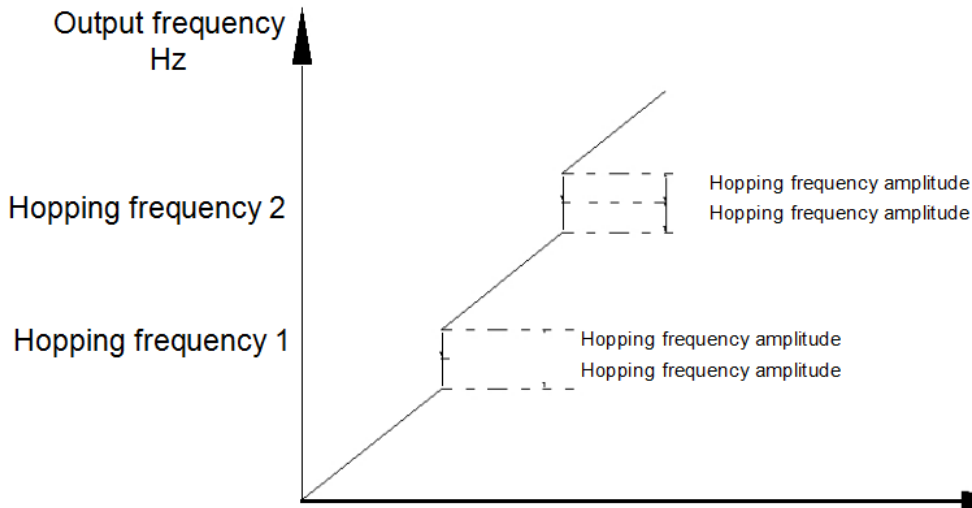
Fig.6-17 Acc./dec. hopping frequency validity schematic diagram

P8-23	P8-23--P8-24	Reserved	Reserved	
P8-25	Acc. time1 & acc. time 2 frequency switching point	0.00Hz ~ MAX frequency	0.00Hz	☆
P8-26	Dec. time1 & dec. time 2 frequency switching point	0.00Hz ~ MAX frequency	0.00Hz	☆

It is valid when motor 1 is selected without switching acceleration / deceleration time through DI terminal. In inverter running process, P8-25 & P8-26 choose different acceleration / deceleration time according to the running frequency range. As shown in fig.6-18:
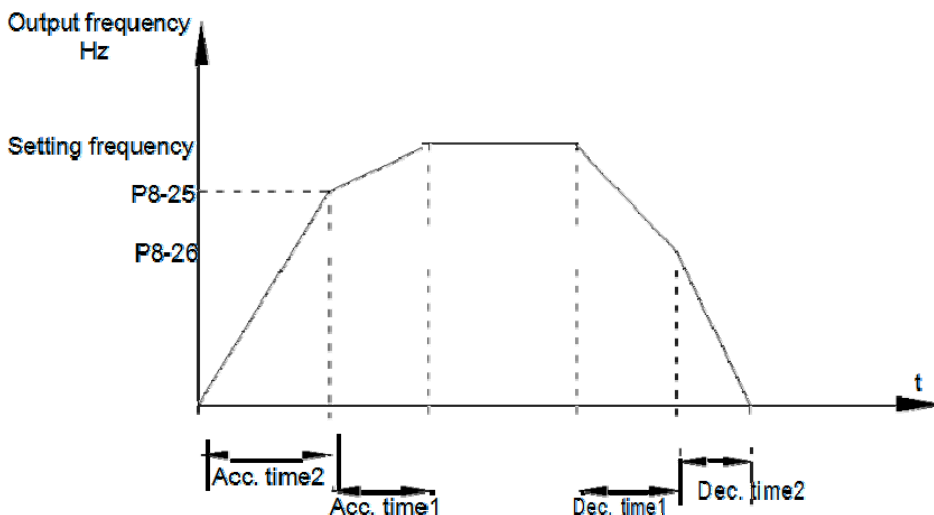
Fig.6-18 Acc./dec. time switching schematic diagram

During acceleration process, if running frequency is less than P8-25 ,then choose acc. time2. If

running frequency is greater than P8-25, choose acc. time 1. During deceleration process, if running frequency is greater than P8-26, then choose dec. time 1. If running frequency is less than P8-26 , choose dec. time 2.				
P8-27	Terminal jog priority	0: invalid 1: valid	0	☆
It is used to set if terminal jog function has the highest priority. When P8-27 is valid, if jog command occurring during running , inverter will switch to jog running mode.				
P8-28	Frequency detection value (FDT2)	0.00Hz ～MAX frequency	50.00Hz	☆
P8-29	Frequency detection hysteresis value(FDT2)	0.0% ～ 100.0%（PDT2 level）	5.0%	☆
This frequency detection function and FDT1 function are exactly the same, for details please refer to FDT1 , namely function codes P8-19, P8-20 description.				
P8-30	Random frequency arrival detection value1	0.00Hz ～MAX frequency	50.00Hz	☆
P8-31	Random frequency arrival detection range1	0.0% ～ 100.0%（MAX frequency）	0.0%	☆
P8-32	Random frequency arrival detection value2	0.00Hz ～MAX frequency	50.00Hz	☆
P8-33	Random frequency arrival detection range2	0.0% ～ 100.0%（MAX frequency）	0.0%	☆
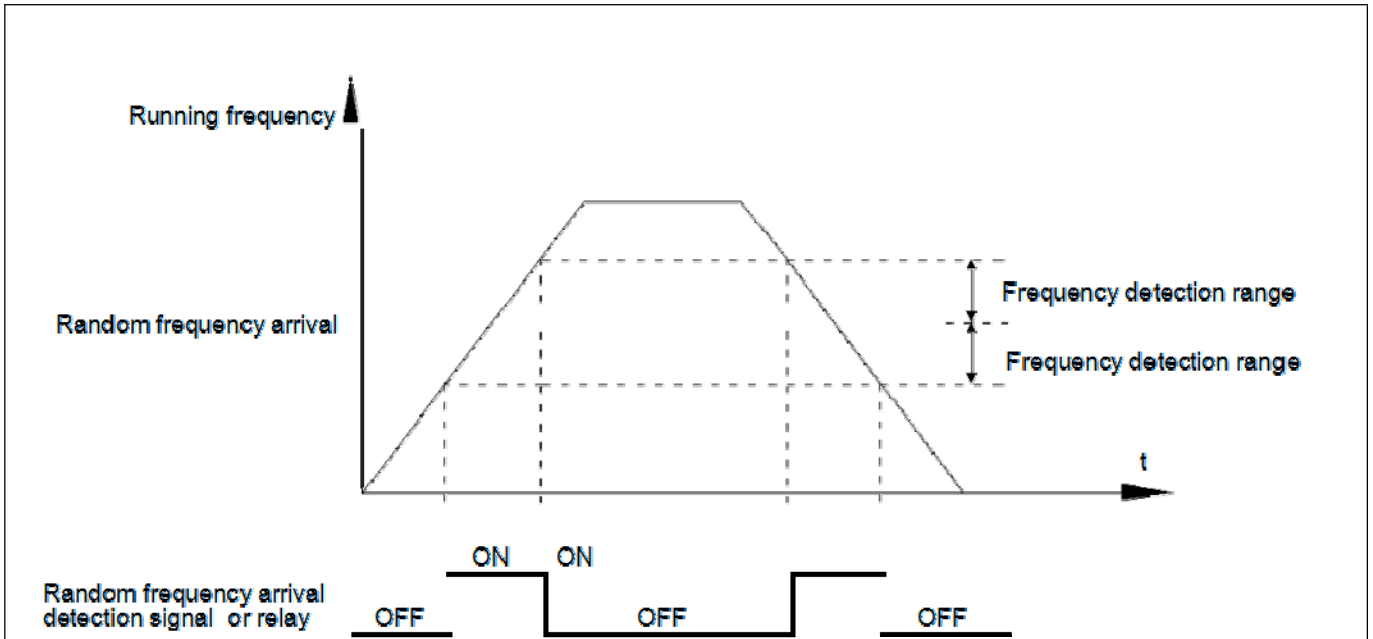
Fig.6-19 Random frequency arrival detection schematic diagram

When inverter output frequency is within the positive & negative detection range of random frequency arrival detection value , multi-function terminal DO output ON signal.

P8-34	Zero-current detection level	0.0% ~ 300.0% 100.0% motor rated current	5.0%	☆
P8-35	Zero-current detection delay time	0.01s ~ 600.00s	0.10s	☆

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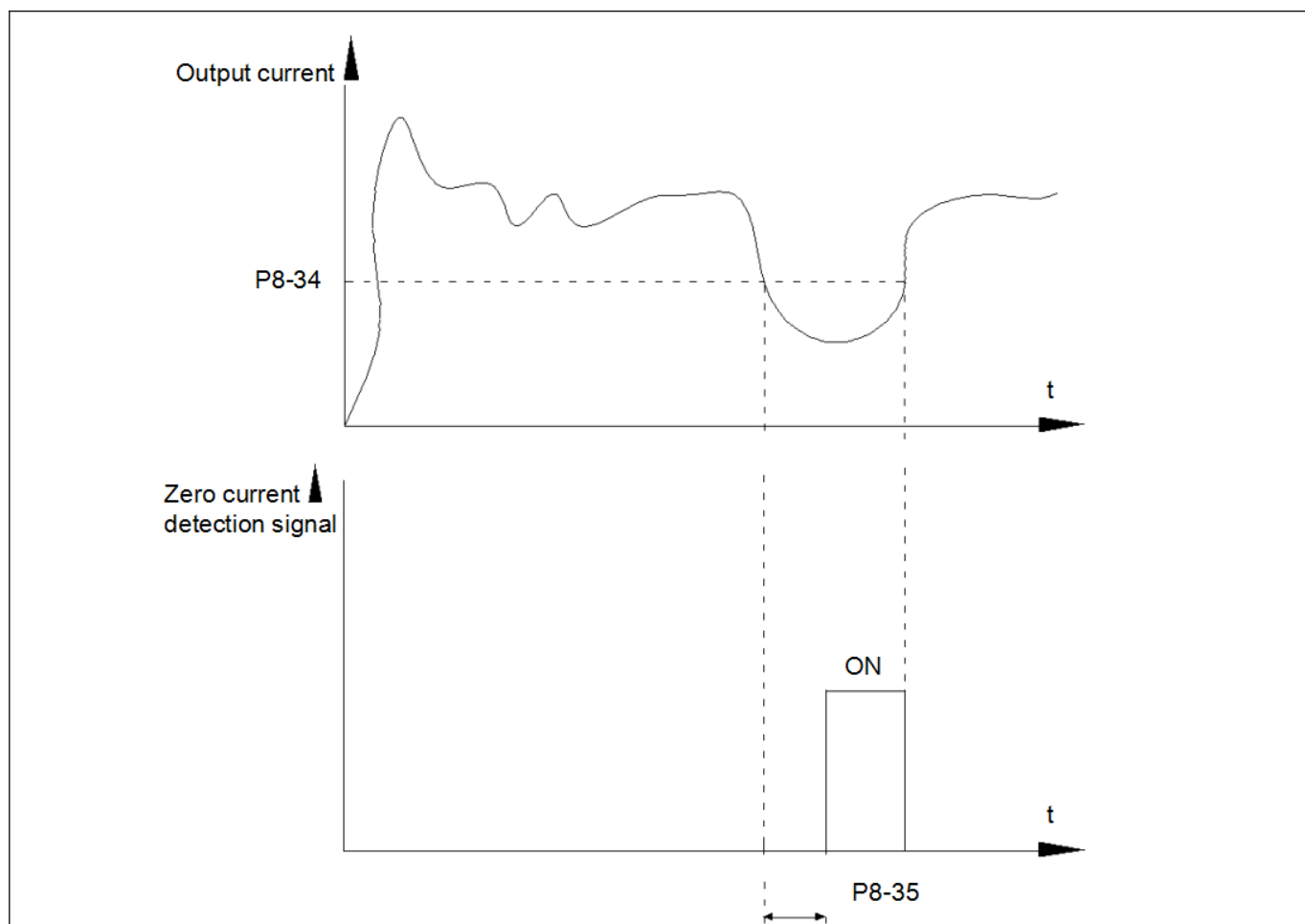
Fig.6-20 Zero-current detection schematic diagram

When inverter output current is less than or equals to zero-current detection level, and the lasting time exceeds zero-current detection delay time, inverter multi-function terminal DO output DO signal. Fig.6-20 is schematic diagram of zero-current detection.

