Controller Manual

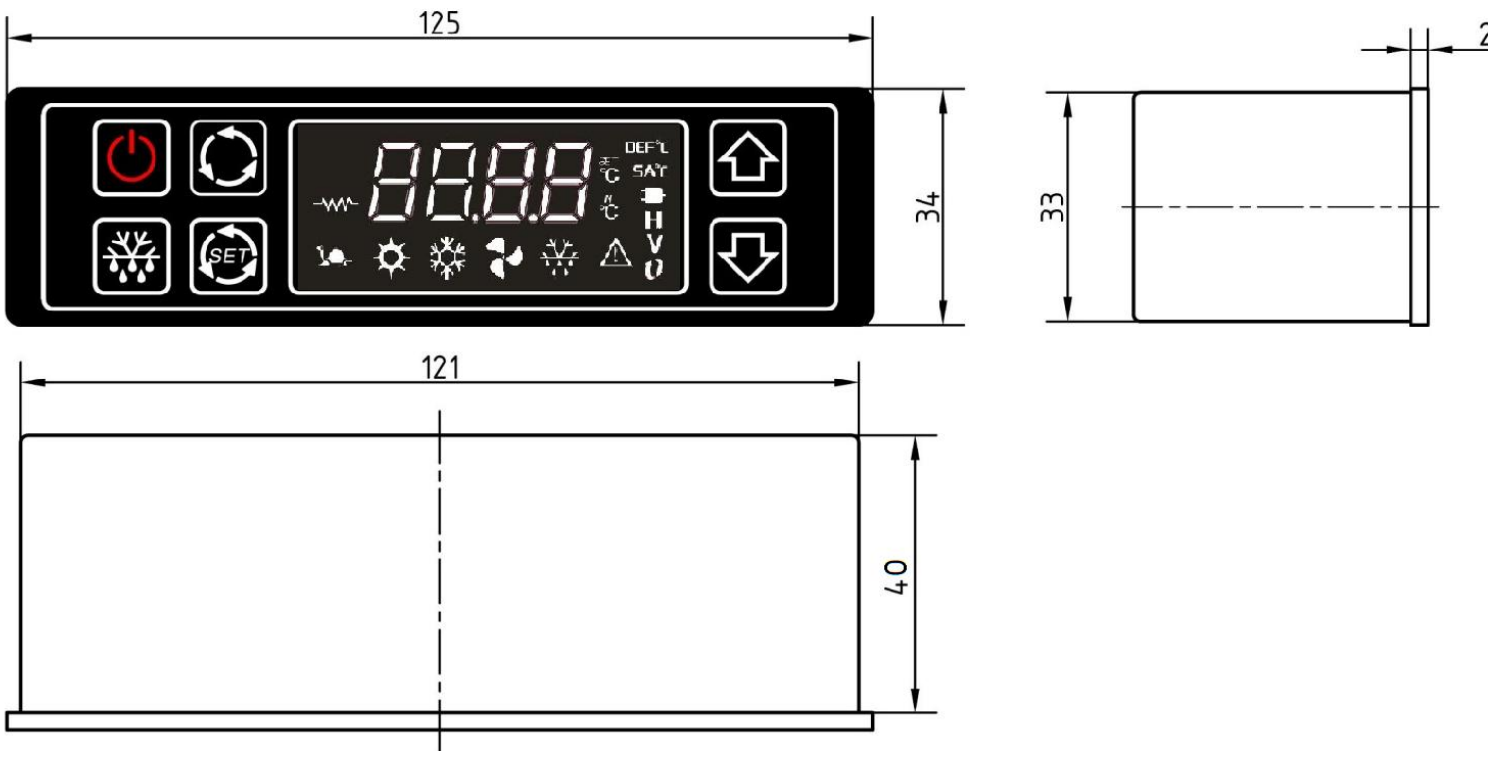
【Model：LDRP1141】

Independent Refrigeration Unit Controller

Technical Data

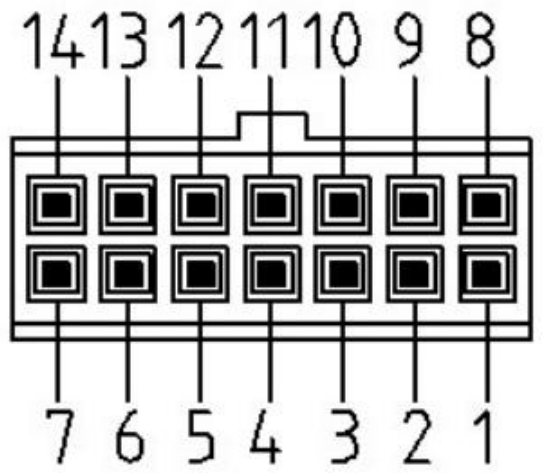
- ■ Rated voltage **DC24V / 12V**
- ■ Voltage max. available range **DC16V ~ DC32V / DC8V ~ DC16V**
- ■ Rated current **Less than 100mA**
- ■ Voltage detecting range **DC0V ~ DC50V**
- ■ Temperature adjusting range **-20℃ ~ 85℃**
- ■ Accuracy of temperature setup **1℃**
- ■ Temperature setup range **-40℃ ~ 40℃, Subject to advanced parameters value setup F08~F07**
- ■ Accuracy of temperature display **0.1℃**
- ■ Temperature display range **-40℃ ~ 85℃**
- ■ Temperature detecting controlling standard **Container temperature is subject to sensor of return air inlet; defrosting temperature is subject to sensor of return gas pipe**
- ■ Temperature sensor model **B = 3275K at 25℃, R_{25} = 5KΩ**
- ■ Pressure switch signal type **Normally earthing; be off and impending when there is a fault**
- ■ Evaporator blower control output **Max. 3A**
- ■ Compressor control output **Max. 3A**
- ■ Condenser fan control output **Max. 3A**
- ■ Defrosting valve control output **Max. 3A**

