Changzhou Winpark Electronics Co., Ltd
Address: 6th Floor of Tianan Industrial Village A plus, Xinbei, Changzhou 213022, China
Tel: 0086-519-85132277   Email: winpark@cnwinpark.com
Fax: 0086-519-85108252   Web: www.cnwinpark.com

SAT100 Series Temperature Control Module
Operation Manual

(苏)制 04000201
Version No.:V1.01

Thank you for using Winpark products. Please read this manual carefully before operating the controller and always keep it around you to make it available easily anytime.

⚠️   **WARNING**

Wire connection

If failure or error of this module could result in a critical accident of the system, install an external protection circuit to prevent such an accident.

Choose fuse protection power supply wire and output wire to avoid strong current strike which may cause failure or damage to the controller.

Power supply

Please use the controller under rated power supply to avoid causing failure or damage to the controller.

Don't turn on thee power supply until all of the wiring is completed and checked again

Using sites limitation

Don't use this controller in the places subject to flammable or explosive gas to avoid cause fire.

Don't use this controller in dusty, corrosive and steam exhaust environment

Don't use this controller where there are strong shock and strike.

If failure or error of this module could cause danger to human life or big loss of property, it is not recommended to use this module. If it has to be used, it is necessary to install external protection equipments.

☐ **General Electrical Data**

Rated voltage	18~30V DC
Power consumption	≤5VA
Insulation Strength	Power supply- input：1500V AC 1min Input-relay output：1500V AC 1min Power supply-relay output：1500V AC 1min
Insulation Resistance	Input-relay output：>20MΩ Input-power supply：>20MΩ Power supply-relay output：>20MΩ
Working Environment	Ambient temperature：0℃ ~50℃ Relative humidity：35%~85%（no condensation）

☐ Measuring Data

| Permissible input resistance	thermocouple：≤ 100Ω
Measuring range	0 ~600°C
Display accuracy	0.1°C
tolerance	±0.5%FS

☐ Out put data

Capacity of relay output contacts	3A 220V； Resistive load or designated
SSR Trigger signal	Output voltage: power supply input voltage Output current：10mA

☐ Product model

SAT100—☐ ☐ ☐ ☐ ☐ –SP ☐ ☐- V☐ ☐
　　　　(1)　　　(2) (3) (4)　(5) (6)　　　(7) (8)　　(9) (10)

SN	Name	Explanation
(1)	Design code	100: 100 series products
(2)	Input method	0: thermocouple input
(3)	output method	0: break output
(4)	Alarm method	0: upper limit upward alarm
(5)	Input type	0: K　1:E　5:J
(6)	Output type	0: relay contacts output 1: logic level output (to control SSR)
(7) (8)	Special model No.	**: Ordinary
(9) (10)	Software Version	01: Ordinary

☐ Wiring connection
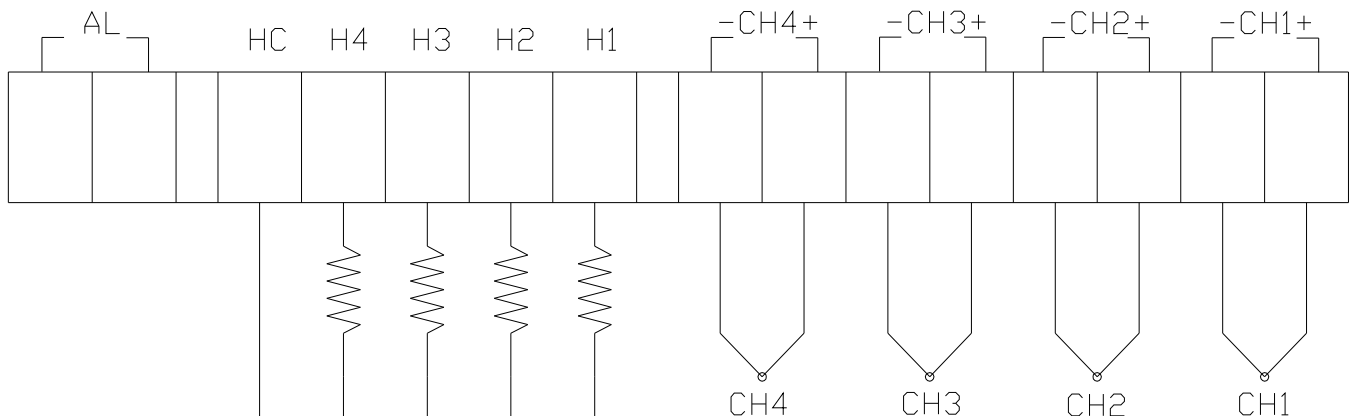
□ Address code explanation

