

Smartgen[®]

HAT300

ATS CONTROL MODULE

OPERATING MANUAL



Smartgen Electronics

<http://www.smartgen.com.cn/>

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1. DESCRIPTION

The HAT300 is an Automatic Transfer System Control Module. It precisely measure/display two source 3-phase AC voltage and output free voltage controlling switch signal. This module is suitable for a variety of ATS system and can be widely used to electric devices in many fields such as electric power, communication, petroleum, coaling, metallurgy, rail, municipal business, smart mansion etc.

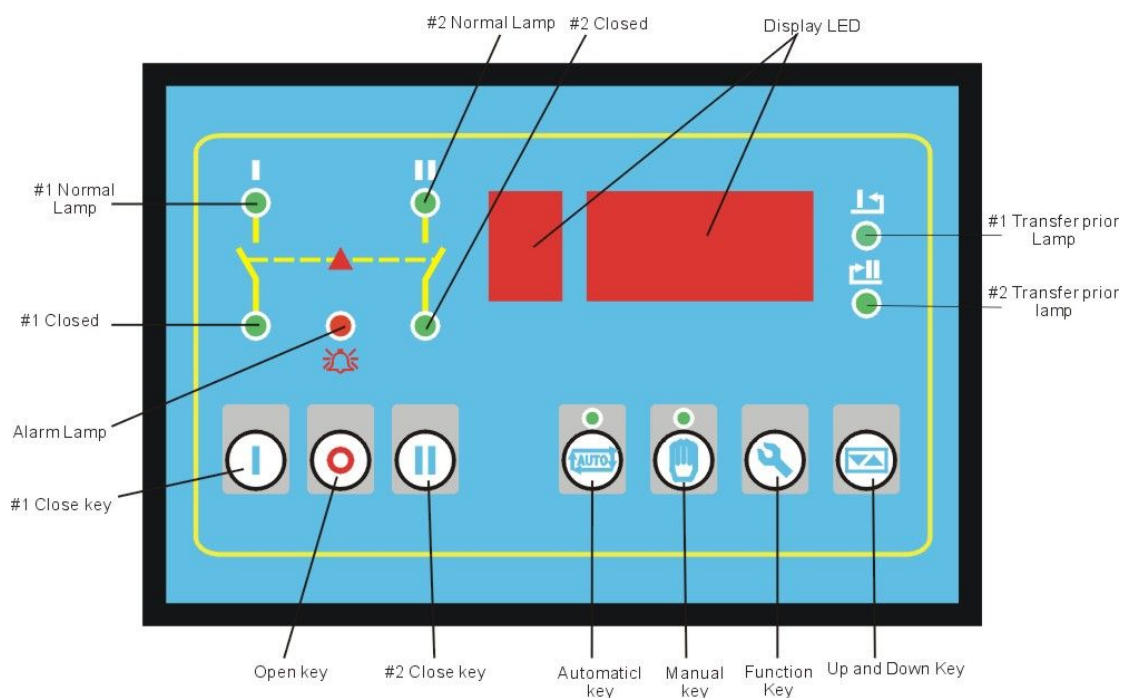
2. FEATURES

- ▶ Measure two source multi-parameters include over voltage, under voltage, over frequency, under frequency, miss phase.
- ▶ Compatible to multi-type of automatic transfer switches(ATS):
no OFF position(two segments kind), such as SOCOMEC VS switch;
one OFF position(three segments kind), such as SOCOMEC VE switch.
two OFF position, such as the ATS composed of two circuit breakers or two contacts;
- ▶ Compatible to automatic switching of two utility source, two generating power or between one utility source and one generating power;
- ▶ Microprocessor based design, LED display, tactile key operation;
- ▶ Measure and display two source 3-phase AC voltage precisely;
- ▶ ATS power switching circuits that supply for ATS;
- ▶ Configurable priority of supply able to set I# supply priority or II# supply priority or NONE supply priority;
- ▶ Function of start generator;
- ▶ Function of auto transfer when one switch closing failures and another works well;
- ▶ Auto/Manual button available, mandatory opening or closing switch in manual mode;
- ▶ Password to prevent the miss operation of non-professionals;
- ▶ Function of re-closing to prevent instantaneous power off aiming at switch which opening as voltage being low;



- ▶ Function of re-closing while power off to prevent the abnormal On/Off operation from the mismatching between the operation unit and switch position;
- ▶ Pulse output closing and Opening signal(up to 20 seconds), output auto shutoff after switching is done;
- ▶ Transfer rest delay time is programmable;
- ▶ Two N line separating design;
- ▶ Industrial standard RS-232 communication interface to fulfill the “remote controlling、 remote measuring、 remote communication” function by the ModBus communication protocol;
- ▶ Parameters can be set in site or in monitor center and can not lose even power off;
- ▶ Module structure design, ABS plastic crust, embedded installation, plug connector, convenient maintenance