Controller Dimensions



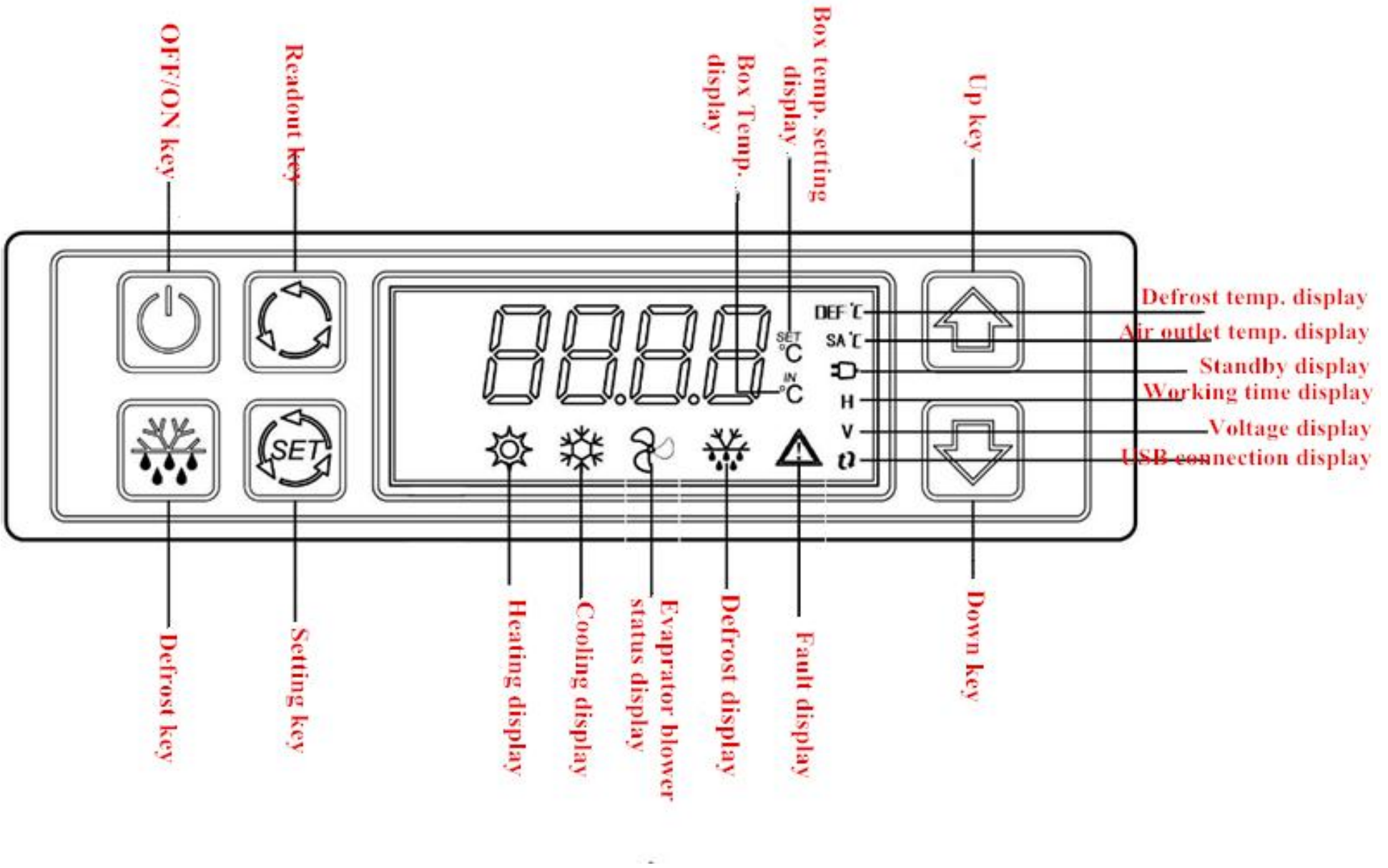
Terminal Definition

Output Terminal of Controller



1	LP input(bonding when voltage is normal)	8	Positive terminal of power source(DC12V/24V)
2	Negative terminal of power source	9	HP input(bonding when voltage is normal)
3	Negative terminal of temperature sensor	10	Temperature sensor in vehicle container
4	Temperature sensor in air outlet	11	Temperature sensor of defrosting temp.
5	Fuse detection input(connect optionally)	12	Control of evaporator blower(Max. 3A)
6	Control of defrosting valve(Max. 3A)	13	Control of compressor(Max. 3A)
7	Blank	14	Control of condenser fan(Max. 3A)

View of Controller



ON and OFF process of the refrigeration unit

■ To start-up the unit：

(1) Start the vehicle engine;

(2) Shortly press the ON key to start-up the unit, then operate per to following instructions in this manual.

■ To stop the unit：

(1) Press OFF key for 1 minute to stop the unit;

(2) Shut down vehicle engine.

Notes: Please operate per to instructions, otherwise there will be damage to the refrigeration system.

Instructions of controller keys

■ ON and OFF key

Power ON Operation: The back light of ON key will be on when electrified, then shortly press the ON key to start-up the cooling system. The system will get into cooling or heating mode if everything is OK with the system.

Power OFF Operation: press the OFF key for 1 second, the system will get in to the stop process: the defrost valve, compressor, condenser fan, and evaporator blower will be shut off one by one with 2 seconds interval time.

■ Defrost key

* Under the cooling mode, shortly press the defrost key to switch into defrost mode, and the defrost display is on light in the meantime.

