ETDDRIVES

AC780 General Vector Inverter

User Manual

AC780_ENG_Manual CH01-12 V1.20

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Chapter 1 Preface

Firstly, thank you for purchasing our ETD AC780 series inverter!

AC780 series is a general purpose high performance current vector inverter, mainly used to control and adjust the speed and torque of three-phase AC asynchronous motor。

AC780 uses the high performance current vector control technology to achieve the excellent dynamic characteristics of high precision and high torque. It also includes abundant functions and perfect protection, can be used to drive and control fan, water pump, machine tools, paper making, drawing and a variety of automated production equipment.

This manual introduces the features of AC780 series inverter and the use of methods, including product selection, parameter setting, debugging, maintenance and inspection, fault diagnosis and so on. Please carefully read the user manual before use. Please use the product in the understanding of product safety precautions. Equipment manufacturers should send this user manual with the equipment to the end user, to facilitate the use of reference.

Attentions

☆ In order to explain the details of some products, there will be a shell or safety cover removal state description. Before run the inverter, be sure to install the shell or cover as required and operate according to the contents of the user manual.

☆ The pictures in this user manual are only for illustration and may differ from the actual product you purchase.

☆ ETD is committed to the continuous improvement of products a, the manual provided may be updated, but we will not notice you.

☆ If the customer change the product, we will not provide the company's quality assurance.

☆ If you need to order the user manual for damage or loss, please write down the machine model and the factory serial number, and contact our agent or the company.

1.1 Introduction

ETD AC780 series is 3 phase high performance vector control inverter, whose rated working voltage is 3¢ 400/480Vac, and power size is from 0.75kW to 355kW. Here ETD newly launched AC780 series drives, which is a kind of general vector control AC drives with supreme quality and multi-functions. The timely response and accurate control can be achieved by the decoupling control on the motor field current and torque current.

The high performance and powerful functions are achieved mainly by a 32-bit DSP microchip. The main functions of this chip are: motor vector control, the networking and interface functions with the external devices, protection and diagnosis functions, and so on. It mainly includes the follow functions:

1 Multiple input and output signals, which can be configured freely;

2 Vector control regulator, the speed and flux observation;

3 Tuning of the motor parameters: stator and rotor resistors, leakage inductance, and mutual inductance;

4 Auxiliary PID block that can be configured freely;

5 LCD & LED panel configuration.

6 External series communication functions RS485;

7 Expansion of CAN or profibus DP, and can select different field bus you need.

8 Complete electrical isolation between the user terminals and internal circuits for digital input and output;

9 Input analog signal can be configured as differential input, which has a high anti-noise performance;

Through the optimized PWM control technology and EMC entirety design, AC780 can meet the requirements of low noise and high EMC performance from the customer application field. AC780 has pass the test of lightning surge, electrostatic discharge (ESD), electrical fast transient (EFT), high voltage withstand, etc. under the running state of AC drives, and all reach to the highest level which IEC standard demands.

AC780 has tried to be a compact structure design, meanwhile ensure convenient to mount or dismount the IGBT module on the heat sink and other boards in the AC drives.

1.2 Product checking

Upon unpacking, check：

1 Whether the nameplate model and AC drive ratings are consistent with your order. The box contains the AC drive, certificate of conformity, user manual and warranty card.

2 Whether the AC drive is damaged during transportation. If find any omission or damage, please contact ETD or your supplier immediately.

1.3 Product naming and nameplate

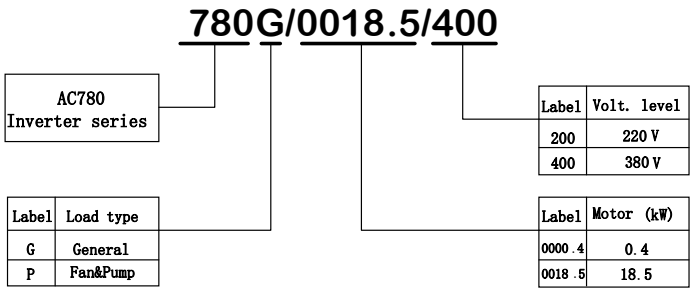


Figure 1-1 Product naming

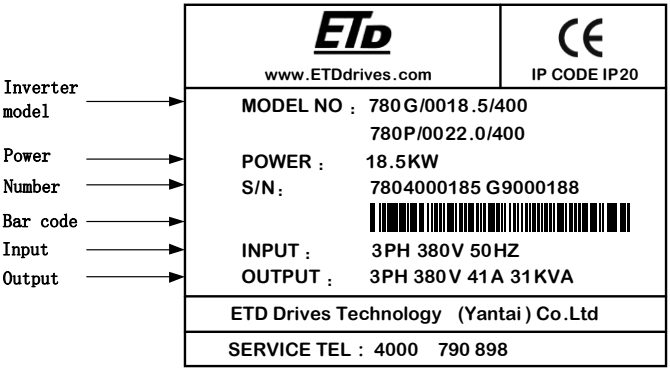


Figure 1-2 Product nameplate

Chapter 2 Safety information and attentions

For your safety, please pay attention to the markings used in this user manual

Danger: Not operate as required, may result in serious injury or death

Warning: Not operate as required, may result in minor injuries, and equipment damage.

2.1 Installation		
	1	Don’t install the drive if you find water seepage, component loss, or damage upon unpacking.
	2	Don’t install the drive if the packing list does not conform to the product you received
	3	Install drive on incombustible objects and keep it away from combustible materials. Failure to comply will result in a fire.
	4	Keep the drive away from explosive gas. .Failure to comply will result in a fire.
	5	Handle the equipment with care during transportation to prevent damage to the equipment.
	6	Don't allow screws, washers and other metal foreign matters to fall inside the drive, otherwise there is a danger of fire.
	7	Don’t loosen the fixed screws of the components, especially the screws with the red mark.
	8	Don’t touch the components with your hands. If not, it will result in static electricity damage.

2.2 Wiring		
	1	Only qualified personnel shall wire the drive.
	2	Never wire the drive unless the input AC supply is totally disconnected.
	3	The drive must be properly earthed to reduce electrical accident.
2.2 Wiring		

 warning	1	Don't confuse the input and output terminals, otherwise there is an explosion or property may be damaged.
	2	Don't short circuit P and N, otherwise there is a danger of fire or property may be
	3	Cable lugs must be connected to main terminals firmly, otherwise property may be damaged.
	4	The bare portions of the power cables must be bound with insulation tapes.

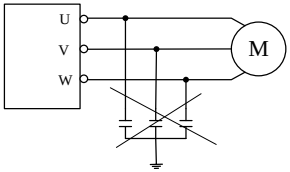
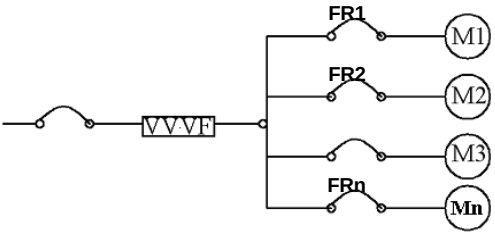
2.3 Power on		
 dangerous	1	Install the cover before switching on the drive, to reduce the danger of electric shock and explosion.
	2	Don't open the ac drive's cover after power-on. Failure to comply will result in electric shock.
	3	Don't touch ac drive's terminals after power-on. Failure to comply will result in electric shock.
	4	Don't touch fan or discharging resistors to check the drive. Failure to comply will result in the personnel burn.

2.4 Maintenance		
 dangerous	1	Perform the maintenance job after confirming that the DC Bus voltage is below 36V.
	2	Only qualified personnel can maintain or repair the ac drives. Failure to comply will result in personnel injury or damage to the ac drive.
	3	Only trained personnel can change the components, it is prohibited to leave wires or metal parts inside the drive so as to avoid the risk of fire.

2.5 Others		
 dangerous	1	It is strictly prohibited to modify the inverter, wiring, loose internal bolts, otherwise damaged inverter.
	2	Scrapped machine according to industrial waste treatment, the capacitor in the machine when burning may explode, and plastic parts burning will produce toxic gases.

2.6 About mechanical load		
warning	1	Driving a common motor at low speed for a long time, the drive's life will be reduced due to the deteriorating heat dissipation effect, so a special variable frequency motor is needed if long time operation with constant torque is required.
	2	If the motor and the inverter rated capacity does not match, be sure to adjust the inverter motor protection related parameter values.
	3	More than 50Hz operation, but also to ensure that motor bearings and mechanical equipment bearing capacity,
	4	In the lifting load and other occasions, should consider the optional brake assembly.
	5	In the reciprocating load, the output current will be unstable, long-term low-frequency operation is more prominent, recommended more than 20Hz frequency operation.
	6	The inverter may encounter the mechanical resonance point of the load device at some output frequency. By setting the jump frequency to avoid.
	7	It is strictly prohibited to switch on or off the motor when inverter is running, otherwise it will cause the inverter over-current, or even the inverter burned
	8	If enable the failure restart function, the motor will automatically restart after the operation stopped, do not close to the machine in order to avoid danger.
	9	Motor maximum speed (frequency) must be in accordance with the motor and equipment connected to the motor.
	10	Before changing the steering of the motor, confirm the safety of doing so, the impact on the equipment.
	11	The AC780 inverter must be connected to the ground terminal with a ground conductor.
	12	Before testing any motor cable, disconnect the motor cable from the inverter.

2.7 About inverter

warning	1	As the inverter output is PWM pulse wave, it is very dangerous to install capacitors or varistors, etc. So, be sure to dismantle such components from the outside of inverter, as is shown in figure 2-1：  Figure 2-1 The inverter output prohibit connecting device
	2	Inverter input voltage must be within the allowable range, otherwise prone to inverter damage. Please select a suitable transformer before inverter.
	3	The inverter is equipped with lightning over current protection device, which has certain self-protection ability to induction lightning.
	4	When using a frequency converter with multiple motors, it should be noted that the motor load can not be a reciprocating load, otherwise it will bring instability, each motor must have a separate overcurrent protection device. The selection of FR1~FRn must match the rated value of motor M1~Mn, in this case, the inverter can not protect single motor。  Figure 2-2 One inverter drive multiple motors
	5	When the inverter connected to the power supply, do not make any measurement of the inverter internal circuit。
	6	The inverter has great capacitive leakage current.
	7	When the inverter is connected to power supply, even if the motor is not running, the motor U, V, W terminal, rectifier bridge / brake resistor terminal (P+, PR) are still charged.
	8	Control I/O terminal and power supply voltage isolation, even if the inverter is not power, relay output and other I/O terminals may still have dangerous voltage.
	9	If the inverter is used as a part of the machine, the machine manufacturer is responsible for providing the main power switch.

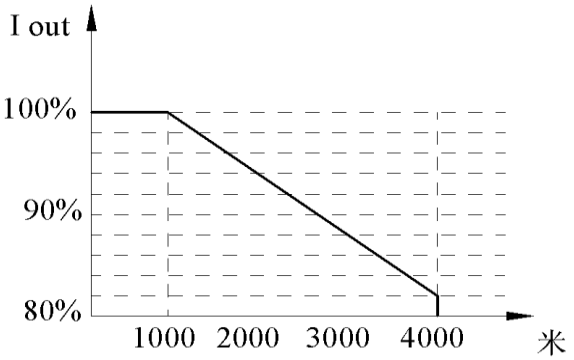
<table>
<tr><th colspan="3">2.7 About inverter</th></tr>
<tr><td rowspan="5">warning</td><td>10</td><td>At an altitude of more than 1000 meters, due to the thin air inverter cooling capacity becomes poor, it is necessary to reduce the output current of inverter. In Fig. 2-3, it is relation curve of rated current of the inverter with altitude。
 

Figure 2-3 inverter derating with altitude</td></tr>
<tr><td>11</td><td>After the inverter is energized, do not touch any input and output terminals, otherwise there is a risk of electric shock.</td></tr>
<tr><td>12</td><td>The parameter setting, checking and confirming must be done after the inverter is replaced.</td></tr>
<tr><td>13</td><td>AC780 all pluggable components must be plugged in the case of power down.</td></tr>
<tr><td>14</td><td>Don't do any part of the AC780 inverter voltage test. This test requires special testing steps, ignoring the specified steps will bring destructive results.</td></tr>
</table>

Chapter 3 **Product specifications**

3.1 Product model and technical data

Product model	Input voltage		Power G/P(KW)	Output capacity （KVA）	Output current G/P(A)	Adaptive motor G/P(KW)
Single/three phase200V 50/60Hz						
780G/0000.4/200	1/3 phase200V		0.4/-	1.0/-	3.2/-	0.4/-
780G/0000.75/200	1/3 phase200V		0.75/-	2.0/-	6/-	0.75/-
780G/0001.5/200	1/3 phase200V		1.5/-	2.4/-	8/-	1.5/-
780G/0002.2/200	1/3 phase200V		2.2/-	3.7/-	11/-	2.2/-
Three phase 400V 50/60Hz						
780G/0000.75/400	3 phase 400V		0.75/1.5	2.6/3.7	3.4/4.8	0.75/1.5
780G/0001.5/400	3 phase 400V		1.5/2.2	3.7/4.2	4.8/6.2	1.5/2.2
780G/0002.2/400	3 phase 400V		2.2/3.7	4.2/6.6	6.2/9	2.2/3.7
780G/0003.7/400	3 phase 400V		3.7/4.0	6.6/7.2	9/11	3.7/4.0
780G/0004.0/400	3 phase 400V		4.0/5.5	7.2/11	11/14	4.0/5.5
780G/0005.5/400	3 phase 400V		5.5/7.5	11/14	14/18	5.5/7.5
780G/0007.5/400	3 phase 400V		7.5/11	14/21	18/27	7.5/11
780G/0011.0/400	3 phase 400V		11/15	21/26	27/34	11/15
780G/0015.0/400	3 phase 400V		15/18.5	26/34	34/41	15/18.5
780G/0018.5/400	3 phase 400V		18.5/22	34/40	41/52	18.5/22
780G/0022.0/400	3 phase 400V		22/30	40/50	52/65	22/30
780G/0030.0/400	3 phase 400V		30/37	50/61	65/80	30/37
780G/0037.0/400	3 phase 400V		37/45	61/73	80/96	37/45
780G/0045.0/400	3 phase 400V		45/55	73/98	96/128	45/55
780G/0055.0/400	3 phase 400V		55/75	98/130	128/165	55/75
780G/0075.0/400	3 phase 400V		75/90	130/153	165/185	75/90
780G/0090.0/400	3 phase 400V		90/110	153/170	185/224	90/110
780G/0110.0/400	3 phase 400V		110/132	170/211	224/260	110/132
780G/0132.0/400	3 phase 400V		132/160	211/230	260/302	132/160
780G/0160.0/400	3 phase 400V		160/185	230/260	302/340	160/185

	Three phase 400V 50/60Hz					
780G/0185.0/400	3 phase 400V		185/220	260/340	340/450	185/220
780G/0220.0/400	3 phase 400V		220/250	340/360	450/470	220/250
780G/0250.0/400	3 phase 400V		250/280	360/390	470/520	250/280
780G/0280.0/400	3 phase 400V		280/315	390/460	520/605	280/315
780G/0315.0/400	3 phase 400V		315/355	460/520	605/640	315/355
780G/0355.0/400	3 phase 400V		355/400	520/560	640/680	355/400
	Three phase 480V 50/60Hz					
780G/0005.5/480	3 phase 480V		5.5/7.5	11/14	14/18	5.5/7.5
780G/0007.5/480	3 phase 480V		7.5/11	14/21	18/27	7.5/11
780G/0011.0/480	3 phase 480V		11/15	21/26	27/34	11/15
780G/0015.0/480	3 phase 480V		15/18.5	26/34	34/41	15/18.5
780G/0018.5/480	3 phase 480V		18.5/22	34/40	41/52	18.5/22
780G/0022.0/480	3 phase 480V		22/30	40/50	52/65	22/30
780G/0030.0/480	3 phase 480V		30/37	50/61	65/80	30/37
780G/0037.0/480	3 phase 480V		37/45	61/73	80/96	37/45
780G/0045.0/480	3 phase 480V		45/55	73/98	96/128	45/55
780G/0055.0/480	3 phase 480V		55/75	98/130	128/165	55/75
780G/0075.0/480	3 phase 480V		75/90	130/153	165/185	75/90
780G/0090.0/480	3 phase 480V		90/110	153/170	185/224	90/110
780G/0110.0/480	3 phase 480V		110/132	170/211	224/260	110/132
780G/0132.0/480	3 phase 480V		132/160	211/230	260/302	132/160
780G/0160.0/480	3 phase 480V		160/185	230/260	302/340	160/185
780G/0185.0/480	3 phase 480V		185/220	260/340	340/450	185/220
780G/0220.0/480	3 phase 480V		220/250	340/360	450/470	220/250
780G/0250.0/480	3 phase 480V		250/280	360/390	470/520	250/280
780G/0280.0/480	3 phase 480V		280/315	390/460	520/605	280/315
780G/0315.0/480	3 phase 480V		315/355	460/520	605/640	315/355
780G/0355.0/480	3 phase 480V		355/400	520/560	640/680	355/400

3.2 AC780 series technical data

input	Range of rated voltage and frequency	200V/50Hz/60Hz，voltage：±10%；frequency：±5% 400V/50Hz/60Hz，voltage：±10%；frequency：±5% 480V/50Hz/60Hz，voltage：±10%；frequency：±5%
output	Rated voltage	3 phase：200V（proportional to input voltage） 3 phase：400V（proportional to input voltage） 3 phase：480V（proportional to input voltage）
Control performance	Modulation method	Space voltage vector SVPWM
	Control method	Open-loop vector, close-loop vector, VF
	Frequency range	0 ~ 300.00Hz
	Frequency precision	Digital command：±0.01%（－10℃~ ＋50℃ ）
		Analog command：maximum× 0.025% (25℃ ±10%)
	Setting resolution	Digital command：0.01 Hz
		Analog command：maximum× 0.025%Hz
	Output resolution	0.01 Hz
	Frequency setting	0~10V(2~20kΩ), 0~20mA（500Ω）
	Acceleration / deceleration time	0.0 ~6500.0s （ Independently set acceleration / deceleration time）
	Brake torque	20% without brake resistor， 125% with brake resistor
	V/F curve	Straight, square V/F curve and programming V/F curve
Protection function	Overload protect	Electronic thermal overload relay protection
	Instantaneous over current	G type： 250% rated current P type： 200% rated current
	Overload	G type：150% overload for 60s P type：120% overload for 60s
	Over voltage	410Vdc（200V class）/820Vdc（400V class）/910Vdc（480V class）
	Under voltage	190Vdc（200V class）/380Vdc（400V&480 class）
	Instantaneous power loss compensate	Immediately stop when power down time is 15ms or more. According to factory setting, continue to turn if power off time is less 2 seconds.
	Overheat protection	Heatsink overheating protection, power module overheat protection
	Speed loss	Speed loss protection during acceleration / deceleration and constant speed operation
	Earth fault	Electronic circuit protection
Place	Temp. / humidity	－10℃~＋50℃，90% relative humidity
	Use location	Indoor (to prevent corrosive gases and dust)
	Vibration	0.5G below

Chapter 4 Mechanical installation

4.1 Installation requirements

- Ambient temperature：Ambient temperature greatly affects the life of the drive. It is required to be within the range of -10°C~50°C. If the temperature is higher than 40°C, the AC drive should be de-rated.
- Install the AC drive on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation. When the AC drive installed in the cabinet, install fan on the top of the cabinet to ensure that the temperature of the cabinet within the allowable range.
- Install the AC drive vertically on the support using screws to ensure that the heat can be dissipated upwards, cannot be inverted.
- Mount in the location where vibration is less than 0.6g; Far away from the punching machine or the like.
- Mount in the location free of direct sunlight, high humidity, condensation, oil dirt, dust and metal powder.
- Mount in the location free of corrosive gas, explosive gas or combustible gas.

4.2 Product details

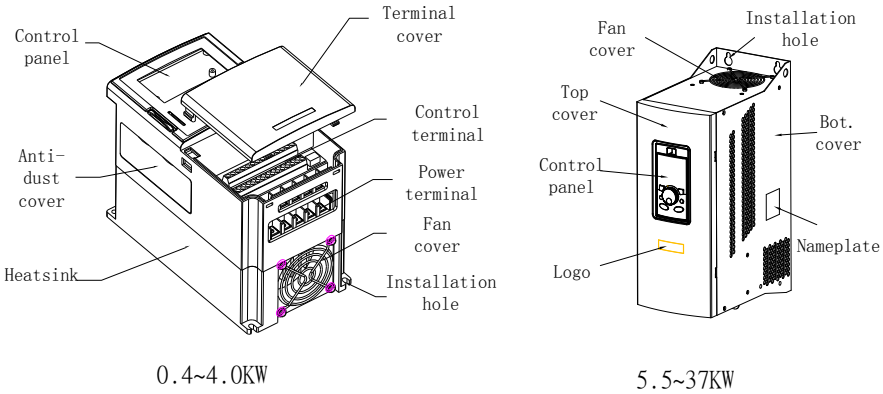


Figure 4-1 0.4~37kW Structure outline drawing

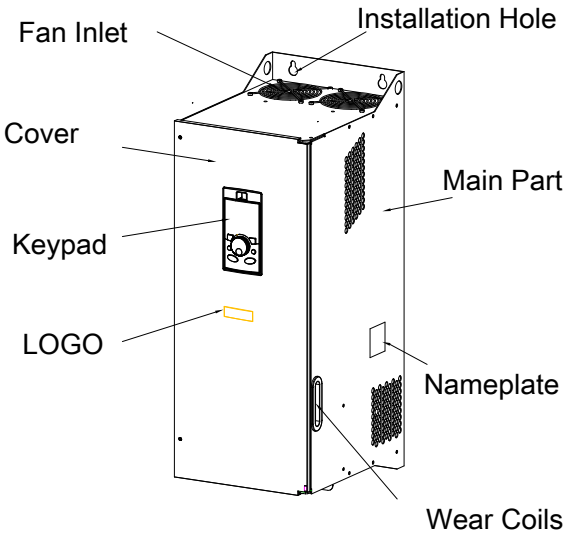


Figure 4-2 45~90kW Structure outline drawing

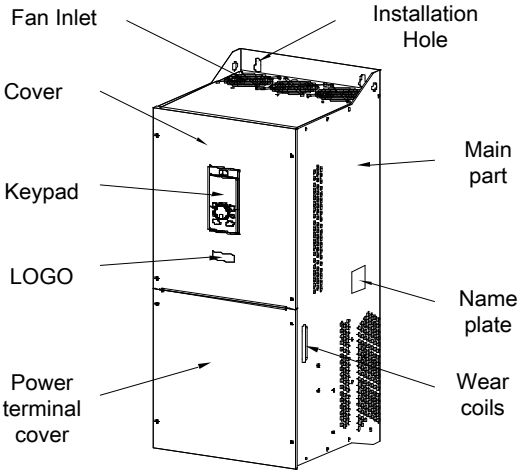


Figure 4-3 110~355kW Structure outline drawing

4.3 Installation Clearance Requirements

AC780 On the top of the AC Drive there are the cooling fans .When multiple AC drives are required to work together, install them side by side. For application installing multiple AC drives, if one row of AC drives need to be installed above another row, install an insulation guide plate to prevent AC drives in the lower row from heating those in the upper row and causing faults. AC780 Schematic of Installation space is as follows

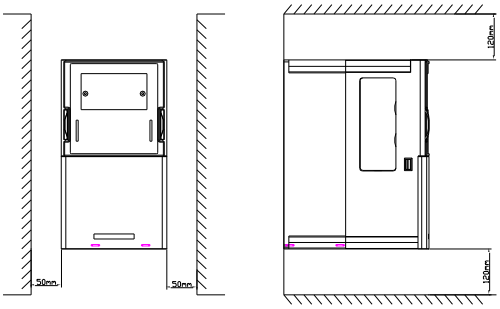


Figure 4-4 0.4~4.0kW Schematic of Installation space

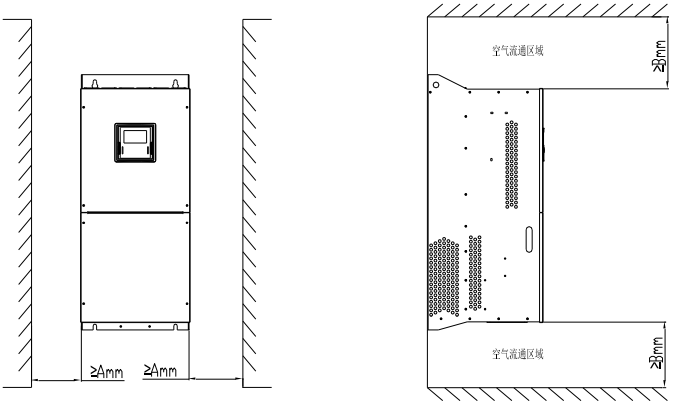


Figure 4-5 5.5~37kW Schematic of Installation space

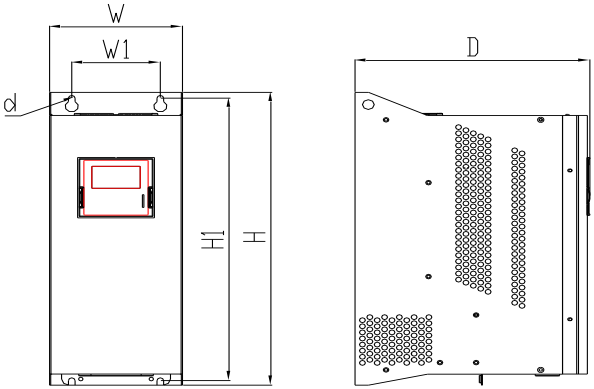


Figure 4-6 45~355kW Schematic of Installation space

Inverter model	Installation space（mm）	
	A	B
AC780/0000.4~AC780/0004.0kW	≥50	≥120
AC780/0005.5~AC780/0037.0kW	≥200	≥100
AC780/0045.0~AC780/0090.0kW	≥50	≥200
AC780/0110.0~AC780/0355.0kW	≥50	≥300

4.4 Mechanical Installation Method and Process

1）Removing And Mounting keypad

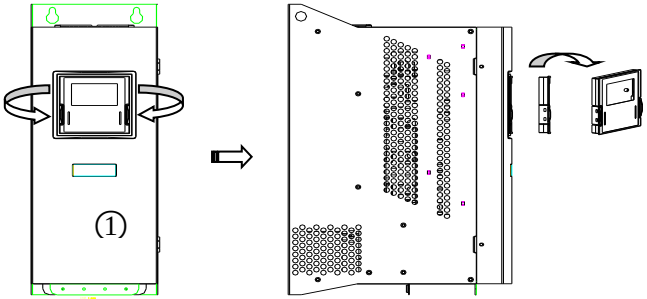


Figure 4-7 Remove and mount keypad

① As shown in fig. Use your finger stretch down the groove along the top of the keypad, then the finger evoke, when you hear “KAKA”, the keypad begin to be divorced from snap.

