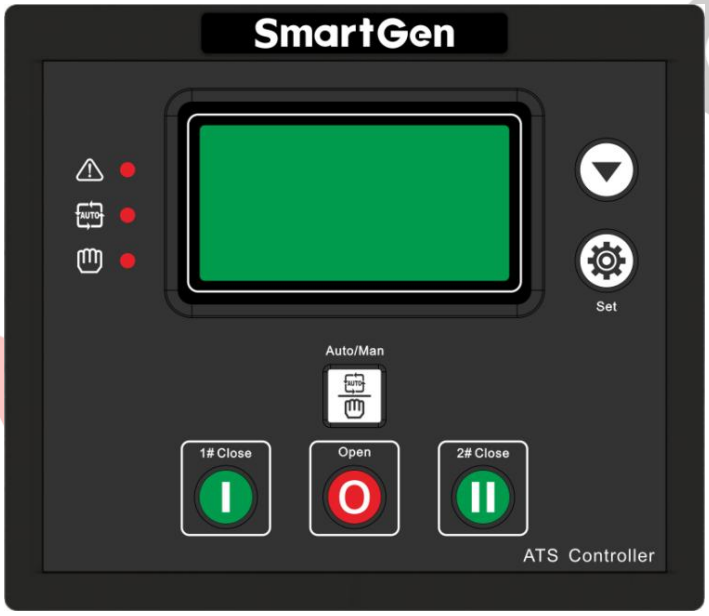
HAT560NC SERIES

(HAT560NC/HAT560NBC)

ATS CONTROLLER

USER MANUAL



SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

Chinese trademark

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SmartGen — make your generator ***smart***

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Table 1 Software Version

Date	Version	Note
2016-06-27	1.0	Original release.
2019-10-16	1.1	Add breaker application diagram.

CONTENT

1 OVERVIEW

HAT560NC series ATS controller is an intelligent dual power transfer module with configurable function, automatic measurement, LCD display and digital communication. It integrates digitalization, intelligence and networking together, automating measurement and control process, reducing artificial operation mistakes and it an ideal product for dual power transfer.

HAT560NC series ATS controller is made by the microprocessor in the core, which can precisely measure 2-channel 3 phase/single phase voltage, make accurate judgment for any abnormal voltage (over volt, under volt, loss of phase, over frequency, under frequency) and output volt free discrete control signal. After full consideration of its applications on various ATS (load automatic transfer system), it can be directly used for specialized ATS, contactor ATS, air break ATS etc. It has compact structure, advanced circuits, simple wiring and high reliability, which can be widely used in electrical devices, automatic control and testing system of electric power, telecommunications, petroleum, coal, metallurgy, railways, municipal administration, intelligent building, etc.

2 PERFORMANCE AND CHARACTERISTICS

1) System type can set as: Mains (1#) & Generator (2#), Generator (1#) & Mains (2#), Mains (1#) & Mains (2#), Generator (1#) & Generator (2#).
2) 132x64 LCD with backlight, optional Chinese and English display, push-button operation.
3) 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
4) Over/under voltage, loss of phase, reverse phase sequence, over/under frequency protection.
5) Automatic/manual mode transfer: in manual mode, it can force the switch to close or open;
6) All parameters can be configured on site; with two level passwords non professionals operations can be prevented.
7) Load/non load mode can be configured on site to do genset commissioning operations;
8) Switch re-closing function and power-off re-closing function are fitted;
9) Close output can be configured to pulse or steady pulse output;
10) Applicable for ATS of one neutral position and non-position.
11) 2-channel N wire isolation design;
12) Real-time clock (RTC).
13) Event log function, which can record 50 items circularly.
14) Scheduled genset start/stop function: running for once monthly/weekly and running with load or without load can also be configured;
15) Can control two generators to work cyclically, and genset running time and crank rest time can be set.
16) Optional AC system or DC system supply.
17) LINK communication interface has "remote control, remote measuring, remote communication" function by the ModBus communication protocol and can remote start/stop the genset and remote control the ATS to close or open.
18) RS485 isolated communication interface has "remote control, remote measuring, remote communication" function by the ModBus communication protocol; by the front-end intelligent device (YD/T 1363.3—2005) protocol users can remotely measure the status of incoming line cabinet and remotely control ATS close and open;
19) Can check the current status of controller (digital input port, digital output port, over voltage, under voltage, over frequency, under frequency etc. abnormal circuit phenomenon);
20) Suitable for various wiring types (3 phase 4-wire, 3-phase 3-wires single-phase 2-wire, and 2-phase 3-wire);
21) Modular design, self extinguishing ABS plastic shell, pluggable terminal, built-in mounting, compact structure with easy installation;

