



Compressor A/C brushless 24V

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:

- Soft starting
- Over-voltage and under-voltage protection
- Locked-rotor protection and current-limiting protection
- High pressure protection and Low pressure protection
- Stepless speed regulation by variable analog signal input (0~5V DC or 5~11V DC)



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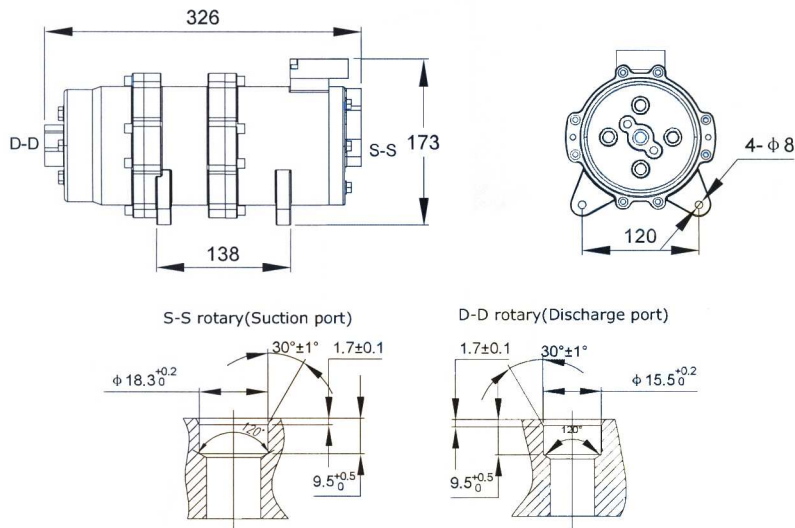
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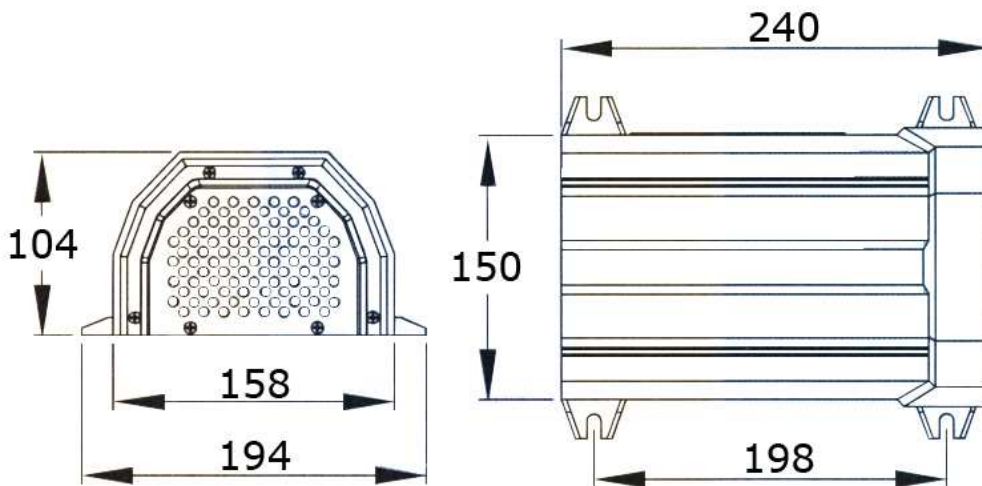
2 - Size of the unitis

Dimension of motor-compressor



3D drawing is available

Dimension of external electronics



3D drawing is available

Total weight: 15kg



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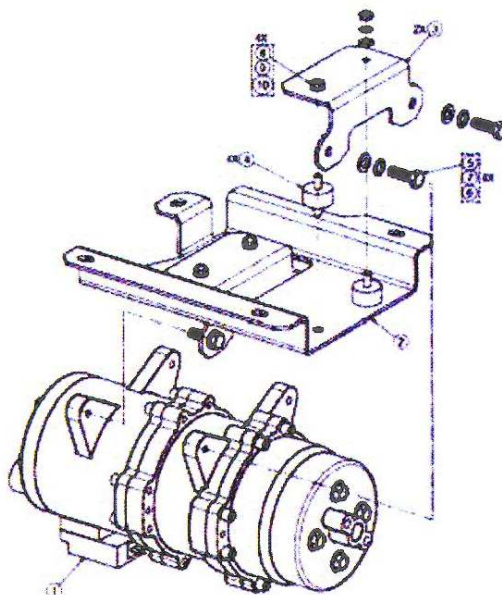
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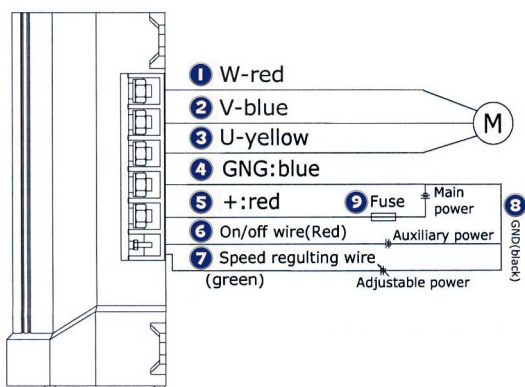
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3 - Installation

