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# 6000E&6000M

## Current Vector Inverter

**ELECTRIC SHOCK**  
In the user manual  
when electrical power is  
10 minutes after power off.  
Set AC power to output terminals.  
or grounding techniques.

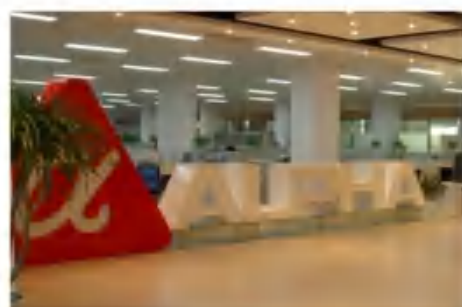


## » Company Profile

Shenzhen ALPHA Electric Co.,Ltd was established in 2000, and owns more than 30 subsidiaries and 50 after-sale service centers across China. Our headquarter is located in Longhua district of Shenzhen City, and has another 2 manufacturing bases are located in Zhejiang Province and Jiangxi Province. The company employs more than 500 people, of which about 60 percent are technology staff.

Our main business is in the design, development, and sales of industrial automation, power assembly of new energy automobile, and intelligent elevator control system. Meanwhile, as a High-Tech enterprise, we put a lot of focus in R&D expenditures. We have several comprehensive laboratories, we have introduced the advanced technology from both domestic and abroad, we also allied with a number of scientific research institutions and universities.

Through years of efforts, our professional sales and after-sale service teams help Alpha not only gain the customers recognition by reliable products, but also gain the customers trust by premium services. In the future, we will continue to serve our partners with professional spirit and excellent services based on industrial automation, new energy vehicle, and elevator control fields, achieve win-win collaboration.



## » Product Introduction

6000E/M is a high-performance open loop current vector frequency inverter. It adopts 32-Bit DSP, high integration, compact design, perfect protection, high reliability. The controlling software integrates advanced current vector controlling technology and magnetic flux vector controlling technology with strong overload ability which ensures the quick response, stability in low frequency running, high torque output in low frequency. It can meet with a wide application demands with leading technology in global market.



## » Features

|                      |  |   |
|----------------------|--|---|
| Compact Structure    | Optimized structure design, advanced technical platform      |   |
|                      | Improved brake circuit                                       |   |
|                      | Optional built-in brake unit for 30KW~132KW                  |   |
| Superior Performance | High accuracy of stable speed, wide speed scope              |   |
|                      | High output under vector control                             |   |
|                      | High torque under low speed, small torque fluctuation        |   |
|                      | Optimized VF algorithm                                       |   |
|                      | High accuracy of motor parameter setting                     |   |
| High Reliability     | AVR Function guaranteed high torque output under low voltage |   |
|                      | High heat reliability  | Independent ventilation design  |
|                      | Temperature increase test                                    | Accordance with the wide voltage input scope under international standard |
|                      | Auto-spraying technology                                     | long life-time design   |
| Easy to use          | Improved EMC design  | Compliance with CE certification  |
|                      | Overexcitation Function                                      | RS485 Communication port and MODBUS communication agreement               |
|                      | Instant shut down without stop machine                       | Application in wind generator and pump                                    |
|                      | Improved machine protection                                  | VF fully separation and semi-separation                                   |
|                      | Keyboard extension   | Diverse terminal function, ease to use                                    |

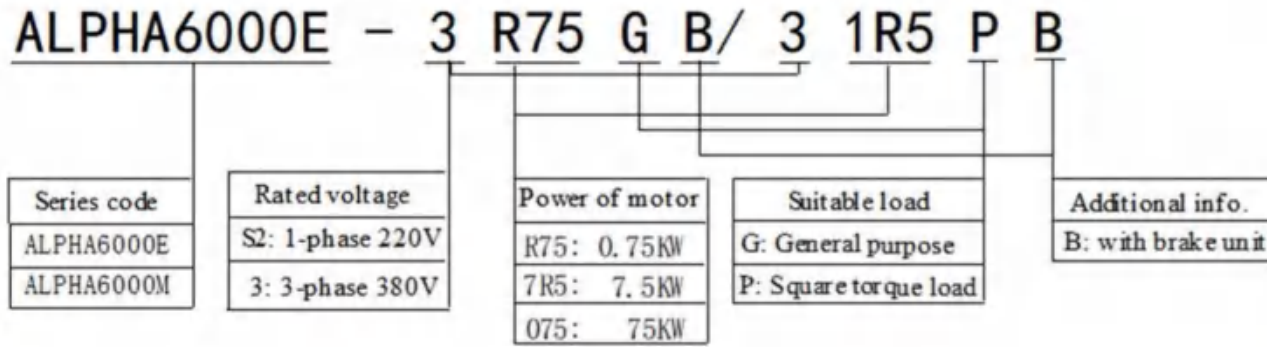
## » Application

CNC Machinery, Chemical Fiber, Plastic Machinery, Textile Machinery, Food Machinery, Ceramic Machinery, Centrifugal Machinery, Wood Craft Machinery, Printing Machinery, Package Machinery, Wind Generator, Pump, etc.