Table 2 HAT560NC Series Controller Model and Function Distinguish

Function			
Type	DC Power Supply	AC Power Supply	AC Current/Power
HAT560NC	√	×	×
HAT560NBC	√	√ (LN220V)	×

3 SPECIFICATION

Table 3 Technical Parameters

Items	Contents		
Operating Voltage	1. DC 8.0V~35.0V continuous ; 2. AC170V~277V, AC power L1N1/L2N2 supply		
Power Consumption	≤3W (Standby mode: <2W)		
AC Voltage Input	AC system	HAT560NC	HAT560NBC
	3P4W (ph-N)	AC30V~AC360V	AC170V~AC277V
	3P3W (ph-ph)	AC60V~AC620V	N/A
	1P2W (ph-N)	AC30V~AC360V	AC170V~AC277V
	2P3W (ph-N)	AC30V~AC360V	AC170V~AC277V
Rated Frequency	50/60Hz		
Close Relay Output	16A AC250V Volts free output		
Auxiliary Relay Output 2	7A AC250V Volts free output		
Auxiliary Relay Output 3	16A AC250V Volts free output		
Auxiliary Relay Output 4	16A AC250V Volts free output		
Digital Input	GND connected is active.		
Communication	RS485 isolated communication interface; ModBus protocol/front-end intelligent device (YD/T 1363.3－2005) protocol.		
Case Dimensions	139mmx120mmx50mm		
Panel Cutout	130mmx111mm		
Working Conditions	Temperature: (-25~+70)°C; Humidity: (20~93)%RH		
Storage Condition	Temperature: (-25~+70)°C		
Protection Level	IP55: When waterproof gasket is installed between controller and the control panel;		
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	0.62kg		

4 OPERATING

4.1 OPERATION PANEL

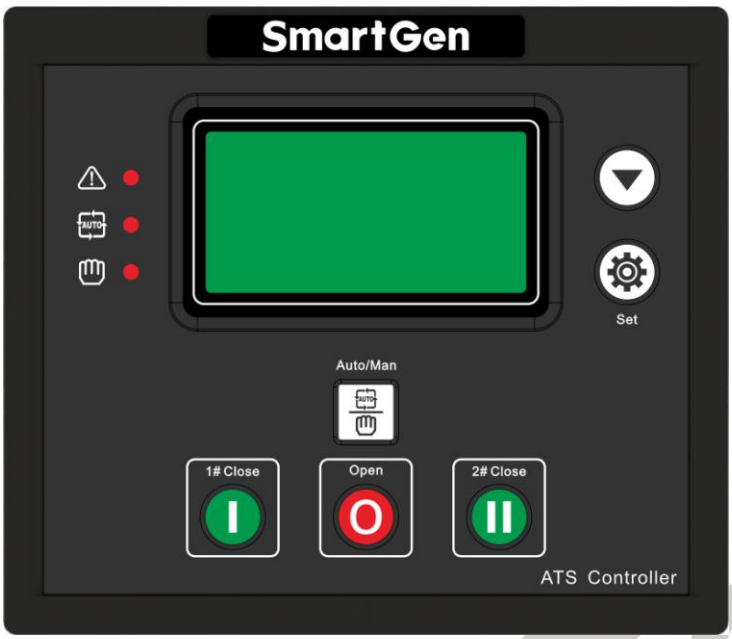


Fig. 1 Operation Panel

4.2 KEY FUNCTION DESCRIPTION

Table 4 Key Function Description

Keys	Function	Description
	I# Manual Close	In manual mode, press and I# connects to load;
	Open	In manual mode, press and disconnect I#/II# load;
	II# Manual Close	In manual mode, press and II# connects to load;
	Manual/Auto Set	Press and it can set controller to Manual/Auto mode;
	Menu/Confirm	Press and enter menu interface; press for longer and exit from current operation and return to main screen; For controller fault alarms, press for 3s, and alarms can be cleared.
	Scroll Screen /Decrease	Transfer display interface; Value decrease key for adjusting parameters in parameter setting page; Press for 3s, LCD backlight shall flash for once and enter backlight always on mode; and press again for 3s, LCD backlight is off and recovers to normal display mode.

