SmartGen HAT530N ATS Controller User Manual

SmartGen
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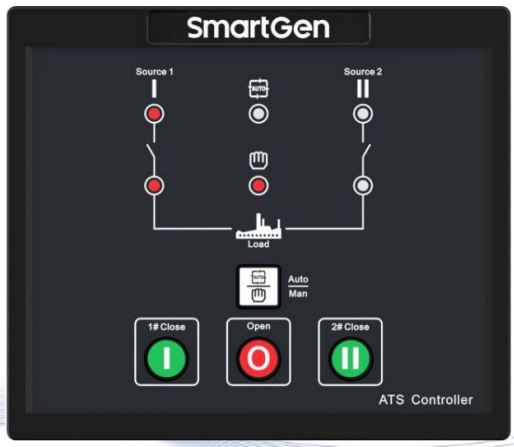
HAT530N ATS Controller
User Manual



SMARTEN(ZHENGZHOU)TECHNOLOGY CO, LTD.

Table 1 – Software Version

Date	Version	Note
2016-07-04	1.0	Original release.
2018-05-25	1.1	Modify the function of terminal 1 as normally open, and terminal 3 as normally close.
2019-05-22	1.2	Add AtyS d wiring diagram.
2020-04-16	1.3	Add Auto Trans. Auto Restore/Auto Trans. Non-restore function description.
2020-06-03	1.4	1. Due to the change in the capacity of the closing and opening relay, the c apacity label in the revised manual is consistent with the mask. 2. Add auto trans. auto restore/auto trans. non-restore parameter instructio ns for panel setting steps.
2020-07-30	1.5	Add 3P3W parameter instructions for panel setting steps. 3P3W is only app licable for AC line voltage 230V power supply system and hardware needs t o be customized.
2022-07-26	1.6	Update the manual format; update the logo of SmartGen.

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OVERVIEW

The powerful Microprocessor contained within the HAT530N ATS controller allows for precision voltage (2-way 3-phase/single phase) measuring and making an accurate judgment on abnormal voltage (power lost, over/under

voltage, over/under frequency, loss of phase, phase sequence wrong) and control ATS to transfer after the delay has expired. This controller is suitable for NO Breaking ATS and ONE Breaking ATS. When #1 power is abnormal, the controller will send a signal to start Genset after the “#1 abnormal delay” has expired. “Three remotes” (remote control, remote measurement, and remote communication) functions can be implemented with the help of the LINK communication port.

PERFORMANCE AND CHARACTERISTICS

Its performance and characteristics are shown as below,

- Measure and display 2-way 3-phase Voltage and Frequency: 1# 2# Line voltage (Uab, Ubc, Uca) Line voltage (Uab, Ubc, Uca) Phase voltage (Ua, Ub, Uc) Phase voltage (Ua, Ub, Uc) Frequency Hz Frequency Hz
- Over/under voltage, loss of phase, phase sequence wrong, over/under frequency protection function. By default, phase reverse sequence protection and over/under frequency protection are disabled; however, users can set the protection function as they need.
- Parameters can be set via PC software using the SG72 module (USB to LINK) or another converse module.
- The voltage normal delay of 1# or 2# can be set in (0~60) seconds and the Genset start delay can be set in (0~3600) seconds.
- The voltage abnormal delay of 1# or 2# can be set in (0~60) seconds and the Genset stop delay can be set in (0~3600) seconds.
- “1# Master”, “Auto/Manual”, “Each Backup” and “2# Master” can be set via controller front panel, to realize the power supply of 1# master or 2# master or backup method for each other.
- The closing output signal can be set as pulse or as continuous output. 2-way N wire isolated design.
- Auto/Manual mode. In manual mode, ATS transfer can be implemented via panel pushbutton.
- LEDs mounted on the front panel can clearly show the ATS running status.
- Forced Open input port is designed; When the input port is active, the switch will be Breaking position forcedly (works for the ATS with Breaking Position).
- AUX.OUTPUT 1 and AUX.OUTPUT 2 can be configured to make it easy to transfer the power supply.
- The output contact capacity of 1# and 2# power supply transfer relays (1# CLOSE, 2# CLOSE, OPEN) is 5A AC250V, volts free contact, which can be directly used in driving the switch to transfer.
- The output contact capacity of the Genset starts relay (GENS START) is 7A AC250V/7A DC28V, volts free N/C contact.
- Suitable for various AC systems (3-phase 4-wire, single-phase 2-wire, 2-phase 3-wire, and 3-phase 3-wire).
- Modular design, flame retardant ABS plastic shell, pluggable terminal, built-in mounting compact structure with easy installation.

SPECIFICATION

Table 2 – Product Specification

Items	**Contents**
Operating Voltage	AC170V-277V during AC power L1 N1/L2N2 supply.

Power Consumption	<3W (Standby mode: <1W)
AC Voltage Input 3P4W (ph-N) **1 P2W** (ph-N) 2P3W (ph-N) 3P3W (ph-ph)	AC170V—AC277V(ph-N) AC170V—AC277V (ph-N) AC170V—AC277V(ph-N) AC170V—AC277V(ph-ph) (Hardware needs to be custom ized)
Rated Frequency	50/60Hz
1# Close Relay Output	10A AC250V Volts free output
2# Close Relay Output	10A AC250V Volts free output
Open Relay Output	10A AC250V Volts free output
AUX.OUTPUT 1	16A AC250V Volts free output
AUX. OU I PU 12	16A AC250V Volts free output
Gen Start Relay	7A AC250V Volts free output
1# Close Input	COM2 connect is active.
2# Close Input	COM2 connect is active.
Forced Breaking Input	COM2 connect is active.
Communication	LINK interface, MODBUS Protocol
Case Dimensions	139mmx120mmx5Omm
Panel Cutout	130mmx111mm

