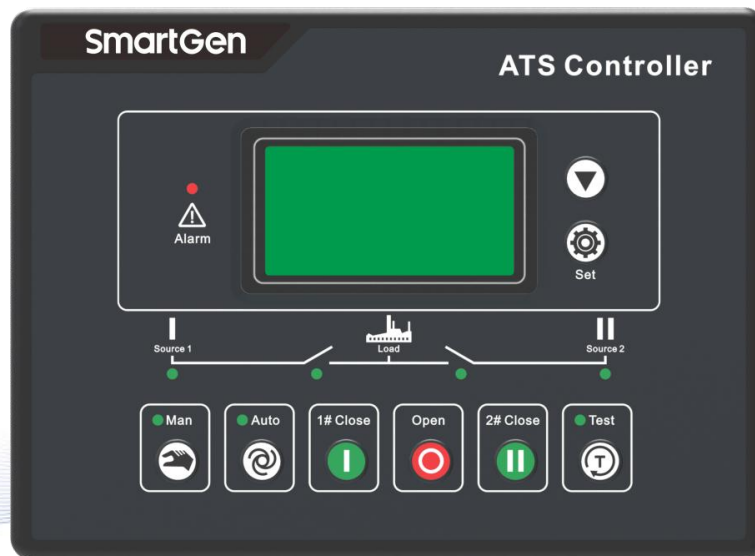# HAT600N SERIES
(HAT600N/HAT600NI/HAT600NB/HAT600NBI)
ATS CONTROLLER

USER MANUAL

郑州众智科技股份有限公司
SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

SmartGen众智Chinese trademark

SmartGenEnglish trademark

SmartGen ─ make your generator *smart*

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Table 1 Software Version

Date	Version	Note
2017-04-06	1.0	Original release.
2019-09-05	1.1	Added communication function description in parameter settings.
2020-05-12	1.3	Fixed current terminal number of breaker application diagram and optimized the diagram.
2020-12-16	1.4	Modified the event log record number.
2021-08-05	1.5	1. Added the torque requirement for fixing clips below the installation dimension drawing; 2. Changed the font to "Roboto"
2022-05-31	1.6	Updated the figures of back panel and case dimensions, updated the logo of SmartGen.
2022-10-24	1.7	Changed terminal 27, 28 in Breaker Wiring Diagram as "normally open contact"; Deleted power module supply way; Modified format issues.

CONTENT

1. OVERVIEW

HAT600N series ATS controller is an intelligent dual-supply module with programmable function, automatic measurement, LCD display, and digital communication. It combines digitalization, intelligence and network together. Measurement and control process are automated, which greatly reduces hand operation mistakes. It is an ideal option for ATS.

HAT600N series ATS controller is made of microprocessor as its core, which can accurately detect 2-way-3-phase voltage and also make accurate judgment for abnormal voltage (over voltage, under voltage, loss of phase, over frequency, under frequency) and output passive control signal. This controller has full consideration in various applications of ATS (automatic transfer system), which can be directly used for Intelligent ATS, Contactor ATS, Circuit Break ATS etc. It has compact structure, advanced circuits, simple wiring and high reliability, can be widely used in electric power, telecommunications, petroleum, coal, metallurgy, railways, municipal administration, intelligent building, electrical devices, automatic control and testing system etc.

2. PERFORMANCE AND CHARACTERISTICS

1) System type can be set to: Mains (1#) & Mains (2#), Mains (1#) & Generator (2#), Generator (1#) & Mains (2#), Generator (1#) & Generator (2#).
2) Backlit 128x64 LCD, optional Chinese and English display, push-button operation.
3) Collect and display 2-way 3 phase Voltage and Frequency:

   1#   2#
   Line-Line voltage (Uab, Ubc, Uca)   Line-Line voltage (Uab, Ubc, Uca)
   Phase voltage (Ua, Ub, Uc)   Phase voltage (Ua, Ub, Uc)
   Frequency (F1)   Frequency (F2)

4) Collect and display load active power, apparent power, power factor and 3 phase current.
5) Over current alarm function.
6) Over/under voltage, loss of phase, reverse phase sequence, over/under frequency protection.
7) Automatic/Manual mode transfer; In manual mode, switch can be forced to close or open;
8) All parameters can be set on site. Two level passwords ensure authorized staff operation only.
9) During genset testing ATS controller can be set to either in On-load or Off-load mode.
10) ATS Controller has function of automatic re-closing.
11) Closing output signal can be set as on intervals or as continuous output.
12) Applicable for ATS of one neutral position, two neutral position and change over.
13) Applicable for 2 isolated neutral line for Generator and Mains.
14) Real-time clock (RTC).
15) Event log can record 50 items circularly.
16) Timely schedule can be set on monthly or weekly basis and trial can be set as with on- load or off -load.
17) Can control two generators to work in a cycle, even the genset running time and crank rest time can be set.
18) Widely range of DC power supply (8V to 35V). Max.80V DC input can be endured in an instant, or be supplied via HWS560 module (input AC 85V~560V, output DC 12V).
19) Wide space between connecting terminals of AC input. Max.625V input voltage.
20) With standard isolated RS485 communication interface. With "remote controlling, remote measuring, remote communication" function by the ModBus communication protocol.
21) Can check the current status of controller (including switch digital input, over Voltage, and under Voltage etc.).
22) Suitable for various AC systems (3 phase 4-wires, 3-phase 3-wires, single-phase 2-wire, and 2-phase 3-wire).
23) Modular design, flame-resisting ABS plastic shell, plug-in terminals and embedded installation. Compact structure with easy installation.

Table 2 HAT600N Series Controller Models and Main Functions

Type	DC Power Supply	AC Power Supply	AC Current and Power
HAT600N	√	×	×
HAT600NI	√	×	√
HAT600NB	√	√ (L-N220V)	×
HAT600NBI	√	√ (L-N220V)	√

3. SPECIFICATION

Table 3 Technical Parameters

Items	Contents		
Operating Voltage	DC 8.0V~35.0V, continuous power supply. HTS220/HWS560 power supply (without battery supply). AC160V~280V (HAT600NB/HAT600NBI) during AC power L1N1/L2N2 supply.		
Power Consumption	<3W (Standby mode: ≤2W)		
AC Voltage Input	AC system	HAT600N/HAT600NI	HAT600NB/HAT600NBI
	3P4W (L-L)	(80~625)V	(80~480)V
	3P3W (L-L)	(80~625)V	Not used
	1P2W (L-N)	(50~360)V	(50~280)V
	2P3W (A-B)	(80~625)V	(80~480)V
Rated Frequency	50/60Hz		
Close/Open Trip Relay Output	16A AC250V Free Voltage relay output		
Programmable Relay Output	16A/7A AC250V Free Voltage relay output		
Digital Input	Connecting to GND		
Communication	RS485 isolated interface, ModBus Protocol		
Dimensions	209mmx153mmx55mm		
Panel Cutout	186mm x 141mm		
Operating Temp.	(-25~+70)°C		
Operating Humidity	(20~93)%RH		
Storage Temp.	(-25~+70)°C		
Protection Rank	IP55: when waterproof gasket is installed between enclosure and control screen.		
Insulation Strength	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal and the leakage current is not more than 3mA within 1min.		
Weight	0.8kg (HAT600N/HAT600NI) 1.0kg (HAT600NB/HAT600NBI)		