② The keypad turn along the bottom of the cover, when fully exposed, you can remove it.

2）Removal of the Front Cover of the inverter

5.5-37kW method and process：

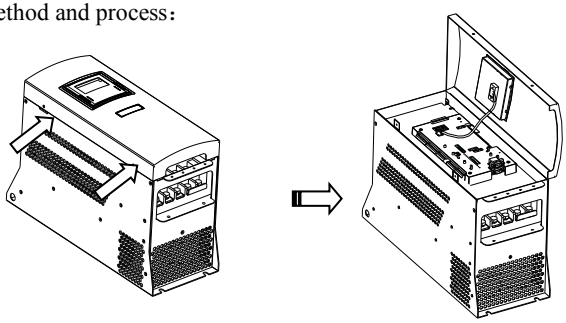


Figure 4-8 5.5~37kW remove front cover

① Remove the two screws on the left side of the cover, you can rotate the cover along the right side.

② You can open the cover to 180°, then you can connect the wears to the terminals.

45-90kW method and process：

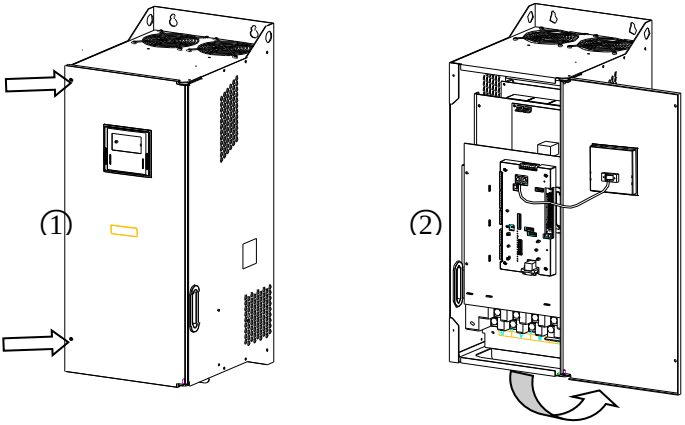


Figure 4-9 45~90kW remove front cover

① Remove the two screws on the left side of the cover, you can rotate the cover

along the right side

② You can open the cover to 180°, then you can connect the wears to the terminals.

110-355kW method and process：

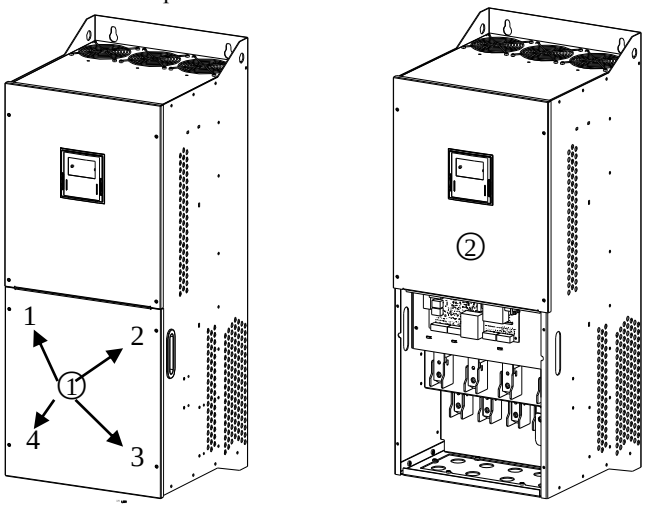
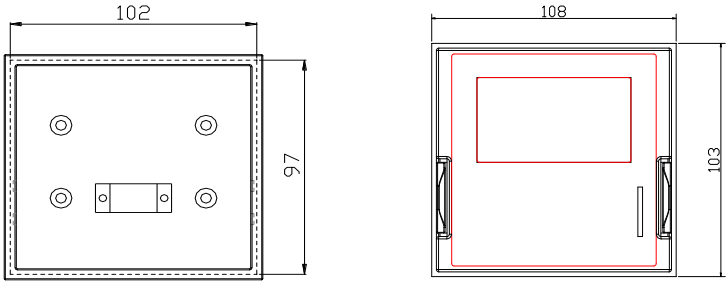


Figure 4-10 110~355kW remove front cover

① Remove the four screws on the top of the cover.

② Remove the cover, and then you can connect the wears to the terminals.

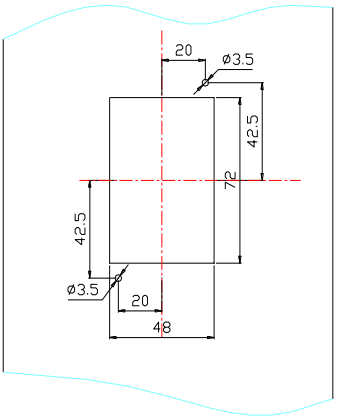
4.5 Keypad installation Size



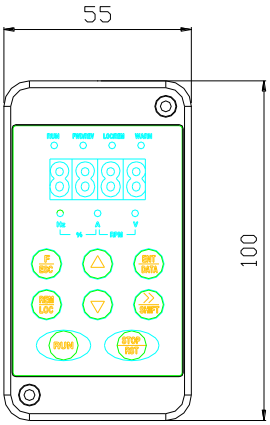
The cutout size for 4kW below keypad（Unit：mm）

The keypad size for 4kW below（Unit：mm）

Figure 4-11 4kW below Keypad size and cutout size



The cutout size for mini remote control keypad （Unit：mm）



The mini remote control keypad size （Unit：mm）

Figure 4-12 The mini remote keypad and cutout size

4.6 Frame and installation size

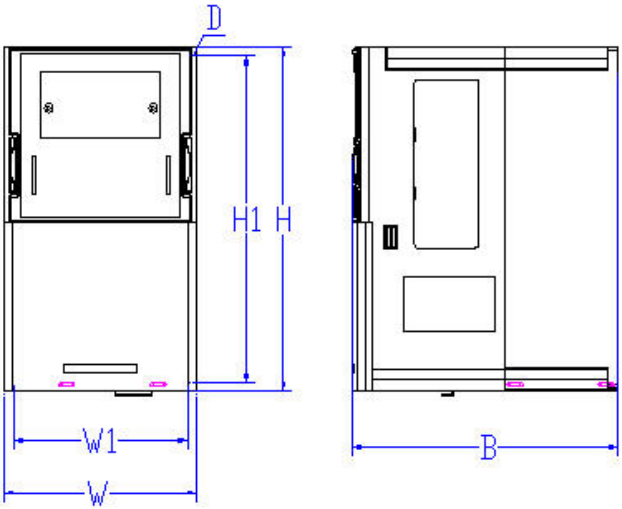


Figure 4-13 0.4~4.0kW inverter frame

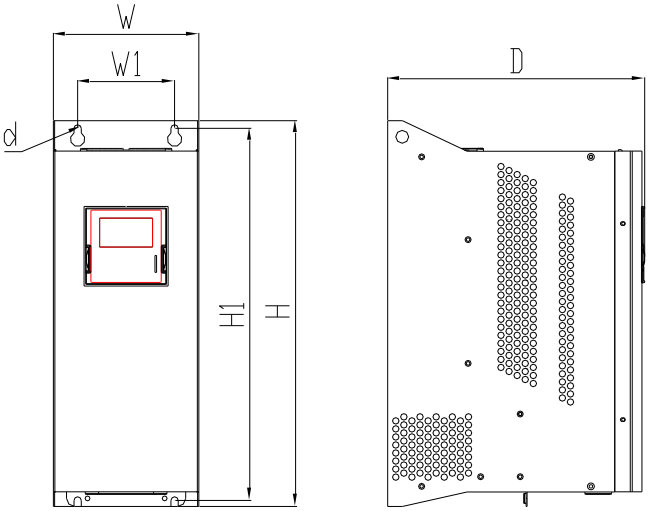


Figure 4-14 5.5~355kW inverter frame

Table 4-1 Fame size（Unit：mm）

Model	W	W1	H	H1	B	D
1/3 phase 200V class						
780G/0000.4/200	105	95	150	139	132	M4
780G/0000.75/200						
780G/0001.5/200	105	95	190	179	144	M4
780G/0002.2/200						
3 phase 400V class						
780G/0000.75/400	105	95	150	139	132	M4
780G/0001.5/400						
780G/0002.2/400	105	95	190	179	144	M4
780G/0003.7/400						
780G/0004.0/400						
780G/0005.5/400	123	95	350	334	230	M5
780G/0007.5/400						
780G/00011.0/400	165	108	453	436	258	M6
780G/0015.0/400						

Model	W	W1	H	H1	B	D
3 phase 400V class						
780G/0018.5/400	180	120	480	463	324	M8
780G/0022.0/400						
780G/0030.0/400	180	120	560	543	324	M8
780G/0037.0/400						
780G/0045.0/400	273	185	732	702	365	M8
780G/0055.0/400						
780G/0075.0/400	273	185	732	702	365	M8
780G/0090.0/400						
780G/0110.0/400	375	274	884	846	415	M10
780G/0132.0/400						
780G/0160.0/400	541	405	986	951	425	M10
780G/0185.0/400						
780G/0220.0/400						
780G/0250.0/400	730	502	1231	1190	502	M10
780G/0280.0/400						
780G/0315.0/400						
780G/0355.0/400						
3 phase 480V class						
780G/0005.5/480	123	95	350	334	230	M5
780G/0007.5/480						
780G/00011.0/480	165	108	453	436	258	M6
780G/0015.0/480						
780G/0018.5/480	180	120	480	463	324	M8
780G/0022.0/480						
780G/0030.0/480	180	120	560	543	324	M8
780G/0037.0/480						
780G/0045.0/480	273	185	732	702	365	M8
780G/0055.0/480						
780G/0075.0/480	273	185	732	702	365	M8
780G/0090.0/480						

Model	W	W1	H	H1	B	D
3 phase 480V class						
780G/0110.0/480	375	274	884	846	415	M10
780G/0132.0/480						
780G/0160.0/480	541	405	986	951	425	M10
780G/0185.0/480						
780G/0220.0/480						
780G/0250.0/480	730	502	1231	1190	502	M10
780G/0280.0/480						
780G/0315.0/480						
780G/0355.0/480						

Chapter 5 Wiring

5.1 Peripheral electrical devices configuration

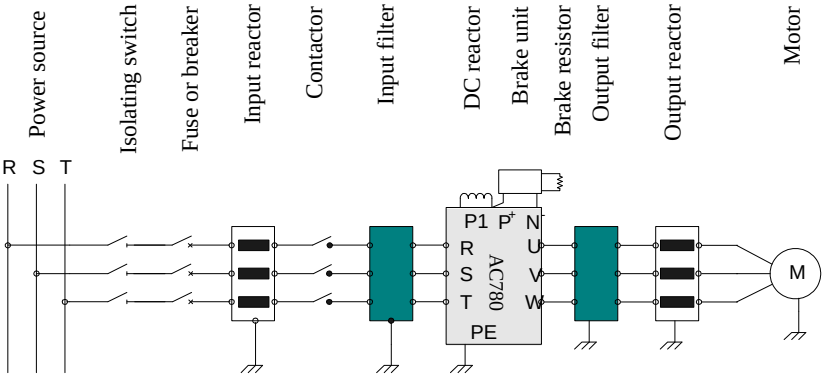


Figure 5-1 AC780 electrical configuration diagram

Attentions for electrical configuration：

- When the grid capacity is larger, it is recommended to add AC or DC reactor reactor in P1-P to improve the power factor.
- The brake unit is built-in for below 18.5kW, users only need to select the appropriate specifications of brake resistor. 18.5kW and above need external brake unit and resistor.
- Must install isolating switch or breaker between the power grid and the inverter to ensure the safety of equipment maintenance.
- To install the circuit breaker with overcurrent protection or fuse before inverter, to avoid fault range expansion.
- If the motor run in low speed for long-term, please consider the use of variable frequency motor.
- For the application of high requirements in the EMI, to choose the input and output of EMI filter, and try to get close to the frequency converter installation.
- The selection of the cable and accessories please refer to Section 5.2 and section 5.3.

5.2 Cable selection

For power cable, its specification should be 1.5 times of its maximum working current. For cable used for control terminals, its cross-sectional area is not less than 1 mm2, and shall have enough mechanical stress.

You must use the yellow green cable with enough cross-sectional area to connect the

AC drive to the protection circuit, which also needs to be connected to grounded bolt with ground mark.

Cross-sectional area of protection cable should meet the follow specifications:

Power cable [mm^2]	Protection cable [mm^2]
S =< 16	Sp = S
16 < S =< 35	Sp = 16
S > 35	Sp = S/2

Cross-sectional area of control and power cables should meet the follow specifications:

AC drive power	AC drive voltage class	Control cable [mm^2]	Input&output Power cable [mm^2]
2.2kW	380-480V; 50/60Hz	1	2.5
3.7kW	380-480V; 50/60Hz	1	4
5.5kW	380-480V; 50/60Hz	1	4
7.5kW	380-480V; 50/60Hz	1	6
11kW	380-480V; 50/60Hz	1	6
15kW	380-480V; 50/60Hz	1	6
18.5kW	380-480V; 50/60Hz	1	10
22kW	380-480V; 50/60Hz	1	16
30kW	380-480V; 50/60Hz	1	25
37kW	380-480V; 50/60Hz	1	25
45kW	380-480V; 50/60Hz	1	35
55kW	380-480V; 50/60Hz	1	35
75kW	380-480V; 50/60Hz	1	50
90kW	380-480V; 50/60Hz	1	70
110kW	380-480V; 50/60Hz	1	95
132kW	380-480V; 50/60Hz	1	150
160kW	380-480V; 50/60Hz	1	185
185kW	380-480V; 50/60Hz	1	185
220kW	380-480V; 50/60Hz	1	250
250kW	380-480V; 50/60Hz	1	300
280kW	380-480V; 50/60Hz	1	370
315kW	380-480V; 50/60Hz	1	480
355kW	380-480V; 50/60Hz	1	510

5.3 Main devices selection

1）Breaker and contactor

When the AC power on, because of the big DC capacitor, a inrush current will flow into the AC drive. This current value can reach to 2-3 times of AC drive rated current. Another thing is that AC780 drive has a high overload capacity (1.5 times rated current for 2 minutes). Thus the breaker rated current should meet the follow formula:

IQ >= (2~3)* IN

Contactor itself has no protection functions, thus no existing of mistake action. Generally, its rated current meets the follow formula:

IC >= 1.1*IN

Among the above expressions: IQ is the rated current of breaker, IC is the rated current of contactor, IN is the rated current of the AC drive. Based on the above expressions, the recommended current specifications for breaker and contactor are listed in the follow table:

AC drive voltage class	Recommended working current for breaker (A)	Recommended working current for contactor (A)
0.4kW; 200V	10	6.5
0.75kW; 200V	10	6.5
1.5kW; 200V	16	11
2.2kW; 200V	25	16
0.75kW; 380-480V	10	6.5
1.5kW; 380-480V	10	6.5
2.2kW; 380-480V	10	6.5
3.7kW; 380-480V	16	11
5.5kW; 380-480V	25	16
7.5kW; 380-480V	40	25
11kW; 380-480V	63	32
15kW; 380-480V	63	50
18.5kW; 380-480V	100	63
22kW; 380-480V	100	80
30kW; 380-480V	125	95
37kW; 380-480V	160	120
45kW; 380-480V	200	135
55kW; 380-480V	200	170
75kW; 380-480V	250	230
90kW; 380-480V	315	280
110kW; 380-480V	400	315
132kW; 380-480V	400	380
160kW; 380-480V	630	450
185kW; 380-480V	630	500
220kW; 380-480V	800	630
250kW; 380-480V	800	700

280kW; 380-480V	1000	780
315kW; 380-480V	1200	900
355kW; 380-480V	1400	1000

Attentions：

A、The main circuit wire type is 600V IV plastic insulated wire.

B、Recommended wire cross-sectional area assuming ambient temperature is 20 C.

C、The so-called maximum wire cross-sectional area is the maximum cross-sectional area of the terminal plate.

- Must install breaker between power supply and input terminals (R/L1，S/L2，T/L3) (When use leakage power switch,)
- Don't need to consider phase consequence when connect the input power terminals (R/L1，S/L2，T/L3)
- Please connect motor to power terminals (U/T1 、V/T2 、W/T3) correctly.
- Please use the pressure joint with sleeve for all power and control terminals.
- The input and output line length shall be less than 10 meters, if more than 10 meters, please use the recommended wire with a larger cross-sectional area.
- Please use the shielded wire or stranded wire for control terminals, in addition, the control wiring should be separated from the main circuit, power circuit.
- In order to ensure the reliability of the use, please contact with the small signal or double contact relay.
- Please connect the ground terminal (EG) to earth.

2）Selection of AC&DC reactor

The role of AC line reactor and DC reactor is to improve system power factor and match the AC drive and grid, and the output AC reactor of the AC drive is to reduce the operation noise of the motor and the leakage current of high-order. Output reactor Output can be used if motor cable is too long or in high-end field.

In the following several conditions, should consider to choose line AC or DC reactor.

a Power supply capacity above 500KVA, and was 10 times more than the capacity of the AC drive.

b The thyristor device shares the same transformer with the AC drive;

c Arc welder distorted wave generating apparatus share the same power supply with the AC drive;

d There is a large voltage distortion (such as a capacitor bank of improving power factor);

e The power supply voltage unbalance ratio is large.

The following 2 tables list the input AC and DC reactor for ETD AC780 series. If customers need the following AC&DC reactor, when ordering please inform us, AC&DC reactor will be shipped together with the AC drive but alone box. When installation, remove the short bar between P1 and P+ and connect DC reactor between P1 and P+ terminals.

Inverter model	Spec. of input AC reactor		Input AC reactor model (Recommended brand：EAGTOP）
	current	Voltage drop	
5.5kW，400-480V	15	2%	ACL-0015-EISH-E1M0B
7.5kW，400-480V	20	2%	ACL-0020-EISH-EM75B
11kW，400-480V	30	2%	ACL-0030-EISH-EM60B
15kW，400-480V	40	2%	ACL-0040-EISH-EM42B
18.5kW，400-480V	50	2%	ACL-0050-EISH-EM35B
22kW，400-480V	60	2%	ACL-0060-EISH-EM28B
30kW，400-480V	80	2%	ACL-0080-EISC-EM19B
37kW，400-480V	90	2%	ACL-0090-EISC-EM19B
45kW，400-480V	120	2%	ACL-0120-EISH-EM13B
55kW，400-480V	150	2%	ACL-0150-EISH-EM11B
75kW，400-480V	200	2%	ACL-0200-EISH-E80UB
90kW，400-480V	200	2%	ACL-0200-EISH-E80UB
110kW，400-480V	250	2%	ACL-0250-EISH-E65UB
132kW，400-480V	290	2%	ACL-0290-EISH-E50UB
160kW，400-480V	330	2%	ACL-0330-EISH-E50UB
185kW，400-480V	390	2%	ACL-0390-EISH-E44UB
220kW，400-480V	490	2%	ACL-0490-EISH-E35UB
250kW，400-480V	530	2%	ACL-0530-EISH-E35UB
280kW，400-480V	600	2%	ACL-0600-EISH-E25UB
315kW，400-480V	660	2%	ACL-0660-EISH-E25UB
355kW，400-480V	800	2%	ACL-0800-EISH-E25UB

Inverter model	Spec. of input DC reactor		Input DC reactor model (Recommended brand：EAGTOP）
	current	Voltage drop	
5.5kW，400-480V	15	2%	DLK-15A/4%
7.5kW，400-480V	20	2%	DLK-20A/4%

11kW，400-480V	30	2%	DLK-30A/4%
15kW，400-480V	40	2%	DLK-40A/4%
18.5kW，400-480V	50	2%	DLK-50A/4%
22kW，400-480V	60	2%	DLK-60A/4%
30kW，400-480V	80	2%	DLK-80A/4%
37kW，400-480V	90	2%	DLK-90A/4%
45kW，400-480V	110	2%	DLK-110A/4%
55kW，400-480V	150	2%	DLK-150A/4%
75kW，400-480V	200	2%	DLK-200A/4%
90kW，400-480V	200	2%	DLK-200A/4%
110kW，400-480V	250	2%	DLK-250A/4%
132kW，400-480V	300	2%	DLK-300A/4%
160kW，400-480V	350	2%	DLK-350A/4%
185kW，400-480V	400	2%	DLK-400A/4%
220kW，400-480V	500	2%	DLK-500A/4%
250kW，400-480V	550	2%	DLK-550A/4%
280kW，400-480V	600	2%	DLK-600A/4%
315kW，400-480V	700	2%	DLK-700A/4%
355kW，400-480V	800	2%	DLK-800A/4%

Don’t need to add DC reactor for below 5.5kW inverters.

3）Brake unit and resistor

When the equipment AC780 drive brakes fast, brake unit is necessary to discharge the feedback power to DC bus which is generated by the fast stop equipment. It has the built-in brake unit for 0.4-15kW AC drive, and customer only need to install the brake resistor. For above 15kW AC drive, Please select the adaptive brake unit for your equipment. Customer must install the brake unit at the follow conditions:

1） For the lifting load which has a frequent process of up and down.
2） For the equipment which has big inertia.
3） For the fast response equipment such as winding machine which decelerate and accelerate frequently.

Selection of brake unit closely depends on the application conditions, such as the values of brake torque and brake ratio. This manual just gives the recommended value as is listed in the follow table for common use. You need adjust these values if your equipment works in brake status frequently and with high brake torque.

