# H110Series Inverter

--Special for carving machine

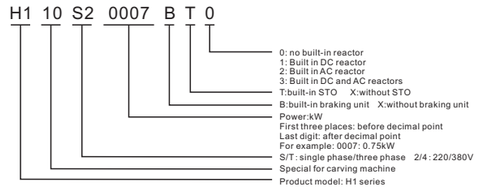
**USER MANUAL**

## NO.1 Product introduction

### 1. 1 Technical Features

| | Items | Description |
|---|---|---|
| input | Rated voltage /frequency | 3ph: 380V~440V , 50Hz/60Hz<br>1ph: 200V~240V , 50Hz/60Hz |
| | Allowed voltage | 3ph: 320V~460V ; 1ph: 180V~260V;<br>voltage Imbalance rate: <3% ; frequency: ±5% |
| output | Voltage | 0~rated input voltage |
| | Frequency | 0Hz~1000Hz |
| | Overload capacity | 120% rated current 1 minute |
| control performance | Control mode | V/F、SVC |
| | Modulation Mode | SVPWM |
| | Motor type | asynchronous motor、synchronour motor<br>single phase motor (consult factory before using) |
| | Start torque | 1Hz/150% |
| | Speed range | 1:100(SVC) |
| | Frequency accuracy | digital setting: maximum frequency±0.01%;<br>anolog setting: maximum frequency±1%; |
| | Frequency resolution | digital setting: 0.1Hz;<br>anolog setting: maximum frequency±1%; |
| | Acceleration/ deceleration curve | line/ S-curve |
| | Rapid current limit | limit current rapidly within the current protection value, to ensure the safety of the equipment |
| | None-stop when instantaneous power off | none-stop when instantaneous power off, automatic frequency drop |
| Operation function | Command source | keypad, terminal, communication |
| | Set value source | digital, analog,multi-speed,communication |
| Operation panel | LED display | Can display: output frequency,output voltage,output current , Bus voltage , display value 1 , display value 2, error, alarm |
| | External keypad | YES |
| Protection function | | over-current protection、over-voltage protection、under-voltage protection、overheating protection、over-load protection、phase lose protection、earth leakage, etc |
| Environment | Store enviornment | indoor, away from direct sunlight, no dust, no corrosive gas, no inflammable gas, no oil mist, no vapour, no drip and no salinity, etc |
| | Altitude | derating use abouve 1000M, derating 10% per 1000M |
| | Environment temperature | -10℃~+40℃(environment temperature around 40℃~50℃please derating use) |
| | Humidity | 5%~95%RH, no condensation |
| | Store temperature | -40℃~+70℃ |
| | Vibration | <5. 9M/S (0.6g) |