## » Product Information

### • Product naming rules



### • Control Circuit Terminal

|     |     |      |      |     |    |    |    |    |
|-----|-----|------|------|-----|----|----|----|----|
| AI1 | 10V | AO   | 24V  | X1  | X2 | X3 | X4 | TB |
| PE  | GND | 485+ | 485- | COM | DO | X5 | TA | TC |

Fig. A Terminal layout of control board Version A

|      |      |     |     |    |    |    |     |     |     |    |    |
|------|------|-----|-----|----|----|----|-----|-----|-----|----|----|
| 485+ | 485- | AO1 | 10V | X1 | X3 | X5 | COM | DO  | TA  | TB | TC |
| AI1  | AI2  | AO2 | GND | X2 | X4 | X6 | COM | PLC | 24V | RA | RC |

Fig. B Terminal layout of control board Version B

## » Control Loop Terminal Function

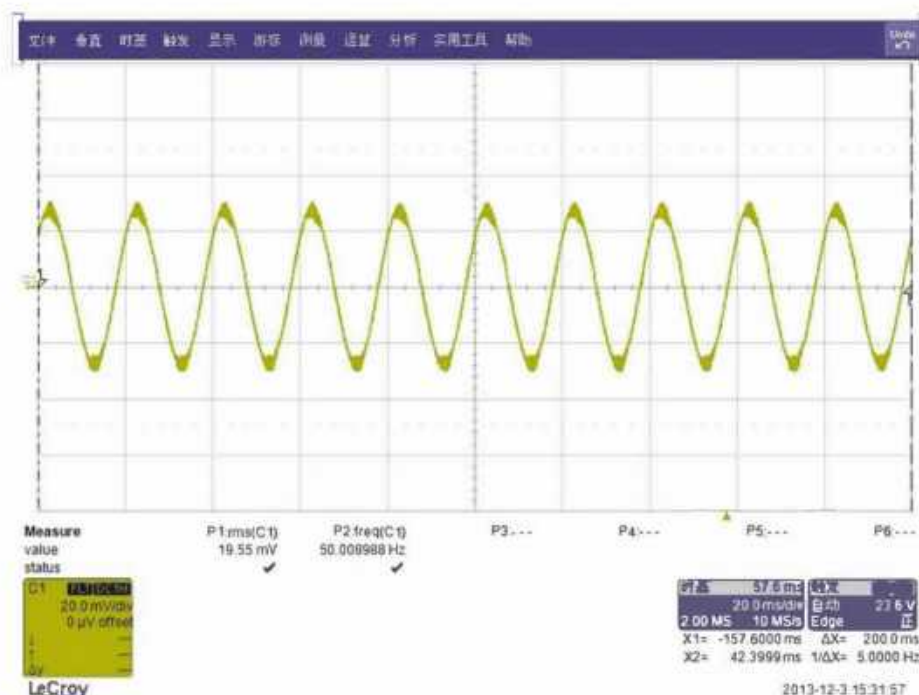
| Type                   | Terminal No | Name                                  | Terminal Function  | Specification  |
|------------------------|-------------|---------------------------------------|--|--|
| Analog Input           | AI1~AI2     | Analog inputs                         | Receive voltage/current input. Voltage or current are selected by DIP switch SW3 or SW1. Voltage input mode is the default mode.   | Input voltage: 0~10V<br>Input current: 0~20mA<br>Reference ground: GND   |
| Analog Output          | AO/AO1      | Analog output                         | Be able to output analog voltage/current. Voltage or current are selected by DIP switch SW2.   | Output voltage: 0/2~10V<br>Output current: 0/4~20mA<br>Reference ground: GND   |
|                        | AO2         | Analog output                         | Provide analog voltage/current output, with voltage and current selected by the DIP switch SW5.  | Output voltage: 0/2~10V<br>Output current: 0/4~20mA<br>Reference ground: GND   |
| Communication          | 485+        | RS485 interface                       | 485 differential signal positive terminal  | Standard RS-485 communication interface, Not isolated to GND   |
|                        | 485-        |                                       | 485 differential signal negative terminal  |  |
| Multi-Functional Input | X1~X6       | Multi-function input terminals        | It can be defined as a multi-function discrete input terminal through programming.   | Optical-isolator input<br>Input resistance: R=3.9kΩ<br>Input voltage: 0~30V<br>Reference ground: COM   |
| Multi-Function Output  | DO          | Open collector output terminal        | It can be defined as a multi-function output terminal for pulse signal through programming. It can also be used as an on-off output terminal.                              | Opto-coupler isolated OC output.<br>operating voltage: 0V~26V<br>Maximum current: 50mA<br>Output frequency: 0~50kHz<br>Reference ground: COM   |
| Electric Replay Output | TA          | Relay output                          | It can be defined as a multi-function relay output terminal through programming.   | TA-TB: NC TA-TC: NO<br>Contact capacity:<br>250VAC/2A (COSΦ=1.0)<br>250VAC/1A (COSΦ=0.4)<br>30VDC/1A   |
|                        | TB          |                                       |  |  |
|                        | TC          |                                       |  |  |
|                        | RA          | Relay output                          |  | RA-RC: NO<br>Contact Capacity:<br>250VAC/2A (COSΦ=1)<br>250VAC/1A(COSΦ=0.4)<br>30VDC/1A  |
|                        | RC          |                                       |  |  |
|                        | PLC         | Multifunctional input common terminal |  | When leaving the factory, it is shorted to 24V, and the PLC is internally isolated from 24V.<br>Note: When using PLC, the SW4 jumper on the right side of the control terminal must be disconnected. |
| Power                  | 10V         | +10V power supply                     | Provide +10V power supply externally (Reference ground: GND)   | Maximum output current 20 mA<br>Open circuit voltage can be up to 12V  |
|                        | 24V         | +24V power supply                     | Provide +24V power supply externally (Reference ground: COM)   | Maximum output current 100mA   |
|                        | GND         | +10V Reference GND                    | Reference GND for analog signal and +10V power supply  | Inner Isolated from COM<br>GND for +10V, AI1, AI2, and AO/AO1,AO2  |
|                        | COM         | +24V Common GND                       | Used with other terminals  | Isolated from GND  |
|                        | PE          | Shield ground                         | It is used for grounding of terminal wiring shield layer. Shield layer of analog signal lines, 485 communication lines, and motor cables can be connected to this terminal | It is internally connected to terminal PE of main circuit.   |

