ZLU09F8G6+

Heat Exchange Controller Technical Specification

Warning

- It may do harm to human, using product in wrong way;
- It may broke the equipment, when using in wrong way;
- Even the noted thing will be dangerous, due to changing conditions;
- Installed on the metal board, and placed tightly;
- Do not installed when lack of parts;
- Do not installed be exposed to direct sunlight, strong in the air and water mist;
- Do not installed be exposed to corrosive or polluted gases, such as sulfur gases, salt fog;
- Make sure the temp. range is -10℃～+50℃ in electrical cabinet when installed, fan can be placed if necessary;
- Make the power input is off, when connection;
- Let electrical personnel do connection job;
- Do not cut off power, when input side has no sign;
- When connection do more protection in order to avoid the danger if computer controller out of control;
- Observe strong and weak electricity separation principle, when connection;
- Use eligible wiring, when connection;
- Adopt the parallel grounding method, grounding line as rough as possible;
- Wiring fixed screw, please use the appropriate screwdriver, too big or too small screwdriver are easy to cause the screw head slide wire;
- Set parameters with the machine equipment, make sure the machine runs well;
- Set Jump line/drawing switch according to machine equipment;
- Make sure the connection is right, then input power;
- Make sure the environment and power is correct, then turn on the machine;
- Do not check sign, in running state;
- Do not change the parameters optional in running state;
- Do not take a close to the running machine;
- If users have any repair requirement, please contact the factory do not repair by yourself;
- Do not pull, twist the power cord, communication line;
- Do not touch the components with your hand;
- Our company have rights to repair the controller’s defect, but no duty to responsible the accident due to defect;
- Our company has no duty to be responsible of the accident due to controller’s defect;
- Our company has the right to the end user site service, but there is no obligation to take responsibility.

Catalogue

1 Instruction

ZL-U09F8G6+ heat exchange controller for outdoor advertising machine energy control. Through effective use of natural cooling outside the cabinet advertising machine for heat exchange in order to achieve the purpose of energy conservation, itself without any refrigeration components, cold air through the cabinet directly into the internal hot air directly discharged to achieve natural cooling.

Features:

- Digital display;
- Communication control or connect environment monitoring units;
- Two temperature sensors: two temperature test point, adjust at base of higher temperature.
- Reserved smoke alarm/access control alarm input.

Packing list

Description (Necessary)	Quantity
ZL-U09F8G6-CPU Board	1
NTC-1M10K(1 m Temp. Sensor)	1

1.1 Control Parts

Data output(2)	Data Input(1)	Analog Output (2)	Analog Input(2))
Fault Output(10A/250VAC)	Smoke alarm	Inlet fan(Speed governing and feedback)	Temperature sensor 1
Heater(10A/250VAC)		Outlet fan(Speed governing and feedback)	Temperature sensor 2

1、 NO is normally open contact, COM is public port.

2、Relay rating refers to resistive load carrying capacity; practical engineering applications should be derated at least 30% of the use.

3、 Terminal with load capacity, limited by the relay specifications and the number.

1.2 Main performance and characters

1.2.1 Runtime environment indication

It including Temp. , Humidity, Pressure, Altitude, etc. Details in table 1.

Term		Unit	Indicators
Temp.	Long term operation	℃	-10 ～ +55
Temp.	Short term operation	℃	-40 ～ +65
Humidity	Long term operation	%RH	5 ～ 85 (Non-condensate)
Humidity	Short term operation	%RH	5 ～ 95 (Non-condensate)
Note:Short term operation means no more than 96 hours continuously and annual accumulative total does not exceed 15 days.			

1.2.2 Power supply

DC input: 16~58VDC Max current: 8A

1.2.3 DC load current

Fan load type: DC brushless fan load；
Fan load quantity: each PCB has two fan ports, inlet fan and outlet fan.
Inlet fan port: each port max output 4A；
Outlet fan port: each port max output 4A；
Fan load control: PWM speed feedback.

1.2.4 Function

- Heat exchange control can save current working states and auto restart function.
- Hot swap controller with anti-reverse function, if the DC power line is reversed, the heat exchange does not work, return to normal after the connection can work.
- Waterproof, moisture-proof, the use of three anti-paint on the circuit board protection, can effectively prevent the moisture, salt spray, weak acid, weak alkali erosion of the controller.