Inverter model	Brake unit		Break resistor(15% duty)		
	model	Qua.	Value (Ω)	power(W)	Qua.
0.4kW，1/3 phase 200V	Built-in	1	150	150	1
0.75kW，1/3 phase 200V	Built-in	1	150	150	1
1.5kW，1/3 phase 200V	Built-in	1	60	400	1
2.2kW，1/3 phase 200V	Built-in	1	60	400	1
0.75kW，3 phase 400-480V	Built-in	1	400	150	1
1.5kW，3 phase 400-480V	Built-in	1	400	150	1
2.2kW，3 phase 400-480V	Built-in	1	150	500	1
3.7kW，3 phase 400-480V	Built-in	1	150	500	1
4.0kW，3 phase 400-480V	Built-in	1	150	500	1
5.5kW，3 phase 400-480V	Built-in	1	130	750	1
7.5kW，3 phase 400-480V	Built-in	1	85	1200	1
11kW，3 phase 400-480V	Built-in	1	60	1500	1
15kW，3 phase 400-480V	Built-in	1	40	2500	1
18.5kW，3 phase 400-480V	DBU-4030	1	60	1500	2
22kW，3 phase 400-480V	DBU-4030	1	48	2000	2

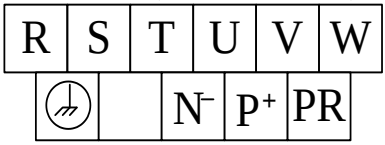
30kW，3 phase 400-480V	DBU-4030	1	40	2500	2
37kW，3 phase 400-480V	DBU-4045	1	48	2000	3
45kW，3 phase 400-480V	DBU-4045	1	40	2500	3
55kW，3 phase 400-480V	DBU-4030	2	40	2500	4
75kW，3 phase 400-480V	DBU-4045	2	48	2000	6
90kW，3 phase 400-480V	DBU-4045	2	40	2500	6
110kW，3 phase 400-480V	DBU-4045	3	48	2000	9
132kW，3 phase 400-480V	DBU-4045	3	40	2500	9
160kW，3 phase 400-480V	DBU-4220	1	40	2500	11
185kW，3 phase 400-480V	DBU-4220	1	40	2500	13
220kW，3 phase 400-480V	DBU-4220	2	40	2500	16
250kW，3 phase 400-480V	DBU-4220	2	40	2500	18
280kW，3 phase 400-480V	DBU-4220	2	40	2500	22
315kW，3 phase 400-480V	DBU-4220	2	40	2500	24
355kW，3 phase 400-480V	DBU-4220	2	40	2500	26

5.4 Wiring of main circuit terminals

（1）Type of main circuit terminals

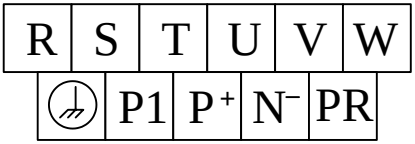
☐ □780G/0000.4/200 -780G/0002.2/200

☐ □780G/0000.75/400(780P/0001.5/400)-780G/0004.0/400(780P/0005.5/400)



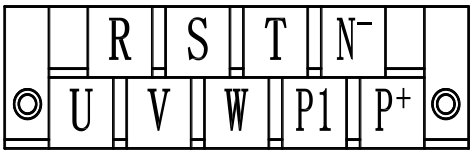
☐ 780G/0005.5/400(780P/0007.5/400)-780G/0015.0/400(780P/0018.5/400)

☐ 780G/0005.5/480(780P/0007.5/480)-780G/0015.0/480(780P/0018.5/480)



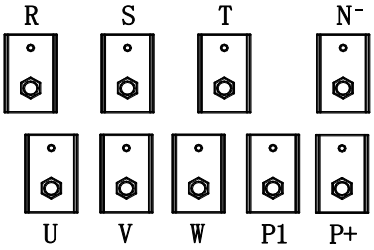
☐ 780G/0018.5/400(780P/0022.0/400)-780G/0090.0/400(780P/0110.0/400)

☐ 780G/0018.5/480(780P/0022.0/480)-780G/0090.0/480(780P/0110.0/480)

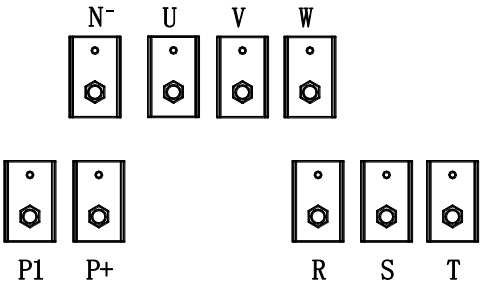


☐ 780G/0110.0/400(780P/0132.0/400) -780G/0132.0/400(780P/0160.0/400)

☐ 780G/0110.0/480(780P/0132.0/480) -780G/0132.0/480(780P/0160.0/480)



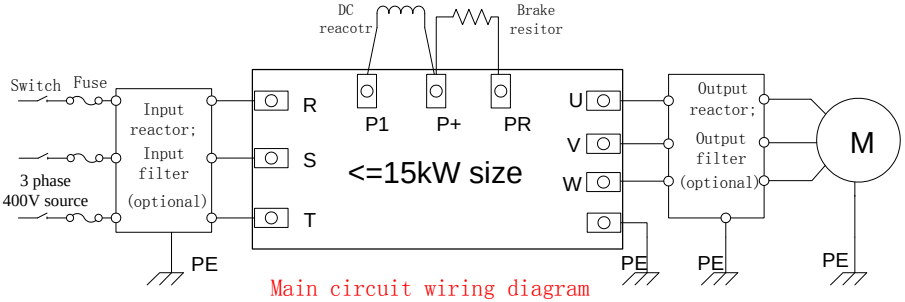
- ☐ 780G/0160.0/400(780P/0185.0/400)-780G/0355.0/400(780P/0400.0/400)
- ☐ 780G/0160.0/480(780P/0185.0/480)-780G/0355.0/480(780P/0480.0/400)



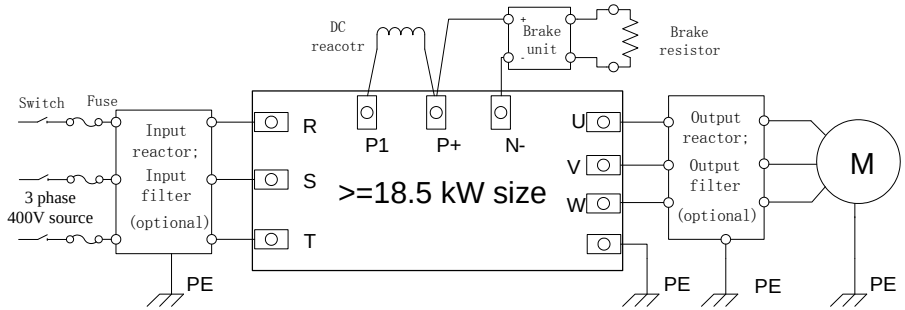
（2）Description of main circuit terminals

Mark	Terminal name	Description
R、S、T	3 phase source input terminals	Connect to 3 three phase source; no demand for phase sequence; Single phase source is prohibited
U、V、W	Output terminals of the AC drive	Connect to 3 phase motor Attention for phase sequence. Exchange any two phases, motor rotation direction is reversed
P^+、PR	Brake terminals	Bake resistor terminals for <=15kW power size
P^+、N^-	DC bus terminals	Common DC bus input point; Connect to an external brake unit for >15kW power size.
P1、P^+	DC reactor terminals	Connect to and external DC reactor. P1 and P+ have been shorted in the factory; Please remove the short bar firstly if you want to install a DC reactor
PE	Earth terminals	Must be grounded

（3）Wring diagram of main circuit terminals



Main circuit wiring diagram for <=15kW size



Main circuit wiring diagram for >=18.5kW size

Notices of main circuit wiring:

1 The input RST power terminals must be connected to AC source through switches and fuses (or breaker), and no demand for phase sequence. In order to interrupt the AC drive from power grid and prevent the expansion of fault when the AC drive have a fault, you can install a contactor in the input side, which can be controlled by the relay output of AC780 expansion board. In order to improve the power factor and suppress harmonics, it is necessary to install input reactor and filter.

2 Prevent installing capacitor or varistor on the output U/V/W terminals, otherwise result in the damage to the AC drive. If the motor line is very long, because of the existing of distribution capacitor, it will lead to electrical resonance that can destroy the motor insulation and result in more leakage current, it is necessary to install a output AC reactor.

3 Brake resistor terminals P+&PR are only existed for <=15kW AC drives. Please select the recommended resistor value and the resistor lead wire length is less than 5m.

4 P1&P+ terminals have been shorted in factory configuration, please removes the short bar firstly if you need install a DC reactor. Don't connect any other devices between P1&P+ terminals except DC reactor. Must short P1&P+ terminals when DC reactor is not required, otherwise the AC drive will not work.

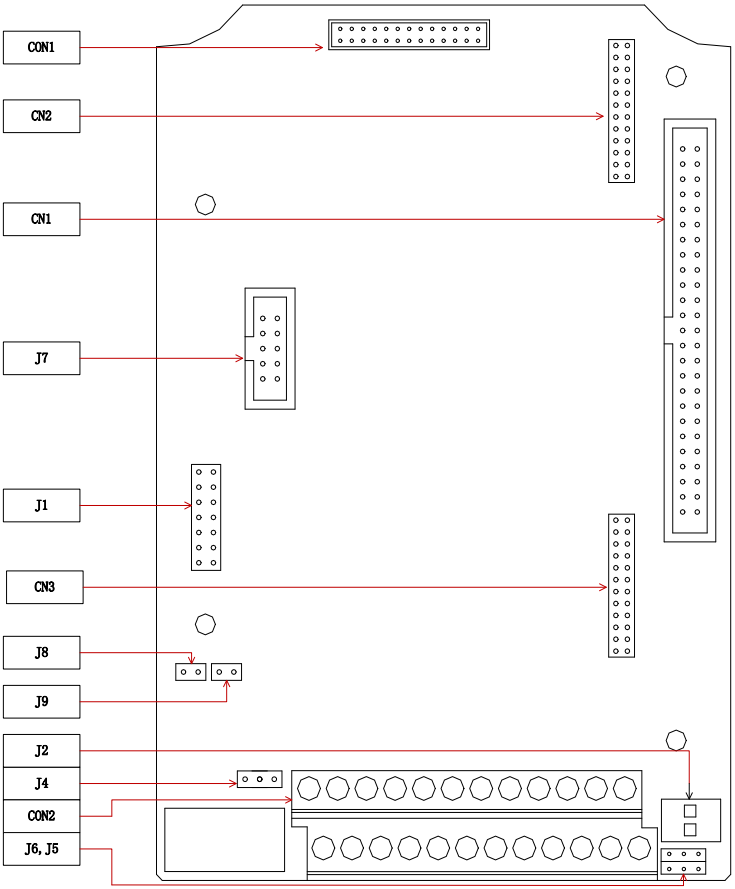
5 Keep P and N- open if they are not used. When connect a brake unit, its wire length

should be less than 5m, and twisted pair wire is recommended. Prevent connecting a brake resistor directly to P+ and N-, otherwise may result in a fire accident. Perform the maintenance job after confirming that the DC Bus voltage is below 36V.

6 PE-terminal must be grounded, otherwise may result in the abnormal state of the AC drive.

7 Breaker, DC reactor, fuse, input AC reactor, output reactor, EMI filter are all optional parts, about their detailed information, you can refer to 5.3 and 5.6.

5.5 Control terminals



5.5.1 Descriptions of control terminals

Terminal name	function
CON1	26Pin connecter which is to power board for 3.7kW&below 3.7kW drives (used by factory)
CN1	50Pin connecter which is to power board for above 3.7kW drives(used by factory)
CN2	Encoder expansion interface
CN3	Anybus expansion interface
CON2	24Pin user control terminal（As is shown in follow graph）
J7	Keypad interface
J2	Dial switch: input mode selection for 2 analog inputs **(Off: 0~10V voltage input； ON: 0~20mA current input)**
J4	Digital input direction selection
J8	Select whether to connect the 24V reference to earth by capacitor
J9	Select whether to connect the GND to earth by capacitor
J6	Mode selection for Analog output 1 **(Right side short: 0~10V output; left side short: 0~20mA output;)**
J5	Mode selection for Analog output 2 **(Right side short: 0~10V output; left side short: 0~20mA output;)**

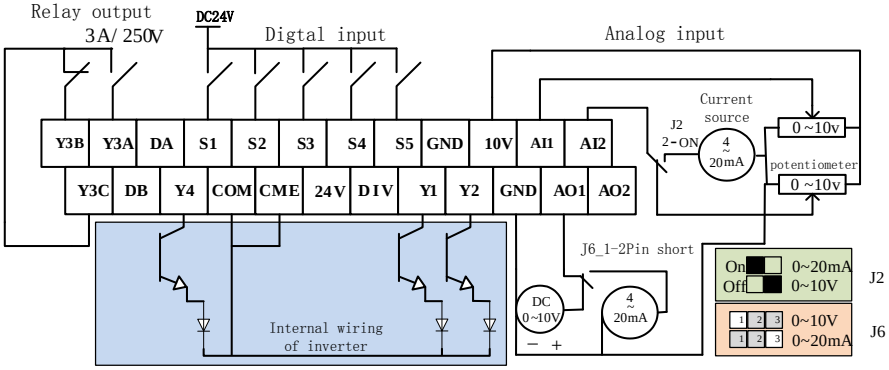


Figure 5-2 wiring diagram of control terminal CON2

5.5.2 Function table of control terminals and jumpers：

classification	label	Name	Function description
Relay output	Y3B	Relay output 3C	（ Common end of relay output）passive contact
	Y3C	Relay output 3B	Passive contact（BC is normally closed），Programmable output。 Electrical Spec.：AC 250V/2.5A，DC 24V/5A
	Y3A	Relay output 3A	Passive contact（AC is normally open），Programmable output。 Electrical Spec.：AC 250V/2.5A，DC 24V/5A
COM	DA DB	RS485 input &output	RS485 input / output terminals, can connect up to 31 inverters
Digtal input	S1	Digital input 1	S1-S5 is a set of configurable input terminals. Through software programming, each input can be configured up to 32 functions. Please refer to the terminal function S1~S5 setting method. S1-S5 terminals all support bipolar input signals, specifically through the J4 jumper terminal selection. J4 1-2 short connection (or DIV shorted 24V), S1-5 support leakage type wiring. J4 2-3 pin short connection (or DIV shorted CME), S1-S5 support source type wiring. Factory default source type wiring **Electrical spec.:** 0V /+24V
	S2	Digital input 2	
	S3	Digital input 3	
	S4	Digital input 4	
	S5	Digital input 5	
	DIV	Common end of digital input	Common end of digital input
	24V	S+24V	24V auxiliary power supply, output less than 200mA current
	CME	CME	The 24V power reference ground CME is completely isolated from the analog ground within the master board.
Digtal output	Y1	Digital output 1	Y1\Y2\Y4，open collector OC gate output, need to add pull resistors if used。This is a set of configurable digital output. Through software programming, each output can be a number of different functional configurations. **Electrical spec.** 0V /+24V
	Y2	Digital output 2	
	Y4	Digital output 4	
	COM	Common end of digital output	Common end of digtal output, Y1\Y2\Y4 support bi-directional digtal output.
Analog input and output	GND	Analog reference	**Electrical spec.** 0V
	+10V	+10V reference power supply	Provide users with +10V reference power supply, which can be connected with an external potentiometer. External potentiometer resistance recommended: more than 4.7K; the power supply output current: less than 10mA.
	GND	Analog reference	

	AI1	Analog input 1	This is the two analog inputs, the input voltage range is 0~+10V, each was 20k input resistance. Set J2 dial switch 1 in OFF position, configure analog input 1 as 0~10V voltage input, 1 in ON position as 0~20mA current input; Set J2 dial switch 2 in OFF position, configure analog input 2 as 0~10V voltage input, 2 in ON position as 0~20mA current input; The analog input can be quantified by software programming.
	AI2	Analog input 2	
	AO1	Analog output 1	This is the two configurable analog output with an output voltage range of 0~+10V. Set the jumper J6 1-2 terminal short, configure analog output 1 as 0~10V output voltage, 2-3 terminal short as 0-20mA current output; Set the jumper J5 1-2 terminal short, configure analog output 2 as 0~10V output voltage, 2-3 terminal short as 0-20mA current output; By programmable settings, you can connect any internal variables to the analog output.
	AO2	Analog output 2	

5.6 Electrical wiring guide

Inverter wiring includes the main circuit and control circuit. The user can open the cover of the housing, the main circuit terminal and the control loop terminal can be seen. The following figure is AC780 factory standard wiring diagram:

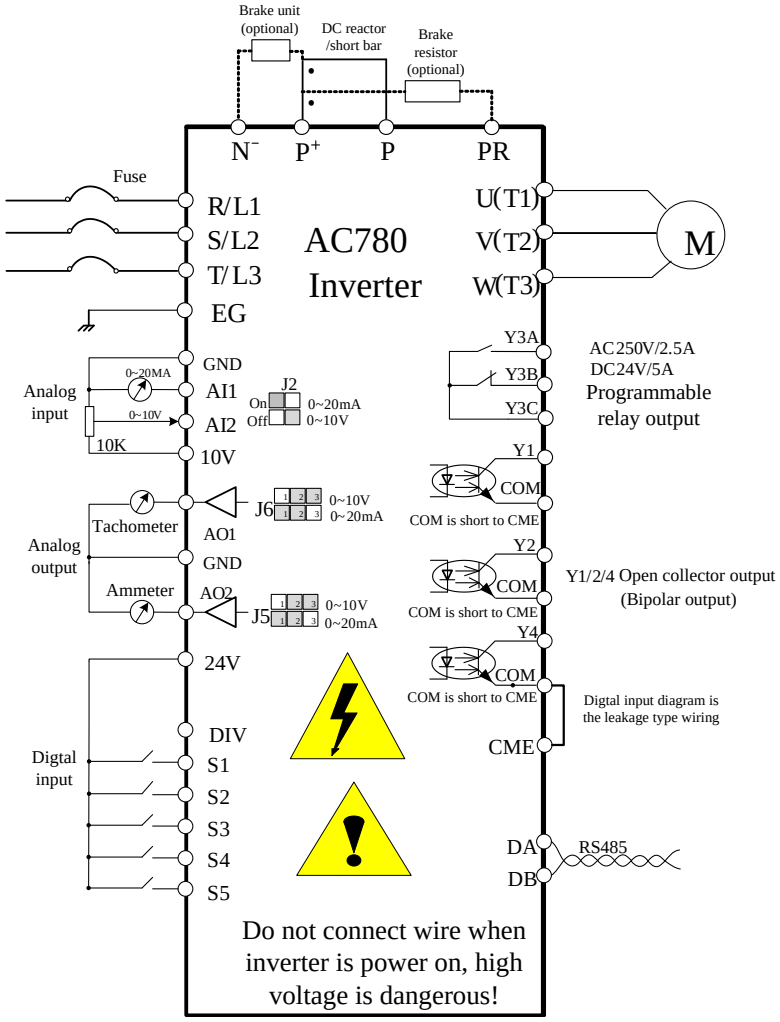
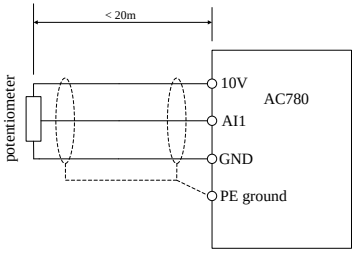


Figure 5-3 AC780 basic wiring diagram

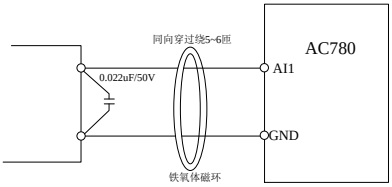
Signal input terminal wiring description：

1）Analog input：

Due to weak analog voltage signal is particularly vulnerable to external interference, so need to use shielded cable, and wiring distance as short as possible, not more than 20m. As follows:

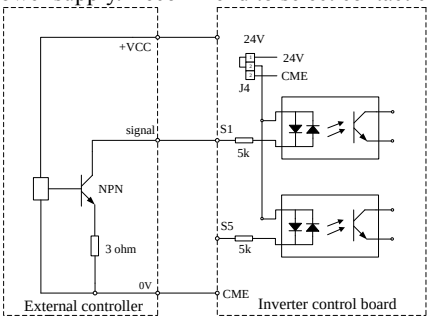


If the analog signal is seriously disturbed, the analog signal source side need to add filter capacitor or ferrite core, as shown below：

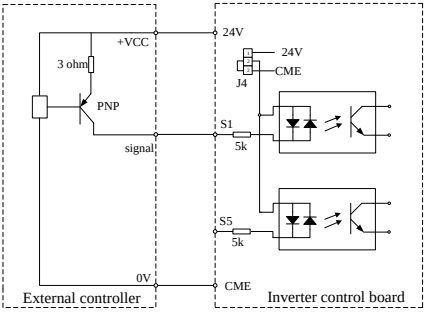


2）S1-S5 digital input：

Generally need shielded cable, and wiring distance as short as possible, not more than 20m. When active mode is chosen, the necessary filtering measures are needed for the crosstalk of power supply. Recommend to select contact control mode.



Leakage wiring mode



Source wiring mode

Chapter 6 Operator panel

ETD AC780 provides a standard LED operator panel for each inverter. With this panel, can modify parameters, monitor the working status of inverter, start or stop inverter, and other operations.

6.1 LED operator panel

Standard LED operator panel

Remote mini LED panel

Key	Name	Function
F/ESC	Return key	Return to the previous menu
>>/SHIFT	Shift key	Shift cursor when set parameters
MF	Multiple function key	Can be set to multiple functions. With the functions of switching panel and terminal, switching operation direction and enter the panel jog mode.
ENT/DATA	Confirm key	Display interface change or save data validation
▲	Up key	Increase function menu or data
▼	Down key	Decrease function menu or data
RUN	Start key	Start inverter（only effective in panel control mode）
STOP /RESET	Stop key	Stop inverter
	Reset key	Used to reset fault or warning status of inverter

Operation of remote mini LED panel is same with the standard LED panel. So, in this manual we only introduce the operation method of the standard LED operator panel.

6.2 Indicating lamp description of LED operator panel

The AC780 inverter control panel provides 7 indicator lights to indicate the operating status of the inverter and the physical unit of the display variable.

RUN：When the lamp is off, it means that the inverter is in stopping status. When the lamp is on, it means that the inverter is in running status.

FWD/REV：When the lamp is on, it indicates a forward running state. When the lamp is off, it indicates a reverse running state.

LOC/REM：This is indicator lamp of operation mode. Lamp is off, it means a panel control mode; Lamp is on, it means a terminal control mode; Lam is flickering, it means a remote control mode.

FAULT fault indicator lamp，it means a fault state when lamp is on.

Hz Unit of current display variable is Hz;

A Unit of current display variable is ampere;

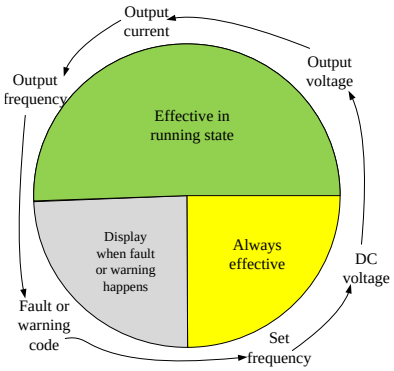
V Unit of current display variable is volt;

％（Hz+A） Percentage

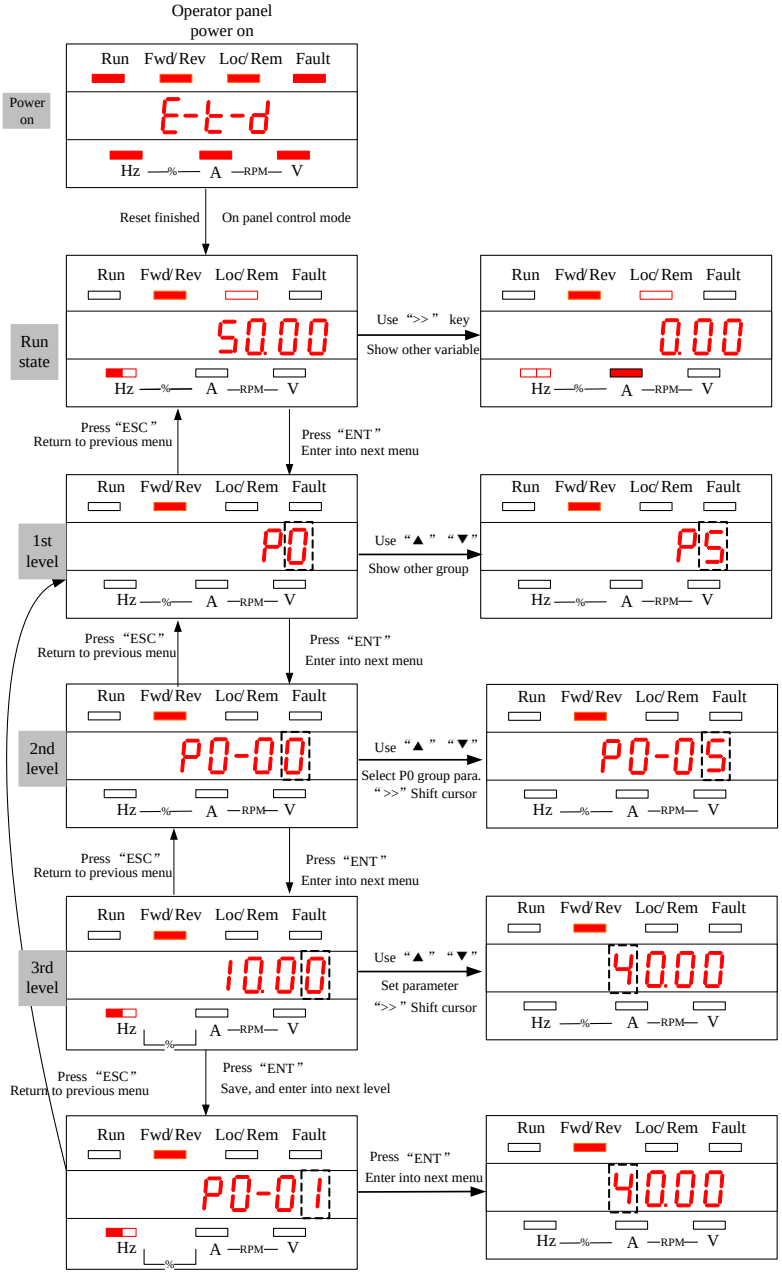
RMP（A+V） Current display variable is speed ;

6.3 Monitor parameters of LED operator panel

Press shift key, rotation in turn is：set frequency－＞DC voltage－＞output voltage－＞output current －＞＞output frequency－＞fault or warning code【don't display if no fault or warning happens】－＞ set frequency.



6.4 Description of operator panel



Chapter 7 Operating the drive

7.1 Check and prepare before operate

Should focus on checking the following before starting the drive

□confirm wiring is right. In particular, check the inverter output terminals U/T1, V/T2, W/T3 not be connected to the power supply, and confirm the grounding terminal (PE) grounding good.

□ Confirm no short circuit or short circuit to ground between terminals and exposed live parts.

□Confirm the terminal connection, plug connector and screw fastening loose

□When power up, ensure that all switches are in a disconnected state, to ensure that the inverter will not start and no unexpected action.

