

# TSC2-M028Y4 USER INSTRUCTION



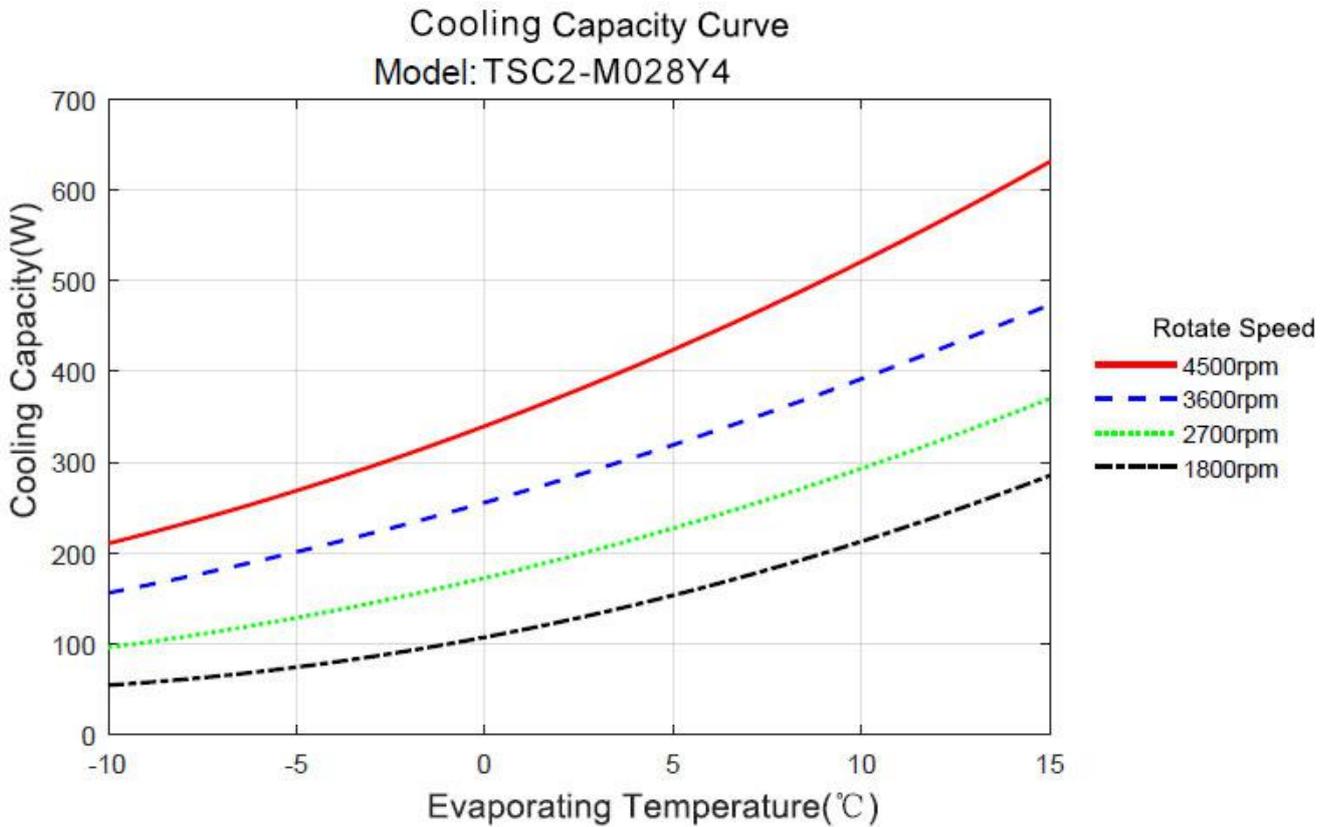
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## 1. Basic Parameters

Compressor Type	DC Dual Rotor Inverter Compressors
Rated Voltage	DC 24V
Voltage range	24V ± 10%
Rated Current	12A
Maximum Current	16A
Displacement	2.8cm <sup>3</sup> /rev
Cylinder Number	2
Motor Rotor Pole	6
Maximum Compression Ratio	6
Speed Range	1800~4500rpm
Cooling Capacity(at 4500 rpm)	465W(ASHRAE Conditions)
Refrigerant	R134a
Max. Amount of Refrigerant	110g
Oil	RL68H
Oil Charge	50mL
Ambient Temperature	-5~55°C
Evaporating Temperature	-10~15°C
Condensing Temperature	45~76°C
Weight	1.3kg
Suction Tube(I.D)	6.5mm
Discharge Tube(I.D)	6.5mm