3. OPERATION



3.1 OPERATION PANEL







LED display screen can display multi -parameters of two power sources such as voltage, delay value, and setting value etc.



 push-button. The  function is used to scroll screen or change a programming value while in the programming mode. When this push-button is pressed down, the displayed value will be incremented/decremented to a lower/higher value as desired.



 push-button. The  function is used to entering in setting menu, shifting cursor in setting and confirming the set information.

 push-button and LED light viewing window. The  function is used to initiate automatic operation.

 push-button and LED light viewing window. The  function is used to initiate manual operation.


 push-button. The  function is used to transfer #1 power to load in manual mode.

 push-button. The  function is used to transfer #2 power to load in manual mode.

 push-button. The  function is used to transfer #1 or #2 power to OFF load in manual mode.

 Lamp. The lamp will flash when alarm has occurred.

 Lamp. The lamp will illuminate when #1 power is prior to transfer.

 Lamp. The lamp will illuminate when #2 power is prior to transfer.

#1 normal lamp: The lamp will illuminate when #1 power is normal, and will flash when #1 power is abnormal , and will extinguish when no power.


#2 normal lamp: The lamp will illuminate when #2 power is normal, and will flash when #2 power is abnormal , and will extinguish when

no power.



#1 closed lamp: The lamp will illuminate when #1 power is connected with the load.

#2 closed lamp: The lamp will illuminate when #2 power is connected with the load.

3.2 DISPLAY

Press the  button to scroll the displaying screen

The first screen (display of the line voltage Uab or the delay time of the normality or the abnormality of the #1、#2 power counted down)

 XXX or  XXX

Display priority: (#1 power normal delay>#2 power normal delay>#1 power abnormal delay>#2 power abnormal delay>display of Uab line voltage) #1 power Uab line voltage will be displayed after all the display of delay is done.

The second screen (Ubc: #1 line voltage)

 XXX

The third screen (Uca: #1 line voltage)

 XXX

The fourth screen (Ua: #1 phase voltage)

 XXX

The fifth screen (Ub: #1 phase voltage)

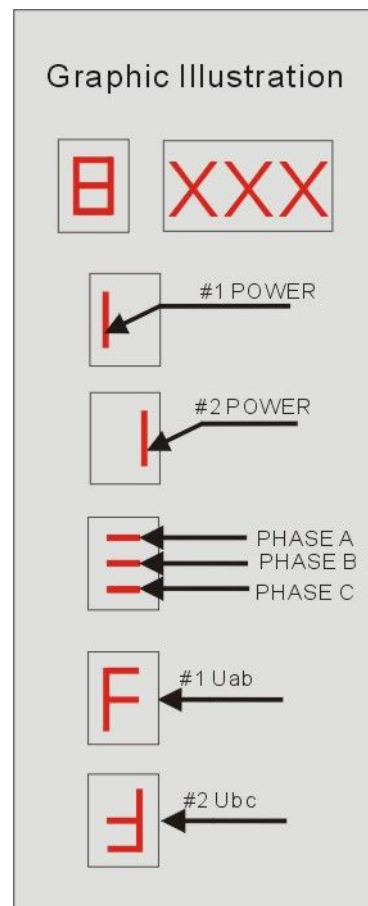
 XXX

The sixth screen (Uc: #1 phase voltage)

 XXX

The seventh screen (Uab: #2 line voltage)

 XXX



The eighth screen (Ubc: #2 line voltage)



The ninth screen (Uca: #2 line voltage)



The tenth screen (Ua: #2 phase voltage)



The eleventh screen (Ub: #2 phase voltage)



The twelfth screen (Uc: #2 phase voltage)



The screen will display the alarm state if there is alarm of #1 or #2 power.

	#1 closing failure
	#2 closing failure
	#1 opening failure
	#2 opening failure
	#1 power serious failure
	#2 power serious failure
	Both #1 and #2 power are closed at same time.




Note: if there is alarm of #1 power or # II power, pressing the button, the module will transfer to the manual mode, and the alarm state will be reset.


4. SETTING OPERATION

4.1 MANUAL/AUTO MODE SETTINGS


Press the button to the auto mode, press the button to the manual

mode.