2 Definition of interface

2.1 Fan unit interface

Definition

NO.	Name	Function	Other
1	IFAN+/OFAN	Inlet/outlet fan power+	
2	IPWM/OPWM	Inlet/outlet fan, PWM speed sign.	
3	IFG/OFG	Inlet/outlet fan Speed pulse sign.	
4	GND/GND	Inlet/outlet fan power-	

2.2 LCD control interface

Definition: (Passive dry contact control signal output)

No.	Name	Other
1	NC	Normal closed, high temperature or low temperature alarm disconnect
2	C1	Public contact
3	NO	Normal disconnect, high temperature or low temperature alarm closed

2.3 Heater output interface

Definition:(Passive dry contact control signal output)

NO.	Name	Other
1	C2	Public contact
2	NO	Heater output

2.4 NTC Interface(temperature port)

Two NTC port use single row inline 2.54-2PIN. Connect with B25/50=3470, R25=10K NTC sensor.

2.5 Fault input interface

Controller has one fault alarm sign input, port use single row inline 2.54mm-2PIN port connect with passive dry node input.

2.6 RS485 interface

RS485 use 5.0mm-3 PIN terminal block.

3 Panel operation guide

3.1 Key operation indication

Key	Definition	Function
SET	**Set/ confirm**	1) Keep press SET enter parameters setting; 2) Short press to switch setting items and parameter values, long press this button to confirm parameter setting;
UP/DN	**Adjust key**	1) Press this key to set the parameter cycle to increase.

3.2 Code list

NO.	Code	Instruction
1	Er	Wrong passwords
2	UL	Reset passwords as “11”

4 Key operation

4.1.1 System parameters setting

4.1.1.1 Enter system parameters setting

Use a group of password to enter the parameter setting status (factory default password is 11), press the〖Set / Confirm〗key and hold for 3 seconds, the digital display shows "00", press the 〖adjust〗 key to enter the password,〖Set / Confirm〗button to confirm. If the password is wrong,『Er』will be displayed and the parameter setting status will be exited. If the password is entered correctly, the parameter setting status will be entered. At this time, the LED will display『r1』, select the parameter code with 〖adjust〗key to display the setting value of this parameter. Then press〖adjust〗key to set the parameter. After setting, press

〖Set / Confirm〗key to return to the state of display parameter code.

4.1.1.2 Exist parameters setting

When the parameter setting is completed, you must press and hold〖Set / Confirm〗key for 3 seconds, the system exits the parameter setting status, and the parameter setting is saved. If there is no key operation within 30 seconds in the parameter setting state, the system exits the parameter setting state, but this parameter setting is invalid, the controller still runs according to the original parameters.

4.1.1.3 Code list

NO.	Code	Parameters	Minimum	Maximum	Unit	Increment	Instruction	Defaults	condition
1	r1	Inlet fan start temp.	0	r2	℃	1	----	35	
2	r2	Inlet fan full speed temp.	r1	60	℃	1	----	40	
3	r3	Outlet fan start temp.	0	r4	℃	1	----	35	
4	r4	Outlet fan full speed temp.	r3	60	℃	1	----	40	
5	r5	Heater start temp.	0	30	℃	1	----	10	
6	r6	Heater hysteresis	0	20	℃	1	----	15	

NO.	Code	Parameters	Minimum	Maximum	Unit	Increment	Instruction	Defaults	condition
7	di	DI1NO, NC	0	1	----	1	0 = NC 1 = NO	1	
8	dF	DI1Function	0	5	----	1	0 = smoke alarm 1 = Flooding alarm 2 = Access alarm 3 = Shaking alarm 4 = Blocking alarm 5 = Other	0	

NO.	Code	Parameters	Minimum	Maximum	Unit	Increment	Instruction	Defaults	condition
9	VH	DC power input over pressure alarm point	0	60	V	1	0 = No power test, Input power ≥ 30VDC Alarm（ lower than	30	

							30VDC stop warning）		
10	VL	DC power input lack pressure alarm point	0	60	V	1	0 = No power test, input power ≤ 18VDC warning （ Over 18VDC stop warning）	18	
11	tH	High temperature alarm point	tL	60	℃	1	When the cabinet temperature is greater than this value alarm	50	
12	tL	Low temperature alarm point	-5	tH	℃	1	When the cabinet temperature is less than this value alarm	10	

NO.	Code	Parameters	Minimum	Maximum	Unit	Increment	Instruction	Defaults	condition
13	iG	Inlet fan speed pulse number	0	16	pulse /rev	1	0=No fan fault test	4	
14	EG	Outlet fan speed pulse number	0	16	pulse /rev	1	0=No fan fault test	4	
15	SH	Inlet/outlet fan maximum speed setting	SL	100	%	1	“--" = 100	90	
16	SL	Inlet/outlet fan minimum speed setting	20	FSH	%	1		30	