## 2. Cooling Capacity Curve



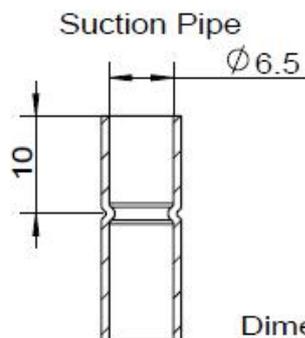
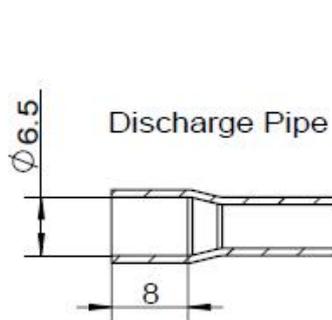
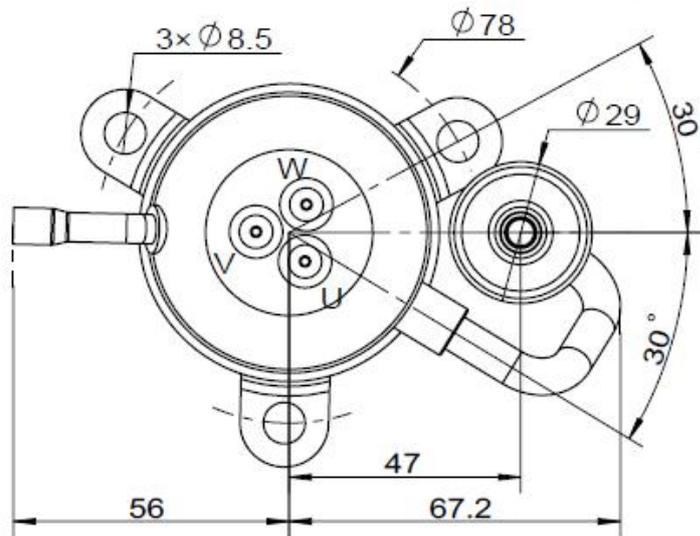
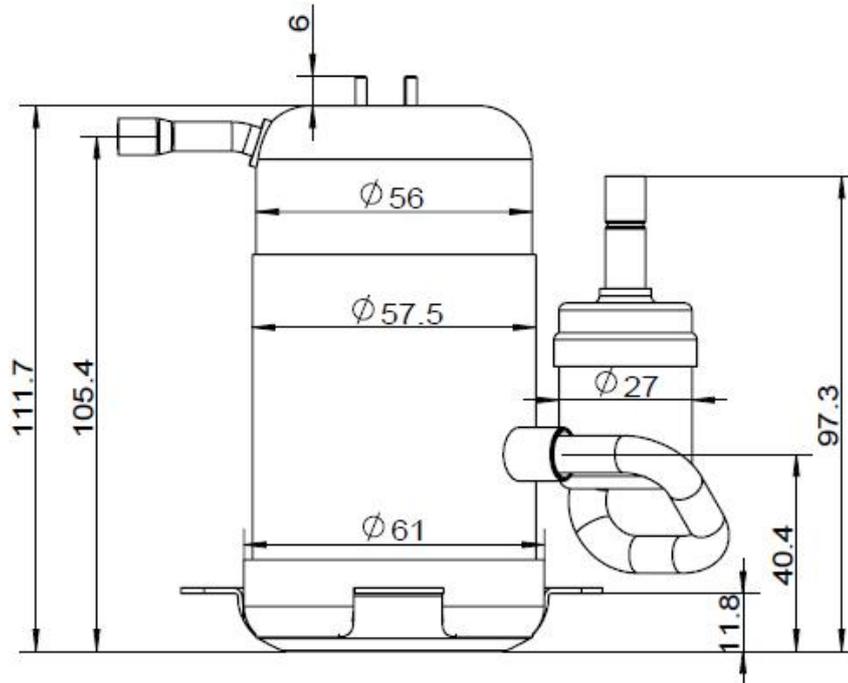
Test conditions: Condensing temperature: 54.4°C; Subcooling degree: 8.3°C; Ambient temperature: 35°C

## 3. Factory list

NO.	Name	Unit	Qty.
1	Compressor	unit	1
2	Drive board	unit	1
3	Connect wire	pcs	1
4	Cushion	unit	3
5	Metal pillar	unit	3
6	Gasket	unit	3

