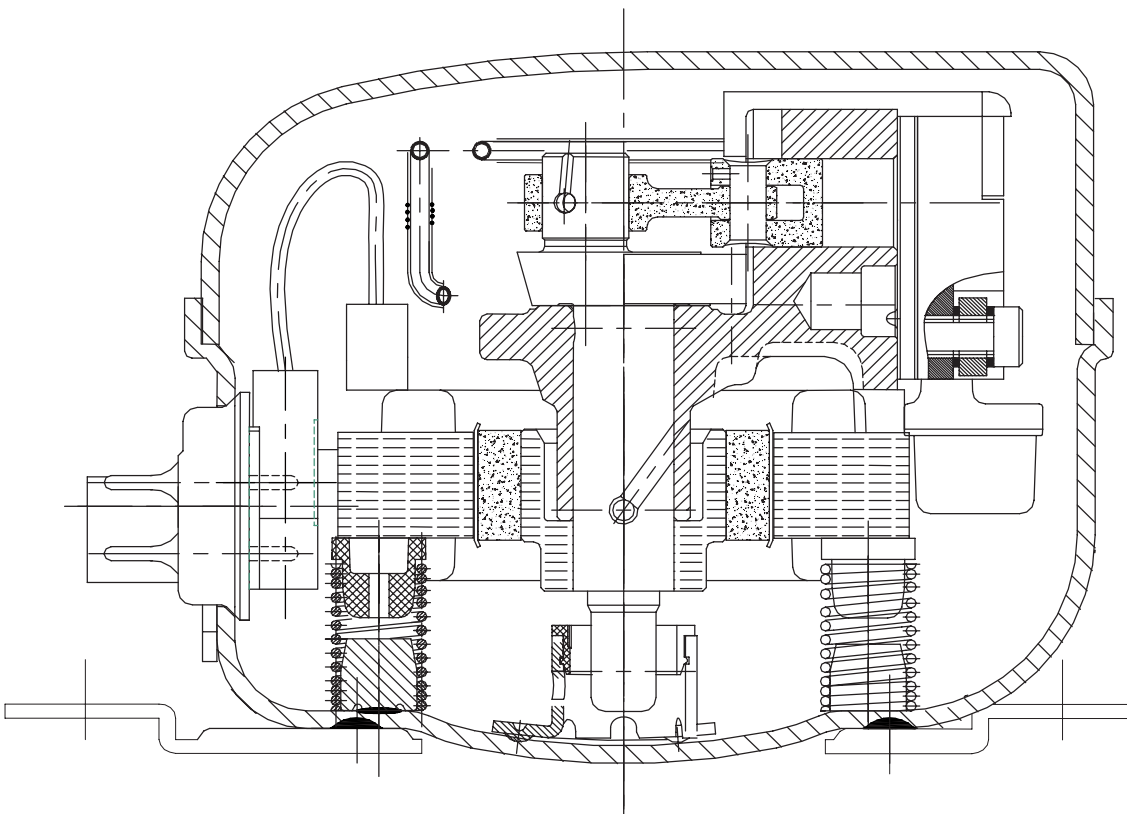

COLDEX
compressors

MK 2.0 VS LBP

Compressors for R134a 12/24 V DC
Technical specifications



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Thanks for choosing the R134a 12/24V DC compressor. Please read this manual thoroughly before beginning operation.

1 About the product

The compressor is intended especially for use in mobile applications, such as in caravans, cooling box, buses and boats. Due to their low energy consumption and highly efficiency. Compact in dimensions high reliable, the compressor is silent, efficient and powerful; The compressor for connection to 12V and 24V DC power supply, supplied either by a battery or by any other kind of filtered DC power supply, the DC voltage is allowed. It is designed to operate silently efficiently and reliably even with an inclination of 30° ,and works with the environmental - friendly refrigerant R134a. The compressor is can be use in the cooling box and freezers designed for capillary tube as the throttling device. The compressor is being especially quiet in operation, the compressor has high COP value. The will operate under continual heeling of 30° such as occurs on boats.