NO.	Code	Parameters	Minimum	Maximum	Unit	Increment	Instruction	Defaults	condition
17	Pr	ON/Off					ON OF	ON	
18	Lb	Baud rate	0	3	----	1	0 = 2400bps 1 = 4800bps	2	

							2 = 9600bps 3 = 19200bps		
19	La	Address	1	99		1		1	
20	Pd	Passwords	0	99		1		11	

NO.	Code	Parameters	Minimum	Maximum	Unit	Increment	Instruction	Defaults	condition
21	Vi	DC input voltage query	0	68	V				
22	t1	Sensor 1(RT1)Temperature inquiry	-9	99	℃				
23	t2	Sensor 2(RT2)Temperature inquiry	-9	99	℃				
24	End	End setting							

5 Control indication

5.1 Heater control

- When temperature lower than heater start temp.(r5), and heater stop over 30 seconds, heater on.
- When temperature reach heater start temp.(r5) + heater hysteresis(r6), heater close.
  Example: r5 = 10, r6 = 15, temperature lower than 10, start heater. When temperature reach 25, close heater.

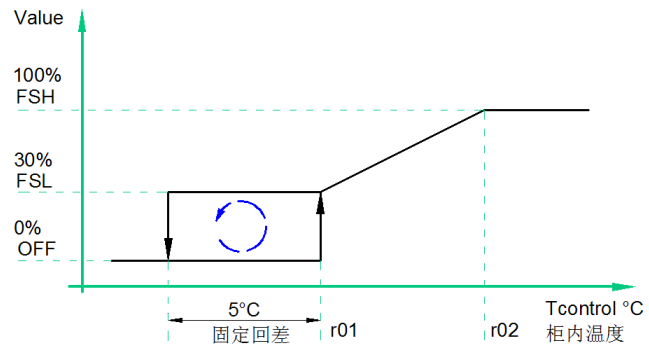
  Note: heater on, inlet/outlet fan running at maximum speed.

5.2 Back light control

- When high temperature warning or low temperature warning, back light relay off.
- When high temperature warning or low temperature warning reset, back light relay off over 1 minute, the relay on.

5.3 Inlet fan control

5.3.1 Inlet fan running state

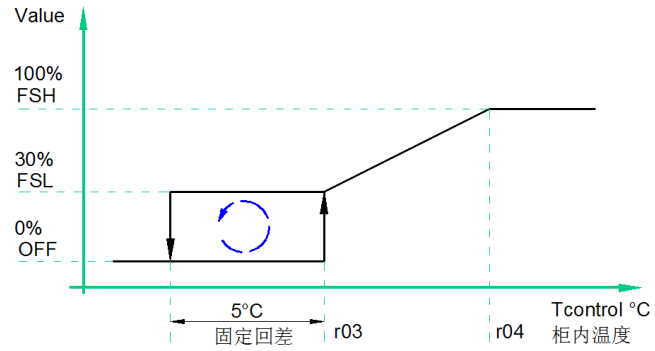


5.3.2 Inlet fan working logic

- When temperature reach inlet fan start temperature(r01), fan start at minimum speed(FSL).
- When temperature drop to inlet fan start temperature(r01) - 5℃, fan stop.
- When temperature between r01 and r02, fan linear speed regulation.
- When temperature over r02, fan start at maximum speed(FSH).

5.4 Outlet fan control

5.4.1 Outlet fan running state



5.4.2 Outlet fan working logic

- When temperature reach outlet fan start temperature(r03), fan start at minimum speed(FSL).
- When temperature drop to outlet fan start temperature(r03) - 5℃, fan stop.
- When temperature between r03 and r04, fan linear speed regulation.
- When temperature over r04, fan start at maximum speed(FSH).

6 Auto restart function

After the system is powered off abnormally, it will be powered on again and the system will run according to the working status before power-off, memory parameters, set temperature value and so on.

7 Communication

Through the control panel RS485 interface, in accordance with the Modbus-Rtu communication protocol requirements, the system telemetry, remote signaling, remote control.

Communication: Serial asynchronous half-duplex

Baud rate: 2400bps, 4800bps, 9600bps(Default)，19200bps；

Data: 8(LSB front)；

Parity Check: none;

Start bits: 1

Stop bits: 1

8 Factory reset

When the controller is in running state, press 〖set/confirm〗 and 〖adjustment〗key at the same time for 5 seconds, the digital display shows『UL』, press〖adjustment〗 key twice again, the controller will automatically resume factory Parameter and the default password「11」.