4. OPERATING
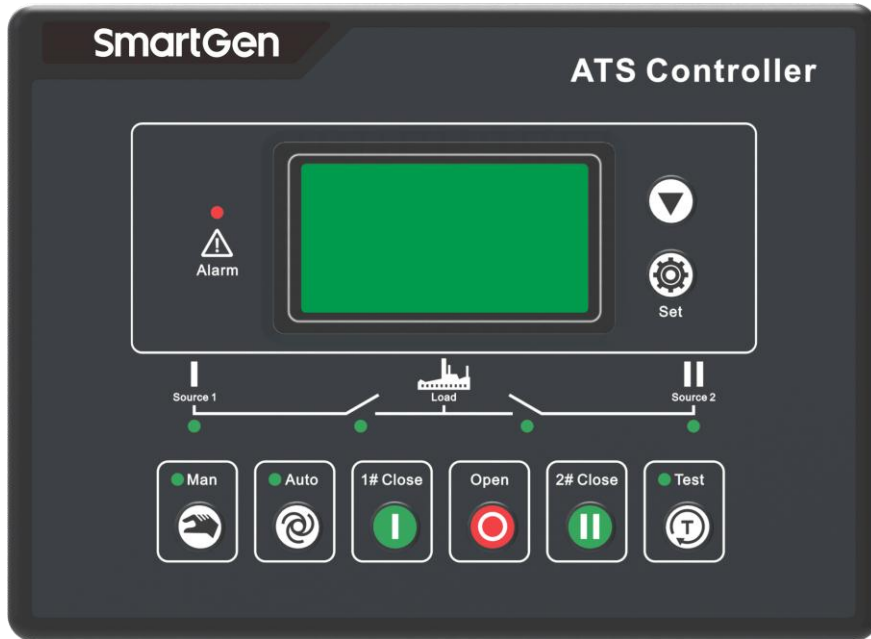
4.1. OPERATION PANEL

Fig.1 Operation Panel

4.2. KEY FUNCTION DESCRIPTION

Table 4 Key Function Description

Icon	Keys	Description
	1# Close	In Manual mode, switch on 1# power to load.
	Open	In Manual mode, switch off 1# or 2# power to off-load.
	2# Close	In Manual mode, switch on 2# power to load.
	Manual	Press and controller enters Manual mode.
	Auto	Press and controller enters Auto mode.
	Test	Pressing this key can directly enter commissioning interface.
	Menu/Confirm	Press the key to enter menu interface; pressing and holding it to return to the main menu interface. When an alarm occurs, pressing and holding the key can remove alarm.
	Scroll Screen/Increase	Scroll the screen. In parameter editing, pressing this key can increase values.

5. LCD DISPLAY

5.1. MAIN SCREEN

Screen	Description
U1(L-L) 380 380 380V **U2(L-L) 380 380 380V** **F1 50.0Hz F2 50.0Hz** **Present Status: MANUAL**	This screen shows: line-line voltage (L1-L2, L2-L3, and L3-L1), frequency and controller's present working mode.
U1(L-N) 219 219 219V **U2(L-N) 219 219 219V** **AMP 500 500 500A** **Present Status: MANUAL**	This screen shows: 1# and 2# 3 phase Voltage (L-N), 3 phase current with load and controller status.
PWR 329kW **PF 1.00 PS 329kVA** **2010-06-10 (4) 20:25:36** **Present Status: MANUAL**	This screen shows: total active power, total apparent power, power factor and real-time clock and controller working status.
1# Volt normal **2# Volt normal** **Gens Start signal Output** **Gens starting**	First line: 1# operating state of power supply. Second line: 2# operating state of power supply. Third line: other operating states. Fourth line: alarm type and information.

Table 5 Display of 1# Status (upper to lower)

No.	Item	Type	Description
1	1# Gens Alarm	Alarm	When 1# genset occur failure, this will display.
2	1# Fail to Close	Alarm	When 1# breaker occur closing failure, this will display.
3	1# Fail to Open	Alarm	When 1# breaker occur opening failure, this will display.
4	1# Over Voltage	Indication	When 1# power supply voltage is higher than the setting value, this will display.
5	1# Miss Phase	Indication	Loss of any phase of A, B and C.
6	1# Over Freq	Indication	When 1# power supply frequency is higher than the setting value, this will display.
7	1# Under Freq	Indication	When 1# power supply frequency is lower than the setting value, this will display.
8	1# Under Volt	Indication	When 1# power supply voltage is lower than the setting value, this will display.
9	1# reverse phase	Warning	Phase sequence is not A-B-C.
10	1# Volt Normal	Indication	1# source voltage is within the setting range.

Table 6 Display Priority of 2# Status (upper to lower)

No.	Item	Type	Description
1	2# Gens Alarm	Alarm	When 2# genset occur failure, this will display.
2	2# Fail to Close	Alarm	When 2# breaker occur closing failure, this will display.
3	2# Fail to Open	Alarm	When 2# breaker occur opening failure, this will display.
4	2# Over Volt	Indication	When 2# power supply voltage is higher than the setting value, this will display.
5	2# Miss Phase	Indication	Loss of any phase of A, B and C.
6	2# Over Freq	Indication	When 2# power supply frequency is higher than the setting value, this will display.
7	2# Under Freq	Indication	When 2# power supply frequency is lower than the setting value, this will display.
8	2# Under Volt	Indication	When 2# power supply voltage is lower than the setting value, this will display.
9	2# reverse phase	Warning	Phase sequence is not A-B-C.
10	2# Volt Normal	Indication	2# source voltage is within the setting range.

Table 7 Display Status of Other Items (upper to lower)

No.	Item	Type	Description
1	Trip alarm	Alarm	Trip alarm input is active.
2	Breaking compulsorily	Warning	Breaking compulsorily input is active.
3	Overload	Warning	Load current is over the setting limit and exceed the setting delay.
4	Gens Start Output	Indication	Display that engine has been started.
5	Remote start input	Indication	This input is active when start the genset circularly.

Remark:

Alarm: when alarm occurs, indicators will flash and this alarm signal won't be cut until it is reset by long pressing ⚙.
Warning: when warning occurs, alarm indicator will flash while extinguish when warning alarm is inactive.

5.2. MAIN MENU INTERFACE

In the main screen, press ⚙ key, and enter the main menu interface.

1. Parameter Setting **2. Event Log** **3. Timing Start** **4. Date & Time Set** **3. Timing Start** **4. Date & Time Set** **5. Language** **6. Information**	Press ⌄ key to choose parameters (the current line was highlighted with black) and then press ⚙ key to confirm, and enter the corresponding display screen.

6. COMMISSIONING

In the main screen, press ⓣ to enter into the operation interface and the screen will show as below:

```
1 Exit
2 Stop to Test
3 Test Off-Load
4 Test On-Load
5 Cycle start
```
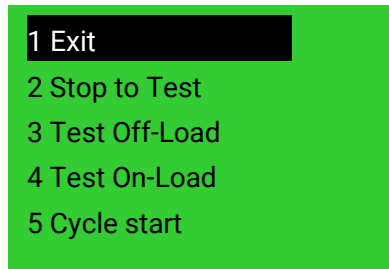
Fig.2 Commissioning Screen

Press ⊙ key to select corresponding function, and press ⊙ key to confirm.

TEST OFF-LOAD: It will send out a start signal immediately. After generator is normal, if mains is normal, the ATS will not act. The ATS will transfer the load to generator only when mains is abnormal. After mains return to normal, the ATS will transfer the load to mains. Here the start generator signal output will keep.

TEST ON-LOAD: It will send out a start generator signal immediately. After generator voltage is normal, the ATS will transfer the load to gens immediately regardless the main is normal or not.

STOP TO TEST: The start generator signal will turn off after pressing this key immediately.

CYCLE START: When this mode is active, generator start-signal will cyclic output according to mains status. The cyclic time can be set by users. If generator fault occurs, start-signal won't be sent out any more by controller. If in manual mode, controller will keep the current status and cancel cycle start function.

Conditions and procedures for cycle start mode:
1) In automatic mode.
2) Output setting: 1# engine start output (N/O Output) and 2 # engine start output (N/O Output).
3) Input setting: 1# generator fault input, 2# generator fault input and remote start input.
4) Option of <Cycle run times> and <Cycle shutdown times> should be programmed and run.
5) Set the system type as 1# Gens & 2# Gens.
6) Set the proper <generator start delay> time.

Remark: In manual mode, after choosing commissioning stage, generator will output start-signal immediately, but the ATS will not transfer to load automatically except for operation manually by pressing key on the front panel.

7. PARAMETERS CONFIGURATION

7.1. PARAMETER CONFIGURATION DESCRIPTION

In the main interface, press ⚙ key, choose **1. Parameter Setting** and then press ⚙ key, to enter the password interface.

Input password value 0-9 by ⌄ key, and shift Right by ⚙ key. Press the ⚙ again to confirm the password when four number is OK. If password is correct, it will enter into the parameter main interface. If it is wrong, it will directly exit and return to main interface. **Factory Default Password is 1234.**

Press ⌄ to shift to next position and set the parameters. Under current parameter set screen, press ⚙ and enter current parameter set mode. Current value of the first line screen display was highlighted with black. Press ⌄ key to change the value and press ⚙ key to shift position. Press ⚙ key again to confirm the settings. If the value number is within the setting range, the value will be saved into the internal memory of the controller; If it is beyond the range, then the parameter settings will not be saved.

