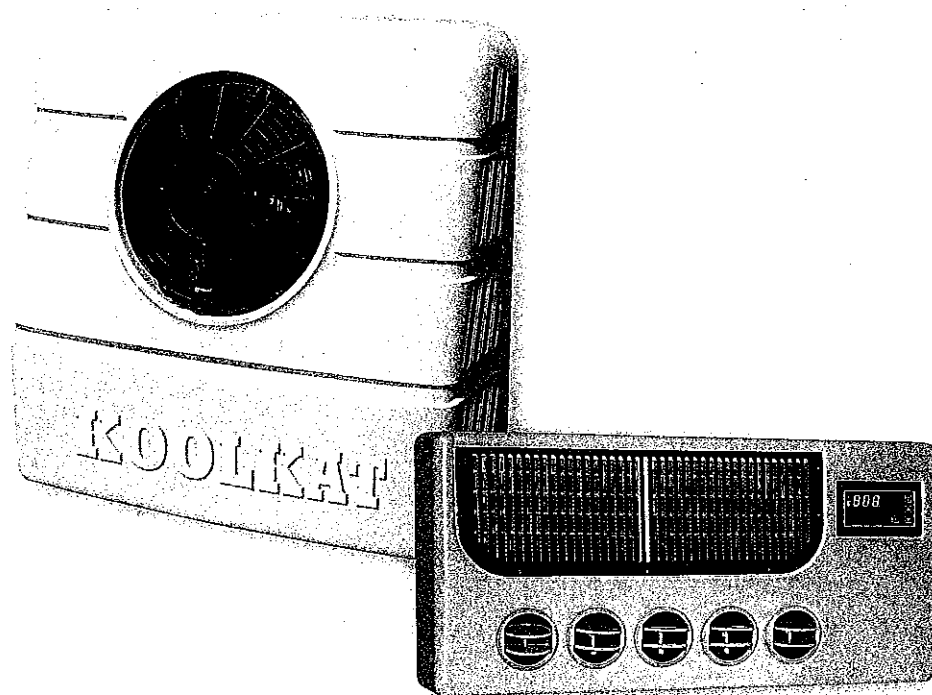


KOOLKAT

Electric Cooling Systems



K20F5

SERIES VEHICLE AIR-CONDITIONER

**Installation Operation And
Maintenance Manual**

Chapter 5. Unit Operation

1. Main function:

- 1). Cooling, evaporator fan low speed, fan middle speed, fan high speed, power shortage protect circuit output. Used to control the relevant electric relay;
- 2). Cooling, centigrade, low speed of fan, middle speed of fan, high speed of fan, five status indicator lamp. Three figure nixie tube.
- 3). 12V / 24V voltage abnormal protection function.
- 4). Switch input function
- 5). Power shortage of battery protection function.
- 6). The control function of remote controller, used to adjusting the setting temperature, wind speed switching, open / close machine, etc.

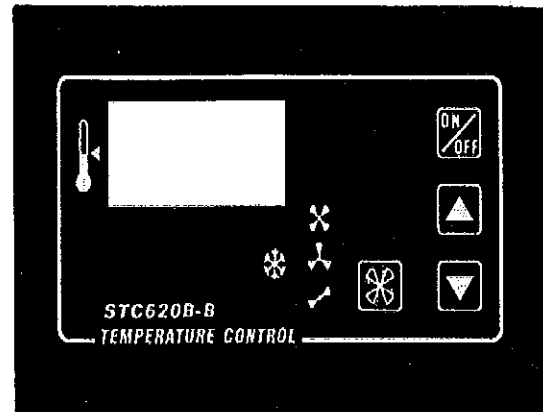
2. Specification:

- 1). The length of sensor line: 80cm (including the length of probe)
- 2). The length of load line: 30cm





