ET270-E12

TRUCK REFRIGERATION UNIT

OPERATION MANUAL

FOREWORD

Thank you For buying Kingtec brand ET270-E12 series truck refrigeration units.

Honored customer, Kingtec Group is a professional manufacturer and supplier of truck refrigeration unit, walk-in cooler equipment, bus air conditioner, railway train and subway air conditioner, and commercial air conditioner. Kingtec refrigeration and air conditioning products are sold all over the People's Republic USA and South East Asia. Kingtec has passed ISO 9001 quality control certification. The company has strong engineering team, up-to-date manufacturing equipment, perfect testing means, and scientific and modern enterprise management in developing, manufacturing, and sales high quality Kingtec products, and serving customers, which satisfy their needs and requirement.

Honored customers, Kingtec formally notice you that please carefully read this manual before unit operation. If you have any questions, please contact Kingtec dealers or Kingtec as soon as possible that we can serve you very soon.

Special notice: Kingtec is responsible only for its refrigeration unit quality and is not liable in any special, indirect, or consequential damages and losses.

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Unit General Description

ET270-E12 split direct drive unit series are specially designed and manufactured for small size refrigeration trucks suitable for 6 through 12 cubic meters truck box volumes and inside temperature 77 to 13 ℉ application, has following characteristics.

- Condenser and Evaporator combined into one united body with new unique appearance design, reasonable parts arrangement easy to install and operate;
- Import compressors specially for transport refrigeration, using environment friendly refrigerants R134a;
- Heat exchanger coil using inner screw grooved copper tube and waved Aluminum fins has long life and high performance.
- Control and safety parts are all internationally famous brand, reliable and accurate.
- Automatic microprocessor controller has functions of temperature display, temperature setting, automatic temperature control, and hot gas defrost etc.
- Every unit is checked and test run before rolling out from factory.

ET270-E12 front mount condenser and evaporator unit

Specifications

Unit models		ET270-E12
Application temperature（℉）		77～13
Type		Split direct drive
Suitable box volume (m^3)		6～12
Refrigeration capacity(w) /86℉	32℉	10200（Btu）
Compressor	model	PD2-18012A
	type	Electric Scroll Compressor
	Displacement	18cc
	oil	RL68H
Condenser and evaporator	type	Front mount Condenser and Evaporator combined into one united body
	fan	Axial flow fan
	voltage	12V
Throttle		TXV w/ outside balance
Refrigerant		R134a

Refrigerant charge(Lb)		2.4
Defrost		hot gas
Dimensions	Evap. and Cond. assembly	1537X680X200(mm)
		985x565x180(mm)
Unit current	DC12V	130A
	AC220V	6.8A
Weight(Lbs)	Evap. and Cond. assembly	41
		166

Note: 1. Box volumes listed above is for reference, and actual volumes should decided by box insulation and sealing, application inside and outside box temperatures, the kind of transport perishable products etc.