* The premise of getting into the defrost mode is that temperature of the defrost sensor is lower than the defrost termination temperature, otherwise the controller can't be get into the defrost mode, and the buzzer alarm will buzz for three times.

* The controller will perform the defrost function circularly per to the defrost interval time,defrost operation time, and the dripping time after defrosting set by the the users. During defrosting, if temperature of the defrost sensor is higher than defrost termination temperature, system will exit from defrost mode and get into dipping or cooling mode.

* Under defrost mode, shortly press the defrost key to exit from the defrost mode.

■ Readout key

Under status of box temperature display, shortly press the readout key can read the faults code(if there is), defrost temperature, air outlet temperature, compressor exhaust temperature,system voltage and unit accumulated working time, etc circularly. When enter into the readout interface, the corresponding icon on display will be light. Once there is fault that cause the buzzer alarms, press the readout key to cancel the alarming.

■ Set key

Shortly press the set key can switch value between box temperature and the setting temperature; Corresponding icons will be light on display screen.

Press the set key for 3 seconds to enter into the advanced functions setting menu. The display

screen will display setting program number, for example, “F01”, then short press the set key to enter into setting status of the program, and the display screen will display the setting content of the program. You can press the Up or Down key to set content of the program. When it is done, shortly press the set key, the display screen will recover to display the setting program number, meanwhile the setting content goes into effect.