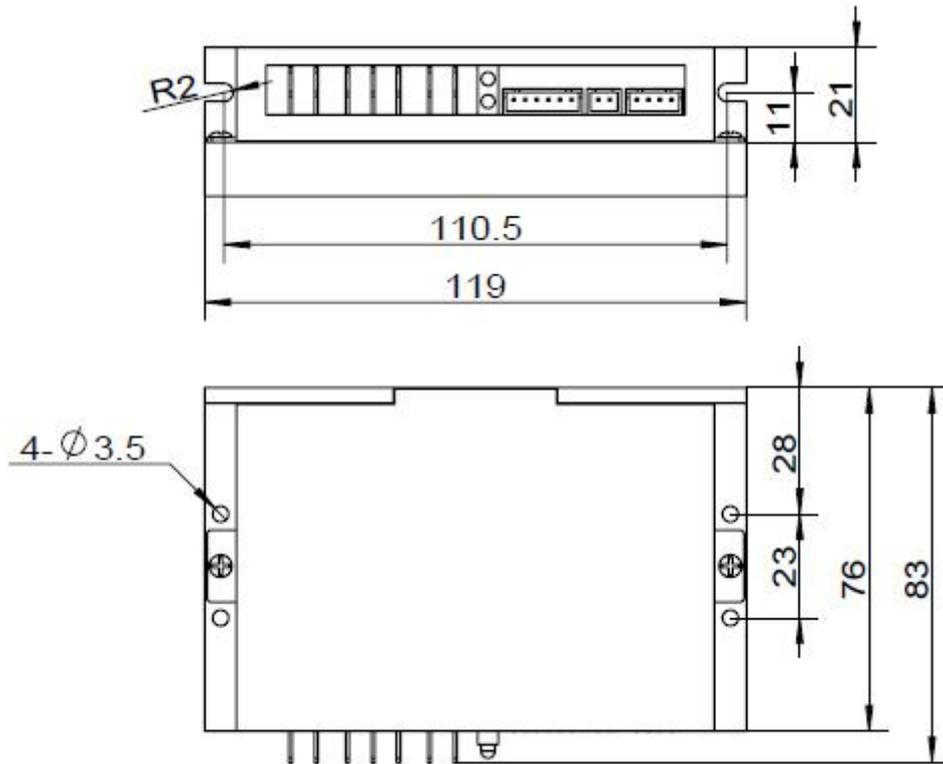
## 4. Size

### 4.1 Compressor size



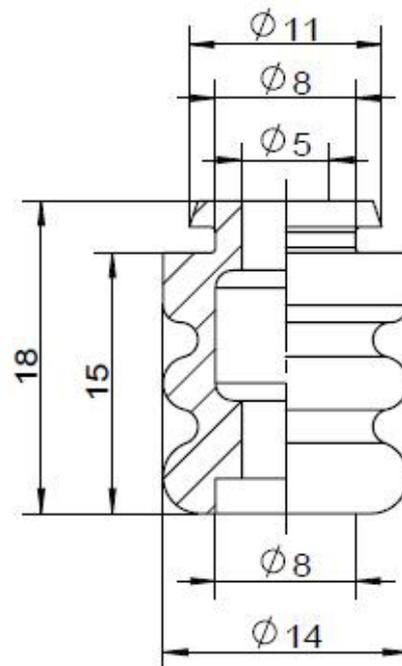
Dimension : mm

4.2 Drive board size



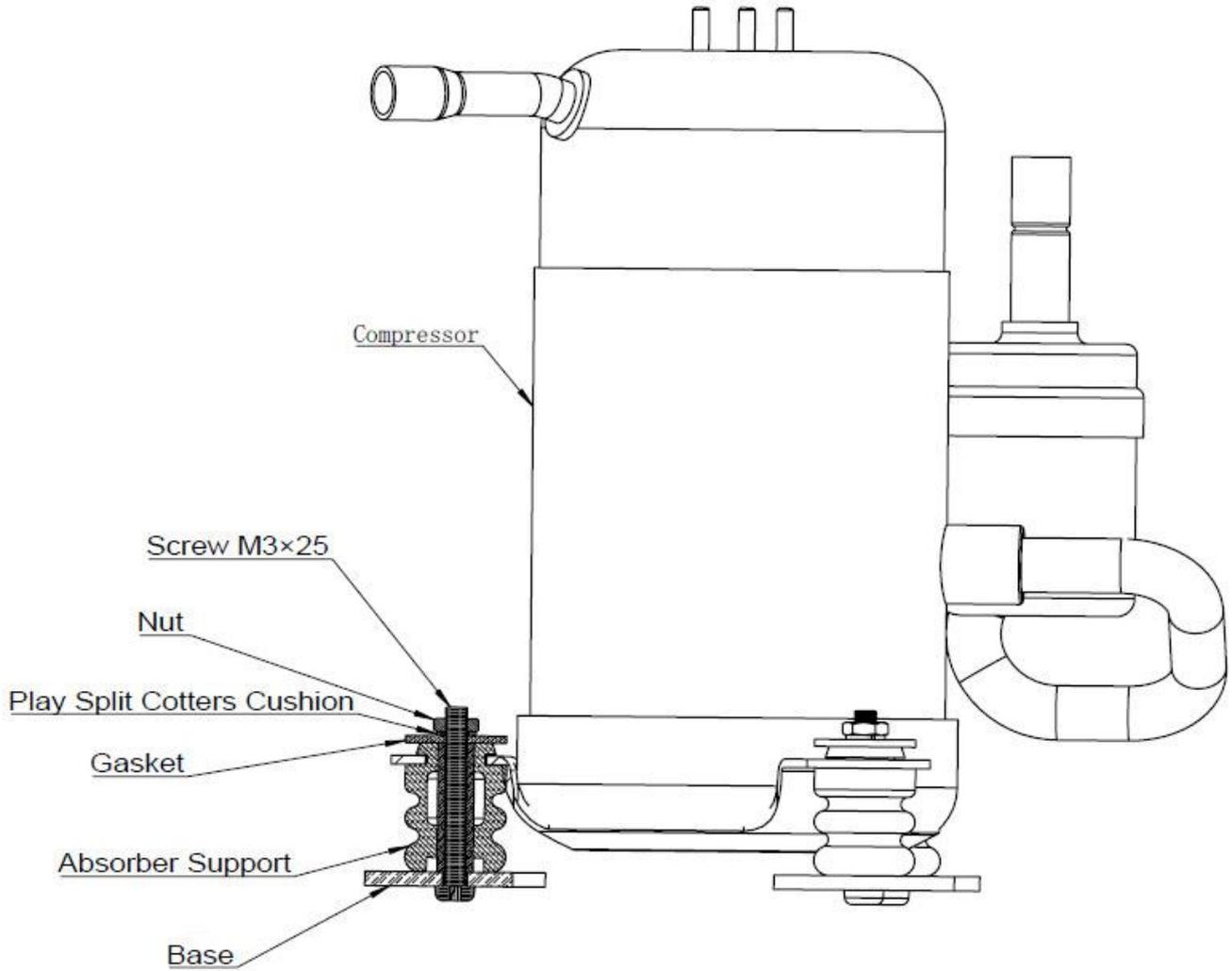
Dimension : mm

4.3 Size of cushion



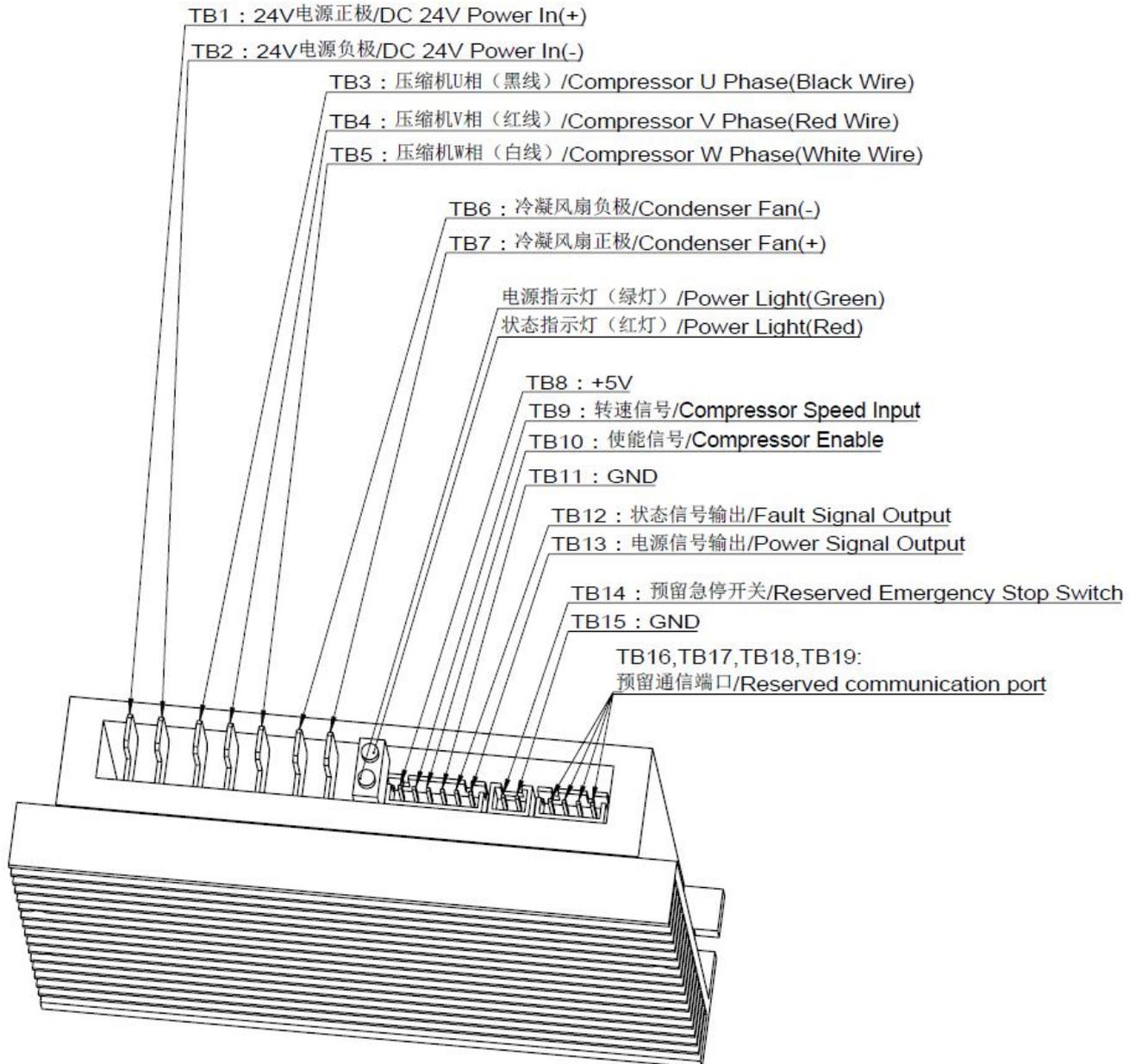
Dimension : mm

4.4 Installation



## 5. Driver wiring instructions

Compressor TSC2-M028Y4 must be driven by a matched driver. The driver interface is shown in the figure below.



### 5.1 Power input port (TB1, TB2)

The driver input voltage range is  $24V \pm 10\%$ , port TB1 is positive and TB2 is negative.

### 5.2 Wiring port of driver and compressor (TB3, TB4, TB5)

The driver and the compressor are connected by a dedicated three-core cable, the colors of the three-core cables are black, red, and white. The black wire is connected to port TB3; the red wire is connected to port TB4; the white wire is connected to port TB5. The other end of the three-core wire has been connected to the terminal block. The terminal block is buckled on the 3 terminal posts on the top of the compressor without distinguishing the position.