## » Features Instruction:

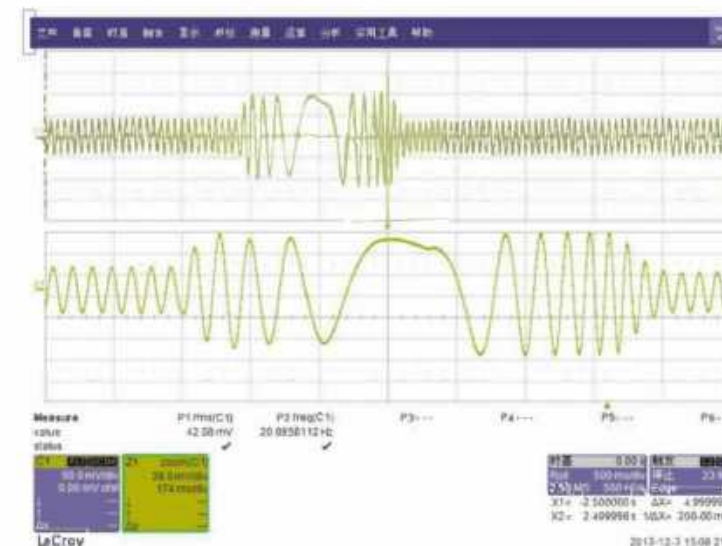
- Defined to be multi-functional switch of input terminal as well as high speed pulse input port, flexible combination between different input terminal.
- Rated input voltage: 380V-440V, 380V $\pm$ 20% fluctuation is allowed.
- Precision of stable speed:  $\pm$ 0.2% under vector control,  $\pm$ 0.5% under V/F control  
Speed adjustment: 1:200 under vector control, 1:100 under V/F control.
- Dynamic torque response time less than 20ms under vector control.
- Overload capacity of heavy load: 150% 60s, 180% 20s.
- Maximum output frequency is corresponding 4 times low intensity magnetic under vector control.

6000E integrated open loop vector control algorithm, excellent voltage and current control, strong load capacity, which guaranteed the quick response, stable running & high torque in low frequency for inverter.

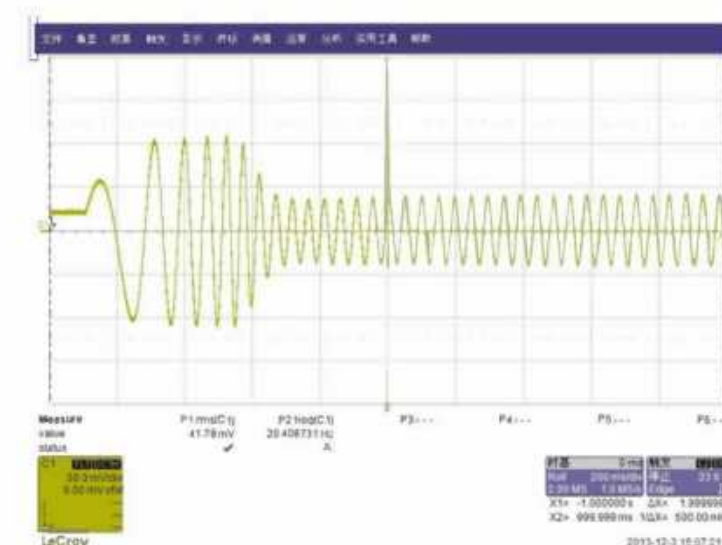
### • 50Hz Current curve in stable running



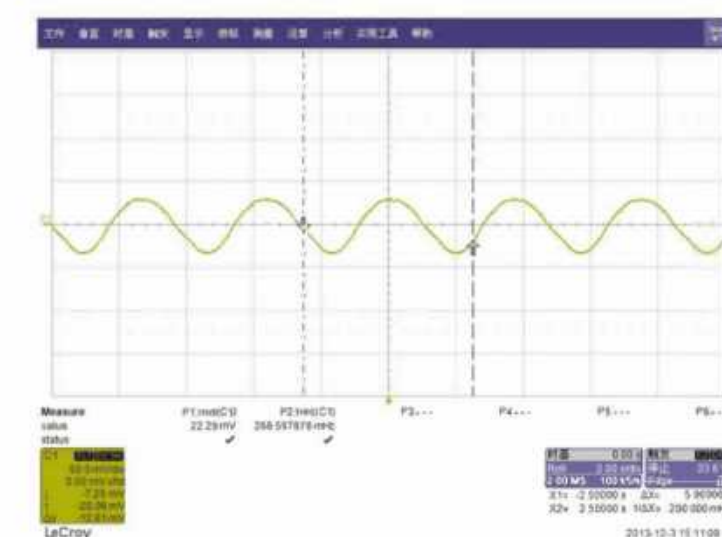
### • Current wave form of positive and negative reverse