P8-36	Output current overlimit value	0.0%(No detection) 0.1%~300.0%(Motor rated current)	200.0%	☆
P8-37	Output current overlimit detection delay time	0.00s ~ 600.00s	0.00s	☆
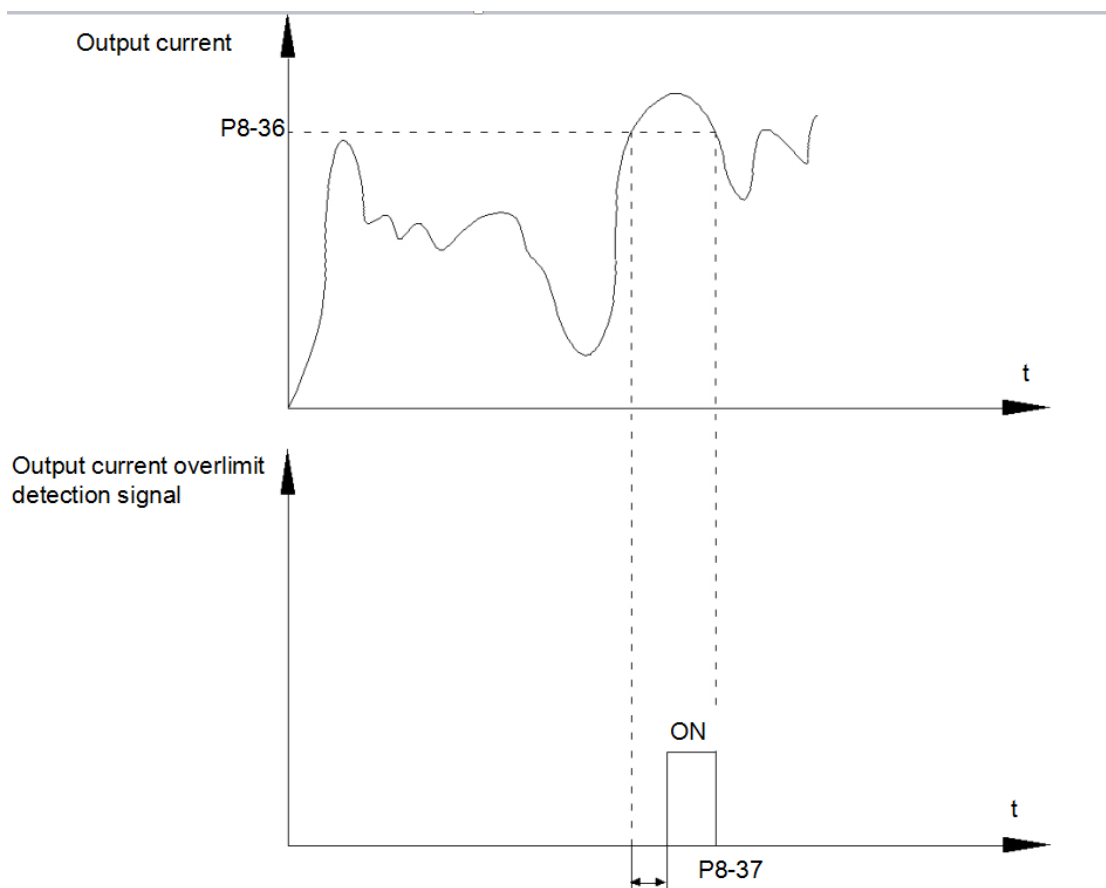
Fig.6-21 Output current overlimit detection schematic diagram

When inverter output current is larger than output current overlimit value(P8-36) ,and lasting time exceeds the software overlimit detection delay time ,inverter multi-function terminal DO output ON signal, fig.6-21 is schematic diagram of output current overlimit detection.

P8-38	Random current arrival 1	0.0%~300.0%(Motor rated current)	100.0%	☆
P8-39	Random current arrival range1	0.0%~300.0%(Motor rated current)	0.0%	☆
P8-40	Random current arrival 2	0.0%~300.0%(Motor rated current)	100.0%	☆
P8-41	Random current arrival range2	0.0%~300.0%(Motor rated current)	0.0%	☆

When inverter output frequency is within the positive & negative detection range of random arrival current value , multi-function terminal DO output ON signal.

VT2 series offers two groups of random current arrival range detection parameters ,as shown in fig. 6-22..
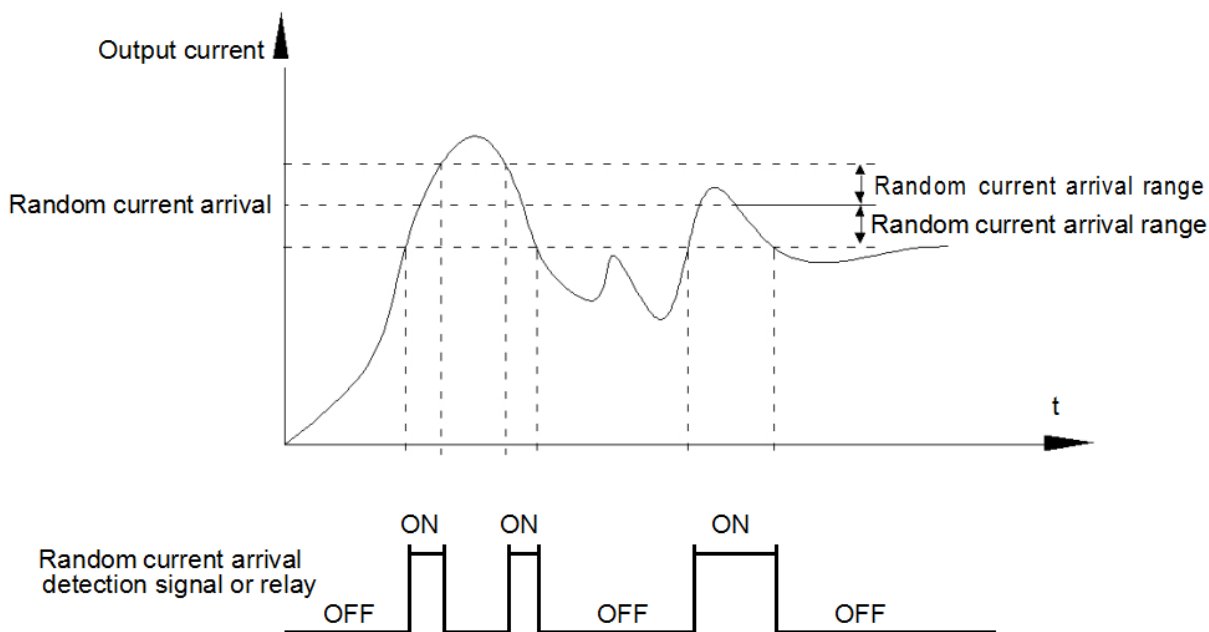
Fig. 6-22 Random current arrival detection schematic diagram

P8-42	Timing function selection	0: Invalid 1: valid	0	☆
P8-43	Running time timing selection	0: P8-44 setting 1: AI1 2: AI2 3: Potentiometer	0	☆

Analog input range 100% corresponds to P8-44.

P8-44	Timing running time	0~6500Min	0	☆

This parameter group is used to time inverter running time.

When P8-42 is valid, inverter starts timing. Inverter would automatically stop after reaching the timing setup , multi-function terminal DO output ON signal. Each time inverter startup from 0 start the timing, timing surplus running time could be viewed through U0-20. Timing of the operation time is set through P8-43, P8-44, unit minute.

P8-45	AI1 input voltage protection value lower limit	0.00V ~ P8-46	3.10V	☆

P8-46	AI1 input voltage protection value upper limit	P8-45 ~ 10.00V	6.80V	☆

When analog input AI1 is greater than the set of P8-46 or less than that of P8-47, inverter multi-function DO output ON signal of "AI1 input overrun", which indicating if AI1 input voltage is within the setup range

P8-47	Module temperature arrival	0℃ ~ 100℃	75℃	☆

Inverter multi-function terminal DO outputs "module temperature arrival" ON signal when inverter radiator temperature arrived the set value of P8-47.

P8-48	Cooling fan control	0: Cooling fan runs at motor operation 1: Cooling fan runs after power-on	0	☆

It is used to select cooling fan action mode.
P8-48=0: Cooling fan operates when inverter in running status or radiator temperature over 40℃ in inverter stop status.
P8-48=1: Cooling fan is always running after power-on.

P8-49	Wake up frequency	Sleep frequency (P8-51) ~ MAX frequency (P0-10)	0.00Hz	☆
P8-50	Wake up delay time	0.0s ~ 6500.0s	0.0s	☆
P8-51	Sleep frequency	0.00Hz ~ wake up frequency (P8-49)	0.00Hz	☆
P8-52	Sleep delay time	0.0s ~ 6500.0s	0.0s	☆

This group of function codes are used to realize sleep and wake up function.
During operation: when set frequency is less than or equals to sleep frequency(P8-51), inverter would step into sleep state and stop after sleep delay time(P8-52). If inverter is in sleep state and current running command is valid, when set frequency is no less than P8-49 wake-up frequency, inverter will start to run after P8-50 wake-up delay time. Generally, please set wake-up frequency no less than sleep frequency. Sleep function and wake-up function are valid when both wake-up frequency and sleep frequency are set to 0.00 Hz. When enabling sleep function(frequency source : PID), PID calculation selection in sleep state is influenced by function code PA-28(PA-28=1).

P8-53	The running time arrival	0.0 ~ 6500.0 Min	0.0Min	☆

Function code	Name	Setting Range	Factory Setting	property
P8-54	Output power correction coefficient	0.00% ~ 200.0%	100.0%	☆

When the running time reached the P8-53 set value, inverter multi-function DO output "Then running time arrival" ON signal.

P9 group Fault and Protection				
Function code	Name	Setting Range	Factory Setting	property
P9-00	Motor overload protection selection	0: Invalid 1: Valid	1	☆
P9-01	Motor overload protection gain	0.20 ~ 10.00	1.00	☆

P9-00=0:   Without motor overload protection function. It is recommended to install a thermal relay between the motor and the inverter.

P9-00=1:   The inverter has overload protection function for the motor according to motor overload protection inverse time limit curve. Motor overload protection inverse time limit curve: 220%×(P9-01)× motor rated current, it will report motor overload fault after it lasts for one minute. When the operating current of the motor reaches the current of 150%×(P9-01)times the rated current of the motor, it will report motor overload after it lasts 60 minutes. Users can set value of P9-01 according to the motor actual overload ability. If the parameter is set too big, it may cause danger of motor overheating damage without inverter fault report.

P9-02	Motor overload pre-alarm coefficient	50% ~ 100%	80%	☆

This function is used before motor overload fault by giving pre-alarm signal through multi-function terminal DO. This pre-alarm coefficient is used to determine the warning timing before motor overload protection. The higher the value, the shorter the warning timing will

be. When the inverter output current is accumulated more than the product of inverse time limit curve with P9-02, multi-function terminal DO output "Motor overload pre-alarm" ON signal.

P9-03	Over-voltage stall gain	0 ~ 100	30	☆
P9-04	Over-voltage stall protection voltage	650V-800V	730V	☆

Over-voltage stall gain: It adjusts the inverter's capacity in suppressing the current stall. The bigger the value is, the stronger the capacity is. For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system would be slow. For the load with large inertia, the value should be large. Otherwise, the suppressing result will be poor, and over voltage fault may be caused. Over voltage stall protection voltage: It selects the protection point for over voltage stall function. When the value is exceeded, the inverter starts to execute the over voltage stall protection function.