3. Main technical parameter:

- 1). Power: 9-32V
- 2). Overall power consumption: less 3W
- 3). The range of measurement: $-30^{\circ}\text{C} \sim 60^{\circ}\text{C}$
- 4). The range of control: $-30^{\circ}\text{C} \sim 60^{\circ}\text{C}$
- 5). Temperature resolution: 1°C
- 6). Precision of measure temperature: $\pm 1^{\circ}\text{C} \pm \text{a half word}$
- 7). Compressor, evaporator low speed, middle speed of fan, high speed of fan, power shortage protection five-way output, rated load current of each way 250MA. loading output voltage is the supply voltage of control panel, output loading can control the relevant electric relay.
- 8). Sensor type: NTC sensor ($10\text{K}\Omega/25^{\circ}\text{C}$, B K Ω 3435K), two stalk sensor, one voltage detection signal input :one switch digital quantity input.
- 9). The front board protection grade: IP54
- 10). Running environment temperature: $-25^{\circ}\text{C} \sim 70^{\circ}\text{C}$
- 11). Storage temperature: $-35^{\circ}\text{C} \sim 75^{\circ}\text{C}$
- 12). Relative humidity: 20%~85% (non condensing)

4. Control panel



Key instruction:

-  : up switch
-  : down switch
-  : Power switch
-  : fan change

The control panel show the evaporator return air temperature.

5. Indicator lamp and state instruction

Indicator Lamp	Sign	State	Function
Refrigeration work	See the picture shown above	Flashing	Compressor relay time delay
Refrigeration work	See the picture shown above	Often bright	Compressor relay open
Refrigeration work	See the picture shown above	Off	Compressor indicator lamp off
Low speed fan work	See the picture shown above	On	(When low speed option) low speed fan relay actuation
Low speed fan work	See the picture shown above	Off	(When low speed option) low speed fan relay off
High speed fan work	See the picture shown above	On	(When high speed option) high speed, middle speed, low speed fan relay pull-in
High speed fan work	See the picture shown above	Off	(When high speed option) high speed, middle speed, low speed fan relay off
Middle speed fan work	See the picture shown above	On	(When middle speed option) middle speed, low speed fan relay pull-in
Middle speed fan work	See the picture shown above	Off	(When middle speed option) middle speed, low speed fan relay off

6. Key operation instruction

1). Modify the setting temperature

A. When open the power each time, after the nixie tube all display for one second it entering into stand-by mode, under stand-by mode, these isn't display. If measured main battery voltage is more than setting protection reset voltage, then the main battery power-lack electric protection output. It will display the setting mode of the temperature until the key start. Under the setting mode of the temperature, the nixie tube flash and showing the setting temperature at present.

B. Under starting up working state, pressing key up and down can adjust the setting temperature, nixie tube flashing showing the setting temperature at present. When setting end, it will stop flashing after three seconds, setting come into effect.

2). Methods of enter, change, quit the managerial menu

A. Under normal working state, pressing key up and key down together exceed for 10 seconds enter into managerial menu, at this time digital tube display F1.

B. Under managerial menu state, pressing key up and down can change the menu item.

C. Under managerial menu state, pressing key up and down together can enter into menu to change the state of parameter. At this time digital tube display parameter value.

D. Under parameter modify state, press key up or down can change the setting value on parameter item.

E. Under parameter item state, pressing key up and down return managerial menu state.

F. Under managerial menu or parameter modify state, There's nothing to do with key exceed for 10 seconds or pressing key up and down exceed for 3 seconds then detrusive temperature setting state, return normal working state.

3). Methods for enter power loss protection voltage setting
When it is power off, pressing fan key to charge for control panel, then entering into power loss voltage setting menu, digital tube display C1. Other setting and quit operation method same as managerial menu change and quit operation method.

4). Power switching key

When control work, pressing power switching key exceed one second, it will access power off state. Under power off

state, control panel relay all disconnect, nixie tube and indicator lamp do not display.

When close the control panel, pressing the power switch key exceed one second, the control panel will start, after nixie tube all display it accessing power on state, it can have temperature setting operation under the power on state. The temperature and mode can be memory after each operation. Under cooling mode: start-time delay two seconds- evaporator fan ten seconds- according to temperature condition judge whether meet the condition of opening the compressor.

5). Fan key

Under the normal working state: pressing the fan key can change fan's low speed, middle speed, high speed running state, when running on low speed, only the low speed fan relay pull-in, when running on middle speed, low speed and middle speed relay pull-in, when running on high speed, low speed, middle, high speed relay pull-in.

6). Defrosting running

Defrosting running is automatically run, defrosting sensor starts working (ON) from 0°C and stops working (OFF) at 8°C.

The compressor and the condenser fan stop working and the evaporator runs normally when defrosting is conducted. Display space alternate displays the temperature at present and dFr under defrosting state.