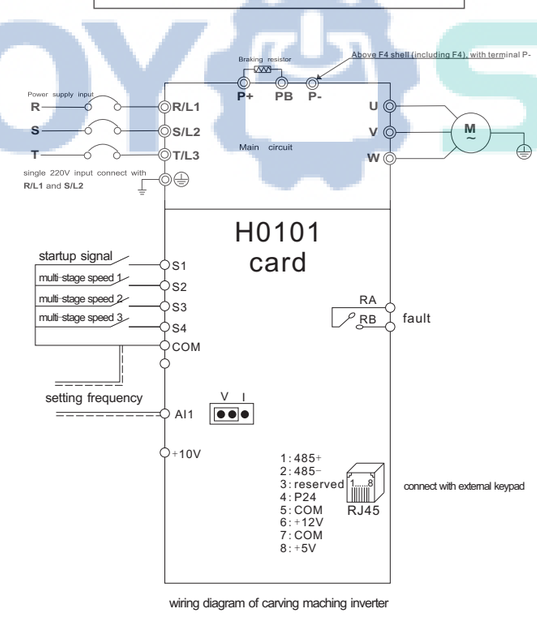
### 1.2 H110 nameplate




### 1.3 H110 series specifications and models

| Base.No | Models | Input voltage | input current (A) | Power (kW) | output current (A) | Adaptive motor (kW) |
|---|---|---|---|---|---|---|
| F1 | H110S20015BX0 | 1 phase 220V | 8.2 | 1.5 | 7.0 | 1.5 |
| | H110S20022BX0 | 1 phase 220V | 14.0 | 2.2 | 12.5 | 2.2 |
| F2 | H110T20037BX0 | 1 phase 220V | 23.0 | 3.7 | 15.2 | 3.7 |
| | | 3 phase 220V | 13.5 | | | |
| F3 | H110T20055BX0 | 1 phase 220V | 38.6 | 5.5 | 23 | 5.5 |
| | | 3 phase 220V | 16.5 | | | |
| | H110T20075BX0 | 3 phase 220V | 37 | 7.5 | 31 | 7.5 |
| F4 | H110T20110BX0 | 3 phase 220V | 52 | 11 | 45 | 11 |
| | H110T20150BX0 | 3 phase 220V | 68 | 15 | 58 | 15 |
| F1 | H110T40015BX0 | 3 phase 380V | 5.8 | 1.5 | 3.7 | 1.5 |
| | H110T40022BX0 | 3 phase 380V | 6.5 | 2.2 | 5.0 | 2.2 |
| | H110T40030BX0 | 3 phase 380V | 12.6 | 3.0 | 7.0 | 3.0 |
| F2 | H110T40040BX0 | 3 phase 380V | 14 | 4.0 | 10.5 | 4.0 |
| | H110T40055BX0 | 3 phase 380V | 16 | 5.5 | 13 | 5.5 |
| F3 | H110T40075BX0 | 3 phase 380V | 21 | 7.5 | 18 | 7.5 |
| | H110T40110BX0 | 3 phase 380V | 28 | 11 | 24 | 11 |
| F4 | H110T40150BX0 | 3 phase 380V | 36 | 15 | 30 | 15 |

## NO.2 Wiring diagram for carving machine inverter




wiring diagram of carving maching inverter

### 2. 1 Main circuit terminal description

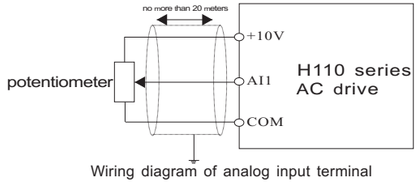
| Terminal identification | Name | Function description |
|---|---|---|
| ⏚ | Grounding terminal | Safety grounding |
| R/L1、S/L2、T/L3 | Main circuit power input terminal | Connect three phase power supply, single phase power supply connect to R/L1, S/L2 |
| P+、PB | Braking terminal | Connect to external braking resistor |
| P+、P- | DC bus terminal | Two sets or more inverters use a common DC bus (Above F4 shell (including F4), with terminal P-) |
| U、V、W | output terminl | Connect to three phase motor |

### 2.2 Control terminal specification

| Terminal identification | Name | Function description |
|---|---|---|
| +10V | 10Vpower supply | Provide + 10V power supply to the outside, and the maximum output current is 50mA |
| AI1 | Analog input terminal | 1. input voltage rang: DC 0V~10V<br>2. Input current range: 0~20mA<br>3. Select voltage or current through SW1 jumper |
| COM | digit, analog ground | Isolate the internal from the communication ground GND |
| S1~S4 | Digital input terminal | 1. Optocoupler isolation<br>2. Input impedance: 2.4k Ω<br>3. Voltage range at level input: 9V~30V |
| RA RB | relay output | 1. Resistive load: 250VAC 3A/30VDC 3A<br>2. inductive load: 250VAC 0.2A/24VDC 0.1A(cos $\phi$ =0.4) |
| RJ45 | Network port | The keyboard can be led out or connected to the upper computer |

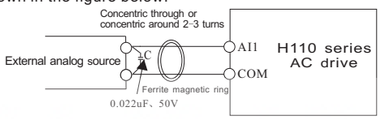
### 2. 3 Analog wiring

Because weak analog voltage signals are particularly vulnerable to external interference, shielded cables are generally required, and the wiring distance shall be as short as possible, not more than 20 meters. As shown below:



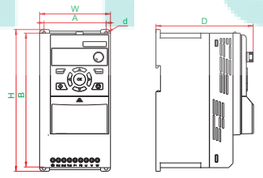

Wiring diagram of analog input terminal

When some analog signals are seriously disturbed, filter capacitors or ferrite magnetic cores need to be added to the analog signal source side. As shown in the figure below:




Wiring diagram of analog input terminal plus filter processing

## NO.3 Product Dimension




| Framework | H110 Series Dimensions(mm) | | | | | |
|---|---|---|---|---|---|---|
| | W(Width) | H(Height) | D(Depth) | A | B | d |
| F1 | 85 | 170 | 124 | 67.3 | 158 | 5 |
| F2 | 97 | 194 | 133 | 85 | 184 | 5 |
| F3 | 126 | 237 | 147 | 112 | 223 | 5 |
| F4 | 168 | 298 | 160 | 154 | 283 | 6 |

## NO.4 Keypad description

### 4. 1 Keypad appearance and keypad explanation

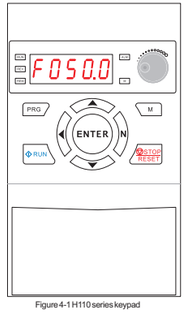



Figure 4-1 H110 series keypad

| Item | Structure | Function description |
|---|---|---|
| 1 | F050.0 | Display |
| 2 | PRG | Program/exit |
| 3 | ◀ | Status diaplay interface work as status switch key;other interface work as left shift key |
| 4 | N | Reserved key |
| 5 | RUN | RUN |
| 6 | | Potentiometer: refer to parameter P01.63 |
| 7 | ▲ | In the mode of program, work as value change key; otherwise, UP/DOWN key, refer to parameter P01.63,P02.03,P02.04 |
| 8 | ▼ | |
| 9 | ENTER | Enter |
| 10 | STOP RESET | STOP/RESET |
| 11 | M | Customization key |

### 4. 2 Indicator light description

| Indicator light | Status | Function description |
|---|---|---|
| RUN | light on/ flickering | operating /decelerating |
| REV | light on | reverse operation |
| REM | light on | remote start stop |
| ALM | light on | fault indication |
| M | light on | S1 terminal start indication |

### 4. 3 Display item description

| Display code | Item description |
|---|---|
| F | output frequency |
| C | output current |
| U | output voltage |
| d | DC bus voltage |
| H | Setting frequency |
| t | Customized display |
| A | current alarm |
| E | current fault |

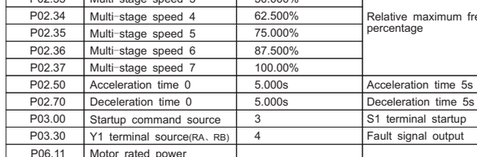
## NO.5 Carving machine wiring diagram

The application macro has been set for the special AC drive of H110 series carving machine when leaving the factory. The user only needs to set the maximum frequency (P02. 18), motor rated power (P06. 11), rated voltage (P06. 12), rated frequency P06. 13), rated current (P06. 14) and rated speed (P12. 06) according to the motor nameplate. When leaving the factory, the motor parameters are 400Hz and 24000rpm.

Macro setting steps: stop the operation of the AC drive and restore the factory value P01.11 = 2, set the application macro P01.20=84. Finally, set the motor and other parameters.

The speed regulation of carving machine is divided into analog speed regulation and multi-stage speed regulation. The wiring diagram and parameter table of the two control modes are as follows:

### 5.1 Analog control parameter table

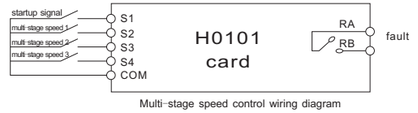



Analog control wiring diagram

Analog control parameter table

| Parameter No. | Function | setting value | description |
|---|---|---|---|
| P01.20 | application macro | 84 | carving machine macro |
| P02.18 | Max. Setting frequency | 400.000Hz | Max.Frequency 400. 00Hz |
| P02.50 | acceleration time 0 | 5.000s | acceleration time 5S |
| P02.70 | deceleration time 0 | 5.000s | deceleration time 5S |
| P03.00 | startup command source | 3 | S1 terminal startup |
| P03.30 | Y1 terminal source(RA, RB) | 4 | fault signal output |
| P03.42 | Ai1 high level voltage (current) | 9.800V(mA) | Maximum voltage/current of input signa |
| P06.11 | motor rated power | set according to motor nameplate | reference to motor nameplate |
| P06.12 | motor rated voltage | | |
| P06.13 | motor rated frequency | | |
| P06.14 | motor rated current | | |
| P12.06 | motor rated speed | | |

