HFC6100LT

FAN CONTROLLER

USER MANUAL

SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

Chinese trademark

English trademark

SmartGen — make your generator *smart*

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Table 1 - Software Version

Date	Version	Note
2020-12-18	1.0	Original release.
2021-03-05	1.1	Modified some function descriptions.

CONTENTS

1 OVERVIEW

HFC6100LT Fan Controller can be used for automatic control of 5 groups of fans, and can control its start/stop and PWN output function according to the selected temperature sensor. It has the function of balancing the running time of fan. This controller integrates digital, intelligent and network technologies and is able to work in the temperature range (-40°C~+70°C). It is easy and reliable to operate by LCD display with Chinese and English.

HFC6100LT Fan Controller adopts 32-bit micro-processing technique which can achieve precise measurement of various parameters, value adjustment, timing and threshold setting etc. All the parameters can be configured from front panel. It can be used in all types of fan automatic systems for its compact structure, simple connection and high reliability.

2 PERFORMANCE AND CHARACTERISTICS

Its main characters are shown as follows:

— 132*64 LCD display with backlight, optional Chinese and English operation interfaces for on-site selection, which is convenient for commissioning staff;

— With RS485 communication port, it can achieve "four remote" functions (remote control, remote measurement, remote communication and remote adjustment) via MODBUS protocol;

— Collect and display parameters of temperature, PWM output percentage, fan output numbers, etc.;

— With the function of grouping control of fans, 1 sensor could control the output of a group of fans, or multiple sensors could control the same group of fans, the number of output fans is the maximum number of fans required by multiple sensors;

— Each sensor can set the temperature control fan curve, (8 points, X (Temperature), Y (Output fan numbers);

— With the function of balancing running time: the fan with shortest running time will output when the start conditions are met each time;

— Control protection functions: to realize high temperature and open circuit of sensor alarms, as well as perfect fault display protections;

— With PWM control output function, the auto mode will automatically adjust PWM output duty ratio according to the selected temperature sensor;

— Parameter setting function: allow users to change and set the parameters in case of missing even power off. The parameters can be adjusted from front panel;

— With a variety of temperature sensor curves and they are available for users to customize;

— The controller has 12# outputs, which can be divided into 5 groups at most;

— With 4# PWM output ports and each one can manually or automatically adjust PWM;

— Wide power supply range DC(8~35)V, is able to adapt to different battery voltage environments;

— Add rubber gasket ring between shell and controller screen, the waterproof performance can reach to IP65;

— Controller is fixed by metal fixing clips;

— Modular design, pluggable wiring terminals, embedded mounting, compact structure and easy installation.

Table 2 – Performance Parameters

Items	Contents
Working Voltage	Continuous power supply: DC8.0V to DC35.0V
Power Consumption	<4W(Standby mode: ≤2W)
AUX. Output 1~12	1A DC24V Transistor B+ output
PWM 1-4	1A DC24V Transistor B+ output Frequency 100Hz Duty Ratio 0~100%
Digital Input 1-16	Low threshold voltage is 2.8V; high limit voltage is 60V
Digital Input 17-18	Low threshold voltage is 1.2V; high limit voltage is 60V
RS485	Isolated, half-duplex, 9600 baud rate, maximum communication length 1000m
Vibration	5 - 8 Hz: ±7.5 mm 8 - 500 Hz: 2 g IEC 60068-2-6
Shock	50g, 11ms, half-sine, complete shock test from three directions, and 18 times shock for each test IEC 60068-2-27
Bump Test	25g, 16ms, half-sine IEC 60255-21-2
Production Compliance	According to EN 61010-1 installation category (over voltage category) III, 300V, pollution class 2, altitude 3000m
Overall Dimensions	209mm x 167mm x 45mm
Panel Cutout	186mm x 141mm
Working Condition	Temperature: (-40~+70)°C Relative Humidity: (20~93)%RH
Storage Condition	Temperature: (-40~+80)°C
Protection Level	Front panel: IP65, when waterproof gasket ring inserted between panel and housing. Rear panel:IP20
Weight	0.6kg

4 OPERATION

4.1 CONTROLLER PANEL

Fig.1 - HFC6110LT Front Panel Indication

⚠ **Note:** Partial indicator insructions.

Table 3 –Indicators Introduction

Indicator	Description
Alarm	Slow flashing (1 time per second) when alarms, light off when there is no alarm.
Status	Light on when fan outputs, light off when there is no output.
Power Normal	If input port is set as unit normal input, light on when input port closes and light off when input port opens. Otherwise, the power normal indicator will light on.
Fan Switch	In manual switch mode, light off after it is illuminated for 1s when pressing the switch key.
Fan Speed	In manual speed mode, light off after it is illuminated for 1s when pressing the speed key.

Table 4 – Keys Description

Icon	Key	Description
	Fan Speed	In manual mode, press this key to set controller to manual fan speed mode. Adjust PWM output duty ratio to realize fan speed control by pressing or . Note: In manual fan speed mode, press to switch PWM output channel.
	Fan Switch	In manual mode, press this key to set controller to manual fan switch mode. Open or close the corresponding fans by pressing or . Note: In manual fan switch mode, press to switch fan output channel.
	Manual	Press this key to set controller to manual mode. Long press this key for more than 3s to test whether the panel indicator is normal. (Lamp test)
	Auto	Press this key to set controller to auto mode.
	Fan On/Speed-up	In manual fan switch mode, press this key to control the selected fan opening. In manual fan speed mode, press this key to control the selected PWM channel speed-up.(PWM duty ratio increases)
	Fan Off/Speed-down	In manual fan switch mode, press this key to control the selected fan closing. In manual fan speed mode, press this key to control the selected PWM channel speed-down.(PWM duty ratio decreases)
	Set/Confirm	Press this key to enter menu list, move the cursor in parameter setting and confirm the set information.
	Page Up/Increase	Screen scroll; Up cursor and increase value in parameter setting.
	Page Down/Decrease	Screen scroll; Down cursor and decrease value in parameter setting.
	Homepage/Return	Return to homepage when in main interface; Return to previous interface when pressing this key in parameters setting interface.

4.3 FAN CONTROLL MODE

4.3.1 AUTO MODE

Auto mode is activated by pressing [icon], LED indicator beside the key is illuminating which confirms this action.