Long time pressing ⚙ will go back to the main display screen.

7.2. PARAMETER CONFIGURATION TABLE

Table 8 Parameter Configuration Item

No.	Item	Range	Default	Description
01	1# Normal Delay	(0-9999)s	10	It is the delay of 1# power from voltage abnormal to voltage normal.
02	1# Abnormal Delay	(0-9999)s	5	It is the delay of 1# power from voltage normal to voltage abnormal.
03	2# Normal Delay	(0-9999)s	10	It is the delay of 2# power from voltage abnormal to voltage normal.
04	2# Abnormal Delay	(0-9999)s	5	It is the delay of 2# power from voltage normal to voltage abnormal.
05	Close Breaker	(0-20)s	5	Closing relay output pulse. If set as zero, it is continuous output.
06	Open Breaker	(1-20)s	5	Opening relay output pulse.
07	Transfer Interval	(0-9999)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	When module receives a closing signal, closing relay output.
09	Again Close Time	(0-20.0)s	1.0	When the breaker fail to close for the first time, the module will open breaker, and then attempt to close for the second time, if still failed to close the second time, the module will send out closing breaker failure signal.
10	Again Open Time	(0-20.0)s	1.0	When the breaker fail to open for the first time, the module will close breaker, and then attempt to open for the second time, if still failed to close the second time, the module will send out opening breaker failure signal.
11	Start Delay	(0-9999)s	1	When voltage is abnormal, start delay begins and starting signal is initiated. In cycle start, starting signal is initiated, delay begins. After delay ends, if voltage abnormal, send fault alarm and start another genset. Start delay should be higher than total starting time, minimum 30 seconds.
12	Stop Delay	(0-9999)s	5	It is the delay from #1 power is normal to send out stop generator signal.

No.	Item	Range	Default	Description
13	Cycle Run Time	(1-1440)min	720	Gens cycle start run time.
14	Cycle Stop Time	(1-1440)min	720	Gens cycle stop time.
15	Rated Volt	(100-600)V	230	AC system rated voltage.
16	Over Voltage	(100-150)%	120	The settings are used to configure the power over voltage point in the event of the voltage rising above the setting value. This value can be adjusted to suit user requirements.
17	Over Voltage Return	(100-150)%	115	Normal return value of over voltage.
18	Under voltage	(50-100)%	80	The settings are used to configure the power under voltage point in the event of the voltage falling below the setting value.
19	Under Voltage Return	(50-100)%	85	Normal return value of under voltage.
20	Over Frequency	(0.0-75.0)Hz	55.0	When the frequency is over the point, over frequency is active.
21	Over Frequency Return	(0.0-75.0)Hz	52.0	Normal return value of over frequency.
22	Under Frequency	(0.0-75.0)Hz	45.0	When the frequency is under the point, low frequency is active.
23	Under Frequency Return	(0.0-75.0)Hz	48.0	Normal return value of over frequency.
24	CT Ratio	(5-65000)/5	500	Current Transformer ratio.
25	Rated Load Current	(5-6000)A	500	Load rated current.
26	Over Current Value	(50-150)%	120	Load over current value.
27	Over Current Delay	(0-9999)s	1296	Over current alarm delay
28	Module Address	(1-254)	1	RS485 communication address
29	Password		1234	It applies to modify parameters.
30	System Type	(1-4)	1	1.1# Mains 2# Gens 2.1# Gens 2# Mains 3.1# Mains 2# Mains 4.1# Gens 2# Gens
31	Off Position	(1-3)	1	1) two OFF position; 2) one OFF position; 3) no OFF position
32	AC System	(1-4)	1	1. 3-phase 4 wires 2. 3-phase 3 wires 3. Single phase 2 wire 4. 2-phase 3 wires
33	Priority Select	(1-3)	1	1. 1# Priority; 2. 2# Priority; 3. No Priority
34	Aux. Output 1	(1-28)	25	01. Not Used
35	Aux. Output 2	(1-28)	28	02. Critical Failure
36	Aux. Output 3	(1-28)	13	03. Fail of Transfer
37	Aux. Output 4	(1-28)	16	04. Warning Output
38	Aux. Output 5	(1-28)	18	05. Alarm Output(delay) 06. 1# Normal Volt 07. 1# Abnormal Volt 08. 2# Normal Volt 09. 2# Abnormal Volt 10. Overcurrent Output

No.	Item	Range	Default	Description
				11. Auto State Output
				12. Manual State Output
				13. Gens Start(N/O)
				14. Gens Start(N/C)
				15. 1# Shut Output
				16. 1# Break Off Output
				17. 2# Shut Output
				18. 2# Break Off Output
				19. Common Alarm Output
				20. Time Test Gen Start
				21. Shut State
				22. 2# Shut State
				23. 1# Gens Start(N/O)
				24. 2# Gens Start(N/O)
				25. ATS Power L1
				26. ATS Power L2
				27. ATS Power L3
				28. ATS Power N
39	Aux. Input 1	(1-14)	02	01.Not used
40	Aux. Input 2	(1-14)	01	02.Breaking compulsorily
41	Aux. Input 3	(1-14)	01	03.Test off-load
42	Aux. Input 4	(1-14)	01	04.Test on-load
				05. Test Lamp
				06. 1# Gens Alarm
				07. 2# Gens Alarm
				08. Remote start
				09. Trip alarm
				10. Reserved
				11. Reserved
				12. Reserved
				13. Reserved
				14. Reserved
43	Communication Set	(1-4)	1	1. Enable COM Adj/Ctrl
				2. Disable COM Control
				3. Disable COM Adjustment
				4. Disable COM Adj/Ctrl

Table 9 Input Port Function Description

Item	Description
01 Not used	Invalid.
02 Breaking compulsorily	When active, this will force the breaker to transfer the ATS to OFF position. "None OFF position" ATS is unavailable.
03 Test Off-load	When active, controller will send a genset start signal immediately. When mains is normal, gens will not close the breaker.
04 Test On-Load	When active, controller will send genset start signals immediately. When gens is normal, gens will close the breaker.
05 Test lamp	When active, all Led lights on the front panel of the controller will be bright and the background of the LCD will be black in color.
06 1# Gens Alarm	In Cycle start, if the input is active, 1# Gens will not start.
07 2# Gens Alarm	In Cycle start, if the input is active, 2# Gens will not start.
08 Remote start	This input is necessary for cycle start generator.
09 Trip alarm	
10 Reserved	
11 Reserved	
12 Reserved	
13 Reserved	
14 Reserved	

Table 10 Output Port Function Descriptions

Item	Description
01. Not used	Invalid.
02. Critical failure	Switch transfer failure also belongs to the critical failure alarm.
03.Fail of transfer	1# closed failure, 1# open failure, 2# closed failure, and 2# open failure also belongs to the fail to transfer.
04. Warning output	1# reverse phase sequence; 2# reverse phase sequence, and load over current and compulsory belongs to general warning output.
05. Alarm output (delay)	When there is Serious fault then it will alarm for 60sec.
06. 1# Normal volt	It will output when 1# voltage is normal.
07. 1# Abnormal volt	It will output when 1# voltage is abnormal.
08. 2# Normal volt	It will output when 2# voltage is normal.
09. 2# Abnormal volt	It will output when 2# voltage is abnormal.
10. Over current output	It will output when loaded current exceeds the limit.
11. Auto state output	In will show output in automatic mode.
12. Manual state output	In will show output in manual mode.
13. Gens start (NO)	When generator starts output (Relay closed).
14. Gens start (NC)	When generator starts output (Relay released).
15. 1# close output	1# Switch ON signal output.
16. 1# open output	1# Switch OFF signal output, for one breaking position breaks off output.
17. 2# close output	2# Switch ON signal output.
18. 2# open output	2# Switch OFF signal output.
19. Common alarm output	It includes serious fault alarm and common alarm.
20. Timing Start Gen	Schedulers start generator function.
21. 1# Shut state	1# Switch auxiliary shutdown output.
22. 2# Shut state	2# Switch auxiliary shutdown output.
23. 1#Gens start (NO)	1# Gens start output.
24. 2#Gens start (NO)	2# Gens start output.
25. ATS power L1	ATS power supply.
26. ATS power L2	
27. ATS power L3	
28. ATS power N	

8.   EVENT LOG

In the main screen, press ⚙ key and select **2. Event Log**, and then press ⚙ key, the screen will show the event log interface as below:
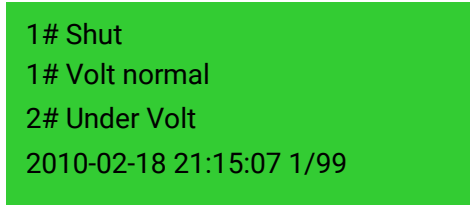
```
1# Shut
1# Volt normal
2# Under Volt
2010-02-18 21:15:07 1/99
```

Fig.3 Event Log Screen

Press ⬇ key to select the corresponding record, and press ⚙ key to enter into detailed information interface.