P9-05	Over current stall gain	0 ~ 100	20	☆
P9-06	Over current stall protection current	100% ~ 200%	150%	☆

Over current stall: When the output current of the inverter reaches setup of over current stall protection current (P9-06), if the inverter is running with acceleration speed, it will stop acceleration. When the inverter is running with constant speed, it will reduce the output frequency. When the inverter is running with deceleration speed, it will stop deceleration and the operating frequency will not recover normally till the current is less than the current stall protection current (P9-06). Over current stall protection current: It selects the protection point for over current stall function. When the value is exceeded, the inverter starts to execute the over current stall protection function. This value is relative to the percentage of rated current of the motor. Over current stall gain: It adjusts the inverter's capacity in suppressing the over current stall. The bigger the value is, the stronger the

capacity is.				
P9-07	Ground short circuit protection upon power-on	0: Invalid 1: valid	1	☆
It determines whether the motor has ground short circuit fault upon power-on. If this function is valid, the inverter UVW end will output voltage within the period of time after power-on.				
P9-08	Braking unit initial voltage	650 ~ 800V	680V	☆
Note: Please set the true parameters ,otherwise it will abnormal of the built-in braking unit.				
P9-09	Fault auto reset time	0 ~ 20	0	☆
When the inverter selects fault auto reset, it is used to set the times of auto reset. If this value is exceeded, the inverter will perform fault protection.				
P9-10	Fault auto reset FAULT AO selection	0: Invalid 1: Valid	0	☆
If inverter has been set of fault auto reset function , P9-10 is used to set if FAULT DO actions or not during fault auto reset time.				
P9-11	Fault auto reset interval time	0.1s ~ 100.0s	1.0s	☆
The waiting time of the inverter from the fault alarm to auto reset.				
P9-12	Input phase lack protection selection	Unit's digit: Input phase lack protection selection Ten's digit: Contactor attracting protection 0: Forbidden 1: allowed	00	☆
1bit: It is used to choose whether to protect input phase loss. 10bit: Contactor attracting protection VT2 series inverter above 18.5kW (type G) has input phase fault protection function.				

For the inverter below 18.5kW (type P), the input phase fault protection function is invalid at any setup.

P9-13	Output phase lack protection selection	0: Forbidden 1: Allowed	1	☆
		It is used to choose whether to protect output open-phase.		
P9-14	The 1ST fault type	0: No fault 1: reserved 2: Acceleration over current 3: Deceleration over current 4: Constant speed over current 5: Acceleration over voltage 6: Deceleration over voltage 7: Constant speed over voltage 8: Control power supply fault 9: Undervoltage fault	-	●
P9-15	The 2nd fault type	10: AC Drive overload 11: Motor overload 12: Input phase lack 13: Output phase lack 14: Module overheating 15: External equipment fault 16: Communication fault 17: Contactor fault 18: Current inspection fault 19: Motor tuning fault 20: Encoder /PG card fault 21: EEPROM read & write fault 22: AC Drive hardware fault 23: Short circuit to ground fault	-	●
P9-16	The latest fault type	24: Reserved 25: Reserved 26: Total running time arrival fault	-	●

		27: User-defined fault 1 28: User-defined fault 2 29: Total power-on time arrival fault 30: Load off fault 31: PID feedback loss during operation fault 40: Each wave current limiting fault 41: Motor switching fault 42-51: Reserved		
P9-17	The 3rd fault frequency	-	-	●
P9-18	The 3rd fault current	-	-	●
P9-19	The 3rd fault bus voltage	-	-	●
P9-20	The 3rd fault input terminal	-	-	●
P9-21	The 3rd fault output terminal	-	-	●
P9-22	The 3rd fault AC Drive state	-	-	●
P9-23	The 3rd fault power-on time	-	-	●
P9-24	The 3rd fault running time	-	-	●
P9-27	The 2nd fault frequency	-	-	●
P9-28	The 2nd fault current	-	-	●
P9-29	The 2nd fault bus voltage	-	-	●
P9-30	The 2nd fault input terminal	-	-	●

P9-31	The 2nd fault output terminal	-	-	●
P9-32	The 2nd fault AC Drive state	-	-	●
P9-33	The 2nd fault power-on time	-	-	●
P9-34	The 2nd fault running time	-	-	●
P9-35	P9-35—P9-36	Reserved	Reserved	
P9-37	The 1st fault frequency	-	-	●
P9-38	The 1st fault current	-	-	●
P9-39	The 1st fault bus voltage	-	-	●
P9-40	The 1st fault input terminal	-	-	●
P9-41	The 1st fault output terminal	-	-	●
P9-42	The 1st fault AC Drive state	-	-	●
P9-43	The 1st fault power-on time	-	-	●
P9-44	The 1st fault running time	-	-	●
P9-45	P9-45—P9-58	Reserved	Reserved	☆
P9-59	Transient stop selection	0 invalid 1 Deceleration 2 Deceleration to stop	0	★
P9-60	Transient stop action pause protection voltage	85%	85%~100%	★
P9-61	Transient stop voltage recovery	0.5s	0.1~100s	★

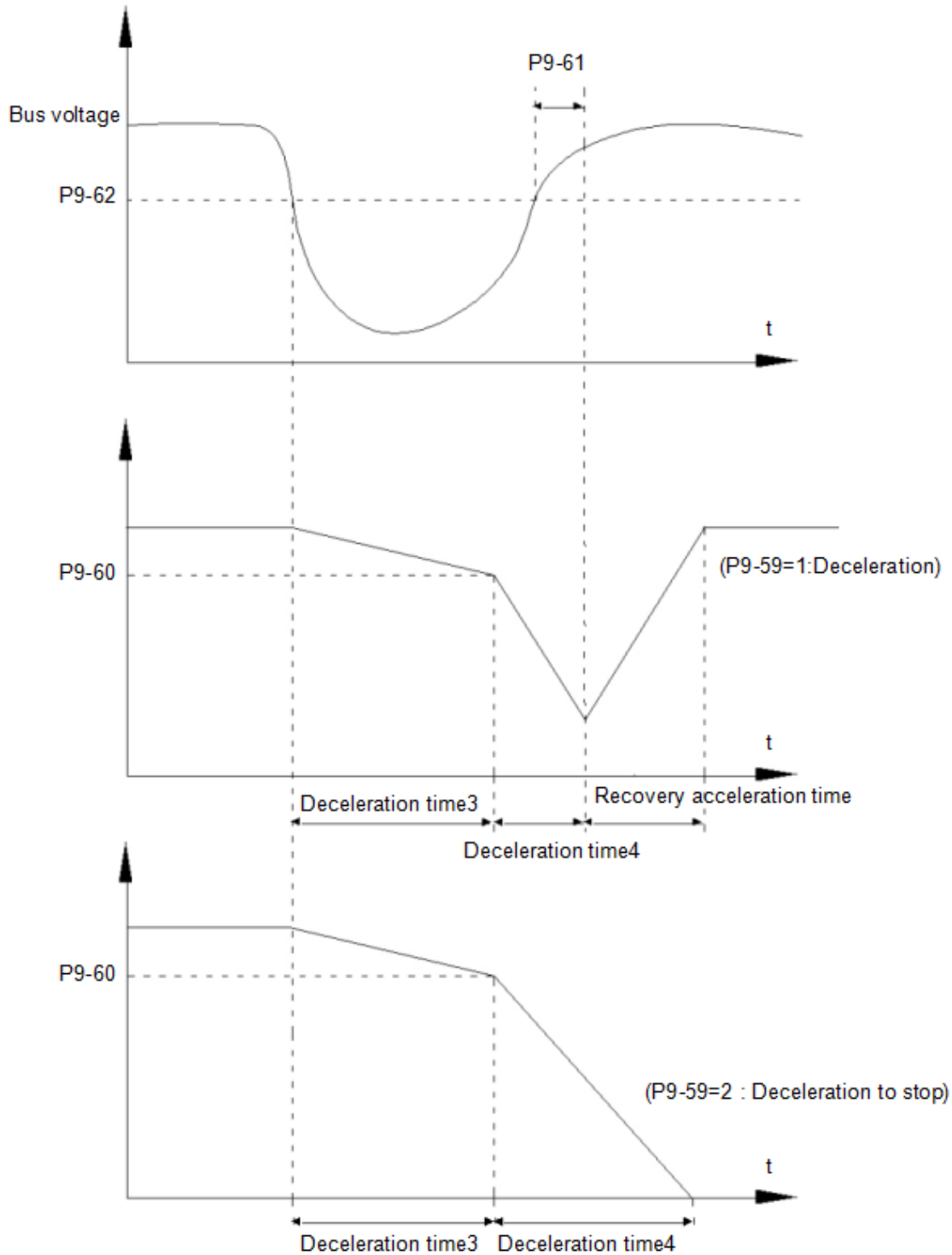|	judgment time				
P9-62	Transient stop action judgment voltage	80%		60%~100%	★

Fig.6-23 Transient stop action schematic diagram

The function defines when instant outage or voltage suddenly drops, inverter compensating dc busvoltage decrease by load feedback energy through decreasing output revolving speed, which maintaining inverter running.

P9-59=1: When instant outage or voltage suddenly drops, inverter decelerates. Inverter normally accelerates to the set running frequency until bus voltage came to normal. Bus voltage has restored to normal is based on normal bus voltage duration time. If the time exceeds P9-61 set value , bus voltage is normal. P9-59=2: When instant outage or voltage suddenly drops, inverter decelerates to stop.

P9-63	Load-off protection selection	0: invalid 1: valid	0	☆
P9-64	Load-off detection level	0.0 ~ 100.0%	10.0%	☆
P9-65	Load-off detection time	0.0 ~ 60.0s	1.0s	☆

When the protection function is valid and inverter output current is less than load-off detection level P9-64(duration time ＞P9-65), inverter output frequency automatically decreased to 7% of the rated frequency. In the load-off protection period, if the load restored, the inverter automatically restore to the set running frequency.

P9-67	Over speed detection value	0.0%～ 50.0%（MAX frequency）	20.0%	☆
P9-68	Over speed detection time	0.0s: No detection 0.1 ~ 60.0s	1.0s	☆

This function is only valid in speed sensor vector control.
Inverter fault alarm when motor actual revolving speed exceeds the set frequency(excess value ＞ P9-67 ,duration time ＞P9-68) .Fault No. 43=E.oSF.

P9-69	Excessive speed deviation detection value	0.0%～ 50.0%（MAX frequency）	20.0%	☆
P9-70	Excessive speed deviation detection time	0.0s: NO detection 0.1 ~ 60.0s	5.0s	☆

This function is only valid in speed sensor vector control.
Inverter fault alarms when deviation detected between motor actual revolving speed and the set frequency(deviation > P9-69, duration time > P9-70). Fault No. 42=E.SdL. P9-70=0.0s: Excessive speed deviation fault detection is canceled.

Function code	Name	Setting Range	Factory Setting	property
P9-71	Reserved	-	-	☆
P9-72	Reserved	-	-	☆
P9-73	Instantaneous stop action deceleration time	0~300.0s	20.0s	★
PA group PID function				
Function code	Name	Setting Range	Factory Setting	property
PA-00	PID reference source	0: PA-01 setting 1: AI1 2: AI2 3: Potentiometer 4: reserved 5: Communication 6: MS command	0	☆
PA-01	PID reference value	0.0% ~ 100.0%	50.0%	☆
It is used to select target parameter reference channel of process PID. Set target value of process PID is a relative value, set range is 0.0%~100.0%. PID feedback value is a relative value as well,PID play the role of making the two relative value the same.				
PA-02	PID feedback source	0: AI1 1: AI2 2: Potentiometer 3: AI1-AI2 4: reserved 5: Communication 6: AI1+AI2 7: MAX(|AI1|, |AI2|) 8: MIN(|AI1|, |AI2|)	0	☆
It is used to select the feedback channel of PID Feedback value of process PID is a relative value, set range is 0.0%~100.0%.				
PA-03	PID action direction	0: Positive action 1: Negative action	0	☆
Positive action: If the feedback signal is smaller than the PID reference signal, it is required to boost the output frequency of the inverter to make PID reach balance. The winding				

tension PID control is such a case.