□Check the following points after power on

◇Operation panel no fault display;

◇Air channel in the inverter is unobstructed;

	Connect the power supply after cover installed; Don't remove cover after switching power; Wet hand cannot operate switch to prevent electric shock accident;

7.2 Operation method

AC780 inverter has a variety of operating methods, please refer to the "sixth chapter operator panel" and the eighth chapter functional parameter table. Select the most suitable operation method according to application requirements and operating regulations. The usual method of operation is shown in table 7-1.

7.3 Quick start

After checking and confirming the abnormal situation, set the function parameters needed for the inverter operation properly. After the parameter setting is complete, it can run the drive.

When try to start, it is recommended to operate the inverter and motor at a lower frequency, and gradually increase the operating frequency by observing the abnormal situation. Drive is set to panel control mode at factory, can be set by parameter "P0.01".

Table 7-1 Common operation method

operation mode	Frequency setting	Operate command
Panel mode	Set by press▲▼key on panel	Start the drive by press RUN key; Stop the drive by press STOP/RESET key;
Terminal mode	Potentiometer or 0~20mA current input	Digital input S1---+24V Digital input S2—+24V

□Start the drive by press RUN key, stop the drive by press STOP/RESET key;

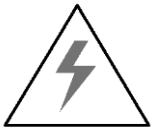
□Check the following points during running

◇Whether the motor rotate direction is right.

◇Whether the rotation of the motor is stable (no whistle or vibration).

◇Whether acceleration / deceleration is smooth.

□ If all is ok, continue to increase the frequency by press ▲▼ key. After the above test, confirmed that no abnormal circumstances, and then can be formally put into operation.



If the drive and motor running abnormal, should immediately stop running, and refer to the "tenth chapter fault diagnosis", check the reason for abnormal situation. After inverter stop, if not disconnected main circuit power supply, terminal R/L1, S/L2, T/L3 is still charged. At this time, touch the inverter U/T1, V/T2, W/T3 will cause electric shock. In addition, even if the main power supply is removed, because the filter capacitor needs a certain time to discharge. The main power supply is cut off for 10 minutes, and should use DC voltmeter to test DC bus voltage, and confirmed that DC voltage is lower than the safe voltage value and then can contact the inverter internal circuit.

Chapter 8 Parameters List

Parameter name	Explaination	Range	Default
Basic Parameters			
P0.00 **GP Type**	1：G Type（Constant Torque Load） 2：P Type（Constant Power Load）	Read Only	
P0.01 Command source selection	0: Operation panel control 1: DI Terminal control 2: Communication control	0~2	0
P0.02 **Ramp Reference1（Main Frequency source selection）**	**0：Preset Frequency P0-10（adjustable by up and down key button ）** 1：scaled analog input 1 2：scaled analog input 2 3：multi speed selected by digital inputs 4：Simple PLC reference 5：AUX PID regulator output 6：Communication 7：Hi Frequency pulse input	0~7	0
P0.03 motor Rated power	Set up the proper motor power (kW) according to the name plate	0.4kW～650.0kW	Model dependent
P0.04 motor Rated current	Set up the proper motor power (kW) according to the name plate	0.1A～6000.0A	Model dependent
P0.05 motor Rated freqency	Set up the proper motor rated frequency according to the name plate（Hz）	0.01Hz～Max Freq	Model dependent
P0.06 motor Rated speed	Set up the proper motor rated speed according to the name plate（rpm）	100～10000rpm	Model dependent
P0.07 motor Rated voltage	Set up the proper motor rated voltage according to the name plate（V）	10V～1000V	Model dependent
P0.08 Control mode	**0：sensorless（SVC）** 1：indirect Vector control（IFOC） 2：V/F control	0~2	0
P0.09 MAX freq	Set up the max frequency limit according to your appliactions	50.00Hz～300.00Hz	50.00Hz
P0.10 Preset freq	The internal preset frequency	0.00Hz～max freq（F0-09）	10.00Hz
P0.11 ACC time 1	Set up the first motor Acceleration time 1	0.0s～6500.0s	Model dependent
P0.12 DEC time 1	Set up the first motor Deceleration time 1	0.0s～6500.0s	Model dependent
Parameter name	Explaination	Range	Default

P0.13 Tuning CMD	0：NO operation 1：static tuning 2：rotating tuning	0~2	0
P0.14 Turn direction	0：clockwise 1：anti-clockwist	0~1	0
P0.15	Memorize the freq ref when power off	0：No 1：Yes	0
P0.16	reserved	reserved	reserved
P0.17	reserved	reserved	reserved
P0.18	reserved	reserved	reserved
P0.19	reserved	reserved	reserved
P0.20	reserved	reserved	reserved
Current loop parameters			
P1.00 Positive torque configuration	0：no limit 1：scaled analog input 1 2：scaled analog input 2 3：Hi Frequency pulse input 4：Communication 5：Min(AI1,AI2) 6：Max(AI1,AI2)	0~6	0
P1.01 Negative torque configuration	Negative torque configuration，same as P1.00 setiing up	0~6	0
P1.02	Positive torque current limit setting	0.0%～200.0%	150%
P1.03	Negtive torque current limit setting	0.0%～200.0%	150%
P1.04	Proportional Gain of the torque current	0～65535	1000
P1.05	Intergral Gain of the torque current	0～65535	500
P1.06	Proportional Gain of the Flux current	0～65535	1000
P1.07	Intergral Gain of the Flux current	0～65535	500
P1.08	PreMagnetising Current	0%～100%	30%
P1.09	Time for the PreMagnetising	0.0s～10.0s	0.0S
P1.10	Motor overload protection gain	0.20～10.00	1.00
P1.11	Motor overload warning coefficient： This function is used to send a warning signal to the control system via DO before motor overload protection.	50%～100%	80%
P1.12	**OverCurrentThreshold：** The inverter will set the overcurrent flag if the output current is greater than this threshold and lasted for the corresponding delay time.	0%～300.0% （motor rated curent）	200.0%
P1.13	OCDelayTime. The time for which it will be lasted before OC flag being set.	0.00s～600.00s	0.00S
Parameter name	Explaination	Range	Default

P1.14	**Over current stall Gain** The inverter will adjust the ACC/DEC time according to over current stall gain if the output current is greater than the stall current threshold (P1.15) to avoid OC stall trip.	0～1000	200
P1.15	OC stall current threshold	100%～200% （rated motor cur）	150%
P1.16	**Over voltage stall Gain** The inverter will adjust the DEC time according to over voltage stall gain if the output voltage is greater than the stall voltage threshold (P1.17) to avoid OV stall trip.	0～1000	0
P1.17	OV stall voltage threshold	120%～150%	130%
P1.18	Reserved	Reserved	Reserved
P1.19	Reserved	Reserved	Reserved
P1.20	Reserved	Reserved	Reserved
P1.21	Reserved	Reserved	Reserved
P1.22	current detect threshold(%Motor rated cur)	0.0%～300.0%	100.0%
P1.23	current detect range(%Motor rated cur)	0.0%～300.0%	0.0%
P1.24	torque detect threshold(%Motor rated cur)	0.0%～300.0%	100.0%
P1.25	torque detect range(%Motor rated cur)	0.0%～300.0%	0.0%
P1.26	Zero current detect threshold(%rated cur)	0.0%～300.0%	5.0%
P1.27	Zero current detect delay time	0～600.00s	0.10s
Parameter name	Explaination	Range	Default

Speed loop Paeameters			
P2.00 **Rame Ref2 (Auxilary Frequency source selection）**	**0：zero** **1：Preset frequency P0-10** 2：scaled analog input1 3：scaled analog input2 4：multi speed selected by digital inputs 5：Simple PLC reference 6：AUX PID regulator output 7：Communication 8：Hi Frequency pulse input	0~8	0
P2.01	Aux frequency source scaling coefficient	**0%～150%**	**100%**
P2.02	Operation of the main and Aux frequency source reference	0 + 1 - 2 Min 3 Max	**0**
P2.03	SPD_Offset	0.00Hz～F0-10	0.00Hz
P2.04 Speed limit configuration	0：Preset value P2.05 1：scaled AI1 2：scaled AI2 3：Hi Frequency pulse input 4：communication	**0~4**	**0**
P2.05	**Preset speed limit（max speed limit）**	**0～Max frequecy**	**50.00Hz**
P2.06	StandStillLogic threshold (stop or run at this speed if the reference lower than threshold)	0.00Hz～max freq	0.00Hz
P2.07	**Speed loop filter time** **Low pass filter used to reduce the noise siginal, but a too large filter time will reduce the speed dynamic response**	0.000s～0.100s	0.000s
P2.08	Proportional gain 1 of Speed loop	1～100	30
P2.09	Intergral gain 1 of Speed loop	0.01s～10.00s	0.50s
P2.10	Switch frequence 1	0.00～50.00Hz	5.00Hz
P2.11	Proportional gain 2 of Speed loop	1～100	20
P2.12	Intergral gain 2 of Speed loop	0.01s～10.00s	1.00s
P2.13	Switch frequence 2	0.00Hz～max freq	10.00Hz
Parameter name	Explaination	Range	Default

P2.14	Acc time 2	0.0s～6500.0s	Model dependent
P2.15	Dec time 2	0.0s～6500.0s	
P2.16	Acc time 3	0.0s～6500.0s	
P2.17	Dec time 3	0.0s～6500.0s	
P2.18	Acc time 4	0.0s～6500.0s	
P2.19	Dec time 4	0.0s～6500.0s	
P2.20	S curveAcc time	0.0%～（100.0%）	10.0%
P2.21	S curve Dec time	0.0%～（100.0%）	10.0%
P2.22	Jog frequency	0.0Hz～MAX	3.00Hz
P2.23	ACC time for Jog operation	0.0s～6500.0s	20.0s
P2.24	DEC time for Jog operation	0.0s～6500.0s	20.0s
P2.25	（ENCODER PPR）	64~10240	1024
P2.26	Encoder fault threshold（%MAX frequency）	0.0%～50.0%	20%
P2.27	Encoder fault time	0.0s～60.0s	5.0S
P2.28	Speed loop adaptive Pid enable	0~1	0
P2.29~~	Reserved	Reserved	Reserved
~~P2.32	Reserved	Reserved	Reserved
Analog input and output parameters			
P3.00	AI1 minimum input voltage	0.00V～+10.00V	0.00V
P3.01	Setting of AI1 minimum input	-100.0～+100.0%	0.0%
P3.02	AI1 maximum input voltage	0.00V～+10.00V	10.00V
P3.03	Setting of AI1 maximum input	-100.0～+100.0%	100.0%
P3.04	AI2 minimum input voltage	0.00V～+10.00V	0.00V
P3.05	Setting of AI2 minimum input	-100.0～+100.0%	0.0%
P3.06	AI2 maximum input voltage	0.00V～+10.00V	10.00V
Parameter name	Explaination	Range	Default

P3.07	Setting of AI1 maximum input	-100.0～+100.0%	100.0%
P3.08	AI3 minimum input voltage	0.00V～+10.00V	-10.00V
P3.09	Setting of AI3 minimum input	-100.0～+100.0%	-100.0%
P3.10	AI3 maximum input voltage	0.00V～+10.00V	10.00V
P3.11	Setting of AI3 maximum input	-100.0～+100.0%	100.0%
P3.12	AI1 filter time	0.00s～10.00s	0.10s
P3.13	AI2 filter time	0.00s～10.00s	0.10s
P3.14	AI3 filter time	0.00s～10.00s	0.10s
P3.15 AO1 variable selection	0：frequency reference 1：frequency feedback 2：output current 3：output voltage 4：output torque 5：output power 6：scaled analog input 1 7：scaled analog input 2 8：comunication setting 9：motor speed rpm	0~9	0
P3.16 AO2 variable selection		0~9	1
P3.17	AO1 offset	-100.0%～+100.0%	0.0%
P3.18	AO1 gain	-100.00～+100.00	1.00
P3.19	AO2 offset	-100.0%～+100.0%	0.0%
P3.20	AO2 gain	-100.00～+100.00	1.00
P3.21	AO1 filter time	0.00s～10.00s	0.10s
P3.22	AO2 filter time	0.00s～10.00s	0.10s
P3.23	Reserved	Reserved	Reserved
P3.24	Reserved	Reserved	Reserved
P3.25	Reserved	Reserved	Reserved
P3.26	Reserved	Reserved	Reserved
P3.27	Reserved	Reserved	Reserved
P3.28	Reserved	Reserved	Reserved
P3.29	Reserved	Reserved	Reserved
P3.30	Reserved	Reserved	Reserved
P3.31	Reserved	Reserved	Reserved
Parameter name	Explaination	Range	Default

Digital input and output parameters			
P4.00 DI1 function configuration	0：function dummy 1：forward run 2：reverse run 3：three-wire run control 4：forward Jog 5：reverse Jog 6：ACC time selection terminal 1 7：ACC time selection terminal 2 8：coast stop/free stop 9：alarm reset（RESET） 10：external fault 11：MOP_UP 12：MOP_DOWN 13：MOP_RESET(CLEAR) 14：Ramp block； 15：Pause runing； 16：multi speed selection MUX1 17：multi speed selection MUX2 18：multi speed selection MUX3 19：multi speed selection MUX4 20：frequency source switch enable 21：pulse counter input 22：pulse counter reset 23-31:reversed 32：AUX PID Disable 33：PID intergral Disable 34：PID parameter switch 35：PIDoutput reverse 36：User defined fault 37：Energence Stop 38：Decelaration and DC Brake 39：DC Brake 40~64 Reversed	0~64	1
P4.01 DI2 function configuration		0~64	2
P4.02 DI3 function configuration		0~64	9
P4.03 DI4 function configuration		0~64	0
P4.04 DI5 function configuration		0~64	0
P4.05 DI6 function configuration		0~64	0
P4.06 DI7 function configuration		0~64	0
P4.07 DI8 function configuration		0~64	0
P4.08 Comparator1 configuration		0~64	0
P4.09 Comparator2 configuration		0~64	0
P4.10 Comparator3 configuration		0~64	0
P4.11 Comparator4 configuration		0~64	0
P4.12 Comparator5 configuration		0~64	0

Parameter name	Explaination	Range	Default
P4.13	Digital input filter time	0.000s～1.000s	0.010s
P4.14	2-wire/3-wire terminal selection： 0：2-wire mode 1 1：2-wire mode 2 2：2-wire mode 1 3：3-wire mode 2	0~3	0
P4.15	Updown_reate of MOP（0.001Hz）	0.001Hz/s～ 60.000Hz/s	1.00Hz/s
P4.16	Minimum input of Hi-freq pulse	0.0kHz～100.00kH	0.00kHz
P4.17	Setting of Hi-freq pulse minimum input	-100.0%～100.0%	0.0%
P4.18	maximun input of Hi-freq pulse	0.0kHz～100.00kH	50.00kHz
P4.19	Setting of Hi-freq pulse maximun input	-100.0%～100.0%	100.0%
P4.20	Filter time of Hi-freq pulse input	0.00s～10.00s	0.1s
P4.21	Digital input 1 Delay time	0.0s～3600.0s	0.0s
P4.22	Digital input 2 Delay time	0.0s～3600.0s	0.0s
P4.23	Digital input 3 Delay time	0.0s～3600.0s	0.0s
P4.24	Digital input valid level1： 0：Hi level valid 1：low level valid 1st bit：DI1 valid level selection 2nd bit：DI2 valid level selection 3rd bit：DI3 valid level selection 4th bit：DI4 valid level selection 5thbit：DI5 valid level selection	00000~11111	00000
P4.25	Digital input valid level2： 0：Hi level valid 1：low level valid 1st bit：DI6 valid level selection 2nd bit：DI7 valid level selection 3rd bit：DI8 valid level selection	00000~11111	00000
P4.26	DO1/Hi-freq pulse output selection: 0：Hi-Freq output（FMP） 1：Digital output（FMR）	**0~1**	**1**
P4.27 DO1 function configuration	0：No function 1：Inverter in Run Status 2：Inverter in Error Status 3：Inverter Ready 4：Ramp End 5：Motor overload Pre-warning 6：Inverter overload pre-warning 7：reverse running 8：Reserved 9：Over-tempreture 10：output current exceeds Limit	0~50	1
P4.28 DO2 function configuration		0~50	0
P4.29 DO3 function configuration		0~50	2

P4.30 DO41 function configuration	11：Up-limit frequency arrived 12：lower-limit frequency arrived 13：reversed 14：Torque was limited 15：Hysteresis Comparator 1 output 16：Hysteresis Comparator 2 output 17：Hysteresis Comparator 3 output 18：Hysteresis Comparator 4 output 19：Hysteresis Comparator 5 output 20：Range Comparator 1 output 21：Range Comparator 2 output 22：Range Comparator 3 output 23~41 reserved 42：Frequency1 reached 43：Frequency2 reached 44：Current level reached 45：Torque level reached 46：frequency1 detected 47：frequency2 detected 48~50：Reserved	0~50	5
P4.31 DO5 function configuration		0~50	扩展
P4.32 DO6 function configuration		0~50	扩展
P4.33 Comparator1 func selection		0~50	
P4.34 Comparator2 func selection		0~50	
P4.35 Comparator3 func selection		0~50	扩展
P4.36 Comparator4 func selection			
P4.37 Comparator5 func selection		0~50	扩展
P4.38	Hi-freq output variable selection: Same as AO	0	0
P4.39	Maximum frequency of FMP	0.01kHz～100kHz	50.00kHz
P4.40	Y1output delay time	0.0s～3600.0s	0.0s
P4.41	Y2 output delay time	0.0s～3600.0s	0.0s
P4.42	Y3 Relay output3 delay time	0.0s～3600.0s	0.0s
P4.43	Y4 otuput delay time	0.0s～3600.0s	0.0s
P4.44	Y5 output delay time	0.0s～3600.0s	0.0s
P4.45	Y6 output delay time	0.0s～3600.0s	0.0s
P4.46	**DO valid level selection** 0：High level valid 1：low level valid 1st Bit：digital output Y1 2nd Bit：digital output Y2 3rd Bit：digital output Y3/Relay output 4th Bit：digital output Y4 5th Bit：digital output Y5	00000~11111	00000
P4.47	Comparator 1 set delay time	0.0s～3600.0s	0.0s
P4.48	Comparator 2 set delay time	0.0s～3600.0s	0.0s
P4.49	Comparator 3 set delay time	0.0s～3600.0s	0.0s
P4.50	Comparator 4 set delay time	0.0s～3600.0s	0.0s

Parameter name	Explaination	Range	Default
P4.51	Comparator 5 set delay time	0.0s～3600.0s	0.0s
P4.52	**Comparator output valid level selection** 0：high level valid 1：low level valid 1st Bit：for comparator1 output 2nd Bit：for comparator2 output 3rd Bit：for comparator3 output 4th Bit：for comparator4 output 5th Bit：for comparator5 output	00000~11111	00000
FOC-Vector control parameters			
P5.00	Stator resistance	0.001Ω～65.535Ω	Model independent
P5.01	Rotor resisitance	0.001Ω～65.535Ω	
P5.02	Leakage inductance	0.01mH ～ 655.35mH	
P5.03	Mutual inductance	0.1mH～6553.5mH	
P5.04	Magnetizing current	0～Motor Rated	
P5.05	KiKv coefficient 1	**10~100%**	**100%**
P5.06	KiKv coefficient 2	**10~100%**	**90%**
P5.07	KiKv coefficient 3	**10~100%**	**85%**
P5.08	KiKv coefficient 4	**10~100%**	**75%**
P5.09	KiKv coefficient 5	10~100%	60%
P5.10	Slip compensate Gain	50%～200%	100%
P5.11	Kp_flux	0～2000	100
P5.12	Ki_flux	1～1000	2
P5.13	Deflux_Mode： 1:Deflux on total ouput voltage 2: Deflux on Vq voltage	1~2	1
P5.14	Minimum flux ref	1%～200%	50%
P5.15	Deflux_Vq1	10%～200%	120%
P5.16	Deflux_Vq2	10%～200%	100%
P5.17 V/Fcurve profile	0：linear V/F 1：multi-point V/F 2：square power V/F 3：1.2 power V/F 4：1.4 power V/F 5：1.6 power V/F 6：1.8 power V/F	0~6	0
P5.18	Torque boost(%rated voltage)	0.0%（auto-boost） 0.1%～30.0%	Model dependent
P5.19	Cut-off frequency of torque boost	0.00Hz～max ferq	50.00Hz
P5.20	V/F curve start point frequency	0.00Hz～max ferq	0.00Hz

Parameter name	Explaination	Range	Default
P5.21	V/F curve start point voltage	0.0%～100.0%	0.0%
P5.22	V/F curve middle point frequency	0.00Hz～最大频率	0.00Hz
P5.23	V/F curve middle point voltage	0.0%～100.0%	0.0%
P5.24	V/F curve 3rd point frequency	0.00Hz～最大频率	0.00Hz
P5.25	V/F curve 3rd point voltage	0.0%～100.0%	0.0%
P5.26	V/F slip compemsation gain	0.0%～200.0%	0.0%
P5.27	V/F over voltage stall rejection coefficient	0～200	64
P5.28	V/F control jerk rejection coefficient	0～100	Model dependent
Auxiliary PID and constant pressure water supply parameters			
P6.00 PID reference Source selection	0：Preset value P6.02 1：scaled analog input1 2：scaled analog input 2 3：communication reference 4：multi-frequency setting 5：hi-freq pulse input setting	0~5	0

Parameter name	Explaination	Range	Default
P6.01	PID preset reference	0.0%～100.0%	50.0%
P6.02 PID feedback source selection	0：scaled analog input1 1：scaled analog input2 2：**AI1+AI2** 3：**AI1-AI2** 4：Hi-Freq pulse feedback **5：comunication feedback** **6：MAX(AI1，AI2)** **7：Min(AI1，AI2)**	0~7	0
P6.03	Kpa1	0.0～100.0	20.0
P6.04	Tia1	0.01s～10.00s	2.00s
P6.05	Kda1	0.000s～10.000s	0.000s
P6.06	Kpa2	0.0～100.0	20.0
P6.07	Tia2	0.01s～10.00s	2.00s
P6.08	Kda2	0.000s～10.000s	0.000s
P6.09	PID adaptive Gain Mode： 0：fixed at the 1st Gain group； 1：switch via terminals or comparator 2：switch according to error---linear **3：**switch according to error---squre power **4：**switch according to error---cube power **5：**switch according to error -2 power **6：**switch according to error -3 power	0~6	0
P6.10	PID gain switch error X1	0.0%～P6.11	20.0%
P6.11	PID gain switch error X2	P6.10～100.0%	80.0%
P6.12	PID error dead-band	0.0%～100.0%	0.0%
P6.13	PID error limit	0~65535	0
P6.14	PID differential limit	0.00%～100.00%	0.10%
P6.15	PID_OutRamp_AccRate	0.00%～100.00%	1.00%
P6.16	PID_OutRamp_DecRate	0.00%～100.00%	1.00%
P6.17	PID output maximum limit	0.00～max freq	10.00Hz
P6.18	PID output minimum limit	0.00～max freq	10.00Hz
P6.19	PID reference ramp time	0.00～650.00s	0.00s
P6.20	PID feedback filter time	0.00～60.00s	0.00s
P6.21	PID output filter time	0.00～60.00s	0.00s
P6.22	PID output scaling	1～65535	1000
P6.23	Wake up frequency(constant pressure water supply application)	Sleep freq ～ max freq	0.00Hz
P6.24	Wake up time	0.0s～6500.0s	0.0s
P6.25	Sleep frequency(constant pressure water supply application)	0.00Hz～wake up freq	0.00Hz
P6.26	Sleep time	0.0s～6500.0s	0.0s
P6.27	PID feedback loss threshold	0～100.0%	0.0%
P6.28	PID feedback loss time	0.0s～20.0s	0.0s
P6.29	PID operation enable when stop	0:PID off at stop 1:pid still run	0
P6.30	PidAntiWindUp enable	0: Dsiable；1:EN	0

Parameter name	Explaination	Range	Default
General used function blocks			
P7.00	Frequency detect level1（FDT1）	0 Hz～max freq	50.00Hz
P7.01	Frequency detect hysteresis1 （FDT1）	0 Hz～max freq	3Hz
P7.02	Frequency detect level2（FDT1）	0 Hz～max freq	50.00Hz
P7.03	Frequency detect hysteresis2 （FDT2）	0 Hz～max freq	3Hz
P7.04	Frequency reach detection level1	0.00Hz～max freq	50.00Hz
P7.05	Frequency reach detection range1	0 Hz～max freq	3Hz
P7.06	Frequency reach detection level2	0.00Hz～max freq	50.00Hz
P7.07	Frequency reach detection range2	0 Hz～max freq	3Hz
P7.08	Frequency reference arrive detection range	0.0%～100.0%	1%
P7.09	IGBT module tempeture arrive value	0℃～100℃	75℃
P7.10 Comparator1 non-inverting input source selection	0：preset comp1 threshold（P7.12） 1：output frequency 2：output current 3：output voltage 4：output torque 5：output power 6：sclaed analog input1 7：sclaed analog input2 8：comunication setting	0~8	0
P7.11 Comparator1 inverting input source selection		0~8	0
P7.12	comp1 preset threshold	0~65535	8888
P7.13	Comp1 hysteresis	0~65535	1000
P7.14	Comp2 non-inverting input source selection	0~12	0
P7.15	Comp2 inverting input source selection	0~12	0
P7.16	Comp2 preset threshold	0~65535	8888
P7.17	Comp2 hysteresis	0~65535	1000
P7.18	Comp3 non-inverting input source selection	0~12	0
P7.19	Comp3 inverting input source selection	0~12	0
P7.20	Comp3 preset threshold	0~65535	8888
P7.21	Comp3 hysteresis	0~65535	1000
P7.22	Comp4 non-inverting input source selection	0~12	0
P7.23	Comp4 inverting input source selection	0~12	0
P7.24	Comp4 preset threshold	0~65535	8888
P7.25	Comp4 hysteresis	0~65535	1000
P7.26	Comp5 non-inverting input source selection	0~12	0
P7.27	Comp5 inverting input source selection	0~12	0
P7.28	Comp5 preset threshold	0~65535	8888
P7.29	Comp5 hysteresis	0~65535	1000