9 Failure testing and protection

Failure testing and acting

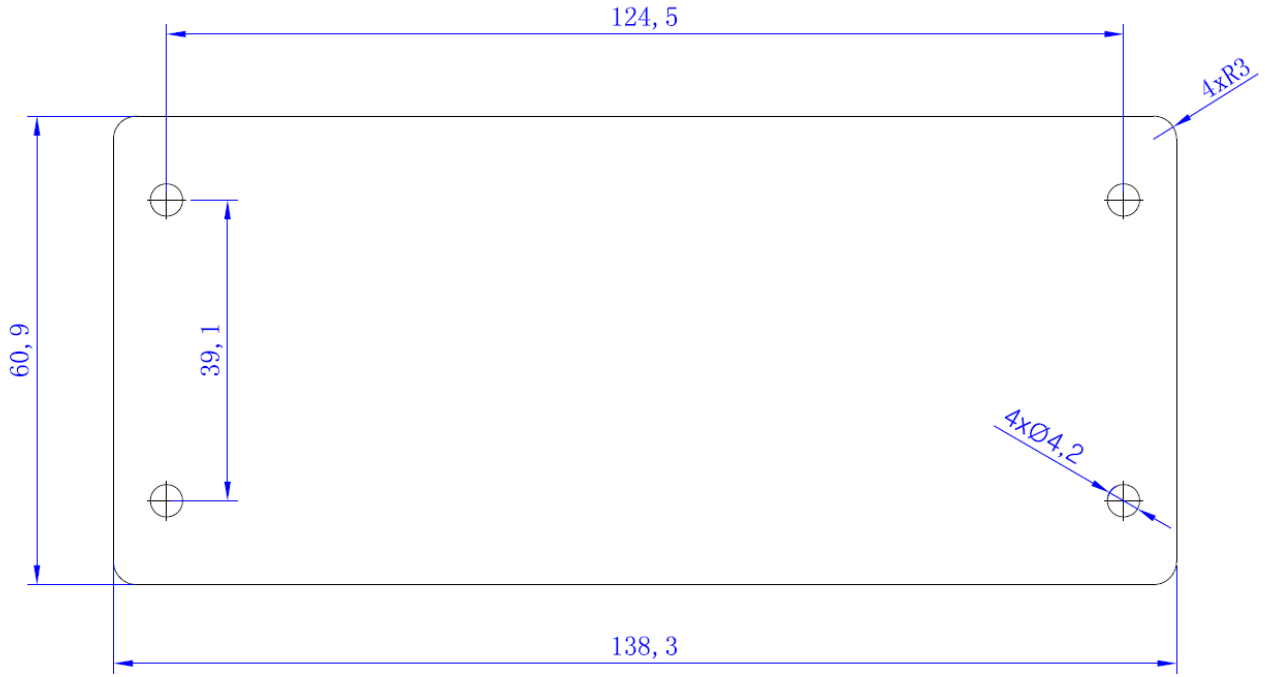
According to the system settings, each fault point is normally closed, indicating that the fault point is normal if it forms a loop, and indicates a fault if it is disconnected. No point of failure, please set it to normally open, so as to avoid unnecessary alarm.

No.	Code	Alarm reason	Delay	Duration	Reset	Back light	heater	Inlet fan	Outlet fan
1	E1	Sensor 1/2 failure	0 sec	3 sec	Auto	ON	OFF	ON	ON
4	Ht	High temp. alarm	0 sec	5 sec	Auto	OFF	OFF	ON	ON
5	Lt	Low temp. alarm	0 sec	5 sec	Auto	OFF	ON	ON	ON
6	HV	Over-voltage protection	0 sec	3 sec	Auto	OFF	OFF	OFF	OFF
7	LV	Under-voltage protection	0 sec	3 sec	Auto	OFF	OFF	OFF	OFF
8	IP	Inlet fan failure	Fan on	2 min	Auto	ON	OFF	ON	ON
9	EP	Outlet fan failure	Fan on	2 min	Auto	ON	OFF	ON	ON
14	SK	Smoke alarm	0 sec	5 sec	Manual	OFF	OFF	OFF	OFF
15	Wt	Flooding alarm	0 sec	5 sec	Manual	OFF	OFF	OFF	OFF
16	Dr	Access alarm	0 sec	5 sec	Auto	ON	\	\	\
17	SH	Shaking alarm	0 sec	5 sec	Auto	ON	\	\	\
18	BL	Blocking alarm	0 sec	5 sec	Manual	ON	OFF	ON	ON

