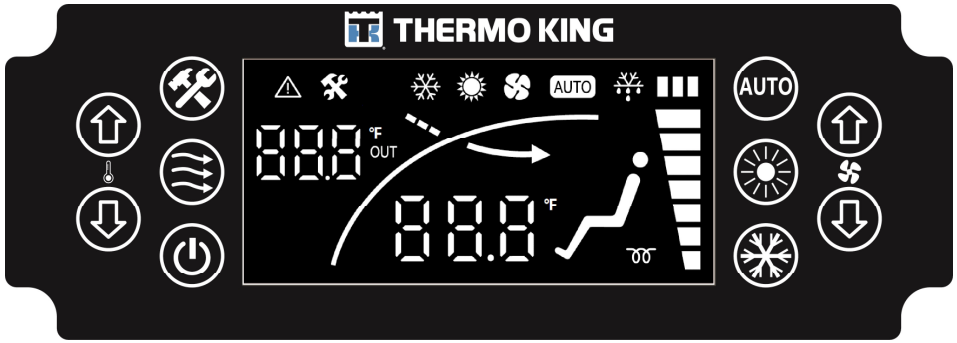
E-Bus iCAN A/C Controller

Operation Manual



THERMO KING

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E-Bus iCAN A/C Controller Operation Manual

Overview

I-CAN Controller is used for E-Vehicle A/C system, which includes: ventilation, cooling, heating, temperature adjustment, Internal and external circulation switching and LED display interface and so on. It has strong anti-interference ability, concise appearance, and easy operation and so on.

1. Application scope

The control system is developed for E-bus air-conditioner, which includes ECU (Electrical Control Unit) and HMI (Human Machine Interface). ECU and HMI are linked via CAN bus. Unit has many functions such as auto, cooling, heating ,ventilation, auto defrost, fresh air, alarm management and so on, equipped with evaporating fans controlled by PWM with 7 steps, VF compressor, condensing fan controlled by PWM with 2 steps, PTC and LED display.

2. Technical parameters

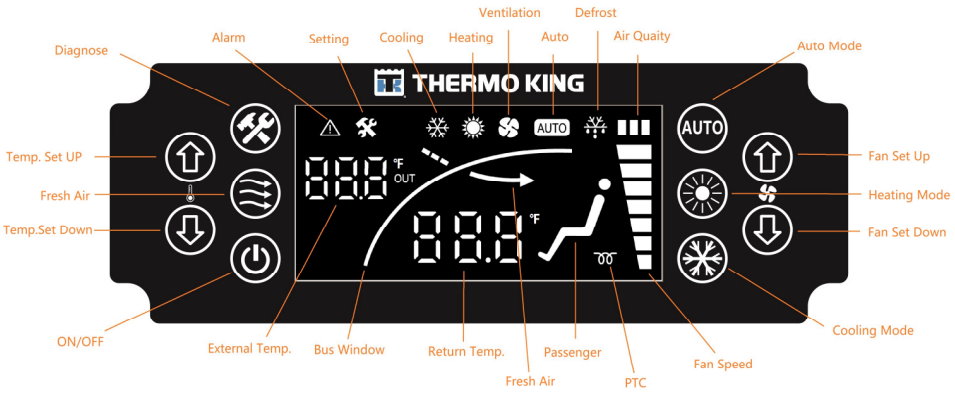
Nominal voltage:	DC 24V
Working voltage range:	DC18V~DC32V
Setpoint temperature range:	15℃~32℃（default）
Temperature display range:	Return temp.: -20℃~85℃（resolution: 0.1℃）
Storage Temperature:	-40℃～85℃
Working Temperature:	-40℃～85℃
Relative humidity:	0%~85%
Atmospheric pressure:	86～106Kpa
Temperature sensor numbers:	Max to 6

3. Main signal of control system

E-BUS CONTROL SYSTEM	
Power supply	DC24V （18V~32V）
Compressor Enable	Compressor enable signal
NTC sensor	25℃@10KΩ
HP&LP Switch	Normal when closed, Fault when open
Compressor temperature protection switch	Normal when closed, Fault when open
DC/DC power input	Check DC/DC voltage of output
Inverter Fault	Feedback by CAN Communication
Inverter Frequent Setting	By CAN Communication