2. Kingtec reserves the right to change above specification without pre-notice.

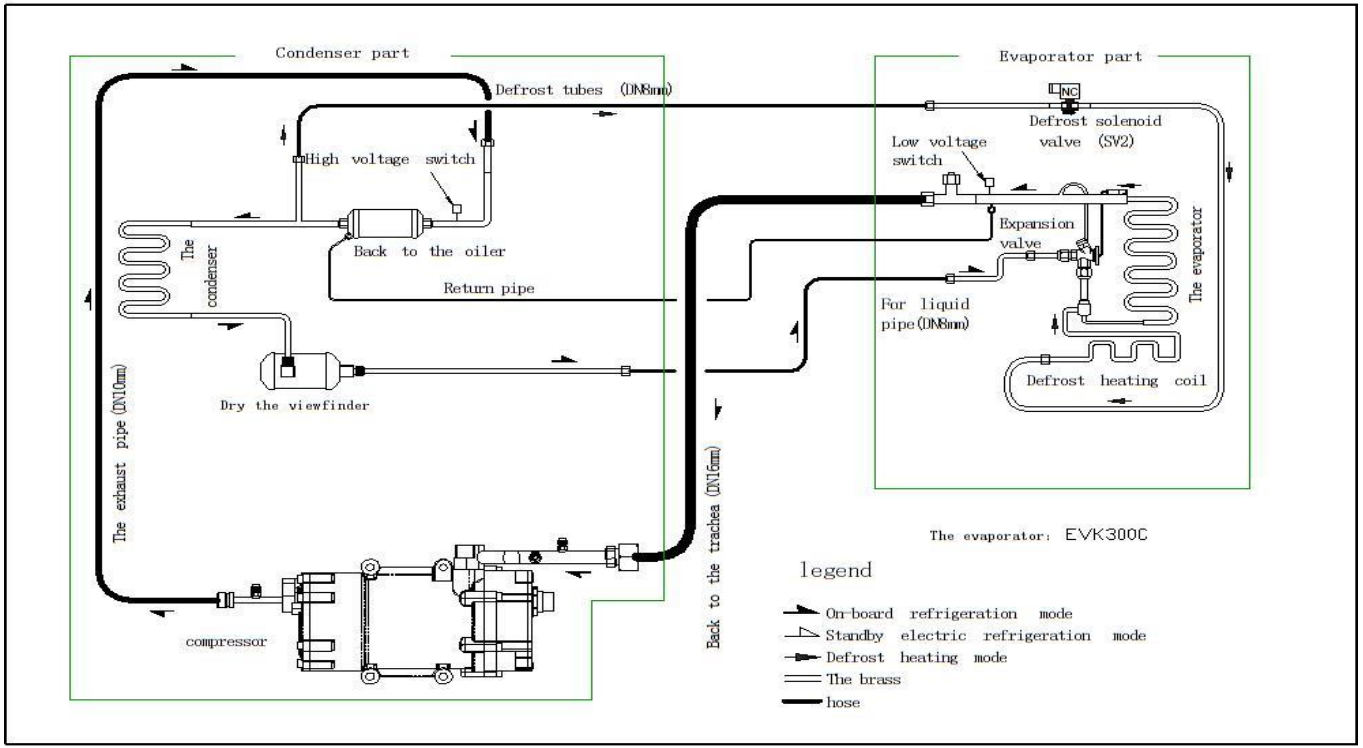
3. Contact Kingtec for application and special requirement.

Unit working principle and system cycles schematics

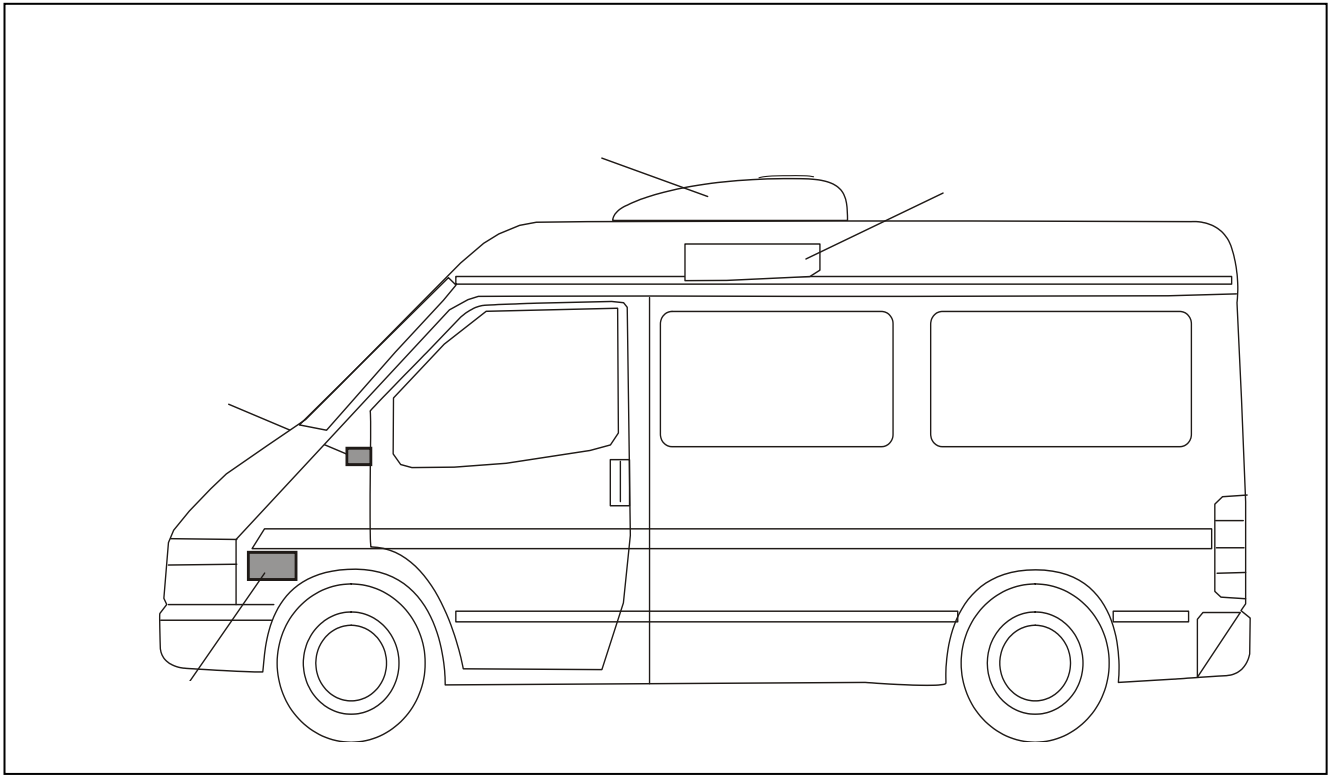
Refrigeration principle. The compressor driven by truck engine, discharges high temperature high pressure refrigerant gas to condenser. And the gas condenses in the air-cooled condenser, changes to liquid, and flows into receiver. Then the liquid passes filter-drier which removes water and impurity in the fluid and thermo-expansion valve (TXV) which reduces liquid pressure. Later, the fluid flows through evaporator and evaporates, and absorbs heat from and reduce temperature of air inside truck box. Finally, the gas refrigerant suck back to complete the refrigeration cycle. The refrigeration system continuously cycles in this way and therefore reduce the truck box inside air temperature. When the inside temperature near to set temperature, compressor clutch is open, compressor stops working. Otherwise when air temperature inside truck box rise up to higher than set temperature, compressor clutch closes, compressor starts to work.