4.3.2 AUTO CONTROL OUTPUT

4.3.2.1 ONE GROUP OF FANS CONTROLLED BY ONE GROUP OF SENSORS

Fan Automatic Control Setting:
a) The balanced running time is not enable, temp. sensor 1 controls the first group of fans and the outlets of the first group of fans are (Output port 1 2 3 4);
b) The fan control curves (X1:60℃,Y1：0)，（X2:70℃,Y2：1），（X3:80℃,Y3：2），（X4:90℃,Y4：3），（X5:100℃,Y5：4）；
c) The return difference value of sensor 1: 5℃;
d) 1#PWM output temp. sensor selects sensor 1.
**The logic graph of automatic running is shown as below:**
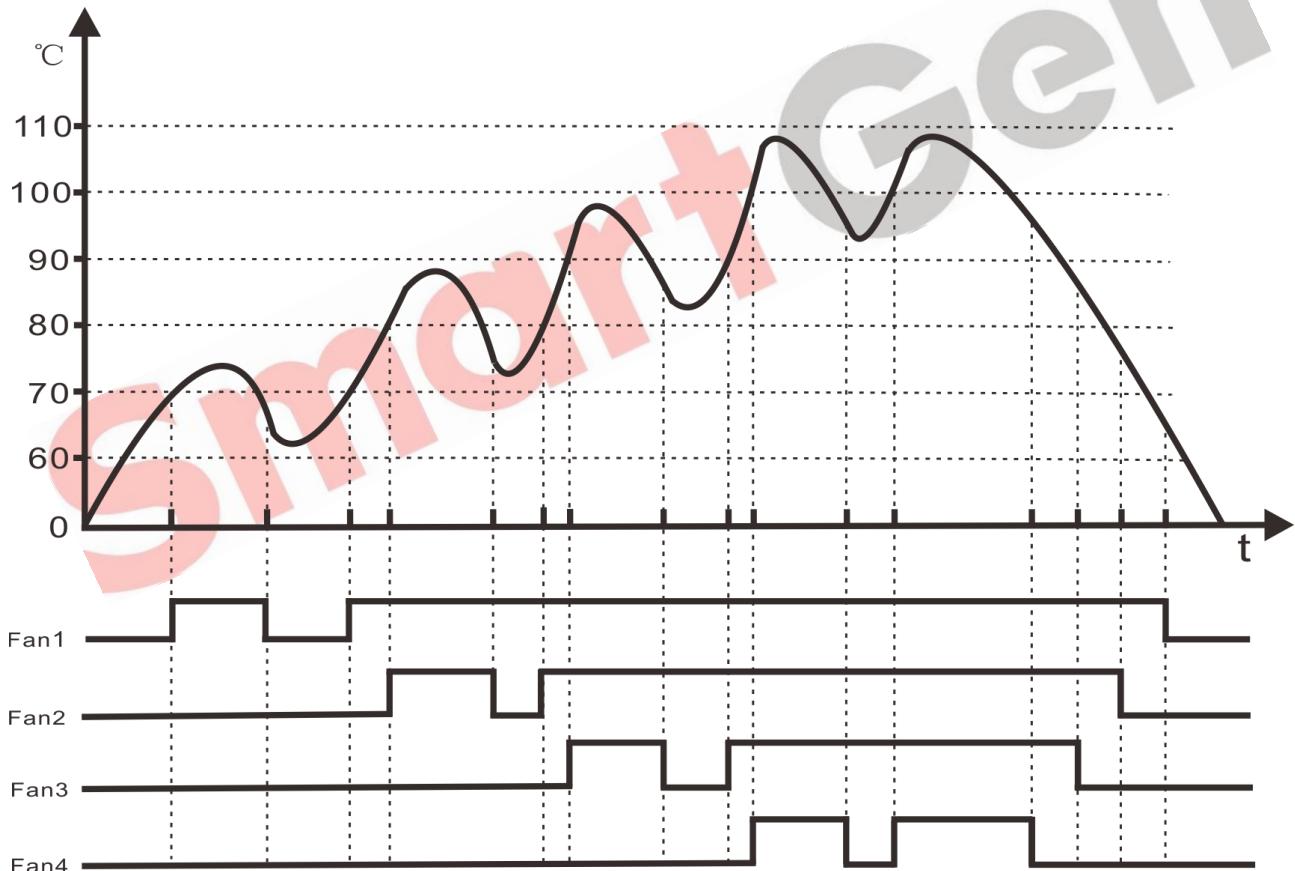
Fig.2 – The Logic Graph of Automatic Control

⚠**NOTE**: When balanced running time enables and meets the start condition, the fun with shortest running time will output; when meets the stop condition, the fun with longest running time will shut down.

PWM1 will automatically output corresponding duty ratio according to the set PWM output curve.

4.3.2.2 ONE GROUP OF FANS CONTROLLED BY TWO GROUPS OF SENSORS

When 2# sensor control the same group of fans: the number of output fans are the maximum number of 2# sensor required fan on.

Fan Automatic Control Setting:

a) The balanced running time is not enable, temp. sensor 1 and temp. sensor 2 control the first group of fans at the same time, and the outlets of the first group of fans are (Output port 1 2 3 4);

b) The fan control curves of sensor 1 and sensor 2 are as follows: (X1:60℃,Y1：0)，（X2:70℃,Y2：1)，（X3:80℃,Y3：2)，（X4:90℃,Y4：3)，（X5:100℃,Y5：4)；

c) The return difference value of sensor 1 and sensor 2: 5℃;

d) 2#PWM output temp. sensor selects sensor 2.

Fan Automatic Running Description:

The running process description of turning on/off the fan is the same as 4.3.2.1.

⚠**NOTE:** The fan on temperature of sensor 1 or sensor meets the output condition, the fan off temperature of the sensor 1 and sensor 2 meet the shutdown condition simultaneously. Example: when the temperature of sensor 1 is 70℃ and the temperature of sensor 2 is 80℃, two fans should be output by fan groups; when the temperature of sensor 1 drops to 65 ℃ and that of sensor 2 drops to 75℃, one fan shall be shut down of fan groups.

⚠**NOTE:** In auto mode, when the unit normal input is inactive, delay the setting time, all the output will be disconnected and the output of PWM duty ratio is 0.