10 Dimensional drawing

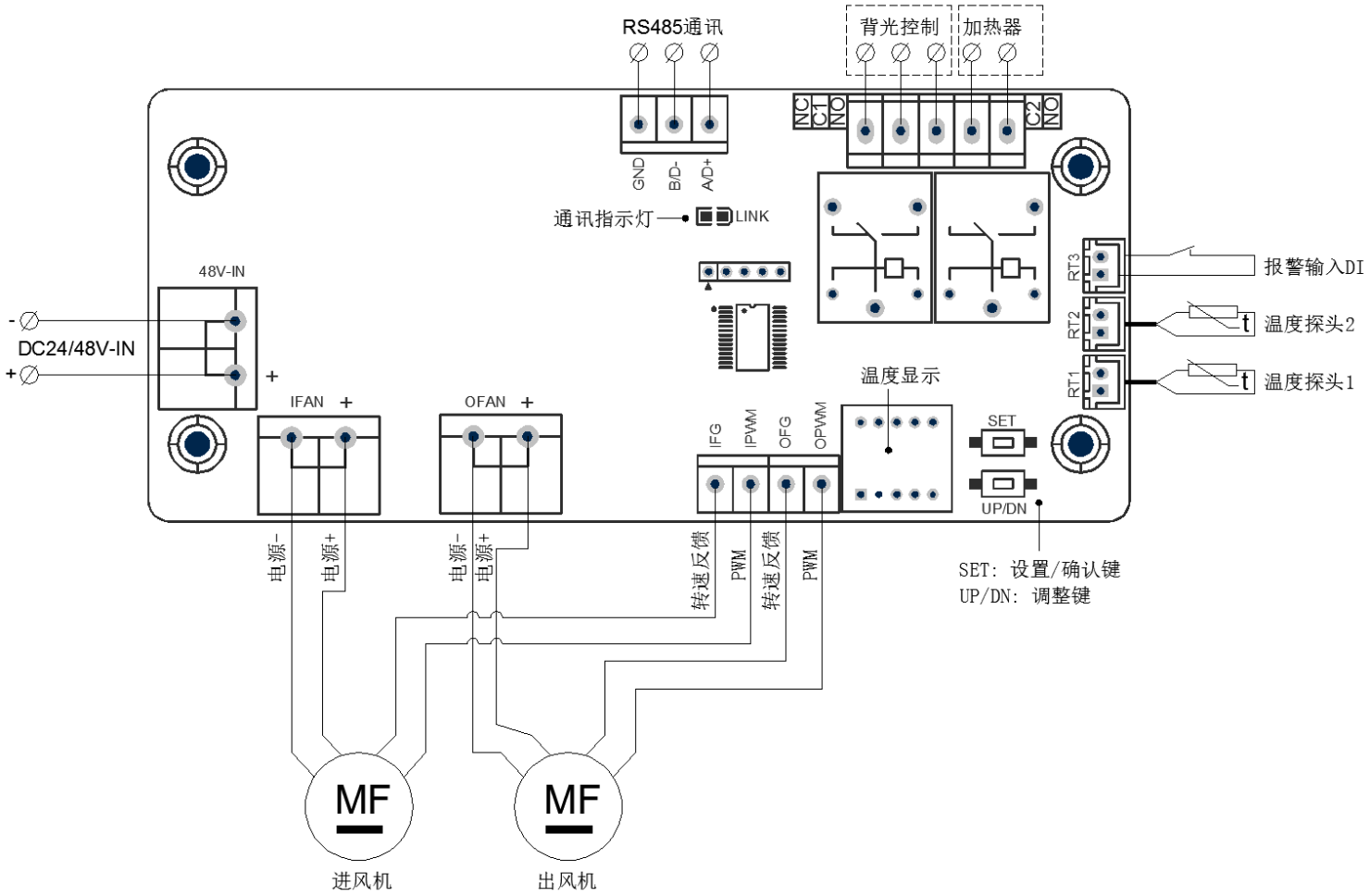
Main PCB size

unit: mm

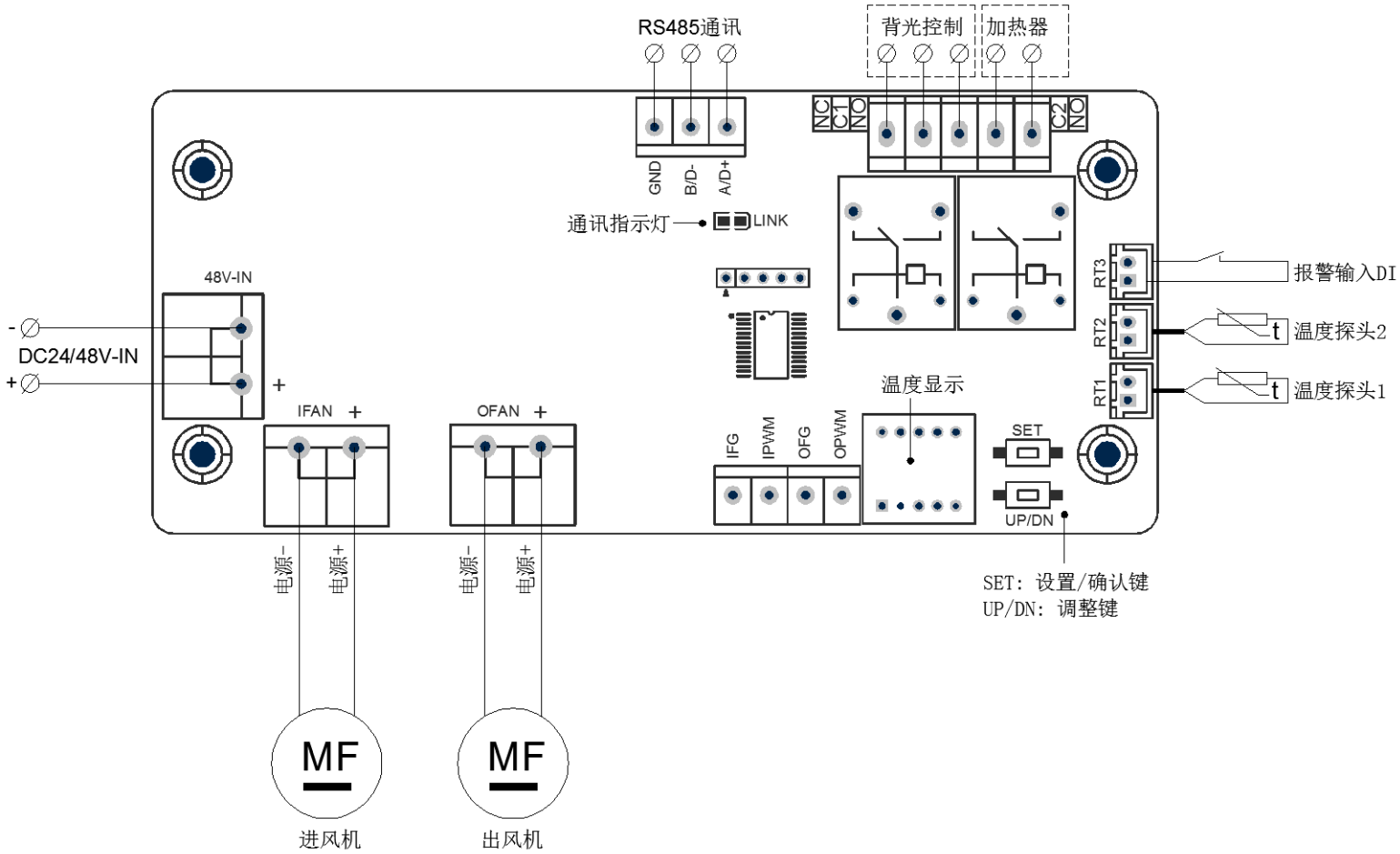


11 Wiring diagram

11.1 PWM fan wiring diagram



11.2 Constant speed fan wiring diagram



***When using fixed-speed fan To avoid fan fault alarm, set the [Number of In / Out Fan Speed Pulse] to 0.**

12 Appendix A: Temperature-resistance table

Temperature-resistance table（103A-34）									
Resistance value: R（25℃） = 10KΩ B： B（25℃/50℃） = 3470K									
Temp. ℃	Resistance value KΩ	Temp. ℃	Resistance value KΩ	Temp. ℃	Resistance value KΩ	Temp. ℃	Resistance value KΩ	Temp. ℃	Resistance value KΩ
-40	219.038	0	28.572	40	5.726	80	1.599	120	0.530
-39	206.754	1	27.313	41	5.528	81	1.553	121	0.516
-38	195.237	2	26.116	42	5.338	82	1.508	122	0.503
-37	184.437	3	24.979	43	5.155	83	1.465	123	0.490
-36	174.302	4	23.897	44	4.980	84	1.424	124	0.478
-35	164.789	5	22.869	45	4.811	85	1.384	125	0.466
-34	155.855	6	21.891	46	4.650	86	1.344	126	0.454
-33	147.461	7	20.960	47	4.494	87	1.306	127	0.443
-32	139.572	8	20.074	48	4.345	88	1.268	128	0.432
-31	132.154	9	19.230	49	4.202	89	1.233	129	0.421