### 5.3 Condensing fan power supply port (TB6, TB7)

The driver is equipped with ports TB6 and TB7 dedicated to supply power to the condensing fan, where TB6 is the negative pole and TB7 is the positive pole. This port has voltage output only when the compressor is running, the output voltage is 24V, and the maximum load is 2A.

### 5.4 Indicator

There are two indicators on the driver, the green one is the power indicator, and the red one is the status indicator. The power indicator indicates the power status of the driver, and it will light up as long as the power is connected. The status indicator indicates the compressor's working or fault status. The specific description is shown in the table below.

Working/fault status	Description	Status indicator lighting
Normal work		No light
Waiting to start	The driver is connected to power, but the compressor does not start.	Flashing at a constant speed
Driver overvoltage	The high voltage protection is triggered when the input voltage of the driver is higher than 32V, and returns to normal when the voltage drops to 31.5V.	2 flash repeating
Driver undervoltage	When the driver input voltage is lower than 19V, the low-voltage protection is triggered, and it returns to normal when the voltage rises to 20.5V.	3 flash repeating
Driver overheating	The overheating protection is triggered when the temperature of the driver exceeds 80° C, and returns to normal when the temperature drops to about 71° C.	4 flash repeating
Driver failure	The internal circuit of the drive is faulty.	6/7/8 flash repeating
External fault	Such as compressor stall, phase line short circuit, etc.	Light is always on

The status of the power indicator and the status indicator can be synchronously output through ports TB13 and TB12, respectively.

### 5.5 5V voltage output port (TB8)

When the driver is connected to the power supply, the port TB8 can output a voltage of 5V, which can be used to adjust the compressor speed, which will be described in detail later.

### 5.6 Compressor speed signal input port (TB9)

TB9 is a signal input port for controlling the speed of the compressor, which can receive voltage signals, and the range is 0~5V (relative to GND). The corresponding relationship between voltage value and compressor speed is shown in the following table (there may be some individual differences).

Speed voltage U/V	Compressor speed N/rpm
0~1.35	0
1.35	1800
$1.35 < U < 3.4$	$1300 * (U - 1) + 1345$
$3.4 \leq U \leq 5$	4500

### 5.7 Compressor enable signal input port (TB10)

The compressor can be started only when the compressor enable signal input port TB10 is grounded (TB11). When TB10 is connected to high level or suspended, the compressor does not work.

### 5.8 GND (TB11)

TB11 is connected to the negative port TB2 of the power supply, and is mainly used to connect the control signal of the compressor. All voltage signals on the driver are relative to GND. If an external circuit is used to control the compressor, the external circuit must also share the ground with the driver.

### 5.9 Status signal output port (TB12)

TB12 can output voltage signal, synchronized with the status indicator. When the status indicator (red light) is on, the voltage of TB12 is 2V; otherwise, there is no output.

#### **5.10 Power signal output port (TB13)**

TB13 can output power signal, synchronized with the power indicator. When the power indicator (green light) is on, the voltage of TB13 is 2V; otherwise, there is no output.

#### **5.11 Reserved emergency stop switch signal (TB14, TB15)**

The function of TB14 is the same as TB10. The compressor can only work when TB14 is grounded. Under normal circumstances, it is not necessary to use this port to control the compressor's working status, directly short-circuit it with TB15 (GND), and control the compressor through TB10. Under special circumstances, an emergency stop switch can be connected between TB14 and TB15 to quickly start or stop the compressor.