### • 50Hz Accelerated current wave form

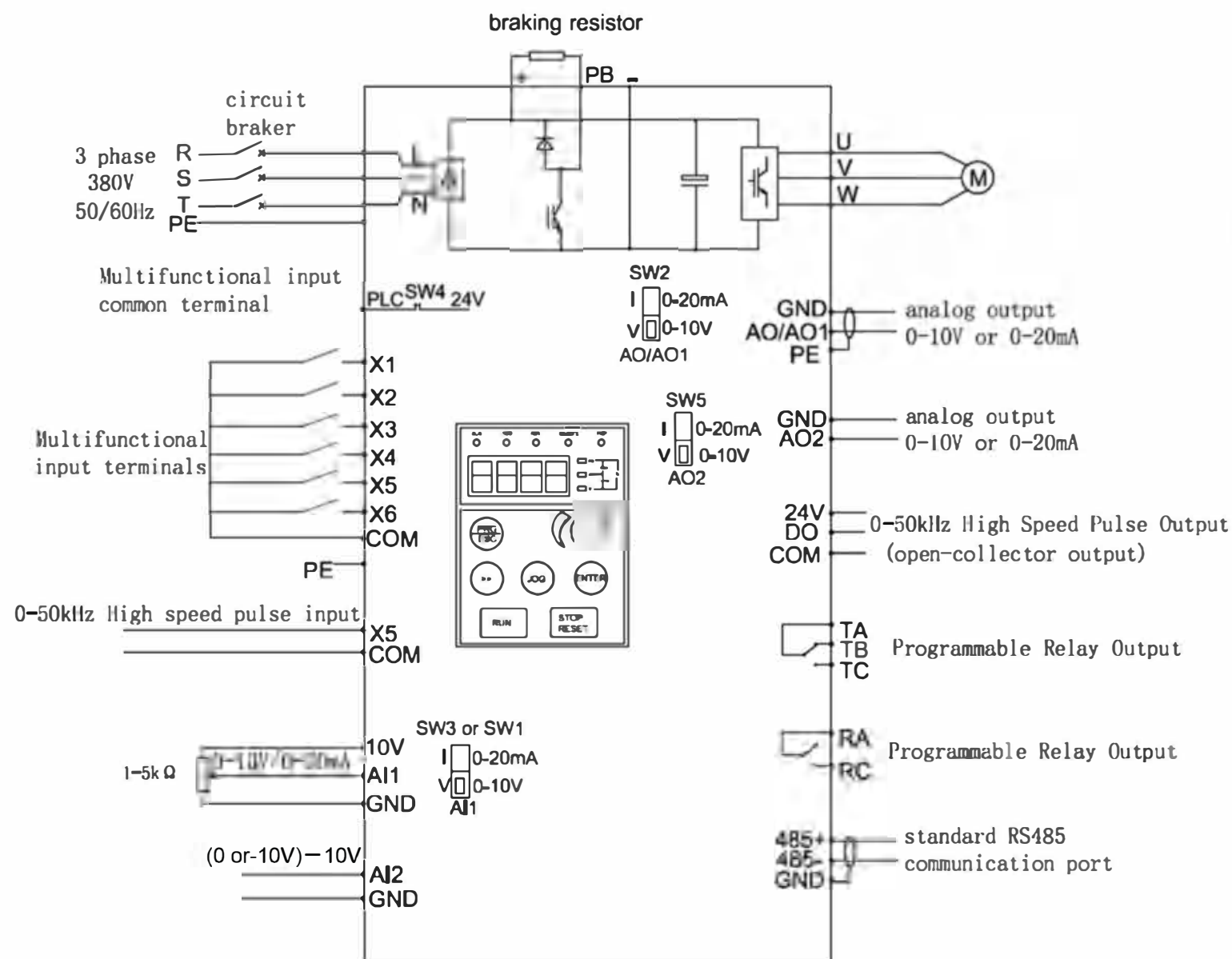


### • Current wave form in 0.2Hz low frequency





## » Connecting Diagram



## » Technical Specification




| Item                                       | Specification   |
|--|---|
| Rated input voltage and frequency          | Three phase: 380-440V 50/60Hz   |
| Allowable input voltage range              | Three phase 380V: 304-456V, voltage imbalance rate less than 3%, frequency imbalance rate less than $\pm 5\%$   |
| Rated output voltage                       | 0~Rated input voltage   |
| Maximum overload current                   | G-type: 150% for 1 minute, 180% for 20 seconds;<br>P-type: 120% for 1 minute, 150% for 1 second.  |
| Control mode                               | V/F control mode or Current vector control  |
| Frequency control range                    | Low frequency mode: 0.00~650.00Hz;<br>High frequency mode: 0.0~1000Hz(reserve)  |
| Frequency control accuracy                 | Digital setting: $\pm 0.01\%$ ( $-10^{\circ}\text{C}\sim+40^{\circ}\text{C}$ )<br>Analog setting: $\pm 0.01\%$ ( $15^{\circ}\text{C}\sim35^{\circ}\text{C}$ )   |
| Set frequency resolution                   | Digital setting: 0.01Hz;<br>Analog setting: 1/1000 maximum frequency  |
| Output frequency resolution                | 0.01Hz  |
| Frequency analog setting signal            | 0~10V, 0~20mA   |
| Acceleration and deceleration time         | 0.1~3600 seconds (acceleration and deceleration time are independently set)   |
| Braking torque                             | Up to 125% with additional braking resistor   |
| Voltage/frequency characteristics          | 4 fixed V/F characteristics can be selected and any V/F characteristics can be set, with PG V/F control   |
| Protection function                        | Overvoltage, undervoltage, current limiting, overcurrent, overload, electronic thermal relay, overheating, overvoltage stall, load short circuit, grounding, input phase loss, output phase loss, short circuit to ground or between phases, motor overload protection, etc |
| Operating ambient temperature and humidity | $-10^{\circ}\text{C}\sim+40^{\circ}\text{C}$ ; 5-95% RH (without condensation)  |
| Storage temperature                        | $-40^{\circ}\text{C}\sim+70^{\circ}\text{C}$  |
| Working condition                          | Indoor (without corrosive gases);At an altitude of no more than 1000 meters, free from dust, corrosive gases, and direct sunlight.  |
| Vibration limitation                       | Less than $5.9\text{m/s}^2$ (0.6g)  |
| Ingress Protection                         | IP20 at least   |