4.3.3 MANUAL MODE

Manual mode is activated by pressing 🖐, the controller enters "Manual Mode" and the LED indicator is illuminating.

4.3.4 MANUAL CONTROL OUTPUT

a) In manual mode, press 🔲 and controller enters manual fan switch mode. Select the corresponding fan output by pressing 🔲. When select output 1, press 🔲 and the outlet 1 will output, press 🔲 and the outlet 1 will be disconnected.

b) In manual mode, press 🔲 and controller enters manual fan speed mode. Select the corresponding speed output channel (PWM) by pressing 🔲. When select PWM1 channel, press 🔲 to speed up (1#PWM output duty ratio increases), press 🔲 to speed down (1#PWM output duty ratio decreases).

5.1 ALARM

When controller detects the alarm signal, it only alarms.

Table 5 – Controller Warning Alarms

No.	Items	Description
1	Battery Over Voltage	When the controller detects that the battery voltage is higher than the threshold, it will send alarm signal.
2	Battery Under Voltage	When the controller detects that the battery voltage is lower than the threshold, it will send warning alarm signal.
3	Sensor 1 Open Circuit	When the controller detects that sensor 1 is open and the open action selects alarm, it will send alarm signal.
4	Sensor 1 High	When the controller detects that the temperature value of sensor 1 is greater than the alarm value, it will send alarm signal.
5	Sensor 2 Open Circuit	When the controller detects that sensor 2 is open and the open action selects alarm, it will send alarm signal.
6	Sensor 2 High	When the controller detects that the temperature value of sensor 2 is greater than the alarm value, it will send alarm signal.
7	Sensor 3 Open Circuit	When the controller detects that sensor 3 is open and the open action selects alarm, it will send alarm signal.
8	Sensor 3 High	When the controller detects that the temperature value of sensor 3 is greater than the alarm value, it will send alarm signal.
9	Sensor 4 Open Circuit	When the controller detects that sensor 4 is open and the open action selects alarm, it will send alarm signal.
10	Sensor 4 High	When the controller detects that the temperature value of sensor 4 is greater than the alarm value, it will send alarm signal.
11	Sensor 5 Open Circuit	When the controller detects that sensor 5 is open and the open action selects alarm, it will send alarm signal.
12	Sensor 5 High	When the controller detects that the temperature value of sensor 5 is greater than the alarm value, it will send alarm signal.
13	#1~12 Fan Faults	When the controller detects that the #1~12 fan faults input, or the input port set fans running input and when fans output, when fans running do not input, the controller will send corresponding alarm signal.

6 CONNECTIONS

The rear panel of HFC6100LT is as below:
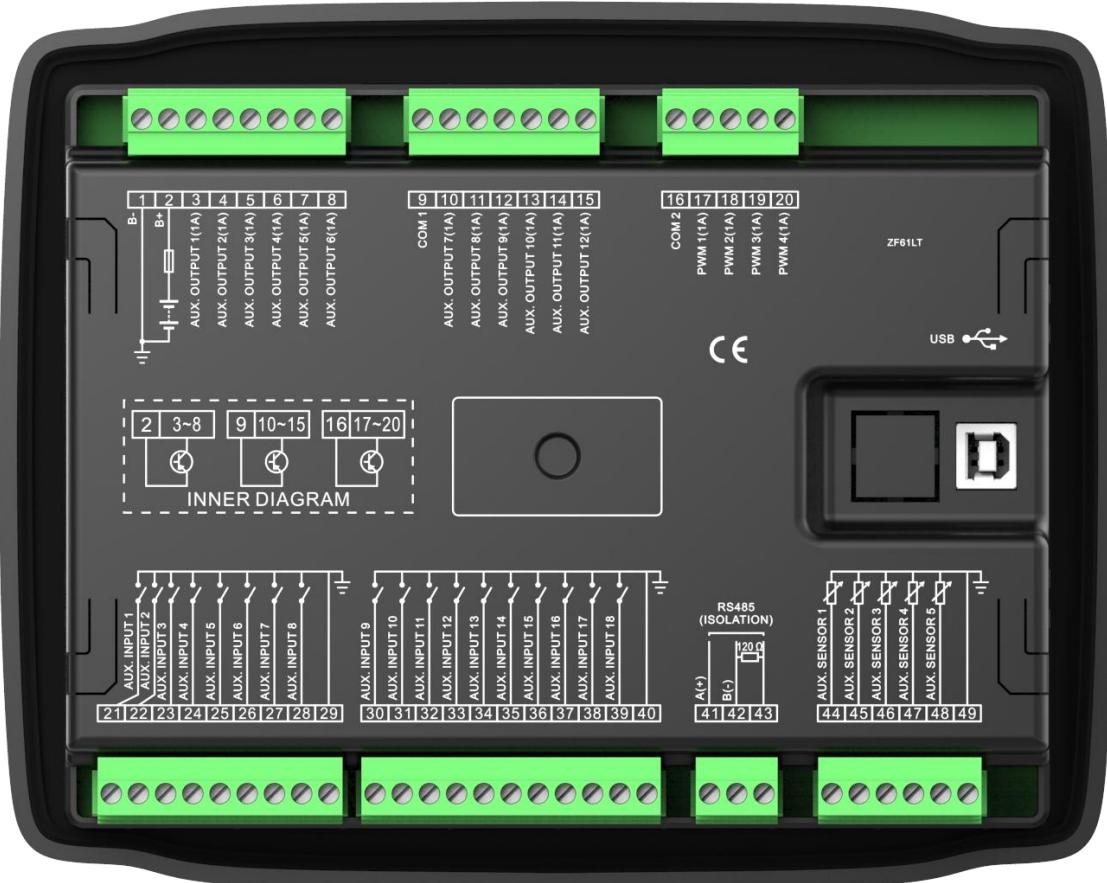
Fig.3 – Controller Rear Panel Drawing