Working Temperature	(-25-4-70)°C;
Working Humidity	(20-93)%RH
Storage Temperature	(-30-4-80)°C
Protection Level	IP65 Gasket: when the waterproof gasket is installed between the control ler and control window.
Insulation Strength	Apply AC1.5kV voltage between the high voltage terminal and low voltag e terminal and the leakage current is not more than 3mA within 1min.
Weight	0.51 kg

4OPERATING

4.1 OPERATION PANEL

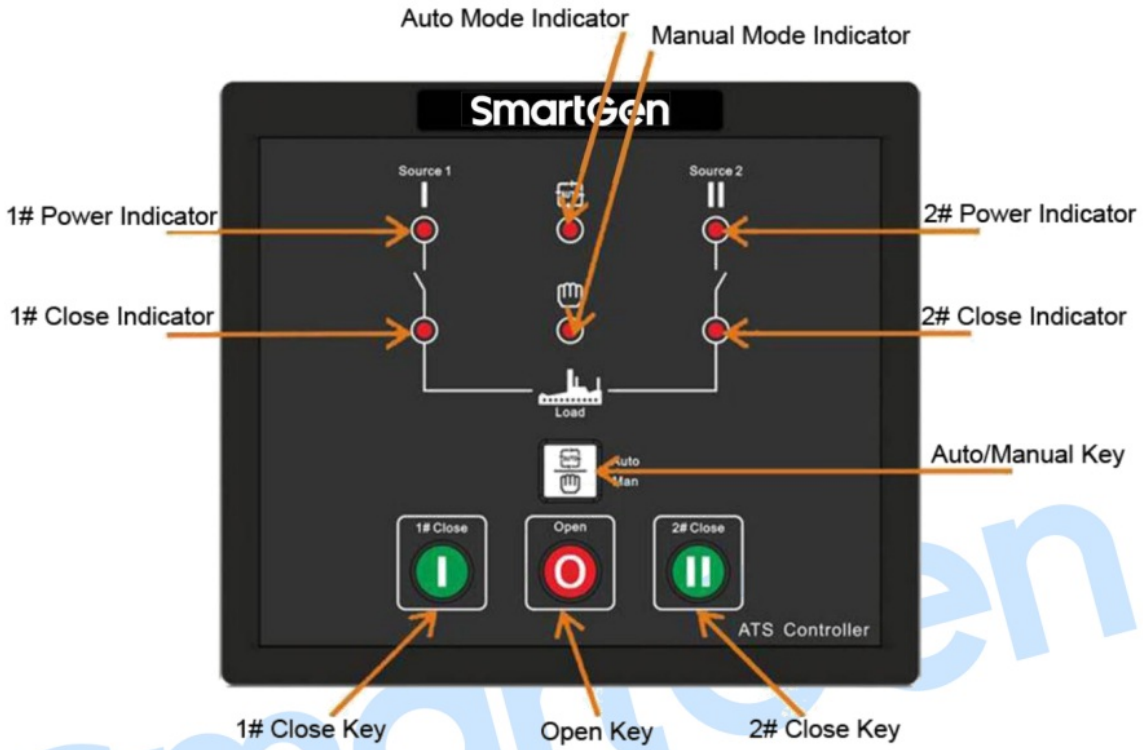


Fig.1 – HAT530N Panel Drawing

4.2 INDICATORS DESCRIPTION

Table 3 – Indicator Function Description in Normal Testing Mode

Items	Description
1# Power Indicator	It is illuminated when 1# power is normal; flashing when 1# power state is abnormal ; off when there is no 1# power.
2# Power Indicator	It is illuminated when 2# power is normal; flashing when 2# power state is abnormal ; off when there is no 2# power.
1# Close Indicator	It is illuminated when 1# power auxiliary contactor is active while off when it is deact ivated.
2# Close Indicator	It is illuminated when 2# power auxiliary contact is active while off when it is deactiv ated.
Auto Mode Indicator	It is illuminated when the controller is in auto mode while the controller is in manual mode.
Manual Mode Indicator	It is illuminated when the controller is in manual mode while the controller is in auto mode.

NOTE: For more details please refer to the following description of “Panel Button Operation”.

PANEL BUTTON OPERATION

5.1 PANEL OPERATION

Pressing and holding the  button for more than 3s, all LEDs are illuminated to enter into lamp test mode; Pressing and holding the  button for more than 7s, all LEDs are flashing (500ms per time) to enter into parameter setting status, and the release  button; If you are not trying to set parameters, press  and all LEDs flash quickly for 5 times (once per 200ms) and return to normal test mode. At lamp test state, release  , and the controller will return to normal test mode. After entering parameter setting mode, if parameters are not set, the controller will automatically return back to normal test mode after about 1 minute and 30 seconds.

5.2 MASTER SETTING

First of all, make the controller enter the parameter setting status and then conduct the setting. Procedures for setting “1# Master”, “2# Master” and “Each Backup”

a) Press  ,  and  at the same time, when 1#/2# power indicator and auto indicator are illuminated; release the three buttons, then the auto indicator and 2# power indicators extinguish, 1# power indicator illuminates, which means controller master status can be set.

b) Pressing  can circularly set 3 conditions of power supply.

- 1# Master: 1# power indicator illuminates and 2# power indicator extinguishes
- 2# Master: 2# power indicator illuminates and 1# power indicator extinguishes
- Each Backup: 1# power and 2# power indicators are illuminating at the same time;

c) After adjusting, press  , when 1# power indicator, auto indicator, and 2# power indicator are illuminated, the adjusted power master has been saved. The controller will back to normal status automatically after all LEDs are

flashing 5 times rapidly and the controller will work according to the master status.
Once the controller is powered on, its master status can be judged by the following three conditions.

- If 1# power supply indicator flashes rapidly three times, indicating 1# power supply for master.
- If 2# power supply indicator flashes rapidly three times, indicating 2# power supply for master.
- If 1# and 2# power supply indicators flash simultaneously three times, indicating it is Each Backup.