Negative action: If the feedback signal is smaller than the PID reference signal, it is required to decrease the output frequency of the inverter to make PID reach balance. The unwinding tension PID control is such a case.

This function is influenced by function 35,please pay attention during operation.

PA-04	PID reference feedback range	0 ～ 65535h	1000	☆

PID reference feedback range is a dimensionless unit which is used to display U0-15 PID setup and U0-16 PID feedback. PID reference feedback related to the value 100.0%, corresponding to a given feedback range PA-04.If PA-40 is set to 2000,PID is set to 100.0%,PID given display U0-15 is 2000.

PA-05	Proportional gain Kp1	0.0 ～ 100.0	20.0	☆
PA-06	Integration time Ti1	0.01s ～ 10.00s	2.00s	☆
PA-07	Differential time Td1	0.000s ～ 10.000s	0.000s	☆

Proportional gain Kp1:   the parameter determines the adjustable strength of PID regulator. The larger P is, the greater the adjustable strength will be. When the parameter is set to 100.0, it means that when the deviation between PID feedback value and reference value is 100.0%, the range for the PID regulator to regulate the output frequency commands is the maximum frequency (integration effect and differential effect are omitted).

Integration time Ti1:   determines the strength of PID integration regulation. The shorter the integration time , the greater adjustable strength will be. Integration time means that when the deviation between PID feedback value and reference value is 100%, the adjustment by the integration regulator (proportional effect and differential effect are omitted) after continuous adjustment in this period reaches the maximum frequency.

Differential time Td1:   determines the degree of adjustment that PID regulator performs on the derivation between PID feedback value and reference value. Differential time means that if the feedback value changes 100% within this time, the adjustment by the differential regulator (proportional effect and differential effect are omitted) will reach the maximum frequency. The longer differential time is, the higher the degree of adjustment will be.

PA-08	PID cutoff frequency of reverse rotation	0.00 ～MAX frequency	2.00Hz	☆

In some cases, only when the frequency of the PID output is negative (i.e., frequency inversion) could PID put the reference and feedback to the same state. High inversion

frequency is not allowed in some certain cases, PA-08 is used to determine reverse

frequency upper limit.

PA-09	PID deviation limit	0.0% ~ 100.0%	0.0%	☆

It is used to set the maximum allowable deviation between the system feedback value and

reference value. When the deviation between the PID feedback and reference is within this

range, the PID stops adjustment. The deviation limit is calculated according to the

percentage of the PID setup source (or feedback source). When deviation between reference

value and the feedback value is small, output frequency is stability constant. It's especially

effective for some closed loop control occasions.

PA-10	PID differential amplitude limit	0.00% ~ 100.00%	0.10%	☆

In PID regulation, the role of differential is relatively sensitive that system oscillation may be

easily caused. Therefore, range of PID differential regulation has been limited to a small

range. PA-10 is used to set PID differential output range.

PA-11	PID reference change duration	0.00 ~ 650.00s	0.00s	☆

PID reference changes according to this parameter value, which corresponds to the time

taken for the PID reference to change from 0% to 100%.

When PID reference changed, PID given value linear changes in accordance with given time,

which can reduce system adverse effect caused by given mutation.

PA-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	☆
PA-13	PID output filter time	0.00 ~ 60.00s	0.00s	☆

PA-12 is used for filtering of PID feedback. The filtering helps to reduce the influence of the

feedback interference, but brings response performance of process closed-loop system.

PA-13 is used for filtering of PID output frequency. The filtering helps to reduce the

mutations of the output frequency, but brings response performance of process closed-loop system.

| PA-14	-	-	-	☆
PA-15	Proportional gain Kp2	0.0 ~ 100.0	20.0	☆
PA-16	Integration time Ti2	0.01s ~ 10.00s	2.00s	☆
PA-17	Differential time Td2	0.000s ~ 10.000s	0.000s	☆
PA-18	PID parameter switching condition	0: No switching 1: Switching by DI terminal 2: Switching automatically by deviation 3: Switching automatically by running frequency	0	☆
PA-19	PID parameter switching deviation1	0.0% ~ PA-20	20.0%	☆
PA-20	PID parameter switching deviation2	PA-19 ~ 100.0%	80.0%	☆
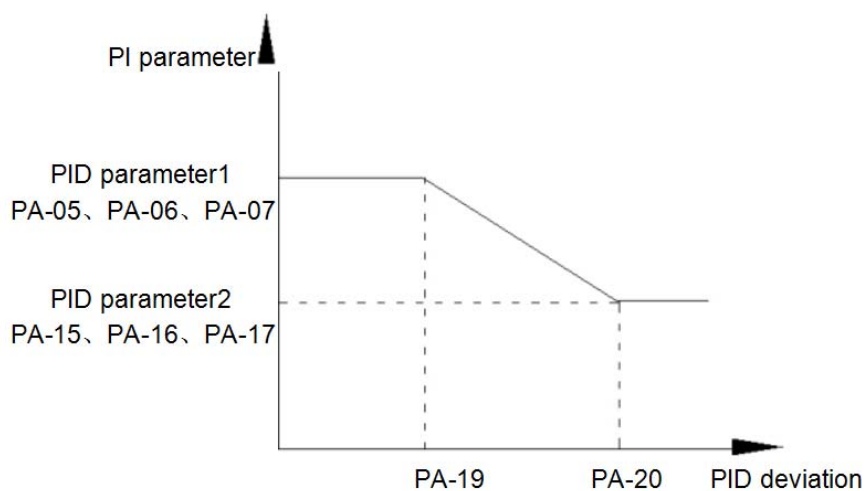
Fig.6-25 PID parameter switching schematic diagram

In some applications, one group of PID parameters can not meet the needs of the whole operation process. Different parameters are used for different situations.

This group of function codes is used to switch 2 groups of PID parameters. Regulator

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parameters PA-15~PA-17 and parameter PA-05~PA-07 have the same setting method.

Two groups of PID parameters can be switched through multi-function digital DI terminal as well as PID deviation auto switching.

PA-18=1: Set multi-function terminal to 43(PID parameter switching terminal). Choose parameter group 1(PA-05~PA-07) when terminal invalid, while valid please choose parameter group 2(PA-15~PA-17). PA-18=2: When deviation absolute value between reference and feedback is less than PA-19 set value, PID parameters select parameter group 1. When deviation absolute value between reference and feedback is greater than PA-20 set value, PID parameters select group 2. When deviation absolute value between reference and feedback is within the range of switching deviation 1 & 2 , PID parameters select linear interpolation value of the 2 PID parameter groups. As shown in 5-26。

PA-21	PID initial value	0.0% ~ 100.0%	0.0%	☆
PA-22	PID initial value retention time	0.00 ~ 650.00s	0.00s	☆

Inverter fixed startup value is PID initial value(PA-21) .PID starts closed-loop regulation after PID initial value retention time(PA22).
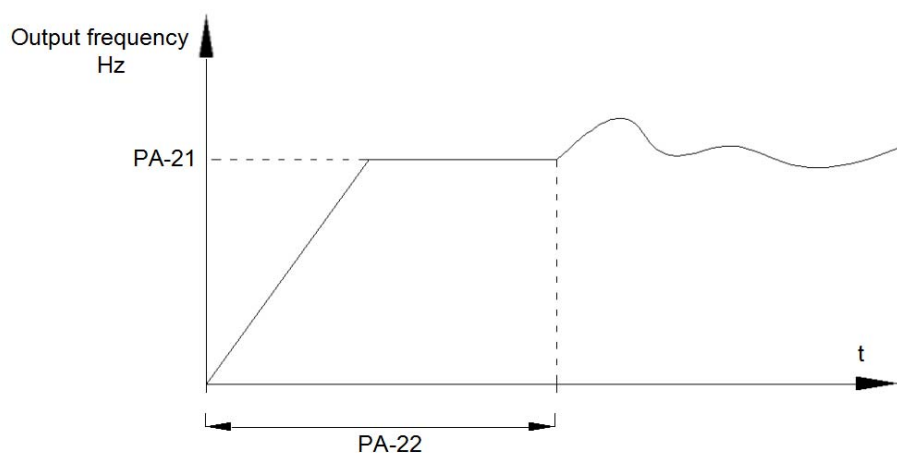

Fig.6-26 PID initial function schematic diagram

This function is used to limit difference between the PID output two beats (2ms / beat),

which suppressing rapid change of PID output, so that the inverter operation tends to be stable.

PA-23	Output deviation forward maximum value	0.00% ~ 100.00%	1.00%	☆
PA-24	Output deviation reverse maximum value	0.00% ~ 100.00%	1.00%	☆

PA-23 and PA-24 correspond to the output deviation maximum absolute value of forward running and reverse running respectively.

PA-25	PID integration attribute	Unit's digit: Integration separation 0: invalid 1: valid Ten's digit: Whether stop integration when reaching output limit 0 : Continue to integration 1: Stopping integration	00	☆

1bit : Integration separation

If integration separation valid, then when the multi-function digital DI integration suspended (function 22) effective, the PID integration stop operation, and only proportion and differential function effectively.

If integration separation invalid, regardless of validity of multi-function digital DI ,integration separation is invalid.

10bit : Whether stop integration when reaching output limit

When PID operation output reaches the maximum or minimum value, user could choose whether to stop integration or not.

If you choose to stop integration, then the PID integration stops calculation, which may

		contribute to the reduction of PID overshoot.		
PA-26	PID feedback loss detection value	0.0%: No judging 0.1% ~ 100.0%	0.0%	☆
PA-27	PID feedback loss detection time	0.0s ~ 20.0s	0.0s	☆

This function is used to judge if PID feedback has been lost.

When PID feedback value is less than PA-26 set value, and lasted for more than PA-27 set value, inverter fault alarm. Fault No. 31= E.PID.

PA-28	PID stop operation	0: Stop without operation 1: Stop with operation	0	

It is used to select if PID keeping operation under PID stop status. Generally PA-28=0 in stop status.

Pb group Swing frequency, fixed length and counting				
Function code	Name	Setting Range	Factory Setting	property
Pb-00	Swing setup mode	0: Relative to the center frequency 1: Relative to the maximum frequency	0	☆

It is used to determine the swing amplitude benchmark value.

0:   Relative to the center frequency (P0-07 frequency source):   It is a variable swing amplitude system, with the swing amplitude changing with the center frequency (setup frequency).

1:   Relative to the maximum frequency (P0-10 maximum output frequency):   It is a fixed swing amplitude system, with fixed swing amplitude that is calculated by the maximum frequency.

Pb-01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%	☆
Pb-02	Jump frequency amplitude	0.0% ~ 50.0%	0.0%	☆

It is used to determine the amplitude value and the jump frequency value. Swing relative

to the center frequency (variable swing, select Pb-00=0): Swing (AW) =frequency source P0-07 setup times swing amplitude Pb-01. Swing relative to the maximum frequency (fixed swing, Pb-00=1) : Swing (AW) = maximum frequency P0-10 times swing amplitude Pb-01. When the swing is running, the jump frequency

relative to the swing= Swing (AW) times jump frequency amplitude P0-02. If "Swing relative to the center frequency (variable swing amplitude, Pb-00=0)" is selected, the jump frequency is variable value. If "Swing relative to the maximum frequency (fixed swing, Pb-00=1)" is selected, the jump frequency is fixed value. The swing operation frequency is constrained by upper frequency limit and lower frequency limit.