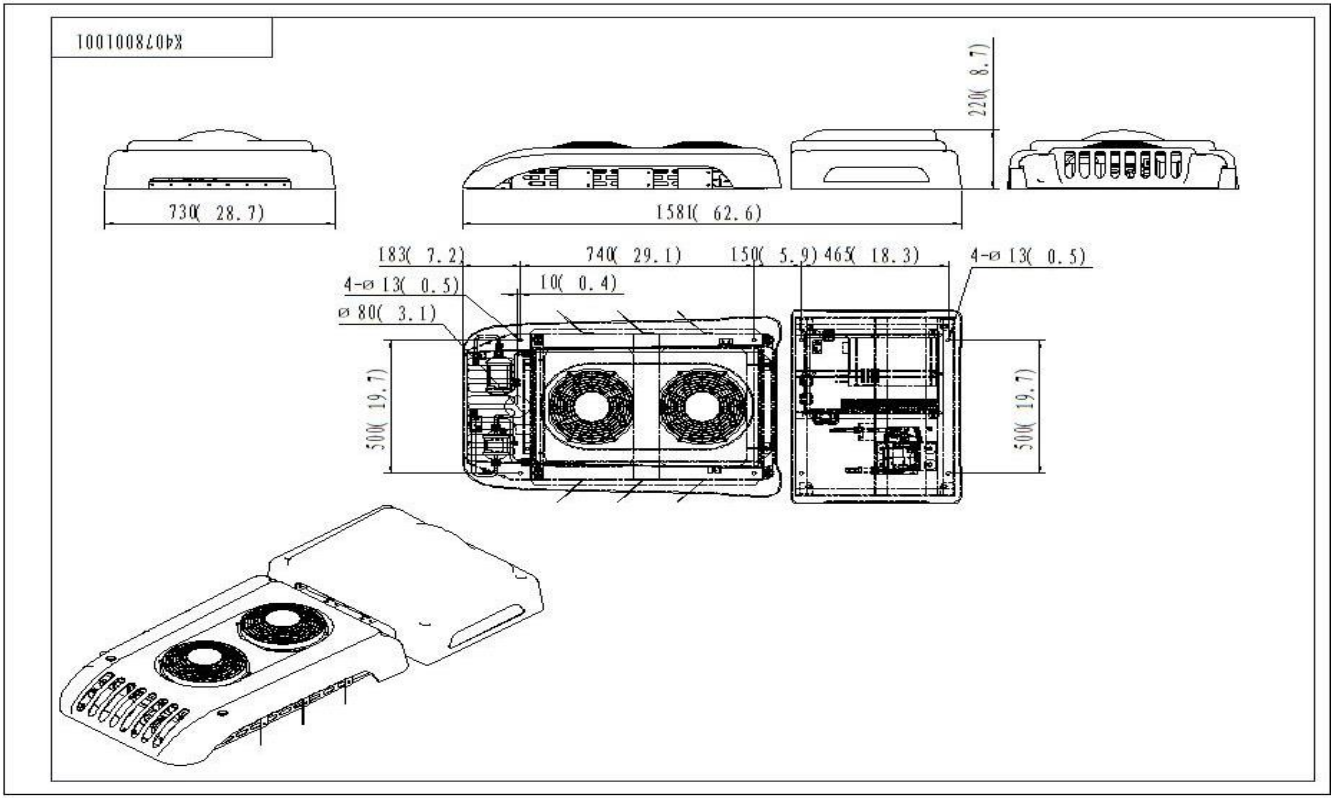
Defrost principle. During defrost, defrost valve is open, most high temperature gas refrigerant flows into defrost tube in water pan and evaporator coils to melt frost icing on evaporator coils. Refrigerant flows back to compressor by suction line. After defrost, the defrost valve close, system starts to refrigeration cycles.

