ZL-6XXA-R Series Electronic Thermostat Instruction Manual

1. Feature

ZL-6XXA-R is an electronic thermostat with RS 485, dedicated to control the cold storage, seafood machine, water heaters, etc.

Front panel water-proof level is IP65. The small case size is same as those on the market.

2. Main Function

● Temperature measurement
● Temperature display
● Temperature calibration
● Compressor delay protection
● Buzzer alarm output
● Defrost control (Based on both timer and temperatures)
● Fan control
● Max high-temperature or min low-temperature exceed warning.
● Sensor failure warning
● External warning input
● RS 485

3. Model List

Model	Function
ZL-610A-R	Cool+External Alarm Input+Periodic Defrost+RS 485
ZL-620A-R	Cool+External Alarm Input+High Efficient Intelligent Defrost+RS 485
ZL-630A-R	Cool+External Alarm Input+High Efficient Intelligent Defrost +Fan Control+RS 485

4. Size Specification

1. Front panel dimension：78* 34.5mm
2. Drilling template：71* 29mm
3. Whole machines dimension：78* 34.5* 71mm
4. Length of sensor(s)：3m (including the sensor probe)

5. Technical Specification

● Temperature Sensor：NTC
● Setting Range：-40 ~ 120℃
● Display Range：-50 ~ 130℃

- Working Temperature：-10 ~ 45℃
- Storage Temperature： -30 ~ 70℃
- Humidity：5 ~ 85%RH (without dewing)
- Power Supply：AC185 ~ 245V 50HZ
- Terminal Wire：<= 2 * 1.5mm^2 or 1 * 2.5mm^2
- Load Current：10A 250Vac（Resistive load）
- Case：PC + ABS Fire Proof
- Protection Degree：IP65 (front panel)

6. Operation Instruction

6.1 Display Indication

Display Sign Description

Icon	Function	On	Off	Blinking
	Compressor	On	Off	Compressor will be on after protection delay
	Defrost	Defrosting	----	Water dripping during defrosting
	Temperature Setting	Setting temperature	----	----
	Repairing	Faulty	No fault	----
	Warning	Warning	No warning	----

Panel Digit Indication

Four red digits display the measured temperature and warning code.

No.	Display Code	Warning Information
1	E01	Room temperature sensor fault（short circuit or open circuit）
2	E02	Defrosting temperature sensor fault（short circuit or open circuit）
3	Hi	Temperature exceeds the MAX value
4	Lo	Temperature exceeds the MIN value
5	EE	Data access error
6	Err	Password error
7	iA	External warning
8	dEF	Defrosting operation
9	UnL	Restore the default password "1111"

6.2 Keypad Operation

6.2.1 Set refrigeration temperature

Keeping 【S】 pressed for 3 seconds to enter temperature setting mode. The indicator ❄ is on, and the digital shows the set temperature. Press key 【▲】 or 【▼】 to change the set temperature (Keeping 【▲】 or 【▼】 pressed, it will be adjusted quickly.). Press 【S】, the set temperature will be saved and leave the setting mode. Or do not press any key for 30 seconds; the device will leave the set mode without saving the set data.

6.2.2 Set system parameters

Enter Into System Parameter Setting Mode

Use the password to enter into the parameter setting mode, the factory password is "1111". Keep 【P】 pressed for 3 seconds to enter the mode. The digital displays 『---0』, then press 【▼】 to the digit of the password, press 【▲】 to the value of the digit, press 【S】 to confirm. If the password is wrong, it will shows 『Err』, and returns to the measuring temperature states after the buzzer beeping 3 times. If the password is right, the buzzer beeps once and enters into the mode. Digital will display a parameter code 『U10』. Press 【▲】 or 【▼】 to select the parameter code. Press 【S】 to show its value. Press 【▲】 or 【▼】 to set the value. Press 【S】 to return parameter code display status.

Exit the Mode

Keep depressing 【P】 for 3 seconds, the set parameters will be saved, the mode exits.

If do not press any key for 30 seconds, the mode will exit without saving all the set data.

