# Single Phase Power Supply Three-Phase Motor Driver
# User's Manual


## T13-XXXW-12-H

Thank you for choosing this three-phase motoe driver. Please read this manual carefully before use and keep it properly for future reference.

## Preface

In order to give full play to the function of the frequency converter and ensure the safety of users. please read this operation manual in detail. If you find any abnormal phenomenon during use and this situation is not listed in this operation manual, please contact the dealers in various regions or the business personnel of the company, and we will solve the product problem for you in time.

## Instructions For Use

In order to ensure that the user is always in a safe operation state, there are [ dangerllattentionl and other symbols in this manual to remind you of the safety precautions during handling, installation, operation and inspection of the frequency converter. Please cooperate to make the use of the frequency converter safer.

| | |
|---|---|
| ! Danger | Improper operation may cause casualties. |
| ⚠ Attention | Improper operation may cause damage to the frequency converteror mechanical system. |

### ! Danger

- After the frequency converter is powered off, do not touch the circuit board until the red charging indicator on the main board is off.
- Do not implement wiring during power transmission. Do not check the circuit board when the frequency converter is in operation.
- Do not disassemble or change the internal connecting wires or circuit parts of the frequency converter by yourself.
- The grounding terminal of the frequency converter must be properly grounded. 200V class Ⅲ grounding, 400V class special grounding.
- The sales of this product must comply with the provisions of en61800-3. When used at home, this product may cause electromagnetic interference, in which case the user may have to take appropriate measurements.
- When the frequency converter is installed in a large power supply system of more than 600KW (included) or a leading capacitoe is installed on the power side, it may cause a maximum peal current to flow through the power supply to the iput edd, resulting in its failure. In order to prevent this situation, it is recommendeinstall an AC reactor at the power input of the frequency converter to suppress the surge current and protect the frequency converter, which can also improve the power factor at the power supply end.

### ⚠ Attention

- Do not conduct voltage withstand test on the components inside the frequency converter. Semiconductor parts are vulnerable to high voltage breakdown.
- Never connect the output terminals TL (U), T2 (V) and T3 (W) of the frequency converter to the AC power supply.
- The CMOS integrated circuit of the main circuit board of the frequeney converter is easy to be affected and damaged by static electricity. Do not touch the main circuit board.

1. Display Interface

1.1 Description of Display Interface

L1:power indicator, the power indicator is always on. The red LED flashes and the key is locked. L2: the forward rotation indicator is green (FWD), which is always on during operation. The LED flashes when the forward rotation stops. L3: the reversing indicator light is blue (Rev), which is always on during operation, and the LED light flashes when reversing stops. L4: four digit nixie tube display.


## 1.2 Key Function Interpretation

KL: function parameter display key (P-K / shift). Press P-K key to query 1pm module temperature, bus current, bus voltage, motor running speed and motor running frequency.

Shift can be selected and set during shift setting.

K2: set the entry key (menu / ESC). The menu key is the function entry key. The ECS key is the exit key.

K3; save / lock key (save / lock) save: save, lock: lock.
Press and hold K2, K3 and K4 to lock or unlock. No operation on the interface after running for 3 minutes
Dynamic locking.
K4: forward and reverse switching key (FWD / Rev)
KS: speed regulation plus key / data setting plus ( ↑ )
K6: start / stop key / data setting confirmation key (run / stop / OK).
K7: speed regulation decrease key / data setting decrease ( ↓ ).
VR: panel speed regulating potentiometer. Key, external port and Rs485 operation are invalid.

## 2. Function Description

### 2.1 Brief Description of Frequency Converter

The frequency converter is a single-phase 220V voltage input to drive the three-phase motor (be sure to convert the connection method into triangular type). The frequency output is 1.0-99.0hz. In order to improve the output voltage, this product uses SVPWM modulation mode with carrier frequency of 8.0khz. It is applicable to motors below 750W and the maximum output power is 1100W. The frequency converter can arbitrarily change the V / F curve by setting the V / f compensation frequency and setting the voltage ratio at this frequency.

By setting the maximum value of V / F curve, according to the load clearing condition, maximize the use efficiency of electric energy, reduce the heating of motor and prolong the service life of motor and frequency converter.