5.3 AC SYSTEM SETTING

AC system can be set only when the controller is in parameters setting status. Procedures of setting “Single-phase 2-wire”, “3-phase 4-wire”, “2-phase 3-wire” and “3-phase 3-wire”:

a) Press  ,  and  at the same time, when 1#/2# power indicator and auto indicator are illuminated; release the three buttons, then the auto indicator and 2# power indicators extinguish, 1# power indicator illuminates.

b) Press  , when 1#/2# power indicator and auto indicator are illuminated; release the button, then the auto indicator and 1#/2# power indicators are extinguished simultaneously, which means the controller AC system can be set.

c) Pressing  can circularly set four AC systems.

- Single-phase 2-wire: 1# close indicator illuminates
- 3-phase 4-wire: 1# close indicator, 2# close indicator, and manual mode indicator illuminate simultaneously
- 2-phase 3-wire: 1# close indicator and manual mode indicator illuminate simultaneously;
- 3-phase 3-wire: 2# close indicator and manual mode indicator illuminate simultaneously.

d) After adjusting, press  , when 1# power indicator, auto indicator, and 2# power indicator are illuminating, the adjusted AC system has been saved. The controller will back to normal status automatically after all LEDs are flashing 5 times rapidly and the controller will work according to the set AC system.
Once the controller is powered on, its AC system can be judged by the following four conditions.

- If 1# close indicator illuminates, it means Single-phase 2-wire system is selected.
- If 1# close indicator, manual mode indicator, and 2# close indicator illuminate simultaneously, it means a 3-phase 4-wire system is selected.
- If the 1# close indicator and manual mode indicator illuminate simultaneously, it means a 2-phase 3-wire system is selected.
- If the 2# close indicator and manual mode indicator illuminate simultaneously, it means a 3-phase 3-wire system is selected.

5.4 DELAY ADJUSTMENT

Adjusting the “1# power normal delay” potentiometer (located nearby the back panel terminal) can set output delay after the 1# power supply is normal. Adjusting the “2# power normal delay” potentiometer (located nearby the back panel terminal) can set output delay after the 2# power supply is normal. First make the controller enter parameter setting status, and then conduct the setting. Setting Procedures of “1# power abnormal delay” and “2# power abnormal delay”:

a) Press  and  at the same time, when 1#/2# power indicator and auto indicator are illuminated; release the two buttons, then the auto indicator and 1#/2# power indicators are
extinguished simultaneously which means the delay timer of the controller can be set.

- 1# power abnormal delay: adjust the “1# Power Normal Delay” potentiometer;
- 2#power abnormal delay: adjust the “2#Power Normal Delay” potentiometer;

b) After adjusting the delays, press. When 1#/2# power indicator and automatic indicator are illuminated simultaneously, the adjusted values have been saved. The controller will back to normal status automatically after all LEDs are flashing 5 times rapidly and the controller will work according to the set delay values.
NOTE 1# Normal Delay set value must be no less than 1# Abnormal Delay, otherwise, 1# Normal Delay set value will be forced to be set as 1# Abnormal Delay set value. 2# Normal Delay set value must be no less than 2# Abnormal Delay, otherwise, 2# Normal Delay set value will be forced to set as 2# Abnormal Delay set value.

5.5 FACTORY RESET DELAY VALUE

First, make the controller enter the parameter setting status and then conduct the setting.

a) Press  and  at the same time, when 1#/2# power indicator and auto indicator are illuminated; release the two buttons, then the auto indicator and 1#/2# power indicators are
extinguished simultaneously which means the delay timer of the controller can be set.

b) After adjusting the delays, press  . When 1#/2# power indicator and automatic indicator are illuminated simultaneously, the adjusted value has been saved. The controller will back to normal status automatically after all LEDs are flashing 5 times rapidly and the controller will work according to the set delay values.

NOTE Factory settings 1#/2# power abnormal delay 5s and Genset stop delay 90s.

5.6 AUTO TRANS. AUTO RESTORE SETTING

First of all, make the controller enter the parameter setting status and then conduct the setting. Set “Auto Trans. Auto Restore/Auto Trans. Non-Restore” Steps:

a) Press  and  at the same time, when 1#/2# power indicator and auto indicator are illuminated, release the two buttons, then the auto indicator and 2# power indicator are extinguished, 1# power indicator and 1# close indicator are illuminated, which means the auto trans. auto restore of the controller can be set.

b) Press  can circularly set two states: Auto trans. non-restore when 1# power indicator and 1# close indicator are illuminated, 2# power indicator and 2# close indicator are extinguished. Auto trans. auto restore when 2# power indicator and 2# close indicator are illuminated, 1# power indicator and 1# close indicator are extinguished.

c) After adjustment, press  . When # 1 # 2 power indicator and auto indicator are illuminated at the same time, it indicates that the set parameter value has been saved successfully; all indicators on the panel flash 5 times quickly to return to normal test mode. The controller works according to the set state of auto trans. auto-restore/auto trans. non-restore.

NOTE: Turn on the power supply of the controller, auto trans. auto-restore/auto trans. non-restore set by the controller can be judged by the following two situations:
If 1# power indicator and 1# close indicator flash quickly three times at the same time, it is auto trans. non-restore.
If 2# power indicator and 2# close indicator flash quickly three times at the same time, it is auto trans. auto restore.