The Evaporating Temperature range: -35°C -5°C

Condensing temperatures range :

Max. 60°C at stable conditions and max. 70°C at peak load

Ambient temperatures range: Min. -10°C; max. 55°C

2 Features

- 2.1.Easy start, High efficiency.
- 2.2.Low noise, Low vibrancy, Long life cycle.
- 2.3.Attached Controller, Few attachment, Easy to use.
- 2.4.Rotary speed at 2300rpm 3500rpm adjustable.

3 Type

Hermetic reciprocating refrigeration compressor.

4 Technical Data

Table 1 Specification

| | | | | |
|------------------------------|-----------------------|--------------|-------------------|--------|
| Compressor Model | MK 2.0VS | | | |
| Displacement cm ³ | 2.0 | | | |
| Applications | LBP | | | |
| Rotation rpm | 2300 | 3000 | 3500 | |
| Capacity W | 35.0 | 45.0 | 52.0 | |
| Input Power W | 31.8 | 41.0 | 47.2 | |
| Operating Current A | 1.4/2.7* | 1.7/3.4* | 2.0 | |
| C.O.P W/W | 1.1 | | | |
| Operating Voltage V DC | 10.9 - 17V | 22.7V- 31.5V | 22.7V- 31.5V | |
| Cooling | Static or Fan cooling | | | |
| Lubricant | Polyester | | | |
| Lube Vol. ml | 80 | | | |
| Weight kg | 2.3 | | | |
| Weight of Controller kg | 0.20 | | | |
| Motor Type | BLDCM | | | |
| Refrigerant | R134a | | | |
| Throttling Device | Capillary | | | |
| Power V DC | 12/24 | | 24 | |
| Test conditions: | Evaporating Temp. | -23.3 °C | Suction. Temp. | 32.2°C |
| | Condensing Temp. | 54.4 °C | Sub-cooling Temp. | 32.2°C |
| | Ambient Temp. | 32.2°C | | |

5 Controller

5.1 Wiring

The Compressors are fixed with a brushless direct current motor which is controlled by electronically communicated Attached Controller the wiring is showed as the following drawing:

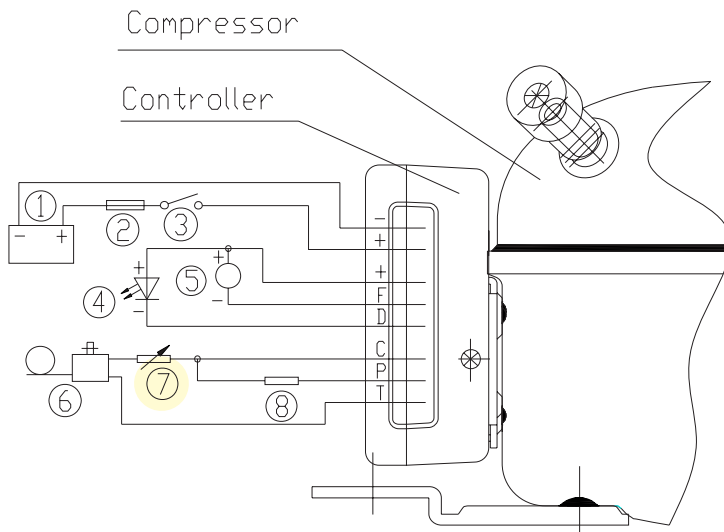


Diagram 1 Wiring Diagram

The components are as follow:

- | | |
|---------------------------------|--|
| ① Battery | ② Fuse |
| ③ Main Switch | ④ LED (optional) |
| ⑤ 12V DC Cooling Fan | ⑥ Thermostat |
| ⑦ Resistor for presetting speed | ⑧ Resistor for presetting battery protection voltage |

5.1.1 The Controller is connected to the battery directly, wrong connect the poles doesn't destroy the compressor and controller, but the compressor do not work;

5.1.2 The fuse must be connected in the + cable to protect controller, which close to the power supply, 15A fuse for 12VDC and 7.5A fuse for the 24VDC are recommended;

5.1.3 If a main switch is used, it should be rated to current of min. 20A;

5.1.4 To prevent voltage dropping, please avoid extra junction in the power supply system.

5.1.5 A Light Emitting Diode (LED) for compressor operation monitoring can be connected between the terminals + and D .

Operational errors will cause the LED to flash a number of times. The number of flashes depends on what kind of operational error was recorded. Each flash will last 1/4 second and each error will repeat every 4 seconds. Operational errors show by Table 5, please see it in page 5.

