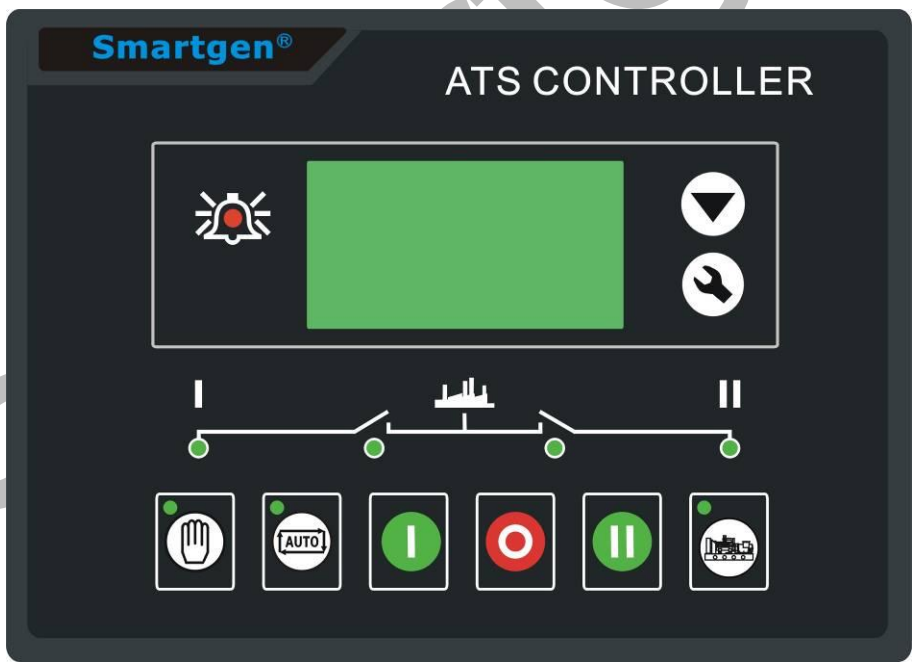
Smartgen®

HAT600 Series

HAT600/HAT600I/HAT600B/HAT600BI

ATS CONTROLLER

OPERATING MANUAL



Smartgen Technology

众智电子 **Chinese trademark**

Smartgen® **English trademark**

Smartgen — make your generator ***smart***

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If colors of actual products are different from those mentioned within this manual, please take the actual product as the standard.

Software Version

Version	Date	Note
1.0	2009-11-30	Original release.
1.1	2010-04-07	Revise front mask
1.2	2010-06-20	Modify instruction format and panel cutout size.
1.3	2010-06-30	Add the clock and schedule start function.
1.4	2010-07-05	Add type instruction of HAT600 series.
1.5	2011-04-08	Modify cycle start functions.

1.6	2011-09-02	Add description of current function
1.7	2012-03-02	Change company name into “Smartgen Technology”; Add trademark description
1.8	2012-09-01	Add functional description; modify some parameters; add event log description.

CONTENT

1 OVERVIEW

HAT600 series ATS controller is intelligent dual-supply module with programmable function, automatic measurement, LCD display, and digital communication. It combines digital intelligence and networking. Automatic measurement and control can reduce incorrect operation. It is an ideal option for ATS.

HAT600 series ATS controller is made of microprocessor as its core, can accurately detect extended-spectrum 2-way-3-phase voltage and also make accurate judgment and output passive control switch under the abnormal voltage (over and under voltage, miss phase and over and under frequency). This controller has full consideration in various application of ATS (automatic transfer system) can be directly used for Intelligent ATS, Contactor ATS, Circuit Break ATS etc. It have compact structure, advanced circuits, simple wiring and high reliability, 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

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

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

- Measure and display active power, apparent power, power factor and 3 phase current;
- Over current alarm;
- Over/under voltage, loss of phase, reverse phase sequence, over/under frequency protection.
- Automatic/Manual mode. In manual mode, can force switch to close or open;
- All parameters can be set on site. With Two different passwords which

ensures authorized staff operation only.

- During genset testing ATS controller can be set either on On-load or Off-load mode.
- ATS Controller has function of automatic Re-closing.
- Closing output signal can be set as on intervals or as continuous output.
- Applicable for ATS of one neutral position, two neutral position and change over.
- Applicable for 2 isolated neutral line for Generator and Mains.
- Real-time clock (RTC).
- Event log can record 99 items circularly.
- Timely schedule can be set on monthly or weekly basis and trial can be set as with on- load or off -load.
- Can control two generators to work in a cycle, even the genset running time and crank rest time can be set.
- 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).
- Wide space between connecting terminals of AC input. Max.625V input voltage.
- With standard isolated RS485 communication interface. With "remote controlling, remote measuring, remote communication" function by the ModBus communication protocol.
- Can check the current status of controller (including switch digital input, over Voltage, and under Voltage etc.).
- Suitable for various AC systems (3 phase 4-wires, 3-phase 3-wires, single-phase 2-wire, and 2-phase 3-wire).
- Modular design, flame-resisting ABS plastic shell, plug-in terminals and embedded installation. Compact structure with easy installation.