Parameter name	Explaination	Range	Default
P7.30	Reserversd	Reserversd	Reserversd
P7.31	Reserversd	Reserversd	Reserversd
P7.32	Reserversd	Reserversd	Reserversd
P7.33	Reserversd	Reserversd	Reserversd
P7.34	Reserversd	Reserversd	Reserversd
P7.35	Reserversd	Reserversd	Reserversd
P7.36	Reserversd	Reserversd	Reserversd
P7.37	Reserversd	Reserversd	Reserversd
P7.38	Reserversd	Reserversd	Reserversd
P7.39	Reserversd	Reserversd	Reserversd
P7.40	Reserversd	Reserversd	Reserversd
P7.41	Reserversd	Reserversd	Reserversd
P7.42	Reserversd	Reserversd	Reserversd
P7.43	Reserversd	Reserversd	Reserversd
P7.44	Reserversd	Reserversd	Reserversd
P7.45	Reserversd	Reserversd	Reserversd
P7.46	Reserversd	Reserversd	Reserversd
P7.47	Reserversd	Reserversd	Reserversd
Run Control			
P8.00 Start mode	0：normal start 1：speed track start(catch on the fly) 2：pre-magnetising start	0~2	0
P8.01	Start frequency	0.00Hz～10.00Hz	0.00Hz
P8.02	Start frequency hold time	0.0s～100.0s	0.0s
P8.03 Speed track mode	0：tracking from stop frequency 1：tracking from zero 2：tracking from max frequency	0~2	0
P8.04	Speed tracking rate	1～100	20
P8.05	Stop mode：0：decelarate stop 1：coast	0~1	0
P8.06	**DC braking start frequency**	**0.00Hz～max freq**	**0.00Hz**
P8.07	**DC braking waiting time**	**0.0s～100.0s**	**0.0s**
P8.08	DC braking current	0%～100%	0%
P8.09	**DC braking holding time**	0.0s～100.0s	0.0s
P8.10	Reverse rotation enable： 0-EN，1-Disable	0~1	0
P8.11	**Operation when freq reference lower than cut-off frequency**	**0:run@cutoff freq 1：stop 2：zero speed run**	**0**
P8.12	Low voltage ride-through enable： 0：disable 1：enable	0	0
P8.13	LVRT voltage	60.0%～100.0%	75%
P8.14	LVRT frequency change point(% rate voltage)	80.0%～100.0%	90%
P8.15	LVRT voltage recovery judge time	0.00s～100.00s	0.50s
P8.16	Carrier frequency	1.0kHz～12kHz	Model dependent

Parameter name	Explaination	Range	Default
LED Pannel and Communication settings			
P9.00 MF.K keybutton function selection	0：MF.K-0no function 1：switch between the keypad control and remote control 2：FWD/REV switch 3：Forward Jog 4：Reverse Jog	0~4	0
P9.01 STOP keybutton function selection	0：only valid @ keypad ctrl 1：always valid	0~1	0
P9.02	Modbus Address 1～247，	1～249	1
P9.03 BuadRate	0：4800BPS 1：9600BPS 2：19200BPS 3：38400BPS 4：57600BPS	0~4	1
P9.04	Serial communication format	0：NoParity（8-N-2） 1：EVEN（8-E-1） 2：ODD（8-O-1） 3：NoParity（8-N-1）	1
P9.05 Communication protocol selection	0：MODBUS-RTU 1：Profibus-DP 2：CANBUS 3：ANYBUS	0~4	0
Multi-speed reference and simple PLC			
PA.00 **Simple PLC operation mode**	**0：stop after 1 cycle** **1：hold the last reference freq after 1 cycle** **2：periodic running**	**0~2**	**2**
PA.01	Frequency refernece 0	-100.0%～100.0%	0.0%
PA.02	Frequency reference 1	-100.0%～100.0%	0.0%
PA.03	Frequency reference 2	-100.0%～100.0%	0.0%
PA.04	Frequency reference 3	-100.0%～100.0%	0.0%
PA.05	Frequency reference 4	-100.0%～100.0%	0.0%
PA.06	Frequency reference 5	-100.0%～100.0%	0.0%
PA.07	Frequency reference 6	-100.0%～100.0%	0.0%
PA.08	Frequency reference 7	-100.0%～100.0%	0.0%
PA.09	Frequency reference 8	-100.0%～100.0%	0.0%
PA.10	Frequency reference 9	-100.0%～100.0%	0.0%
PA.11	Frequency reference 10	-100.0%～100.0%	0.0%
PA.12	Frequency reference 11	-100.0%～100.0%	0.0%
PA.13	Frequency reference 12	-100.0%～100.0%	0.0%
PA.14	Frequency reference 13	-100.0%～100.0%	0.0%
PA.15	Frequency reference 14	-100.0%～100.0%	0.0%
PA.16	Frequency reference 15	-100.0%～100.0%	0.0%
PA.18	Running time for step 0	0.0s～6500.0s	0.0s
PA.19	Acc/Dec time selection for step 0	0～3	0

Parameter name	Explaination	Range	Default
PA.20	Running time for step 1	0.0s～6500.0s	0.0s
PA.21	Acc/Dec time selection for step 1	0～3	0
PA.22	Running time for step 2	0.0s～6500.0s	0.0s
PA.23	Acc/Dec time selection for step2	0～3	0
PA.24	Running time for step 3	0.0s～6500.0s	0.0s
PA.25	Acc/Dec time selection for step 3	0～3	0
PA.26	Running time for step 4	0.0s～6500.0s	0.0s
PA.27	Acc/Dec time selection for step4	0～3	0
PA.28	Running time for step 5	0.0s～6500.0s	0.0s
PA.29	Acc/Dec time selection for step 5	0～3	0
PA.30	Running time for step 6	0.0s～6500.0s	0.0s
PA.31	Acc/Dec time selection for step6	0～3	0
PA.32	Running time for step 7	0.0s～6500.0s	0.0s
PA.33	Acc/Dec time selection for step 7	0～3	0
PA.34	Running time for step 8	0.0s～6500.0s	0.0s
PA.35	Acc/Dec time selection for step8	0～3	0
PA.36	Running time for step 9	0.0s～6500.0s	0.0s
PA.37	Acc/Dec time selection for step 9	0～3	0
PA.38	Running time for step 10	0.0s～6500.0s	0.0s
PA.39	Acc/Dec time selection for step10	0～3	0
PA.40	Running time for step 1	0.0s～6500.0s	0.0s
PA.41	Acc/Dec time selection for step 11	0～3	0
PA.42	Running time for step 12	0.0s～6500.0s	0.0s
PA.43	Acc/Dec time selection for step12	0～3	0
PA.44	Running time for step 13	0.0s～6500.0s	0.0s
PA.45	Acc/Dec time selection for step 13	0～3	0
PA.46	Running time for step 14	0.0s～6500.0s	0.0s
PA.47	Acc/Dec time selection for step14	0～3	0
PA.48	Running time for step 14	0.0s～6500.0s	0.0s
PA.49	Acc/Dec time selection for step 15	0～3	0
User parameters			
PC.00	User password	0～65535	0
PC.01 Parameter initlization	**0： No operation 1：restore all parameters to default except for motor related parameter 2：remove the error recoerds**	**0~2**	**0**
U0 inverter status vaiables (Read Only)			
V0-00	Frequency reference	0.01Hz	
V0-01	Output frequency	0.01z	
V0-02	Output voltage	0.1V	
V0-03	Output current	0.01A	
V0-04	EDC Bus voltage	0.1V	
V0-05	Output torque	0.1%	
V0-06	Output power	0.1Kw	
V0-07	PID Reference	0.01%	

Parameter name	Explaination	Range	Default
V0-08	PID feedback	0.01%	
V0-09	Digital input status	--	
V0-10	Digital output status	--	
V0-11	AI1 voltage	0.01V	
V0-12	AI2voltage	**0.01V**	
V0-13	AI3 voltage	0.01V	
V0-14	Hi-freq pulse frequency	0.01Hz	
V0-15	Encoder feedback rpm	0.1Rpm	
V0-16	Inverter main freq reference	0.01Hz	
V0-17	Inverter Aux freq reference	**0.01Hz**	
V0-18	Line speed of the load	1m/Min	
V0-19	Length	1m	
V0-20	Power on time	1h	
V0-21	Tempreture of the heat-sink	**degree**	
V0-22	ROM version		
V0-23	Reversed		
V0-24	reversed		

Chapter 9 Parameter Detailed Descriptions

9.1 Basic Parameters

P0-00	**GP Type**	Default	Read Only
	Range	1	G Type（Constant Torque Load）
		2	P Type（Constant Power Load, Pump and Fans）

1：G Type, suitable for Constant Torque Load，the overload coefficient is 150%/1min；
2：P Type, suitable for Constant power Load，for example ventilation fans and pumps, the overload coefficient is 120%/1min；

P0-01	Command selection	Default	0：Operation panel control
	Setting Range	0	0: Operation panel control
		1	1: DI Terminal control
		2	2: Communication control

There are 2 command source available for AC780 inverter：LOCAL and REMOTE。The command source could be changed only when the inverter was in stop state. The current selected command source is indicated by the LOC/REM LED status. The manufacuteer default setting is keypad control。

The operation command was sent by the remote host via communication if the inverter was set to communication control by this parameter. Please refer to the communication related parameters for detailed information on communication settings。

P0-02	**Ramp reference1(main freq source selection)**	Default	**0：Preset Frequency P0-10**
	Setting Range	0	**0：Preset Frequency P0-10**
		1	1：scaled analog input 1
		2	2：scaled analog input 2
		3	3：multi speed selected by digital inputs
		4	4：Simple PLC reference
		5	5：AUX PID regulator output
		6	6：Communication
		7	7：Hi Frequency pulse input

This parameter is used to select the main ramp reference source of the velocity loop. There are 8 choices in all:

0：preset frequency setting。The parameter P0-10 was the initial value of the main ramo reference, the user can adjust the reference frequency value by the ▲and▼ keybutton（or the terminals which were configured to MOP_UP or MOP_DOWN）。

1：Scaled analog input 1--AI1

2：Scaled analog input 2—AI2

The velocity loop ramp input was set by the scaled analog input. 2 analog inputs (AI1，AI2) are available for AC780inverter, and both AI can be configured as 0V～10Vvoltage input or 0～

20mAcurrent input by choosing the corresponding switch J2positions. The scaling factor can be adjusted by the P3 group parammeters.

3：Multi-speed reference selected by the combination of the digital input terminals。The ramp reference was determined by the combination status of the digital inputs which was configurated to mul-reference mux selection (refer to P4 parameters), the binary coding of the digital input was pointed to the corresponding to setings. The value 100% is scaled to the maximum speed.

4：Simple PLC。The velocity ramp reference is determinded by the simple routine, pleaserefer to PA group parameters for detailed information on the Simple PLC tasks.

5：Auxliary PID output. This setting is usualy used in the field required cose loop process control, for example: constant pressure water supply, and constant tension draw machine control.

6：Comunication reference.。the inverter frequency reference was set by the remote host via communication。AC780 support profibus, canbus, Modbus-RTU etc comunicaitons.

7：high frequency input。the inverter frequency was set by the pulse digital input。The frequency range of the pulse input is from 0 to 100Khz.

P0-03	Motor Rated power	Default	Model dependent
	Setting Range	0.4kW～650.0kW	
P0-04	Motor Rated current	Default	厂家设定，机型确定
	Setting Range	0.1A～6000.0A	
P0-05	Motor Rated freqency	Default	厂家设定，机型确定
	Setting Range	1Hz～Max Freq	
P0-06	Motor Rated speed	Default	1500rpm
	Setting Range	10～60000rpm	
P0-07	Motor Rated voltage	Default	380V
	Setting Range	100V~1000V	

The above parameters is the motor rated parameters，and is very caricial for the motor control and protection，the user must properly setup these parameters according to the motor name plate.

P0-08	Control mode	Default	0：**sensorless（SVC）**
	Setting Range	0	**0：sensorless（SVC）**
		1	1：indirect Vector control（IFOC）
		2	2：V/F control

0：Sensorless vector control, rotor flux oriented vector control. This control mode is suitable for the high motor control performance required applications. The vector control performance is much dependent on the motor parameters (Rs, Rr, Lm, Lr, Tr), so to get a higher motor control performance, the motor parameter self-tuning is needed.

1：IFOC， close loop indirected field oriented vector control. The encoder feedback must be available。

2：V/F control，voltage/frequency control，suitable for the applications which are not so critical on the motor dynamic or steady state performance. Please not, only in VF mode, the inverter can drive multiple motors.

P0-09	MAX freq	Default	50.00Hz
	Setting Range	50.00Hz～500.00Hz	

This parameter is used to set up the maximum frequency according the application requirements. Please note, the 100% of the analog input and communication reference was scaled to this maximum frequency, and the the maximum can be greater than the motor rated frequency.

P0-10	Preset freq	Default	50.00Hz
	Setting Range	0.00～max_freq	

The intial value of the preset velocity loop ramp reference frequency, only valid when the frequency source was set to keypad control or “MOP_UP or DOWN”。

P0-11	ACC time 1	Default	10.0S（60S for big drives）
	Setting Range	0.00s～6500s	
P0-12	DEC time 1	Default	10.0S（60S for big drives）
	Setting Range	0.00s～6500s	

These parameters are used to set the accelerate and decelerate time. The Acc/Dec time represents the time required for the inverter to accelerate/decelerate from 0Hz to maximum frequency. The unit is 0.1s. 4 sets of Acc/Dec times are available for AC780 drives, the user can select the desired time by the coresponding digital inputs, the default choice is ACC/DEC time1。

P0-13	Tuning command	Default	0
	Setting Range	0	0：NO operation
		1	1：static tuning
		2	2：rotating tuning

Motor parameter selftuning command. Start the inverter after setting the tuning command，the motor parameter tuning process will be performed automatically, and the motor paramerer which are very critical for the verctor control: Lm, Lr, Rs, Rr, Tr will be calculated. Please note the motor name plate specifications must be set up properly(P0-03～ P0-07)。

0：tuning ended, no operation。

1：Static tuning; it is used in the cases that the load was already connected to the motor and rotating tuning can not be launched.

2：Rotaing tuning; the load must be disconnected. The static tuning will be lauched first, then the motor will accelerate to the rated frequency tuning the magnetizing current and mutul inductance.

P0-14	Turn direction	Default	0
	Setting Range	0	0：clockwise
		1	1：anti-clockwist

The rotor flux rotaing direction can be changed by this parameter, that’s to change the motor tuning direction.

P0-15	Memorize the freq ref	Default	0
	Setting Range	0	Not memorize
		1	Yes, memorize

If the main frequency source was set to the preset digital reference(P0-10), the freq_ref canbe changed by▲or▼ button(or the digital function MOP_UP、MOP_DOWN。The user can choose to memorize the modified frequency reference by seting this parameter.

9.2 Current loop parameters

P1-00	Positive torque configuration	Default	0: no limit
	Setting Range	0	0：no limit
		1	1：scaled analog input 1
		2	2：scaled analog input 2
		3	3：Hi Frequency pulse input
		4	4：Communication
P1-01	Negativetorque configuration	Default	0 no limit
	Setting Range	Same settings as **P1-00**	

AC780 inverter can be set to work in the torque control mode by setting the torque limit parameters. The default mode is 0: no limit, so the inverter work in speed control mode。

1: scaled analog input 1: the torque current is limit to the current represented by the scaled analog input 1. The user can adjust the scaling map between the analog input voltage and the torque current limit, the default setting is 10V, corresponding to 100% motor rated torque.

2: scaled analog input 2: the torque current is limit to the current represented by the scaled analog input 2. The user can adjust the scaling map between the analog input voltage and the torque current limit, the default setting is 10V, corresponding to 100% motor rated torque.

3: Hi-freq pulse intputs; the torque current is limit to the current represented by the hi-freq pulse input. The user can adjust the scaling map between the pulse input frequency and the torque current limit, the default setting is 100kHz corresponding to 100% motor rated torque.

4:the torque current is limit to the communication settings，100% is corresponding to 100% motor rated torque；AC780 supportsMODBUS-RTU,Profibus,Canbus communication, please refer to the related parameters for details。

P1-02	Positive torque current limit	Default	150%
	Setting Range	0.00~200.00%	
P1-03	Negtive torque current limit	Default	150%
	Setting Range	0.00~200.00%	

Set the limit value of the motor torque current, default setting is 150% of the motor rated torque。

P1-04	Kp_iq	Default	2048
	Setting Range	0～32767	
P1-05	Ti_iq	Default	512
	Setting Range	0～32767	
P1-06	Kp_id	Default	2048
	Setting Range	0～32767	
P1-07	Ti_id	Default	512
	Setting Range	0～32767	

As shown in fig9.1，2 current PID regulator was utilized in the vercotr control scheme. These parameters are used to set up the proportional gains and intergral time of the torque/magnetising current regulator。

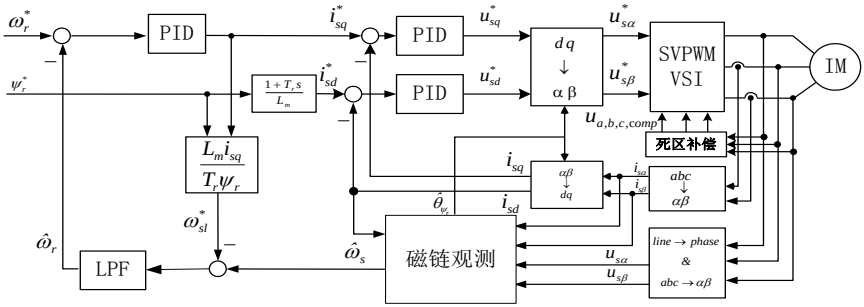


Fig 9.1 vertor control block diagram

P1-08	PreMagCurrent	Default	0%
	Setting Range	0% ~ 100%	
P1-09	PreMagTime	Default	0
	Setting Range	0.0s ~ 10.0s	

The induction motor start dynamic response could be improved by premagnetising. These parameters are used to set the premagnetising current and time。The default setting is 0, normal start without premagnetising。

P1-10	Motor overload protection gain	Default	100.00%
	Setting Range	0% ~ 1000.0%	
P1-11	Motor overload pre-warning coefficient	Default	80%
	Setting Range	50%～100%	

These parameters are used to set the thermal protection of the motor。The AC drive judges whether the motor is overloaded according to the inverse time-lag curve of the motor overload protection. The built-in motor thermal protection curve is 200% rated current for 60 senconds, 150% rated current for 30mins. So 100% of the gain means to use the above mentioned standard thermal protection curve, otherwise, the time before the protection intervened will be multiplied by this gain.

Pre-warning coefficient is used to send a warning signal to the control system via DO before motor overload protection. This parameter is used to determine the percentage, at which prewarning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.

If the value of F1-10 is set too large, damage to the motor may happen because the motor overheats but the AC drive does not report the alarm。

P1-12	**OverCurrentThreshold**	Default	200.00%
	Setting Range	50%～300.0% motor rated current	
P1-13	OCDelayTime	Default	0.00S
	Setting Range	0.00s ~ 600.00s	

The inverter will set the overcurrent flag if the output current is greater than this threshold and lasted for the corresponding delay time.

P1-14	**Over current stall Gain**	Default	200
	Setting Range	0~1000	
P1-15	OC stall current threshold	Default	150%
	Setting Range	100%～200%（motor rated current）	

The inverter will adjust the ACC/DEC time according to over current stall gain if the output current is greater than the stall current threshold (P1.15) to avoid OC stall trip.；

P1-16	**Over voltage stall Gain**	Default	0
	Setting Range	0~1000	
P1-17	OV stall voltage threshold	Default	130%
	Setting Range	100%～150%（% motor rated voltage）	

The inverter will adjust the DEC time according to over voltage stall gain if the output voltage is greater than the stall voltage threshold (P1.17) to avoid OV stall trip。

P1-22	current detect threshold	Default	100.0%
	Setting Range	0.0%～300.0%（% motor rate current）	
P1-23	current detect range	Default	0%
	Setting Range	0.0%～300.0%（% motor rate current）	
P1-24	torque detect threshold	Default	100.0%
	Setting Range	0.0%～300.0%（% motor rate current）	
P1-26	torque detect range	Default	3%
	Setting Range	0.0%～300.0%（% motor rate current）	
P1-27	Zero current detect threshold	Default	5.0%
	Setting Range	0.0%～300.0%（% motor rate current）	
P1-27	Zero current detect delay time	Default	1
	Setting Range	0.00s～600.00s	

These parameters are used to monitor if the total outputcurrent or the output torque current is in the detect range, that's if the requreied current is in the specified level. If so, the inverter can indicate the status by a digital output siginal, as shown in the following diagram fig9.2。

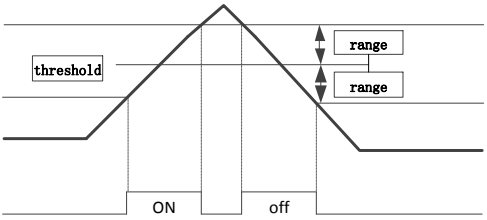


Fig 9.2 output current detect threshold and range

9.3 Speed loop Paeameters

P2-00	**Rame Ref2 (Auxilary Frequency source selection)**	Default	**0**
	Setting Range	0	**0：zero**
		1	**1：Preset frequency P0-10**
		2	2：scaled analog input1
		3	3：scaled analog input2
		4	4：multi speed selected by digital inputs
		5	5：Simple PLC reference
		6	6：AUX PID regulator output
		7	7：Communication
		8	8：Hi Frequency pulse input

Select the auxiliary speed loop ramp reference.

P2-01	Aux frequency source scaling coefficient	Default	100%
	Setting Range	**0%～150%**	

This parameter is used to set the scaling coefficient of the auxiliary ramp reference. For example, if the 2nd ramp reference was used to trim the speed reference, set this parameter to 10%, then 100% input the auxiliary ramp reference only counts for 10 percent of the maximum frequency。

P2-02	Operation of the main and Aux frequency source reference	Default	**0**
	Setting Range	0	+
		1	-
		2	Min
		3	Max

Select the operation of the main and auxiliary frequency source：

0：main freq source A+aux freq source B。The target freq is the sum of A and B

1：main freq source A-aux freq source B. the target freq is the substraction of A and B。

2：the target freq is the maximum of A and B。

3：the target freq is the minimum of A and B。

P2-03	SPD_Offset	Default	0
	Setting Range	**0%～max_freq**	

Set the speed loop offset。

P2-04	**Speed limit configuration**		Default	**0**
	Setting Range	0	0：Preset value P2.05	
		1	1：scaled AI1	
		2	2：scaled AI2	
		3	3：Hi Frequency pulse input	
		4	4：communication	
P2-05	**Preset speed limit**		Default	**50.00Hz**
	Setting Range		**0～max frequency**	

These parameters are used to set the speed limit:

0 preset digital value setting： the upper speed limit is determinded by parameter P2-05；

1 scaled AI**1：** the upper speed limit is determinded by scaled AI1,10V responding to 100%；

2 scaled AI**2：** the upper speed limit is determinded by scaled AI2,10V responding to 100%；

3 pulse input： the upper speed limit is determinded by pulse input,100Khz responding to 100%；

4 Communication： the upper speed limit is determinded by communication input；

P2-06	StandStill Logic threshold	Default	0Hz
	Setting Range	**0～maximum frequency**	

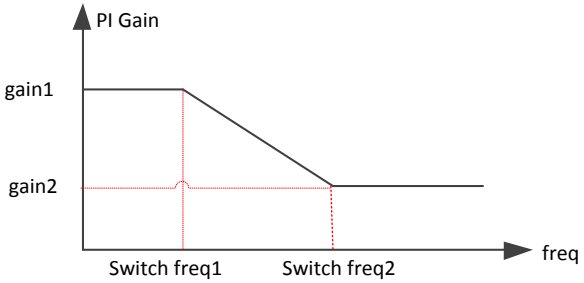
Standstill threshold，if the frequency reference is smaller than this value, the inverter will run at this threshold frequency or zero (depends on the parameter setting P8.11)。

P2-07	**Speed loop filter time**	Default	0
	Setting Range	0.000s～1.000s	

The output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references to reduce the possible noise interferience and make the speed loop stable. A large speed loop filter constant may cause a big delay and poor response, but a small filter constant may result a speed loop oscilation and poor steady state accuracry.