-30	125.176	10	18.427	50	4.064	90	1.198	130	0.411
-29	118.609	11	17.661	51	3.931	91	1.164		
-28	112.427	12	16.932	52	3.802	92	1.131		
-27	106.605	13	16.237	53	3.679	93	1.100		
-26	101.120	14	15.574	54	3.560	94	1.069		
-25	95.950	15	14.942	55	3.445	95	1.039		
-24	91.075	16	14.339	56	3.335	96	1.011		
-23	86.477	17	13.763	57	3.229	97	0.983		
-22	82.139	18	13.214	58	3.127	98	0.956		
-21	78.044	19	12.690	59	3.029	99	0.930		
-20	74.177	20	12.189	60	2.934	100	0.904		
-19	70.524	21	11.710	61	2.843	101	0.880		
-18	67.072	22	11.253	62	2.755	102	0.856		
-17	63.810	23	10.817	63	2.670	103	0.833		
-16	60.724	24	10.399	64	2.588	104	0.810		
-15	57.806	25	10.000	65	2.509	105	0.788		
-14	55.045	26	9.618	66	2.433	106	0.767		
-13	52.431	27	9.254	67	2.360	107	0.747		
-12	49.956	28	8.905	68	2.289	108	0.727		
-11	47.612	29	8.572	69	2.220	109	0.708		
-10	45.390	30	8.253	70	2.154	110	0.689		
-9	43.285	31	7.949	71	2.090	111	0.671		
-8	41.289	32	7.657	72	2.027	112	0.653		
-7	39.397	33	7.378	73	1.967	113	0.636		
-6	37.601	34	7.110	74	1.909	114	0.620		
-5	35.897	35	6.854	75	1.853	115	0.604		