6.3 Parameter Code and Description Table:

ZL-610A-R:

No	Parameter code	Function	Range	Note	Factory setting
1	U10	Compressor power on delay time	1 ~ 100min		3
2	U11	Compressor MIN continuous work time	0 ~ 100min		3
3	U12	Compressor run frequency	0 ~ 8	0: Disable	5
4	U20	Room temperature sensor calibration	-9.9 ~ +9.9		0
5	U22	Temperature difference	0.1～+10.0℃	The hysteresis of control	1.0
6	U30	Defrosting cycle	0~180 hour	0: Not defrost	12
7	U31	Defrosting（end）time	1 ~ 180min		30
8	U33	Dripping water time	0 ~ 180min		5
9	U34	Over temperature warning delay time after defrost ends	0~180 hour	0: Disable	2
10	U35	Defrost when the device starts	0~1	0: Disable 1:Enable	0
11	U36	Defrost delay time when the device start	0 ~ 180min	0: Disable	0
12	U50	High-temperature warning deviation value to Max Temp	0~60℃	0: Disable	0

13	U51	Low-temperature warning deviation value to Min Temp	0~60℃	0: Disable	0
14	U52	Over-temperature warning delay time	1 ~ 180min		30
15	U53	First over-temperature warning delay time after power supply	0~180 hour	0: Disable	2
16	U60	External input warning mode	0~4	0:Warning off 1:On, Lock 2:On, Unlock 3:Off, Lock 4:Off, Unlock	0
17	U61	External warning input delay	0~120min		0
18	U62	Buzzer warning	0~1	0:Warning off 1:Warning on	
19	U97	Baud rate setting	0 ~ 3	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps	3
20	U98	Device address	1 ~ 99	----	1
21	U99	Password	0000~9999		1111
22	End	Finished setting			

ZL-620A-R:

No	Parameter code	Function	Range	Note	Factory setting
1	U10	Compressor power on delay time	1 ~ 100min		3
2	U11	Compressor MIN continuous work time	0 ~ 100min		3
3	U12	Compressor run frequency	0 ~ 8	0: Disable	5
4	U20	Room temperature sensor calibration	-9.9 ~ +9.9		0
5	U21	Defrosting sensor calibration	-9.9~+9.9		0
6	U22	Temperature difference	0.1～+10.0℃	The hysteresis of control	1.0
7	U30	Defrosting cycle	0~180 hour	0: Not defrost	12
8	U31	Defrosting（end）time	1 ~ 180min		30
9	U32	Defrosting end temperature	0.5 ~ 50℃		15
10	U33	Dripping water time	0 ~ 180min		5
11	U34	Over temperature warning delay time after defrost ends	0~180 hour	0: Disable	2
12	U35	Defrost when the device starts	0~1	0: Disable	0

				1:Enable	
13	U36	Defrost delay time when the device start	0 ~ 180min	0: Disable	0
14	U50	High-temperature warning deviation value to Max Temp	0~60℃	0: Disable	0
15	U51	Low-temperature warning deviation value to Min Temp	0~60℃	0: Disable	0
16	U52	Over-temperature warning delay time	1 ~ 180min		30
17	U53	First over-temperature warning delay time after power supply	0~180 hour	0: Disable	2
18	U60	External input warning mode	0~4	0:Warning off 1:On, Lock 2:On, Unlock 3:Off, Lock 4:Off, Unlock	0
19	U61	External warning input delay	0~120min		0
20	U62	Buzzer warning	0~1	0:Warning off 1:Warning on	
21	U97	Baud rate setting	0 ~ 3	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps	3
22	U98	Device address	1 ~ 99	----	1
23	U99	Password	0000~9999		1111
24	End	Finished setting			

ZL-630A-R:

No	Parameter code	Function	Range	Note	Factory setting
1	U10	Compressor power on delay time	1 ~ 100min		3
2	U11	Compressor MIN continuous work time	0 ~ 100min		3
3	U12	Compressor run frequency	0 ~ 8	0: Disable	5
4	U20	Room temperature sensor calibration	-9.9 ~ +9.9		0
5	U21	Defrosting sensor calibration	-9.9~+9.9		0
6	U22	Temperature difference	0.1~+10.0℃	The hysteresis of control	1.0
7	U30	Defrosting cycle	0~180 hour	0: Not defrost	12
8	U31	Defrosting（end）time	1 ~ 180min		30
9	U32	Defrosting end temperature	0.5 ~ 50℃		15