PARAMETER CONFIGURATION

6.1 PARAMETERS TABLE

Table 4 – Parameters Setting Table

No.	Item	Range	Default	Description

01	1# Normal Delay	(0-60)s	Can be set via controller potentiometer	It is the delay of #1 power from voltage abnormal to voltage normal. Generally, it is 10s.
02	1# Abnormal Delay	(0-60)s	5	It is the delay of #1 power from voltage normal to voltage abnormal.
03	2# Normal Delay	(0-60)s	Can be set via controller potentiometer	It is the delay of #2 power from voltage abnormal to voltage normal. Generally, it is 10s.
04	2# Abnormal Delay	(0-60)s	5	It is the delay of #1 power from voltage normal to voltage abnormal.
05	Close Delay	(0-20)s	5	Closing relay output pulse. If set as zero, it is continuous output.
06	Open Delay	(1-20)s	5	Open relay output pulse.
07	Transfer Interval	(0-60)s	1	It is the delay from 1# power open to 2# power close or from 2# power open to 1# power close.
08	Exceed Transfer	(0-20.0)s	0.0	It is the extra output delay of the close relay after the closing signal has been received.
09	Start Delay	(0-3600)s	1	When voltage is abnormal, the start delay begins; the start signal is initiated after the delay has expired.
10	Stop Delay	(0-3600)s	90	When starting, if the mains voltage is normal, a stop delay begins; a stop signal is initiated after the delay has expired.

11	AC System	(0-3)	0	0. 3-phase 4-wire 1. 2-phase 3-wire 2. Single phase 3. 3-phase 3-wire
12	Rated Volt	(100-240)V	230	AC system rated voltage.
13	Rated Frequency	(50.0-60.0) Hz	50.0	To offer standards for detecting of over/under frequency.
14	Over Volt Enable	(0-1)	1	0: Disable: 1: Enable
15	Over Voltage	(100-120) %	115	Voltage upper limit; it is abnormal when the voltage has exceeded the set value.
16	Over Volt Return	(100-120)%	113	Voltage upper limit return value; it is normal only when the voltage falls below the set value.
17	Under voltage	(70-100)%	75	Voltage lower limit; it is abnormal when the voltage has fallen below the set value.
18	Under Volt Return	(70-100)%	77	Voltage lower limit return value; it is normal only when the voltage has exceeded the set value.
19	Over Freq. Enable	(0-1)	0	0: Disable: 1: Enable
20	Over Frequency	(100-120) %	110	Frequency upper limit; it is abnormal when the frequency has exceeded the set value.

21	Over Freq. Return	(100-120)%	104	Frequency upper limit return value; it is normal only when the frequency falls below the set value.
22	Under Freq. Enable	(0-1)	0	0: Disable: 1: Enable
23	Under Frequency	(80-100)%	90	Frequency lower limit it is abnormal when the frequency has fallen below the set value.
24	Under Freq. Return	(80-100)%	96	Frequency lower limit return value; it is normal only when the frequency has exceeded the set value.
25	Loss of Phase	(0-1)	1	0: Disable: 1: Enable
26	Reverse Phase Sequence	(0-1)	0	0: Disable: 1: Enable
27	Master-Slave Set	(0-2)	0	O. 1# Master; 1. 2# Master; 2. Each Backup
28	Auto Trans. Auto Restore Set	(0-1)	1	0: Auto Trans. Non-Restore 1: Auto Trans. Auto Restore
29	Neutral Position	(0-1)	0	0. One Breaking; 1. No Breaking

30	Aux. Output 1	(0-23)	20	For more details please refer to the following OUTPUT FUNCTION DESCRIPTION
31	Aux. Output 2	(0-23)	23	For more details please refer to the following OUTPUT FUNCTION DESCRIPTION

NOTE1: Parameters above are configured via the PC software of SmartGen. The PC programming connection is to use the LINK interface of the SG72 module connecting with the LINK interface of the controller.

NOTE2: "1# Normal Delay" and "2# Normal Delay" can be set only via the potentiometer which locates nearby the back panel terminal. "1# Abnormal Delay" and "2# Abnormal Delay" can be set via the PC software or potentiometer which locates nearby the back panel terminal. AC system and priority selection can be set via panel button or PC software while other parameters can be set via PC software only.

NOTE3: 1# Normal Delay set value must be no less than 1# Abnormal Delay, otherwise, 1# Normal Delay set value will be forced to set as 1# Abnormal Delay set value. 2# Normal Delay set value must be no less than 2# Abnormal Delay, otherwise, 2# Normal Delay set value will be forced to set as 2# Abnormal Delay set value. If motor driving type ATS (e.g. SOCOMEC VS) is applied, the Close delay and Open delay must be no less than 5s; If magnet driving type ATS (e.g. SOCOMEC ATySM3s) is applied, the Exceed Transfer delay must be set as 0.
NOTE4: "Priority Select" in the last version is changed to "Master-Slave Set"; Set contents "0: 1# Priority; 1: 2# Priority; 2: No Priority" are changed to "0: 1# Master; 1: 2# Master; 2: Each Backup".

6.2 OUTPUT FUNCTION DESCRIPTION

Table 5 – Output Function Description

Items	**Description**
00. Not used	Invalid.
1. 1# Normal volt	It will output when1 # voltage is normal.
2. 1# Abnormal volt	It will output when 1# voltage is abnormal.
3. 2# Normal volt	It will output when 2# voltages is normal.
4. 2# Abnormal volt	It will output when 2# voltages is abnormal.