- When the controlling module is set into Auto mode, the “Auto” lamp will be turned on. The controlling module will estimate the quality of both the power and close or open the switches automatically. If both the powers work well, the switches will be turned on according to the priority of them. If both the powers are normal at the same time, the switch that first close will supply for load. It will not be switched to another power until abnormality occurs in the power.
- When the controlling module is set into the manual mode, the manual lamp will be turned on. Press the  button, the  button or the  button to transfer the switches.

Note: pressing the  button will take no effect to the two segments switch.

4.2 PARAMETER SETTINGS



Press the  button to set the parameters. The password is needed and will be displayed as follows:

0 0 0

Default password: “123”. Press the  button to shift . Press the  button to circulate the number from 0 to 9. The parameters can not be set until the password is confirmed. The parameters are displayed as follows:



The first screen: setting **the normal delay time of the #1 power**, range: (0-999s)

P - 01

Press the  button to set the value, (press the  button to next settings)



The second screen: setting **the normal delay time of the #2 power**, range: (0-999s)

P - 02

Press the  button to set the value, (press the  button to next settings)



The third screen: setting **the abnormal delay time of the #1 and #2 power**, range: (0-999s)

P - 03

Press the  button to set the value, (press the  button to next settings)



The fourth screen: setting **the delay time of the start generator**, range: (0-999s)

P - 04

Press the  button to set the value, (press the  button to next settings)



The fifth screen: setting **the delay time of the stop generator**, range: (0-999s)

P - 05

Press the  button to set the value, (press the  button to next settings)

The sixth screen: setting **the type of ATS**

P - 06

Press the  button to set the value, (press the  button to next settings)



000: No OFF position (two segment switch)

001: One OFF position (three segment switch)

002: Two OFF position

The seventh screen: setting **the transfer priority of #1 and #2 power**

P - 07

Press the  button to set the value, (press the  button to next settings)



000: no priority

001: #1 power prior to transfer

002: #2 power prior to transfer



The eighth screen: setting **ATS shut delay**, range: (0-20s)

P - 08

Press the  button to set the value, (press the  button to next settings)



The ninth screen: setting **over voltage**, range: (50-360V)

P - 09

Press the  button to set the value, (press the  button to next settings)



The tenth screen: setting **under voltage**, range: (50-360V)

P - 10

Press the  button to set the value, (press the  button to next settings)



The eleventh screen: setting **Calibrate for A phase voltage of #1 power**

P - 11

Press the  button to set the value, (press the  button to next settings)



The twelfth screen: setting **Calibrate for B phase voltage of #1 power**

P - 12

Press the  button to set the value, (press the  button to next settings)



The thirteenth screen: setting **Calibrate for C phase voltage of #1 power**

P - 13

Press the  button to set the value, (press the  button to next settings)



The fourteenth screen: setting **Calibrate for A phase voltage of #2 power**

P - 14

Press the  button to set the value, (press the  button to next settings)



The fifteenth screen: setting **Calibrate for B phase voltage of #2 power**

P - 15

Press the  button to set the value, (press the  button to next settings)


The sixteenth screen: setting **Calibrate for C phase voltage of #2 power**

P - 16

Press the  button to set the value, (press the  button to next settings)

The seventeenth screen: **quit** the settings

 **E n d**

Press the  button to set the parameter, and then enter

000: quit without saving the above parameters

001: quit after saving the above parameters

Others: return to the settings

Setting of other parameters: (only by the PC software via RS232 interface), the number in the bracket is the factory value.

1. Communication address	1-254 (1)
2. Transfer rest time	0-999S (5)
3. Stop generator delay time	0-999S (90)
4. Over voltage	50-360V (264)
5. Under voltage	50-360V (160)
6. ATS shut delay	0-20.0S(5.0)
7. ATS break delay	1-20.0S(5.0)

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8. Delay for transfer over	0-5.0S(0)
9. Again shut delay	0-10.0S(0)
10. Again break delay	0-10.0S(0)
11. Digit input1(IN1)	1# ATS Abnormal Input
12. Digit input2(IN2)	2# ATS Abnormal Input
13. Digit output(relay K5)	Gen Start Output(normal open)

Note:

The below table is the detail information for the above settings.

Item	Description
Normal delay time of the #1 power	It is the delay of #1 power from voltage abnormal to voltage normal.
Normal delay time of the #2 power	It is the delay of #2 power from voltage abnormal to voltage normal.
Abnormal delay time of the #1 and #2 power	It is the delay of #1 or #2 power from voltage normal to voltage abnormal.
Delay time of the start generator	It is the delay form #1 power is abnormal to start generator.
the transfer priority of #1 and #2 power	<ul style="list-style-type: none"> ▶When #1 power is set to priority transfer, if #1 and #2 is normal at the same time, the switch will transfer load to #1 power source. ▶When #2 power is set to priority transfer, if #1 and #2 is normal at the same time, the switch will transfer load to #2 power source. ▶When setting for no priority, if #1, 2 power is normal at the same time and #1,2 take no load, the switch will first transfer load to #1 power source. ONLY when #1 power is abnormal, the #2 power will supply for load; if the switch have been taken load, it will not switched to another power until abnormality occurs in the power.
Communication address	Setting the Modbus™ Slave ID of the controller you wish to communicate with.
Transfer rest time	It is the delay from #1 power breaker opened to #2 power breaker start to close or from #2 power breaker opened to #1 power breaker start to close.