HAT600 series controller and its main functions are shown as following,

Function / Type	DC power supply	AC power supply	AC current sample
HAT600	√	**×**	**×**
HAT600I	√	**×**	√
HAT600B	√	√ **(LN220V)**	**×**
HAT600BI	√	√ **(LN220V)**	√

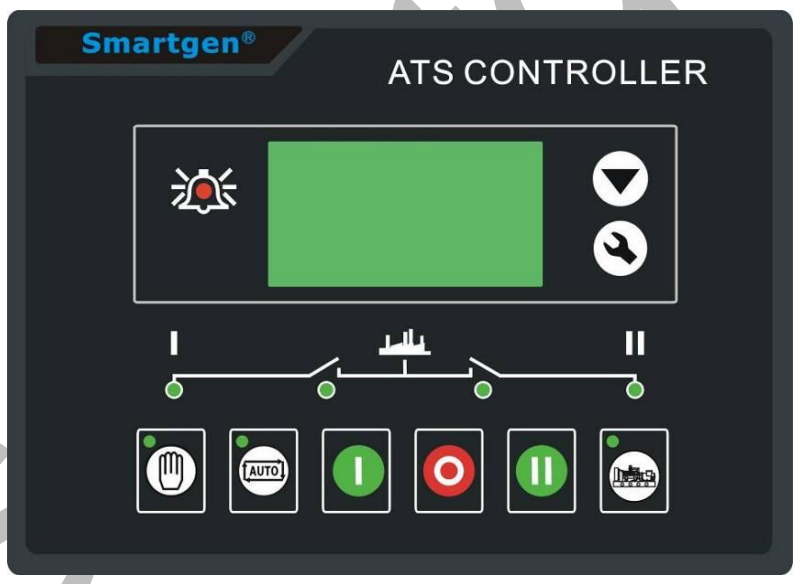
3 SPECIFICATION

Operating voltage	1. DC 8.0V~35.0V, continuous power supply. 2. HTS220/HWS560 power supply (without DC input). 3. AC160V~280V (HAT600B/HAT600BI) during AC power L1N1/L2N2 supply.		
Power consumption	<3W (Standby mode: ≤2W)		
AC voltage Input	AC system	HAT600/HAT600I	HAT600B/HAT600BI
	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 and Open Trip Relay output	16A 250VAC Free Voltage relay output		
Programmable relay output	16A/7A 250VAC Free Voltage relay output		
Digital Input	Connecting to GND		
Communication	RS485 isolated interface, MODBUS Protocol		
Dimensions	209mmx153mmx55mm		
Panel cutout	186mm x 141mm		
Operating Temp. range	Temperature: (-25~+70)°C; Humidity: (20~90)%RH		

Storage condition	Temperature: (-30~+80)°C
Protection rank	IP55: If waterproof gasket is fixed between controller and its panel. IP42: If waterproof gasket IS NOT fixed between controller and its panel.
Insulation strength	Object: Among the input/output/ power supply Quoted standard: IEC688-1992 Test way: AC1.5kV/1min leakage current 5mA.
Weight	0.8kg(HAT600,HAT600I)/1.0kg(HAT600B/HAT600BI)

4 OPERATING

4.1 OPERATION PANEL



4.2 KEY FUNCTION DESCRIPTION

	I# Close	In Manual mode, switch on 1# power to load.
	Open	In Manual mode, switch off 1# or 2# power to off-load.
	II# Close	In Manual mode, switch on 2# power to load.
	Manual	Press and controller enter into Manual mode.
	Automatic	Press and controller enter into 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

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** **2010-06-10 (4) 20:25:36** **Present Status: MANUAL**	This screen shows: 1# and 2# 3 phase Voltage (L-N), real-time clock and controller working state.

AMP 500 500 500A **PWR 329kW** **PF 1.00 PS 329kVA** **Present Status: MANUAL**	This screen show: 3 phase load current, active power, apparent power, power factor and controller working mode.
1# Volt normal **2# Volt normal** **Gens Start signal Out** **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.

Display priority of the #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 Shut	Alarm	When 1# breaker occur closing failure, this will display.
3	1# Fail to Break off	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# Below Freq	Indication	When 1# power supply frequency is lower than the setting value, this will display.
8	1# Below 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.

Display priority of the #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 Shut	Alarm	When 2# breaker occur closing failure, this will display.
3	2# Fail to Break off	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# Below Freq	Indication	When 2# power supply frequency is lower than the setting value, this will display.
8	2# Below 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.

Display status of the 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 Out	Indication	Display that engine has been started.
5	Remote start input	Indication	This input is active when start the genset circularly.

NOTE:

Alarm: When alarm occurs, indicators will flash and this alarm signal won't be cut until long pressing to reset.

Warning: when warning occurs, alarm indicator will flash while extinguish when warning alarm is inactive.

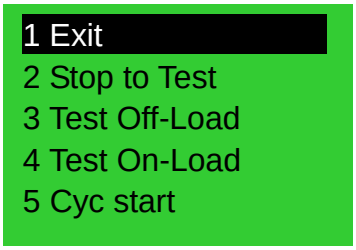
5.2 MAIN MENU INTERFACE

In the screen, press key, can enter the main menu interface.

1. Parameters set **2. History record** **3. Time start** **4. Date & Time Set** **3. Time 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, can enter the corresponding display screen.

6 COMMISSIONING

On the main screen press  to enter into the operation interface, the screen will show as following:



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 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 mains immediately regardless whether 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 send out anymore 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.

Note: 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

In the main interface, press key, choose **1.Parameters setting** and then press key, to enter the password interface.

Input password value 0-9 by key, and to shift Right by key. Press the again to confirm the password when Four number is OK. If password correct and enter into the parameter mains interface. While error, directly exit and return to main interface. **Factory Default Password is 1234**. Press to shift to next position and set the parameters. While setting the current configuration parameters according to press key. Then enter current parameter model, and the current value of the first line screen display was highlighted with black. Press key to change the value while press key to shift position, and press key again to confirm the password when Four number is OK. 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 parameters setting will not be saved. Long time press will back to the main display screen.

7.1 PARAMETERS TABLE

Parameters item table

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	Open Breaker	(0-20)s	5	Closing relay output pulse. If set as zero, it is continuous output.