7. Menu parameter list

Menu grade	Item (F model)	The range of parameter	Default	Remarks
Managerial Menu	F1	F5~F4	20°C	Temperature setting parameter
	F2	0: 12V power supply 1: 24V power supply	0	Voltage option
	F3	1°C~25°C	2°C	Hystersis setting
	F4	F1~70°C	+30°C	Temperature the maximum setting value
	F5	-35°C~F1	15°C	Temperature the minimum setting value
	F6	0.1 minute ~5 minutes (step size 0.5 minute)	0.5	Compressor protection delay
	F7	F8~70°C	60°C	Exceeds upper limit alarm value
	F8	-35°C~F7	-50°C	Exceeds lower limit alarm value

When the temperature sensors measured temperature exceeds the setting upper limit temperature super F7, and set the duration of time over F9 minutes when the cycle of digital tube displays the current temperature and super-limit fault code **AtH**. The relay work as usual.





When the temperature sensor measured temperature lower than the minimum temperature super F7, and set the duration of time over F8 minutes when the cycle of digital tube displays the current temperature and super-limit fault code **AtL**. The relay work as usual.

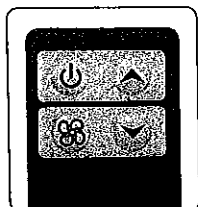
12. Wind speed key

Pressing wind speed key can switch among low speed, middle, high speed, at the same time the equivalent indicator light on. When switch to low speed, the fan is starting, low speed fan relay pull-in, middle speed fan and high speed fan disconnect. When switch to middle speed, the fan is starting, low speed fan and middle speed fan relay together pull-in, high speed fan relay disconnect. When switch to high speed, when the fan is starting, low speed fan and middle speed fan relay together pull-in.

13. Remote control

Remote control keys are:

- key  : raised
- key  : lower
- key  : Power switch
- key  : speed switch



Remote control functions: In addition to enter the management menu and adjust menu parameters, can use to the other buttons to operate with the panel. Upward and downward by keys can be set to adjust the temperature, press the power key to switch machine to close.

13. Fault code table

Fault code	Fault information content
CtS	Cabin Temp Short
CtO	Cabin Temp Open
dtS	Defrost Temp Short
dtO	Defrost Temp Open
PSO	Pressure Switch Open
OvP	Over Voltage Protection
UvP	Under Voltage Protection
tbL	Truck Battery Low
AbL	Auxiliary Battery Low
AtH	Ambient Temp High
AtL	Ambient Temp Low
dFr	Defrost Protection

- 1). The nixie tube show the fault code when it has faults.
- 2). When the fault removed, the system will quit protection and enter normal operation according to the mode before protection..

Chapter 6. Daily Check and Maintenance

Checking and maintenance the air-conditioner properly and timely can keep the unit in a good operating condition all the time, which can increase the service time and reduce the breakdown. We suggest you doing like the following items.

1. Daily Check and Maintenance

1). Check the refrigerant charge

This unit system is very small, so please add the accurate refrigerant charge, or that will made a great impact on the pressure of the whole system. Please add according to the nameplate. (R134a is only allowed)

2). Check the leakage of the cooling system

If oil pollution occurs to the joint or some part of the cooling system, it means refrigerant leakage happens to the part. If the pollution occurs to the joint, screw down the joint tightly. if any further leakage, please go to the nearest authorized maintenance station of Koollkat or contact with the Koollkat after-sales service department.

3). Clean air filter net

Wash the evaporator filter net once in a week, take the air filter out and check the cleanness of it. First blow the air filter with the compressed air or wash it with the warm water which contains the neutral detergent, then wash it again with the clean water.

4). The air conditioner is forbidden for any usage when the failure light is on. That the failure light is on means some fault happens to the air conditioner. If the air conditioner is still used under such case, it' s like the continuous work with sickness, which only makes the sickness more serious and cause damage to the air conditioner system or the components & parts.

5). Shot connection on the pressure switch is not allowed under any condition. The air conditioner pressure protection fails if the pressure switch is connected short and damage to the components & parts of the air conditioner will be caused once abnormality occurs.

6). Vehicle heat load increases drastic under the sunlight insolation, which make the condensation and evaporation pressure of the unit raise, and the cooling speed will slow down.

7). Please set the normal rotation speed of the motor and compressor at 2800RPM, Do not too high or that will damage the compressor easily, and reduce the service time.