■ Up key

Under status of box temperature display, press the Up key to enter into temperature setup function, then the temperature setup display light is on. Press the up key for one press, the temperature will increase for one Celsius degree, till the temperature increase to the max. allowed(Advance setting parameters is F07). Continually press the Up key will keep increasing the temperature. When enter into the readout and setting status, combine Up key with the present menu can make options alteration and value increase.

■ Down key

Under status of box temperature display, press the Down key to enter into temperature setup function, then the temperature setup display light is on. Press the down key for one press, the temperature will decrease for one Celsius degree, till the temperature decrease to the mini. allowed(Advance setting parameters is F08). Continually press the Down key will keep decreasing the temperature. When enter into the readout and setting status, combine Down key with the present menu can make options alteration and value decrease.

Definitions of below marks are as follows without priority notice:

T_{set}	Setting Temperature
T_{in}	Temperature in box(return air inlet temperature)
T_{def}	Defrost Temperature
T_{dzr}	Return Difference Temperature of Cooling
T_{dzh}	Return Difference Temperature of Heating

■ **Cooling mode**

The controller will start or stop the cooling system automatically per to changes of temperature.

$T_{in} - T_{set} >= T_{dzr}$ Start Cooling

T_{in} - T_{set} <= 0 Stop Cooling

T_{in} - T_{set} <= -T_{dzh} Enter into Heating Mode

Besides, necessary conditions for start-up of compressor are:

1. Mini. compressor downtime longer than 1min.
2. Refrigeration pipes is under normal pressure values.
3. Voltage of vehicle power is under normal values.

Start-up of the cooling procedure:

Start the condenser fan→ 1s→ start the defrost valve → 2s → start compressor → 2s → Shut down the defrost valve → 2s → start the evaporator blower

Shut down of the cooling procedure:

Shut down compressor → 3s → Shut down condenser fan → 1s → Shut down evaporator blower

■ Heating mode

The controller will start or stop the heating system automatically per to changes of temperature.

T_{in} - T_{set} >= T_{dzr} Start Heating

T_{in} - T_{set} <= 0 Stop Heating

T_{in} - T_{set} <= -T_{dzh} Enter into Heating Mode

Besides, necessary conditions for start-up of compressor are:

1. Mini. compressor downtime longer than 1min.
2. Refrigeration pipes is under normal pressure values.
3. Voltage of vehicle power is under normal values.

Start-up of the heating procedure:

Start the defrost valve → 3s → start compressor → 2s → start the evaporator blower

Shut down of the heating procedure:

Shut down compressor → 1s → Shut down defrost valve → 3s → Shut down evaporator blower

■ Defrost mode

Under the cooling mode, controller starts and stops the defrosting automatically per to defrost

interval time, defrost operation time, defrost termination temperature, and dripping time after defrosting set by users, etc.

Users can also shortly press the defrost key to enter into manual defrost mode, the premises are:

1. Defrost sensor temperature lower than defrost termination temperature.
2. Refrigerant pipes are under normal pressure values
3. Voltage of vehicle power is under normal values.

Circular function of automatic defrost :

Waiting for defrost interval → start-up defrost procedure → Waiting for defrost time(or arrived at defrost termination temperature)

Waiting for dripping time ← Start-up dripping procedure ←

Start-up the defrost procedure:

Start defrost valve, shut down the evaporator blower → 3s → start compressor → 7s → Shut down condenser fan

Shut down the defrost procedure:

Shut down compressor → 1s → shut down defrost valve

Start-up the dripping procedure:

Shut down all the outputs

Shut down the dripping procedure:

Shut down all the outputs

Instruction of controller functions

■ Temperature setting function

Under status of box temperature display, press the set key for one time(or directly press the Up or Down key) will enter into temperature setting function; then the temperature setting display light will be on and the screen will display the current setting temperature; you can press the Up or Down key to change the setting temperature value, which is up to the advanced setting parameters F08~F07. The setting will come into force automatically after 5s and it will come back to the box temperature display.

■ Parameters Readout function

Under status of box temperature display, shortly press the readout key, the parameters displayed

successively are: fault codes(if there is), defrost temperature, temperature in air outlet, compressor exhaust temperature, system voltage(volt), accumulated working time(hour).

The corresponding display light will be on if entering into the above readout interface.

Ps: the compressor exhaust temperature has no corresponding display light.