5 LCD DISPLAY

5.1 MAIN SCREEN

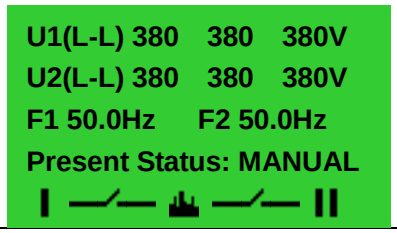
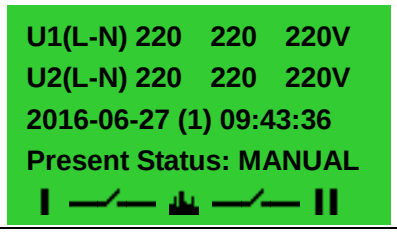
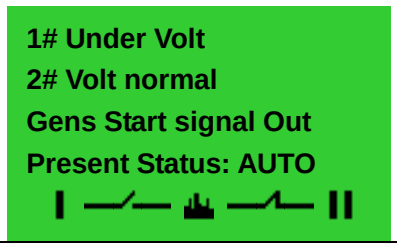
	This screen shows: 1#/2# line voltage (L1-L2, L2-L3, and L3-L1), frequency, controller working status, close and load information.
	This screen shows: 1#/2# 3 phase Voltage (L-N), real-time clock, controller working status, close load information.
	First line: 1# working status Second line: 2# working status Third line: other working status Fourth line: alarm type and information. Fifth line: close and load information

Table 5 1# Status (Upper to Lower)

No.	Item	Type	Description
1	1# Gens Alarm	Alarm	When 1# genset failure occurs, this will display.
2	1# Fail to Close	Alarm	When 1# close failure occurs, this will display.
3	1# Fail to Open	Alarm	When 1# open failure occurs, this will display.
4	1# Over Voltage	Indication	When 1# power supply voltage has exceeded the set value, this will display.
5	1# Loss of 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 set value, this will display.
7	1# Under Freq	Indication	When 1# power supply frequency has fallen below the set value, this will display.
8	1# Under Volt	Indication	When 1# power supply voltage has fallen below the set value, this will display.
9	1# Phase Sequence Wrong	Warning	Phase sequence is not A-B-C.
10	1# Volt Normal	Indication	1# power supply voltage is within the setting range.

Table 6 2# Status (Upper to Lower)

No.	Item	Type	Description
1	2# Gens Alarm	Alarm	When 2# genset failure occurs, this will display.
2	2# Fail to Close	Alarm	When 2# close failure occurs, this will display.
3	2# Fail to Open	Alarm	When 2# open failure occurs, this will display.
4	2# Over Voltage	Indication	When 2# power supply voltage has exceeded the setting value, this will display.
5	2# Loss of 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 set value, this will display.
7	2# Under Freq	Indication	When 2# power supply frequency has fallen below the set value, this will display.
8	2# Under Volt	Indication	When 2# power supply voltage has fallen below the set value, this will display.
9	2# Phase Sequence Wrong	Warning	Phase sequence is not A-B-C.
10	2# Volt Normal	Indication	2# power supply voltage is within the setting range.

Table 7 Other Status (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	Gens Start Out	Indication	Start input is active.
4	Remote Start Input	Indication	This input is active when start the genset circularly.

NOTES:

Alarm: When alarm occurs, indicators will flash and this alarm signal won't be removed until is pressed for 3s;

Warning: When warning alarm occurs, alarm indicator will flash while it will extinguish when warning alarm is inactive. That is to say, warning alarm is not latched.

5.2 MAIN MENU INTERFACE

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

1. Exit **2. Parameters Set** **3. Event Log** **4. Scheduled Start** **5. Commissionning** **4. Scheduled Start** **5. Commissioning** **6. Date/Time** **7. Language** **6. Information**	Press key to choose parameters (the current line was highlighted with black) and then press key to confirm, then enter into the corresponding display screen.

6 PARAMETERS CONFIGURATION

6.1 PARAMETERS CONFIGURATION INTERFACE

In the main interface, press key, choose **2.Parameters setting** and press again to enter parameter password confirmation interface.