No.	Item	Range	Default	Description
06	Close 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 Shut 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 Break 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.
13	Cycle Run Time	(1-1440)m	720	Gens cycle start run time.
14	Cycle Stop Time	(1-1440)m	720	Gens cycle stop time.

No.	Item	Range	Default	Description
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 Rate	(5-6000)/5	500	Current Transformer rate.
25	Rated Load Current	(5-5000)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

No.	Item	Range	Default	Description
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	1 Not used 2 Critical failure 3 Fail of Transfer 4 Warning output 5 Alarm output(delay) 6 1# Normal volt 7 1# Abnormal volt 8 2# Normal volt 9 2# Abnormal volt 10 Overcurrent output 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
35	Aux. Output 2	(1-28)	28	
36	Aux. Output 3	(1-28)	13	
37	Aux. Output 4	(1-28)	16	
38	Aux. Output 5	(1-28)	18	
39	Aux. Input 1	(1-14)	02	01.Not used 02.Breaking compulsorily 03.Test off-load 04.Test on-load 05. Test Lamp 06. 1# Gens Alarm 07. 2# Gens Alarm
40	Aux. Input 2	(1-14)	01	
41	Aux. Input 3	(1-14)	01	
42	Aux. Input 4	(1-14)	01	

No.	Item	Range	Default	Description
				08. Remote start 09. Trip alarm 10. Reserved 11. Reserved 12. Reserved 13. Reserved 14. Reserved

7.2 INPUT/OUTPUT FUNCTION DESCRIPTION

The input port function as below,

Item	Description
1 Not used	Invalid.
2 Breaking compulsorily	When active, this will force the breaker to transfer the ATS to OFF position. “None OFF position” ATS is unavailable
3 Test off-load	When active, controller will send a genset start signal immediately. When mains is normal, gens will not close the breaker.
4 Test On-Load	When active, controller will send genset start signal immediately. When mains is normal, gens will close the breaker.
5 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.
6 1# Gens Alarm	In Cycle start, if the input is active, 1 # Gens will not start
7 2# Gens Alarm	In Cycle start, if the input is active, 2 # Gens will not start
8 Remote start	This input is necessary for cycle start generator.
9 Trip alarm	
10 Reserved	
11 Reserved	
12 Reserved	
13 Reserved	
14 Reserved	

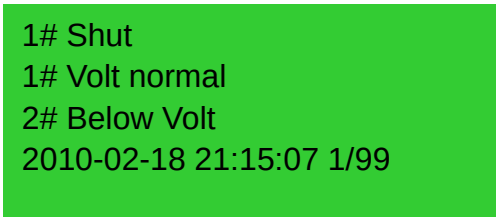
The output function as below,

Item	Description
1 Not used	
2 Critical failure	Switch transfer failure also belongs to the critical failure alarm.
3 Fail of transfer	1# closed failure,1# open failure, 2# closed failure,

	2# open failure also belongs to the fail to transfer.
4 Warning output	1# reverse phase sequence; 2# reverse phase sequence, and load over current and compulsory belongs to general warning output.
5 Alarm output (delay)	When there is Serious fault then it will alarm for 60sec.
6 1# Normal volt	It will output when #1 voltage is normal.
7 1# Abnormal volt	It will output when #1 voltage is abnormal.
8 2# Normal volt	It will output when #2 voltages is normal.
9 2# Abnormal volt	It will output when #2 voltages 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.
13Gens start (N/O)	When generator starts output (Relay closed).
14Gens start (N/C)	When generator starts output (Relay released).
15 1# shut output	1# Switch ON signal output.
16 1# break off output	1# Switch OFF signal output, for one breaking position breaks off output.
17 2# shut output	2# Switch ON signal output.
18 2# break off output	2# Switch OFF signal output.
19 Common alarm output	It is include serious fault alarm and common alarm.
20 Time TestGen Start	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 (N/O)	1# Gens start output.
24 2#Gens start (N/O)	2# Gens start output.
25 ATS power L1	ATS power supply.
26 ATS power L2	
27 ATS power L3	
28 ATS power N	

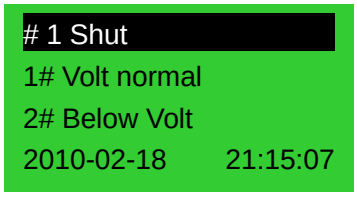
8 EVENT LOG

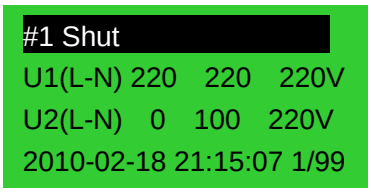
On the main screen press key and select **2 Event log**, and then pressing key, the screen will show the event log interface as follow:

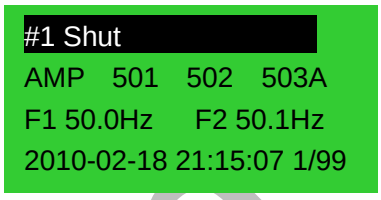


Press key to select the corresponding record, and press key to enter into detailed information interface.

In the detailed information interface, press key can display the record information circularly. The detailed information include specific status of voltage, current, frequency and time-to-event. Press will exit the current interface, while pressing for a long time will return to main screen.







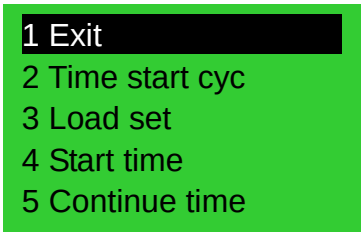
Event log include：Record type, 1# power supply status, 2# power supply status, 1# 3-phase voltage, 2# 3-phase voltage, 3-phase current, 1# frequency, 2# frequency and time-to-event.