## 2.2. Internal Parameter Setting

2.2.1 operation interface description

The display contents of functional parameters are as follows:

1. Items that can be queried by KL key

T - XX: displayed as radiator temperature value.

Cx.xx: displays the current current value.

30. X: displayed as DC bus voltage value.

XXXX: displayed as the speed of the motor.

FXX. X: displayed as the operating frequency value.

2. E-x.x: indicates a fault. Refer to the fault code to determine the fault cause.

3. The power indicator flashes on the setting interface and during startup, which means that the machine has successfully communicatcd with the external RS485.

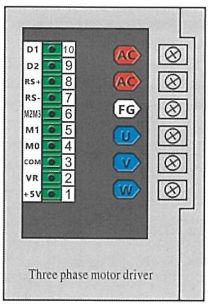
Press the key for 3 minutcs without operation, and the power light flashes, At this time, K2, K3 and K4 are locked.

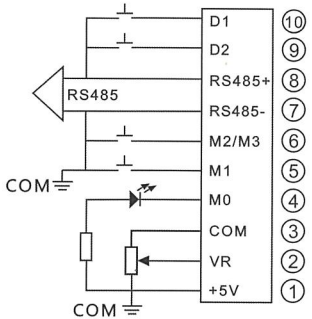
4. Operation indicator FWD (green) led, rev (blue) led, flashing represenrts stop; Normally on indicates that it is running in this mode.

External Terminal Control Diagram:

| Serial No. | Sign | Functions |
|---|---|---|
| ① | +5V | External regulating power output |
| ② | VR | External potentiometer input |
| ③ | GND | Com public port |
| ④ | MO | Indicator setting port |
| ⑤ | MI1 | M function port |
| ⑥ | MI2/D3 | Mi function port / segment speed D3 |
| ⑦ | RS485- | Communication RS485 interface (to be determined) |
| ⑧ | RS485+ | Communication RS485 interface (to be determined) |
| ⑨ | D2 | Section speed interface |
| ⑩ | D1 | Section speed interface |
| Note :Don behalf of the period of speed | | |

External Terminal Control Wiring Diagram:
(COM is not allowed to connect with external earth and zero line)




## The corresponding diagram of segment speed is as follows:

| No. | D3 | D2 | D1 |
|---|---|---|---|
| 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 |
| 2 | 1 | 0 | 1 |
| 3 | 1 | 0 | 0 |
| 4 | 0 | 1 | 1 |
| 5 | 0 | 1 | 0 |
| 6 | 0 | 0 | 1 |
| 7 | 0 | 0 | 0 |
| Note: M1, M2, D1, D2 and D3 are at high level when nothing is connected, so the low level is effective. D1, D2 and D3 are all at high level, indicating the lowest speed. | | | |

### 2.2.2 Description of Setting Interface

When pressing K2 (menu), the nixie tube Flashes - 0.0 - through the digital setting plus and minus button ( ↑ ) ( ↓ ), adjust and select the setting parent item code to enter. See Table I for the parent item code

During the setting process, the code to be set can be adjusted through the digital setting shift key (K1) and the addition and subtraction key (T). After the code is set, press the confirmation key (K6) to enter the sub item code selection. After the sub item code is selected, press K6 to return to the parent code interface, display the flashing - x.x -I, then select the next parent code, and then press K6 to enter the sub code selection.

When all setting options are completed, press the data setting and saving key K3 to display the flashing save, and then press the data setting and saving key K3 (save) to confirm saving. After the interface stops flashing the data is saved. Starting the frequency converter can operate according to the set data without power off and power on. When you do not want to save data, you can press the menu setting exit key (menu / ESC) to exit without affecting the previously set parameters, or automatically return to the operation interface after 20s without key operation.

