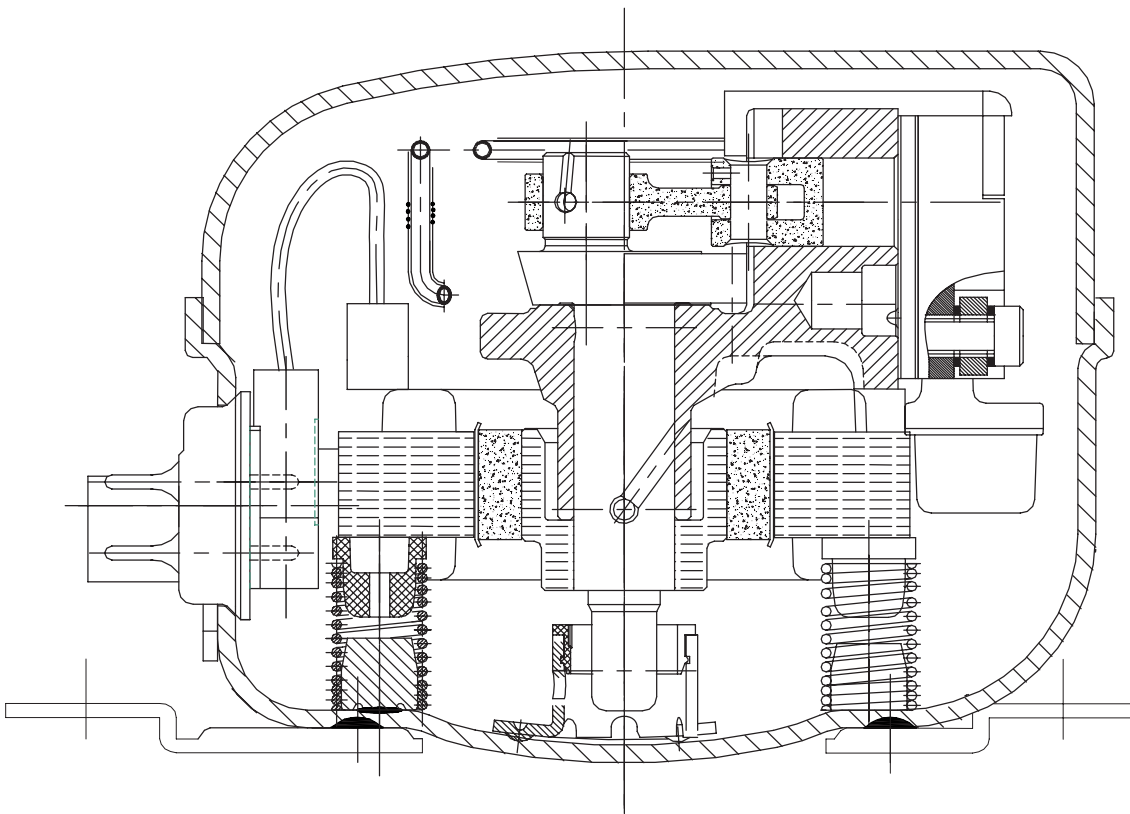

COLDEX
compressors

MK 1.3 VS LBP

Compressors for R134a 12/24 V DC
Technical specifications



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Thank you for choosing the **MK 1.3 VS LBP** R134a 12/24V DC compressor.
Please read this manual thoroughly before beginning operation.

1 Application range

Suitable for the cooling device with a power of 12 or 24V DC power supply, Evaporating Temperature at $-35^{\circ}\text{C} \sim -5^{\circ}\text{C}$, especially for using in whose volume is below 40L over-the-road refrigerant or mobile applications, and the refrigerant is R134a.

2 Features

- 2.1. Easy start, High reliable.
- 2.2. Low noise, Low vibrancy, long use life.
- 2.3. Attached Controller, Few attachment, Easy to use.
- 2.4. Rotary speed at 2500rpm ~ 3500rpm adjustable.