In the detailed information interface, press ⬇ key and it can display the record information circularly, including the temporal voltage of #1 and #2, detailed voltage, current, frequency and date and time. Press ⚙ and it will exit the current interface, while pressing ⚙ for a long time will return to main screen.

```
1# Close
1# Volt normal
2# Below Volt
2010-02-18      21:15:07
```

```
1# Close
U1(L-N) 220   220   220V
U2(L-N)  0   100   220V
2010-02-18 21:15:07 1/99
```

```
1# Close
AMP   501   502   503A
F1 50.0Hz    F2 50.1Hz
2010-02-18 21:15:07 1/99
```
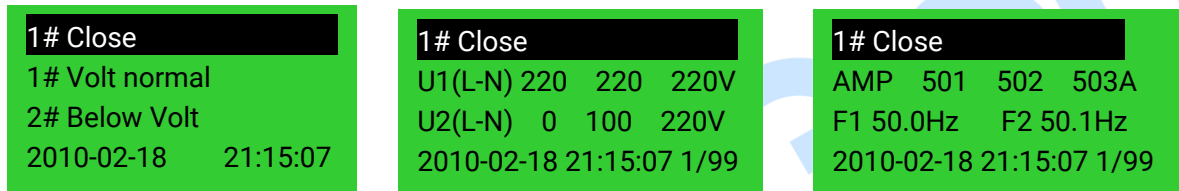
Fig.4 Event Log Screen

Event log includes: record type, 1# power supply status, 2# power supply status, 1# 3-phase voltage, 2# 3-phase voltage, 3-phase current, 1# frequency, 2# frequency and time-to-event etc.

Table 11 Event Log Type

No.	Type	Description
1	1# Close	1# close signal output
2	2# Close	2# close signal output
3	1# Fail to Close	1# power supply cannot connect to load.
4	2# Fail to Close	2# power supply cannot connect to load.
5	1# Fail to Open	1# power supply cannot disconnect to load.
6	2# Fail to Open	2# power supply cannot disconnect to load.
7	Trip Alarm	The input is active.
8	Forced Open	Forced open input is active.

9. TIMING START

In the main screen, press ⚙ key and select **3. Timing Start**, and then press ⚙ key, the screen will show the time start interface as below:

```
1 Exit
2 Timing start cycle
3 Load set
4 Start time
5 Continue time
```
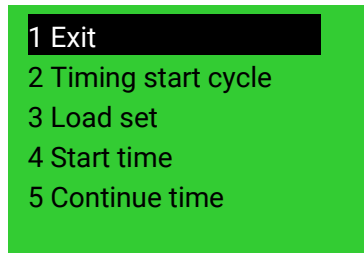
Fig.5 Timing Start Screen

Time start cycle: includes inhibit start; single time, weekly or monthly.
Load set: Starting generator with load or without load.
Start time: Generator start date and time.
Continue time: Generator continuously run time can be set on the duration of maximum time for 99 hours 59 minutes.

10. DATE AND TIME SETTING

In the main screen, press ⚙ key and select **4. Date & Time Set**, and then press ⚙ key, the screen will show the Date & Time Set interface as below:

```
Date& Time Set

10-06-25 (2) 10:00
```
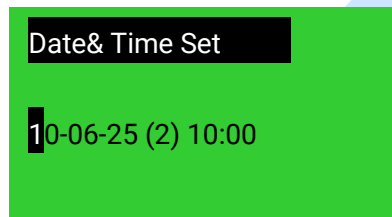
Fig.6 Date & Time Set

Press ⊙ key and input corresponding bit values 0-9, press ⚙ key and make bit shift to right. At the last bit press ⚙ key, so date and time can be updated.
Date and time format set: year-month-date (week) and hour: minute.

11. LANGUAGE SETTING

In the main screen, press ⚙ key and select **5. Language**, press ⚙ again to enter into language setting interface and the screen will show the language interface as follow:

```
1. Simplified Chinese
2. English
```
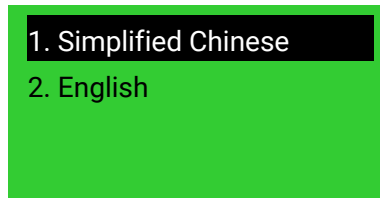
Fig.7 Language Screen

Press ⊙ to select the language and press ⚙ to confirm the setting.
Language option: Simplified Chinese/English.

12. CONTROLLER INFORMATION

In the main screen, press ⚙ key and select **6. Information**, and then press ⚙ key, the screen will show the controller information interface as follow:
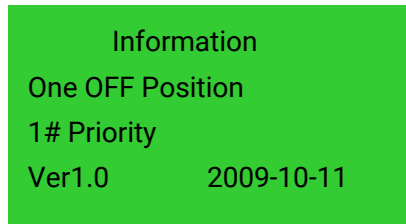
Information
One OFF Position
1# Priority
Ver1.0   2009-10-11

Fig.8 Information Screen

Display contents include off positions setting and switching priority choice and controller version, date. Long press ⚙ key and it will exit and return to main screen.

13. ATS OPERATION

13.1. MANUAL OPERATION

Press 🖑 key and manual operation indicator goes light, and the manual mode is active.

1) Press 🅘, 1# close relay outputs immediately, if 1# closing input is active, its indicator lights, and the 1# source connect to load.

2) Press 🅘🅘, 2# close relay outputs immediately, if 2# closing input is active, its indicator lights, and the 2# source connect to load.

3) Press 🅞, 1# or 2# open relay outputs immediately, if 1# or 2# closing input is inactive, the indicators is black, the 1# or 2# power disconnect with load.

Remark: For the ATS of no OFF position, pressing 🅞 key is invalid.

13.2. AUTOMATIC OPERATION

Press 🌀 and the automatic LED will light. Controller enters AUTO mode and can automatically switch load to 1# or 2#.

13.3. ATS POWER SUPPLY

The power of ATS is smartly controlled by controller. As long as one power is normal, it can ensure ATS voltage power supply normally and can be transferred properly.

Users should select power supply voltage (phase voltage or line voltage) based on ATS type. If phase voltage is chosen, connect the phase voltages (e.g. A phase) of #1 and #2 separately to N/C Pin 5 and N/O Pin 7 of auxiliary output 1; and connect N phases of #1 and #2 separately to N/C Pin8 and N/O Pin10 of auxiliary output 2. And then connect the common output of auxiliary output1&2 to ATS power supply. Power on the controller, and enter the parameters set page. Set aux. output 1 to "ATS power L1" and set output 2 to "ATS power N". If the ATS power is supplied by Line Voltage, setting way is the same as above, and it only needs to change phase N to phase voltage. Aux. output 2 also needs to be changed based on the settings. Wiring diagrams are shown as below:
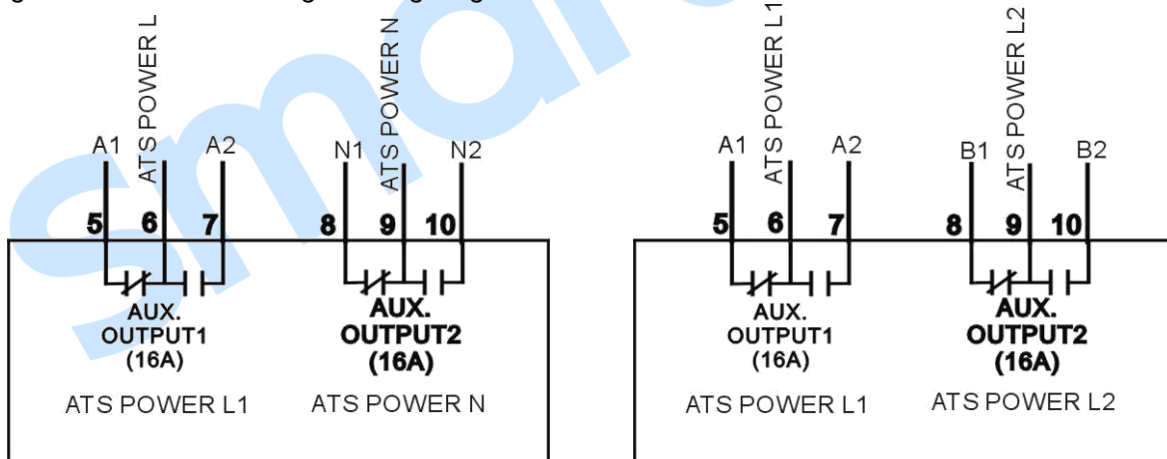

Fig.9 ATS L-N and L-L Power Supply

Note: Normally Close (NC) input voltage must come from 1# voltage.