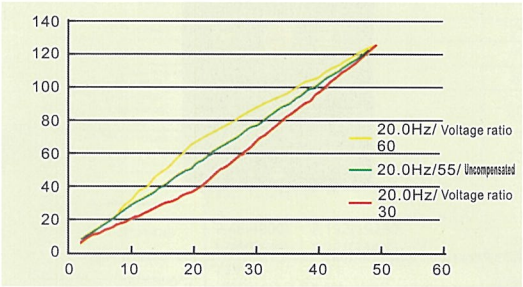
# Table 1

| No. | Parent code | Content | Subitem Code | Factory Value |
|---|---|---|---|---|
| 1 | -0.1- | Set start time | Setting range: 1-15 (corresponding time 5s-0.1s) | 7 |
| 2 | -0.2- | Set stop time | Setting range: 1-15 (corresponding time 5s-0.1s) | 7 |
| 3 | -0.3- | Minimum frequency compensation | Setting range: 5-15 | 8 |
| 4 | -0.4- | Set maximum compensation frequency | Setting range: 5.0-30.0hz | 20 |
| 5 | -0.5- | Set the voltage ratio to compensate for the highest frequency | Setting range: 25-85 | 55 |
| 6 | -0.6- | Maximum frequency limit voltage ratio | Setting range: 80-128 | 128 |
| 7 | -0.7- | RS485 baud rate | 0,48(4800) 2,192(19200)<br>1,96(9600) 3,384(38400) | 96 |
| 8 | -0.8- | RS485 format, ASCII | 1,8N1 3,8E1<br>2,8N2 4.801 | 8N1 |
| 9 | -0.9- | Slot number | 1-255 | 1 |
| 10 | -1.0- | Operating frequency source | 0: Panel keyboard control | 1 |
| | | | 1: Panel potentiometer control | |
| | | | 2: External analog signal input (output voltage is 0-sv) or external potentiometer | |
| | | | 3: RS485(RS485) | |
| | | | 4: Segment speed input | |
| 11 | -1.1- | Start / stop control source | 0: Panel keyboard control | 0 |
| | | | 1: RS485(RS485) | |
| | | | 2: Positive rotation upon power on | |
| | | | 3: Reverse when powered on | |
| | | | 4: External port | |
| 12 | -1.2- | Parking mode | 0: Inertia stop | 1 |
| | | | 1: Deceleration stop | |
| | | | 2: Brake stop | |
| 13 | -1.3- | Mi function selection | 0: Mil / forward / stop, mi2 reverse / stop | 0 |
| | | | 1: Mil / run / stop, mi2 reverse / forward | |
| | | | 2: Mil / run / stop, mi2 section speed | |

| | | | | |
|---|---|---|---|---|
| 14 | −1.4− | MO function selection | 0: Indication during operation<br>1: Set arrival indication<br>2: Fault indication<br>3: Undefined (customizable) | 0 |
| 15 | −1.5− | Overload protection selection | Undefined | |
| 16 | −1.6− | Over temperature protection selection | 40℃~100℃ | 90℃ |
| 17 | −1.7− | Maximum frequency setting | 0~99.0Hz | 50 |
| 18 | −1.8− | Minimum operating frequency | 0~30.0Hz | 0 |
| 19 | −1.9− | Working frequency | 0~99.0Hz | 50 |
| 20 | −2.0− | Frequency corresponding to the highest output voltage | 35 0~99.0Hz | 50 |
| 21 | −2.1− | Segment speed 1 setting | 0~99.0Hz | 5 |
| 22 | −2.2− | Segment speed 2 setting | 0~99.0Hz | 10 |
| 23 | −2.3− | Segment speed 3 setting | 0~99.0Hz | 20 |
| 24 | −2.4− | Segment speed 4 setting | 0~99.0Hz | 25 |
| 25 | −2.5− | Segment speed 5 setting | 0~99.0Hz | 35 |
| 26 | −2.6− | Segment speed 6 setting | 0~99.0Hz | 40 |
| 27 | −2.7− | Segment speed 7 setting | 0~99.0Hz | 45 |
| 28 | −2.8− | Operation arrival frequency | 0~99.0Hz | 45 |
| 29 | −2.9 | Undefined (customizable) | ---- | |
| 30 | −3.0− | Current display selection | 1 : % | 1 |
| 31 | −3.1− | Undefined (customizable) | ---- | |
| 32 | −3.2− | Braking frequency at stop | 00.0-50.0Hz | 0 |
| 33 | −3.3− | Braking time | 0.0-5.0S | 0 |
| 34 | −3.4− | Braking coefficient | 00-30% | 0 |
| 35 | −3.5− | Pair of Poles | 1~6 | 2 |
| 36 | −3.6− | Motor slip | 0.01~1.00 | 1 |
| 37 | −3.7− | Rated speed of motor | 1~9999 | 1500 |
| 38 | −3.8− | Segment speed 0 setting | 0~99.0Hz | 0 |
| 39 | −9.1− | Restore default values | Display the blinking CLE and press the OK key tp perform the operation | |
| 40 | −9.5− | Reset MCU | When -8.88 flashes,press the OK key to perform the operation | -8.88 |
| 41 | −9.6− | | | |
| 42 | −9.7− | Hardware version number | | -X.xx |
| 43 | −9.8− | Software version number | | -X.xx |