Refrigeration/Defrost cycle schematics



Installation




730(28.7)
1581(62.6)
220(8.7)
183(7.2)
740(29.1)
150(5.9)
465(18.3)
4-ø 13(0.5)
10(0.4)
4-ø 13(0.5)
ø 80(3.1)
500(19.7)
500(19.7)

Installation procedure

1. Remove unit condenser assembly cover, uses bolts in spare part kits to fix the condenser assembly to truck box body wall or roof (see installation schematics for position). Note that the installation height must not be higher than truck box.
2. Install compressor and accessories.
3. Use connectors, o-rings, and rubber hose connect system separate assemblies and parts together (drill holes or opening on the truck box body for passing through hoses).
4. Install control box, wiring electric harness. Note unit application voltage and electric poles.
5. Fix rubber hose and electric harness.
6. Use Nitrogen to test refrigeration system sealing. The system should be charged to 3.5 MPa and can keeps the pressure 5 min. to check leakage. Be sure no leak on every connecting points.
7. Use vacuum pump to vacuum the refrigeration system to lower than 0.67 mbar.
8. Charge the refrigeration system to prescript refrigerant and weight.
9. Run engine, commission the unit, watch its operation at lease 2 hours.

Note: Unit should be installed by professionals. If there are any problems in installation, please contact Kingtec.

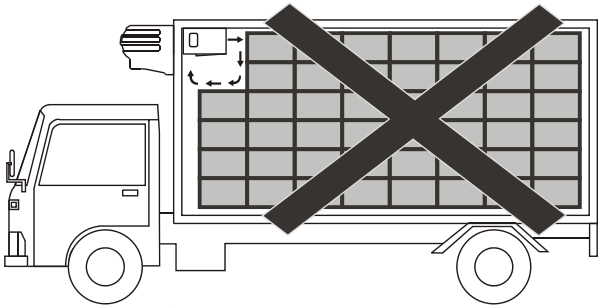
Recommended Perishable Product Transport Temperatures

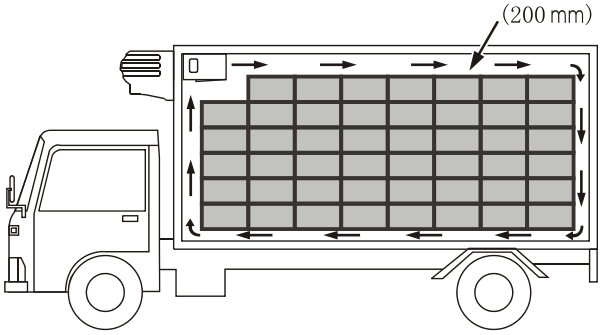
Below are recommended perishable products transport temperature for you reference. Actual set temperature depends on special transport and store provisions and conditions.

Transport products	Set temperature
ice and ice cream	-20℃
deep frozen products	-18℃
organ, transplant organ	-18℃
sea food	-18℃
butter, cream	-14℃
eggs, offal, poultry, and game	-12℃
meat	-10℃
fresh seafood and meat	+2℃
dairy products	+3℃
fresh fruits and vegetables	+5℃
banana	+15℃

ading notice

1. Transport refrigeration unit is only for keeping transport product at its temperature. Please low product to its required temperature before loading.
2. User can set truck box temperature at the transport products required.
3. Low truck box air temperature to required set value and defrost once before loading.
4. Products should keep 150 mm from front wall, 200 mm from roof, and leave rooms on floor when loading for air return flow. (wood pallets or Aluminum channel is suggested)
5. User should clean condenser air side periodically to ensure its heat exchange efficient.
6. Please shut down unit immediately if abnormal situation appears, and restart the unit only fix the malfunction.