Pb-03	Swing frequency cycle	0.1s ～ 3000.0s	10.0s	☆
Pb-04	Triangle wave rise time coef.	0.1% ～ 100.0%	50.0%	☆

Swing frequency cycle: It defines the time of a whole cycle for rising and falling of the swing frequency. The coefficient of triangle wave rising time is Pb-04,it is time percentage of triangle rising time relativing to swing frequency cycle Pb-03. Triangle wave rising time= Swing frequency cycle Pb-03 times triangle wave rising time coefficient Pb-04 (unit: s) Triangle wave falling time= Swing frequency cycle Pb.03 times (1-triangle wave rising time coefficient Pb.04) (unit: s)

Pb-05	Setup length	0m~65535m	1000m	☆
Pb-06	Actual length	0m~65535m	0m	☆
Pb-07	Pulse number per meter	0.1~6553.5	100	☆

The three parameters such as setup length, actual length and number of pulses per meter are mainly used for fixed-length control. Length information needs to be collected through multi-function digit input terminal, you can get Pb.06 actual length by division of terminal sampling pulse number and Pb-06.When actual length is longer than reference length Pb-05, multi-function digit terminal DO output "length arrival" ON signal.During the process of fixed-length control, length reset operation(by multi-function terminal DI)is permitted(choose DI function selection as 28),for specifications please refer to P4-00~P4-09. Set corresponded input terminal function to "length counting input" (function 27).When pulse frequencyis high, only DI5 port can be used.

Pb-08	Counting value setup	1 ~ 65535	1000	☆
Pb-09	Designated counting value	1 ~ 65535	1000	☆

Counting value should be collected through multi-function digital input terminal. Corresponding input terminal should be set to the function of "counter input" (function 25) in application. DI5 terminal should be used when pulse frequency is high. When counting value reaches Pb-08 set value, multi-function digit DO output "setup counting value arrival" ON signal, then stop counting. When counting value reaches Pb-09 set value, multi-function digit DO output "designated counting value arrival" ON signal, then continues to count until reaching "setup counting value" .Specified counting value should not be greater than setup counting value Pb-08.

PC group MS speed function & simple PLC function				
Function code	Name	Setting Range	Factory Setting	property
PC-00	MS command 0	-100.0% ~ 100.0%	0.0%	☆
PC-01	MS command 1	-100.0% ~ 100.0%	0.0%	☆
PC-02	MS command 2	-100.0% ~ 100.0%	0.0%	☆
PC-03	MS command 3	-100.0% ~ 100.0%	0.0%	☆
PC-04	MS command 4	-100.0% ~ 100.0%	0.0%	☆
PC-05	MS command 5	-100.0% ~ 100.0%	0.0%	☆
PC-06	MS command 6	-100.0% ~ 100.0%	0.0%	☆
FC-07	MS command 7	-100.0% ~ 100.0%	0.0%	☆
PC-08	MS command 8	-100.0% ~ 100.0%	0.0%	☆
PC-09	MS command 9	-100.0% ~ 100.0%	0.0%	☆
PC-10	MS command 10	-100.0% ~ 100.0%	0.0%	☆

PC-11	MS command 11	-100.0% ~ 100.0%	0.0%	☆
PC-12	MS command 12	-100.0% ~ 100.0%	0.0%	☆
PC-13	MS command 13	-100.0% ~ 100.0%	0.0%	☆
PC-14	MS command 14	-100.0% ~ 100.0%	0.0%	☆
PC-15	MS command 15	-100.0% ~ 100.0%	0.0%	☆

MS speed command can be used on three occasions: frequency source, VF separation voltage source, process PID set source Dimension of MS speed command is a relative value ranging from -100.0% to 100.0%. When used as command source, it's the percentage of maximum frequency. When used as VF separation voltage source, it's the percentage of motor rated voltage. When used as PID set source, dimension conversion is not needed during the process. MS command should be selected according to the different states of multi-function digit DI terminals. For details please refer to P4 group.

PC-16	PLC running mode	0: Single running stop 1: Single running end remaining final value 2: Continuous circulation	0	☆

Simple PLC command can be used on two occasions: frequency source, VF separation voltage source. Fig 5-30 is the schematic diagram of simple PLC that used as frequency source. Positive & negative of

PC-00~PC-15 determines the running direction.

PLC has 3 running modes as frequency source (VF separation voltage source is not provided with the 3 modes):

0: Single running stop Upon completion of one single cycle of the inverter, it will stop automatically and will not start until running command is given again.

1: Single running end remaining final value Upon completion of one single cycle of the inverter, the inverter will remain the running frequency and direction of last one phase. After the inverter restarted upon stop, it will run from the initial status of PLC.

2: Continuous circulation Upon completion of one single cycle of the inverter, it will enter next cycle and not stop until stop command is given.

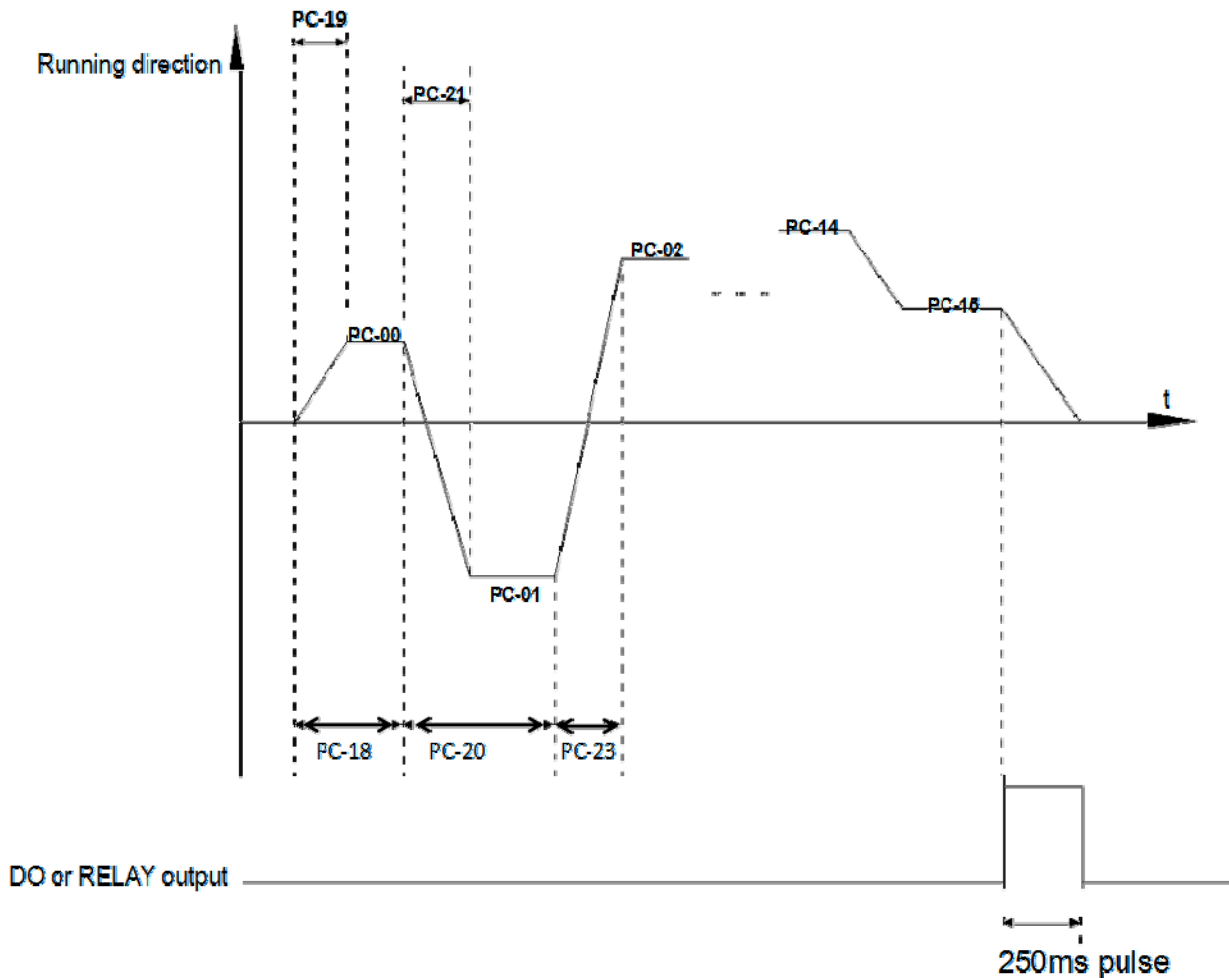VTDRIVE VT2 Series User-Manual

Fig.6-29 Simple PLC schematic diagram

PC-17	PLC power off memory selection	Unit's digit: Power off memory selection 0: Power off without memory 1: Power off with memory Ten's digit: Stop memory selection 0: Stop without memory	00	☆

		1: Stop with memory		
		PLC power off memory refers to memorizing the PLC running stage and running frequency before power off, and continues to run from the memory stage upon next power-on. If 1bit is set to 0, PLC process would restart upon power-on. PLC stop memory refers to the record of PLC running stage and running frequency of the time before. Next time PLC continues to run from the memory stage. If 10bit is set to 0, PLC process would restart upon power-on.		
PC-18	PLC 0segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-19	PLC 0segment acc./dec. time	0 ～ 3	0	☆
PC-20	PLC 1segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-21	PLC 1segment acc./dec. time	0 ～ 3	0	☆
PC-22	PLC 2 segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-23	PLC 2 segment acc./dec. time	0 ～ 3	0	☆
PC-24	PLC 3 segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-25	PLC 3 segment acc./dec. time	0 ～ 3	0	☆
PC-26	PLC 4 segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-27	PLC 4 segment acc./dec. time	0 ～ 3	0	☆
PC-28	PLC 5 segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-29	PLC 5 segment acc./dec. time	0 ～ 3	0	☆
PC-30	PLC 6 segment running time	0.0s(h) ～ 6553.5s(h)	0.0s(h)	☆
PC-31	PLC 6 segment acc./dec. time	0 ～ 3	0	☆

PC-32	PLC 7 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-33	PLC 7 segment acc./dec. time	0 ~ 3	0	☆
PC-34	PLC 8 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-35	PLC 8 segment acc./dec. time	0 ~ 3	0	☆
PC-36	PLC 9 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-37	PLC 9 segment acc./dec. time	0 ~ 3	0	☆
PC-38	PLC 10 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-39	PLC 10 segment acc./dec. time	0 ~ 3	0	☆
PC-40	PLC 11 segment running time	0.0s(h) ~ 6553.5s(h)	0.0sh)	☆
PC-41	PLC 11 segment acc./dec. time	0 ~ 3	0	☆
PC-42	PLC 12 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-43	PLC 12 segment acc./dec. time	0 ~ 3	0	☆
PC-44	PLC 13 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-45	PLC 13 segment acc./dec. time	0 ~ 3	0	☆
PC-46	PLC 14 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-47	PLC 14 segment acc./dec. time	0 ~ 3	0	☆
PC-48	PLC 15 segment running time	0.0s(h) ~ 6553.5s(h)	0.0s(h)	☆
PC-49	PLC 15 segment acc./dec. time	0 ~ 3	0	☆

PC-50	Running time unit	0: seconds 1: hours	0	☆
PC-51	MS command 0 reference mode	0: Function code PC-00 setting 1: AI1 2: AI2 3: Potentiometer 4: served 5: PID 6: Pre-frequency（P0-08） UP/DOWN modified	0	☆

It is used to select the reference channel of MS speed 0. Besides choosing PC-00, MS command 0 has many other options, which is convenient for switching between MS command and other set modes. Both MS command and simple PLC used as frequency source can easily realize switching between the two frequency sources.

Pd group Communication function group				
Function code	Name	Setting range	Default	property
Pd-00	Baud rate	Unit's digit: MODBUS 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	5005	☆
Pd-01	MODBUS Data format	0: Without calibration (8-N-2) 1: Even parity calibration (8-E-1) 2: Uneven parity calibration (8-O-1) 3: No calibration (8-N-1) (MODBUS valid)	0	☆
Pd-02	Local address	1-247, 0 is broadcast address	1	☆

Pd-03	MODBUS Response delay	0ms ~ 20ms	2	☆
Pd-04	Excessive communication time	0.0: invalid，0.1 ~ 60.0s	0.0	☆
Pd-05	Data transformat selection	Unit's digit: MODBUS 0: Non-standard MODBUS protocal 1: Standard MODBUS protocal Ten's digit: Profibus-DP 0: PPO1 format 1: PPO2 format 2: PPO3 format 3: PPO5 format	30	☆
Pd-06	Communication read current resolution	0: 0.01A 1: 0.1A	0	☆

PE group Reserved				
PP group Function code management				

Function code	Name	Setting Range	Factory Setting	property
PP-00	Reserved	0 ~ 65535	0	☆

The password set function is used to prohibit the unauthorized person from viewing and modifying the parameters. When the parameter is set to any non-zero number, the password protection function is enabled. If no password is needed, change the parameter value to 00000. After the user password is set and takes effect, when entering the password setting state, if the user password is incorrect, you cannot view and modify the parameter. You can only view the operation display parameters and stop displaying parameters. Please keep your password in mind. If you set the password mistakenly or forget the password, please contact the manufacturer.