Press and input the corresponding password 0~9; press key to right move the bit, at fifth bit press key to check password. If password is correct, it enters parameter setting interface, otherwise, it exits directly. Factory default password is **00318**.

NOTE: In parameter setting page, press longer and it can exit parameter setting menu directly and return to main interface.

>Exit >Module Setting >System Setting >Timer Setting >Input Port Setting > System Setting > Timer Setting > Input Port Setting >Output Port Setting >Function Setting	Press key to choose parameters (the current line was highlighted with black) and then press key to confirm, and it can enter into the corresponding display screen. Select >Exit and it will return to main display.
System Setting >Exit >System Type >Neutral Setting >AC System System Setting >Priority >Rated Voltage >Over Voltage >Under Voltage System Setting > Over Voltage >Under Voltage >Over Frequency >Under Frequency	Press key to choose parameters (the current line was highlighted with black) and then press key to confirm, and it can enter into the corresponding display screen. Select >Exit and it will return to previous menu.

Under Voltage Set Value：00080% Return Value：00085% Under Voltage Set Value: 00080% Return Value：00085%	Press ▼ button and it can scroll screen in parameter setting; In current parameter setting screen, press ⚙ and it will enter into configuration status; the first digit of the current parameter was highlighted with black. Press ▼ to adjust the set value; and press ⚙ key to right move the bit, at last bit press ⚙ key to confirm the set value. If the set value is in the range, the setting is successful; if it is out of the range, then the setting is invalid.

6.2 PARAMETERS TABLE

Table 8 Parameter Configuration Table

No.	Item	Range	Default	Description
01	1# Volts Normal Delay	(0-9999)s	10	The delay from #1 power abnormal to normal.
02	1# Volts Abnormal Delay	(0-9999)s	5	The delay from #1 power normal to abnormal.
03	2# Volts Normal Delay	(0-9999)s	10	The delay from #2 power abnormal to normal.
04	2# Volts Abnormal Delay	(0-9999)s	5	The delay from #2 power normal to abnormal.
05	Close Time	(0-20)s	5	Pulse time of close relay. When it is 0, means output constantly.
06	Open Time	(1-20)s	5	Pulse time of open relay.
07	Transfer Interval	(0-9999)s	1	Interval time from 1# switch off to 2# switch on; or from 2# switch off to 1# switch on.
08	Transfer Delay Expired	(0-20.0)s	0.0	The prolongation output time of the close relay after the module receives a closing signal.
09	Again Close Delay	(0-20.0)s	1.0	When the breaker fail to open for the first time, then the module will close for the second time and the Again Close Delay begins, after the delay has expired, if still failed to open the second time, the module will send out fail to open alarm.
10	Again Open Delay	(0-20.0)s	1.0	When the breaker fail to close for the first time, then the module will open for the second time and the Again Open Delay begins, after the delay has expired, if still failed to close the second time, the module will send out fail to close alarm.
11	Gen Start Delay	(0-9999)s	1	When voltage is abnormal, start delay begins, after the start delay has expired, start signal will be initiated.
12	Gen Stop Delay	(0-9999)s	5	After the genset is start, when voltage is normal, stop delay begins, after the stop delay has