## » Specification and Parameter

| Series     | Model            | Input Voltage   | Power capacity (kVA) | Input current (A) | Output current (A) | Matching Motor Power (kW) |
|------------|------------------|---|----------------------|-------------------|--------------------|---------------------------|
| ALPHA6000M | S2R4GB           | Single-Phase 220V<br>50/60Hz: 176~264V,<br>frequency imbalance<br>rate < ±5%                                | 1                    | 5.1               | 2.4                | 0.4                       |
|            | S2R75GB          |   | 1.7                  | 9.2               | 4.5                | 0.75                      |
|            | S21R5GB          |   | 2.8                  | 13.1              | 7                  | 1.5                       |
|            | S22R2GB          |   | 4                    | 23                | 10                 | 2.2                       |
| ALPHA6000E | 3R75GB/31R5PB    | Three-phase 380V<br>50/60Hz: 304~456V,<br>voltage imbalance<br>rate < 3%, frequency<br>imbalance rate < ±5% | 1.6/3.2              | 3.7/5.4           | 2.5/4              | 0.75/1.5                  |
|            | 31R5GB/32R2PB    |   | 3.2/4.8              | 5.4/7             | 4/6                | 1.5/2.2                   |
|            | 32R2GB/3004PB    |   | 4.8/6                | 7/10.7            | 6/9                | 2.2/4                     |
|            | 3004GB/35R5PB    |   | 6/8.6                | 10.7/15.5         | 9/13               | 4/5.5                     |
|            | 35R5GB/37R5PB-N  |   | 8.6/11.2             | 15.5/20.5         | 13/17              | 5.5/7.5                   |
|            | 37R5GB/3011PB    |   | 11.2/17              | 20.5/26           | 17/25              | 7.5/11                    |
|            | 3011GB/3015PB-SJ |   | 17/21                | 26/35             | 25/32              | 11/15                     |
|            | 3015GB/3018PB-SJ |   | 21/24                | 35/38.5           | 32/37              | 15/18.5                   |
|            | 3018GB/3022PB-SJ |   | 24/30                | 38.5/46.5         | 37/45              | 18.5/22                   |
|            | 3022GB-SJ        |   | 30                   | 46.5              | 45                 | 22                        |
|            | 3030P-N          |   | 40                   | 62                | 60                 | 30                        |
|            | 3030G/3037P-N    |   | 40/50                | 62/76             | 60/75              | 30/37                     |
|            | 3037G/3045P-N    |   | 50/60                | 76/92             | 75/90              | 37/45                     |
|            | 3045G/3055P-N    |   | 60/72                | 92/113            | 90/110             | 45/55                     |
|            | 3055G/3075P-N    |   | 72/100               | 113/157           | 110/152            | 55/75                     |
|            | 3075G/3093P-N    |   | 100/116              | 157/180           | 152/176            | 75/93                     |
|            | 3093G/3110P-N    |   | 116/138              | 180/214           | 176/210            | 93/110                    |
|            | 3110G/3132P-N    |   | 138/167              | 214/256           | 210/253            | 110/132                   |
|            | 3132G-N          |   | 167                  | 256               | 253                | 132                       |
|            | 3160P-N          |   | 200                  | 307               | 304                | 160                       |
|            | 3160G/3185P-N    |   | 200/230              | 307/350           | 304/342            | 160/185                   |
|            | 3185G/3200P-N    |   | 230/250              | 350/385           | 342/380            | 185/200                   |
|            | 3200G/3220P-N    |   | 250/280              | 385/430           | 380/426            | 200/220                   |
|            | 3220G/3250P-N    |   | 280/320              | 430/500           | 426/480            | 220/250                   |
|            | 3250G/3280P-N    |   | 320/342              | 500/548           | 480/520            | 250/280                   |
|            | 3280G/3315P-N    |   | 342/395              | 548/625           | 520/600            | 280/315                   |
|            | 3315G/3355P-N    |   | 395/445              | 625/710           | 600/680            | 315/355                   |
|            | 3355G/3400P-N    |   | 445/500              | 710/760           | 680/750            | 355/400                   |
|            | 3400G/3450P-N    |   | 500/565              | 760/830           | 750/820            | 400/450                   |
|            | 3450G/3500P-N    |   | 565/625              | 830/910           | 820/900            | 450/500                   |
|            | 3500G/3560P-N    |   | 625/690              | 910/970           | 900/950            | 500/560                   |
|            | 3560G/3630P-N    |   | 690/765              | 970/1070          | 950/1050           | 560/630                   |
|            | 3630G-N          |   | 765                  | 1070              | 1050               | 630                       |

## » Spare Parts

| Serial No | Part Name                 | Mode No                            | Description  | Picture   |
|-----------|---------------------------|------------------------------------|--|---|
| 1         | Remote control box        | KB6-LED08(big)<br>KB6-LED11(small) | Optional keyboard, internal extra CPU, support parameter upload and download, improved anti-interference ability |  |
| 2         | Key board extension cable | KB6-C020A                          | Extend the cable of keyboard   |  |
| 3         | Extension tray            | 635MP03-A(big)<br>631MP08-A(small) | Fix the keyboard on the door when extension needed   |  |

### • Optional Functions

- Revolving speed tracking function**  
 Machine that with power of 35R5GB/37R5PB or above could be equipped with this function, make remark when place order.
- High-power built-in braking unit**  
 Optional built-in braking unit for machine that with power 3030G,3030P-3132G,3132P. Make remarks when placing order and add B after the model number.

