1. Summary

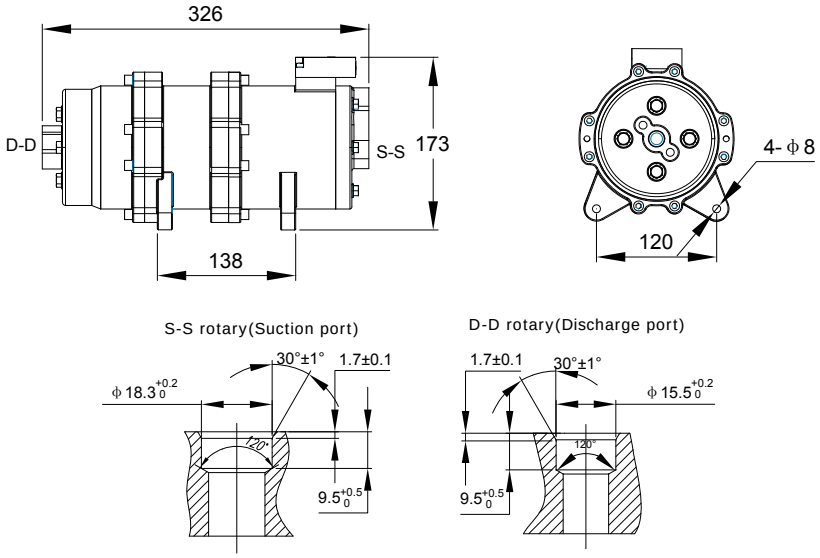
The unit consists of scroll compressor, built-in sensorless brushless DC motor and external electronics. The scroll compressor is driven by sensorless BLDC motor directly without any coupling, and the motor is driven by external electronics, which feedback signal is from back EMF.

The unit has the following features:

A. Soft starting
B. Over-voltage and under-voltage protection
C. Locked-rotor protection and current-limiting protection
D. High pressure protection and Low pressure protection
E. Stepless speed regulation by variable analog signal input(0~5VDC or 5~11VDC)

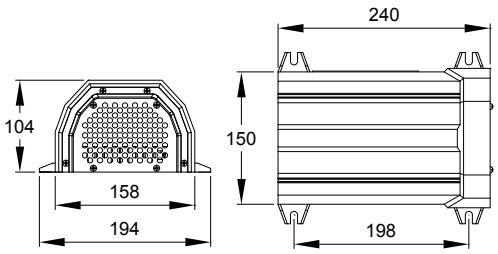
2. Size of the untis

A. Dimension of motor-compressor



3D drawing is available.

B. Dimension of external electronics

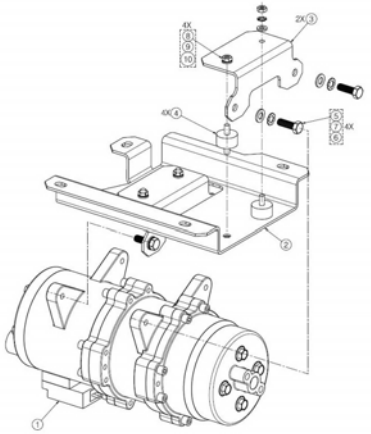


3D drawing is available.

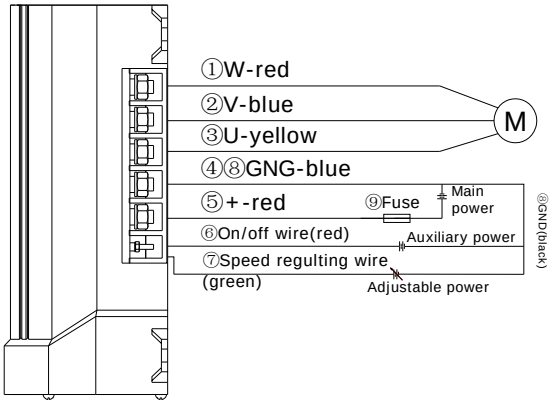
C. Total weight: 15KGS

3. Installation

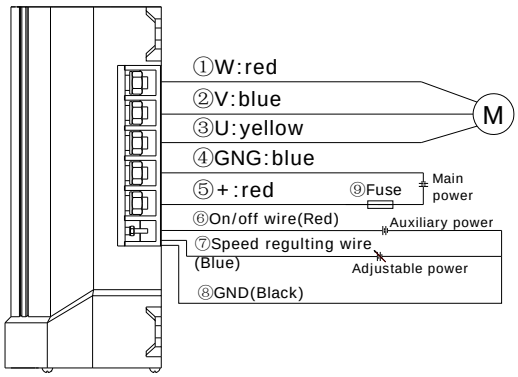
As the unit is totally enclosed type, it can be installed horizontally by different bracket, if the users want low vibration level, they can add some rubber shock absorbers like the following figure:



4. Wiring diagram



With one GND wire



With separated GND wires

①②③ cables connect the winding of motor to controller;

④⑤ cables are for power supply:

12VDC: 10~15VDC (max. speed: 1000RPM)
24VDC: 21~32VDC (max. speed: 2500RPM)
48VDC: 38~58VDC
72VDC: 65~95VDC
96VDC: 88~119VDC
144VDC: 114~174VDC
288VDC: 260~360VDC(<400VDC)
400Hz Compressor

⑥ wire is controlling wire(on/off), which need constant input voltage. Both 12VDC and 24VDC are optional;

⑦ wire is for speed regulation by variable analog signal input. Both 0~5VDC and 5~11VDC are optional;

⑧ wire is the GND wire for auxiliary power and adjustable power(if the controller is 48V, 72V, 96V…., this wire will be separated from GND wire for power supply);

⑨ Fuse: 100A (Recommendable)

5. Technical parameters and requirements

Table 1

Basic Parameters

Part name	Item	Value
Scroll compressor, sensorless BLDC motor	Displacement	36cc/r
	Max.allowable Instantaneous Speed(RPM)	4500
	Continuous speed(RPM)	3000
	Minimum speed(RPM)	1000
	Refrigerant	HFC-134a
	Refrigeration oil	RL68H(120mL)
External Controller	Nominal input voltage(DC)	12VDC,24V,48V,72V,96V,144V,288V

Table 2

Detailed Parameters: Cooling capacity, Power consumption and Rating Conditions

Rating Conditions					Tesing Requirements		
Speed	**Suction pressure**	**Discharge pressure**	**superheat**	**subcool**	**Cooling capacity**	**Input power**	**COP**
RPM	Kpa(abs)	Mpa(abs)	℃	℃	W	W	
1000	300	1.5	10	5	900	475	1.89
2000	300	1.5	10	5	1900	1000	1.90
3000	300	1.5	10	5	2900	1500	1.93

Suction temperature: 10.7 ℃, discharge temperature: 65 ℃

Table 3

Noise Level

Speed	Suction Pressure	Discharge Pressure	Noise Level
RPM	KPa	MPa	dB
1000	196	1.7	<68
2000	196	1.7	<70
3000	196	1.7	<74

- Cleanliness:
  The gross mass of exogenous impurity inside the motor-compressor assembly must be less than 50mg.

- Water Ration:
  The residual moisture content of the motor-compressor assembly can't exceed

1000ppm.

- Air Tightness:
  The leakage must be less than $5.8x10^{-6}$mbar.l/s under 1.64MPa pressure of Hydrogen/Nitrogen mixture (Ammonia Concentration: 1%) in compressor.

- High Pressure Leakage:
  The leakage can't exceed 15g/year under 1380KPa pressure of HFC-134a in compressor.

- High Pressure Testing:
  The compressor can't have any damage and leakage when the interior of compressor is under at least 6MPa.

- Vibration Testing:
  After vibration testing (30 times acceleration of gravity; Frequency: 150Hz; Vibration direction: up, down, left, right and axial; Duration: 20 hours each direction), the motor-compressor assembly should meet the following requirements:
  a. The body of compressor can't have any crack and damage, and the compressor can run normally;
  b. The bolts can't have any looseness and damage;
  c. The leakage can't exceed 15g/year;

- Temperature Alternating Testing:
  After 20 hours' temperature alternating cycle, the leakage of HFC-134a can't exceed 15g/year, and the COP can't be less than the value under rating condition
  (table 2, 3000RPM)

- Insulation Resistance:
  The wholly insulation resistance of electric compressor should be more than 100MΩ.

- Dielectric Strength:
  Under 1000VAC 50Hz/60Hz or 1600VDC
  Duration: 1 minute
  Relative humidity: 45%~75%
  No insulation breakdown and flashover.