-4	34.279	36	6.609	76	1.798	116	0.588		
-3	32.743	37	6.374	77	1.746	117	0.573		
-2	31.285	38	6.149	78	1.695	118	0.558		
-1	29.898	39	5.933	79	1.646	119	0.544		
0	28.572	40	5.726	80	1.599	120	0.530		

13 Appendix B: MODBUS-RTU address table

Address	Name	R/W	Range	Code	Note
Failure					
0	Sensor 1 failure(RT1)	R	0~1	0x01	0=no failure，1=failure
1	Sensor 2 failure(RT2)	R	0~1	0x01	0=no failure，1=failure
2	Reserved	R	0~1	0x01	
3	Reserved	R	0~1	0x01	
4	Reserved	R	0~1	0x01	
5	Reserved	R	0~1	0x01	
6	Over-voltage protection	R	0~1	0x01	0=no failure，1=failure
7	Under-voltage protection	R	0~1	0x01	0=no failure，1=failure
8	High temp. alarm	R	0~1	0x01	0=no failure，1=failure
9	Low temp. alarm	R	0~1	0x01	0=no failure，1=failure
10	Reserved	R	0~1	0x01	
11	Reserved	R	0~1	0x01	
12	Inlet fan failure	R	0~1	0x01	0=no failure，1=failure
13	Reserved	R	0~1	0x01	
14	Reserved	R	0~1	0x01	
15	Outlet fan failure	R	0~1	0x01	0=no failure，1=failure
16	Reserved	R	0~1	0x01	
17	Reserved	R	0~1	0x01	
18	Reserved	R	0~1	0x01	
Alarm input					
19	Smoke alarm	R	0~1	0x01	0=no failure，1=failure
20	Flooding alarm	R	0~1	0x01	0=no failure，1=failure
21	Access alarm	R	0~1	0x01	0=no failure，1=failure
22	Shaking alarm	R	0~1	0x01	0=no failure，1=failure
23	Blocking alarm	R	0~1	0x01	0=no failure，1=failure
24	Reserved	R	0~1	0x01	
25	Reserved	R	0~1	0x01	
Relay output					
27	Inlet fan working state	R	0~1	0x01	0=off，1=on
28	Outlet fan working state	R	0~1	0x01	0=off，1=on
29	Heating relay	R	0~1	0x01	0=off，1=on

30	Reserved	R	0~1	0x01	
31	Back light control relay	R	0~1	0x01	0=off，1=on
32	Reserved				
33	Reserved				
34	Reserved				
35	Reserved				
36	Reserved				
Other					
59	System on/ off	RW	0~1	0x01/0x05	0=off，1=on