PP-01	Parameter initialization	0: No function 1: Restore to factory default value, motor parameter not included 2: Clear memory	0	★

0: No function				
1: Restore to factory default value, motor parameter not included The inverter restores all the parameters excluding the following parameters of the factory default values: Motor parameters, P0-22, fault record information, P7-09, P7-13, P7-14.				
2: Clear memory The inverter clears the fault records , P7-09, P7-13 and P7-14 to zero.				
PP-02	Parameter display attribute	Unit's digit: U group display selection 0: No display 1: display Ten's digit: A group display selection 0: No display 1: display	11	★
PP-03	-	-	-	☆

The establishment of parameter display selection is basically convenient for the users viewing the different arrangement forms of function parameters according to the actual needs. Three display methods are offered as below:

Name	Description
Function parameter mode	Sequence display inverter function parameters, respectively P0~PF、A0~AF、U0~UF.
User customization parameter mode	User customization display of specified function parameters (32 at most). The display parameters is determined through PE group.
User change parameter mode	Parameters which are different from factory default.

Chart 6-10

When existing display for PP-03, user could switch into different display mode through QUICK key. Function parameter display mode as default.

Display codes as below:

Parameter display mode	Display
Function parameter mode-FunC	-FunC
User customization parameter mode-USEt	-USEr
User change parameter mode-U--C	-U--C

Chart 6-10

VT2 series offers two groups of personalized parameter display mode: user customization function mode, user change parameter mode. In user customization parameter mode, sign u is added to the user customization function code as default. In user change parameter mode, sign c is added to the user customization function code as default. E.g.: P1-00 is displayed as cP1-00 .

PP-04	Function codes modification attribute	0: Can be modified 1: Can not be modified	0	☆

This function is used to prevent disoperation of the function parameters.

PP-04=0: All the function codes can be modified.

PP-04=1: All the function codes can only be viewed, but not modified.

A0 group Torque control group				
Function code	Name	Setting Range	Factory Setting	property
A0-00	Speed/ torque control mode selection	0: spreed control 1: torque control	0	★

A0-00 is used to select inverter control mode: speed control or torque control.

Multi-function digit DI terminal of VT2 series is equipped with two functions relating torque control: Torque control banned(Function29), speed control/torque control switching (function 46). The two terminals should be matched with A0-00 to realize switching between speed control and torque control. A0-00 sets the control mode when speed/torque control switching terminal is invalid. If the speed/ torque control switching terminal is valid, control mode is equivalent to the inversion of A0-00 value. When function 29 is valid, speed control mode is fixed for the inverter.

A0-01	Torque setup source selection in torque control mode	0: digit setting 1(A0-03) 1: AI1 2: AI2 3: potentiometer 4: reserved 5: communication 6: MIN(AI1,AI2) 7: MAX(AI1,AI2)	0	★
A0-02	-	-	-	
A0-03	Torque digital setup in torque control mode	-200.0% ~ 200.0%	150.0%	☆

A0-01 is used to select torque set source. There are totally 8 kinds of torque set mode.

Torque set is a relative value, which 100% corresponds to inverter rated torque. Set range: 200.0%~200.0%. Maximum torque is 2 times than the inverter rated torque.

When the torque is set by selection 1~7, 100% of communication ,analog input, pulse input corresponding to A0-03.

A0-04	-	-	-	
A0-05	Torque control forward maximum frequency	0.00Hz ~MAX frequency	50.00Hz	☆
A0-06	Torque control reverse maximum frequency	0.00Hz ~MAX frequency	50.00Hz	☆

A0-05, A0-06 are used to set forward or reverse maximum running frequency in torque control mode. In inverter toque control mode, if load torque is less than motor output toque, the motor revolving speed would speed up. In case of galloping or other accidents of mechanical system , motor maximum revolving speed must be limited.

A0-07	Upper torque filter time	0.00s ~ 65000s	0.00s	☆
A0-08	Lower torque filter time	0.00s ~ 65000s	0.00s	☆

In torque control mode , rate of speed change of motor and load is decided by the difference between motor output toque and load torque. Therefore, motor speed may change fast, causing noise or excessive mechanical stress problems. By setting the torque control acc./dec. time, can make the motor speed changes smoothly. A0-07 and A0-08 should be set to 0.00s in situations where torque rapid response is needed. E.g.: Two motors drive the same load, to make sure of load uniform distribution , one is set as host inverter(speed control mode) and another is the slave one(torque control mode). Actual output torque of the host inverter is the torque command of the slave, and slave torque is required to quickly follow the host torque, then torque control acc./dec. time is set to 0.00s for the slave inverter.

A1 ~A4group reserved				
A5 group Control optimization group				
Function code	Name	Setting Range	Factory Setting	property
A5-00	DPWM switching frequency upper limit	0.00Hz ~ 15.00Hz	12.00Hz	☆

A5-00 is only valid for VF control mode. In asynchronous motor VF running mode, square wave determines the continuous modulation mode. Wave value ＜A5-00: 7-stage continuous modulation mode. Wave value＞A5-00: 5-stage continuous modulation mode. In 7-stage continuous modulation mode, inverter switch loss is relatively big, but current ripple is small. In 5-stage continuous modulation mode, inverter switch loss is relatively small, but current ripple is big. High frequency may lead to motor operation instability, generally there is no need of modification. For VF operation instability please refer to P3-11. For inverter loss and temperature rise please refer to P0-15.

A5-01	PWM modulation	0: Asynchronous modulation 1: Synchronous modulation	0	☆

	mode			
This parameter is only valid for VF control mode. Asynchronous modulation refers to carrier frequency that linear changes with output frequency, and ensure that the ratio of them (carrier ratio) remains the same. Generally high output frequency is benefit for output voltage quality. Generally, synchronous modulation is not needed at low frequencies (below 100Hz), because the ratio of carrier frequency and output frequency is relatively high, asynchronous modulation advantage is more obvious. When running frequency is greater than 85Hz, synchronous modulation is valid. And fixed as asynchronous modulation mode when below this frequency.				
A5-02	Dead-zone compensation mode selection	0: No compensation 1: Compensation mode 1 2: Compensation mode 2	1	☆
Generally speaking , A5.02 needs not to be modified. Only when the output voltage waveform quality has special requirements or motor appears abnormal phenomenon would users switch the compensation mode. Compensation mode 2 is suggested in large power applications.				
A5-03	Random PWM depth	0: Random PWM invalid 1 ～ 10: PWM carrier frequency random depth	0	☆
Set the random PWM, monotonous and harsh electromagnetic noise can be changed to the heterogeneous and soft, the external electromagnetic interference can be effectively reduced. 0 indicates that the PWM is invalid. Different random PWM depth represents different regulation effect.				
A5-04	Rapid current-limiting enable	0: enable 1: able	1	☆
Enable the rapid current-limiting function so as to minimize inverter overcurrent protection fault and make the inverter work normally. If the inverter long time continuous staying in rapid current-limiting state, it may occur overheating fault, which is not allowed during operation. Fault alarm of long time rapid current-limiting is 40= E.CbC , which refers to inverter overload and necessary stop.				

A5-05	Current detection compensation	0 ~ 100	5	☆
It is used to set inverter current detection compensation. Excessive setting may lead to decrease of control performance. Generally do not need to be modified.				
A5-06	Under-voltage point setup	210 ~ 420V	350V	☆
A5-06 is used to set value of inverter under-voltage fault 9= E.LU. Different voltage level of 100.0% corresponds to different voltage point, respectively: Single phase 220V or three-phase 220V: 220V Three-phase 380V: 350V Three phase 480V: 450V Three-phase 690V: 650V				
A5-07	SVC optimization mode selection	1: optimization mode 1 2: optimization mode 2	1	☆
1: Optimization mode 1 It is used when there is high torque control linearity requirements. **2: Optimization mode 2** It is used when there is high speed stability requirement..				
A5-08	Dead zone time adjustment	100% ~ 200%	150%	★
This parameter is set according to 1140V voltage level. By adjusting the value can improve the voltage effective use rate. Users are not suggested to modify.				
A5-09	Over-voltage point setup	200.0V ~ 2500.0V	Model dependant	★
A5-09 is overvoltage point set through software, which is not related to hardware overvoltage point.				

Table 6-1 basis function parameter table

6.2   Monitoring parameters

Function code	Parameter name	MIN unit	Communication address
U0 group basic monitoring parameters			
U0-00	Running frequency (Hz)	0.01Hz	7000H
U0-01	Setting frequency (Hz)	0.01Hz	7001H
U0-02	Bus voltage (V)	0.1V	7002H
U0-03	Output voltage (V)	1V	7003H
U0-04	Output current (A)	0.01A	7004H
U0-05	Output power (kW)	0.1kW	7005H
U0-06	Output torque (%)	0.1%	7006H
U0-07	DI input status	1	7007H
U0-08	DO output status	1	7008H
U0-09	AI1 voltage (V)	0.01V	7009H
U0-10	AI2 voltage（V）/ current（mA）	0.01V/0.01mA	700AH
U0-11	Reserved	Reserved	Reserved
U0-12	Counting value	1	700CH
U0-13	Reserved	1	700DH
U0-14	Load speed display	1	700EH
U0-15	PID setting	1	700PH
U0-16	PID feedback	1	7010H
U0-17	PLC phrase	1	7011H
U0-18	Reserved	Reserved	Reserved
U0-19	Reserved	Reserved	Reserved
U0-20	The left running time	0.1Min	7014H
U0-21	AI1 voltage before correction	0.001V	7015H
U0-22	AI2 voltage(V)/current(mA)before correction	0.001V/0.01mA	7016H
U0-23	U0-23-- U0-24	Reserved	Reserved
U0-24	Liner speed	1m/Min	7018H
U0-25	Pulse input frequency	1Min	7019H

U0-26	Current running time	0.1Min	701AH
U0-27	Reserved	Reserved	Reserved
U0-28	Communication setting value	0.01%	701CH
U0-29	Reserved	Reserved	Reserved
U0-30	Main frequency X	0.01Hz	701EH
U0-31	Auxiliary frequency Y	0.01Hz	701PH
U0-32	View any memory address value	1	7020H
U0-33	U0-33—U0-38	Reserved	Reserved
U0-39	Target voltage upon V/F separation	1V	7027H
U0-40	Output voltage upon V/F separation	1V	7028H
U0-41	DI state visual display	1	7029H
U0-42	AO state visual display	1	702AH
U0-43	DI function state visual display 1	1	702BH
U0-44	DI DI function state visual display 2	1	702CH
U0-45	Fault information	1	702DH
U0-58	Phase Z counting	1	703AH
U0-59	Setting frequency (%)	0.01%	703BH
U0-60	Running frequency (%)	0.01%	703CH
U0-61	AC Drive state	1	703DH
U0-62	Reserved	Reserved	Reserved
U0-63	Sent value of point-point communication	0.01%	703PH
U0-64	By number of the station	1	7040H
U0-65	Torque upper limit	0.1%	7041H

Table 6-2 Monitoring parameters

6.3 VT2 Series Definition of the communication address

VT2 Series AC Drives support the Modbus communication protocol，The host computer can control, monitor and modify the function parameters through the communication protocol.

VT2 Series communication data can be divided into function code data, non functional code data, and the latter includes operation command, running state, running parameter, alarm information ,etc.