### 2.2.3.Description of low frequency v/f compensation

- 0.3 - 0.4 - and - 0.5 - values can be set according to the load conditions, table 2 values and linear V / F curve values. To lift the motor torque at low frequency, it is necessary to select the upper limit frequency of the lifting torque, set the compensation maximum frequency voltage ratio at - 0.3 -, - 0.4 -, and find the corresponding frequency or similar frequency in Table 2. When it is higher than the data, it will increase the slope of the V / F curve and lift the torque. When it is lower, the data will reduce the slope of the V / F curve and reduce the torque.
For example, set the value to 20.0 in - 0.3 -, 60, 55, 30 in - 0.4 -, and - 0.5 - to 8 by default. The three lines of V / F are as follows:




### 2.2.3 Maximum frequency limit voltage ratio

When the load is relatively small and the motor runs at the maximum speed, the optimal operation effect can be achieved by reducing the option data set at - 0.6 -.

Table 2: Linear voltage ratio

| Frequency HZ | Voltage Ratio | Frequency HZ | Voltage Ratio | Frequency HZ | Voltage Ratio | Frequency HZ | Voltage Ratio | Frequency HZ | Voltage Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 11 | 32 | 21 | 57 | 31 | 81 | 41 | 106 |
| 2 | 10 | 12 | 35 | 22 | 59 | 32 | 84 | 42 | 108 |
| 3 | 13 | 13 | 37 | 23 | 62 | 33 | 86 | 43 | 111 |
| 4 | 15 | 14 | 40 | 24 | 64 | 34 | 89 | 44 | 113 |
| 5 | 18 | 15 | 42 | 25 | 67 | 35 | 91 | 45 | 116 |
| 6 | 20 | 16 | 45 | 26 | 69 | 36 | 94 | 46 | 118 |
| 7 | 23 | 17 | 47 | 27 | 72 | 37 | 96 | 47 | 121 |
| 8 | 25 | 18 | 50 | 28 | 74 | 38 | 99 | 48 | 123 |
| 9 | 28 | 19 | 52 | 29 | 77 | 39 | 101 | 49 | 126 |
| 10 | 30 | 20 | 55 | 30 | 79 | 40 | 104 | 50 | 128 |

3. Set Case

Case 1: setting motor acceleration time

Turn on the power, press the (mcnu / ESC) key to enter the main menu, display - 0.0 - I, press the ( ↑ ) key, display - 0.1 -, press the (run / stop key, display 01.01: represents the acceleration time of 5S; 02 represents acceleration time of 2.55; 03 reprcscnts acceleration tome of 1.6s. Via the ( ↑ ) key and ( ↓ ) Key to select the acceleration time to be adjusted. Prcss the (run / stop ) key to return to the main menu - 0.1 - at this time, you can continue to set other options. If you do not set other options, press the (save / lock) kcy to enter the Save option, and the nixie tube displays flashing save. Press the (save / lock) key again to rcturn to the frequency display interface. If you do not want to save, press the (menu / ESC) key, and the previously modified data is invalid.