### 5. 2 Multi-stage speed control wiring diagram and parameter table




Multi-stage speed control wiring diagram

Multi-stage speed control parameter table

| Parameter NO. | Function | setting value | description |
|---|---|---|---|
| P01.20 | Application macro | 84 | Carving machine macro |
| P02.18 | Max. Setting frequency | 400.000Hz | Max. Frequency 400. 00Hz |
| P02.31 | Multi-stage speed 1 | 25.000% | Relative maximum frequency percentage |
| P02.32 | Multi-stage speed 2 | 37.500% | |
| P02.33 | Multi-stage speed 3 | 50.000% | |
| P02.34 | Multi-stage speed 4 | 62.500% | |
| P02.35 | Multi-stage speed 5 | 75.000% | |
| P02.36 | Multi-stage speed 6 | 87.500% | |
| P02.37 | Multi-stage speed 7 | 100.00% | |
| P02.50 | Acceleration time 0 | 5.000s | Acceleration time 5s |
| P02.70 | Deceleration time 0 | 5.000s | Deceleration time 5s |
| P03.00 | Startup command source | 3 | S1 terminal startup |
| P03.30 | Y1 terminal source(RA, RB) | 4 | Fault signal output |
| P06.11 | Motor rated power | Set according to motor nameplate | reference to motor nameplate |
| P06.12 | Motor rated voltage | | |
| P06.13 | Motor rated frequency | | |
| P06.14 | Motor rated current | | |
| P12.06 | Motor rated speed | | |

## Multi stage speed comparison table

| S4 | S3 | S2 | Effective multi-stage speed | Apply macro setting frequency |
|---|---|---|---|---|
| 0 | 0 | 1 | Multi-stage speed 1 | 100Hz |
| 0 | 1 | 0 | Multi-stage speed 2 | 150Hz |
| 0 | 1 | 1 | Multi-stage speed 3 | 200Hz |
| 1 | 0 | 0 | Multi-stage speed 4 | 250Hz |
| 1 | 0 | 1 | Multi-stage speed 5 | 300Hz |
| 1 | 1 | 0 | Multi-stage speed 6 | 350Hz |
| 1 | 1 | 1 | Multi-stage speed 7 | 400Hz |

0: means S terminal no signal
1: means S terminal has signal

## NO.6 Carving machine parameter table

| Function code | Function | Description (setting range) | Factory default |
|---|---|---|---|
| P01.11 | Parameter operation | 0. Normal operation<br>1. Parameter initialization, initialized parameters except P1. XX<br>2. Initialize all parameters | 0 |
| P01.41 | local address | 0~247<br>⊙Function: set local address of AC drive | 1 |
| P01.42 | Baud rate | 0:2400bps 1:4800bps<br>2:9600bps 3:19200bps<br>4:38400bps 5~10:reserved<br>⊙Function: Communication port configuration | 3 |
| P01.43 | Parity check | 0. No check<br>1. Even parity check<br>2. Odd check<br>⊙function: Communication port configuration | 0 |
| P01.44 | Data bit | 7~8<br>⊙function: Communication port configuration | 8bits |
| P01.45 | Stop bit | 0.0~2.0<br>⊙function: Communication port configuration | 1.0bit |
| P02.00 | Multi-stage speed source | 0~11111111<br>units: S1<br>tens: S2<br>hundreds' digit: S3<br>thousands' digit: S4<br>...<br>(S4 S3 S2 — Effective multi stage: 000 Multi-stage speed 0; 001 Multi-stage speed 1; 010 Multi-stage speed 2; 011 Multi-stage speed 3; 100 Multi-stage speed 4; 101 Multi-stage speed 5; 110 Multi-stage speed 6; 111 Multi-stage speed 7)<br>* P02.00: multi-stage speed source, select corresponding external terminal, multi-stage speed 0~ 7 refer to P02. 30~P02. 37<br>* Example: select S2, S3 and S4 as effective external terminals to control multi-stage speed, P02. 00 is set to 1110, and the specific 8-stage speed correspondence is shown in the table above: | 1110 |
| P02.10 | Setting (frequency) source F1 | 0: key board<br>1. multi-stage speed<br>2:AI1<br>3:AI2<br>5:communication<br>key board setting source: P01. 63<br>0: key board digital set<br>1: key board potentiometer set | 1 |
| P02.18 | Max. Setting value | 0.000~99999.000<br>* Principle explanation:<br>limit the range of setting value. When each setting source is in%, the maximum setting value (P02. 18) represents 100%, means the maximum setting value is takenas the benchmark. | 400.000Hz |
| P02.24 | Jog frequency | - 1000.000%~1000.000%<br>Function: set jog frequency, jog command refers to P03. 03 | 10.000% |
| P02.30 | Multi-stage speed 0 | - 1000.000%~1000.000%<br>Function: multi0stage setting, relative P02.18 Maximum set percentage | 0.000% |
| P02.31 | Multi-stage speed 1 | | 25.000% |
| P02.32 | Multi-stage speed 2 | | 37.500% |
| P02.33 | Multi-stage speed 3 | | 50.000% |
| P02.34 | Multi-stage speed 4 | | 62.500% |
| P02.35 | Multi-stage speed 5 | | 75.000% |
| P02.36 | Multi-stage speed 6 | | 87.500% |
| P02.37 | Multi-stage speed 7 | | 100.00% |
| P02.50 | Acceleration time | 0.050s~3600.000s<br>* Principle explanation:<br>As shown in the figure, the acceleration time refers to the acceleration from 0Hz to P06. 13 time required for rated frequency of motor<br>Output frequency<br>P06.13<br>TIME<br>Acceleration time Deceleration time | 5.000s |
| P02.70 | Deceleration time | | |