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Item	Description
Start generator delay time	It is the delay from #1 power is abnormal to send out start generator signal.
Stop generator delay time	It is the delay from #1 power is normal to send out stop generator signal.
Over voltage	The setting are used to configure the #1 and #2 power over voltage point in the event of the #1 or #2 voltage rising above the setting value. This value can be adjusted to suit user requirements.
Under voltage	The setting are used to configure the #1 and #2 power under voltage point in the event of the #1 or #2 voltage falling below the setting value. This value can be adjusted to suit user requirements.
ATS shut delay	Breaker close pulse. If it is set to zero, it will held.
ATS break delay	Breaker open pulse.
Delay for transfer over	After the module has received a close state input, the breaker close output continue to held until the delay is expended.
Again shut delay	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 the second time closing breaker is still failure, the module will send out closing breaker failure signal.
Again break delay	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 the second time opening breaker is still failure, the module will send out opening breaker failure signal.

Configurable digit input define

Digit Input	Content	Description
IN1	Not used	
	1# ATS Abnormal Input	It is the input of #1 breaker fault such as the circuit breaker is short-circuit.
	2# ATS Abnormal Input	It is the input of #2 breaker fault such as the circuit breaker is short-circuit.

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	Transfer to Off-Position	When the input is active, the breaker will be force to transfer to OFF position.
IN2	Not used	Same as above
	1# ATS Abnormal Input	
	2# ATS Abnormal Input	
	Transfer to Off-Position	

NOTE: The above two Auxiliary digit inputs don't permitted the same selection choices.

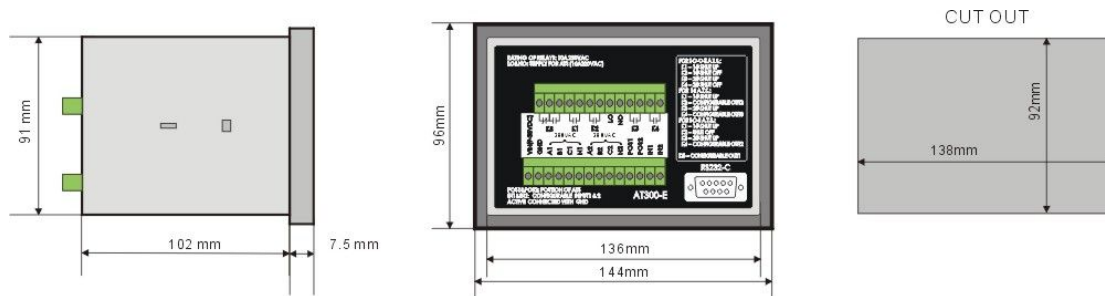
Configurable digit output(Relay K5) define

Item	Description
Not used	
Reserve1	Factory used
Fault Output	It include closing failure, opening failure and breaker fault of #1, 2 source.
Transition Failure Output	It include #1 closing failure, opening failure and #2 closing failure, opening failure.
1# Volt Normal Output	It is active when #1 voltage is normal.
1# Volt Abnormal Output	It is active when #1 voltage is abnormal.
2# Volt Normal Output	It is active when #2 voltage is normal.
2# Volt Abnormal Output	It is active when #2 voltage is abnormal.
Auto Position(mode) Output	It is active in auto mode.
Manual Position(mode) Output	It is active in manual mode.
1# Shut Up Output	#1 closing breaker output.
1# Shut Off Output	#1 opening breaker output.
2# Shut Up Output	#2 closing breaker output.
2# Shut Off Output	#2 opening breaker output.
Gens Start Output(normal open)	When the start generator signal is active, the output relay energized. When the start generator signal is inactive, the output relay de-energized. Here the DC supply is necessary.
Gens Start Output(normal close)	When the start generator signal is inactive, the output relay energized. When the start generator signal is active, the output relay de-energized.