14. COMMUNICATION CONFIGURATION AND CONNECTION

HAT600N series controller has RS485 serial port, which can connect the local area network openly. It uses Modbus protocol via PC or system software. It can also be applicable to dual power switching management for factories, telecom, industrial and civil buildings, achieving "remote control, remote measuring, remote communication" functions.

More information about communication protocol, please refer to *HAT600 Communication Protocol*.

Communication parameters:

Module address   1 (range: 1-254, User can set.)
Baud rate   9600bps
Data bit   8bit
Parity bit   None
Stop bit   1 bit or 2bits (set via PC)
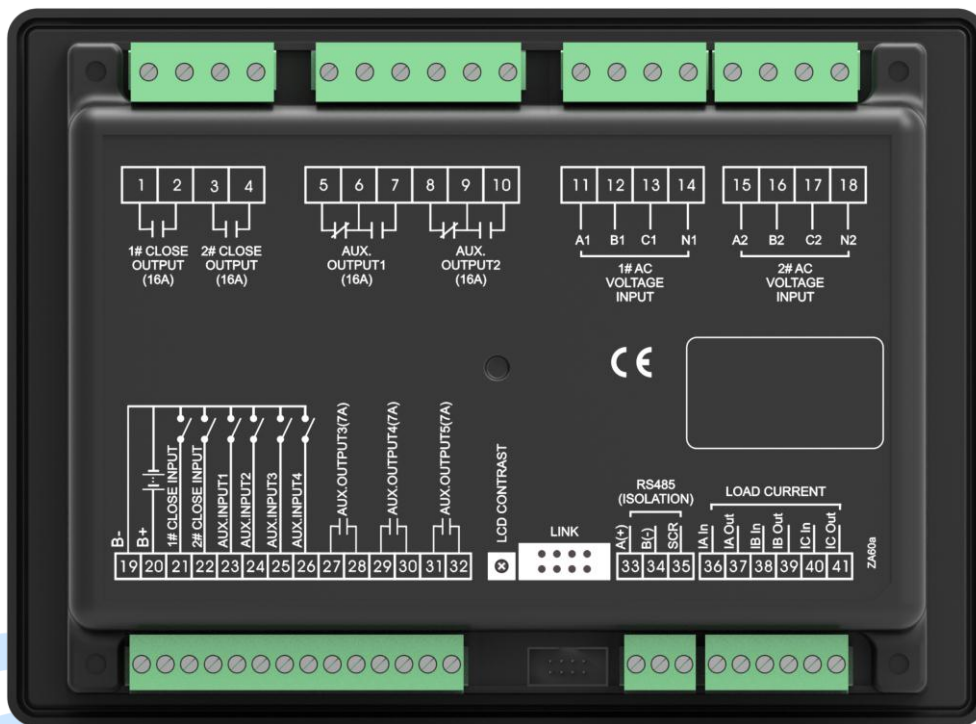
15. DESCRIPTION OF CONNECTING TERMINALS