Turn the address selecting switch to ON position, the displaying digital tube on the panel would increase by degree (one time in every 2 seconds) from 0 to F (0~15). When turn the switch to OFF, the address stops changing and the communication address of the module then is 20+ digital tube value, which range is 20~35.

□ Parameter Description

Parameter	Name	Description	Default
P	Proportional Band	Proportional band of heating end （when P=0, it is stepping control）	10.0
I	Integral Time	Integral Time of heating end (Re-adjust time) ("I" is return difference in stepping control)	240
D	Differential Time	Differential time of heating end (advance adjust time).	60
IT	Overshoot suppression	The smaller is this parameter, the smaller is the first overshoot, but it will take longer to reach the set temperature.	10
SP	proportional band separation	To prevent overshoot caused by proportional function.	0
T	Heat cycle time	Output one action in this cycle under break control	30
PC	Refrigerating Proportional band	Proportional band of time proportional control in refrigerating end	10
PO	Refrigerating Proportion band offset	Proportional band offset of time proportional control in refrigerating end	0
CT	Refrigerating cycle time	Output one action in this cycle under break control	90
TR	Temperature modification	Modify temperature when the position of sensor or other factors affect measuring.	0
DB	Dead Band control	Insensitive area of alarm. It can reduce the action times of alarm relay. Range；-10.0%~10.0%（Default 0.0%）	10
FIL	input filter factor	used for input signal. The bigger is this factor the smoother is the input. But it cause delay to the input. Press SET to enter next page.	0

□ Refrigerating Parameter Description

PC: Refrigerating Proportional band;   PO: Refrigerating Proportion band offset (Unit: °C); CT: Refrigerating cycle time (Unit: Second)

Two types of refrigerating:

1. Step refrigerating

PC=0，PO：Refrigerating Proportion band offset，CT：Non-defined

For example: set SV=100, PO=10, when PV=110.5°C alarm outputs, when PV=109.5°C alarm stops. When PV=109.6°C ~110.4°C, it remains the original status: Return Difference Value=1°C

2. Proportional refrigerating

PC= Proportional Band（%），PO: Refrigerating Proportion band offset (Unit: °C), CT: Refrigerating cycle time (Unit: Second)

Refrigerating output =（actual temperature –set temperature- Refrigerating offset）/（（Proportion band %）*500）

For example: PC=5，PO=5，CT=30，SV=100，Actual temperature =108

Refrigerating output =（108-100-5）/（5%*500）=0.12

Because Refrigerating cycle time CT=30 seconds，in refrigerating cycle the valid output time=30*0.12=3.6seconds

□ **basic communication protocol**：Modicon Modbus Protocol，RTU Slave Mode

(Note: If the touch screen has the function of fragment communication optimization, please close this optimization function)

Communication connection	RS485	Data bit	8
Parity bit	even	Stop bit	1
Baud rate	19200BPS		
Equipment address	20-35 optional		
Parameter, variable	Exist in form of holding register（HR）, show in 2 bytes 16 hexadecimal complement, address shows as Wxxxx		
Control switch, bit status	Exist in form of coil, show in 1 bit, value 1 means valid., address shows as Bxxxx		
Supported command	01（Read Coil Status） 03（Read Holding Registers） 05（Force Single Coil） 06（Preset Single Register） 16（Preset Multiple Regs）		
Alternating control area with touch screen	Address：80，words: 2-8		
Alternating status area with touch screen	Address：88		
Because the communication buffer area is relatively small in the module, please close communication optimization function when programming touch screen configuration.			