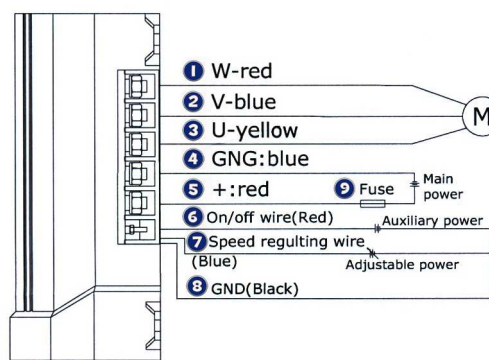
As the unit is totally enclosed type, it can be installed horizontally by different bracket, if the users want low vibration level, they can add some rubber shock absorbers like the following figure:



4 - Wiring diagram



With one GND wire



With separated GND wires

① ② ③ cables connect the winding of motor to controller

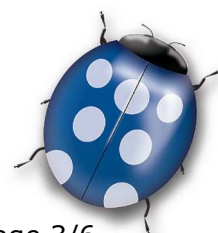
④ ⑤ cables are for power supply:

12V DC: 10~15V DC (max.speed: 1000rpm)

24V DC: 21~32V DC (max.speed: 2500rpm)

48V DC: 38~58V DC

72V DC: 65~95V DC



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96V DC: 88~119V DC
144V DC: 114~174V DC
288V DC: 260~360V DC (<400V DC)
400Hz Compressor

- ⑥ wire is controlling wire (on/off), which need constant input voltage. Both 12V DC and 24V DC are optional
- ⑦ wire is for speed regulation by variable analog signal input. Both 0~5V DC and 5~11V DC 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

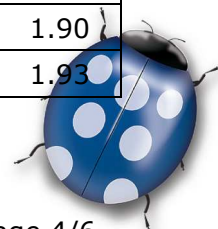
Table 1
Basic Parameters

| 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) | 12V, 24V, 48V, 72V, 96V, 144V, 288V |

Table 2
Detailed Parameters: Cooling capacity, Power consumption and Rating Conditions

| Rating Conditions | | | | | Testing Requirements | | |
|-------------------|------------------|--------------------|-----------|---------|----------------------|-------------|------|
| Speed | Suction pressure | Discharge pressure | superheat | subcool | Cooling capacity | Input power | COP |
| rpm | kPa(abs) | MPa(abs) | °C | °C | 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°C, discharge temperature: 65°C



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☛ **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 5.8×10^{-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; 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



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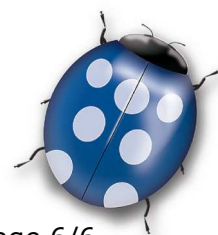
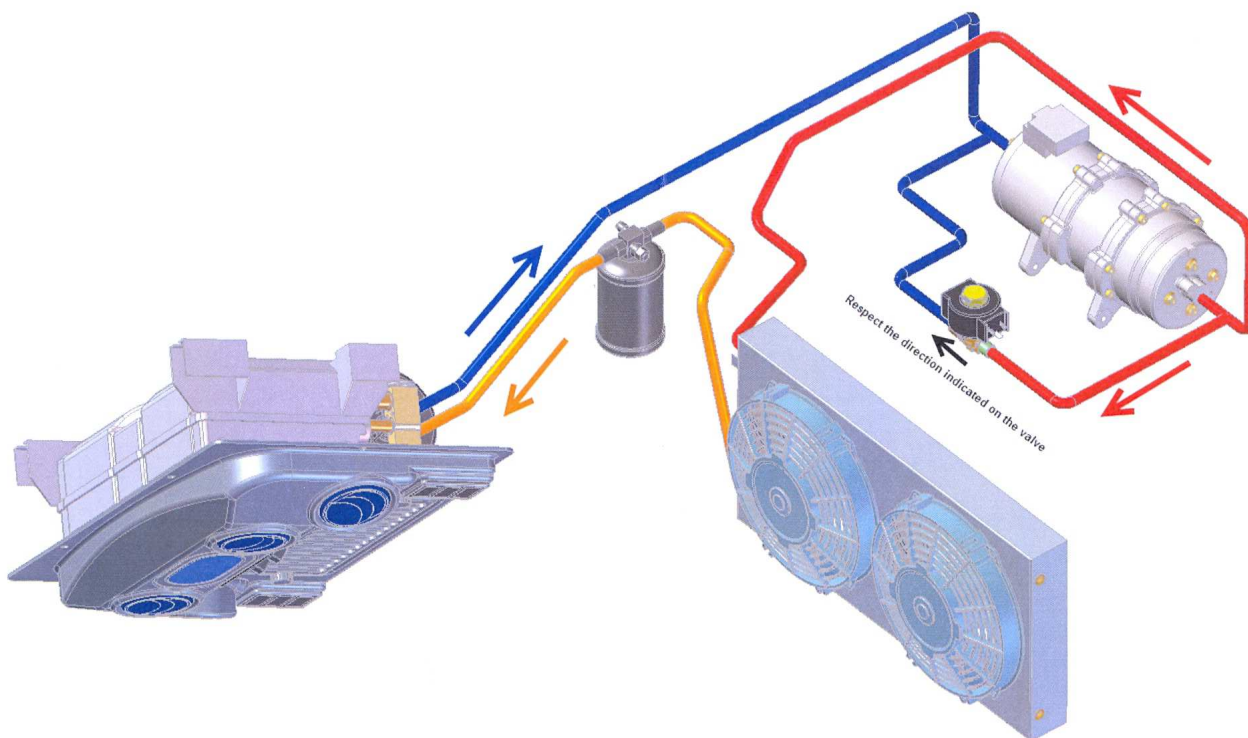
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- Dielectric Strength:
Under 1000V AC 50Hz/60Hz or 1600V DC
Duration: 1 minute
Relative humidity: 45%~75%
No insulation breakdown and flashover



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