5.1.6 If a cooling fan is used. It must be connected to electronic unit terminals+ and F, only use 12VDC fan , no matter what power supply you are using;

5.1.7 A Thermostat is connected between the terminal C and T of the electronic unit. It will start or stop the running of compressor automatically;

5.1.8 A Resistor can be connected between terminal C and T, it allows you to adjust the speed of the compressor, the relationship between the resistor and the compressor speed shown by Table 3; please see it in page 3.

5.1.9 To ensure sufficient battery power for compressor and avoid permanent damage to the battery because heavy discharge. A battery protection resistor is connected between terminal C and P, the different resistor will get the different voltage protection, the details is showed by Diagram 4;

5.2 □ The Technical Specification of controller as follow:




Table2 Controller Data

| Compressor Model | | MK2.0 VS |
|------------------|----------------------------|-------------------|
| Controller | Model | 13216 |
| | Dimensions | 99mm× 68mm× 40mm |
| | Output Power W | 20W~ 140W |
| | Static Consumption Power W | ≤ 2 |
| | Max. Ambient Temp. | 55°C |
| | Max. Operating Current A | 12V≤ 12A 24V≤ 6A |
| | Startup Time Sec. | ≤ 6 sec. 1850 rpm |

5.3 Compressor Speed Setting:

The speed of compressor can be adjusted in a range of 2300 rpm/ 3500 rpm by adjusting the resistor of presetting speed:

Table 3 Speed Setting (Terminal C-T)

| | Resistor Ω | Speed rpm |
|--|------------|-----------|
| | 0 | 2300 |
| White Resistor  | 277 | 2500 |
| Black Resistor  | 692 | 3000 |
| Red Resistor  | 1523 | 3500 |

5.4 Standard Battery Protection Setting:

Table 4 Battery Protection Setting ± 0.1 V

| Protect Resistor KΩ | 12V cut - out V | 12V cut - in V | 12V Max Voltage V | 24V cut - out V | 24V cut - in V | 24V Max voltage V |
|---------------------|-----------------|----------------|-------------------|-----------------|----------------|-------------------|
| 0 | 9.6 | 10.9 | 17.0 | 21.3 | 22.7 | 31.5 |
| 1.6 | 9.7 | 11.0 | 17.0 | 21.5 | 22.9 | 31.5 |
| 2.4 | 9.9 | 11.1 | 17.0 | 21.8 | 23.2 | 31.5 |

| | | | | | | |
|-----|------|------|--------------------------------|------|------|------|
| 3.6 | 10.0 | 11.3 | 17.0 | 22.0 | 23.4 | 31.5 |
| 4.7 | 10.1 | 11.4 | 17.0 | 22.3 | 23.7 | 31.5 |
| 6.2 | 10.2 | 11.5 | 17.0 | 22.5 | 23.9 | 31.5 |
| 8.2 | 10.4 | 11.7 | 17.0 | 22.8 | 24.2 | 31.5 |
| 11 | 10.5 | 11.8 | 17.0 | 23.0 | 24.5 | 31.5 |
| 14 | 10.6 | 11.9 | 17.0 | 23.3 | 24.7 | 31.5 |
| 18 | 10.8 | 12.0 | 17.0 | 23.6 | 25.0 | 31.5 |
| 24 | 10.9 | 12.2 | 17.0 | 23.8 | 25.2 | 31.5 |
| 33 | 11.0 | 12.3 | 17.0 | 24.1 | 25.5 | 31.5 |
| 47 | 11.1 | 12.4 | 17.0 | 24.3 | 25.7 | 31.5 |
| 82 | 11.3 | 12.5 | 17.0 | 24.6 | 26.0 | 31.5 |
| 220 | 9.6 | 10.9 | Photovoltaic Solar Application | | | 31.5 |

Controller calibrator to the operating voltage automatically, when the battery voltage is lower than 17 VDC, the controller is working at a 12 VDC system automatically when the voltage is higher than 17 VDC the controller is working at a 24 VDC system automatically. If a 220KΩ resistor is connected between terminals C and P, the operating voltage range could be extended between 9.6V - 31.5V, this means components is very suitable for photovoltaic solar power application.