□ **Basic data description**

Version No. address of module software：W8600

Name	description	Read/write	Address	Unit
PV1	Channel 1PV value	Read only	W48	0.1℃
PV2	Channel 2 PV value	Read only	W49	0.1℃
PV3	Channel3 PV value	Read only	W50	0.1℃
PV4	Channel 4 PV value	Read only	W51	0.1℃
W52~ W55 backup				
SV1	Channel 1SV value	Read&write	W40	1℃
SV2	Channel 2 SV value	Read&write	W41	1℃
SV3	Channel 3 SV value	Read&write	W42	1℃
SV4	Channel 4 SV value	Read&write	W43	1℃
W44~ W47 backup				

□ **Appended Instructions：**

1　High/low temperature alarm

1.1　Bit parameter

Enable high/low temperature alarm	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
W017	Corresponding bit address（B）							
（highbyte）Enable high temperature alarm: Enable high temperature alarm of the corresponding channel, when the value is set to 1, it means the function is enabled.	279	278	277	276	275	274	273	272
（lowbyte）Enable low temperature alarm: Enable low temperature alarm of the corresponding channel, when the value is set to 1, it means the function is enabled.	287	286	285	284	283	282	281	280
high/low temperature alarm output	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
W014	Corresponding bit address（B）							
（highbyte）high temperature alarm output: When the value is 1, it means the corresponding channel is in high temperature alarm state.	231	230	229	228	227	226	225	224
（lowbyte）low temperature alarm output: When the value is 1, it means the corresponding channel is in low temperature alarm state.	239	238	237	236	235	234	233	232
Machine high temperature alarm bit	B176	when there are 2 or more channels of high temperature alarm, the bit=1						
Machine low temperature alarm bit	B177	when there are 2 or more channels of low temperature alarm, the bit=1						
enable machine high temperature alarm expansion module	B288	When the bit=1, the 8th channel of the expansion module would be enforced as the output of machine high temperature alarm						
enable machine low temperature alarm expansion module	B289	When the bit=1, the 7th channel of the expansion module would be enforced as the output of machine low temperature alarm						

1.2　Word parameter

Function	Address	
high temperature alarm deviation	W026	Unit: ℃，if high temperature alarm of this channel is enabled, when(PV-SV)≥Value of high temperature alarm deviation, the high temperature alarm of this channel output=1. if high temperature alarm deviation=0, it means high temperature alarm is invalid.
low temperature alarm deviation	W027	Unit: ℃，if low temperature alarm of this channel is enabled, when(PV-SV)≥Value of low temperature alarm deviation, the low temperature alarm of this channel output=1. if low temperature alarm deviation=0, it means low temperature alarm is invalid.

2　Measuring radix point control

Function	Address	
Measuring value radix point control	B296	When the bit=0，the unit of PV output value is 1℃ When the bit=1，the unit of PV output value is0. 1℃

3　Output mode
3.1　address（W165）

bit	7	6	5	4	3	2	1	0
	expansion module output				main module output			
Output mode	0000：refrigerating output 0001：User-defined output, the low 8 byte content of address (W096) register content is the output of expansion relay. "1" means relay pickup				0000：relay or SSR output 0001：SCR controlled AC cycle proportional output			

4　Sensor abnormal protection

4.1　Judging by heating power and temperature rising time.

4.2　parameter

4.2.1　temperature rise threshold value 3.0 degree (fixed)

4.2.2　setting parameter

4.2.3　bit parameter

W010	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
	Corresponding bit address（B）							
Alarm status	167	166	165	164	163	162	161	160
Alarm clear: set to 1 to clear corresponding alarm output, control bit resets to zero automatically.	175	174	173	172	171	170	169	168

4.2.4　Word parameter

Function	Address	
Heating power valve value	W020	0~1000 correspond with 0~100.0%
Temperature rise valve value	W021	0~3600 correspond with 0~3600 seconds, if set to 0, the alarm function is invalid.

4.3　Working principle
4.3.1　When the heating power is continuously bigger than threshold value and temperature rise doesn't reach 3.0 degree in temperature rise threshold value time, alarm is output.