10	U33	Dripping water time	0 ~ 180min		5
11	U34	Over temperature warning delay time after defrost ends	0~180 hour	0: Disable	2
12	U35	Defrost when the device starts	0~1	0: Disable 1:Enable	0
13	U36	Defrost delay time when the device start	0 ~ 180min	0: Disable	0
14	U40	Fan start temperature	-45～+120℃		-10
15	U41	Fan start-up delay	0～600sec		60
16	U42	Fan stop delay	0～600sec		0
17	U43	Fan mode	0～1	0: Controlled 1: Free mode	0
18	U50	High-temperature warning deviation value to Max Temp	0~60℃	0: Disable	0
19	U51	Low-temperature warning deviation value to Min Temp	0~60℃	0: Disable	0
20	U52	Over-temperature warning delay time	1 ~ 180min		30
21	U53	First over-temperature warning delay time after power supply	0~180 hour	0: Disable	2
22	U60	External input warning mode	0~4	0:Warning off 1:On, Lock 2:On, Unlock 3:Off, Lock 4:Off, Unlock	0
23	U61	External warning input delay	0~120min		0
24	U62	Buzzer warning	0~1	0:Warning off 1:Warning on	
25	U97	Baud rate setting	0 ~ 3	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps	3
26	U98	Device address	1 ~ 99	----	1
27	U99	Password	0000~9999		1111
28	End	Finished setting			

7. Control Function Description

7.1 Compressor Control

● When the temperature ≧"Set temperature"+"U22", and the compressor has stopped for "U10", the compressor starts.

● When the temperature ≦"Set temperature"-"U22", and the compressor has run for "U11",

the compressor stops.

For example:

If set temperature is 18℃,【U22】is 2℃. When the temperature ≧ 20℃, compressor starts. If the temperature ≦ 16℃, compressor stops. The room temperature will be between 18±2℃.

● Compressor emergent on

Press and hold "▼" key for 5 seconds, the compressor will power on if the following meets:

◆ The compressor has stopped for "U10";

◆ The controller is not in defrosting or dripping water states;

◆ Room temperature is between "Set temperature"+"U22" and "Set temperature"-"U22".

After compressor emergent on, when room temperature goes down to "Set temperature"-"U22", it stops cooling.

7.2 Compressor Delay Protection

● After power supply, the compressor is able to start only after the time (U10) has passed.

● After the compressor stops, it is able to restart again only after the time (U10) has passed.

● After the compressor starts, it is able to stop only after the time (U11) has passed.

7.3 Fan Control (Only for ZL-630A-R)

7.3.1 Fan control mode: Controlled mode and free mode.

7.3.2 Controlled mode

● In the state of cooling, when the evaporator temperature is less than (U40), or the cooling time is more than (U41), the fan will starts.

● If set 0 for (U41), the fan will start immediately when come into the cooling state.

● After cooling stops, the fan will stop after the time of (U41).

● If set 0 for (U41), the fan will stop immediately when cooling stops.

7.3.3 Free mode

The fan will be always running, except during defrosting. In this mode, (U40), (U41) and (U42) parameters have no effect.

7.4 Protection Running Mode When Room Temperature Sensor Fails

When the room temperature sensor fails, the system will automatically run into the protected running mode. In this mode, the compressor will run and stop with the period of 30 minutes. Compressor works for U12* 3 minutes, stops for ｛30 - (U12* 3)｝minutes.

For example: Set 【U12】 is 3，when the temperature sensor fails，compressor runs for 9 minutes and then stops 21 minutes, move in circles. If U12=0, system stops when sensor fails

7.5 Protection Running Mode When Defrost Temperature Sensor Fails
(for ZL-620A-R, ZL-630A-R)

● When the defrost sensor fails, the controller will periodically defrost according to (U30) and (U31). The dripping water function will be cancelled.

● If the fan is in the "controlled mode", it will cancel the conditions of fan temperature control; the fan will work according to (U41) and (U42) parameter. (For ZL-630A-R)

7.6 Defrosting Function

7.6.1 Automatic defrosting

● When the compressor continuously running time reaches the time of defrost cycle (U30), the system starts to defrost.

● When one of the conditions (defrosting end time (U31) and defrosting end temperature

(U32)) meets, the defrosting stops.

● ZL-610A-R will periodically defrost according to (U30) and (U31) parameter.

7.6.2 Manual forced defrosting

● When in non-defrosting stage, keep 【▲】 pressed for 7 seconds, the system starts forced defrosting.

● When in defrosting stage, keep 【▲】 pressed for 7 seconds, the defrosting stops.

7.6.3 Dripping water function

● After defrosting, system will drip water for the time (U33), then start cooling.

● This function will not work when:

◆ After manual forced defrosting ◆ Defrosting temperature sensor fails

7.6.4 Check defrosting data

● Check defrosting sensor temperature:

When the digit shows the room temperature, depress 【▲】, the digits will show defrost sensor's temperature. Do not keep depressing for 7 seconds, to avoid the device stops forced defrosting. (Suits for ZL-620A-R and ZL-630A-R)

● Check the left time of defrosting or dropping:

Depress 【▼】 to show the left time of defrosting, or dripping. Do not keep depressed for 7 seconds.