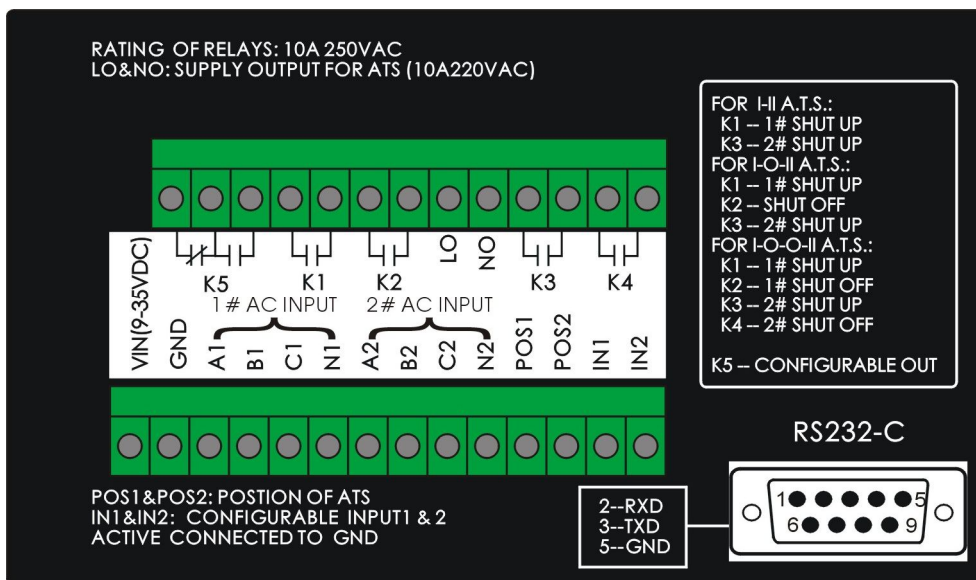
5. INSTALLATION AND UNIT DIMENSIONS

The **HAT300** Module has been designed for front panel mounting. Fixing is by 2 clips for easy assembly.

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REAR PANEL LAYOUT



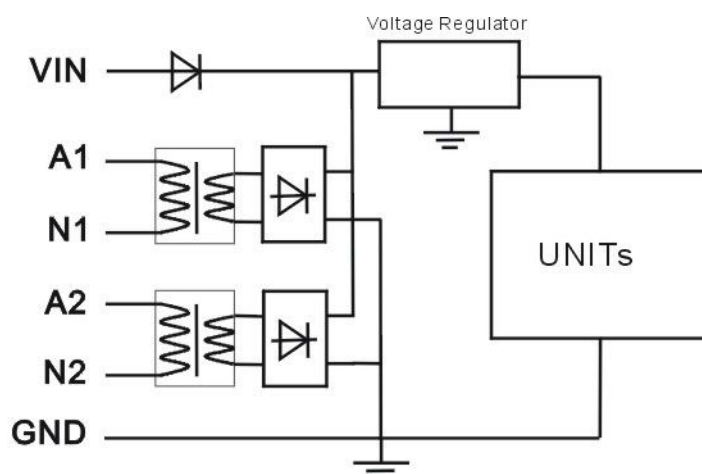
6. DESCRIPTION OF CONNECTING TERMINAL

Terminal	Diameter of Wire	Description
Vin(9-35VDC)	1.0mm	Engine-generator battery positive input. It is not necessary. Fuse of Max. 1A Is Recommended.
GND	1.0mm	Engine-generator battery negative input. It is common earth terminal of all switch inputs.
A1	1.5mm	Connect to #1 power L1 output. (Fuse of 10A is Recommended)
B1,C1,N1	1.0mm	Connect to #1 power L2, L3, N output. (Fuse of 1A is Recommended)
A2	1.5mm	Connect to #2 power L1 output. (Fuse of 10A is Recommended)
B2,C2,N2	1.0mm	Connect to #2 power L2, L3, N output. (Fuse of 1A is Recommended)

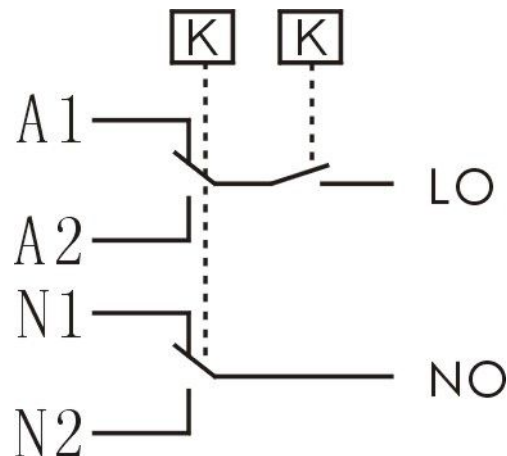
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Terminal	Diameter of Wire	Description
POS1	1.0mm	It is the input of #1 breaker closing auxiliary contact. It is active to be connect to GND.
POS2	1.0mm	It is the input of #2 breaker closing auxiliary contact. It is active to be connect to GND.
IN1	1.0mm	Configurable digit input1. It is active to be connect to GND.
IN2	1.0mm	Configurable digit input2. It is active to be connect to GND.
K1	1.5mm	#1 breaker closed output.
K2	1.5mm	#1 breaker opened output.
K3	1.5mm	#2 breaker closed output.
K4	1.5mm	#2 breaker opened output.
K5	1.0mm	Configurable digit output.
LO	1.5mm	It is used to supply for ATS. It come from #1 and #2 power phase A. Any of #1 and #2 phase A voltage is normal it will output.
NO	1.5mm	It is used to supply for ATS. It come from #1 and #2 power phase N. Any of #1 and #2 phase A voltage is normal it will output.