Electric Working Principle

1. Cooling. On the normal system refrigeration pressure condition, if box air temperature is higher than set value, compressor works(working status depends on set parameters), condenser fan and evaporator fan work also. If box air temperature is low than set value, compressor, condenser fan, and evaporator fans are all out of work.
2. Defrost. When defrost function is on, compressor, condenser fans, and defrost solenoid work, but evaporator fan is out of work. Unit is on defrost until the end of defrost time duration. Then defrost stops and unit is back to normal cooling function. When defrost time interval is timed out, a new defrost start. Defrost cycles periodically as stated above.
3. Malfunction alarm.： Temperature sensor open and short display, unit is out of work. Check circuit or change temperature sensor. Defrost Temperature sensor short and open display, unit is out of work, Check circuit or change temperature sensor.When there is alarm form air-exhaust sensor circuit open or circuit short,the whole
   unit will stop working. The circuit should be check or the sensor should be replaced. Air outlet temperature sensor open and short display, unit is out of work; Check circuit or change temperature sensor.Refrigeration system pressure alarm display: control cut off all output, and unit is out of work. Check refrigeration pressure and/or change pressure switch. High and low voltage alarm display, and unit is out of work, check battery and power supply; alarm for not generate electricity, unit is out of work, check if transformer is malfunction; stand-by system has three phase AC protector which can test power supply automatically. As three phase AC comes forth fault phase and open-phase, buffer will sound to display, unit is out of work, check three phase AC fault phase and open-phase.
4. Control box output protection: compressor --5A fuse； condenser fan--20A fuse；evaporator fan --20A fuse； defrost output--5Afuse；controller power input--5A fuse.

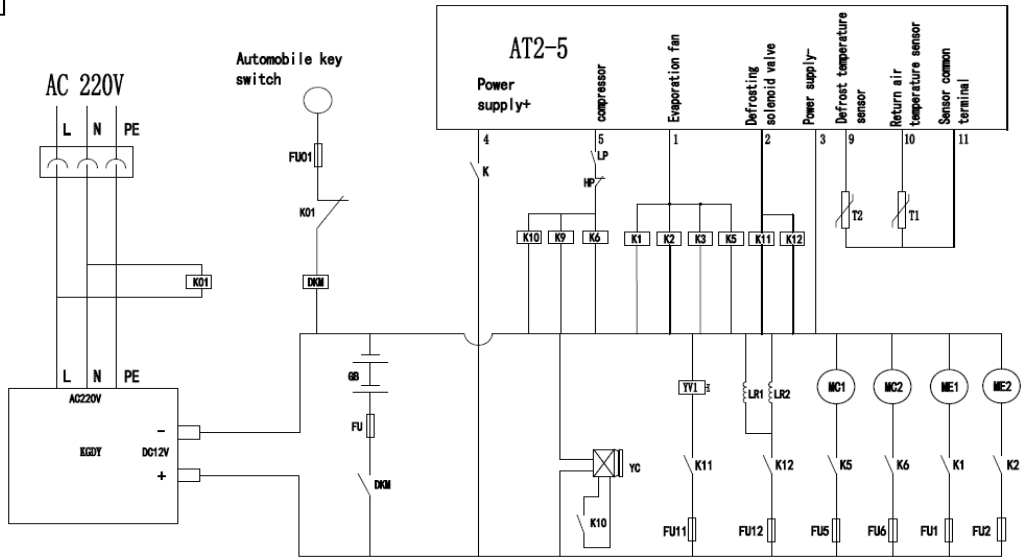
Common Troubleshooting

Items	trouble phenomena	possible reasons	disposals
1	unit dose no cooling compressor dose no work	clutch, loss belt, compressor, electricity	repair/change tighten/change repair/change check/repair
2	unit runs w/o cooling or w/ weak cooling	compressor valve , system pressure, loss belt, box body insulation or door air leak, blocked evap. Air flow	repair see item 3 tighten repair see item 4
3	System pressure abnormal: high condensing pressure, low suction pressure,	very dirty condenser, condenser fan, air in system, over charged	Clean, Repair, discharge off & recharge, discharge the extra

	high suction pressure	system dirty/ice block inside, refrigerant leak, TXV, heavy frost evaporator compressor valve, defrost solenoid	repair, check/repair, repair/change defrost change repair/change
4	blocked evaporator	heavy frost coil, evaporator fan	see item 5 repair/ change
5	Abnormal defrost cycles: Auto start defrost fault, auto start but no defrost	electricity, electricity, defrost solenoid, clutch, compressor	check/repair check/repair repair/change repair repair
6	controller malfunction	incorrect parameter setting, sensor, wiring, control box	re-setting, repair/change check/repair repair/change