7.7 Buzzer Function

Buzzer sounds shortly for every key press. When confirming the parameter setting, it sounds longer. 3 short beeps means invalid. When the system comes wrong or external alarm input, the buzzer alarm function will be off if U62=0, or the buzzer continuous alarming if U62=1. After the system problem solved and disappears, press 【P】 key to stop warning.

7.8 High-temperature and Low-temperature Warning

● When the room temperature ≥ "set temperature"+ "U50", and the time reaches to "U52 or U53 or U34", high temperature warning starts.

● When the test temperature ≦ "set temperature"+ "U51", and the time reaches to "U52 or U53 or U34", low temperature warning starts.

7.9 External Input Warning

There are following ways for the external warning input, when the condition meets, the device will warn:

Normal On: If close, warning starts.

Normal Off: If open, warning starts.

Lock: when the external warning input signal disappears, system keeps warning, until pressing the 【P】 key to stop the warning.

Unlock: when the external warning input signal disappears, warning stops.

7.10 Temperature Calibration Function

When there is tolerance between the measured temperature and real temperature, set parameter U20 and U21 to calibrate. The calibration range is ±9.9℃. When setting the parameter, the step is 0.1℃ for every key press. Keep the key pressed, the set data will increase/decrease continuously and quickly.

7.11 Restore the Default Parameters and Password

Keep【P】and 【▲】keys pressed for 5 seconds, the device displays "UnL", press 【▼】 twice, buzzer sounds, system auto restores the default parameters and password"1111".

8. Controller Installation

8.1 Warning

Avoid installing the device in the following environment:

● Relative humidity is greater than 90%, or possibly dewing.

● Strong vibration.

● Possibility be dropped, or within fog.

● Exposed to eroding and polluting gases (such as: air containing sulfur and ammonia, salty fog, smoky mist) to prevent erosion and oxidation.

● Ambient containing explosive or inflammable materials/gases.

8.2 Installation Procedure

Insert the controller into hole (step one)   Slide the bracket to fix the device (step two)
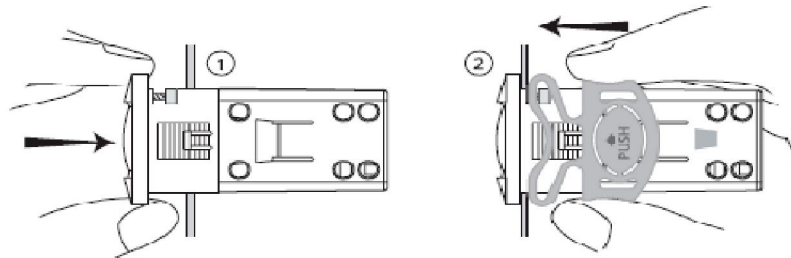
9. Electrical Connection

Warning

● Electrical wiring must be manipulated by certified electrician.

● Wrong power supply may damage the device and system seriously.

● Try with effort to layout the sensors and switches line apart from inductive load lines and power supply lines. The sensors and switches lines are not allowed go with the power supply lines and inductive load lines in a same pipeline, and are not allowed to pass near the contactor, breaker and the similar.

● Reduce the length of sensors' wiring as possible, avoid forming a spiral shape near the power devices.

● Avoid direct contact with the internal electronic components.

● After finish and check the electrical wiring layout, before connect them to the device, please follow this instruction: Pay attention the "electrical wiring diagram" below, wrong connection possibly damages the device and the system, and may be dangerous to the user. All security and protecting device for the equipments are necessary. They are very important to protect the equipments, and the user's safety.

Electrical wiring diagram

ZL-610A-R

R1,R2: 5A/250V~   AMB.T: Air Ambient Sensor
DI: Digital Input
SERIAL

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

R1   R2   220V~   DI   AMB.T
L   N   L   L   N

ZL-630A-R

R1,R2,R3: 5A/250V~   AMB.T: Air Ambient Sensor
DEF.T: Defrost Sensor
DI: Digital Input
SERIAL

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

R1   R2   R3   220V~   DI   AMB.T DEF.T
L   N   L   L   N

ZL-620A-R

R1,R2: 5A/250V~   AMB.T: Air Ambient Sensor
DEF.T: Defrost Sensor
DI: Digital Input
SERIAL

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

R1   R2   220V~   DI   AMB.T DEF.T
L   N   L   L   N