05.1 #2# Abnormal volt	It will output when 1 #2# voltages are abnormal simultaneously.
6. Auto Mode	It will output in automatic mode.
7. Manual Mode	It will output in manual mode.
8. Gens start (N/O)	When generator starts output (Relay closed).
9. Gens start (N/C)	When the generator starts output (Relay released).
10. 1# Close Output	1# Switch ON signal output.
11. Open Output	Switch OFF signal output.
12. 2# Close Output	2# Switch ON signal output.
13. Reserved	
14. Reserved	
15. Reserved	
16. 1# Close Status Output	The close status of 1# switch.
17. 2# Close Status Output	The close status of the 2# switch.
18. Reserved	
19. Reserved	

20. ATS Power A Phase	ATS power supply.
21. ATS Power **B** Phase	
22. ATS Power C Phase	
23. ATS Power N Phase	

OPERATION CONTROL

When the controller is running, pressing  the key can set the controller to Auto mode or Manual mode (indicated by automatic and manual indicators).
In Auto mode, the controller can automatically transfer the load to 1# or 2# power. When it is set to Auto Trans. Auto Restore, master power is normal, and the controller will transfer to the master power end in priority; When it is set to Auto Trans. Non-Restore, the controller only transfers to backup power, and master power transfer can only be controlled manually. Each Backup is for two powers to be backup; when 1# power is abnormal, 2# is normal, then the switch will transfer to 2# power supply, and vice versa. When it is set to Each Backup, the controller will not detect Auto Trans. Auto Restore setting.

In Manual mode, press  the key, and load will be transferred to 1# power supply; press  to disconnect

DESCRIPTION OF CONNECTING TERMINALS

8.1 BACK PANEL

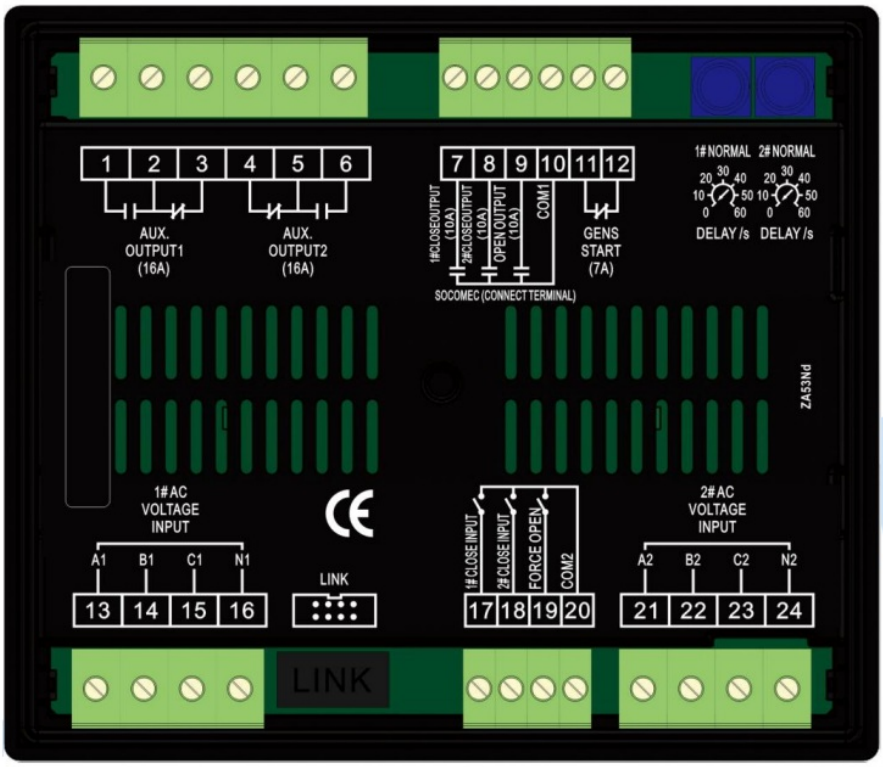


Fig. 2 – HAT530N Rare Panel Drawing

8.2 FUNCTION DESCRIPTION OF WIRING TERMINALS

Table 6 – Terminal Function Table

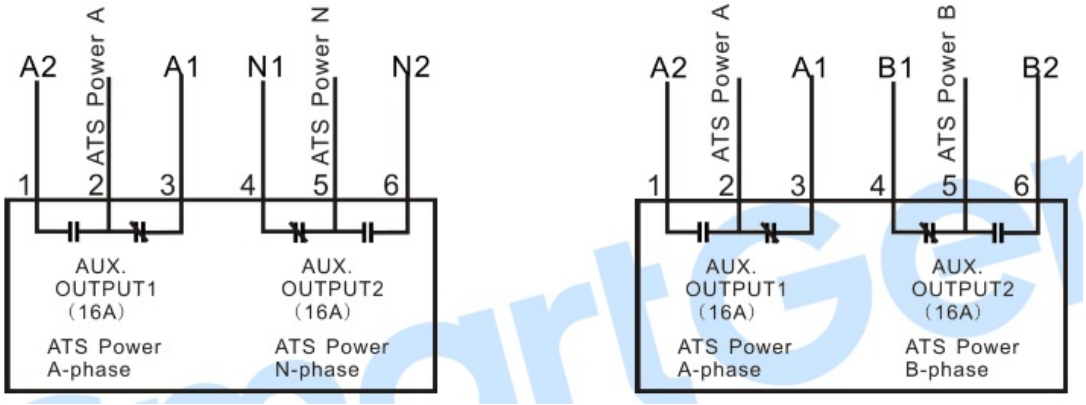
No.	Items	Description		**Remark**
1	Aux. Output 1	NO	Default: ATS Power A Phase	Volt-free relay contact output; Rated 16A.
2		COM		
3		NC		
4	Aux. Output 2	NC	Default: ATS Power N Phase	Volt-free relay contact output; Rated 16A.
5		COM		
6		NO		
7	1# Close Output	Volt-free relay contact output;		Normally Open Output; Rated 10A.
8	2# Close Output	Volt-free relay contact output;		Normally Open Output; Rated 10A.