Fig.10 Connecting Terminal Description

SmartGen
MAKING CONTROL SMARTER

Table 12 Functional Description of Input/Output Ports

| Pin	Items	Description		Notes
1	1# close output	Volt-free relay contact output		250V16A (relay capacity)
2				
3	2# close output	Volt-free relay contact output		250V16A (relay capacity)
4				
5	Aux. output 1	NC	Default: ATS power of L1 output	Volt-free relay contact output: 250V16A
6		Common		
7		NO		
8	Aux. output 2	NC	Default: ATS power of N output	Volt-free relay contact output: 250V16A
9		Common		
10		NO		
11	A1	1# AC 3-phase 4 wire voltage input		For single phase, only connect A1, N1
12	B1			
13	C1			
14	N1			
15	A2	2# AC 3-phase 4 wire voltage input		For single phase, only connect A2, N2
16	B2			
17	C2			
18	N2			
19	B-	Connect battery negative		DC negative input
20	B+	To start engine, connect the terminal to battery positive		DC positive input (8-35)V controller power supply
21	1# close input	Detection of 1# switch closing state, voltage free contact input		connect GND
22	2# close input	Detection of 2# switch closing state, voltage free contact input		connect GND
23	Aux. input 1	connect GND		
24	Aux. input 2			
25	Aux. input 3			
26	Aux. input 4			
27	Aux. output 3	Voltage free relay contact output		250V7A
28				
29	Aux. output 4	Voltage free relay contact output		250V7A
30				
31	Aux. output 5	Voltage free relay contact output		250V7A
32				
33	RS485 A+	RS485 communication port		
34	RS485 B-			
35	RS485 GND			
36	IA Input	Sensing from Secondary phase A current		Only suitable for HAT600NI/HAT600NBI
37	IA Output			
38	IB Input	Sensing from Secondary phase B current		
39	IB Output			
40	IC Input	Sensing from Secondary phase C current join		
41	IC Output			
LCD Contrast	LCD Display	Adjust the LCD contrast		
LINK	Programming port	Factory update		
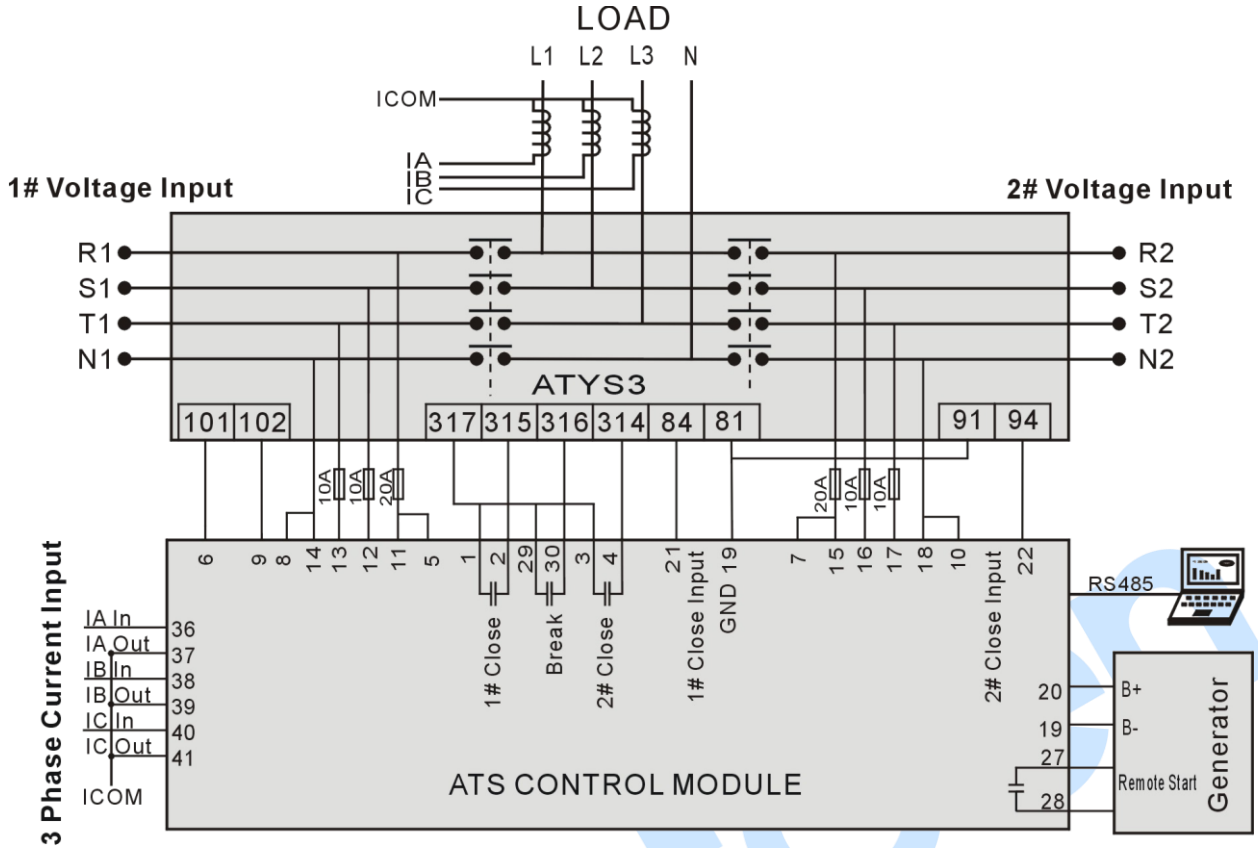
Fig.11 ATYS3 Wiring Diagram
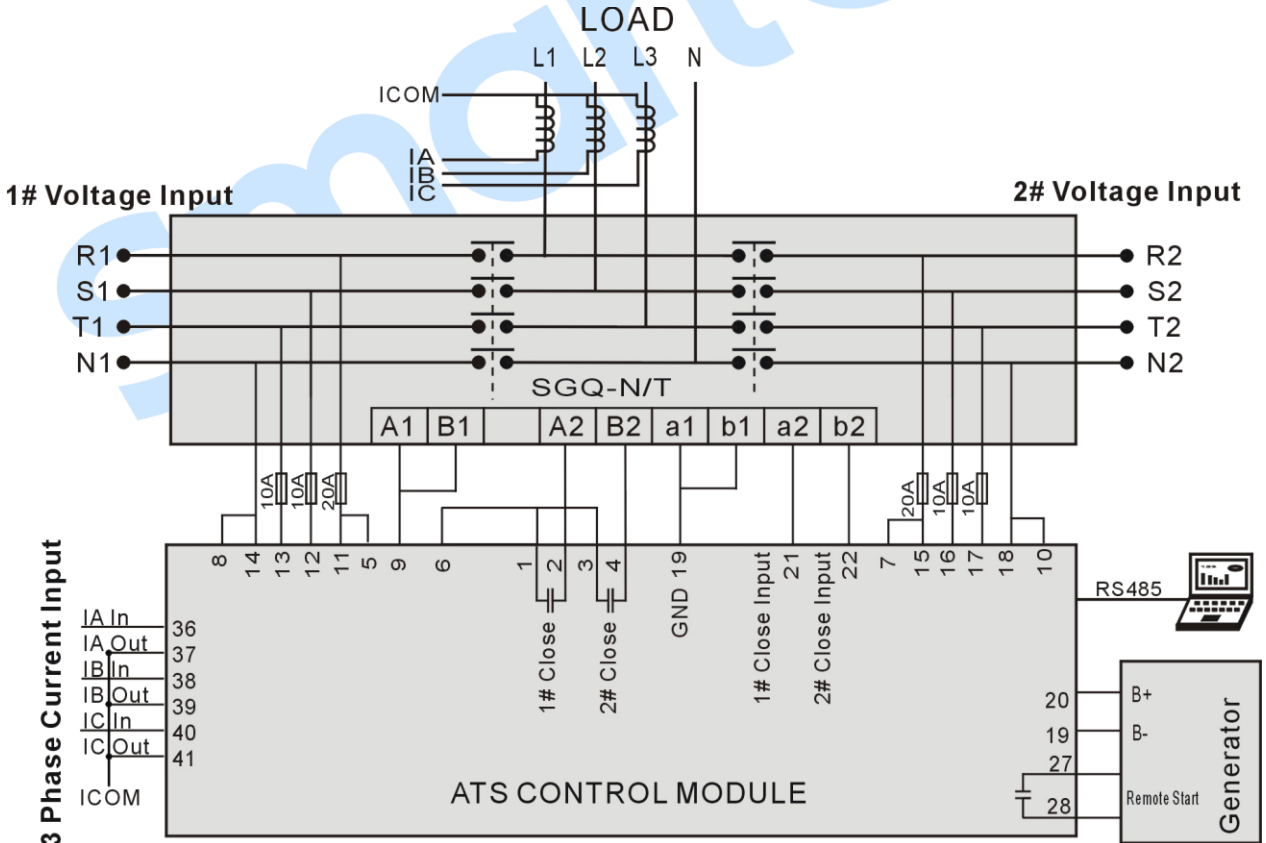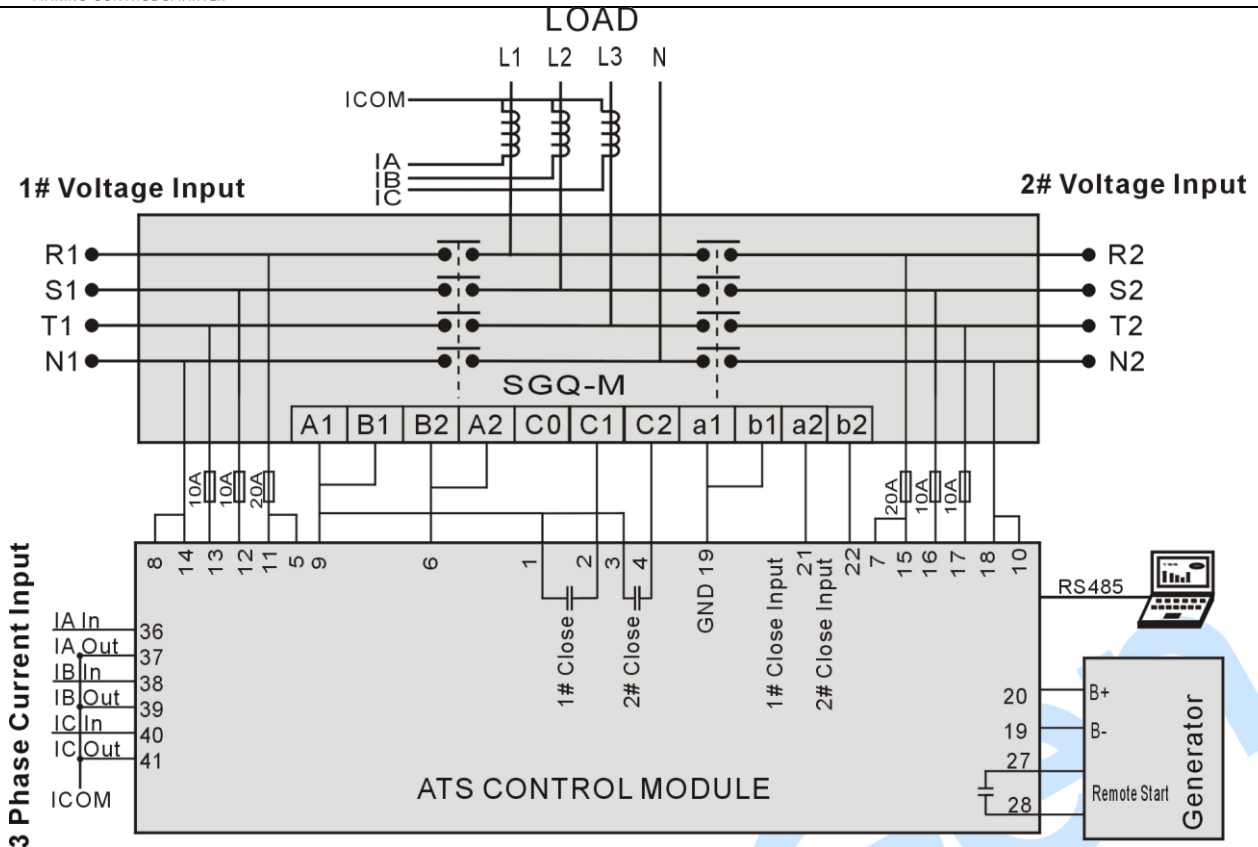