No.	Item	Range	Default	Description
				expired, stop signal will be initiated.
13	Cycle Running Time	(1-1440)min	720	Gens cycle start running time.
14	Cycle Stop Time	(1-1440)min	720	Gens cycle stop time, that is to say it is the cycle stat running time of the other genset.
15	Genset Supply Delay	(0-9999)s	60	Failure identification time during genset cycle start running.
16	Rated Voltage	(100-600)V	230	AC system rated voltage.
17	Over Voltage	(100-150)%	120	Upper limit value of voltage; it is abnormal if the value has exceeded the set value.
18	Over Voltage Return	(100-150)%	115	Upper limit return value of voltage; it is normal only when the value has fallen below the set value.
19	Under voltage	(50-100)%	80	Lower limit value of voltage; it is abnormal if the value has fallen below the set value.
20	Under Voltage Return	(50-100)%	85	Lower limit return value of voltage; it is normal only when the value has fallen below the set value.
21	Over Frequency	(0.0-75.0)Hz	55.0	Upper limit value of frequency; it is abnormal if the value has exceeded the set value.
22	Over Frequency Return	(0.0-75.0)Hz	52.0	Upper limit return value of frequency; it is normal only when the value has fallen below the set value.
23	Under Frequency	(0.0-75.0)Hz	45.0	Lower limit value of frequency; it is abnormal if the value has fallen below the set value.
24	Under Frequency Return	(0.0-75.0)Hz	48.0	Lower limit return value of frequency; it is normal only when the value has fallen below the set value.
25	Module Address	(1-254)	1	Communication address
26	Password		00318	For entering advanced parameters setting.
27	System Type	(0-3)	0	0.1# Mains 2# Gens 1.1# Gens 2# Mains 2.1# Mains 2# Mains 3.1# Gens 2# Gens
28	Neutral Setting	(0-2)	1	0) Two Breaking; 1) One Breaking; 2) No Breaking.
29	Connection Setting	(0-3)	0	0: 3P4W; 1: 3P3W; 2: Single Phase; 3: 2P3W.
30	Priority Select	(0-2)	0	0. 1# Priority; 1. 2# Priority; 2. NO Priority
31	Aux. Output 2	(0-31)	12	Not used
32	Aux. Output 3	(0-31)	24	Critical failure

No.	Item	Range	Default	Description
33	Aux. Output 4	(0-31)	27	Fail of Transfer Warning output Alarm output(delay) 1# Normal volt 1# Abnormal volt 2# Normal volt 2# Abnormal volt Reserved Auto status output Manual status output Gens Start Output(N/O) Gens Start Output(N/C) 1# Close output 1# Open output 2# Close output 2# Open output Common Alarm output Timing Commissioning 1# Close Status Output 2# Close Status Output 1# Gen Start Output(N/O) 2# Gen Start Output(N/O) ATS Power A Phase ATS Power B Phase ATS Power C Phase ATS Power N Phase 1# 2# Abnormal Volt Reserved Reserved Reserved
34	Aux. Input 1	(0-13)	1	00.Not used 01.Breaking compulsorily 02.Test off-load 03.Test on-load 04. Test Lamp 05. 1# Gens Alarm 06. 2# Gens Alarm 07. Remote start 08. Trip alarm 09. Reserved 10. Reserved 11. Reserved 12. Reserved 13. Reserved
35	Aux. Input 2	(0-13)	0	

6.3 INPUT/OUTPUT FUNCTION DESCRIPTION

Table 9 Input Port Function Description

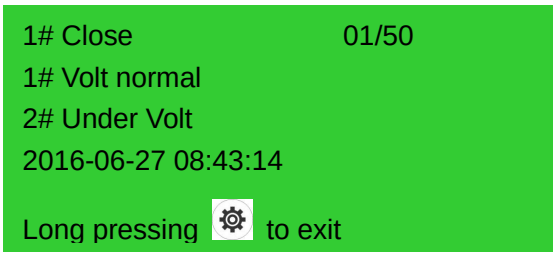
Item	Description
0 Not used	Invalid
1 Breaking compulsorily	Applicable only for ATS with breakings; when it is active, ATS will transfer to 0 no matter in manual or auto mode;
2 Test off-load	Genset start is outputted and when Mains is normal, Gen doesn't close;
3 Test On-Load	Genset start is outputted and When Mains is normal, Gen closes;
4 Test lamp	LED indicators on the panel are all on; LCD backlight is on; LCD screen is dark;
5 1# Gens Alarm	1# genset fault occurs and it prohibits to start 1# genset (used for cyclical start);
6 2# Gens Alarm	2# genset fault occurs and it prohibits to start 2# genset (used for cyclical start);
7 Remote start	It is a must for genset start cyclically;
8 Trip alarm	
9 1#Priority	
10 2#Priority	
11 Reserved	
12 Reserved	
13 Reserved	