9	Open Output	Volt-free relay contact output;	Normally Open Output; Rated 10A.
		Output COM of close switch and	
10	COM1	open switch	COM1
11			
12	GEN Start	Volt-free relay contact output;	Normally Close Output; Rated 7A.
13	AI		
14	B1	1# AC 3-phase 4 wire voltage	For the single phase, only connect AI,
15	CI	input	Ni.
16	N1		
		Detection of 1# ATS closing	
17	1# Close Input	status; auxiliary contact input	Connect COM2 is active.
		Detection of 2# ATS closing	
18	2# Close Input	status; auxiliary contact input	Connect COM2 is active.
		When active, the ATS is in Neutral	
19	Force Open		Connect COM2 is active.
		Position.	
20	COM Port	Input COM	COM2

21	A2		
22	B2	2# AC 3-phase 4 wire voltage	For the single phase, only connect A2,
23	C2	input	N2.
24	N2		
LINK	Communication Port	Communicate with PC/Program upda te	

ATS POWER SUPPLY

The power of ATS is supplied by the controller, as long as one power is normal, this can ensure the ATS power supply is normal and can be transferred properly.
Users should select power supply voltage (phase voltage or line voltage) based on ATS type. If choosing phase voltage, connect the phase voltage of 1# and 2# (e.g. A phase) to normally close (Pin3) and normally open (Pin1) contact of auxiliary output 1; connect N phase of 1# and 2# to normally close (Pin4) and normally open (Pin6) contact of auxiliary output 2. And then connect the common output of auxiliary output 1 and auxiliary output 2 to ATS power supplies. When controller power is ON, the default configuration of auxiliary output 1 is “ATS power A” while auxiliary output 2 is “ATS power N”. If the ATS power is supplied by Line Voltage, same procedures as above but change phase N to phase voltage, and the auxiliary output 2 should be configured as “ATS power B”. Parameters can be set via PC software. Wiring diagrams are shown as follows:



NOTE: If there is no need to control ATS Power Supply, then the above terminals are not connected and the Auxiliary Output 1 and Auxiliary Output 2 should be set as “Not used”. If Auxiliary output 1 and Auxiliary Output 2 are used for something function other than the “ATS Power Supply”, corresponding function items should be set.