Event log type：

NO.	Type	Description
1	1# Shut	1# close signal output
2	2# Shut	2# close signal output
3	1# Fail to Shut	1# power supply can not connect to load.
4	2# Fail to Shut	2# power supply can not connect to load.
5	1# Fail to Break off	1# power supply can not disconnect to load.
6	2# Fail to Break off	2# power supply can not disconnect to load.
7	Trip alarm	The input is active.
8	Breaking compulsorily	Breaking compulsorily input is active.

9 TIMING START

On the main screen press key and select **3 Time start**, and then pressing key, the screen will show the time start interface as follow:



Time start cycle: Include inhibit start; single time, weekly or monthly.

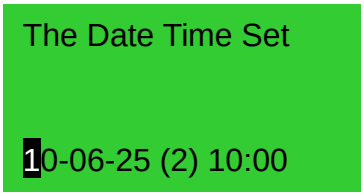
Load set: Starting generator with load or without load.

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

On the main screen press key and select **4 Date & Time set**, and then pressing key, the screen will show the Date & Time Set interface as follow:

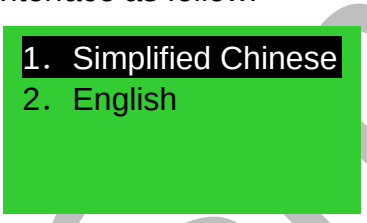


Press key according to the corresponding bit input values 0-9, pressing key to carry through the right of bit shift; pressing key when right shift to the end, can update the date and time.

Date and time format set: year-month-date (week) and hour: minute.

11 LANGUAGE SETTING

On 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:

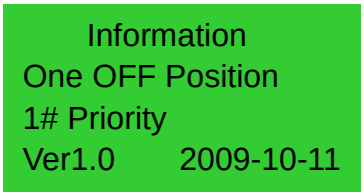


Press to select the language and press to confirm the setting.

Language option：Simplified Chinese/ English

12 CONTROLLER INFORMATION

On the main screen press key and select **6 Controller information**, and then pressing key, the screen will show the controller information interface as follow:



Display content includes off positions setting and switching priority choice and controller version, date.

Long pressing key will exit and return to main screen.

13 ATS OPERATION

13.1 MANUAL OPERATION

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

- Press, 1# close relay outputs immediately, if 1# closing input is active, its indicator lights, and the 1# source connect to load.
- Press, 2# close relay outputs immediately, if 2# closing input is active, its indicator lights, and the 2# source connect to load.
- 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. ***1**

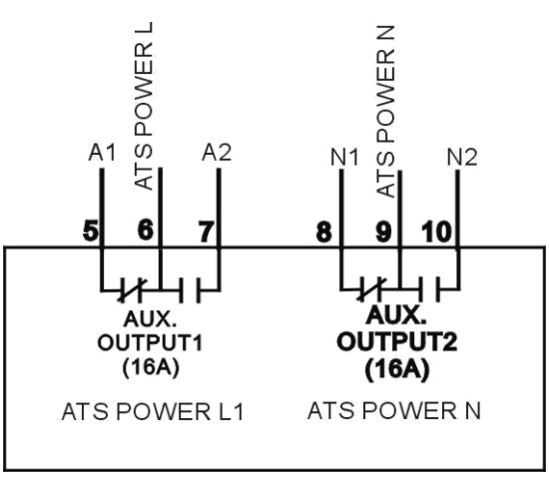
Note ***1:** For the ATS of no OFF position, pressing key is invalid.

13.2 AUTOMATIC OPERATION

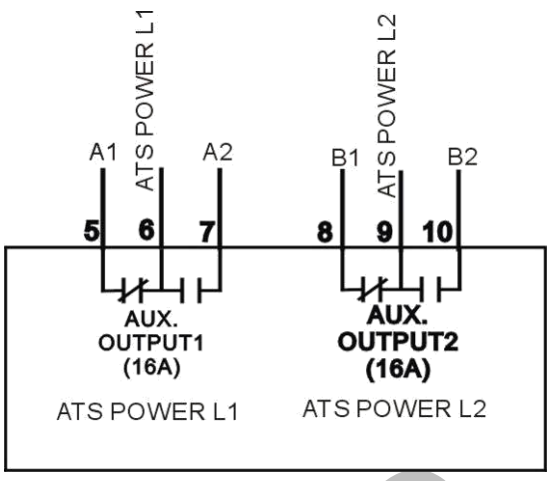
Press and the automatic LED will light, enter AUTO mode and controller can automatically switch load to 1# or 2#.

13.3 ATS POWER SUPPLY

The power of ATS is supplied by controller, as long as one power is normal, this can ensures 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 choose phase voltage, connect the phase voltage (A1) to normally close (Pin5) and normally open (Pin7) contact of auxiliary output 1; connect N phase (A1) to normally close (Pin8) and normally open (Pin10) contact of auxiliary output 2. And then connect the common output of auxiliary output1&2 to ATS power supplies. When controller power is ON, parameters can be set and also set the configurable output1 as "ATS power L1". If the ATS power supplied by Line Voltage, setting way is same as above, but need to change phase N to phase B. Wiring diagrams are shown as following:



ATS L-N voltage power supply



ATS L-L voltage power supply

Note: Normally Close (N/C) input voltage must come from 1# voltage.