Table 6 – Terminal Connection Description

No.	Function	Cable Size	Remark	
1	DC input B-	1.5mm^2	Connect to negative of battery	
2	DC input B+	1.5mm^2	Connect to positive of battery. Max.10A fuse is recommended.	
3	Aux. Output 1	1.0mm^2	B+ is supplied by 2 points, Transistor output rated 1A.	Refer to Table 9
4	Aux. Output 2	1.0mm^2		
5	Aux. Output 3	1.0mm^2		
6	Aux. Output 4	1.0mm^2		
7	Aux. Output 5	1.0mm^2		
8	Aux. Output 6	1.0mm^2		
9	COM1	1.5mm^2	Aux. output 7~12 common ports, connect to positive of battery.	
10	Aux. Output 7	1.0mm^2	B+ is supplied by 9 points, Transistor output rated 1A.	Refer to Table 9
11	Aux. Output 8	1.0mm^2		
12	Aux. Output 9	1.0mm^2		
13	Aux. Output 10	1.0mm^2		
14	Aux. Output 11	1.0mm^2		
15	Aux. Output 12	1.0mm^2		

No.	Function	Cable Size	Remark	
16	COM2	1.5mm^2	PWM 1-4 output common ports Connect to positive of battery.	
17	PWM Output 1	1.0mm^2	B+ is supplied by 16 points, rated 8A Transistor output rated 1A.	
18	PWM Output 2	1.0mm^2		
19	PWM Output 3	1.0mm^2		
20	PWM Output 4	1.0mm^2		
21	Aux. Input 1	1.0mm^2		Connect to GND(B-)
22	Aux. Input 2	1.0mm^2		Connect to GND(B-)
23	Aux. Input 3	1.0mm^2		Connect to GND(B-)
24	Aux. Input 4	1.0mm^2		Connect to GND(B-)
25	Aux. Input 5	1.0mm^2		Connect to GND(B-)
26	Aux. Input 6	1.0mm^2		Connect to GND(B-)
27	Aux. Input 7	1.0mm^2		Connect to GND(B-)
28	Aux. Input 8	1.0mm^2		Connect to GND(B-)
29	Aux. Input Common Port	The controller interior has been connected to power input B-.		
30	Aux. Input 9	1.0mm^2		Connect to GND(B-)
31	Aux. Input 10	1.0mm^2		Connect to GND(B-)
32	Aux. Input 11	1.0mm^2		Connect to GND(B-)
33	Aux. Input 12	1.0mm^2		Connect to GND(B-)
34	Aux. Input 13	1.0mm^2		Connect to GND(B-)
35	Aux. Input 14	1.0mm^2		Connect to GND(B-)
36	Aux. Input 15	1.0mm^2		Connect to GND(B-)
37	Aux. Input 16	1.0mm^2		Connect to GND(B-)
38	Aux. Input 17	1.0mm^2		Connect to GND(B-)
39	Aux. Input 18	1.0mm^2		Connect to GND(B-)
40	Aux. Input Common Port	The controller interior has been connected to power input B-.		
41	RS485+	0.5mm^2	Impedance-120Ω shielding wire is recommended and its single end grounded.	
42	RS485-	0.5mm^2		
43	Terminal Resistor (120Ω)	0.5mm^2	If impedance-120Ω is needed, short connected terminal 41、43.	
44	Sensor 1 Input	1.0mm^2	Connect to temp. sensor 1.	
45	Sensor 2 Input	1.0mm^2	Connect to temp. sensor 2.	
46	Sensor 3 Input	1.0mm^2	Connect to temp. sensor 3.	
47	Sensor 4 Input	1.0mm^2	Connect to temp. sensor 4.	
48	Sensor 5 Input	1.0mm^2	Connect to temp. sensor 5.	
49	Sensor Common Port	/	Sensor common port The controller interior has been connected to power input B-.	

7.1 PARAMETER CONTENT AND RANGE

Table 7 – Parameter Content and Range

No.	Item	Range	Default	Remark
1	Battery Over Voltage Alarm Threshold	(12.0-40.0)V	33.0	When battery voltage is higher than this value and lasts for 20s, controller will send battery high voltage alarm signal.
2	Battery Under Voltage Alarm Threshold	(4.0-30.0)V	8.0	When battery voltage is lower than this value and lasts for 20s, controller will send battery low voltage alarm signal.
3	Manually Set PWM Period	(0-100)%	10	Manual fan speed mode, press speed-up or speed-down key, the PWM period will be adjusted.
4	Sensor 1 Curve Selection	(0-15)	10	PT100, refer to Table 8.
5	Sensor 1 Open Circuit	(0-1)	0	0: Inactive 1: Alarm
6	Sensor 1 High Alarm Threshold Value	(0-300)℃	95	When the temperature of external temp. sensor is higher than this value, it will send high temperature signal. When the setting value is equal to 300, it will not send the signal.
7	Sensor 1 Control Fan Groups	(0-5)	1	1 group of fan controlled.
8	Sensor 1 Custom Curve	Custom temperature sensor curve (X: Resistance Y: Temperature).			
9	Sensor 1 Fan Control Curve	Custom fan control curve (X: Temperature Y: Number of fan output)			
10	Return Difference Value of Sensor 1	(0-300)℃	5	During the fan output control process, temperature difference required when the fan output is turned off.
11	Sensor 2 Curve Selection	(0-15)	10	PT100, refer to Table 8.
12	Sensor 2 Open Circuit	(0-1)	0	0: Inactive 1: Alarm
13	Sensor 2 High Alarm Threshold Value	(0-300)℃	95	When the temperature of external temp. sensor is higher than this value, it will send high temperature signal. When the setting value is equal to 300, it will not send the signal.
14	Sensor 2 Control Fan Groups	(0-5)	2	2 groups of fan controlled.
15	Sensor 2 Custom Curve	Custom temperature sensor curve (X: Resistance Y: Temperature).			
16	Sensor 2 Fan Control Curve	Custom fan control curve (X: Temperature Y: Number of fan output)			