### • Braking electric resistance and power chart

| Voltage (V)       | Motor Power (kW) | Resistance Value (Ω) | Resistance Power (kW) | Voltage (V)      | Motor Power (kW) | Resistance Value (Ω) | Resistance Power (kW) |
|-------------------|------------------|----------------------|-----------------------|------------------|------------------|----------------------|-----------------------|
| Single-phase 220V | 0.4              | 200                  | 0.1                   | Three-phase 380V | 75               | 13.6/2               | 18                    |
|                   | 0.75             | 150                  | 0.2                   |                  | 93               | 20/3                 | 18                    |
|                   | 1.5              | 100                  | 0.4                   |                  | 110              | 20/3                 | 18                    |
|                   | 2.2              | 75                   | 0.5                   |                  | 132              | 20/4                 | 24                    |
| Three-phase 380V  | 0.75             | 300                  | 0.4                   |                  | 160              | 13.6/4               | 36                    |
|                   | 1.5              | 300                  | 0.4                   |                  | 185              | 13.6/4               | 36                    |
|                   | 2.2              | 200                  | 0.5                   |                  | 200              | 13.6/5               | 45                    |
|                   | 4                | 200                  | 0.5                   |                  | 220              | 13.6/5               | 45                    |
|                   | 5.5              | 100                  | 0.8                   |                  | 250              | 13.6/5               | 45                    |
|                   | 7.5              | 75                   | 0.8                   |                  | 280              | 13.6/6               | 54                    |
|                   | 11               | 50                   | 1                     |                  | 315              | 13.6/6               | 54                    |
|                   | 15               | 40                   | 1.5                   |                  | 355              | 13.6/7               | 63                    |
|                   | 18.5             | 30                   | 4                     |                  | 400              | 13.6/8               | 72                    |
|                   | 22               | 30                   | 4                     |                  | 450              | 13.6/8               | 81                    |
|                   | 30               | 20                   | 6                     |                  | 500              | 13.6/8               | 90                    |
|                   | 37               | 16                   | 9                     |                  | 560              | 13.6/8               | 100                   |
|                   | 45               | 13.6                 | 9                     |                  | 630              | 13.6/8               | 110                   |
|                   | 55               | 20/2                 | 12                    |                  |                  |                      |                       |



## • Keyboard



Keyboard installation measurement chart (mm)

| Specifications                                  | w      | d        |
|---|--------|----------|
| 6000M-S2R4GB ~ S22R2GB<br>6000E-3R75GB ~ 3004GB | 49±0.2 | 76.5±0.2 |
| 6000E-35R5GB/37R5PB and above                   | 61±0.2 | 96.5±0.2 |

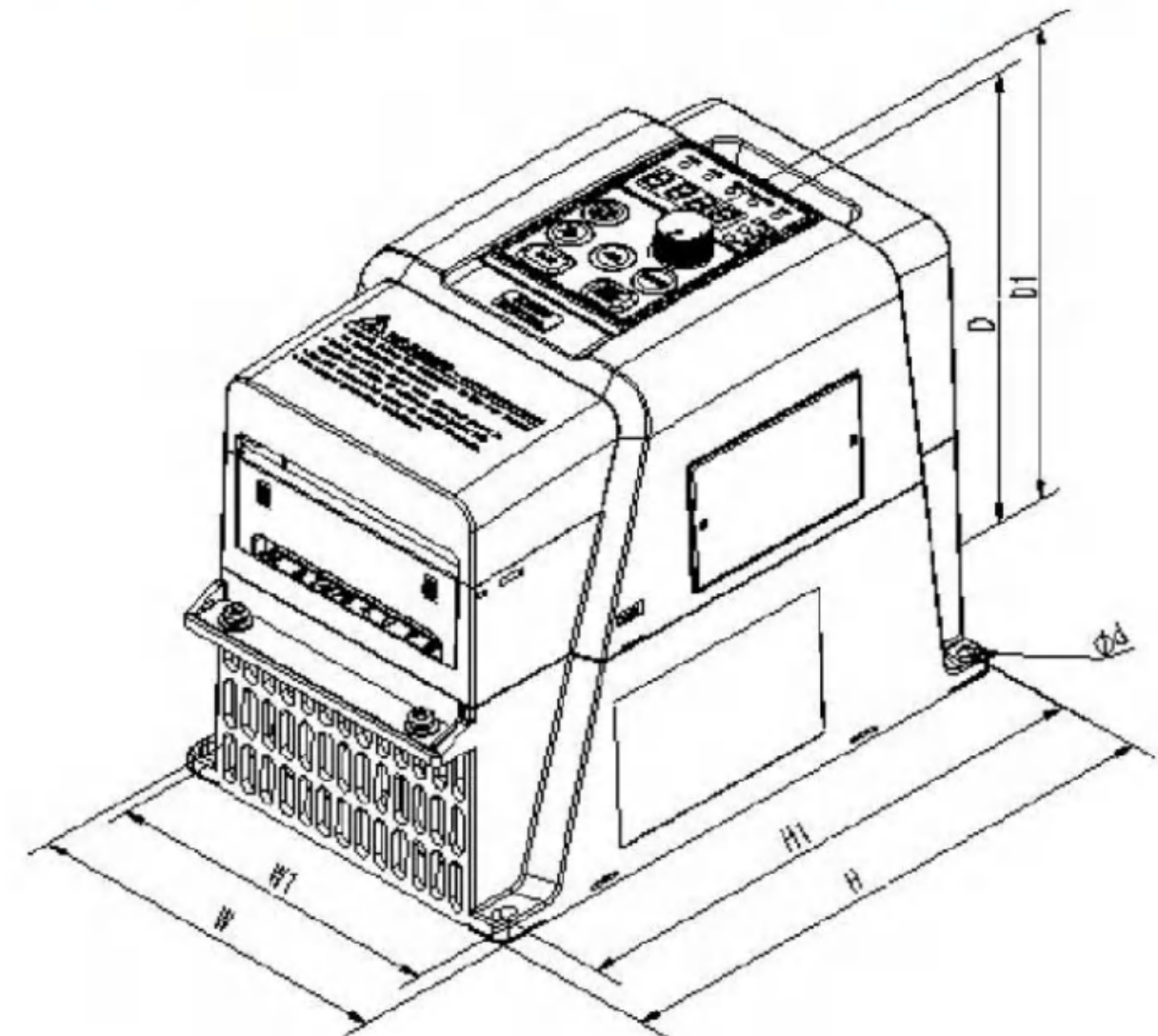
Remark:  
There are 2 types of keyboard with same size : normal keyboard and remote control box.