14 COMMUNICATION CONFIGURATION

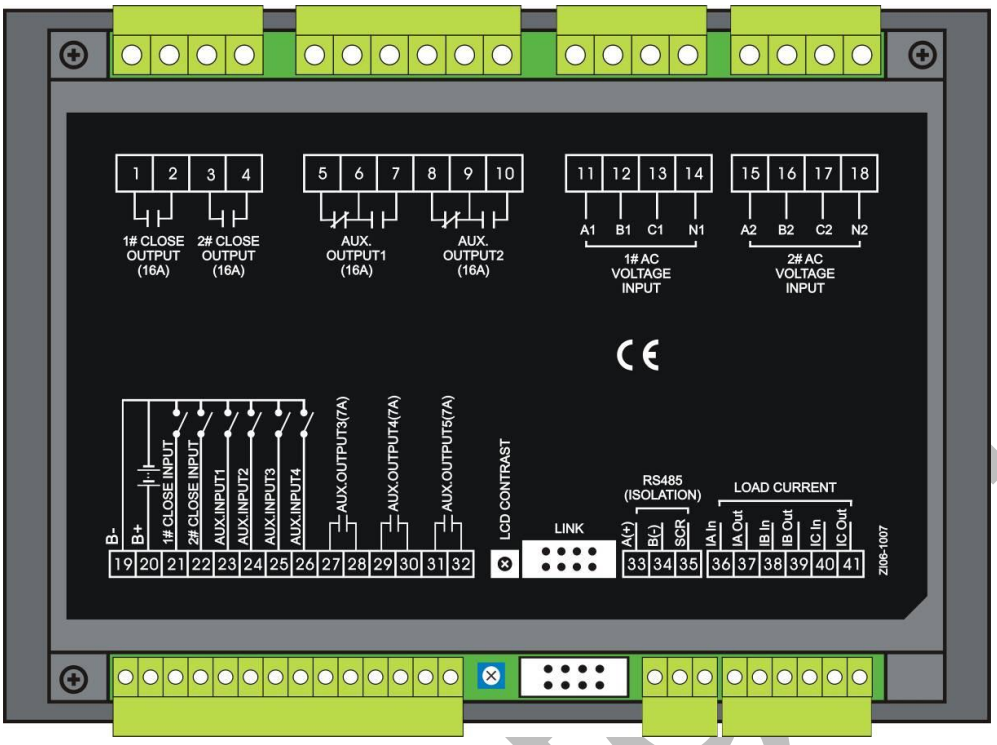
HAT600 series controller has RS485 serial port, can connect the local area network openly. It uses Modbus protocol via PC or system software, it can also be applicable to dual power switching management to factories, telecom, industrial and civil buildings, which achieves “remote control, remote measuring, remote communication” functions.

More information of Communication Protocol, refer to “HAT600 Communication Protocol”.

Communication parameters,

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

15 DESCRIPTION OF CONNECTING TERMINALS



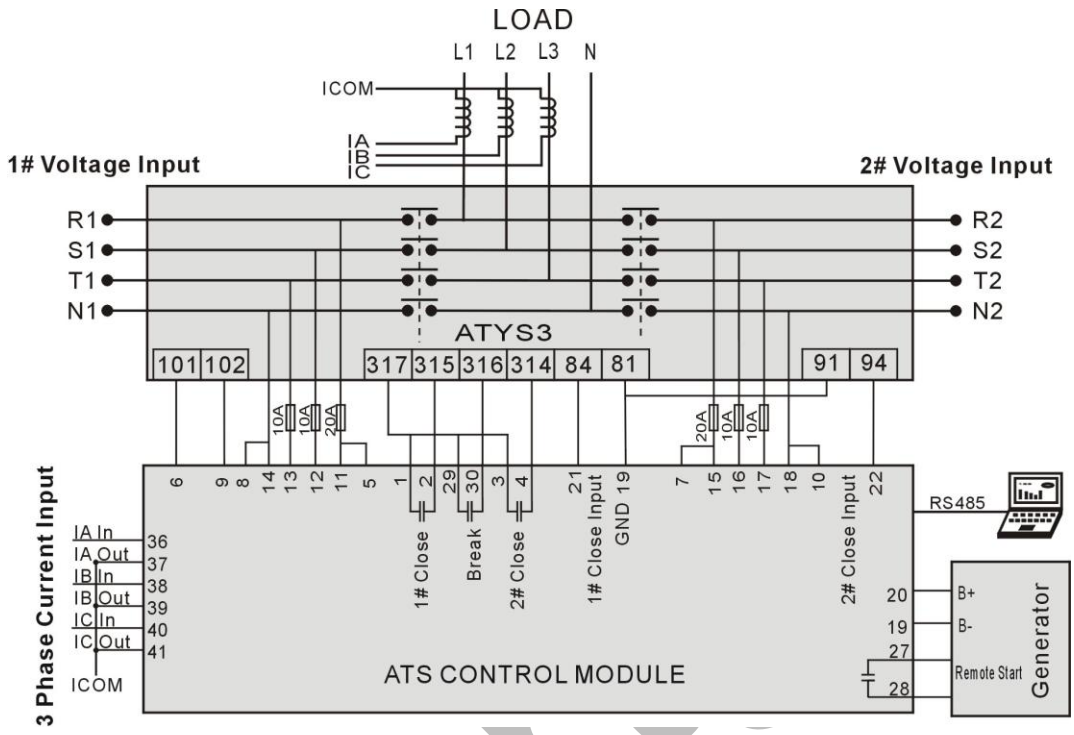
Port functional description,

Pin	Items	Description		Notes
1	1# close output	Volt-free relay contact output		250V16A(relay capacity)
2				
3	2# close output	Passive relay contact output		250V16A(relay capacity)
4				
5	Aux. output 1	NC	Default: ATS power of L1 output.	250V16A(relay capacity)
6		Common		
7		NO		
8	Aux. output 2	NC	Default: ATS power of L1 output.	250V16A(relay capacity)
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			