TYPICAL WIRING DIAGRAM

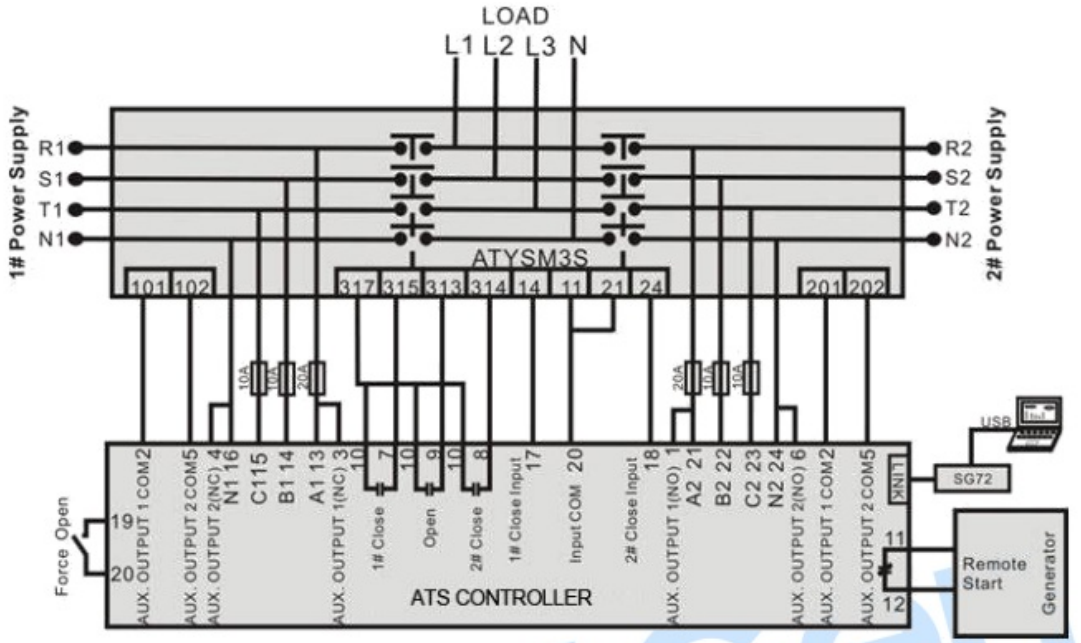


Fig. 5 - ATySM3s Wiring Diagram

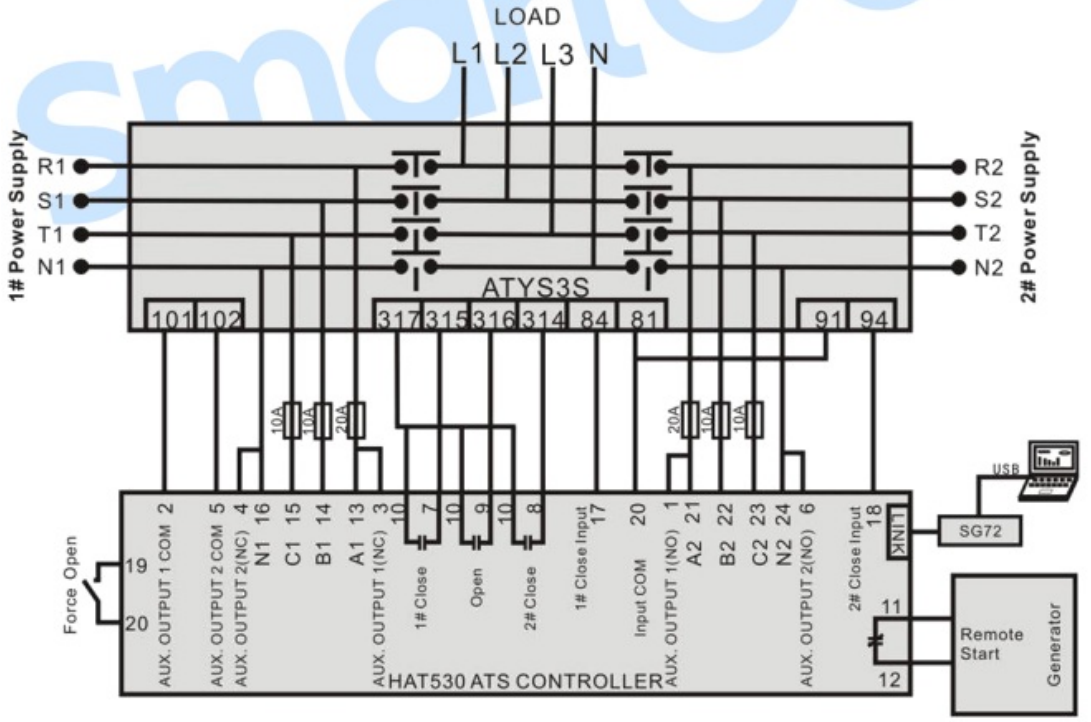


Fig. 6 - ATyS3s Wiring Diagram

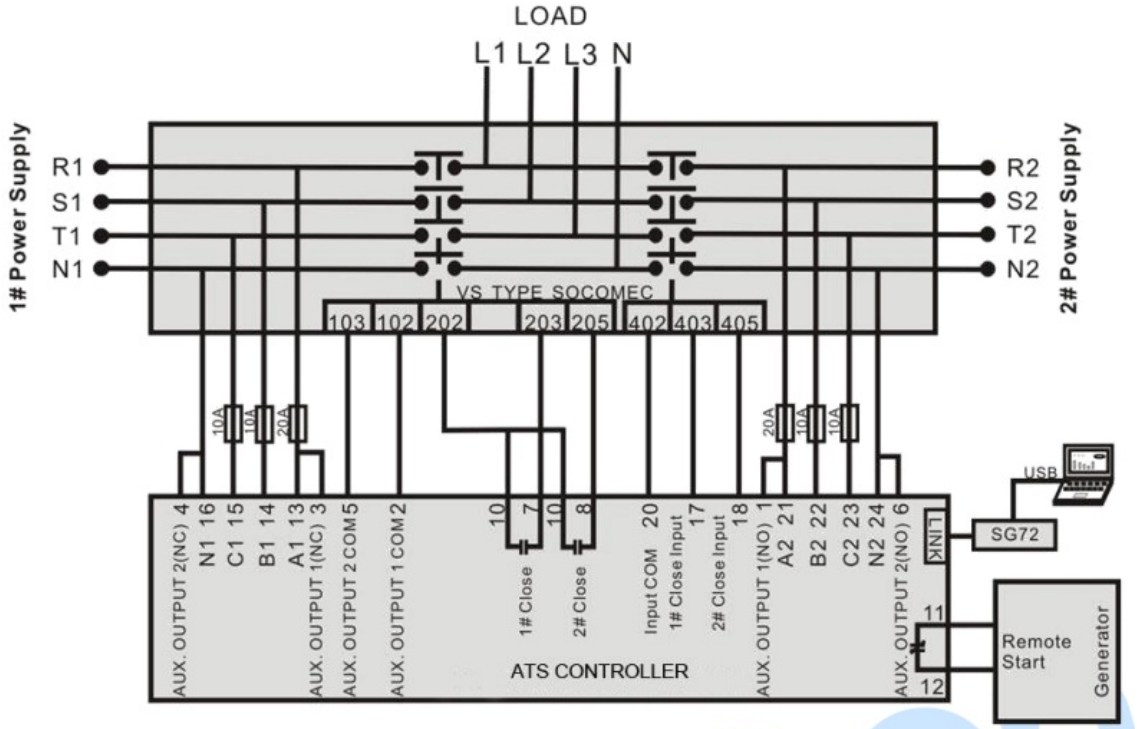


Fig. 7 - SOCOMEC VS Wiring Diagram

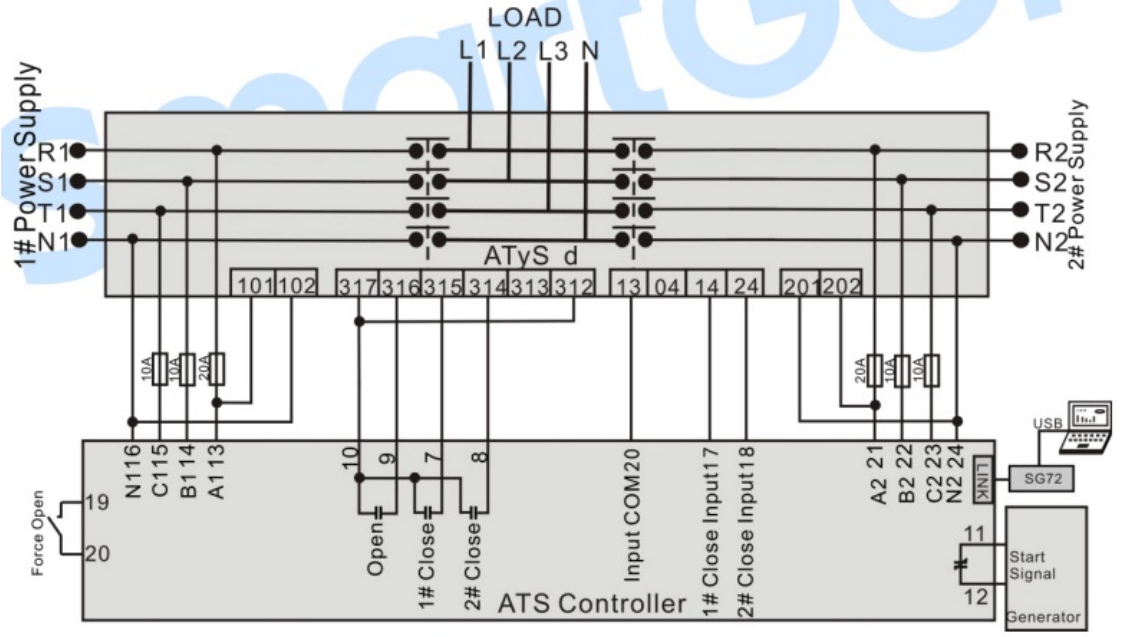


Fig. 8 – AtyS d Wiring Diagram

NOTE: The diagram is for reference only. The actual wiring shall follow the ATS instruction. Users should choose the proper fuse capacity according to the actual power consumption. If SOCOMEC VS is applied, the Close delay and Open delay must be no less than 5s (Default: 5s).