5.5 Error Indication

Operational errors will cause the LED to flash a number of times. The errors is showed by table 5. Each flash will last ¼ second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error recording is repeated every 4 seconds. The operational errors shown by LED (optional).

Table 5 Error Indications

| Number of flashes | Error Type |
|-------------------|--|
| 5 | <p>Thermal cut-out of controller</p> <p>If the refrigeration system has been too heavily loaded, or if the ambient temperature is higher than 55 °C, the controller will run too hot</p> |
| 4 | <p>Minimum motor speed error</p> <p>if the refrigeration system is too heavily loaded, the motor speed is lower than 1850 rpm.</p> |

| | |
|---|---|
| 3 | <p style="text-align: center;">Motor start error</p> <p>The rotor is blocked or the differential pressure of the refrigeration system is higher than 5 bar</p> |
| 2 | <p style="text-align: center;">Fan over-current cut-out</p> <p>The operating current of cooling fan is more than 1A</p> |
| 1 | <p style="text-align: center;">Battery protection cut-out</p> <p>Battery Voltage is outside the setting range shown in Table 4</p> |

6 Accessories

Table 6 Accessories

| No. | Title | Pieces | Model | Comments |
|-----|---------------------|--------|--------------------|-----------------------------|
| 1 | Controller | 1 | 13216 | MK 2.0 VS |
| 2 | Screw of controller | 1 | GB/T823-1988 M4× 8 | |
| 3 | Rubber grommet | 4 | MK 2.0 VS | Base on the demand of users |
| 4 | Grommet sleeve | 4 | MK 2.0 VS | |

7 Transportation and storage

7.1 Please keep the compressor perpendicularity, can not be turned upside down and avoid vibration and shocks during transportation.

7.2 The compressors must be mounted in the dry and clean place.

7.3 More than two layer package of compressors is not available, and avoid any rolling during loading and unloading.

7.4 After consignment, it is better store the compressors not exceeded by 6 months.

8 Precautions

8.1 The compressor is only allowed to connect a 12/24VDC system, it is forbidden to connect compressor directly with AC power supply.

- 8.2 The back gas tube on refrigeration system must be connected with the suction tube on compressor, not the process tube on it; otherwise the compressor can not work in gear.
- 8.3 Please mount the compressor into the refrigeration system quickly in 10 minutes after uninstal the tubes of the compressor (suggest to uninstal the process tube first).
- 8.4 Balance pressure (55 °C) before start the compressor □the pressure in the compressor could not more than 0.49MPa.
- 8.5 Do not operate the compressor before polyester is charged.
- 8.6 The refrigerant charge should be less than 100g.
- 8.7 The interval of compressor operation: it runs more than 3 minutes, also the stoppage is more than 3 minutes.
- 8.8 Special attention do not use the compressor as a vacuum pump, and do not start it under vacuum status too.
- 8.9 The refrigeration system should minimize the content of chlorines and moisture which must be free of paraffin and silicon.
- 8.10 To ensure correct start and operating conditions, the following cable dimensions must be observed

Table 7 Cable requirements

| Cross-section mm ² | Max. length between battery and Controller m | |
|----------------------------------|---|--------|
| | 12V DC | 24V DC |
| 2.5 | 2.5 | 5 |
| 4 | 4 | 8 |
| 6 | 6 | 12 |
| 10 | 10 | 20 |

9 After sales service:

We will recover or repair the compressors which was damaged or could not work normally due to the product quality (if the user abides by the manual correctly) after the compressors has sold at 36 months.

10 Appendixes

DIMENSION COMPRESSOR COLDEX **MK 2.0 VS LBP**