Table 10 Output Port Function Description

Item	Description
0 Not Used	Invalid
1 Critical Failure	It includes switch transfer failure;
2 Fail of Transfer	It includes 1# close failure, 1# open failure, 2# close failure, 2# open failure;
3 Warning Alarm Output	General warnings include 1# phase sequence wrong, 2# phase sequence wrong, and force to open;
4 Alarm Output (delay)	It outputs for 60s continuously for critical fault alarms;
5 1# Volts Normal	It will output when #1 voltage is normal.
6 1# Volts Abnormal	It will output when #1 voltage is abnormal.
7 2# Volts Normal	It will output when #2 voltages is normal.
8 2# Volts Abnormal	It will output when #2 voltages is abnormal.
9 Reserved	
10 Auto Status Output	It will output in auto mode.
11 Manual Status Output	It will output in manual mode.
12Gens Start Output (N/O)	It outputs when genset starts (Relay closed).
13Gens Start Output(N/C)	It outputs when genset starts (Relay opened).
14 1# Close Output	1# switch close signal output.
15 1# Open Output	1# switch open signal output as one breaking
16 2# Close Output	2# switch close signal output.
17 2# Open Output	2# switch open signal output.
18 Common Alarm Output	It includes critical failure alarm and warning alarm.
19 Timing Commissioning	Timing test function starts;
20 1# Close Status Output	#1 switch close status output.
21 2# Close Status Output	#2 switch close status output.
22 1#Gen Start Output (N/O)	It issues 1# oil engine start signal;
23 2#Gen Start Output (N/O)	It issues 2# oil engine start signal;
24 ATS Power A Phase	ATS power supply.
25 ATS Power B Phase	
26 ATS Power C Phase	
27 ATS Power N Phase	
28 1#2# Volts Abnormal	It outputs when 1# voltage and 2# voltage are abnormal.
29 Reserved	
30 Reserved	
31 Reserved	

7 EVENT LOG

In the main screen, press key and select **3 Event log**, and then press key again to confirm, the screen will show the event log information below:

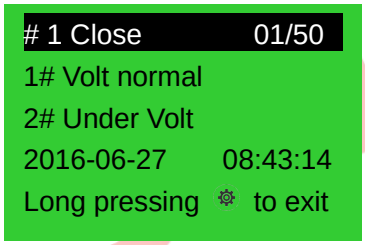


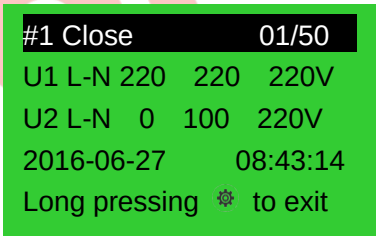
Press key to select the corresponding record, and press key to enter into detailed information interface.

In the detailed information interface, press key and it can display the record information circularly, which includes 1#/2# volt status, specific voltage, frequency and time and date. Press and it can exit the current interface, while press for a long time and it can return to main screen.

Event log information includes: event log type, 1# power supply, 2# power supply, 1# 3-phase voltage, 2# 3-phase voltage, 1# frequency, 2# frequency and the record date and time.

Table 11





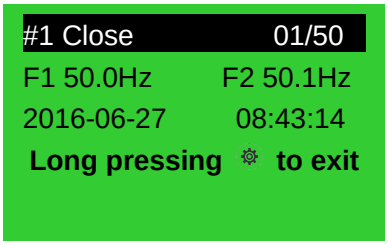
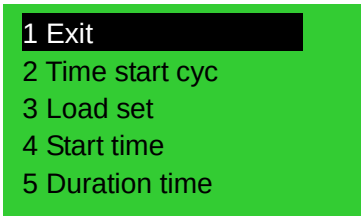


Table 11 Event Log Types

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	Breaking compulsorily	Breaking compulsorily input is active.

8 TIMING START

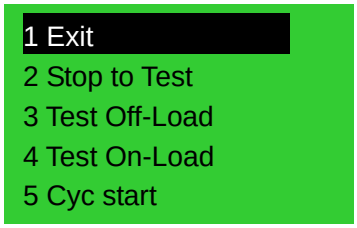
In the main screen, press key and select **4 Time start**, and then pressing key to confirm, the screen will show the timing start interface below:



Time start cycle: includes inhibit start; start the genset single time, weekly or monthly.
Load set: start the generator with load or without load.
Start time: the date and time of the genset starting.
Duration time: generator continuous run time can be set to the duration of maximum time for 99 hours and 59 minutes.

9 COMMISSIONING

In the main screen, press key and select **5 Commissioning**, and then press key to confirm, the screen will show the commissioning interface as below:



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

TEST OFF-LOAD: It will send out a start signal immediately. After gen voltage is normal, if mains voltage is normal, the ATS will not act. If mains voltage is abnormal, ATS will transfer the load to generator. When mains volt recovers to normal, the ATS will transfer the load to mains. At this time the start generator signal still continuously outputs.