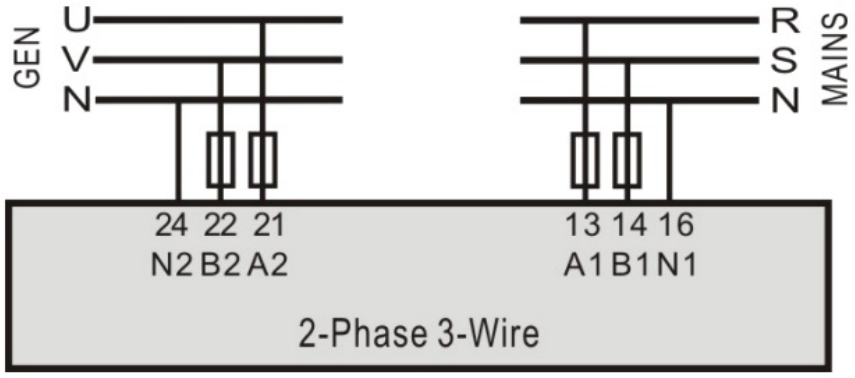


Fig. 9 - 2-phase 3-wire Wiring Diagram

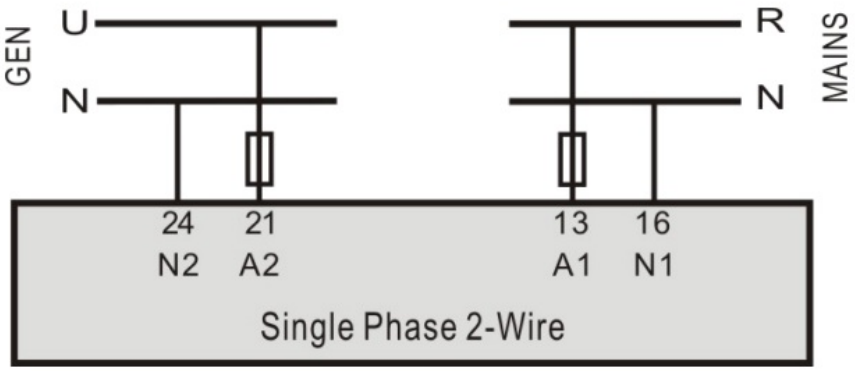


Fig. 10 - Single phase 2-wire Wiring Diagram

NOTE Above pictures take the AC 220V voltage as an example. If AC 110V voltage is applied in actual use, please contact with SmartGen technical staff to get the specific wiring methods.

INSTALLATION

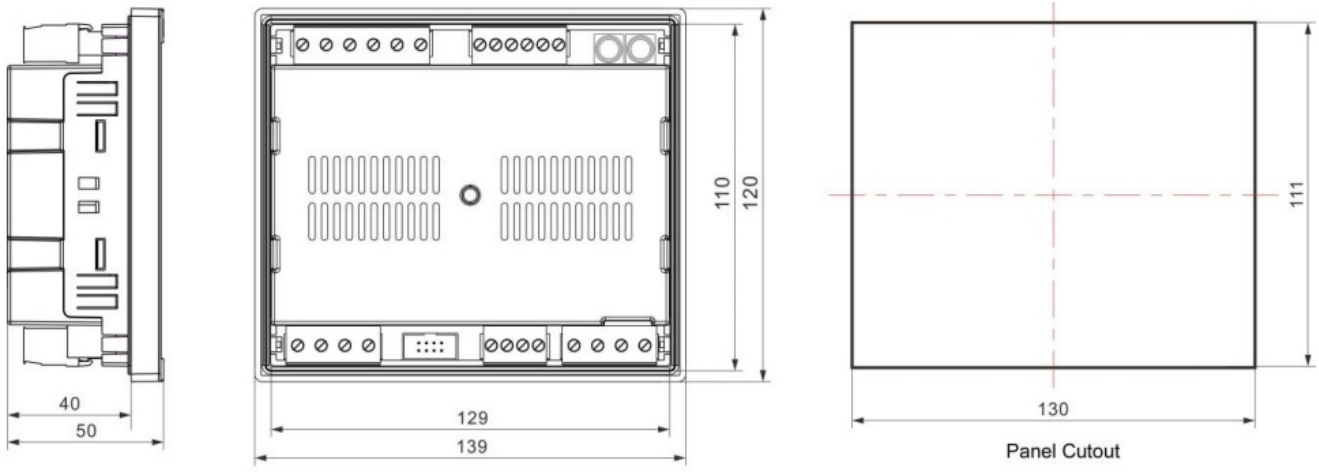


Fig. 11 - Installation Dimensions

FAULT FINDING

Table 7 – Fault Finding

Symptom	Possible Solutions
The controller no response with power.	Check controller wring.
ATS not transfer Check ATS;	Check the connection wirings between the controller and the ATS.
Electrical parameters detection error	Check controller wring; Modify electrical parameters detection value.
PC software communication failure	Check communication port settings and connections.

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Documents / Resources

	SmartGen HAT530N ATS Controller [pdf] User Manual HAT530N, ATS Controller, HAT530N ATS Controller
	SmartGen HAT530N ATS Controller [pdf] User Manual HAT530N, ATS Controller, HAT530N ATS Controller, Controller

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