P2-08	KPv1	Default	30
	Setting Range	1～1000	
P2-09	Tiv1	Default	0.5
	Setting Range	0.01s～10.00s	
P2-10	Switch frequence 1	Default	5Hz
	Setting Range	0.00～maximum freq	
P2-11	KPv2	Default	20
	Setting Range	1～1000	
P2-12	Tiv2	Default	1.00S
	Setting Range	0.01s～10.00s	
P2-13	Switch frequence 2	Default	20Hz
	Setting Range	0.00～maximum freq	

These parameters are used to set the speed loop PID regulator gain profile, as shown in the following diagram:

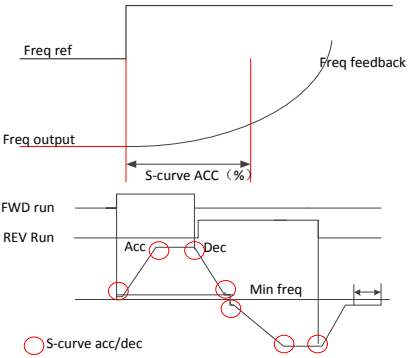


Speed loop PI gains may vary with running frequencies. If the running frequency is less than or equal to "Switch frequency 1", the speed loop PI gains are set to group1. If the running frequency is equal to or greater than "Switch frequency 2" , the speed loop PI gains will be group 2. If the running frequency is between 2 switch frequencies, the speed loop PI gains are obtained from the linear interpolation between the two groups of PI parameters, as shown in Figure。

P2-14	Acc time 2	Default	10.0S（for big inverters 60S）
	Setting Range	0.0s～65000s	
P2-15	Dec time 2	Default	10.0S（for big inverters 60S）
	Setting Range	0.00s～65000s	
P2-16	Acc time 3	Default	10.0S（for big inverters 60S）
	Setting Range	0.0s～65000s	
P2-17	Dec time 3	Default	10.0S（for big inverters 60S）
	Setting Range	0.0s～65000s	
P2-18	Acc time 4	Default	10.0S（for big inverters 60S）
	Setting Range	0.0s～65000s	
P2-19	Dec time 4	Default	10.0S（for big inverters 60S）
	Setting Range	0.0s～65000s	
P2-20	S curve Acc time	Default	20.0%
	Setting Range	0.0%～（100.0%）	
P2-21	S curve Dec time	Default	20.0%
	Setting Range	0.0%～（100.0%）	

The AC780 inverter provides four groups of acceleration/deceleration time, that is, the three above groups and the group defined by P0-11 and P0-12. Definitions of four groups are completely the same. You can switch over between the four groups of acceleration/deceleration time through different state combinations of DI terminals。

AC780 inverter provides S-curve acceleration and deceleration. The output frequency increases or decreases along the S curve, as following fig indicates. The S curve is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt. P2-20 and P2-21 respectively define the time proportions of the start segment and the end segment.



P2-22	Jog frequency	Default	3.00Hz
	Setting Range	0.0Hz～Maximum freq	
P2-23	ACC time for Jog operation	Default	20.0S（for big inverters 60S）
	Setting Range	0.0s～6500.0s	
P2-24	DEC time for Jog operation	Default	20.0S（for big inverters 60S）
	Setting Range	0.0s～6500.0s	

These parameters are used to set the jog reference frequency and acc/dec time。

P2-25	ENCODER PPR	Default	1024PPR
	Setting Range	64~10240	
P2-26	Encoder fault threshold	Default	20.0%
	Setting Range	0.0%～50.0%	
P2-27	Encoder fault time	Default	2S
	Setting Range	0.0s～60.0s	

P2-28	Speed loop adaptive Pid enable	Default	0 : disable
	Setting Range	0：not enable	
		1：enable	

The user can enable the adaptive PID controller of AC780 inverter speed loop by setting this parameter to 1.

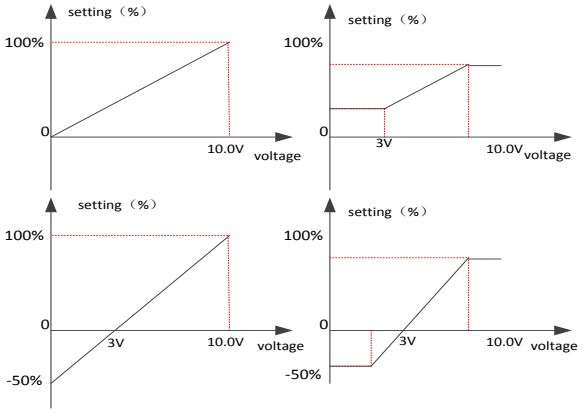
9.4 Analog input and output parameters

ETDAC780 provides 2 analog inputs (0V~+10V or 0~20mA configuration) and 2 analog outputs (0V~+10V or 0~20mA selectable). The analog outputs are programble, the user can choose the variables wanted to be represented by the analog outputs 。

P3-00	AI1 minimum input voltage	Default	0.0V
	Setting Range	0.00V～+10.00V	
P3-01	Setting of AI1 minimum input	Default	0.0%
	Setting Range	-100.0～+100.0%	
P3-02	AI1 maximum input voltage	Default	10.0V
	Setting Range	0.00V～+10.00V	
P3-03	Setting of AI1 maximum input	Default	100%
	Setting Range	-100.0～+100.0%	

These parameters are used to set up the scaling relationship between the analog inputs and the UI value. By default, 0~10V/0~20mA is corresponding to0~100.00%.

As shownin the following diagram, if the analog input voltage is greater than the “AI1 maximum input voltage”(P3-02)，the corresponding UI value will be “Setting of AI1 maximum input” (P3-03); if the analog input voltage is less than the “AI1 minimum input voltage”(P3-00)，the corresponding UI value will be “Setting of AI1 minimum input” (P3-01)。Different AI curves can be achieved by different setting as shown in the fillowing digram：



P3-04	AI2 minimum input voltage	Default	0.0V
	Setting Range	0.00V～+10.00V	
P3-05	Setting of AI2 minimum input	Default	0.0%
	Setting Range	-100.0～+100.0%	
P3-06	AI2 maximum input voltage	Default	10.0V
	Setting Range	0.00V～+10.00V	
P3-07	Setting of AI2 maximum input	Default	100%
	Setting Range	-100.0～+100.0%	

The useage of analog input 2 is similar to AI1。

P3-08	AI3 minimum input voltage	Default	0.0V
	Setting Range	0.00V～+10.00V	
P3-09	Setting of AI3 minimum input	Default	0.0%
	Setting Range	-100.0～+100.0%	
P3-10	AI3 maximum input voltage	Default	10.0V
	Setting Range	0.00V～+10.00V	
P3-11	Setting of AI3 maximum input	Default	100%
	Setting Range	-100.0～+100.0%	

the useage of AI3 is similar to AI1。（please note, AI1 and AI2 is the standard perpherials, but AI3 is provided by optional card）

P3-12	AI1 filter time	Default	0.1S
	Setting Range	0.00s～10.00s	
P3-13	AI2 filter time	Default	0.1S
	Setting Range	0.00s～10.00s	
P3-14	AI3 filter time	Default	0.1S
	Setting Range	0.00s～10.00s	

These parameters (AI1~AI3 filter time) is used to set the software filter time of analog inputs. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input. However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

P3-15	AO1 variable selection		Default	1
	Setting Range	0	0：frequency reference	
		1	1：frequency feedback	
		2	2：output current	
		3	3：output voltage	
		4	4：output torque	
		5	5：output power	
		6	6：scaled analog input 1	
		7	7：scaled analog input 2	
		8	8：comunication setting	
		9	9：motor speed rpm	

This parameter is used to choose the variables to be represented by the analog output 1, the following table shows the variable table and scaling relation:

value	Variables selected	Scaling(0~10V corresponds the variable value)
0	0：frequency reference	0～maximum frequency
1	1：frequency feedback	0～maximum frequency
2	2：output current	0～2 times the motor rated current
3	3：output voltage	0～1.3 times the inverter rated voltage
4	4：output torque	0～2 times motor rated torque
5	5：output power	0～2 times motor rated power
6	6：scaled analog input 1	0V～10V（ 0～20mA）
7	7：scaled analog input 2	0V～10V（ 0～20mA）
8	8：comunication setting	0~100%
9	9：motor speed rpm	0.01kHz～100.00kHz

The user also can change the scaling relation between the analog output voltage and variable UI value by setting the AO gains and offsets, refer to P3-17~~P3-20.

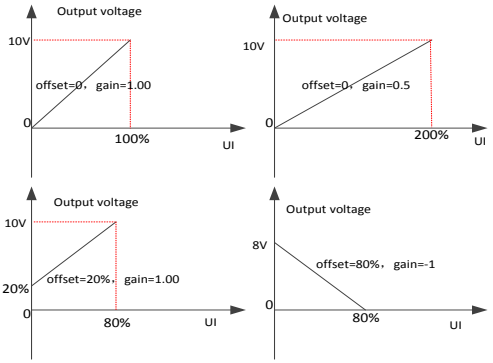
P3-16	AO1 variable selection	Default	2
	Setting Range	0~11	

The same as AO1 variable setting。

P3-17	AO1 offset	Default	0
	Setting Range	-100.0%～+100.0%	
P3-18	AO1 gain	Default	1
	Setting Range	-10.0~10.0	

P3-19	AO2 offset	Default	0
	Setting Range	-100.0%～+100.0%	
P3-20	AO2 filter time	Default	1
	Setting Range	-10.0~10.0	

The equation of output voltage and variable UI value is Y=Kx+b, here Y is the output, K is the gain and b is the offset. So these parameter are used to adjust the slip and offset of the analog output equation：



P3-21	AO1 filter time	Default	0
	Setting Range	0.00s～10.00s	
P3-22	AO2 filter time	Default	0
	Setting Range	0.00s～10.00ss	

These parameters (Ao1~Ao2 filter time) is used to set the software filter time of analog outputs. If the analog output variable is liable to interference, increase the value of this parameter to stabilize the analog output. However, increase of the Ao filter time will slow the response. Set this parameter properly based on actual conditions.

9.5 Digital input and output parameters

ETDAC780 drive provides five DI terminals (DI5 can be used for high-speed pulse input). With optinal expansion card, S6~S8 digital inputs are available。Each DI can be assigned to different functions as shown in the following table.（please note：only one function can be configured to each terminal, and the function of different input should not be duplicated.）。

P4-00	DI1 function configuration	Default	1
	Setting Range	0~64	
P4-01	DI2 function configuration	Default	2
	Setting Range	0~64	
P4-02	DI3 function configuration	Default	9
	Setting Range	0~64	
P4-03	DI4 function configuration	Default	0
	Setting Range	0~64	
P4-04	DI5 function configuration	Default	0
	Setting Range	0~64	
P4-05	DI6 function configuration	Default	0
	Setting Range	0~64	
P4-06	DI7 function configuration	Default	0
	Setting Range	0~64	
P4-07	DI8 function configuration	Default	0
	Setting Range	0~64	
P4-08	**Comparator1 configuration**	Default	0
	Setting Range	0~64	
P4-09	**Comparator2 configuration**	Default	0
	Setting Range	0~64	
P4-10	**Comparator3 configuration**	Default	0
	Setting Range	0~64	
P4-11	**Comparator4 configuration**	Default	0
	Setting Range	0~64	
P4-12	**Comparator5 configuration**	Default	0
	Setting Range	0~64	
P4-13	Digital input filter time	Default	0.010s
	Setting Range	0.000s～1.000s	

Digital output function description table

set	name	description
0	function dummy	No function
1	forward run	Start the drive in forward or reverse direction。
2	reverse run	
3	three-wire run control	2/3 wire mode selection 。 Refer to the description of P4-14 for detailed information。
4	forward Jog	Jog Start the drive in forward or reverse direction。
5	reverse Jog	
6	ACC/Dec time selection 1	Select the required acc/dec time from the 4 time parameters provided by AC780 drive.
7	ACC/Dec time selection 2	
8	coast stop/free stop	Coasting Stop the drive。
9	alarm reset（RESET）	Reset the error.
10	external fault	External fault, can be used as user defined error singal， the inverter trip for Err16.
11	MOP_UP	Digital potentiometer, can be used to increase or decrease reference values
12	MOP_DOWN	
13	MOP_RESET(CLEAR)	Reset the Digital potentiometer to zero。
14	Ramp block；	The ramp ouput will be blocked if this function is valid 。
15	Running Pause；	The inverter will decelerates to stop, and resumes its previous running status after this function is invalid.
16	multi speed selection MUX1	Choose one of the 16 multi-reference by the combination of these digital terminals。
17	multi speed selection MUX2	
18	multi speed selection MUX3	
19	multi speed selection MUX4	
20	frequency source switch enable	Internal switch signal
21	pulse counter input	The input terminal of the hi-speed pulse。
22	reserved	
--	reserved	
31	PLC Reset	Reset the simple PLC to its intial state
32	AUX PID Disable	Disable the auxiliary PID operation
33	PID intergral Disable	Disable the integral operation of the Aux PID
34	PID parameter switch	Switch the PID gains by this terminal

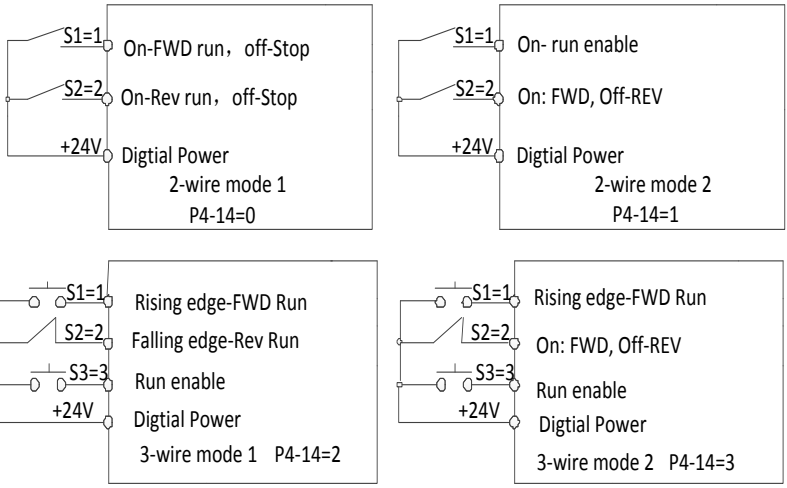
35	PID output reverse	Reverse the pid output, change the control direction
36	User defined fault	The user defined error, trip for ERR31
37	Energence Stop	The inverter will decelerate to stop with full current and voltage capability
38	Decelaration and DC Brake	The inverter will decelerate to stop with choosen dec time, and then start DC braking
39	DC Brake	The inverter will start DC braking immediately

Examples of the digital terminal configurations：

- Forward or reverse running by terminal start。

  ETDAC780 provides flexiable terminal control modes, support both 2 wire and 3 wire mode control. 2 wire mode control is level valid mode, while 3 wire mode is edge valid mode, the detailed settings is indicated as the following diagram:

P4-14	2 /3-wire terminal selection		Default	2-wire mode 2
	Setting Range	0	2-wire mode 1	
		1	2-wire mode 2	
		2	2-wire mode 1	
		3	3-wire mode 2	



4 terminal control modes

- Multi-reference MUX selection

S4=19	S3=18	S2=17	S1=16	select
0	0	0	0	Step 0 reference
0	0	0	1	Step 1 reference
0	0	1	0	Step 2 reference
0	0	1	1	Step 3 reference
0	1	0	0	Step 4 reference
0	1	0	1	Step 5 reference
0	1	1	0	Step 6 reference
0	1	1	1	Step 7 reference
1	0	0	0	Step 8 reference
1	0	0	1	Step 9 reference
1	0	1	0	Step 10 reference
1	0	1	1	Step 11 reference
1	1	0	0	Step 12 reference
1	1	0	1	Step 13 reference
1	1	1	0	Step 14 reference
1	1	1	1	Step 15 reference

- ACC/DEC time selection：

AC780 provids 4 groups of Acc/Dec time, the user can select the required time by different combination of digital inputs which are configured to ACC/DEC time selection function.

Combination of DI		**The selected ACC DCC time**
S2=7	**S1=6**	
OFF	OFF	Acc time 1/Dec time 1
OFF	ON	Acc time 2/Dec time 2
ON	OFF	Acc time 3/Dec time 3
ON	ON	Acc time 4/Dec time 4

- Digital potentiometer MOP_UP/MOP_DOWN function

Only valid when the frequency source is set to preset frequency. The target frequence can increase or decrease by using the mop_up or mop_down terminals。

Digital input（MOP_UP function）	on	off	off	on
Digital input（MOP_DOWN function）	off	on	off	on
Operation status	accelerate	decelerate	hold	hold

Notes：

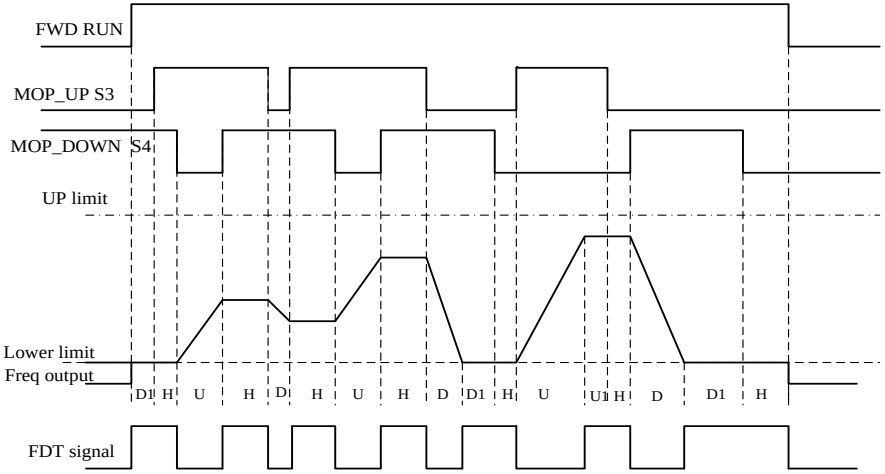
□ please set the frequency limit when using the terminal up/down。

□ If the start command is valid, enve the MOP_UP/DOWN terminal is not valid, the inverter will

run from the start frequency to the preset frequency;

□ the Jog operation has the higer priority。

The following diagram indicates the runtime sequence of the MOP function



U=UP（accelarate） D=DOWN（decelerate） H=HOLD（保持）

U1=UP status（stay at upper limit freq） D1=DOWN status（stay at lower limit freq）

P4.15	Up_down_reate of MOP	Default	1.00Hz/s
	Setting Range	0.001Hz/s～60.000Hz/s	

It is used to set the up and down_rate of the MOP terminals. The unit is Hz per sencond。

P4.16	Minimum input of Hi-speed pulse	Default	0.00kHz
	Setting Range	0.0kHz～100.00kH	
P4.17	Setting of Hi-speed pulse minimum input	Default	0.0%
	Setting Range	-100.0～+100.0%	
P4.18	maximun input of Hi- speed pulse	Default	50.00kHz
	Setting Range	0.0kHz～100.00kH	
P4.19	Setting of Hi- speed pulse maximun input	Default	100.0%
	Setting Range	-100.0～+100.0%	
P4.20	Filter time of Hi- speed pulse input	Default	0.0s
	Setting Range	0.00s～10.00s	

These parameters are used to set up the scaling relationship between the high speed pulse input and the internal UI value. Similar to the analog input settings.。

P4.21	Digital input 1 Delay time	Default	0.0s

	Setting Range	0.0s～3600.0s	
P4.22	Digital input 2 Delay time	Default	0
	Setting Range	0.0s～3600.0s	
P4.23	Digital input 3 Delay time	Default	0
	Setting Range	0.0s～3600.0s	

These parameters are used to set the delay time of the AC drive when the status of DI terminals changes. Only DI1, DI2 and DI3 support the delay time function.。

P4.24	Digital input valid level1		Default	00000
	Setting Range	1st bit	S1： 0--Hi level valid; 1—low level valid	
		2nd bit	S2： 0--Hi level valid; 1—low level valid	
		3rd bit	S3： 0--Hi level valid; 1—low level valid	
		4th bit	S4： 0--Hi level valid; 1—low level valid	
		5th bit	S5： 0--Hi level valid; 1—low level valid	
P4.25	Digital input valid level2		Default	00000
	Setting Range	1st bit	S6： 0--Hi level valid; 1—low level valid	
		2nd bit	S7： 0--Hi level valid; 1—low level valid	
		3rd bit	S8： 0--Hi level valid; 1—low level valid	
		4th bit	reserved	
		5th bit	reserved	

These parameters are used to set the valid mode of DI terminals. If set to 0-- High level valid, then the DI terminal is valid when being connected with +24V, and invalid when being disconnected from +24V; Vice versa if some bit is set to 1-- Low level valid, then the DI terminal is invalid when being connected with +24V, and invalid when being disconnected from +24V.

P4-26	DO1/Hi-freq pulse output selection		Default	0
	Setting Range	0	0：Hi-Speed output（FMP）	
		1	1：Digital output（FMR）	

The digital output terminal 1 can be configured eihter as general purpose output or hi-speed pulse output. The output pulse frequency can reach up to 100 KHz when configured as FMP function.

ETDAC780 provids 4 digital output terminals which are total configurable, in which Y1 support hi-speed pulse output, and Y3 is a relay output with common open and close contacts.

At the same tine, ETDAC780 provides 5 digital comparators. The output of the comparator operates very similar to the digital inputs, that's the corresponding function can triggered by the output of the comparator outputs, also the comparator can be bypassed by the digital outputs, the bypass could be achieved setting parameters P4~33 to P4~37. 。

P4-27	DO1 function configuration	Default	00000

	Setting Range	0~50	
P4-28	DO2 function configuration	Default	00000
	Setting Range	0~50	
P4-29	DO3 function configuration	Default	00000
	Setting Range	0~50	
P4-30	DO4 function configuration	Default	00000
	Setting Range	0~50	
P4-31	DO5 function configuration	Default	00000
	Setting Range	0~50	
P4-32	DO6 function configuration	Default	00000
	Setting Range	0~50	
P4-33	**Comparator1 func selection**	Default	00000
	Setting Range	0~50	
P4-34	**Comparator2 func selection**	Default	00000
	Setting Range	0~50	
P4-35	**Comparator3 func selection**	Default	00000
	Setting Range	0~50	
P4-36	**Comparator4 func selection**	Default	00000
	Setting Range	0~50	
P4-37	**Comparator5 func selection**	Default	00000
	Setting Range	0~50	

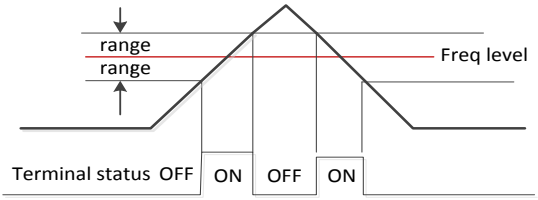
The digital output function items are listed below：

setting	Function	description
0	No function	No function
1	Inverter in Run Status	The AC drive is running and has output frequency(can be zero), the terminal becomes ON.。
2	Inverter in Error Status	When the AC drive stops due to a fault, the terminal
3	Inverter Ready	When the inverter powers up and no error, ready to start;
4	Ramp End	The target frequency has reached;
5	Motor overload Pre-warning	The AC drive judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal becomes ON.
6	Inverter overload pre-warning	The terminal becomes ON 10s before the AC drive overload protection action is performed.
7	Reverse running	The terminal becomes on if the motor is running in reverse dir
8	Reserved	reserved

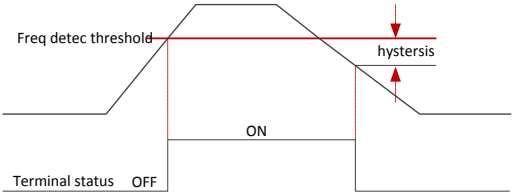
9	Over-tempreture	The terminal is on if the IGBT tempreture exceeds the OT threshold.
10	output current exceeds Limit	On if the inverter current exceeds the OC threshol。
11	Up-limit frequency arrived	When the output frequency reach the up limit frequency, the terminal become on
12	lower-limit frequency arrived	The terminal is on if the inverter run at the lower limit freq
13	reversed	
14	Torque was limited	The terminal is on if the inverter runs at torque limit status。
15	Hysteresis Comparator 1 output	If comparator1 output is set to 1, the terminal is on。
16	Hysteresis Comparator 2 output	If comparator2 output is set to 1, the terminal is on。
17	Hysteresis Comparator 3 output	If comparator3 output is set to 1, the terminal is on。
18	Hysteresis Comparator 4 output	If comparator4 output is set to 1, the terminal is on。
19	Hysteresis Comparator 5 output	If comparator5 output is set to 1, the terminal is on。
20	Range Comparator 1 output	If the non-inverting input value is in the band which determinded by the inverting input value and the hysteris, the terminal becomes ON.
21	Range Comparator 2 output	
22	Range Comparator 3 output	
23~~41		reserved
42	Frequency1 reached	ON if the output frequency in the range of frequency 1 level
43	Frequency2 reached	ON if the output frequency in the range of frequency 2 level
44	Current level reached	ON if the output current in the range of current detect level
45	Torque level reached	ON if the output torque in the range of torque detect level
46	frequency1 detected	Refer to the FDT related parameters for detailed information
47	frequency2 detected	

examples：

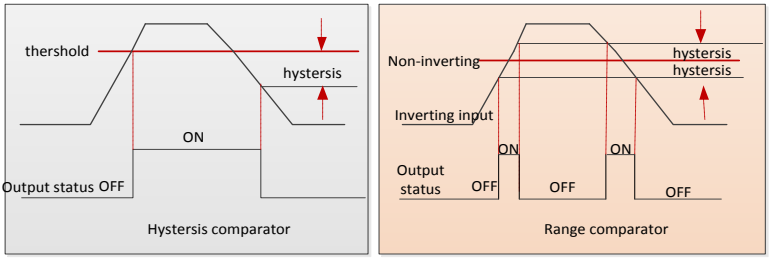
seting: 42，“Frequency1 reached” example



setting: 46 ， “frequency1 detected” example



Examples for the hysteresis comparator and range comparator：



P4.38	Hi-speed pulse output variable selection	Default	0
	Setting Range	0~11	
P4.39	Maximum frequency of FMP	Default	50.00kHz
	Setting Range	0.01kHz～100kHz	

These parameters are used to set up the hi-speed pulse output function, the setting is similar to the analog outputs.