No.	Item	Range	Default	Remark
17	Return Difference Value of Sensor 2	(0-300)℃	5	During the fan output control process, temperature difference required when the fan output is turned off.
18	Sensor 3 Curve Selection	(0-15)	10	PT100, refer to Table 8.
19	Sensor 3 Open Circuit	(0-1)	0	0: Inactive 1: Alarm
20	Sensor 3 High Alarm Threshold Value	(0-300)℃	95	When the temperature of external temp. sensor is higher than this value, it will send high temperature signal. When the setting value is equal to 300, it will not send the signal.
21	Sensor 3 Control Fan Groups	(0-5)	3	3 groups of fan controlled.
22	Sensor 3 Custom Curve	Custom temperature sensor curve (X: Resistance Y: Temperature).		
23	Sensor 3 Fan Control Curve	Custom fan control curve (X: Temperature Y: Number of fan output)		
24	Return Difference Value of Sensor 3	(0-300)℃	5	During the fan output control process, temperature difference required when the fan output is turned off.
25	Sensor 4 Curve Selection	(0-15)	10	PT100, refer to Table 8.
26	Sensor 4 Open Circuit	(0-1)	0	0: Inactive 1: Alarm
27	Sensor 4 High Alarm Threshold Value	(0-300)℃	95	When the temperature of external temp. sensor is higher than this value, it will send high temperature signal. When the setting value is equal to 300, it will not send the signal.
28	Sensor 4 Control Fan Groups	(0-5)	4	4 groups of fan controlled.
29	Sensor 4 Custom Curve	Custom temperature sensor curve (X: Resistance Y: Temperature).		
30	Sensor 4 Fan Control Curve	Custom fan control curve (X: Temperature Y: Number of fan output)		
31	Return Difference Value of Sensor 4	(0-300)℃	5	During the fan output control process, temperature difference required when the fan output is turned off.
32	Sensor 5 Curve Selection	(0-15)	10	PT100, refer to Table 8.
33	Sensor 5 Open Circuit	(0-1)	0	0: Inactive 1: Alarm
34	Sensor 5 High Alarm Threshold Value	(0-300)℃	95	When the temperature of external temp. sensor is higher than this value, it will send high temperature signal. When the setting value is equal to 300, it will not send the signal.

No.	Item	Range	Default	Remark
35	Sensor 5 Control Fan Groups	(0-5)	5	5 groups of fan controlled.
36	Sensor 5 Custom Curve	Custom temperature sensor curve (X: Resistance Y: Temperature).			
37	Sensor 5 Fan Control Curve	Custom fan control curve (X: Temperature Y: Number of fan output)			
38	Return Difference Value of Sensor 5	(0-300)℃	5	During the fan output control process, temperature difference required when the fan output is turned off.
39	Aux. Output 1 Setting	(0-25)	1	Factory default: 1 group of fan control output. Refer to Table 9
40	Output 1 Type	(0-1)	0	0: Normally open; 1: Normally close.
41	Aux. Output 2 Setting	(0-25)	1	Factory default: 1 group of fan control output. Refer to Table 9
42	Output 2 Type	(0-1)	0	0: Normally open; 1: Normally close.
43	Aux. Output 3 Setting	(0-25)	1	Factory default: 1 group of fan control output. Refer to Table 9
44	Output 3 Type	(0-1)	0	0: Normally open; 1: Normally close.
45	Aux. Output 4 Setting	(0-25)	1	Factory default: 1 group of fan control output. Refer to Table 9
46	Output 4 Type	(0-1)	0	0: Normally open; 1: Normally close.
47	Aux. Output 5 Setting	(0-25)	2	Factory default: 2 groups of fan control output. Refer to Table 9
48	Output 5 Type	(0-1)	0	0: Normally open; 1: Normally close.
49	Aux. Output 6 Setting	(0-25)	2	Factory default: 2 groups of fan control output. Refer to Table 9
50	Output 6 Type	(0-1)	0	0: Normally open; 1: Normally close.
51	Aux. Output 7 Setting	(0-25)	3	Factory default: 3 groups of fan control output. Refer to Table 9
52	Output 7 Type	(0-1)	0	0: Normally open; 1: Normally close.
53	Aux. Output 8 Setting	(0-25)	3	Factory default: 3 groups of fan control output. Refer to Table 9
54	Output 8 Type	(0-1)	0	0: Normally open; 1: Normally close.
55	Aux. Output 9 Setting	(0-25)	4	Factory default: 4 groups of fan control output. Refer to Table 9
56	Output 9 Type	(0-1)	0	0: Normally open; 1: Normally close.
57	Aux. Output 10 Setting	(0-25)	4	Factory default: 4 groups of fan control output. Refer to Table 9
58	Output 10 Type	(0-1)	0	0: Normally open; 1: Normally close.
59	Aux. Output 11 Setting	(0-25)	5	Factory default: 5 groups of fan control output. Refer to Table 9
60	Output 11Type	(0-1)	0	0: Normally open; 1: Normally close.
61	Aux. Output 12 Setting	(0-25)	5	Factory default: 5 groups of fan control output. Refer to Table 9

No.	Item	Range	Default	Remark
62	Output 12 Type	(0-1)	0	0: Normally open; 1: Normally close.
63	1 Group of Fans Balanced Running	(0-1)	1	1: Disable 2: Enable.
64	2 Groups of Fans Balanced Running	(0-1)	1	1: Disable 2: Enable.
65	3 Groups of Fans Balanced Running	(0-1)	1	1: Disable 2: Enable.
66	4 Groups of Fans Balanced Running	(0-1)	1	1: Disable 2: Enable.
67	5 Groups of Fans Balanced Running	(0-1)	1	1: Disable 2: Enable.
68	Aux. Input 1 Setting	(0-35)	5	Factory default: 1#fan running input. Refer to Table 10
69	Aux. Input 1 Active	(0-1)	0	Factory default: closed
70	Aux. Input 1 Delay	(0-20.0)s	2.0	
71	Aux. Input 2 Setting	(0-35)	6	Factory default: 2#fan running input. Refer to Table 10
72	Aux. Input 2 Active	(0-1)	0	Factory default: closed
73	Aux. Input 2 Delay	(0-20.0)s	2.0	
74	Aux. Input 3 Setting	(0-35)	7	Factory default: 3#fan running input. Refer to Table 10
75	Aux. Input 3 Active	(0-1)0	0	Factory default: closed
76	Aux. Input 3 Delay	(0-20.0)s	2.0	
77	Aux. Input 4 Setting	(0-35)	8	Factory default: 4#fan running input. Refer to Table 10
78	Aux. Input 4 Active	(0-1)	0	Factory default: closed
79	Aux. Input 4 Delay	(0-20.0)s	2.0	
80	Aux. Input 5 Setting	(0-35)	9	Factory default: 5#fan running input.
81	Aux. Input 5 Active	(0-1)	0	Factory default: closed
82	Aux. Input 5 Delay	(0-20.0)s	2.0	
83	Aux. Input 6 Setting	(0-35)	10	Factory default: 6#fan running input.
84	Aux. Input 6 Active	(0-1)	0	Factory default: closed
85	Aux. Input 6 Delay	(0-20.0)s	2.0	
86	Aux. Input 7 Setting	(0-35)	11	Factory default: 7#fan running input.
87	Aux. Input 7 Active	(0-1)	0	Factory default: closed
88	Aux. Input 7 Delay	(0-20.0)s	2.0	
89	Aux. Input 8 Setting	(0-35)	12	Factory default: 8#fan running input.
90	Aux. Input 8 Active	(0-1)	0	Factory default: closed
91	Aux. Input 8 Delay	(0-20.0)s	2.0	
92	Aux. Input 9 Setting	(0-35)	13	Factory default: 9#fan running input.
93	Aux. Input 9 Active	(0-1)	0	Factory default: closed
94	Aux. Input 9 Delay	(0-20.0)s	2.0	
95	Aux. Input 10 Setting	(0-35)	14	Factory default: 10#fan running input.
96	Aux. Input 10 Active	(0-1)	0	Factory default: closed