1.1 VT2 Series function code data

Function code data is an important setting parameter for AC Drive , as follows:

VT2 series function code data	P group (read-write)	P0、P1、P2、P3、P4、P5、P6、P7、P8、P9、PA、PB、PC、PD、PE、PP
	A group (read-write)	A0、A1、A2、A5、A6、A7、A8、A9、AA、AB、AC、AD、AE、AP

Definition of the communication address as follows:

1、When reading function code data for communication:

For P0~PP and A0~AP group function code data, Its functional group number if its communication address is sixteen bits high,If lower sixteen bit is directly used for function code in function group.

E.G.:

1) **P0-16** function parameters， Its communication address is P010H，the P0H means P0 group，10H represents the sixteen - level data format of the function code in the function group of the sequence number 16.

2) **AC-08** function parameters，its communication address is AC08，the ACH means AC group，08H represents the sixteen - level data format of the function code in the function group of the sequence number 8.

2、When writing function code data for communication,:

For P0~PP group data, its communication address is sixteen bits, it is divided into 00~0P or P0~PP according to whether it is written to EEPROM, and the low sixteen bit is directly used for function code in function group serial number.

E.G.:

1) WRITE function code parameter **P0-16**

When no need to write to EEPROM its address is 0010H

When need to write to EEPROM its address is P010H

For A0~AP group data, its communication address is sixteen bits. it can be divided into 40~4P or A0~AP According to whether to write EEPROM. The low sixteen bit is directly used for function code in function group.

E.G.:

2) WRITE function code parameter **AC-08**

When no need to write to EEPROM its address is 4C08H

When need to write to EEPROM its address is AC08H

1.2 Nonfunctional code data

VT2 Nonfunctional code data	Statue data (read only)	U group、AC Drive fault description、AC Drive running statue
	Control parameter (write only)	Control order、communication setting value,、digit output terminal control 、 analog output AM control、analog output FM control、high speed pulse (PMP) output control 、 parameter initialization

1、statue data

statue data divided into U group、AC Drive fault description、AC Drive running statue

1) U group

The details descriptions of the U group data please reference to the 5th & 6th chapter its communication address as follows:

U0~UP，Its communication address is sixteen bits 70~7P, and the lower sixteen is the number of the monitoring parameters in the group,

E.G.:

U0-11，its communication address is 700BH

2) AC Drive fault description

When the communication read AC Drive fails to describe, the communication address is fixed to 8000H. By reading the address data, the host computer can get the fault code of the current AC Drive. The description of the fault code please reference to the 5th chapter, the definition of the **P9-14** function code.

3) AC Drive running statue

When the communication reads the AC Drive running state, the communication address is fixed to 3000H, and the upper machine can read the address data by reading the address data, and it can get the information of the current AC Drive running state. It is defined as follows:

AC Drive running status communication address	definition
3000H	1: Forward running
	2: Reverse running
	3: Stop

2、control parameter

Control parameter divided into control order、communication setting value、digit output terminal control、analog output AM control、analog output FM control、parameter initialization.

1) control order

When **P0-02**(order source) is 2: In communication control, the upper computer can control the switching and stop of the AC Drive through the communication address. The control commands are defined as follows:

Control order communication address	Order function
2000H	1: Forward running
	2: Reverse running
	3: Forward jog
	4: Reverse jog
	5: Free stop
	6: Decelerate stop
	7: Fault reset

2) Communication setting value

Communication set points, main users, VT2 series intermediate frequency source, torque upper limit source, V/F separation voltage source, PID given source and PID feedback source are selected as the given data communicated to timing. The communication address is 1000H, and when the upper computer sets the communication address value, the data range is -10000~10000, corresponding to the relative given value -100.00%~100.00%.3) digit output terminal control

The function of the digital output terminal is selected as 20: communication control, the host computer can control the digital output terminal of the AC Drive through the communication address. It is defined as follows:

Digit output terminal control communication address	Order contents
2001H	BIT0: AO1 output control BIT1: AO2 output control BIT2: RELAY1 output control BIT3: RELAY2 output control BIT4: FMR output control BIT5: VDO1 BIT6: VDO2 BIT7: VDO3 BIT8: VDO4

	BIT9: VDO5

4) analog output terminals AM、FM

The function of the analog output terminal AM,FM is selected as 20: communication control, the host computer can control the analog terminal of the AC Drive through the communication address. It is defined as follows:

Output control communication address		Order contents
AO1	AO1	0 ～ 7FFF means 0%～ 100%
AO2	AO2	

5) parameter initialization

This function needs to be used when the parameter initialization operation of the frequency converter is needed through the upper computer.

If the PP-00 (user password) is not 0, then we first need to check the password through communication. After passing the check, the PC initialization operation in 30 seconds.

The communication address of the user password verification is 1F00H, and the correct user password is written to the address. Then the password can be completed. The address initialization of communication is 1F01H, and the data content is defined as follows:

Parameter initial communication address	Order contents
1F01H	1: Recover the factory parameters
	2: record information correctly
	4: recover the User backup parameters
	501: Recover the user current parameters

Read-write function code parameters(some code could not to be changed but just could be used by the factory)

1.3 function code parameters address marking rules

The function code group number and label parameter address rules:

High byte:　P0~PP(P group)、A0~AP(A group)、70~7P(U group)

Low byte: 00~PP

E.G.: f choose **P3-12** ,the function code address is 0xP30C;

Note:

1) PP group: Neither read parameters nor change parameters;

2) U group: Only readable, no change of parameters.

Some parameters can not to be changed when the AC Drive is running;Some parameters can not to be changed whatever the AC Drive runs or not.When correcting the function code parameters ,should pay attention to the parameters' range,unit,and related instructions.

Function code group	Communication access address	Correct RAM function code address in the communication
P0 ～ PE group	0xP000 ～ 0xPEPP	0x0000 ～ 0x0EPP
A0 ～ AC group	0xA000 ～ 0xACPP	0x4000 ～ 0x4CPP
U0 group	0x7000 ～ 0x70PP	

Note:　It will reduce the service life of EEPROM if it be stored frequently. Therefore, some function codes do not need to be stored in the communication mode, just change the value in RAM.

1)For achieve this P group,change its high byte P of this function code to 0.

2) For achieve this A group,change its high byte A of this function code to 4.

The related function code address show as follows:

High byte: 00~0P(P group)、40~4P(A group)

Low byte: 00~PP

E.G.: function code **P3-12** not to be stored into EEPROM, the address is 030C;

Function code A0-05 not to be stored into EEPROM ,the address is 4005;

RAM Its address just means to be written rather read.

For all the parameters can also use the command code 07H to realize.

1,Stop / Run parameter parts:

Parameter address	Parameter description	Parameter address	Parameter set
1000H	* Communication set value (Decimal system) −10000 ~ 10000	1010H	PID set
1001H	Running frequency	1011H	PID feedback
1002H	Busbar voltage	1012H	PLC produce
1003H	Output voltage	1013H	Reserved
1004H	Output current	1014H	Reserved
1005H	Output power	1015H	The left running time
1006H	Output torque	1016H	AI1 Pre-correction voltage
1007H	Running speed	1017H	AI2 Pre-correction voltage
1008H	DI input mark	1018H	AI3 Pre-correction voltage
1009H	DO output mark	1019H	Reserved
100AH	AI1 voltage	101AH	Power-on time currently
100BH	AI2 voltage	101BH	Running time currently
100CH	Reserved	101CH	Reserved
100DH	Count value input	101DH	Communication setting value
100EH	Length value input	101EH	Reserved

100PH	Overload speed	101PH	Main frequency X display
–	–	1020H	Main frequency Y display

Note:

1)　The set value of the communication is the percentage of the relative value，10000 means 100.00%，-10000 means -100.00%。

2)　For the data of frequency dimension, the percentage is the percentage of the relative maximum frequency (**P0-10**). For the torque dimension data, the percentage is **P2-10** and **A2-48** (the upper limit of the torque is digitally set, corresponding to the first, second motor).

2、Control order inputted to AC Drive:　(write)

Order address	Order function
2000H	0001: Forward running
	0002: Reverse running
	0003: Forward jog
	0004: Reverse jog
	0005: Free stop
	0006: Decelerate stop
	0007: Fault reset

3、Read the state of the AC Drive:　(read)

State character address	State character function
3000H	0001: Forward running
	0002: Reverse running
	0003: Stop

4、Parameter locking cipher check:　(If back is 8888H means the checking is valid)

Password address	Input contents
1P00H	*****

5、digit output terminal control:　(write)

Order address	Order contents
2001H	BIT0: AO2 output control

	BIT1: reserved
	BIT2: RELAY1 output control
	BIT3: RELAY2 output control
	BIT4: A01 output control
	BIT5: VDO1
	BIT6: VDO2
	BIT7: VDO3
	BIT8: VDO4
	BIT9: VDO5

6、Analog output AM control:　(write)

Order address	Order contents
2002H	0 ～ 7PPP means 0%～ 100%

7、Analog output FM control:　(write)

Order address	Order contents
2003H	0 ～ 7PPP means 0%～ 100%

8、AC Drive description:

AC Drive fault address	AC Drive fault information	
8000H	0000: No fault 0001: Reserved 0002: Accelerate over current 0003: Decelerate over current 0004: Constant over current 0005: Accelerate over voltage 0006: Decelerate over voltage 0007: Constant over voltage	0015: Parameter read-write abnormal 0016: AC Drive hardware fault 0017: Motor to ground short circuit fault 0018: Reserved 0019: Reserved 001A: Running time arrival 001B: User custom fault 1 001C: User custom fault 2 001D: Power-on time arrival 001E: Load off 001P: PID feedback lost when running

	0008: Buffer resistance overload fault 0009: Undervoltage fault 000A: AC Drive overload 000B: Motor overload 000C: Input phase losing 000D: Output phase losing 000E: Module overheating 000P: External fault 0010: Communication abnormal 0011: Contactor abnormal 0012: Current detecting fault 0013: Motor tuning fault 0014: Reserved	0028: Fast current limiting fault 0029: Fault of switching motor at run time 002A: Excessive velocity deviation 002B: Reserved 002D: Reserved 005A: Reserved 005B: Reserved 005C: Reserved 005E: Reserved

Chapter 7

Maintenance and Troubleshooting

Chapter 7   Maintenance and Troubleshooting

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7.1 Routine Repair and Maintenance of VT2 Series

7.1.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.

Routine maintenance involves checking:

1) Whether the motor sounds abnormally during running

2) Whether the motor vibrates excessively during running

3) Whether the installation environment of the AC drive changes

4) Whether the AC drive's cooling fan works normally

5) Whether the AC drive overheats

Routine cleaning involves:

1)Keep the AC drive clean all the time.

2) Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.

3) Clear the oil stain on the cooling fan of the AC drive.

  7.1.2 Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

1) Check and clean the air duct periodically

2) Check whether the screws become loose

3) Check whether the AC drive is corroded

4) Check whether the wiring terminals show signs of arcing.

5) Main circuit insulation test

Note: Before measuring the insulating resistance with megameter (500VDC megameter recommended), disconnected the main circuit from the AC drive. Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

7.1.3 Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

Component	Service Life
Fan	2 to 3 years
Electrolytic capacitor	4 to 5 years

Note: Standard replacement time is under the following conditions, Users can determine the replacement period according to the running time.

◆ Ambient temperature: the annual average temperature is about 30 ° C

◆ Load rate: less than 80%

◆ Running rate: less than 20 hours per day

1) Cooling Fan

● Possible damage reason: Bearing worn, Blade aging

● Judging Criteria: Whether there is crack on the blade, whether there is abnormal vibration noise upon startup.

2) Filter electrolytic capacitor

● Possible damage reason:　Input power supply in poor quality, high ambient temperature, frequent load jumping, electrolytic aging.

● Judging Criteria:　Whether there is liquid leakage, whether the safe valve has projected, measure the static capacitance, measure the insulating resistance.

7.1.4 Storage of the AC drive

After purchasing AC drive, for temporary storage and long-term storage, pay attention to the following two aspects:

1) Pack the AC drive with the original box provided by VTdrive.

2) Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

7.1.5 Warranty Agreement

1) Free warranty only applies to the AC drive itself.

2) VTdrive will provide 18-month warranty (Starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

3) Reasonable repair expenses will be charged for the damages due to the following causes:

(a) Improper operation without following the instructions

(b) Fire, flood or abnormal voltage

(c) Using the AC drive for non-recommended function

4) The maintenance fee is charged according to VTdrive's uniform standard. If there is an agreement, the agreement prevails.

7.2 Faults and Solutions

VT2 series AC drive provide a total Fault information and protective functions. After a fault occurs, the AC drive implements the protection function, and displays the fault code on the operation panel (if the operation panel is available). The corresponding fault types and common solutions for faults are shown in the following table. The table lists only for reference, please do not repair, transform, if can not rule out the fault, please contact our company or agents for technical support.

Figure 7-2 Solutions to the faults of the VT2 Series

Fault Name	Display	Fault investigation	Fault countermeasures
AC Drive unit protection	Err01	1. The output circuit is grounded or short circuited 2. The connecting cable of the motor is too long 3. The module overheats 4. The internal connections become loose 5. The main control board is faulty 6. The drive board is faulty 7. The AC Drive module is faulty	1. Eliminate external faults 2. Install a reactor or an output filter 3. Check the air filter and the cooling fan 4. Connect all cables properly 5. Contact for Technical support 6. Contact for Technical support 7. Contact for Technical support
Overcurrent during acceleration	Err02	1. The output circuit is grounded or short circuited 2. The control method is vector and no	1. Eliminate external faults 2. Perform the motor auto-tuning 3. Increase the acceleration time 4. Adjust the manual torque

		parameter identification 3. The acceleration time is too short 4. Manual torque boost or V/F curve is not appropriate 5. The voltage is too low 6. The startup operation is performed on the rotating motor. 7. A sudden load is added during acceleration 8. The AC drive model is of too small power class	boost or V/F curve 5. Adjust the voltage to normal range 6. Select rotational speed tracking restart or start the motor after it stops 7. Remove the added load. 8. Select and AC drive of higher power class
Overcurrent during deceleration	Err03	1. The output circuit is grounded or short circuited 2. The control method is vector and no parameter identification 3. The deceleration time is too short 4. The voltage is too low 5. A sudden load is added during deceleration 6. The braking unit and braking resistor are not installed	1. Eliminate external faults 2. Perform the motor auto-tuning 3. Increase the deceleration time 4. Adjust the voltage to normal range 5. Remove the added load. 6. Install the braking unit and braking resistor

Overcurrent at constant speed	Err04	1. The output circuit is grounded or short circuited 2. The control method is vector and no parameter identification 3. The voltage is too low 4. A sudden load is added during deceleration 5.The AC drive model is of too small power class	1. Eliminate external faults 2. Perform the motor auto-tuning 3. Adjust the voltage to normal range 4. Remove the added load. 5. Select and AC drive of higher power class
Overvoltage during acceleration	Err05	1. The input voltage is too high 2. An external force drives the motor during acceleration 3. The acceleration time is too short 4. The braking unit and braking resistor are not installed	1. Adjust the voltage to normal range 2. Cancel the external force or install a braking resistor 3. Increase the acceleration time 4. Install the braking unit and braking resistor
Overvoltage during deceleration	Err06	1. The input voltage is too high 2. An external force drives the motor during deceleration 3. The deceleration time is too short 4. The braking unit and braking resistor are not	1. Adjust the voltage to normal range 2. Cancel the external force or install a braking resistor 3. Increase the deceleration time 4. Install the braking unit and braking resistor

		installed	
Overvoltage at constant speed	Err07	1. The input voltage is too high 2. An external force drives the motor during running	1. Adjust the voltage to normal range 2. Cancel the external force or install a braking resistor
Control power supply fault	Err08	1. The input voltage is not within the allowable range	1. Adjust the voltage to normal range
Undervoltage	Err09	1. Instantaneous power failure 2. The AC drive's input voltage is not within the allowable range 3. The bus voltage is abnormal 4. The rectifier bridge and buffer resistor are faulty 5. The drive board is faulty 6. The main control board is faulty	1. Reset the fault 2. Adjust the voltage to normal range 3. Contact for Technical support 4. Contact for Technical support 5. Contact for Technical support 6. Contact for Technical support
AC drive overload	Err10	1. The load is too heavy or locked-rotor occurs on the motor 2. The AC drive model is of too small power class	1. Reduce the load and check the motor and mechanical condition 2. Select an AC drive of higher power class
Motor	Err11	1. P9-01 is set	1. Set P9-01 correctly

overload		improperly 2. The load is too heavy or locked-rotor occurs on the motor 3. The AC drive model is of too small power class	2. Reduce the load and check the motor and mechanical condition 3. Select an AC drive of higher power class
Power input phase loss	Err12	1. The three-phase power input is abnormal 2. The drive board is faulty 3. The lightening board is faulty 4. The main control board is faulty	1. Eliminate external faults 2. Contact for Technical support 3. Contact for Technical support 4. Contact for Technical support
Power output phase loss	Err13	1. The cable connecting the AC drive and the motor is faulty 2. The AC drive's three-phase outputs are unbalanced when the motor is running 3. The drive board is faulty 4. The module is faulty	1. Eliminate external faults 2. Check whether the motor three-phase winding is normal 3. Contact for Technical support 4. Contact for Technical support
Module overheat	Err14	1. The ambient temperature is too high 2. The air filter is blocked 3. The fan is damaged 4. The thermally sensitive resistor of the	1. Lower the ambient temperature 2. Clean the air filter 3. Replace the damaged fan 4. Replace the damaged thermally sensitive resistor 5. Replace the AC Drive module

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		module is damaged 5. The AC Drive module is damaged	
External equipment fault	Err15	1. External fault signal is input via DI 2. External fault signal is input via virtual I/O	1. Reset the operation 2. Reset the operation
Communication fault	Err16	1. The host computer is in abnormal state 2. The communication cable is faulty 3. P0-28 is set improperly 4. THe communication parameters in group PD are set improperly	1. Check the cabling of host computer 2. Check the communication cabling 3. Set P0-28 correctly 4. Set the communication parameters properly
Contactor fault	Err17	1. The drive board and power supply are faulty 2. The contactors is faulty	1. Replace the faulty drive board or power supply board 2. Replace the faulty contactor
Current detection fault	Err18	1. The HALL device is faulty 2. The drive board is faulty	1. Replace the faulty HALL device 2. Replace the faulty drive board
Motor auto-tuning fault	Err19	1. The motor parameters are not set according to the nameplate 2. The motor auto-tunning times out	1. Set the motor parameters according to the nameplate properly 2. Check the cable connecting the AC drive and the motor
EEPROM write fault	Err21	1. The EEPROM chip is damaged	1. Replace the main control board
Short circuit	Err23	1. The motor is short	1. Replace the cable or motor

to ground		circuited to the ground	
Accumulative running time reached	Err26	1. The accumulative running time reaches the setting value	1. Clear the record through the parameter initialization function
Accumulative power-on time reached	Err29	1. The accumulative power-on time reaches the setting value	1. Clear the record through the parameter initialization function
Load becoming 0	Err30	1. The AC drive running current is lower than P9-64	1. Check that the load is disconnected or the setting of P9-64 and P9-65 is correct
PID feedback lost during running	Err31	1. The PID feedback is lower than the setting of PA-26	1. Check the PID feedback signal or set PA-26 to a proper value
Pulse-by-pulse current limit fault	Err40	1. The load is too heavy or locked-rotor occurs on the motor 2. The AC drive model is of too small power class	1. Reduce the load and check the motor and mechanical condition 2. Select an AC drive of higher power class
Motor switching fault	Err41	1. Change the selection of the motor via terminal during running of the AC drive	1. Perform motor switchover after the AC drive stops
Excessive speed deviation fault	Fault No.42	1、Improper set inspection parameters P9-69、P9-60 2、Wrongly set encoder parameters 3、No parameter identification	1、Set inspection parameters properly according to actual situation 2、Set motor encoder parameters correctly 3、Motor parameter identification

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Motor overspeed fault	Fault No.43	No parameter identification 2、Wrongly set encoder parameters 3、Improper set inspection parameters P9-69、P9-60	1、Motor parameter identification 2、Set motor encoder parameters correctly 3、Set inspection parameters properly according to actual situation
Motor overtemperature fault	Fault No.45	Temperature sensor wiring loose Motor overtemperature	Check sensor wiring and eliminate fault 2、Reduce carrier frequency or take other cooling measures for the motor
Initial position fault	Fault No.51	Excessive deviation between motor parameters and the practical value	Reconfirm motor parameter settings, pay attention to the rated current value

7.3 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis.

Table 7-3 Troubleshooting to common faults of the AC drive

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on	1. There is no power supply to the AC drive or the power input to the AC drive is too low 2. The power supply of the switch on the drive board of the AC drive is faulty 3. The rectifier bridge is damaged 4. The buffer resistor is faulty	1. Check the power supply 2. Check the bus voltage 3. Re-connect the 8-core and 28-core cables 4~6. Contact VTdrive for technical support

		5. The control board or the operation panel is faulty 6. The cable connecting the control board and the drive board and the operation panel breaks	
2	"HC" is displayed at power-on	1. The cable between the drive board and the control board is in poor contact 2. Related components on the control board are damaged 3. The motor or the motor cable is short circuited to the ground 4. The HALL device is faulty 5. The power input to the AC drive is too low	1. Re-connect the 8-core and 28-core cables 2~5. Contact VTdrive for technical support
3	"Err23" is displayed at power-on	1. The motor or the motor output cable is short circuited to the ground 2. The AC drive is damaged	1. Measure the insulation of the motor and the output cable with a megger 2. Contact VTdrive for technical support
4	The AC drive display is normal upon power-on. But the "HC" displayed after running and stops immediately.	1. The cooling fan is damaged or locked-rotor occurs 2. The external control terminal cable is short circuited	1. Replace the damaged fan 2. Eliminate external fault

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5	Err14 (Module overheat) fault is reported frequently	1. The setting of carrier frequency is too high 2. The cooling fan is damaged or the air filter is blocked 3. Components inside the AC drive are damaged (thermocouple or other)	1. Reduce the carrier frequency (P0-15) 2. Replace the fan and clean the air filter 3. Contact VTdrive for technical support
6	The motor does not rotate after the AC drive runs	1. Check the motor and the motor cables 2. The AC drive parameters are set improperly (Motor parameters) 3. The cable between the drive board and the control board is in poor contact 4. The drive board is faulty	1. Ensure the cable between the AC drive and the motor is normal 2. Replace the motor or clear mechanical faults 3. Check the re-set motor parameters 4. Contact VTdrive for technical support
7	The DI terminals are disabled	1. The parameters are set incorrectly 2. The external signal is incorrect 3. The jumper bar across OP and +24V becomes loose 4. The control board is faulty	1. Check and reset the parameters in group P4 2. Re-connect the external signal cables 3. Re-confirm the jumper bar across OP and +24V 4. Contact VTdrive for technical support
8	The motor speed is always low in CLVC mode	1. The encoder is faulty 2. The encoder cable is connected incorrectly or in poor contact 3. The PG card is faulty 4. The drive board is faulty	1. Replace the encoder and ensure the cabling is proper 2. Replace the PG card 3~4. Contact VTdrive for technical support
9	The AC drive reports overcurrent	1. The motor parameters are set improperly 2. The acceleration/deceleration	1. Re-set motor parameters or re-perform the motor auto-tunning

	and overvoltage frequently	time is improper 3. The load fluctuates	2. Set proper acceleration/deceleration time 3. Contact VTdrive for technical support
10	Err17 is reported upon power-on or running	The soft startup contactor is not picked up	1. Check whether the contactor cable is loose 2. Check whether the contactor is faulty 3. Check whether 24V power supply of the contactor is faulty 4. Contact VTdrive for technical support
11	No display upon power-on	Related component on the control board is damaged	Replace the control board

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