Case 2: the system restores the factory default value

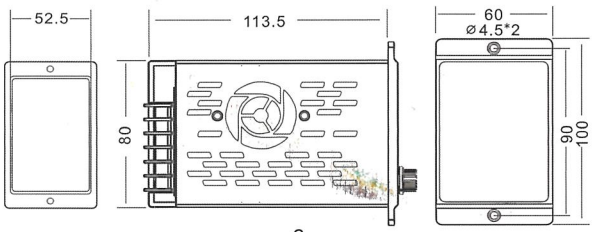
Press the (menu / ESC) key to enter the main menu display - 0.0-I,press the ( ↑ ) key to display - 0.1 -, press the (P-K / Shift) shift key to adjust the main menu - X1 to - 9.1 -, press the (run / stop) key to display flashing CLE, pres the (run / stop) key to restore the factory default value and return to the frequency display interface. If you don't want to operate, press the (menu / ESC) key to return to the frequency display interface.

1. Press (menu / ESC) in any setting interface to return to the frequency display interface.
2. During saving, the nixie tube displays flashing save, press the (menu / ESC) key to exit saving, the previously modified data is invalind, and the parameters will automatically restore the parameters before setting.
3. During data adjustment, the (P-K / s hift) key can be used to shift the nixie tube to quickly set parameters. Press save / lock twice for all places where data needs to be saved
Key to prevent misoperation.

Case 3: Using DC brake

When using DC brake, it is necessary to set item - 1.2 - (parking mode selection 2)- 3.2 - item (starting frequency during parking braking)- 3.3 - item (DC braking time, with 0.1s as the minimum set time unit)- Item 3.4 - sets the DC braking voltage. The voltage value needs to increase slowly from small to large.

3. Installation dimension



## 4. Fault Code

When the frequency converter fails, the four digit nixie tube will flash and display: E - X.X

| No. | Fault Code | Content | Abnormal Causes | Remarks |
|---|---|---|---|---|
| 1 | E-0.1 | Frequency converter overheating | 1. Detect linc fault | 1. Frequency converter for repair |
| | | | 2.Overheated ambient temperature or poor ventilation | 2. Improve ventilation conditions |
| 2 | E-0.2 | Pulse overcurrent | 1.Too much load | 1. Frequencyconverter for repair |
| | | | 2.Improper setting of V / F mode | 2.Set the appropriate V / F curve |
| | | | 3.Fault detection of frequency converter | |
| 3 | E-0.3 | | | |
| 4 | E-0.4 | Frequency converter overload | 1.Too much load | 1.Increase the capacity of frequency converter |
| | | | 2.Improper setting of V / F mode | 2.Set the appropriate V / F curve |
| 5 | E-0.6 | Temperature sensor failure | Open circuit or damage of temperature sensor | 1.Check the temperature sensor connection |
| | | | | 2.Frequency converter for repair |
| 6 | E-0.7 | Temperature sensor failure | Open circuit or damage of temperature sensor | 1.Check the temperature sensor connection |
| | | | | 2.Frequency converter for repair |
| 7 | E-0.8 | Frequency converter overload 100% | The output power of the frequency converter exceeds 100% for more than 6 seconds | 1.Repalce the frequency converter with higher power |
| 8 | E-0.9 | Converter thermal protection | 1. Detect line fault | 1. Frequency converter for repair |
| | | | 2.Overheated ambient temperature or damaged fan | 2. Improve ventilation conditions |
| 9 | E-1.0 | Overvoltage protection | Slow down and stop too fast | Set the acceleration and deceleration value low |

## 5. Precautions

1) When the fault code is displayed as e-0.2, pay attention to the following points
1> If the load is too heavy and the acceleration time is too short, adjust the acceleration time and replace the frequency converter with higher power.
2> If the rated power of the motor is too large, replace the motor combined with the frequency converter.
3> The parameter settings in - 0.3 -, - 0.4 -, -0.5 -, - 0.6 - are unreasonable. It is recommended to restore the factory value.
2) When the motor is running. there will be strong intefderence. At this time, the continuous addition function of manually adjusting the frequency may fail, but pressing and holding the key can still adjust the frequency. It is recommended to use a single key to stop the motor and modify the frequency.
3) For precise speed regulation, it is recommended to use key speed regulation. Potentiometer speed regulation will produce samll offset during motor operation or installation system vibration, so as to affect the control accuracy.
4) When the ambient temperature is too high, enough heat dissipation space needs to be reserved.

## 6.Use Environment

Power supply:single phase:AC220V±20% ; Temperature: - 10℃ - 55℃; Humidity: 0% - 65%