No.	Item	Range	Default	Remark
97	Aux. Input 10 Delay	(0-20.0)s	2.0	
98	Aux. Input 11 Setting	(0-35)	15	Factory default: 11#fan running input.
99	Aux. Input 11 Active	(0-1)	0	Factory default: closed
100	Aux. Input 11 Delay	(0-20.0)s	2.0	
101	Aux. Input 12 Setting	(0-35)	16	Factory default: 12#fan running input.
102	Aux. Input 12 Active	(0-1)	0	Factory default: closed
103	Aux. Input 12 Delay	(0-20.0)s	2.0	
104	Aux. Input 13 Setting	(0-35)	0	Factory default: Not used. Refer to Table 10
105	Aux. Input 13 Active	(0-1)	0	Factory default: closed
106	Aux. Input13 Delay	(0-20.0)s	2.0	
107	Aux. Input 14 Setting	(0-35)	0	Factory default: Not used. Refer to Table 10
108	Aux. Input 14 Active	(0-1)	0	Factory default: closed
109	Aux. Input 14 Delay	(0-20.0)s	2.0	
110	Aux. Input 15 Setting	(0-35)	0	Factory default: Not used. Refer to Table 10
111	Aux. Input 15 Active	(0-1)	0	Factory default: closed
112	Aux. Input 15 Delay	(0-20.0)s	2.0	
113	Aux. Input 16 Setting	(0-35)	0	Factory default: Not used. Refer to Table 10
114	Aux. Input 16 Active	(0-1)	0	Factory default: closed
115	Aux. Input 16 Delay	(0-20.0)s	2.0	
116	Aux. Input 17 Setting	(0-35)	0	Factory default: Not used. Refer to Table 10
117	Aux. Input 17 Active	(0-1)	0	Factory default: closed
118	Aux. Input 17 Delay	(0-20.0)s	2.0	
119	Aux. Input 18 Setting	(0-35)	0	Factory default: Not used. Refer to Table 10
120	Aux. Input 18 Active	(0-1)	0	Factory default: closed
121	Aux. Input 18 Delay	(0-20.0)s	2.0	
122	Power-on Mode Option	(0-1)	1	0: Manual mode; 1: Auto mode.
123	Controller Address	(1-254)	1	The communication address of controller.
124	Password Setting	0-9999	318	The password of the module.
125	1#PWM Output Sensor	(0-4)	1	Factory default: sensor 1 temperature
126	1#PWM Output Minimum	(0-100)%	0	The PWM1 minimum duty ratio.
127	1#PWM Output Mini. Temp.	(0-300)°C	40	The corresponding temperature value of PWM1 mini. duty ratio.
128	1#PWM Output Maximum	(0-100) %	100	The PWM1 maximum duty ratio.
129	1#PWM Output Max. Temp.	(0-300)°C	90	The corresponding temperature value of PWM1 max. duty ratio.

No.	Item	Range	Default	Remark
130	2#PWM Output Sensor	(0-4)	2	Factory default: sensor 2 temperature
131	2#PWM Output Minimum	(0-100)%	0	The PWM2 minimum duty ratio.
132	2#PWM Output Mini. Temp.	(0-300)°C	40	The corresponding temperature value of PWM2 mini. duty ratio.
133	2#PWM Output Maximum	(0-100)%	100	The PWM2 maximum duty ratio.
134	2#PWM Output Max. Temp.	(0-300)°C	90	The corresponding temperature value of PWM2 max. duty ratio.
135	3#PWM Output Sensor	(0-4)	3	Factory default: sensor 3 temperature
136	3#PWM Output Minimum	(0-100)%	0	The PWM3 minimum duty ratio.
137	3#PWM Output Mini. Temp.	(0-300)°C	40	The corresponding temperature value of PWM3 mini. duty ratio.
138	3#PWM Output Maximum	(0-100)%	100	The PWM3 maximum duty ratio.
139	3#PWM Output Max. Temp.	(0-300)°C	90	The corresponding temperature value of PWM3 max. duty ratio.
140	4PWM Output Sensor	(0-4)	4	Factory default: sensor 4 temperature
141	4#PWM Output Minimum	(0-100)%	0	The PWM4 minimum duty ratio.
142	4#PWM Output Mini. Temp.	(0-300)°C	40	The corresponding temperature value of PWM4 mini. duty ratio.
143	4#PWM Output Maximum	(0-100)%	100	The PWM4 maximum duty ratio.
144	4#PWM Output Max. Temp.	(0-300)°C	90	The corresponding temperature value of PWM4 max. duty ratio.
145	Start Interface Delay	(0-360.0)s	0	If set as 0, the start interface is disabled.
146	Date Setting	Set the date of the module.		
147	PWM1 Manual Output Setting	(0-100)%	0	When the controller switches to manual mode, the default output PWM value.
148	PWM2 Manual Output Setting	(0-100)%	0	
149	PWM3 Manual Output Setting	(0-100)%	0	
150	PWM4 Manual Output Setting	(0-100)%	0	
151	Fan Running Detection Delay	(0-3600)s	5	After controlling the fan output, detect the time of the fan operation input. When detects delay is 0s, fun operation input is not detected.
152	Fan Off Delay	(0-3600)s	5	In auto mode, after the unit operation input is inactive, all the output disconnected delay time.