1. UNIT INNER SUPPLY FIGURE



2. LO, NO OUTPUT LOGIC FIGURE



7. SPECIFICATION

► Power supply:

DC: 9-35V come from engine-generator battery.

AC: come from phase A and N of two source, voltage >140V

► Input voltage: 220V \pm 30% 50Hz single-phase or 380V \pm 30% 50/60Hz 3-phase 4 wires

► Power consumption: Less than 2VA in normal voltage

► Relay output: 10A 250VAC

► LO, NO output: 10A 250VAC

► Dimensions: 144x96x116mm

► Panel cutout: 138x92mm

► Weight: 0.83kg

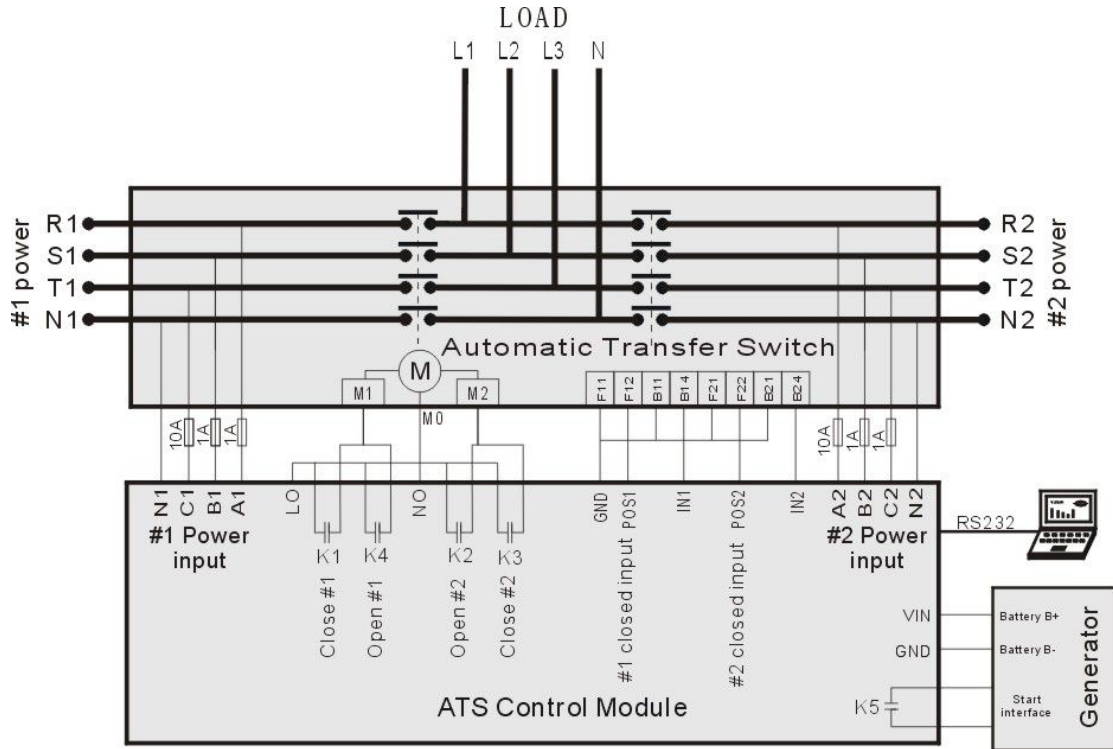
► Operation condition:

Temperature: -30 - +70Celsius degree

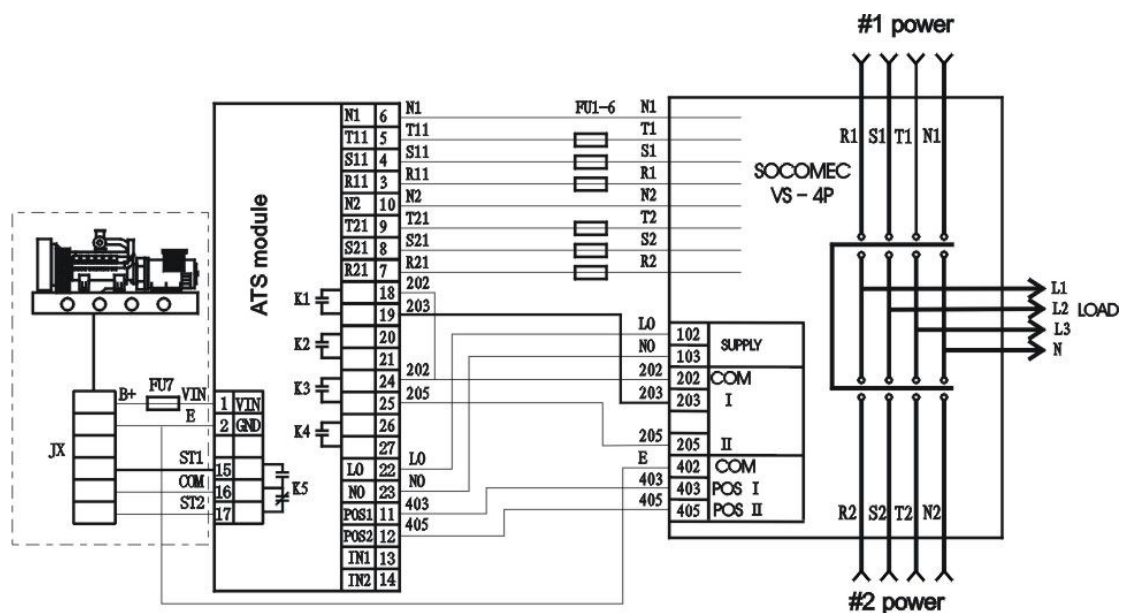
Humidity: 20 - 95% no concreting

8. TYPICAL WIRING DIAGRAM

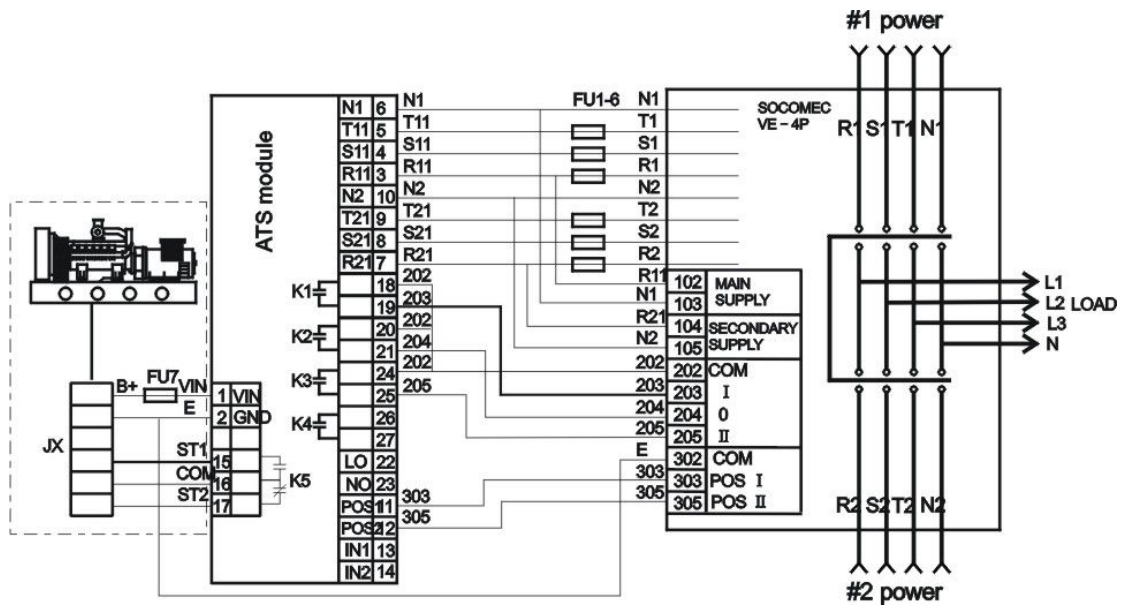
8.1 ONE MOTOR AND TWO CIRCUIT BREAKERS ATS



8.2 CONNECT WITH SOCOMEC VS-TYPE ATS



8.3 CONNECT WITH SOCOMEC VE-TYPE ATS



9. CONFIGURATION SOFTWARE INTERFACE

The module has a RS232 communication port on the rear. The HAT300 configuration software allows the modules to be connected to a PC. Once connected the various operating parameters within the module can be viewed or edited as required by the engineer. This software allows easy controlled access to these values and also has diagnostic monitoring facilities.