Electric Principle Diagram and Wiring Schematics

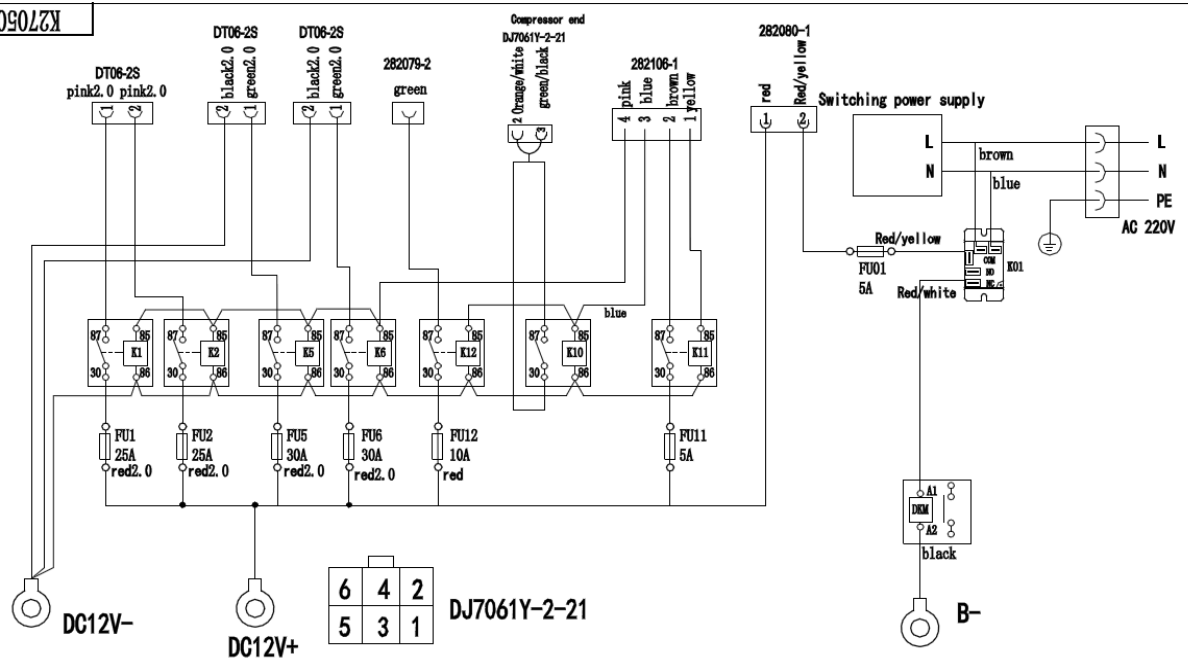
K2705001000



number	code	name	number	code	name
1	ME1-2	Evaporation fan	13	LP	low tension switch
2	MC1-2	Condensing fan	14	KGDY	Switching power supply
3	YC	compressor	15	DKM	Dc contactor
4	YV	Defrosting solenoid valve	16		
5	T1-2	temperature sensor	17		
6	GB	Vehicle storage battery	18		
7	K1-12	Five-pin relay	19		
8	FU1-12	Sheet insurance	20		
9	FU	Safety assembly	21		
10	LR1-2	Heating line	22		
11	HP	high-tension switch	23		
12	AT2-5	control panel	24		

name	schematic diagram	K2705001000
model	ET270-E12	
material		
remarks	AT2-5/AC220V	

K2705003000



Note: 1, 2 is the first gear, 2, 4 is the second gear, and 2, 3 is the third gear.

Remarks: K1, 2 are evaporation fan relays, K5-6 is condensation fan relay, and K10 is compression. Machine relay, K11 for defrosting relay, K12 for water tray heating plate;

name	Wiring diagram of electrical box	K2705003000
model	ET270-E12	
material	AT2-5	
remarks	DC12V/220V	

KINGTEC TRANSPORT REFRIGERATION UNIT

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