7.2 SENSOR SELECTION

Table 8 – Sensor Selection

No.	Sensor	Content	Remark
1	Temp. Sensor	0 Not used 1Custom Resistance Curve 2Reserved 3 VDO 4 CURTIS 5 VOLVO-EC 6 DATCON 7 SGX 8 SGD 9 SGH 10 PT100 11 SUZUKI 12-15Reserved	The custom input resistance range is 0~6kΩ, Factory default is PT100 sensor.

7.3 AUX. OUTPUT 1-12

Table 9 – Definition Content of Aux. Output 1-12

No.	Items	Description
0	Not Used	
1	1 Group of Fan Control Output	The fan output 1 group to control its action.
2	2 Groups of Fan Control Output	The fan output 2 groups to control its action.
3	3 Groups of Fan Control Output	The fan output 3 groups to control its action.
4	4 Groups of Fan Control Output	The fan output 4 groups to control its action.
5	5 Groups of Fan Control Output	The fan output 5 groups to control its action.
6	Common Alarm Output	Act when common warning and common shutdown alarm.
7	Unit Running Output	Output when unit running inputs.
8	Sensor 1 Open Circuit Alarm	Alarm when sensor 1 is disconnected.
9	Sensor 1 High Alarm	Alarm when temperature of sensor 1 is high.
10	Sensor 2 Open Circuit Alarm	Alarm when sensor 2 is disconnected.
11	Sensor 2 High Alarm	Alarm when temperature of sensor 2 is high.
12	Sensor 3 Open Circuit Alarm	Alarm when sensor 3 is disconnected.
13	Sensor 3 High Alarm	Alarm when temperature of sensor 3 is high.
14	Sensor 4 Open Circuit Alarm	Alarm when sensor 4 is disconnected.

No.	Items	Description
15	Sensor 4 High Alarm	Alarm when temperature of sensor 4 is high.
16	Sensor 5 Open Circuit Alarm	Alarm when sensor 5 is disconnected.
17	Sensor 5 High Alarm	Alarm when temperature of sensor 5 is high.
18	In Manual Mode	Output when system is in manual mode.
19	In Auto Mode	Output when system is in auto mode.
20-25	Reserved	

7.4 DIGITAL INPUT 1-18

Table 10 - Definition Content of Digital Input 1-18 (Active When Connect To Ground (B-)

No.	Type	Function Description
0	Not Used	
1	Unit Normal Input	When it is active, the power supply is normal and LED indicator is illuminated.
2	Fan Output Inhibit	When input is active, all the fan outputs are inhibited.
3	All Fan Output	When input is active, all the fans control output.
4	Reserved	
5	1# Fan Running Input	When input is active, it indicates the normal operation state of the #1-12 fan. When controller is in auto mode, the fun will output if the sensor temperature reaches the output value. After the detection delay, if the input is inactive, the fan output will disconnect and the controller will send corresponding fault alarm.
6	2# Fan Running Input	
7	3# Fan Running Input	
8	4# Fan Running Input	
9	5# Fan Running Input	
10	6# Fan Running Input	
11	7# Fan Running Input	
12	8# Fan Running Input	
13	9# Fan Running Input	
14	10# Fan Running Input	
15	11# Fan Running Input	
16	12# Fan Running Input	
17	1# Fan Fault Input	When input is active ,it indicates the fault state of the #1-12 fan, the controller will send corresponding fault alarm.
18	2# Fan Fault Input	
19	3# Fan Fault Input	
20	4# Fan Fault Input	
21	5# Fan Fault Input	
22	6# Fan Fault Input	
23	7# Fan Fault Input	
24	8# Fan Fault Input	
25	9# Fan Fault Input	
26	10# Fan Fault Input	
27	11# Fan Fault Input	
28	12# Fan Fault Input	
29	Simulate Manual Key Input	An external key can be connected to simulate the panel key to be pressed.

No.	Type	Function Description
30	Simulate Auto Key Input	
31-35	Reserved	

8 PARAMETER SETTING

8.1 MENU

After controller powered on, press [⚙/OK] to enter into the parameters setting menu:

1 Parameters Setting
2 Language Option
3 Controller Information
4 Fan Running Time

8.2 CONTROLLER PARAMETER SETTING

"00318" can set all items during inputting password. When default password (00318) has been changed, if more parameter items need to be set or password is forgotten, such as sensor calibration, please contact with the factory.

⚠ **Notes:** Aux. input 1-18 cannot be set as the same items, otherwise it cannot realize correct function; programmable output 1-12 can be set as the same item.

8.3 LANUGUAGE OPTION

User may select display language as simplified Chinese and English.

8.4 CONTROLLER INFORMATION

a) This interface can display the development information of the controller, such as software version, hardware version and release date.
b) Press [▲] to display digital input/output ports status.
c) Press [▼] to display the start interface.

8.5 FAN RUNNING TIME

The fan running time can be viewed through this item.

9   COMMISSIONING

Before operation, the following checking should be carried out:

— Check and ensure all the connections are correct and wire diameter is suitable.

— Ensure that the controller DC power has fuse; battery positive and negative have correctly connected.

— Set controller as Manual Mode, press [⊞] to select corresponding fan output, fan on/off by pressing [⊛] and [⊛]. Press [⊞] to select corresponding PWM channel, speed up/down by pressing [⊛] and [⊛] to adjust PWM output duty ratio.

— Set controller to auto mode, automaticlly control fan on/off according to the sensor temperature.

— If there are any other questions, please contact SmartGen's service.