■ **Automatically cooling & heating function**

Controller will switch to cooling and heating function automatically in line with the setting temperature, box temperature, and per to the cooling & heating return difference temperature, so as to keep the temperature in box at ranges set by users.

■ **Automatically defrost function**

Under the cooling mode, controller will start and shut down defrost automatically according to the defrost interval time, defrost time, defrost termination temperature, and dripping time after defrosting...that are set by users.

Timer timing condition for defrost is;

System is on cooling mode.

■ **Compressor protection function**

1. Mini. compressor downtime longer than 1min.

There must be more than one minute's downtime before starting the compressor again.

2. Refrigeration pipes abnormal pressure detection protect.

Once there is abnormal on refrigeration pipes pressure, compressor output will be cut off.

3. Compressor exhaust temperature over-high detection protect.

The refrigeration system will detect the exhaust temperature; please refer to the advanced parameters setting table to check the set-point temperature of protection.

When the exhaust temperature is higher than F13, please open the injection valve; and close it when exhaust temperature is lower than F14.

When the exhaust temperature is higher than F15, then shut down compressor.

■ **Cooling and heating return difference temperature setting function**

Users can set the cooling and heating return difference temperature to balance contradiction between the compressor start-stop frequency and control accuracy of the box temperature.

■ **Box temperature error compensation value setting function**

Users can change compensation value of box temperature error and display value of box temperature.

■ **Fuse detection function(It has to take matched relay box of Guchen, otherwise it's void.)**

The controller has fuse melting detection function, which can target the melting fuse and display the fault code correspondingly.

■ **Quickly restore to factory default settings function**

Press the Up and Down key in the mean time for 3 seconds, after 2 buzzer voices, all controller parameters will restore to the factory settings.

■ **Power-off preservation of parameters**

The controller will preserve all setting value and accumulated working time of the unit after power-off; and will loading parameters automatically when start up the unit.

■ **Advanced parameters setting function**

Press the set key for 3 seconds to enter into advance menu function; combine with the Up and Down key to set the following functions:

Function Code	Code Definition	Unit	Ranges	Accuracy	Defaults
F01	Defrost interval time	Minute	30~600	30	120
F02	Defrost time	Minute	1~60	1	20
F03	Dripping time	Minute	1~10	1	3
F04	Cooling return difference temperature	℃	1~10	0.5	2
F05	Defrost termination temperature	℃	-10~50	1	8
F06	Heating return difference temperature	℃	1~20；OFF(only cooling)	0.5	OFF(only cooling)
F07	Max. box temperature setting	℃	10~40	1	30

F08	Mini. box temperature setting	℃	-40~5	1	-25
F09	Box temperature error compensation value	℃	-10~10	0.1	0
F10	Evaporator blower operation mode	Auto: stop auto. when get to setting temperature；Continuously			Auto
F11	Power source voltage	12U：12V；24U：24V；Auto;			Auto

Vehicle voltage abnormal range

Voltage detection point is in line with input terminal voltage of controller power source!

Normal voltage	Voltage-low alarming point	Voltage-low recovery point	Voltage-high alarming point	Voltage-high recovery point
12V	10V	11V	16V	15V
24V	19V	21V	32V	29V

Fault codes and trouble-shooting

Items	Fault codes	Legend	Trouble shooting
Box temperature sensor	Open circuit：**OPE1** Short circuit：**SHr1**	OPE 1 SHr 1	If setting temperature is lower than 0℃, then cooling; otherwise heating.
Defrost temperature sensor	Open circuit：**OPE2** Short circuit：**SHr2**	OPE2 SHr2	Shut down defrosting per to defrost temperature.
Voltage of refrigeration pipes	HP fault（open）：**HPEr** LP fault（open）：**LPEr**	HPEr LPEr	All shut down
Power voltage	Below **DC19V / DC10V** ：**LUEr** Above **DC32V / DC16V**：**HUEr**	LUEr HUEr	All shut down

Fuse melting	**Compressor output: FU01** **Condenser fan output: FU02** **Evaporator fan output: FU03** **Defrost valve output: FU04**		Only display fault codes; it's up to users about whether stop the unit or not.
Notes: When there is a fault, fault codes and box temperature will be displayed alternately. Press the readout key will cancel the alarming, and the fault codes won't be displayed any more, yet the fault light will be on for a long time, then you can press the readout key to check the fault code.			