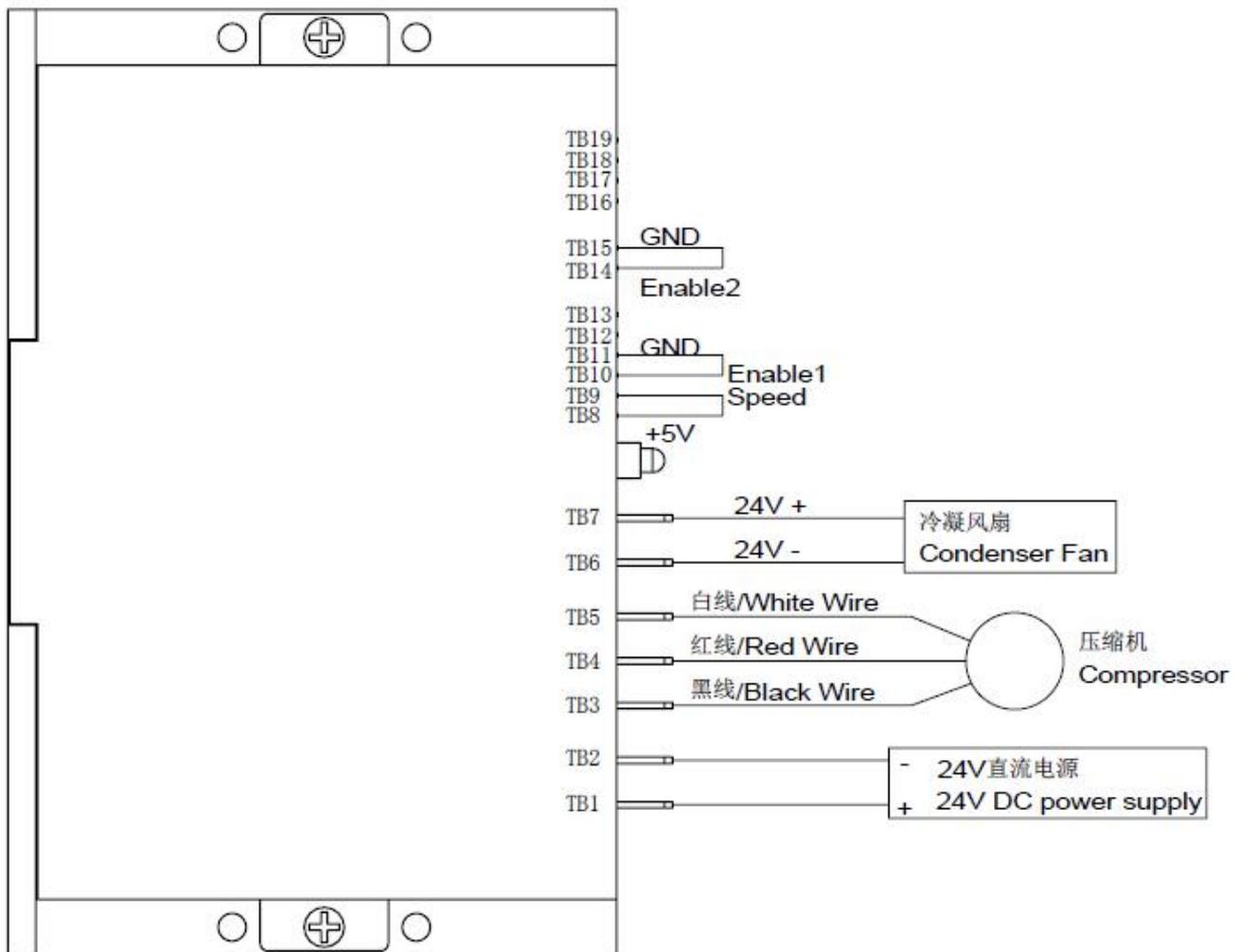
#### **5.12 Reserved communication ports (TB16, TB17, TB18, TB19)**

TB16, TB17, TB18, TB19 are spare ports, and users can customize communication functions through these ports.