| Function code | Function | Description (setting range) | Factory default |
|---|---|---|---|
| P03.00 | Startup command source | 0: no effect<br>1. key board<br>2: communication<br>3:S1<br>4:S2<br>5:S3<br>6:S4<br>...<br>Function: select the command source (when the corresponding command source is the key board, the reverse command, jog command and free parking command all come from the key board custom key M)<br>* Reverse startup command: the setting value is reversed and the start command is issued.<br>* Reverse command: the setting value is reversed.<br>* Jog command: jog function. The priority is higher than the start command and lower than the stop command.<br>16 15 14 13 12 11 10 9 8: S14 S13 S12 S11 S10 S9 S8 S7 S6<br>7 6 5 4 3 2 1 0: S5 S4 S3 S2 S1 Communication Key board No effect | 3 |
| P03.01 | Reverse startup command source | | 0 |
| P03.02 | Reverse command source | | 0 |
| P03.03 | Jog command source | | 1 |
| P03.04 | Stop command source | | 0 |
| P03.05 | Free parking command source | | 0 |
| P03.06 | Free parking command source | | 1 |
| P03.30 | Y1 terminal source (RA, RB or RA1, RB1) | 0: always 0<br>1: always 1<br>2: stopped already<br>3: running<br>4: fault<br>5: alarm<br>6: reversing<br>7: ready<br>1350: running at 0 speed<br>1351: frequency arrived<br>Note: Only when setting carving machine application macro, 1350 and 1351 are valid. | 4 |
| P03.32 | Y2 terminal source (RA2, RB2) | | 1351 |
| P03.34 | Y3 terminal source (RA3, RB3, RC3) | | 1350 |
| P03.41 | AI1 low end voltage (current) | - 999999.000~999999.000<br>⊙function: analog input AI1 setting<br>*AI1 low end voltage(current): set minimum voltage(current) of input signal .<br>*AI1 high end voltage(current): set Max. Voltage (current) of input signal.<br>*AI1 low end setting: set the corresponding value of low-end voltage.<br>*AI1 high end setting: set the corresponding value of high-end voltage.<br>Range setting<br>AI1 high-end setting P03.44<br>AI1 terminal setting<br>AI1 low end setting P03.43<br>0 P03.41 P10.71 P03.42 voltage(current) input<br>AI1 low end voltage (current) AI1 terminal input AI1 high end voltage (current) | 0.200V(mA) |
| P03.42 | AI1 high end voltage (current) | | 9.800V(mA) |
| P03.43 | AI1 low end setting | | 0.000% |
| P03.44 | AI1 high end setting | | 100.00% |
| P05.00 | Control mode | 0:VF<br>1:vector control<br>function: Select motor control algorithm | 1 |
| P05.20 | Stop function | units: 0: free parking; 1: DC braking<br>Tens: 1. Precise parking<br>* Principle explanation:<br>During the stop process, when the output frequency is less than the stop frequency, the stop function starts to work.<br>Precise parking: when parking at any speed, the number of motor turns is the same, so as to realize the one-to-one repeatability of parking position.<br>To achieve the best results, the deceleration time shall be extended as far as possible without triggering the over voltage and over current stall prevention function. | 1 |
| P05.21 | Stop frequency | 0.000Hz~1000.000Hz<br>The explanation refers to P05.20 | 10.000Hz |
| P05.22 | DC braking current | 0.000%~300.000%<br>Set the current of DC braking | 100.000% |
| P05.23 | DC braking time | 0.000s~1000.000s<br>When it is set to 1000.000, keep braking until the free stop or startup signal is received. | 1.000s |
| P06.05 | Carry frequency | 2kHz~16kHz<br>⊙Function: Set carry frequency | *kHz |
| P06.11 | Motor rated power | 0.000kW~100000.000kW<br>⊙Function: Set motor rated parameter | *kW |
| P06.12 | Motor rated voltage | 0V~1000V<br>⊙Function: Set motor rated parameter | *V |
| P06.13 | Motor rated frequency | 1Hz~3000Hz<br>⊙Function: Set motor rated parameter | 400Hz |
| P06.14 | Motor rated current | 0.00A~1000.00A<br>⊙Function: Set motor rated parameter | *A |
| P10.61 | Current fault | – | 0 |
| P10.62 | Previous fault | – | 0 |
| P10.63 | The first two faults | – | 0 |