3 Type

Hermetic reciprocating refrigeration compressor

4 Technical Data

Table 1 Specification

Compressor Model	COLDEX MK 1.3 VS LBP			
Displacement, cm^3	1.3			
Applications	LBP			
Rotation, rpm	2500	3000	3500	
Capacity, W	22	27	31	
Input Power, W	22	27	31	
Operating Current, A	1.8/0.9	2.3/1.25	1.29	
C.O.P, W/W	1.0			
Operating Voltage, V DC	10.9	$\sim 17\text{V}$, $22.7\text{V} \sim 31.5\text{V}$	$22.7\text{V} \sim 31.5\text{V}$	
Cooling	Static or Fan cooling			
Lubricant	Polyester			
Lube Vol., ml	120			
Weight, kg	2.5			
Weight of Controller, kg	0.20			
Motor Type	BLDCM			
Refrigerant	R134a			
Throttling Device	Capillary			
Power, V D C	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 **MK 1.3 VS** LBP Compressors are equipped with a brushless direct current motor which is controlled by an Attached Controller, The wiring shown as following diagram:

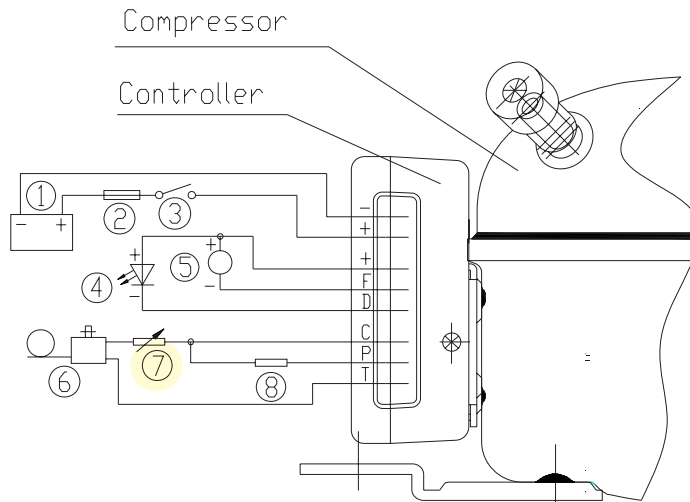


Diagram 1 Wiring Diagram

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 Controller connect directly to the battery, wrong connect the poles doesn't destroy the compressor and controller, but the compressor will not work;
- 5.1.2 Fuse must be connected in the + cable to protect controller, and 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 a 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) connected between "+" and "D" will indicate the state of the operation, a flash will last 1/4 second, and each error will repeat every 4 seconds, the error type see the Table 5;
- 5.1.6 Cooling Fan can be connected between "+" and "F", only 12VDC fan is admitted, no matter the power supply you're using;
- 5.1.7 A Thermostat connected between "C" and "T" will start or stop the compressors' running Automatically;
- 5.1.8 A Resistor can be connected between "C" and "T", it allow you to adjust the speed of compressor, the relationship between the resistor and the compressor speed is shown at Table 3;
- 5.1.9 To ensure sufficient power supply and avoid permanent damage to the battery, a battery protection resistor is connected between "C" and "P", and different resistor will get the different protection voltage, the details is shown at Diagram 4;

5.2、 The Technical Specification of controller is shown

Table 2 Controller Data

Compressor Model		COLDEX MK 1.3 VS LBP
Controller	Refrigerant	R134a
	Dimensions	99mm×68mm×40mm
	Output Power, W	20W~140W
	Static Consumption Power, W	≤2
	Max. Ambient Temp., °C	55
	Max. Operating Current, A	12V ≤12A、24V≤6A
	Startup Time, S	≤6 sec. (speed 1850 rpm)

5.3、 Compressor Speed Setting

The compressor's speed could be adjusted in range 2500rpm~3500rpm by adjusting the resistor of presetting speed:

Table 3 Speed Setting

Resistor, Ω	Speed, rpm
277	2500
692	3000
1523	3500

5.4、 Battery Protection Setting

Table 4 Battery Protection Setting (±0.2 V)

Protect Resistor (KΩ)	12V cut-out (V)	12 V cut-in (V)	12 V Max. Voltage (V)	24V cut-out (V)	24V cut-in (V)	24 V 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 applied voltage automatically, when the battery voltage is lower than 17 VDC, The controller consider it is working in a 12 VDC system, and When the voltage is higher than 17 VDC The controller consider it is working in a 24 VDC system. If a 220K Ω resistor is connected between "C" and "T", the operating voltage range could be extended between 9.6V~31.5V, this means **MK 1.3VS LBP** is very suitable for photovoltaic solar power application.

5.5、 Error Indication

If the start failed, the controller will attempt restarting every 60s, until a successful start is achieved. The following Table shows the Error Type and reason.

Table 5 LED Error Indications

Number of flashes	Error Type
5	Thermal cut-out of controller (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high than 55°C, the controller will run too hot)
4	Minimum motor speed error (if the refrigeration system is too heavily loaded, the motor speed is lower than 1850 rpm)
3	Motor start error (The rotor is blocked or the differential pressure of the refrigeration system is higher than 5 bar)
2	Fan over-current cut-out (The operating current of cooling fan is more than 1A)
1	Battery protection cut-out (Battery Voltage is outside the setting range shown in Table 4)

6 Accessories

Table 6 Accessories

No.	Title	Pieces	Model	Comments
1	Controller	1	12 / 24 volt auto	
2	Screw of controller	1	M4 x 8	
3	Rubber grommet	4	RU HC13 / SL HC13	

7 Transportation and storage

- 7.1 Please keep perpendicularity, can not be turned upside down and avoid vibration and shocks during transportation.
- 7.2 Please ensure to store the compressors under dry and well-ventilated condition to avoid the package getting wet.
- 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 had better store the compressors not more than 6 months.

8 Precautions

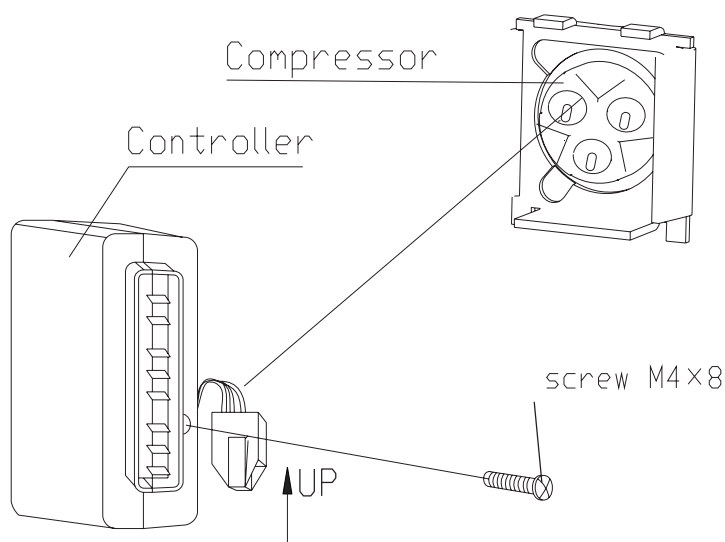
- 8.1 The compressor is only allowed to be connected to a 12/24VDC system, it is forbidden to connect compressor directly with an AC power supply.

- 8.2 The back gas tube on refrigeration system must be connected with the suction tube on compressor, not the process tube on compressor; otherwise the compressor can't 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 (43°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 200g.
- 8.7 The interval of compressor operation: Operation is more than 3 minutes, and the stoppage is more than 3 minutes too.
- 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, and must be free of paraffin and silicon.
- 8.10 In order to make the compressor work properly, 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 Drawing



DIMENSION COMPRESSOR COLDEX **MK 1.3 VS LBP**