## 6. Typical wiring example

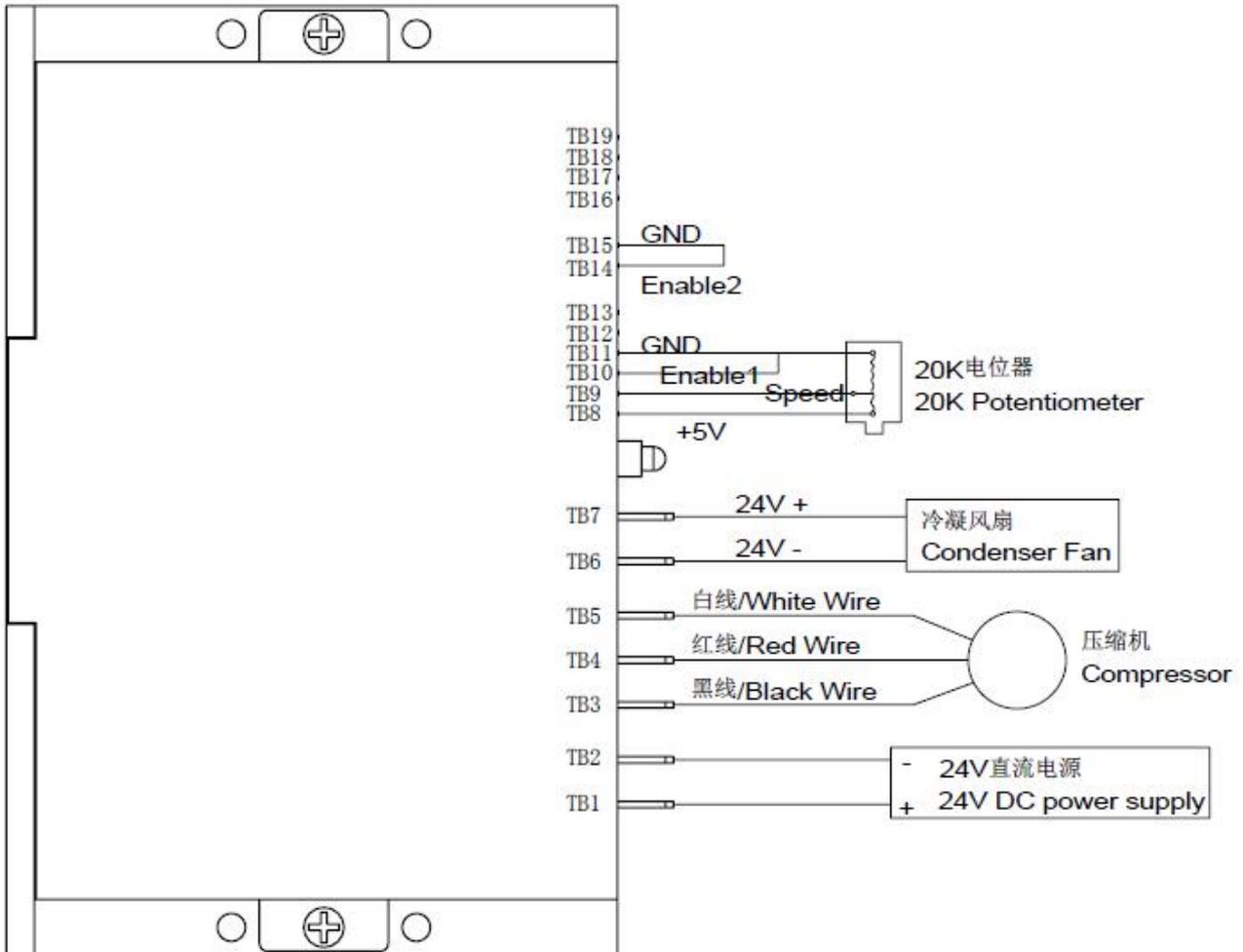
### 6.1 Example 1

The two enable signals can be directly grounded, and the 5V voltage port TB8 on the driver and the speed signal input port TB9 can be directly short-circuited to make the compressor always work at the maximum speed. This wiring method cannot adjust the compressor speed, the wiring diagram is as follows:



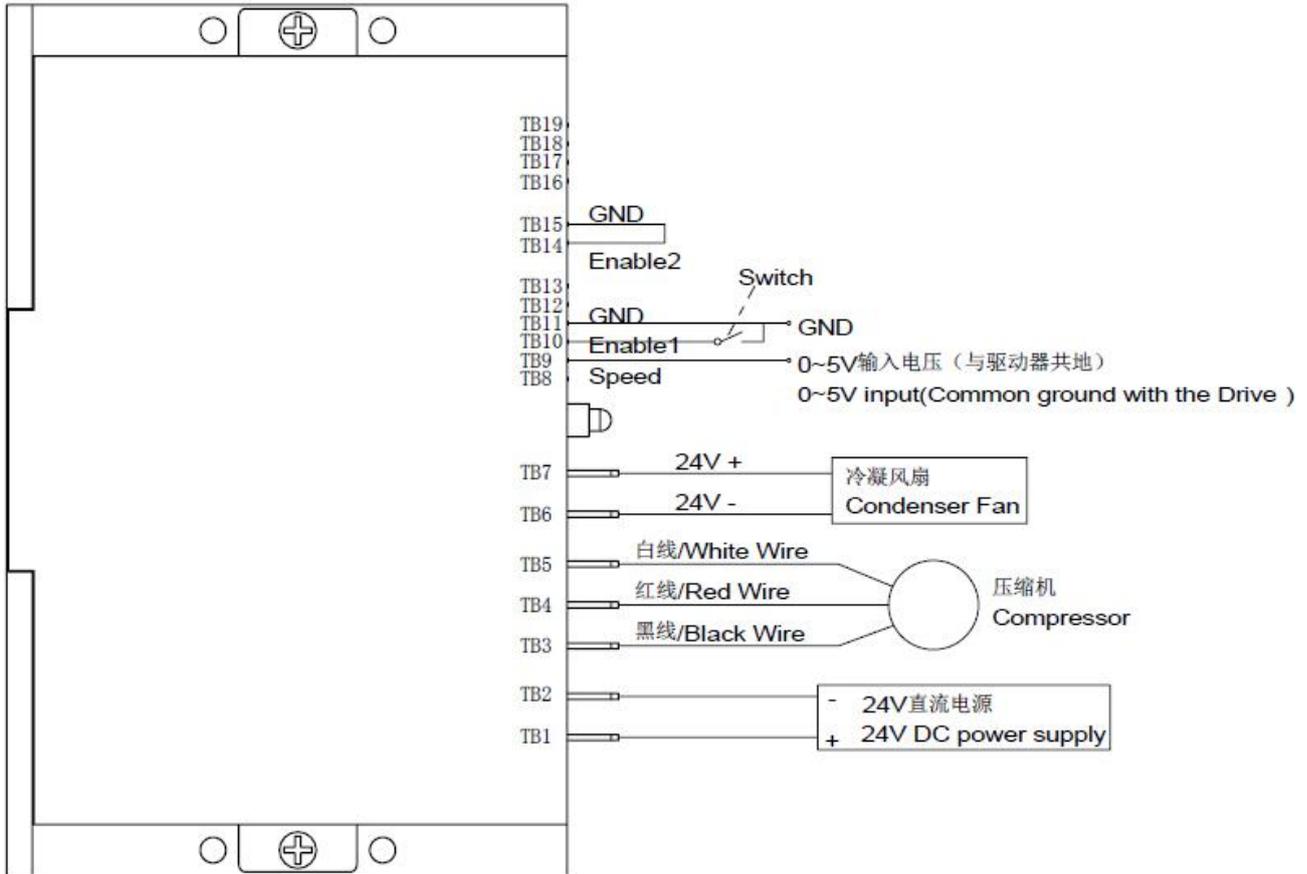
## 6.2 Example 2

On the basis of example 1, connect a 20K potentiometer between the +5V signal and the speed signal on the driver, and adjust the compressor speed by adjusting the potentiometer, as shown in the figure below.