## • Keyboard Tray



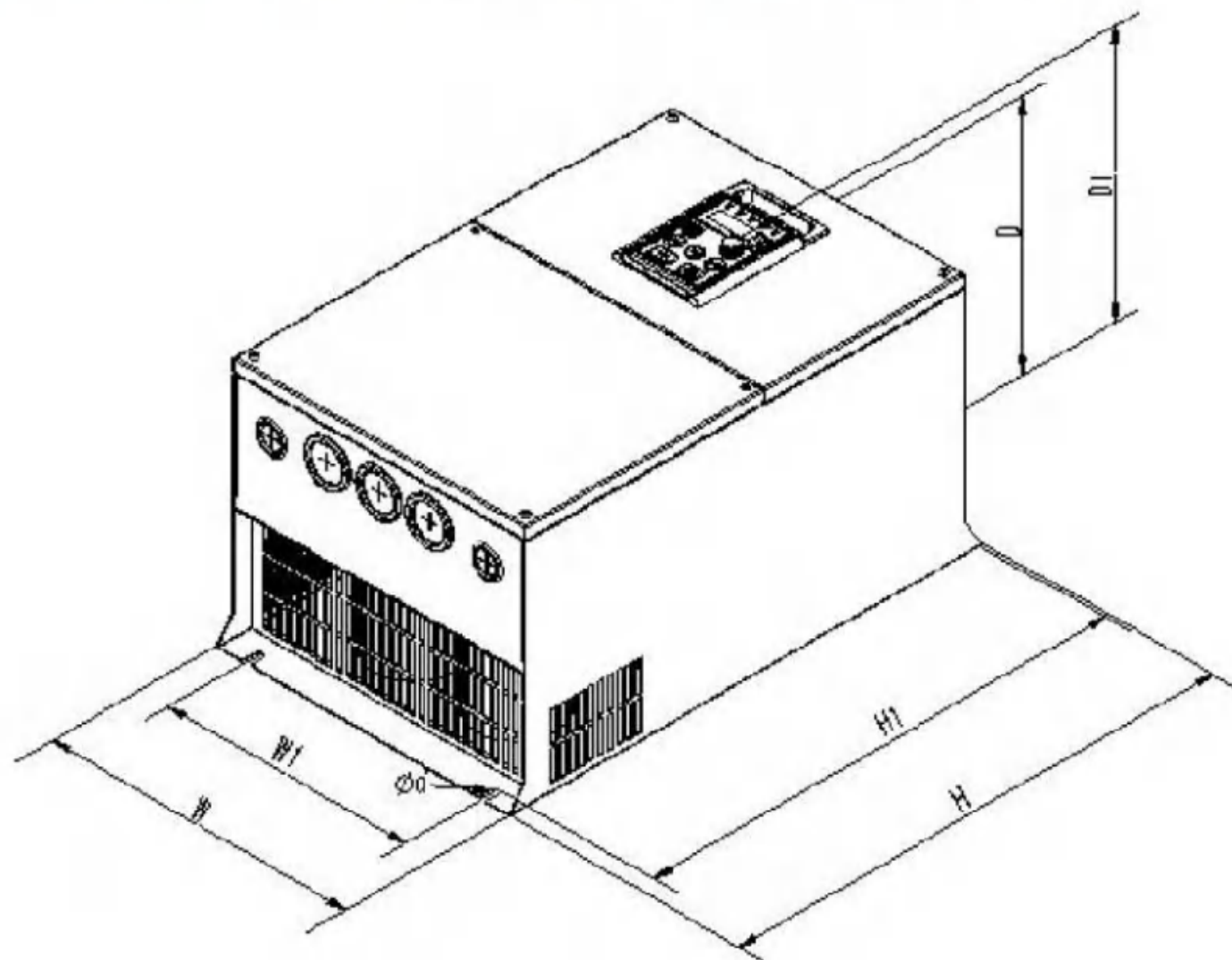
Extension tray  
installation size (mm)