Address	Name	R/W	Range	means	Note	Code
Analog input						
0	Sensor 1 temp.(RT1)	R	-9 ～ 99℃		×10 display	0x03
1	Sensor 2 temp.(RT2)	R	-9 ～ 99℃		×10 display	0x03
2	Reserved	R				0x03
3	Reserved	R				0x03
4	Reserved	R				0x03
5	DC input power voltage	R	0-68V		×10 display	0x03
6	Inlet fan speed	R	0 ～ 9999rmp			0x03
7	Reserved	R				0x03
8	Reserved	R				0x03
9	Outlet fan speed	R	0 ～ 9999rmp			0x03
10	Reserved	R				0x03
11	Reserved	R				0x03
12	Reserved	R				0x03
13	Reserved	R				0x03
14	Reserved	R				0x03
15	Reserved	R				0x03
Parameters setting						
16	Inlet fan start temp.	RW	0～Inlet fan full speed temp.		×10 display	0x03/0x06/0x10
17	Inlet fan full speed temp.	RW	Inlet fan start temp.～60℃		×10 display	0x03/0x06/0x10
18	Outlet fan start temp.	RW	0～Outlet fan full speed temp.		×10 display	0x03/0x06/0x10
19	Outlet fan full speed temp.	RW	Outlet fan start temp.～60℃		×10 display	0x03/0x06/0x10
20	Heater start temp.	RW	0~30℃		×10 display	0x03/0x06/0x10
21	Heater hysteresis	RW	0~20℃		×10 display	0x03/0x06/0x10

22	Reserved	RW				0x03/0x06/0x10
23	Reserved	RW				0x03/0x06/0x10
24	Reserved	RW				0x03/0x06/0x10
25	Reserved	RW				0x03/0x06/0x10
26	Reserved	RW				0x03/0x06/0x10
27	Reserved	RW				0x03/0x06/0x10
28	Reserved	RW				0x03/0x06/0x10
29	Reserved	RW				0x03/0x06/0x10
30	Reserved	RW				0x03/0x06/0x10
31	DI1 NO and NC	RW	0 ～ 1	0 = NC 1 = NO		0x03/0x06/0x10
32	Reserved	RW				0x03/0x06/0x10
33	Reserved	RW				0x03/0x06/0x10
34	Reserved	RW				0x03/0x06/0x10
35	Reserved	RW				0x03/0x06/0x10
36	Reserved	RW				0x03/0x06/0x10
37	DI1 Function selection	RW	0 ～ 5	0 = Smoke alarm 1 = Flooding alarm 2 = Access alarm 3 = Shaking alarm 4 = Blocking alarm 5 = Other		0x03/0x06/0x10
38	Reserved	RW				0x03/0x06/0x10
39	Reserved	RW				0x03/0x06/0x10
40	Reserved	RW				0x03/0x06/0x10
41	Reserved	RW				0x03/0x06/0x10
42	Reserved	RW				
43	Reserved	RW				
44	Reserved	RW				
45	Reserved	RW				
46	DC power input over voltage point	RW	Under voltage ~ 60V	0 = No test of over voltage,input pwer≥58VDC start warning （lower than 58VDC stop alarm）		0x03/0x06/0x10

47	DC power input under voltage point	RW	0V~over voltage	0 = No test under voltage,input power≤44VDC		0x03/0x06/0x10
48	High temp. Alarm point	RW	50℃～low temp. alarm	When temp. Over this value, warning and acting.		0x03/0x06/0x10
49	Low temp. Alarm point	RW	High temp. alarm～ -20℃	When temp. under this value, warning and acting.		0x03/0x06/0x10
50	Inlet fan speed testing velocity pulses (pulse/rev)	RW	0~16	0 = no testing of fan failure alarm.		0x03/0x06/0x10
51	Outlet fan speed testing velocity pulses (pulse/rev)	RW	0~16	0 = no testing of fan failure alarm.		0x03/0x06/0x10
52	In/outlet fan maximum speed setting	RW	minimum speed setting~100%			0x03/0x06/0x10
53	In/outlet fan minimum speed setting	RW	20%~maximum speed setting			0x03/0x06/0x10
54	Reserved	RW				0x03/0x06/0x10
55	No heater	RW	0~1	0 = no, 1 = on		0x03/0x06/0x10
56	Baud rate	RW	0~3	0 = 2400bps 1 = 4800bps 2 = 9600bps 3 = 19200bps	Suitable for point to point communication	0x03/0x06/0x10
57	Address of RS485	RW	1~99		Suitable for point to point communication	0x03/0x06/0x10
58	Passwords	RW	0~99			0x03/0x06/0x10
59	System on/off	RW	0x0000/ 0xFF00	0x0000 = on 0xFF00 = off		0x01/0x05/0x06/0x10
60	Factory setting	RW	0~1	1=Factory setting		0x06/0x10
61	Reserved	RW				
62	Reserved	RW				
63	Reserved	RW				

14 Appendix C: digital display table

显示	意义	显示	意义	显示	意义
	A		M		Y
	B		N		Z
	C		O		1
	D		P		2
	E		Q		3
	F		R		4
	G		S		5
	H		T		6
	I		U		7
	J		V		8
	K		W		9
	L		X		0

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