P4.40	Y1 output delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.41	Y2 output delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.42	Y3 Relay output3 delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.43	Y4 otuput delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.44	Y5 otuput delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.45	Y6 otuput delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	

These parameters are used to set up the delay time of the digital outputs. The delay time refer indicates the time from the status change to actual electrical circuit work.

P4.46	**DO valid level selection**		Default	00000
	Setting Range	1st bit	Y1： 0--Hi level valid; 1—low level valid	
		2nd bit	Y2： 0--Hi level valid; 1—low level valid	
		3rd bit	Y3： 0--Hi level valid; 1—low level valid	
		4th bit	Y4： 0--Hi level valid; 1—low level valid	
		5th bit	Y5： 0--Hi level valid; 1—low level valid	

These parameters are used to set the valid mode of DO terminals. If set to 0-- High level valid, then the DO terminal is high level valid when active and low level when inactive; Vice

versa if some bit is set to 1-- Low level valid, then the coresponding DO terminal is low level whenactive , and high level when inactive.

P4.47	Comparator 1 set delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.48	Comparator 2 set delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.49	Comparator 3 set delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.50	Comparator 4 set delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	
P4.51	Comparator 5 set delay time	Default	0.0s
	Setting Range	0.0s～3600.0s	

These parameters are used to set up the delay time of the comparator outputs. The delay time indicates the time from the comparator status change to actual comparator output reverse.。

P4.52	**Comparator output valid level selection**		Default	00000
	Setting Range	1st bit	comp1： 0--Hi level valid; 1—low level valid	
		2nd bit	comp 2： 0--Hi level valid; 1—low level valid	
		3rd bit	comp 3： 0--Hi level valid; 1—low level valid	
		4th bit	comp 4： 0--Hi level valid; 1—low level valid	
		5th bit	comp 5： 0--Hi level valid; 1—low level valid	

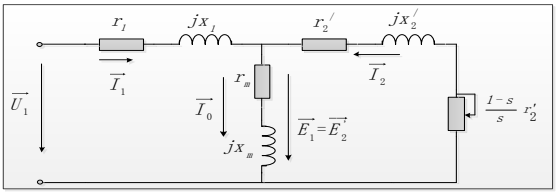
These parameters are used to set the valid mode of comparator outputs, the same as the digital outputs terminals.。

9.6 FOC and V/F control parameters

All the parameters needed for the field flux oriented control are defined in this group, sunch as Rs,Rr, Lm,Lr,Io etc. It is strongly suggested to perform the selftuning process to get these parameters for a better motor control performance.

P5.00	Stator resistance Rs	Default	Model dependent
	Setting Range	0.001Ω～65.535Ω	
P5.01	Rotor resisitance Rr	Default	Model dependent
	Setting Range	0.001Ω～65.535Ω	
P5.02	Leakage inductance Lo	Default	Model dependent
	Setting Range	0.01mH～600.00mH	
P5.03	Mutual inductance Lm	Default	Model dependent
	Setting Range	0.1mH～3000.0mH	
P5.04	Magnetizing current Io	Default	Model dependent
	Setting Range	0～motor rated current	

The following T-type equivalent circuit was adopted in the FOC verctor control. The stator resistance Rs, rotor resistance Rr, leakeage inductance Lr, and mutual inductand Lm is illustrated in the following diagram. The inverter will calaulate all these parameters during the self-tuning process, so there is no need to modify these parameters by manual.



$$\begin{cases} \overrightarrow{U_1}=-\overrightarrow{E_1}+\overrightarrow{I_1}(r_1+jx_1) \\ -\overrightarrow{E_1}=\overrightarrow{I_0}(r_m+jx_m) \\ \overrightarrow{E_1}=\overrightarrow{E_2} \\ \overrightarrow{I_1}=\overrightarrow{I_0}+(-\overrightarrow{I_2}) \\ \overrightarrow{E_2}=\overrightarrow{I_2}(r_2'+jx_2'+\frac{1-s}{s}r_2') \end{cases}$$

P5.05	KiKv coefficient 1	Default	**100%**
	Setting Range	**10%~100%**	
P5.06	KiKv coefficient 2	Default	**90%**
	Setting Range	**10%~100%**	
P5.07	KiKv coefficient 3	Default	**85%**
	Setting Range	**10%~100%**	
P5.08	KiKv coefficient 4	Default	**75%**
	Setting Range	**10%~100%**	
P5.09	KiKv coefficient 5	Default	60%
	Setting Range	**10%~100%**	

The induction motor usually works in magnetic saturation, so the Lr/Lm is not a constant during the complete current range, these parameters are used to compensate the non-linear characteristic of the stator current and inductance.

P5.10	Slip compensate Gain	Default	**100%**
	Setting Range	50%～200%	

The inverter calculate the slip between the rotor flux and rotor mechanical speed, and compensate the slip by multiplying this Slip compensate Gain. If the motor with load runs at a very low speed, increase the value of this parameter; otherwise if the motor with load runs at a very large speed, decrease the value of this parameter.

P5.11	Kp_flux	Default	100
	Setting Range	0～2000	
P5.12	Ki_flux	Default	2
	Setting Range	1～1000	
P5.13	Deflux_Mode	Default	1
	Setting Range	1:Deflux on total ouput voltage	
		2: Deflux on Vq voltage	
P5.14	Minimum flux ref	Default	50%
	Setting Range	1%～200%	
P5.15	Deflux_Vq1	Default	120%
	Setting Range	10%～200%	
P5.16	Deflux_Vq2	Default	100%
	Setting Range	10%～200%	

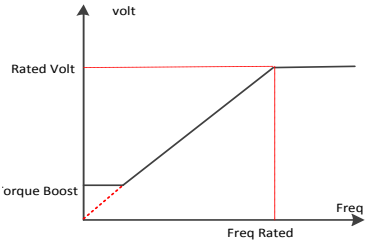
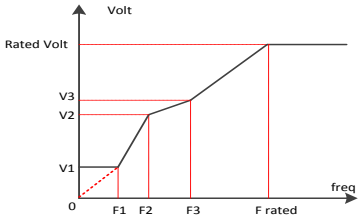
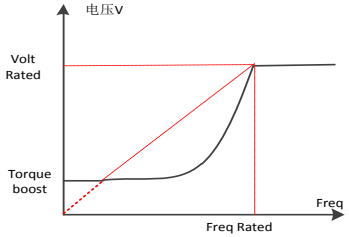
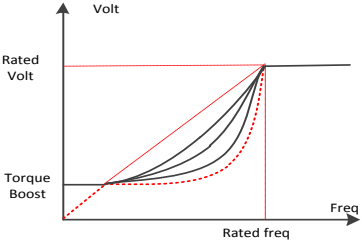
AC780 inverter provides 2 kinds of field weakening methods. The first one is performing field-weakening when the total output voltage reaches the DefluxVoltage which indicated by P5.15 parameter. The other one is performing field-weakening when the q-axis voltage reaches the Vmax divided by the squre root of 2.

P5.17	V/F curve profile		Default 0
	Setting Range	0	0：linear V/F curve
		1	1：multi-point V/F
		2	2：square power V/F curve
		3	3：1.2 power V/F curve
		4	4：1.4 power V/F curve
		5	5：1.6 power V/F curve
		6	6：1.8 power V/F curve
P5.18	Torque boost		Default Model dependent
	Setting Range		0.0%：（auto-boost） 0.1%～30.0%
P5.19	Cut-off frequency of torque boost		Default 50Hz
	Setting Range		0.00Hz～max frequency

The V/F control mode is applicable to low load applications (fan or pump) or applications where one AC drive runs multiple motors. The user can select the different volts per Hz curves to get the required performance.

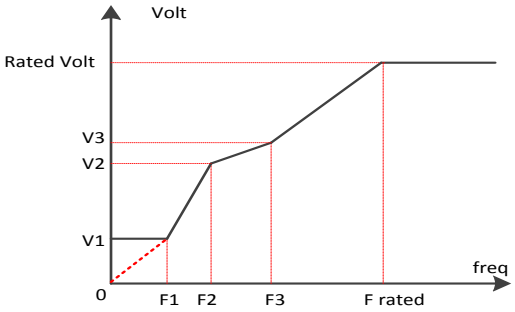
To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the AC drive at low frequency by modifying P5.18. If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer overcurrent. If the load is large and the motor startup torque is insufficient, increase the value of P5.18. If the load is small, decrease the

value of P5.18. If it is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance.

usage	V/F curve	Diagram
Constant torque load	0 linear V/F curve	
Fans pumps	1 multi-point V/F	
Pumps constant power load	2 Squre power curve	
constant power load	3 Between the square and line curve	

P5.20	V/F curve start point frequency	Default	1Hz
	Setting Range	0.00Hz～max freq	
P5.21	V/F curve start point voltage	Default	2%
	Setting Range	0.0%～100.0%	
P5.22	V/F curve middle point frequency	Default	10Hz
	Setting Range	0.00Hz～max freq	
P5.23	V/F curve middle point voltage	Default	20%z
	Setting Range	0.0%～100.0%	
P5.24	V/F curve 3rd point frequency	Default	30Hz
	Setting Range	0.00Hz～max freq	
P5.25	V/F curve 3rd point voltage	Default	60%
	Setting Range	0.0%～100.0%	

These parameters are used to set the user-defined VF curve as following:



P5.26	V/F slip compemsation gain	Default	0.0%
	Setting Range	0.0%～200.0%	
P5.27	V/F over voltage stall rejection coefficient	Default	64
	Setting Range	0～200	
P5.28	V/F control jerk rejection coefficient	Default	60%
	Setting Range	0～100	

P5.28 is used to reduce the osciliation of the VF control. Set to a value as small as possible in the prerequisite of efficient oscillation suppression to avoid influence on V/F control. Set this parameter to 0 if the motor has no oscillation. Increase the value properly only when the motor has obvious oscillation. The larger the value is, the better the oscillation suppression result will be.

9.7 Auxliary PID regulator

The Aux PID regulator is the programmable hi-performance regulator provided by AC780 inverter, and can be used in any field which requires close loop process control. 2groups of PID gains are available, and the gains can be switched over by digital inputs or comparator outputs.

The off-state calculation function must be enable for the constant pressure water supply application.

P6.00	PID reference Source selection		Default	0
	Setting Range	0	0：Preset value P6.02	
		1	1：scaled analog input1	
		2	2：scaled analog input 2	
		3	3：communication reference	
		4	4：multi-frequency setting	
		5	5：hi-freq pulse input setting	
P6.01	PID preset reference		Default	50.0%
	Setting Range		0.0%～200.0%	

These parameters are used to set the PID reference configuration. The internal unit of the reference is percentage, from 0 to 100.00%.

P6.02	PID feedback source selection		Default	0
	Setting Range	0	0：scaled analog input1	
		1	1：scaled analog input2	
		2	2：**AI1+AI2**	
		3	3：**AI1-AI2**	
		4	4：Hi-Freq pulse feedback	
		5	**5：comunication feedback**	
		6	**6：MAX(AI1，AI2)**	
		7	**7：Min(AI1，AI2)**	

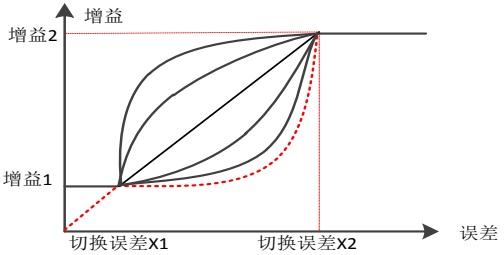
These parameters are used to set the PID feedback configuration. The internal unit of the feedback is percentage, from 0 to 100.00%.

P6.03	Kpa1	Default	20.0
	Setting Range	0.0 ~ 100.0	
P6.04	Tia1	Default	2.00S
	Setting Range	0.01s ~ 10.00s	
P6.05	Kda1	Default	0
	Setting Range	0.000s ~ 10.000s	

P6.06	Kpa2	Default	20.0
	Setting Range	0.0 ~ 100.0	
P6.07	Tia2	Default	2.00S
	Setting Range	0.01s ~ 10.00s	
P6.08	Kda2	Default	0
	Setting Range	0.000s ~ 10.000s	

Two groups of PID gains are available, and the gains can be switched over by digital inputs or comparator outputs.

P6.09	PID adaptive Gain Mode	Default	0
	Setting Range	0	0：fixed at the 1st Gain group；
		1	1：switch via terminals or comparator
		2	2：switch according to error---linear
		3	3：switch according to error---squre power
		4	4：switch according to error---cube power
		5	5：switch according to error -2 power
		6	6：switch according to error -3 power
P6.10	PID gain switch error X1	Default	20%
	Setting Range	0.0%～P6.11	
P6.11	PID gain switch error X2	Default	80%
	Setting Range	P6.10～100.0%	



In some applications, PID parameters switchover is required when one group of PID gains cannot satisfy the requirement of the whole running process. The switchover can be implemented either via a DI terminal or automatically implemented based on the deviation.

If you select switchover via a DI terminal, the DI must be allocated with function "PID gains switchover". If the DI is OFF, group 1 is selected. If the DI is ON, group 2 is selected. If you select automatic switchover, when the absolute value of the deviation between PID feedback and PID setting is smaller than the value of P6.10, group 1 is selected. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of P6.11, group 2 is selected. When the deviation is between P6.10 and P6.11, the PID parameters are the linear or square/ 3rd power interpolated value of the two groups of parameter values.

P6.12	PID error dead-band	Default	0
	Setting Range	0.0%～100.0%	
P6.13	PID error limit	Default	50%
	Setting Range	0.0%～100.0%	
P6.14	PID differential limit	Default	1%
	Setting Range	0.00%～100.00%	

The above parameters are used to limit the error and differential values. In some applications, to improve the stability of thePID, the error dead band are needed. The PID operation is paused/frozen within the deadband zone.

P6.15	PID_OutRamp_AccRate	Default	1.2%
	Setting Range	0.00%～100.00%	
P6.16	PID_OutRamp_DecRate	Default	1.2%
	Setting Range	0.00%～100.00%	
P6.17	PID output maximum limit	Default	10.00Hz
	Setting Range	0.00～max freq	
P6.18	PID output minimum limit	Default	10.00Hz
	Setting Range	0.00～max freq	

A too big change of the PID output may cause a big overshoot of the control system, so the PID limit output is required. P6.15 PID_OutRamp_AccRate and P6.16 PID_OutRamp_DecRate are used to limit the PID positive and negative change rate. The output of the PID can not exceeds the value defined by P6.17 and P6.17, since they are the max and min limits of PID output.

P6.19	PID reference ramp time	Default	0S
	Setting Range	0.00～650.00s	
P6.20	PID feedback filter time	Default	0S
	Setting Range	0.00～60.00s	
P6.21	PID output filter time	Default	0S
	Setting Range	0.00～60.00s	

It is a pratical scheme to set up a ramp for the PID reference in order to avoid the PID fluctuation especially in the case of the situation that reference transits much。Also the low pass filter is ofter useful to reduce the influence of the noise introduced from the ADC sensing and power devices switching. The above mentioned parameters are used to set up the ramp and filter time.

P6.22	PID output scaling	Default	1000
	Setting Range	1～65535	
P6.23	Wake up frequency	Default	0
	Setting Range	Sleep freq～max freq	

P6.24	Wake up delay time	Default	0S
	Setting Range	0.0s～6500.0s	
P6.25	Sleep frequency	Default	0
	Setting Range	0.00Hz～wake up freq	
P6.26	Sleep delay time	Default	0S
	Setting Range	0.0s～6500.0S	
P6.27	PID feedback loss threshold	Default	0
	Setting Range	0～200.0%	
P6.28	PID feedback loss time	Default	0S
	Setting Range	0.0s～20.0s	
P6.29	PID operation enable when stop	Default	0：Dsiable
	Setting Range	0:PID off at stop 1:pid still run	

These parameters are used to set up the constant pressure water supply applications. These parameters are used to implement the sleep and wakeup functions in the water supply application. When the AC drive is in running state, the AC drive enters the sleep state and stops automatically after the sleep delay time if the set frequency is lower than or equal to the sleep frequency.

When the AC drive is in sleep state and the current running command is effective, the AC drives starts up after the wakeup delay time if the set frequency is higher than or equal to the wakeup frequency. Generally, set the wakeup frequency equal to or higher than the sleep frequency. If the wakeup frequency and sleep frequency are set to 0, the sleep and wakeup functions are disabled.

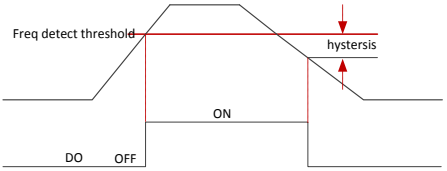
If the sleep function is enabled, if the frequency source is PID, whether PID operation is performed in the sleep state is determined by P6.29. In this case, select PID operation enabled in the stop state (P6.29 = 1).

P6.30	PidAntiWindUp enable	Default	0
	Setting Range	0：disable ； 1：enable	

9.8 General used function blocks

P7.00	Frequency detect level1（FDT1）	Default	50.00Hz
	Setting Range	0 Hz～max freq	
P7.01	Frequency detect hysteresis1（FDT1）	Default	3.0Hz
	Setting Range	0 Hz～max freq	

These parameters are used to detect the output frequency, and send out a digital out DO singal to indicate if the output frequency is in the frequence range。As shown in the following diagram, if the output frequency is greater than the FDT threshold, the DO becomes ON, and only when the freq out was smaller than the FDT threshold subtracted the hysteresis, the DO will becomes off.

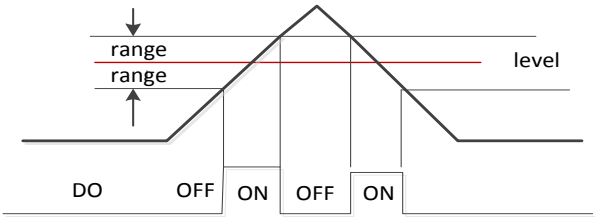


P7.02	Frequency detect level2（FDT2）	Default	50.00Hz
	Setting Range	0 Hz～max freq	
P7.03	Frequency detect hysteresis2（FDT2）	Default	3Hz
	Setting Range	0 Hz～max freq	

The second FDT block, the same usage as the FDT1 block.

P7.04	Frequency reach detection level1	Default	50.00Hz
	Setting Range	0 Hz～max freq	
P7.05	Frequency reach detection range1	Default	3Hz
	Setting Range	0 Hz～max freq	

These parameters are used to detect if the output frequency is in the range defined by the frequency level and range. The digital output terminal which was configured to the function “42 Frequency1 reached” becomes ON, if the frequency is in the range as the dollowing diagram shows。



P7.06	Frequency reach detection level2	Default	50.00Hz
	Setting Range	0 Hz～max freqsss	
P7.07	Frequency reach detection range2	Default	3Hz
	Setting Range	0 Hz～max freq	

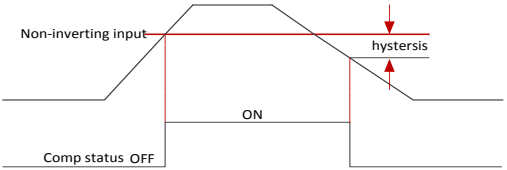
The second Frequency reach detection block, the same usage as the Frequency reach detection1 block.

P7.08	Frequency reference arrive detection range	Default	1%
	Setting Range	0.0%~100.0%	

This parameter defines the deviation around the freqency reference to detect if the target frequency had entered this region. The corresponding digital output terminal which was configured to the function “4 frequency reached, ramp ended” becomes ON, if the frequency output is in the range.

P7.10	Comparator1 non-inverting input source selection		Default	0
	Setting Range	0	0：preset comp1 threshold（P7.12）	
		1	1：output frequency	
		2	2：output current	
		3	3：output voltage	
		4	4：output torque	
		5	5：output power	
		6	6：sclaed analog input1	
		7	7：sclaed analog input2	
		8	8：comunication setting	
P7.11	Comparator1 inverting input source selection		Default	0
	Setting Range		Same items as the non-inverting input	
P7.12	comp1 preset threshold		Default	8888
	Setting Range		0~60000	
P7.13	Comp1 hysteresis		Default	1000
	Setting Range		0~60000	

AC780 inverter provides 5 comparators, each of them is programmable. The user can select the inverting and non-inverting input terminal variable configuration. The ouput of the comparator can be used as the digital inputs to trigger and corespnding functions.



P7.14	Comp2 non-inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.15	Comp2 inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.16	Comp2 preset threshold	Default	8888
	Setting Range	0~60000	
P7.17	Comp2 hysteresis	Default	1000
	Setting Range	0~60000	
P7.18	Comp3 non-inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.19	Comp3 inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.20	Comp3 preset threshold	Default	8888
	Setting Range	0~60000	
P7.21	Comp3 hysteresis	Default	1000
	Setting Range	0~60000	
P7.22	Comp4 non-inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.23	Comp4 inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.24	Comp4 preset threshold	Default	8888
	Setting Range	0~60000	
P7.25	Comp4 hysteresis	Default	1000
	Setting Range	0~60000	
P7.26	Comp5 non-inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.27	Comp5 inverting input source selection	Default	0
	Setting Range	Same setting as comparator1	
P7.28	Comp5 preset threshold	Default	8888
	Setting Range	0~60000	
P7.29	Comp5 hysteresis	Default	1000
	Setting Range	0~60000	

9.9 Runtime Control

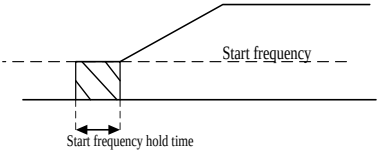
P8.00	Start mode	Default	0 --normal start
	Setting Range	0：normal start 1：speed track start(catch on the fly) 2：pre-magnetising start	

• 0: normal start – If the DC braking time is set to 0, the AC drive starts to run at the startup frequency. – If the DC braking time is not 0, the AC drive performs DC braking first and then starts to run at the startup frequency. It is applicable to small-inertia load application where the motor is likely to rotate at startup.

• 1: speed tracking restart. The AC drive judges the rotational speed and direction of the motor first and then starts at the tracked frequency. Such smooth start has no impact on the rotating motor. It is applicable to the restart upon instantaneous power failure of large-inertia load.

• 2: Pre-magnetising start. It is valid only for asynchronous motor and used for building the magnetic field before the motor runs. If the pre-magnetising time is 0, the inverter cancels pre-magnetising and starts to run at startup frequency. – If the pre-magnetising time is not 0, the AC drive pre-excites first before startup, improving the dynamic response of the motor.

P8.01	Start frequency	Default	0
	Setting Range	0.00Hz～10.00Hz	
P8.02	Start frequency hold time	Default	0.0s
	Setting Range	0.0s～100.0s	



P8.03	Speed track mode	Default	0
	Setting Range	0：tracking from stop frequency 1：tracking from zero 2：tracking from max frequency	
P8.04	Speed tracking rate	Default	10
	Setting Range	1～1000	

To track the rotor speed as fast as possible, the user must select the proper speed tracking mode.

0: tracking from stop frequency, the commonly selected mode.

1: From zero frequency, applicable to restart after a long time of power failure.

2: From the maximum frequency, applicable to the regenerative load.

P8.05	Stop mode	Default	0
	Setting Range	0：decelarating stop	
		1：coasting stop	

P8.06	DC braking start frequency	Default	0
	Setting Range	0.00Hz～最大频率	
P8.07	DC braking waiting time	Default	0.0s
	Setting Range	0.0s～100.0s	
P8.08	DC braking current	Default	0
	Setting Range	0%～100%	
P8.09	DC braking holding time	Default	0.0s
	Setting Range	0.0s～100.0s	

P8.06 (DC braking start frequency)

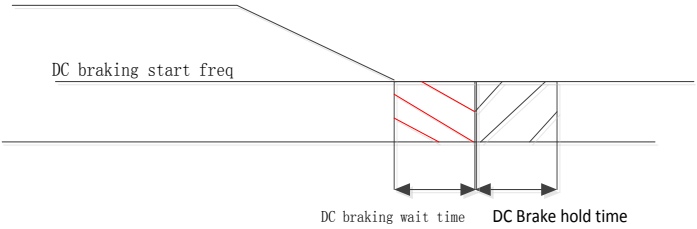
During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value set in P8.06.

P8.07 (DC braking waiting time)

When the running frequency decelerates to the start frequency of DC braking, the inverter stops output for this waiting time and then starts DC braking. This prevents faults such as overcurrent caused due to DC braking at high speed.