The Configuration interface should only be used by competent, qualified personnel, as changes to the operation of the module may have safety implications on the panel / ATS to which it is fitted.

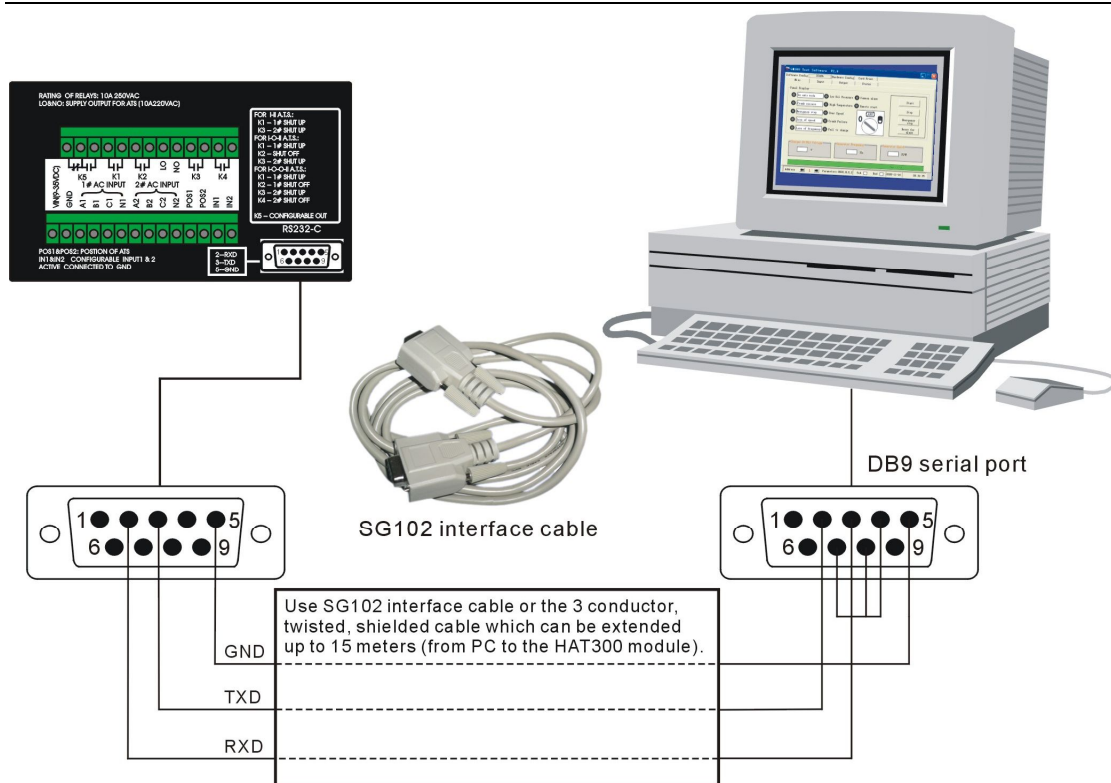
Communication parameters

Item	Default
Module address	1 (range: 1-254)
Baud rate	9600bps
Data bits	8bit
Parity bit	None
Stop bit	2bit

Please download the HAT300 configuration software from the below web site.
<http://www.smartgen.com.cn/>

10.LINK TO PC

This below figure show the link from PC to HAT300 module.



11. FACTORY DEFAULT CONFIGURATION

The digit input 1-2

Input	Defined
Digit input 1(IN1)	1# ATS Abnormal Input
Digit input 2(IN2)	2# ATS Abnormal Input

The digit output K5

Output	Defined
Digit output 1	Gen Start Output(normal open)

Timers and thresholds

Item	Range	Default
Normal delay time of the #1 power	0-999s	10s
Normal delay time of the #2 power	0-999s	10s
Abnormal delay time of the #1 and #2 power	0-999s	5s
Delay time of the start generator	0-999s	60s
Delay time of the stop generator	0-999s	90s
Transfer rest time	0-999s	5s
ATS shut delay	0-20.0s	5.0s

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Item	Range	Default
ATS break delay	1-20.0	5.0s
Delay for transfer over	0-5.0s	0.0s
Again shut delay	0-10.0s	0.0s
Again break delay	0-10.0s	0.0s
Over voltage	50-360V	264V
Under voltage	50-360V	160V

Others

Item	Content
Transfer priority	#1 transfer is prior
ATS type	Three segment(one OFF position)
Module address	1