Fig.12 SGQ-N/T Wiring Diagram

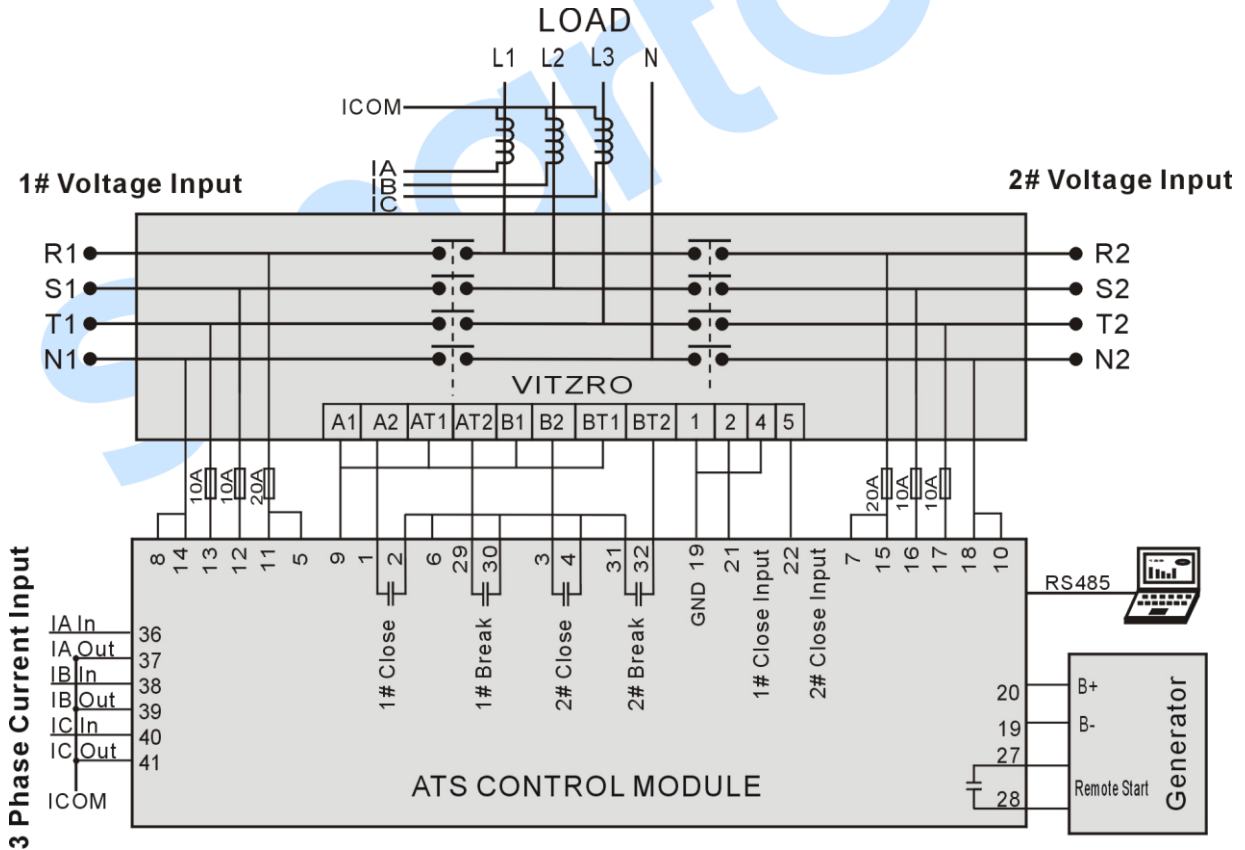**Fig.13 SGQ-M Wiring Diagram**

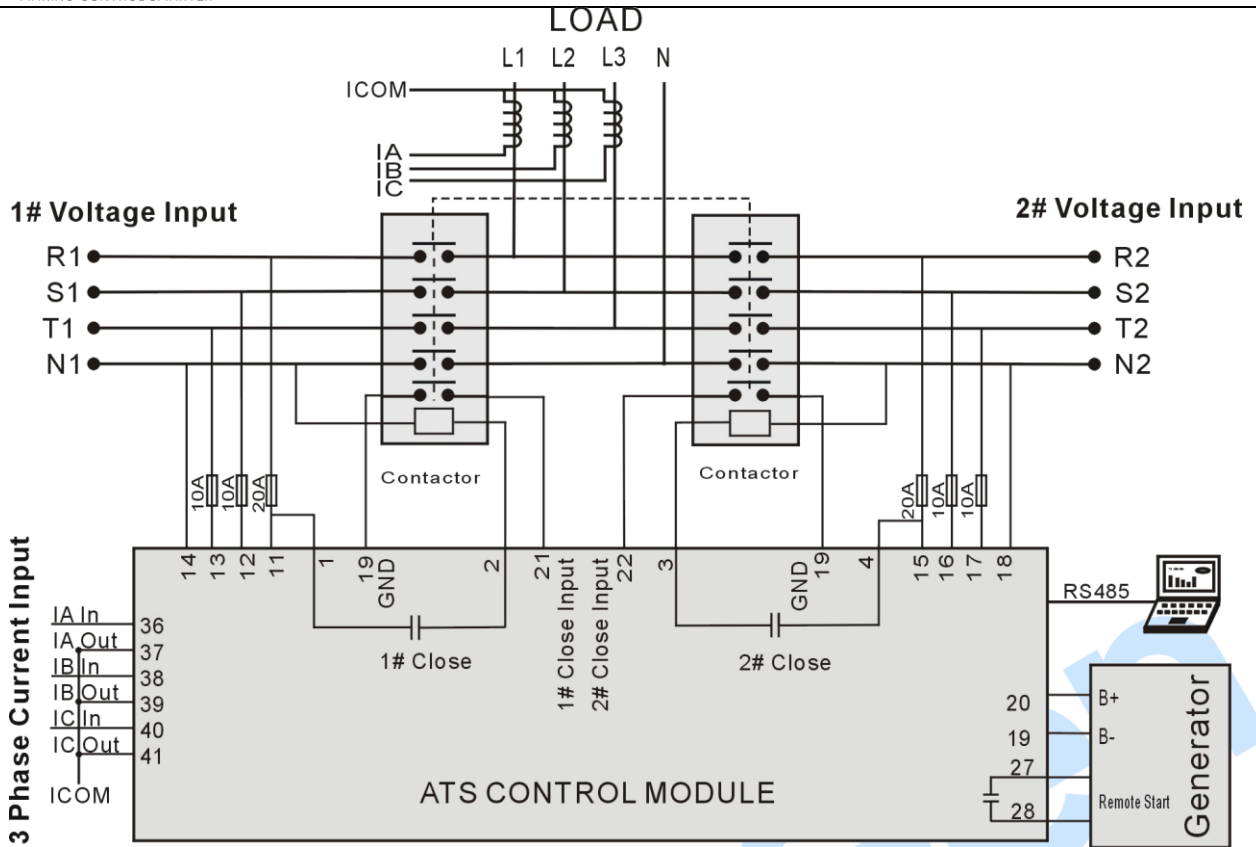**Fig.14 VITZRO Wiring Diagram**

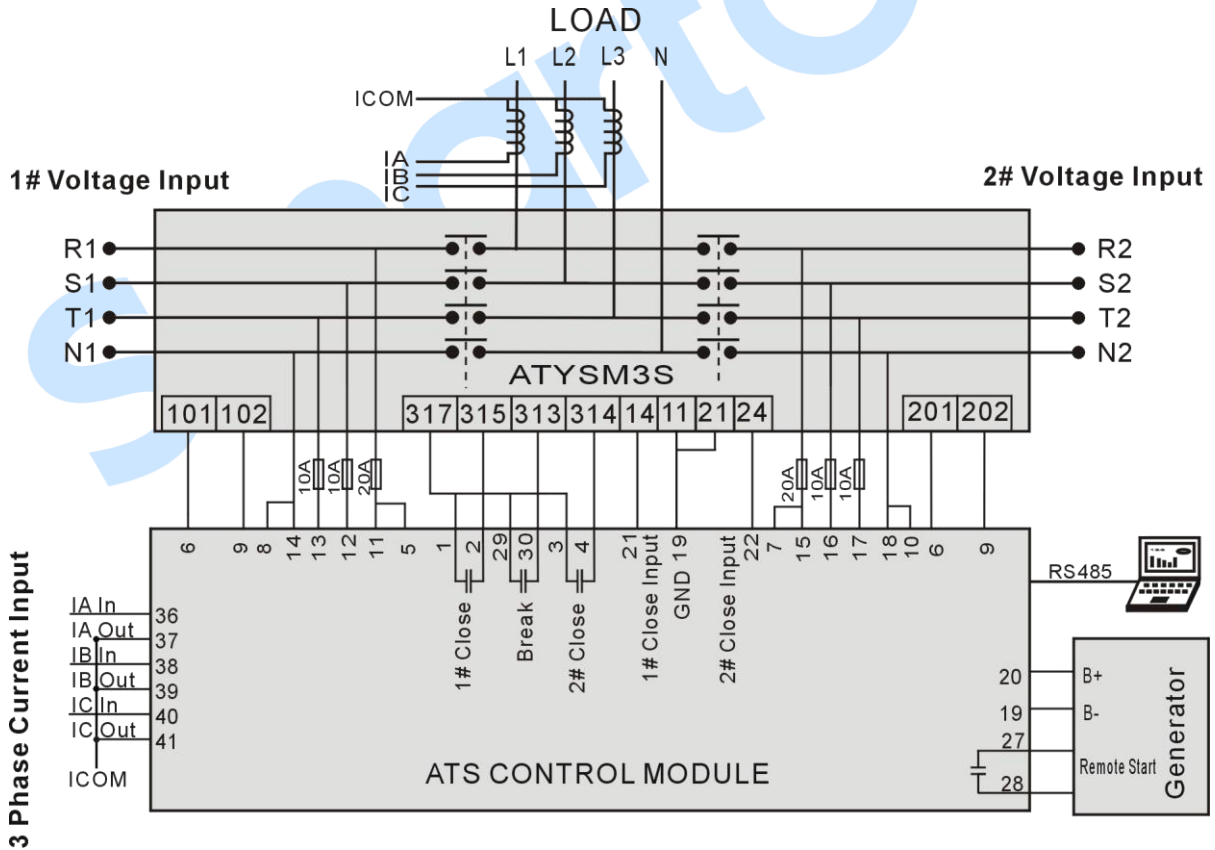**Fig.15 Contactor Wiring Diagram**
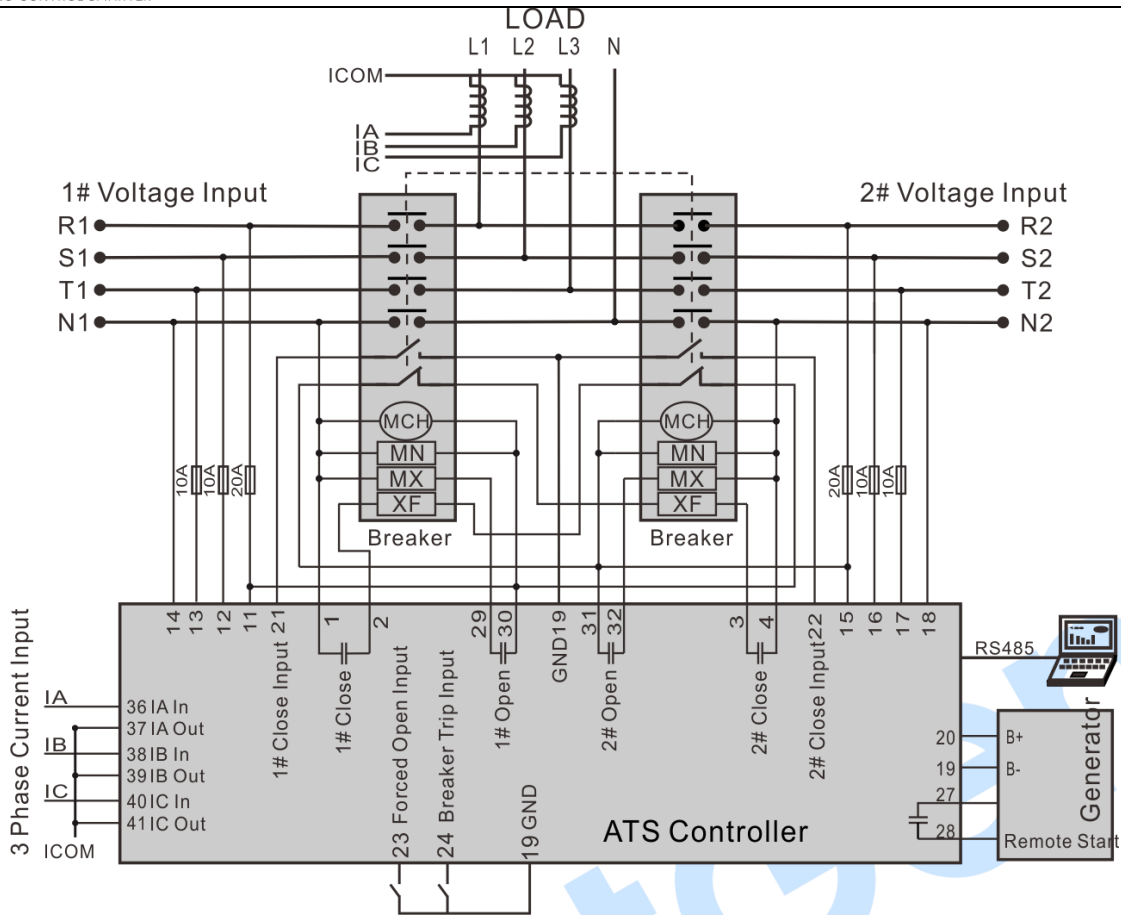

Fig.16 ATYSM3S Wiring Diagram

Fig.17 Breaker Wiring Diagram

Remark: all above are application diagrams of HAT600N series ATS controllers. However, HAT600N and HAT600NB have no current sample input, please skip over the current part of the diagram.
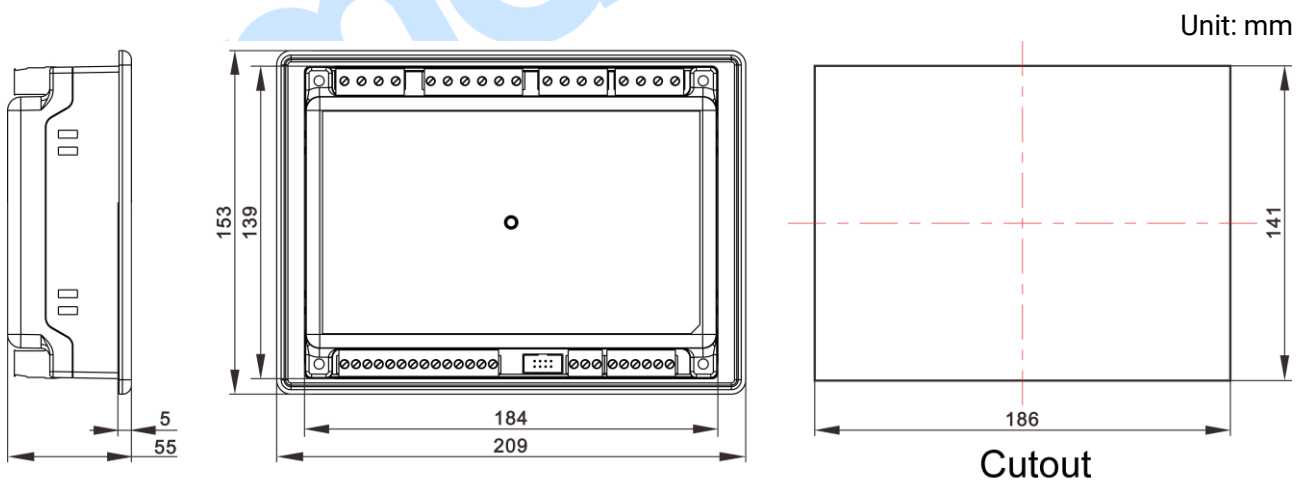
17. INSTALLATION

Fig.18 Case Dimension and Cutout Size

⚠**Note:** The torque of 0.27N·m (2.75kgf·cm) is recommended.

18. FAULT FINDING

Table 13 Fault Finding

Fault Symptom	Possible Remedy
Controller no operation	Check battery voltage Check DC fuse.
RS485 communication failure	Check whether RS485 negative and positive are right connected. Check whether RS485 converter is abnormal. Check whether module address in the parameter settings is correct. If the above methods are not available, try to short connect GND of controller with RS485 converter GND (or PC GND). It is recommended that a 120Ω resistor is added between A and B of RS485.
Programmable output error	Check programmable output connections, and pay attention to N/O and N/C. Check output settings in parameters settings.
Programmable input abnormal	Check whether the programmable input is connected to GND reliably when it's active, and hung it up when it is inactive. (**Note:** The input will be possibly destroyed when connected with voltage.)
ATS is not work while generator running	Check ATS. Check the connection wirings between the controller and the ATS. Check whether breaking positions of ATS are in accordance with the set breakings.

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