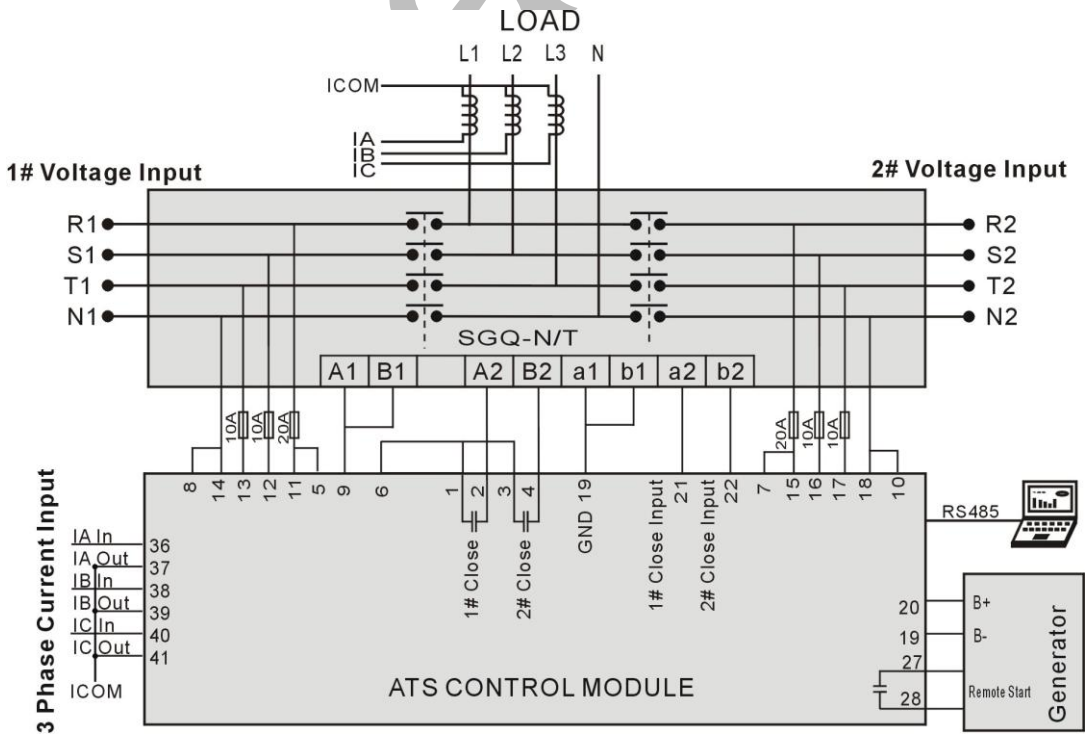
Pin	Items	Description	Notes
19	GND	Connect battery negative	DC negative input
20	DC power input	To start engine, connect the terminal to battery positive	DC positive input 8-35V controller power supply
21	1# close input	Detection of 1 # switch closing state, voltage free contact input	connect GND
22	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 HAT600I/HAT600BI
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	Program port	Factory update	