## » Appearance Size and Installation Size



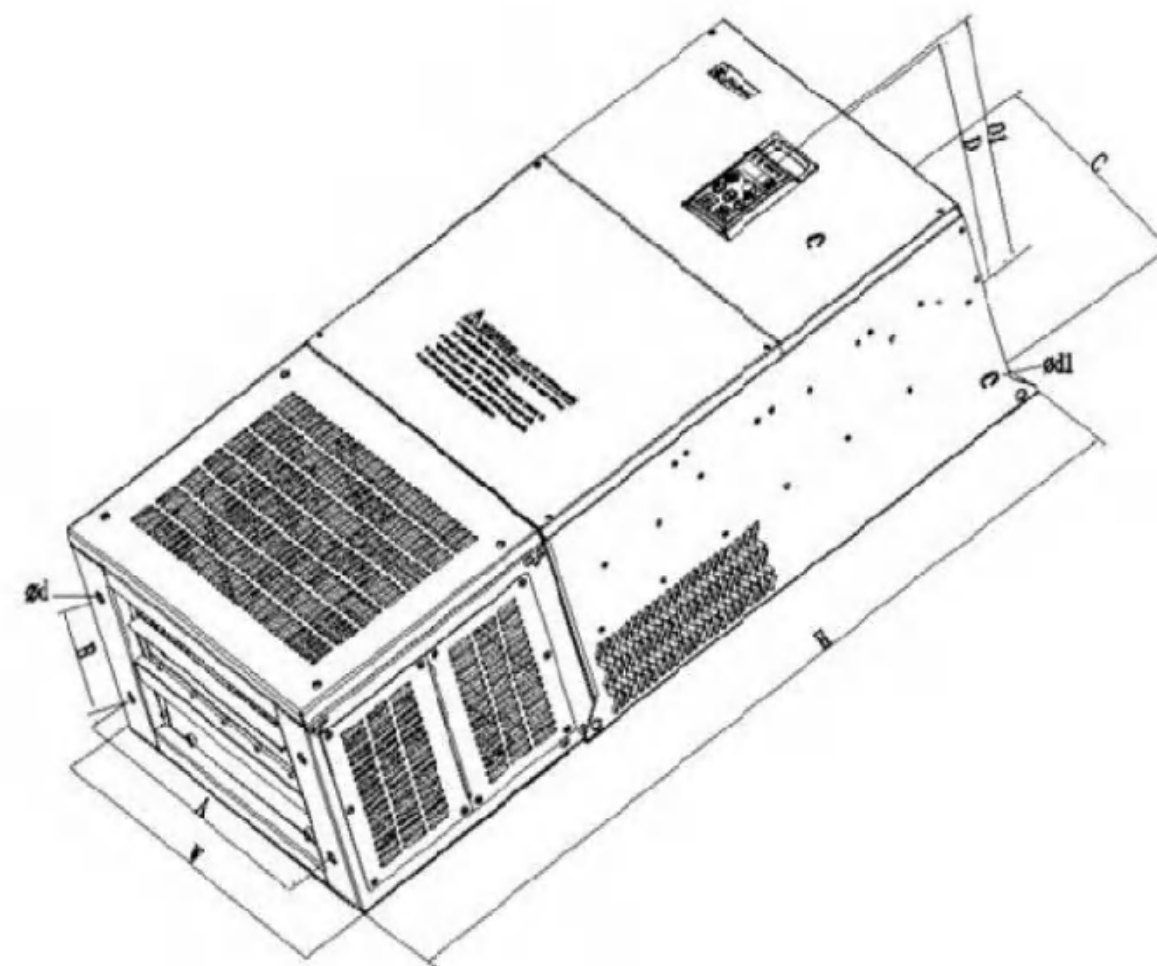
| Model  | H   | H1  | W   | W1  | D   | D1  | d   |
|--|-----|-----|-----|-----|-----|-----|-----|
| S2R4GB~S2R75GB                                 | 145 | 135 | 90  | 82  | 125 | 135 | 4.5 |
| S21R5GB~S22R2GB<br>3R75GB/31R5PB~32R2GB/3004PB | 185 | 175 | 120 | 110 | 150 | 160 | 4.5 |
| 3004GB/35R5PB~35R5GB/37R5PB-N                  | 195 | 182 | 130 | 119 | 162 | 172 | 4.5 |
| 37R5GB/3011PB~3011GB/3015PB-SJ                 | 255 | 238 | 180 | 166 | 174 | 183 | 7   |
| 3015GB/3018PB-SJ~3022GB-SJ                     | 295 | 284 | 180 | 135 | 210 | 220 | 6   |

## » Appearance Size and Installation Size



| Model                         | H   | H1  | W   | W1  | D   | D1  | d  |
|-------------------------------|-----|-----|-----|-----|-----|-----|----|
| 3030P-N ~ 3037G/3045P-N       | 460 | 440 | 285 | 230 | 188 | 203 | 8  |
| 3045G/3055P-N ~ 3055G/3075P-N | 535 | 512 | 320 | 180 | 231 | 250 | 8  |
| 3075G/3093P-N ~ 3093G/3110P-N | 560 | 542 | 375 | 245 | 274 | 292 | 8  |
| 3110G/3132P-N ~ 3132G-N       | 657 | 630 | 458 | 338 | 285 | 303 | 10 |
| 3160P-N ~ 3200G/3220P-N       | 809 | 783 | 520 | 420 | 360 | 378 | 10 |

## » Appearance Size and Installation Size



| Model                         | H    | W    | D   | D1  | A     | B   | C       | Φd | Φd1 |
|-------------------------------|------|------|-----|-----|-------|-----|---------|----|-----|
| 3220G/3250P-N ~ 3250G/3280P-N | 1274 | 620  | 385 | 404 | 550.5 | 239 | 420     | 14 | 12  |
| 3280G/3315P-N ~ 3400G/3450P-N | 1607 | 800  | 412 | 430 | 732   | 266 | 300+300 | 14 | 12  |
| 3450G/3500P-N ~ 3630G-N       | 1800 | 1000 | 480 | 498 | 900   | 300 | /       | 22 | /   |