### 6.3 Example 3

Users can also use an external 0~5V voltage signal to control the compressor speed without using the +5V output voltage on the driver, as shown in the figure below. The voltage signal must share the ground with the driver. A switch or control program can be used to control the start and stop of the compressor by connecting or disconnecting the enable signal port TB10 and GND.



## 7. Notice

1. The compressor needs to be placed horizontally during operation, the maximum inclination angle cannot exceed  $15^{\circ}$ , and it cannot be inclined for a long time.
2. The compressor should not be tilted or turned upside down during storage and transportation to prevent oil overflow.
3. The compressor has been pre-filled with about 50cc of RL68H lubricating oil before leaving the factory, which is sufficient for general refrigeration systems. For systems that have been charged and discharged with refrigerant for many times, appropriate amount of lubricant of the same type can be added as appropriate.
4. R134a must be used as a refrigerant.
5. When working, the driver should be installed in a location where it can easily dissipate heat.
6. Under any working conditions, the compression ratio of the compressor should be less than 6.
7. When the compressor starts, the pressure difference  $\Delta P$  (discharge chamber pressure-suction chamber pressure) should be below 0.03MPa. After the compressor stops, you need to wait at least 30 seconds, and then start again after the pressure is balanced.
8. In order to protect the compressor, neither the rising rate nor the falling rate of the rotation speed should exceed 120rpm/s.
9. Depending on the different refrigeration system, the refrigerant charge should be between 60~120g, and the maximum should not exceed 130g.
10. The driver current should not exceed 15A, if it exceeds this value, it should stop working immediately.
11. Before charging the refrigerant, the internal pressure of the refrigeration system should be less than 20Pa, and the water content should be less than 40ppm. There should be no impurities, metal powders, and residual acids, alkalis, oils and cleaning agents in the manufacturing process in the refrigeration accessories and pipelines. During brazing, a shielding gas should be injected into the system to prevent the occurrence of oxide scale.
12. It is absolutely forbidden to operate the compressor with air or a mixture of air and working fluid, as this may cause an explosion.

13. The suction pipe and exhaust pipe of the compressor are blocked with blind plugs, and they are allowed to be unplugged during use. After removing the blind plug, the inside of the compressor should not be exposed to the atmosphere for more than 5 minutes.
14. Before removing the blind plug, it is allowed to run the compressor directly for a short time to see if it is normal. After the refrigeration system is vacuumed, the compressor cannot be operated directly if the refrigerant has not been charged.
15. The wiring must be carried out in strict accordance with the wiring instructions, and the three phase wires of the compressor U, V and W cannot be connected wrongly. If it is connected incorrectly, the compressor may reverse and the compressor cannot be used after the reverse.
16. Do not keep the speed signal between 0.8V and 1.2V for a long time. In this interval, the compressor may be damaged due to repeated start and stop.
17. The maximum output power of the driver's 24V power supply should not be less than 350W.

## 8. Trouble Shooting

Symptom	Possible Causes	Method
The speed control signal is normal but the compressor does not rotate	<ul style="list-style-type: none"> <li>1 or 2 of the 2 enable signals are not grounded</li> <li>Speed control voltage is lower than 1.35V</li> <li>Loose wiring</li> <li>Insufficient power, sudden voltage drop at startup</li> <li>Compressor enters locked protection state</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the enable signal</li> <li>☞ Check the speed signal</li> <li>☞ Check whether the wiring sequence of the compressor and the driver is correct, and whether the wiring is loose</li> <li>☞ Check the output power of the power supply; check whether the power supply voltage falls below the minimum allowable voltage (especially at the moment of starting)</li> <li>☞ Judge the cause of fault protection by flashing red LED</li> </ul>
The compressor stops working instantly	<ul style="list-style-type: none"> <li>Driver overheat protection</li> <li>Loose wires or terminals</li> <li>Insufficient power supply (pay special attention to the battery)</li> </ul>	<ul style="list-style-type: none"> <li>☞ Judge the cause of fault protection by flashing red LED</li> <li>☞ Check whether the wire or terminal is loose</li> <li>☞ Check whether the power supply is insufficient</li> </ul>
Compressor speed jump	<ul style="list-style-type: none"> <li>The driver enters current protection mode</li> <li>The driver is close to high temperature protection</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the flashing of the LED indicator to determine the fault status</li> </ul>
Compressor overheated	<ul style="list-style-type: none"> <li>The ambient temperature is too high</li> <li>No air flow or insufficient air flow above the compressor</li> <li>Return air temperature is too high</li> </ul>	<ul style="list-style-type: none"> <li>☞ Enhance the airflow above the compressor</li> <li>☞ Check the degree of superheat, it is recommended to set the degree of superheat between 4-6°C</li> </ul>
Compressor overcurrent	<ul style="list-style-type: none"> <li>The condensing pressure is too high</li> <li>Compressor liquid hammer</li> </ul>	<ul style="list-style-type: none"> <li>☞ Reduce condensing temperature/pressure</li> <li>☞ Check the degree of superheat, it is recommended to set the degree of superheat between 4-6°C</li> </ul>

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