10   TYPICAL APPLICATION
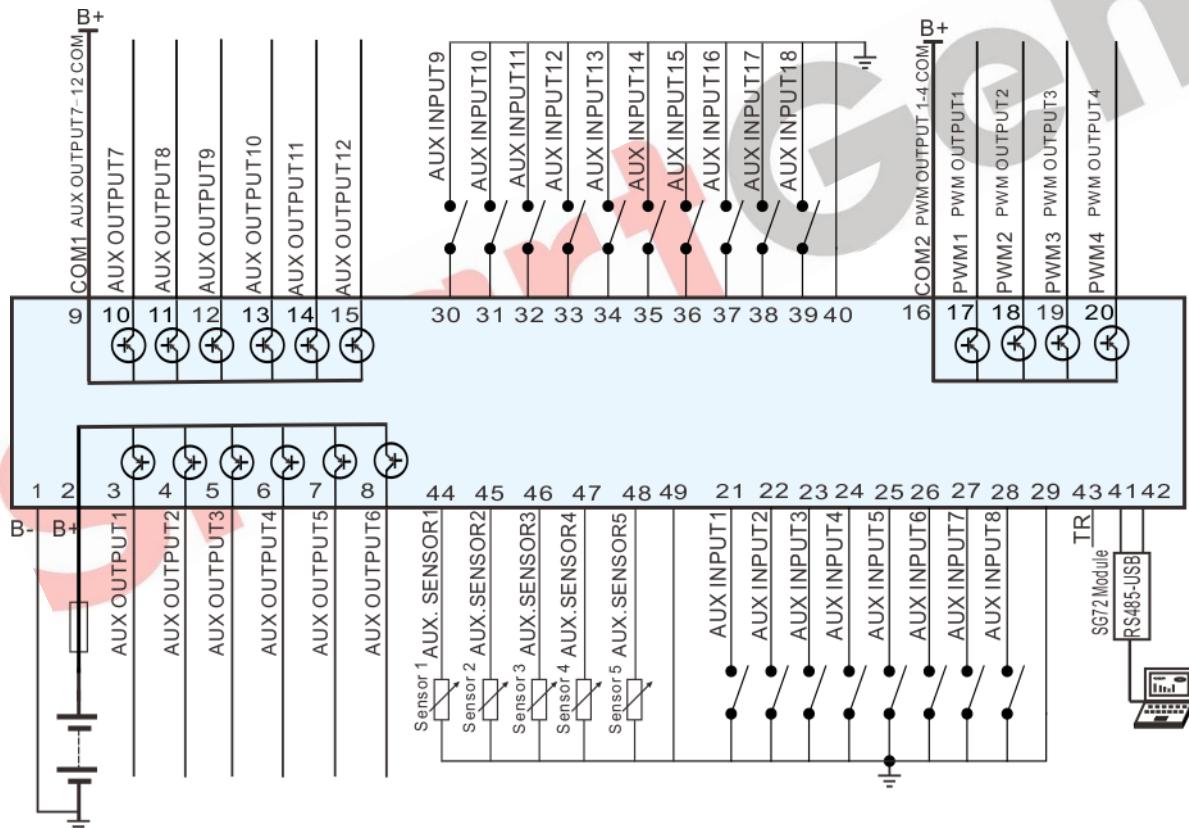
Fig.4 - HFC6110LT Typical Application Diagram

![SmartGen logo]

11 INSTALLATION

11.1 FIXING CLIPS

— Withdraw the fixing clip screw (turn anticlockwise) until it reaches proper position.
— Pull the fixing clip backwards (towards the back of the module) ensuring four clips are inside their allotted slots.
— Turn the fixing clip screws clockwise until they are fixed to the panel.
— Care should be taken not to over tighten the screws of fixing clips.

⚠**NOTE:** A torque of 0.27N·m (2.75kgf·cm) is recommended

11.2 OVERALL DIMENSION AND PANEL CUTOUT
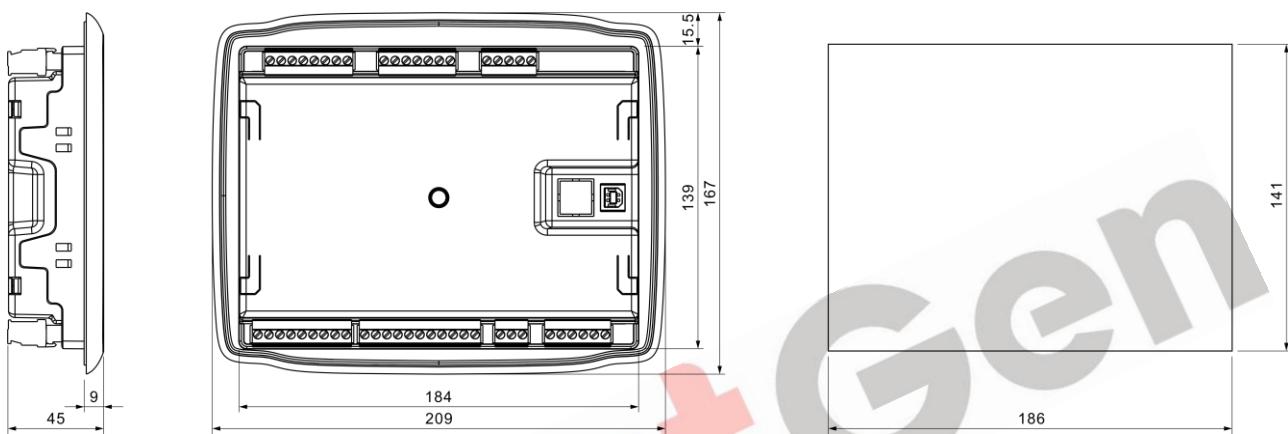
Fig.5– Overall Dimensions and Panel Cutout (Unit: mm)

HFC6110LT controller can be applicable to (8~35) VDC battery voltage. Battery negative must be reliably connected to ground. The connection between controller power B+/B- and positive /negative of battery should not be less than 1.5mm². If a float charger is fitted, please connect output line of the charger with battery directly, and then connect battery positive and negative to power input of controller separately, in case that charger will interfere with the normal running of controller.

— Output and expansion relay: all the outputs of controller are transistor output. If need to expand relay, please add freewheeling diode in both ends of relay coil (when expansion relay coil links DC), or add RC loop (when expansion relay coil links AC), in case controller or other equipment are interfered.

— Dielectric strength test: when the controller has been installed in the control panel, during the test please disconnect all the terminals, in case high voltage damages the controller.

12 TROUBLESHOOTING

Table 11 Troubleshooting

Symptoms	Possible Solutions
Controller Inoperative	Check starting battery; Check connections of controller; Check the DC fuse.
No Output of Fan Control	Check if manual mode fan output is abnormal; Check if temp. sensor is abnormal; Check the configuration parameters are correct.
RS485 Communication Failure	Check connections; Check if COM port is correct; Check if A and B of RS485 is connected reversely; Check if PC COM port is damaged; 120Ω resistance between RS485 and AB is Recommended.

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