5   Manual / Auto switch

5.1   Bit parameter

W012	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
	Corresponding bit address（B）							
Automatic reset control: set to 1, in the next action cycle, the program will automatically clear enabled bits of itself and manual. The channel would enter to auto control status steadily then.	199	198	197	196	195	194	193	192
Manual enable control: set to 1, the corresponding channel enter to manual status; set to 0 to enter to auto status. All channels are in auto status when power on.	207	206	205	204	203	202	201	200

5.2   Word parameter

Function	Address	
Channel 1 manual output control value	W056	0~100.0
Channel 2 manual output control value	W057	0~100.0
Channel 3 manual output control value	W058	0~100.0
Channel 4 manual output control value	W059	0~100.0

5.3   Remark：

Channel manual output control value: user defines output value under manual status（0~100.0）; display output value calculated by PID under automatic mode（0~100.0）.

When break coupling mark is showed, manual output is forbidden and no heating output.

6   Auto-tuning mark

6.1   Bit parameter

	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
W013（highbyte）	Corresponding bit address（B）							
Auto-tuning mark (1 means corresponding channel is under anto-tuning status, could be set.)	215	214	213	212	211	210	209	208

7   Break coupling mark

7.1   Bit parameter

	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
W013（lowbyte）	Corresponding bit address（B）							
Break coupling mark （1 means corresponding channel is under Break coupling status）	223	222	221	220	219	218	217	216

8 2-way PID Parameter

8.1 Bit parameter

	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
W024（lowbyte）	Corresponding bit address（B）							
2-way PID control （1 means 2-way PID is enabled in corresponding channel）	399	398	397	396	395	394	393	392

8.2 Word parameter

Function	Address	
2-way PID refrigerating power output factor	W025	Range 0~100 correspond to 0.1~10.0, when the set data <1.0, it means lower refrigerating output power; when the set data>1.0, it means higher refrigerating output power

9 Power restriction

9.1 Bit parameter

	Backup	Backup	Backup	Backup	Channel 4	Channel 3	Channel 2	Channel 1
W024（highbyte）	Corresponding bit address（B）							
Power restriction control (1 means Power restriction is enabled in corresponding channel）	391	390	389	388	387	386	385	384

9.2 Word parameter

Function	Address	
Power restriction value	W022	Range 0~100 correspond to 0%~100% power, when power restriction is enabled and the actual temperature is below the power restriction temperature, to restrict the max output power lower than this power.
Power restriction temperature	W023	0~400 correspond to 0~400℃，when temperature exceeds this number, power restriction function is canceled.

10 Full switch on/off function

10.1 Bit parameter

Function	Address	
All temperature control on	B184	This bit=1, all temperature control channels are on, this bit reset automatically.
All temperature control off	B185	This bit=1, all temperature control channels are off, this bit reset automatically.

11 Dead band control，-10.0~10.0 correspond to **-10.0%~10.0%**（**default 0.0%**）

11.1 Word parameter

Function	Address	
channel 1 dead band control	W133	When this value is positive, there is dead band in 2-way output, which means the actual output=0, when the absolute value of calculated output value is smaller than this value; when this value is negative, there is overlapping with 2-way output, the actual output value equals to sum of this value and the absolute value of calculated output value
channel 2 dead band control	W233	
channel 3 dead band control	W333	
channel 4 dead band control	W433	

External wiring instructions

1. communication cable wiring instructions:
   a) Communication cable should be shielded or twisted-pair cable. Loose wires are forbidden
   b) Communication cable and power cable should be laid separately.
2. thermocouple wiring instructions
   a) Compensation wire should be used to connect thermocouple and module input port. Or use shielded or twisted-pair wire at least, but this would cause temperature difference in measuring.
   b) The connection wire for 8 channels of thermocouple should be laid concentratedly to enhance the stability of temperature measuring.
   c) Thermocouple wiring should be laid separately from the power line
3. Solid state output wiring instructions
   a) The common port of solid state output can't be connected to the common port of other modules or circuits.
   b) The control line of solid state output could only be connected with corresponding SSR.
   c) Solid state output line should be laid concentratedly and separated from the power line.