P8.08 (DC braking current)

This parameter specifies the output current at DC braking and is a percentage relative to the base value. **P8.09 (DC braking holding time)** specifies the time DC braking process will hold on.



P8.10	Reverse rotation enable	Default	0
	Setting Range	0: enable reverse rotating	
		1：forbid reverse rotating	

P8.11	**Operation when freq reference lower than cut-off frequency**	Default	0
	Setting Range	**0: run @ cutoff freq**	
		1: stop	
		2: run @ sero freq	

P8.12	Low voltage ride-through enable	Default	0
	Setting Range	0：disable	
		1：enable	
P8.13	LVRT voltage	Default	75%
	Setting Range	60.0%～100.0%	
P8.14	LVRT frequency change point(% rate voltage)	Default	90%
	Setting Range	0%～100%	
P8.15	LVRT voltage recovery judge time	Default	0.5S
	Setting Range	0.00s～100.00s	

The DC bus voltage will reduces in case of an instantaneous power failure or sudden voltage drop. This function enables the AC drive to compensate the DC bus voltage reduction with the load feedback regenerative energy by reducing the output frequency so as to makethe inverter running at renerative state for a short time to keep the drive system work continuously without trip.

P8.13 LVRT voltage defines the voltage at which the low voltage ride through LVRT begins.

P8.14 defines the voltage at which the inverter judges that the bus voltage has recovered normal.

P8.16	Carrier frequency	Default	6Khz
	Setting Range	1.0kHz～12kHz	

It is used to adjust the carrier frequency of the AC drive in order to reduce the motor noise, avoiding the resonance of the mechanical system, and reducing the leakage current to the earth and interference generated by the AC drive. If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase. If the carrier frequency is high, power loss and temperature rise of the motor declines. However, the AC drive has an increase in power loss, temperature rise and interference.

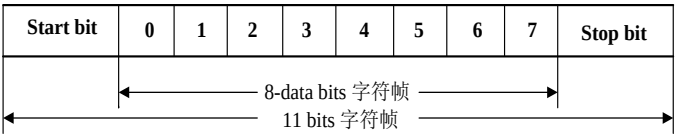
Carrier F（KHz）	Mechanical noise	EMI and leakage curret
1	Big	Less
2		
3		
4		
5		
6		
8		
10		
12	Small	More

9.10 Communication and Led keypad panel

P9.00	MFK keybutton function selection	Default	No function
	Setting Range 0~4	0	0：no function
		1	1：switch between the keypad control and remote control
		2	2：FWD/REV switch
		3	3：Forward Jog
		4	4：Reverse Jog
P9.01	STOP keybutton function selection	Default	0：only valid @ keypad ctrl
	Setting Range 0~1	0	0：only valid @ keypad ctrl
		1	1：always valid
P9.02	Modbus Address	Default	0
	Setting Range	0~247	
P9.03	波特率	Default	1：9600BPS
	Setting Range	0	4800BPS
		1	9600BPS
		2	19200BPS
		3	38400BPS
		4	57600BPS
P9.04	Serial communication format	Default	1
	Setting Range	0	8N2 For RTU
		1	8E1 For RTU
		2	8O1 For RTU
		3	8N1 For RTU

Setting up the serial communication promat ：

0：no parity , 8 data bits , no parity 2 stop bits For RTU



1. even parity , 8 data bits , Evev parity 1 stop bits for RTU

2. Odd parity , 8 data bits , Odd parity 1 stop bits For RTU

3. no parity , 8 data bits , no parity 1 stop bits For RTU

P9.05	protocol selection	Default	0
	Setting Range	0	0：MODBUS-RTU
		1	1：Profibus-DP
		2	2：CANBUS
		4	3：ANYBUS

9.11 Multi-reference and simple PLC operation

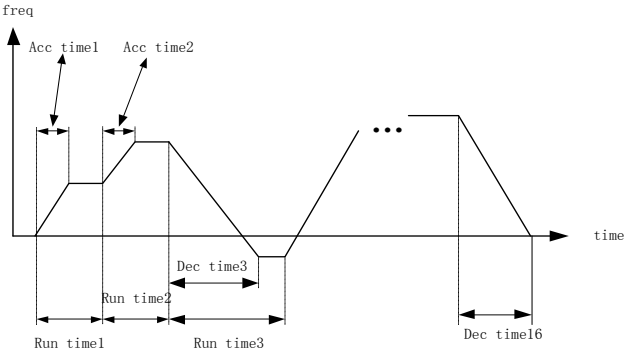
PA.00	**PLC operation mode**	Default	2
	Setting Range	0	**0：stop after 1 cycle**
		1	**1：hold the last reference freq after 1 cycle**
		2	**2：periodic running**

0: Stops after one cycle. The AC drive stops after running one cycle, and will not start up until receiving another command.

1: Keep the last reference after one cycle. The AC drive keeps at the final running frequency and direction after running one cycle.

2: Repeat from the start after one cycle

The simple operation is indicated in the following diagram：



PA.01	Step 0 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.02	Step 1 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.03	Step 2 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.04	Step 3 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.05	Step 4 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.06	Step 5 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.07	Step 6 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.08	Step 7 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.09	Step 8 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.10	Step 9 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.11	Step 10 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.12	Step 11 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.13	Step 12 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.14	Step 13 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.15	Step 14 reference	Default	0
	Setting Range	-100.0%～100.0%	
PA.16	Step 15 reference	Default	0
	Setting Range	-100.0%～100.0%	

The above parameters are used to set the reference for each step. If the simple PLC or multi-reference was selected in the main or aux frequence source, the target frequence will be one of the values defined by the above parameters, which can be specified by the simple PLC operation step or the multi-purpose digital terminals.

The following parameters defines the acc/dec time and the run time for each step:

PA.18	Running time for step 0	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.19	Acc/Dec time selection for step 0	Default	0
	Setting Range	0~3	
PA.20	Running time for step 1	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.21	Acc/Dec time selection for step 1	Default	0
	Setting Range	0~3	
PA.22	Running time for step 2	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.23	Acc/Dec time selection for step 2	Default	0
	Setting Range	0~3	
PA.24	Running time for step 3	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.25	Acc/Dec time selection for step 3	Default	0
	Setting Range	0~3	
PA.26	Running time for step 4	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.27	Acc/Dec time selection for step 4	Default	0
	Setting Range	0~3	
PA.28	Running time for step 5	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.29	Acc/Dec time selection for step 5	Default	0
	Setting Range	0~3	
PA.30	Running time for step 6	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.31	Acc/Dec time selection for step 6	Default	0
	Setting Range	0~3	
PA.32	Running time for step 7	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.33	Acc/Dec time selection for step 7	Default	0
	Setting Range	0~3	
PA.34	Running time for step 8	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.35	Acc/Dec time selection for step 8	Default	0
	Setting Range	0~3	

PA.36	Acc/Dec time selection for step 9	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.37	Running time for step 9	Default	0
	Setting Range	0~3	
PA.38	Acc/Dec time selection for step 10	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.39	Acc/Dec time selection for step 10	Default	0
	Setting Range	0~3	
PA.40	Running time for step 11	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.41	Acc/Dec time selection for step 11	Default	0
	Setting Range	0~3	
PA.42	Acc/Dec time selection for step 12	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.43	Running time for step 12	Default	0
	Setting Range	0~3	
PA.44	Acc/Dec time selection for step 13	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.45	Acc/Dec time selection for step 13	Default	0
	Setting Range	0~3	
PA.46	Running time for step 14	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.47	Acc/Dec time selection for step 14	Default	0
	Setting Range	0~3	
PA.48	Acc/Dec time selection for step 15	Default	0.0s
	Setting Range	0.0s～6553.5s	
PA.49	Running time for step 15	Default	0
	Setting Range	0~3	

9.12 User parameters

PC.00	User Passord	Default	0
	Setting Range	0~65536	

Password input is needed when tring to inspect or change the parameters if this parameter is set to a non-zero value。

PC.01	**Parameter initlization**	Default	0
	Setting Range	0	**No operation**
		1	**restore all parameters to default except for motor related parameter**
		2	**remove the error recoerds**

9.13 Variables

number	address	name	unit
V0-00	2100H	Frequency reference	0.01Hz
V0-01	2101H	Output frequency	0.01z
V0-02	2102H	Output voltage	0.1V
V0-03	2103H	Output current	0.01A
V0-04	2104H	EDC Bus voltage	0.1V
V0-05	2105H	Output torque	0.1%
V0-06	2106H	Output power	0.1Kw
V0-07	2107H	PID Reference	0.01%
V0-08	2108H	PID feedback	0.01%
V0-09	2109H	Digital input status	--
V0-10	210AH	Digital output status	--
V0-11	210BH	AI1 voltage	0.01V
V0-12	210CH	AI2voltage	**0.01V**
V0-13	210DH	AI3 voltage	0.01V
V0-14	210EH	Hi-freq pulse frequency	0.01Hz
V0-15	210FH	Encoder feedback rpm	0.1Rpm
V0-16	2110H	Inverter main freq reference	0.01Hz
V0-17	2111H	Inverter Aux freq reference	**0.01Hz**
V0-18	2112H	Line speed of the load	1m/Min
V0-19	2113H	Length	1m
V0-20	2114H	Power on time	1h
V0-21	2115H	Tempreture of the heat-sink	**degree**
V0-22	2116H	ROM version	
V0-23	2117H	Reversed	
V0-24	2118H	reversed	
V0-25	2119H	Reversed	
V0-26	211AH	Reversed	

Chapter 10 MODBUS Communication protocol

10.1 MODBUS－RTU Communication protocol

Modbus communication protocol is a widely used protocol in the world of inductril electrical devices. With this agreement, the controller between the controller via the network (such as Ethernet) and other devices can communicate. It has become a common industry standard. With it, different manufacturers of industrial control equipment can be connected into a network for centralized monitoring.

AC780 series AC Drives support RS485 interface and support Modbus-RTU protocol. Users can control the drive from PLC and PC. By RS485 protocol you can control drive to run, jog, stop and etc, also can read drive status.

How to configure modus communication:

1、 Hardware connections: Connect 485 communication cable to AC780 drive according to chapter 5.
2、 Software configuration: Set drive address and baud rate in P9 parameters.
3、 Communication protocol.

（1)、Read parameters 0x03（read function code）

BYTE	0	1	2	3	4	5	6	7
Content	Addr	0X03	Hi	Lo	Hi	Lo	CRCHi	CRCLo
Meaning	Address	command	First address		Number		CRC check	

Message returned：

BYTE	0	1	2	3	4	.....	N-1	N
Content	Addr	0X03	Num of Bytes	Hi	Lo	.....	CRCHi	CRCLo
Meaning	Address	command	Bytes number	content			CRC check	

（3）Read variables 0X04（read variables function code）

BYTE	0	1	2	3	4	5	6	7
Content	Addr	0X04	Hi	Lo	Hi	Lo	CRCHi	CRCLo
Meaning	Address	command	First address		Number		CRC check	

Message returned：

BYTE	0	1	2	3	4	.....	N-1	N
Content	Addr	0X04	NumofBytes	Hi	Lo	.....	CRCHi	CRCLo
Meaning	Address	command	Bytes number	content			CRC check	

（3）Write function code （0x06）

BYTE	0	1	2	3	4	5	6	7
Content	Addr	0X06	Hi	Lo	Hi	Lo	CRCHi	CRCLo
Meaning	Address	command	First address		content		CRC check	

Message returned：

BYTE	0	1	2	3	4	5	6	7
Content	Addr	0X06	Hi	Lo	Hi	Lo	CRCHi	CRCLo
Meaning	Address	command	First address		content		CRC check	

Following are CRC check code generate by C language, for reference only:

```
Unsigned char data;   //   Refers to the target message buffer
Unsigned char lengh; //   Message buffer in the number of bytes
    This function will return the value of unsigned integer type of the CRC
    unsigned int crc_chk(unsigned char data,unsigned char lengh)
    {
        int   j;
        unsigned int reg_crc=0xffff;
        while (lengh--)
        {
            reg_crc^=*data++;
            for(j=0;j<8;j++)
            {
                if(reg_crc&0×01)
                {/*LSB(b0)=1*/
                    reg_crc=(reg_crc>>1)^0xa001;
                }
                else
                {
                    reg_crc=reg_crc>>1;
                }
            }
        }
        Return   reg_crc;
    }
```

Commands address mapping table for the AC780 drives:

Definition	address	Function Description	
Drive	0nnnH	nnn Parameter Address	
Command to drive	2000H Command on the drive	Bit0	0：STOP 1：RUN
		Bit1	0：STOP 1：REV
		Bit2	0：STOP 1：FWD JOG
		Bit3	0：STOP 1：REV JOG
		Bit4	0：STOP 1：Coast Stop
		Bit5	0：STOP 1：Decel Stop
		Bit6	0：STOP 1：RESET
		Bit7~15	RESERVE
	2001H	MODBUS Frequence reference	
	2008H Digital Input Force Enable	Bit0	Digital Input S1
		Bit1	Digital Input S2
		Bit2	Digital Input S3
		Bit3	Digital Input S4
		Bit4	Digital Input S5
		Bit5	Digital Input S6
		Bit6	Digital Input S7
		Bit7	Digital Input S8
	2004H Digital Output Force Enable	Bit0	Digital Output Y1
		Bit1	Digital Output Y2
		Bit2	Digital Output Y3
		Bit3	Digital Output Y4
		Bit4	Digital Output Y5
		Bit5	Digital Output Y6
	2002H	Analog out1 setting 2^15=100%	
	2003H	Analog out1 setting 2^15=100%	
	2005H	High speed output setting 2^15=100%	
	2006H	Troque limit	
	200AH	Comparator threshold setting by communication	
	200CH	Communication preset 2	
	200DH	Communication preset 3	
	200EH	Communication preset 4	

Use command 0x04 read drive status and monitor data:

Definition	Address	Function Description	
Monitor drive status	2000H Drive status	0x0001	FWD RUN
		0x0002	REV RUN
		0x0003	STOP
		Others	RESERVE
	2001H Drive fault code	0x0000	No fault
		0x0001	Under voltage
		0x0002	Output short
		0x0003	Software over current
		0x0004	Hardware over current
		0x0005	Software over voltage
		0x0006	Hardware over voltage
		0x0007	Motor overload（OL1 ）
		0x0008	Drive overload（OL2 ）
		0x0009	PN busbar voltage fluctuate
		0x000A	Main circuit fault（FB ）
		0x000B	Heatsink overheat（oH1 ）
		0x000C	Motor overheat（OH2 ）
		0x000D	Grounding fault（GF）
		0x000E	Current sampling fault
		0x000F	RS485 data external fault
		0x0010	S2~S8 external fault
		0x0011	Autotune fault
		0x0012	Lack of water protection
		0x0013	Lack of water protection
		0x0014	Over pressure protection
		0x0015	Under pressure protection/no PID fdbk
		0x0016	Output phase loss
		0x0017	Brake overheat
		0x0018	Communication fault
		0x0019	EEPROM fault（EPF）
		0x001A	Feedback loss
		0x001B	Time to count down
		0x001C	Drive hardware fault
		0x001D	Reserve
		0x001E	Reserve
		0x001F	Reserve
		0x0020	Reserve
		0x0021	Reserve
		0x0022	Reserve
		0x0023	Reserve

Use command 0x04 read drive status and monitor data:

	Address	Variable descriptions
Status and variables 32 Words	2100H	Frequency reference
	2101H	Output frequency
	2102H	Output voltage
	2103H	Output current
	2104H	EDC Bus voltage
	2105H	Output torque
	2106H	Output power
	2107H	PID Reference
	2108H	PID feedback
	2109H	Digital input status
	210AH	Digital output status
	210BH	AI1 voltage
	210CH	AI2voltage
	210DH	AI3 voltage
	210EH	Hi-freq pulse frequency
	210FH	Encoder feedback rpm
	2110H	Inverter main freq reference
	2111H	Inverter Aux freq reference
	2112H	Line speed of the load
	2113H	Length
	2114H	Power on time
	2115H	Tempreture of the heat-sink
	2116H	ROM version
	2117H	Reversed
	2118H	reversed
	2119H	Reversed
	211AH	Reversed
	211BH	reversed
	211CH	Reversed
	211DH	Reversed
	211EH	Reversed
	211FH	reversed

Chapter 11 Troubleshooting

11.1 Faults and Solutions

- . When a fault occurs, the fault code is displayed on the keypad panel, and the output state of the fault contact is changed and the motor are free to stop. Check the fault cause and take corrective actions in the following table
- If the following corrective action can not solve the problem, please contact the company directly.
- In order to reset the drive, switch on the reset input signal or press STOP key, or you can disconnect the main circuit power supply to reset the fault.
- Note: The drive can't reset the fault when a forward (reverse) command is entered.

Table 11-1 Fault diagnosis and corrective measures

Failure Display	Description	Detail	Corrective measures
Err01	1. Main circuit under voltage	Main circuit under voltage: 1.200v level: Line power voltage below 190v 2.400v level: Line power voltage below 380v	1. Check power supply connection 2. Correct the input line power voltage.
	2. Control circuit under voltage	Control circuit under voltage when running	
	3.Contactor Fault	Then main contactor open when running	
Err02	Output short - circuit	Inverter output terminals are shorted	Check if the output circuit is shorted; The acceleration and deceleration time is too short; Perform the motor autotuning; Check motor insulation; Detecting motor coil resistance
Err03	Over current (OC)	The output current exceeds 200% of the rated current.	
Err04	Over current of hardware	By detecting the tube voltage drop of the IGBT, the over-current protection is generated	
Failure	**Description**	**Detail**	**Corrective measures**

Display			
Err05	Software over voltage	Main circuit DC voltage exceeds: 200V level：about 400V 400V level：about 820V 480V level：about 910V	Prolong the decelerate time; Add the brake resistor; Check if voltage of power supply is too high; Check if an external force drives the motor during acceleration
Err06	Hardware over voltage		
Err07	Motor overload (OL1)	The load is too heavy on the motor.	Reduce the load.
Err08	AC drive overload (OL2)	The output current of AC drive exceeds the set value.	Reduce the load and Prolong the decelerate time.
Err09	Bus voltage fluctuation is too large	There is a lack of phase in the input three-phase power supply. There is a large power imbalance	1、Check the power supply voltage 2、Re-tighten input terminal screws
Err10	Main circuit fault （FB ）	DC fuse burn off; The precharge circuit contactor or SCR no reliably pull-in	Check the transistor and the shorted, GND of load-side; check the precharge circuit.
Err11	Heatsink overhea （oH1 ）	The temperature of transistor heatsink over the permitted value (Heatsink temp≥OH1 detection value) (about 95℃)	Check Fans and the ambience temperature.
Err12	Motor overheat （OH2 ）	The motor temperature is too high	Lower the carrier frequency or adopt other heat radiation measures
Err13	Ground Fault （GF）	The output current to ground is more than 50% of the rated current of the inverter	First check the insulation between inverter and motor.
Err14	Current detection fault	CPU A/D unit is damaged; Sampling circuit fault;	Check plug connection ; Replace the faulty drive Board.
Err15	RS485 data bus external fault	The fault of control circuit	Check the external control circuit

Failure Display	Description	Detail	Corrective measures
Err16	Terminal S1~S5 external fault	The fault of control circuit	Check the input terminal, if the terminal is not connected, and then check the parameter settings of input terminal are reasonable.
Err17	Motor auto-tuning fault	The motor auto-tuning times out.	Check the cable connecting the AC drive and the motor
Err18	Lack of water protection	sensor water shortage protection	Waiting for pool water recovery, sensorless water shortage protection should also check parameter 608 Settings are appropriate.
Err19	Lack of water protection	Sensorless water shortage protection	
Err20	Over pressure protection	Water pressure is too high, the inverter into the protection state	Waiting for the pipe pressure returned to normal, the inverter automatic startup.
Err21	Low pressure protection/ PID feedback loss	Check PID feedback circuit	
Err22	Power output phase loss	The AC drive's three-phase outputs are unbalanced when the motor is running.	◎Check whether the motor three-phase winding is normal. ◎Check motor impedance. ◎Tighten the output terminal screws.
Err23	Brake reactor unit overheat.	Beyond the permit value of brake reactor unit	Reduce regenerative load
Err24	Communication fault	The transmission between the inverter and the digital operation panel cannot be established after power on; The host computer is in abnormal state (Initialization time).	◎Re insert the digital operation panel; ◎Check the cabling of host computer ◎Replace the main control board.
Err25	EEPROM Fault(EPF)	The chip on the main control board is damaged	Replace the main control Board.

Failure Display	Description	Detail	Corrective measures
Err26	Feedback fault	Encoder feedback signal loss	Check if the cable connection of the encoder is correct; Set the PPR value correctly based on the actual encoder. Eliminate external cable faults; Replace the damaged encoder; Replace the faulty PG Card.
Err27	Accumulative power-on time reached	The accumulative power-on time reaches the setting value	To seek technical support for decoding
Err28	Inverter hardware fault	Inverter control fault	Replace the main control board.
Err31	User-defined fault	The user-defined fault signal is input via DI	Check the input terminal, if the terminal is not connected, and then check the parameter settings of input terminal are reasonable.

11.2 Motor Failures and Corrective Measures

□If one of the following failures happened on the motor, need to dig out the failure reason and apply the corrective measures accordingly.

□If the following examination and corrective measure can not solve the problems; please do contact our company or the agency immediately.

Table 11-2 Motor Failures and Corrective Measures

Fault	Examination Contents	Corrective Measures
Motor does not rotate	Check if power supply voltage is added to the power supply terminal R/L1, S/L2, T/L3.	◎Power on。 ◎Disconnect the power supply, power again ◎Check the power supply voltage. ◎Confirm that the terminal screw is tightened
	Test the voltage of the output terminals (U/T1，V/T2，W/T3) by the rectified voltage meter	Disconnect the power supply, power again
	The motor is locked because of overload	Reduces engine load, removal of locking.
	Check if the fault has been shown on the keypad	Check the fault lookup table。
	Whether forward or backward command input	Check wiring
	Check whether the frequency reference is given	◎Correct wiring ◎check the voltage of frequency reference
	Check if the operating model setting is correct	Input the correct setting
Reverse rotation of motor	Check whether the wiring of terminals U/T1, V/T2, W/T3 is correct	The three terminals U/T1, V/T2, W/T3, need to correct corresponding to the motor lead sequence.
	Check if FWD and REV signal input is normal	Correct wiring
Motor can rotate but the speed can not be adjusted	Check if the wiring of frequency setting circuit is correct	Correct wiring
	Check if the operating model setting is correct	Input the correct setting
	Check whether the motor load is too heavy	Reduces motor load
Motor speed is too fast or too slow	Check if the rated value (pole and voltage) for motor is correct	Check the data on the motor nameplate
	Check if Gear wheel speed ratio is correct	Check the gear shift mechanism (gear, etc.)

Fault	Examination Contents	Corrective Measures
Motor speed is too fast or too slow	Check if the setting value of maximum output frequency setting is correct.	Check maximum output frequency setting.
	Check whether the voltage drop among the motor terminals is too much with the rectifier voltmeter.	Check V / F characteristic values.
Motor speed instability during operation	Check whether the motor load is too heavy	Reduces motor load
	Motor load change is too large	Reduced load changes; Increase the inverter and motor capacity
	Check if the three-phase or single-phase power supply are used, and if there is any phase missing for the three-phase power.	◎Check whether or not there is any phase missing for the three-phase power supply; ◎ For single phase power supply, connect the AC reactor to the power supply.

Chapter 12 MAINTENANCE

12.1 Basic maintenance methods

Basic maintenance methods		
	1	Do not touch the high-voltage terminals in inverter, otherwise, electrical shock shall occur
	2	Re-install all the covers before re-electrify inverter, check if the breaker in plastic box is broken while uncover the outer cover, otherwise electrical shock shall occur
	3	10 minutes after breaking the main circuit power, conduct the maintenance work upon the confirmation of the AC voltage is below 36V. It shall be dangerous if there is any electric charge on the capacitor
	4	Only qualified maintenance personnels can do the maintenance, examination and part changing work Please remove all the metal articles(e.g. watch, bracelet) and use the insulation tool to resist the electrical shock) , otherwise electrical shock shall happen
	1	PC board for controlling use shall apply CMOS IC, do not touch CMOS components, or which can be damaged by the static electricity
	2	Do not connect or disconnect the connecting wire and inker with the power on, otherwise there shall bring the body injury

12.2 Regular Examination Items

In order to avoid any failure happened to ETD780 drives and ensure smooth operating with long term and high reliability, please do regular examination according to instruction given in the following tables. In order to avoid electrical shock, please break the main circuit power, 10 minutes after that, confirm the AC voltage of the main circuit is blow 36 V, then do the regular examination.

- Check the voltage is in accordance to voltage needed for inverter (pay attention to check if there is any damage for the power wire and motor)
- If there is any loose between the wire terminal and connector (if any broken

strand for the power wires and terminals connection wires)

- Check if there any dust, iron chipping and corrosive liquid and greasy dirt
- NO measurement on inverter insulation impedance
- Check the output voltage, current and frequency for inverter (the disparity between the value measured can't be too big)
- Check if the environment temperature is among -5℃~40℃, if the ventilation status is sound or not
- If there is any abnormal noise or vibration during operating (Inverter is not allowed to put in the location with the big vibration) Clean the blades for air vent and heat sink cleanness status and fan's operating status