| Function code | Function | Description (setting range) | Factory default |
|---|---|---|---|
| P11.10 | Output frequency of current fault | – | 0.0Hz |
| P11.11 | Output current of current fault | – | 0.00A |
| P11.12 | Bus voltage of current fault | – | 0.0V |
| P11.13 | AC drive temperature of current fault | – | 0℃ |
| P11.14 | S terminal status of current fault | – | 0 |
| P11.15 | Y terminal status of current fault | – | 0 |
| P11.16 | Cumulative power on time of current fault | – | 0.000h |
| P12.06 | Motor rated speed | 10rpm~65535rpm<br>⊙Function: Set motor parameter | 24000rpm |

## NO.7 Fault code

| Fault Code | Protection function | Description |
|---|---|---|
| E0001 | system abnormality | AC drive hardware failure or software failure |
| E0004 | ground fault | Abnormal resistance to ground, cause electric leakage |
| E0005 | short circuit to ground | short circuit to ground |
| E0006 | output short circuit | inverter cut off output when inverter output current is 250% larger than inverter rated current. |
| E0007 | output over current | inverter cut off output when inverter output current is 200% larger than inverter rated current. |
| E0008 | DC bus over voltage | inverter cut off output if main circuit DC voltage is higher than 400V(220V motor type) or 800V(380V motor type) when motor decelerates. |
| E0009 | DC bus low voltage | input voltage decrease, inverter cut off output if main circuit DC voltage too low. |
| E0010 | inverter over heat | inverter cut off output if cooling fin is over heat. |
| E0011 | self-learning failure | self-learning parameter wrong or motor abnormal. |
| E0013 | rectifier over heat | rectifier module over heat. |
| E0014 | U phase loss | output U phase loss. |
| E0015 | V phase loss | output V phase loss. |
| E0016 | W phase loss | output W phase loss. |
| E0019 | no motor connect | motor lost connection during operation. |
| E0020 | input phase loss | power input phase loss. |
| E0021 | inverter over load | inverter cut off output when inverter output current ex (120%) 60S |
| E0022 | over torque | motor over torque |
| E0024 | motor over heat | motor temperature is over heat. |
| E0025 | motor over load | inverter cut off output when inverter output current ex (120%) 60S |
| E0026 | current limit | output current exceed setting limit threshold. |
| E0027 | Input power down | The input voltage is lower than the power down standard value (P05.86) |
| E0033 | ST0 | Safe torque output stop function operation |
| E0034 | ST1 | Alarm of ST1 internal circuit diagnosis |
| E0035 | ST2 | Alarm of ST2 internal circuit diagnosis |
| E0036 | ST3 | Alarm of internal circuit diagnosis |
| E0063 | user fault | user defined fault(P03.08) |

Note: The alarm code is compared to the above table,
for example: the keyboard displays "A0025" which means the motor overload alarm.