16 TYPICAL WIRING DIAGRAM

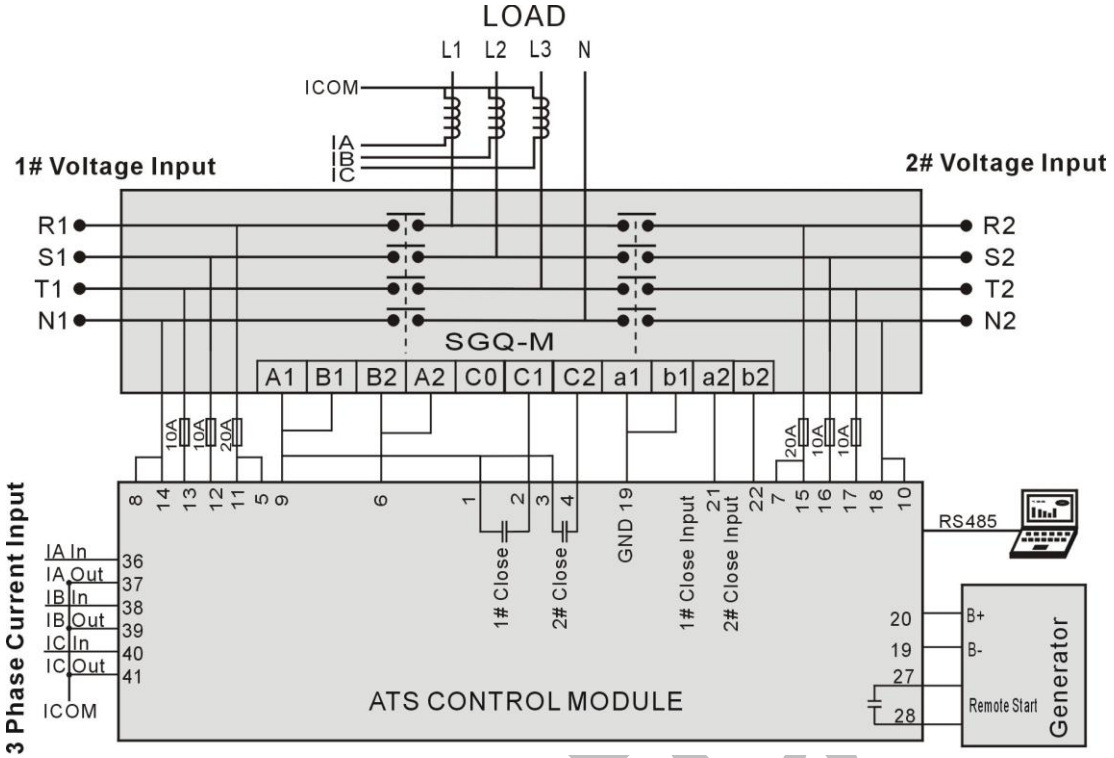
ATYS3 Diagram



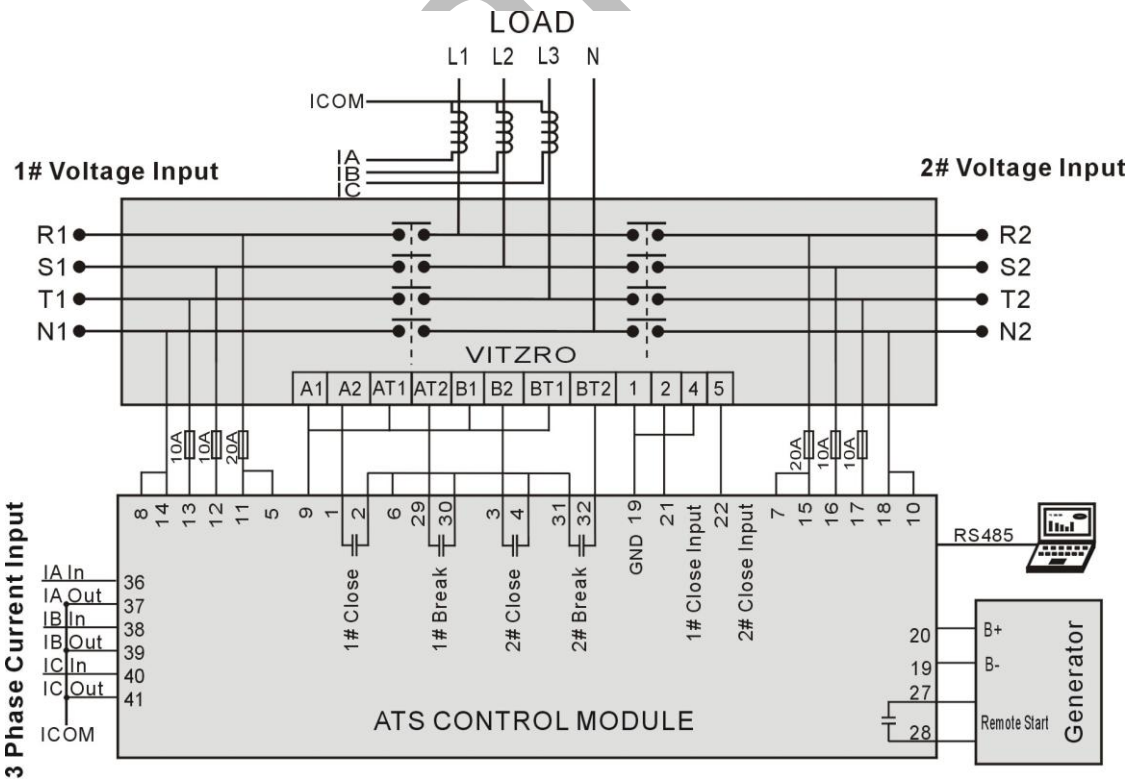
SGQ-N/T Diagram



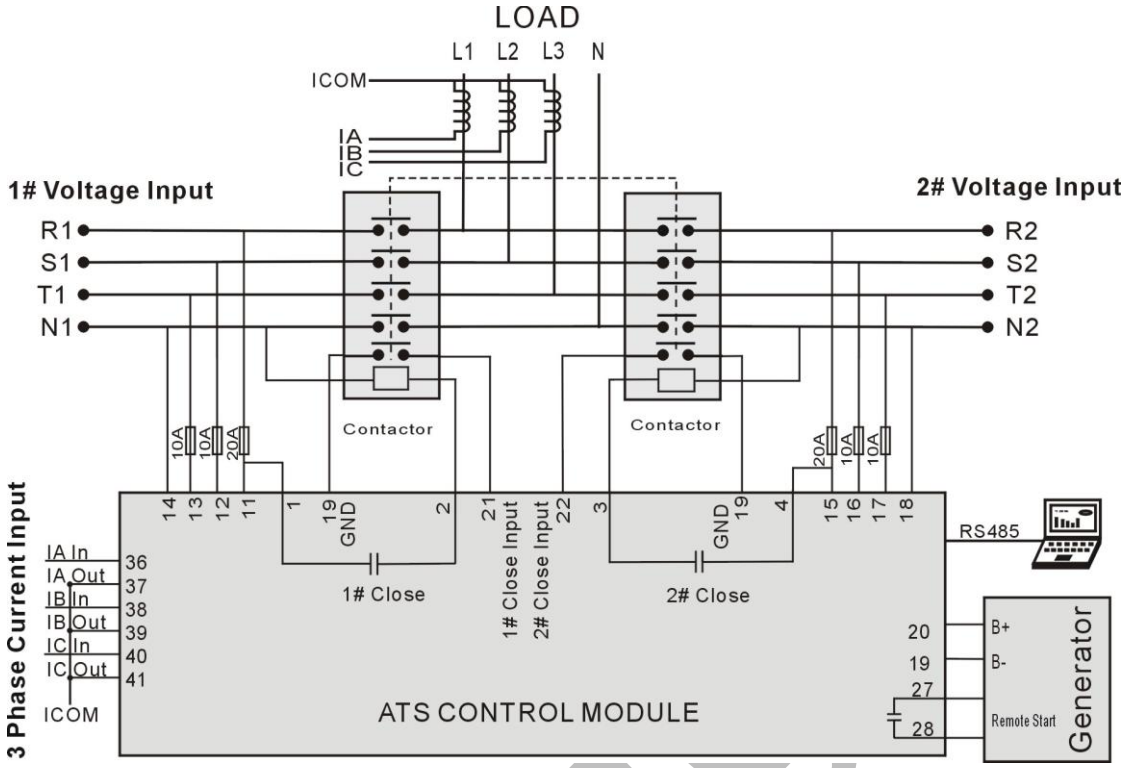
SGQ-M Diagram



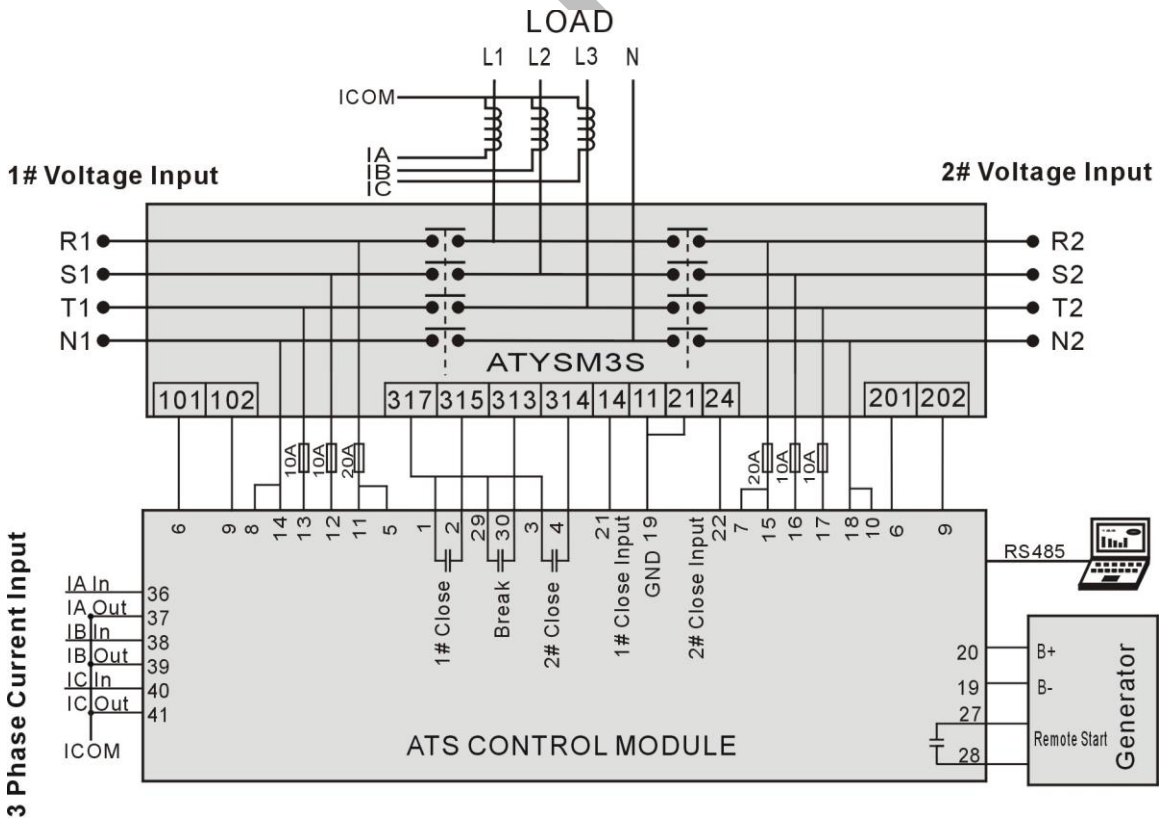
VITZRO Diagram



Contactor Diagram



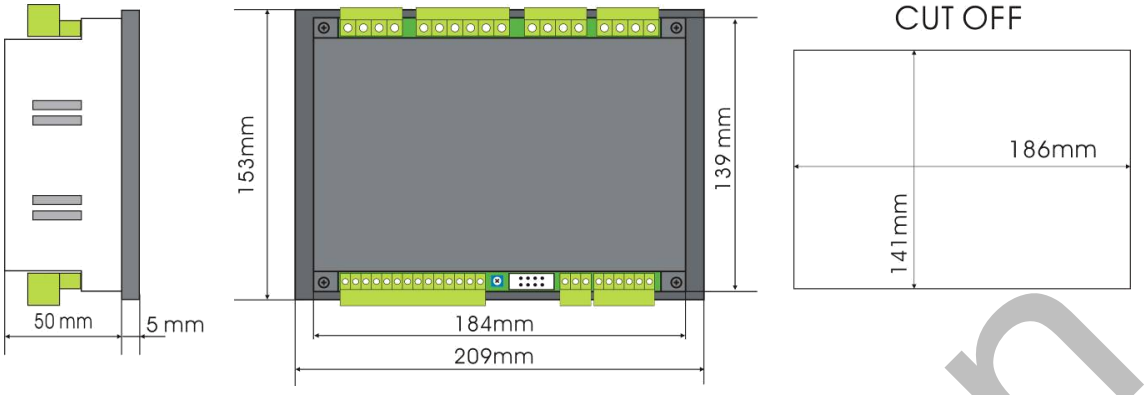
ATYSM3S Diagram



NOTE: All above are application diagrams of HAT600 series ATS controllers. However, HAT600 and HAT600B have no sample current input, please skip over

the current part of the diagram.

17 INSTALLATION



18 FAULT FINDING

Fault Symptom	Possible Remedy
Controller no operation	Check the Phase A1, N1 or Phase A1, N1 voltage. Check connection wirings from the controller to ATS. Check DC fuse.
RS485 communication failure	Check whether the RS485 is wrong connection between negative and positive. Check whether the RS485 adapt is abnormal. Check whether the parameter settings in the module addresses are incorrect. If the above methods are no using, you can try to connect the GND of controller with RS485 GND (or PC GND). Recommend that the A and B lines of the 485 network should be terminated at each end with a 120Ω resistor.
Programmable output error	Check programmable output connections, pay attention to Normally opened and closed. Check the output parameters settings.
Programmable input abnormal	Ensure that the programmable input connect to GND reliably when it's active, and hung 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. Ensure that the ATS OFF position numbers are same as the setting OFF position numbers.