4. Control panel instruction

Keyboard and LED display



5. Basic function instruction

Function	Instruction
Unit Start/Stop	Press ON/OFF key to start the unit when unit is off. The indicator LED will be displayed when unit is on. Press the ON/OFF key to stop the unit when the unit is on. The indicator LED turns off and the unit will be shut off. Then unit will run the mode which be recorded in the memory, but fresh air damper state will be cleared if power is restarted. All parameters will be stored in memory after pressing key .
Fresh Air Switch	After pressing fresh air button ,the indicator LED will be energized and fresh air damper will be open; If press fresh air button again ,the indicator LED will be shut down and fresh air damper will be closed.
Mode Selection	When the unit is powered on, press operation mode key: AUTO , heating , cooling , the indicator LED will be energized as AUTO , heating , cooling correspondingly. When unit is under cooling or heating mode, press cooling key or heating key accordingly, system will go to ventilation mode .
Temperature Setup	When unit is powered on, the indicator LED displays return air temperature. Once press temperature set key , indicator will show temperature set value. The set value ranges from15℃ to 32℃ and changes in steps of 1℃. For any change of set value will be saved after 5s and LED return to home mask.
Fan Speed Selection	Press key to set blower speed ranges from step1 to step7 in manual mode.
Temperature Display	When unit is powered on, press diagnose key to enter temperature display mode, temperature value will be displayed on LED. Press key to select the temperature you want (right-side air supply, left-side air supply, defrost, ambient). When showing the ambient temperature, "OUT" OUT LED will be ON. If the value reaches the limit, the number displayed will be 99.9 or -99.
AUTO Mode	Press key , then indicator AUTO will be lightened and unit will change to AUTO mode. Procedure: 1. If change COOLING mode into AUTO mode, evaporating fan will run automatically. 2. According to the return temperature, controller will decide running mode once running in AUTO mode. If return temperature is greater than the set point, the unit will run AUTO COOL mode; similarly if return temperature is lower than the set point, the unit will run AUTO HEAT mode. When running in AUTO mode, if return temperature sensor fails, system will exit from AUTO mode.
Alarms	When some of the alarms are active, after pressing "AUTO" AUTO key for 3 seconds, alarm code will be displayed, after pressing "AUTO" key again, the system will exit from fault mode.
Cooling/Heating Interlock	If current is heating mode, meanwhile PTC or compressor is running properly, then "COOLING" key will be locked; If current is cooling mode, and compressor is running properly, then "Heating" key will be locked.

Manual Defrost	Long press key for 3 seconds, then after a short beep, manual defrost will be active, if long press key again, quit defrost immediately.
Compressor Protection	For starting up with load is not allowed, compressor will be off for at least 3 minutes after shutting down except in defrost status.

6. Alarm

If some alarms are active, LED display can show user alarm code to help them check problems, meanwhile the alarm led turns to flash. At this moment, long press the key "AUTO" to scan alarm codes, if long press the key "AUTO" again, will go back to main mask. See detailed information in below table.

Table.1: Alarm list

Code	Fault Description	HVAC Action
E01	R1 air outlet temperature sensor short circuit	Compressor switch off PTC switch off
E02	R1 air outlet temperature sensor open circuit	
E21	L1 air outlet temperature sensor short circuit	Compressor switch off PTC switch off
E22	L1 air outlet temperature sensor open circuit	
E41	Return air temperature sensor short circuit	Default 25℃
E42	Return air temperature sensor open circuit	
E51	Ambient temperature sensor short circuit	<Heating> -5℃ <Cooling> or <Ventilation> 25℃
E52	Ambient temperature sensor open circuit	
E61	Defrost temperature sensor short circuit	Compressor switch off
E62	Defrost temperature sensor open circuit	
E71	Outlet water temperature sensor short circuit	Stop BMS
E72	Outlet water temperature sensor open circuit	
E81	Inlet water temperature sensor short circuit	Alarm only
E82	Inlet water temperature sensor open circuit	
oH1	Supply temperature is higher than 55℃ in PTC mode	PTC off (fault unlocked when repowered)
Err	Inverter Fault	Compressor switch off
EPL	Low pressure alarm	Compressor switch off
dPH	High pressure alarm	Compressor switch off
ErP	Pressure switch alarm(DPH or EPL occur more than 6 times within an hour)	Compressor switch off
Eot	Overheat or high pressure Fault	Compressor switch off
dCH	DC/DC supply power voltage exceed 32V	Cut off all outputs
dCL	DC/DC supply power voltage below 18V	Cut off all outputs
PoH	Battery voltage above 32V	Cut off all outputs
PoL	Battery voltage below 18V	Cut off all outputs
dCF	DC/DC fault	Cut off all outputs
bSL	Battery Cooling lock	Stop BMS
Cn1	ECU CAN Communication fault	Cut off all outputs
Cn2	Bus CAN communication fault	Cut off all outputs
Cn3	Compressor CAN communication fault	Compressor switch off

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