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

STOP TO TEST: When Commissioning has been chosen, and if this item is selected, genset start signal will disconnect immediately and it will stop TEST OFF-LOAD or TEST ON-LOAD operation.

CYCLE START: When this is chosen, oil engine start signal will output circularly according to master status. Circular output time can be set by the users. If oil engine fault occurs, it won't send start signal to the oil engine. If it transfers to manual mode, it will keep current status and stop circular start time counting.

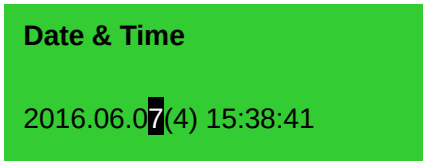
Requirements needed:

1. In automatic mode.
2. Set output to 1# Oil Engine start output (N/O Output) and 2 # Oil Engine start output (N/O Output).
3. Set input to remote start input.
4. <Cycle running time> and <Cycle stop time> should be programmed.
5. Set the system type as 1# Gens & 2# Gens.
6. Set proper < Wait Running > time, and set default delay to 60s.

NOTE: In manual mode, if the commissioning input is active, generator start-signal will output immediately, but the ATS will not transfer automatically except for operation manually by pressing key on the front panel.

10 DATE AND TIME SETTING

In the main screen, press key and select **6 Date & Time**, and then press key again to confirm, the screen will show the Date & Time Set interface as below:



Press to input the corresponding number 0~9; press key to right move the bit, at the last bit press key to update the date and time.

11 LANGUAGE SETTING

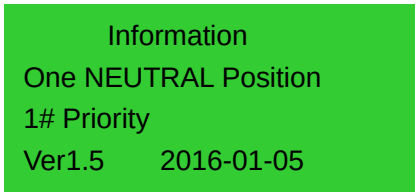
In the main screen, press key and select **7 Language**, press again to enter into language setting interface as below:

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 **8 Controller information**, and then press key again to enter controller information interface as below:



Display contents include current breaking positions setting, transfer priority choice and controller version and date. Press and enter users customizable information page. Longer press key and it will exit and return to main screen.

13 ATS OPERATION

13.1 MANUAL OPERATION

Press [MAN] and manual mode indicator is on, which means controller is in manual mode.

1) Press [I], 1# close relay outputs immediately, if 1# close input is active, the 1# power supply connects to load.

2) Press [II], 2# close relay outputs immediately, if 2# close input is active, the 2# power supply connects to load.

3) Press [O], 1#/2# open relay outputs immediately, if 1#/2# close input is inactive, the 1#/2# power supply disconnects with load.

NOTE: For the ATS without neutral position, it is invalid to press [O] key.

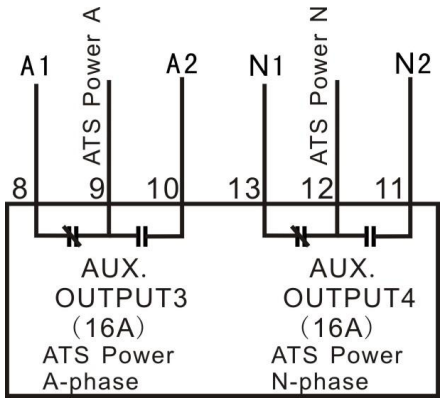
13.2 AUTOMATIC OPERATION

Auto mode indicator is on, which means controller is in auto mode. Controller can transfer to 1# load or 2# load automatically.

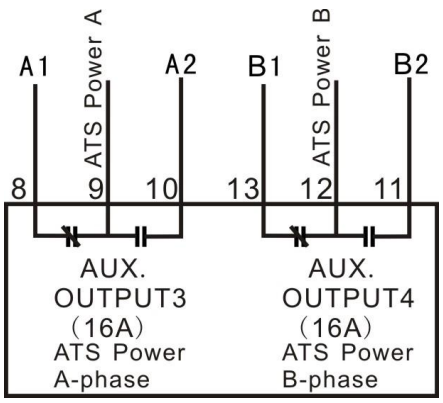
13.3 ATS POWER SUPPLY

ATS power supply is provided by the controller smartly. Only if there is one channel normal voltage can it ensure normal ATS power, and make it work normally.

Users shall choose power supply voltage (phase or line) based on ATS type. If it is phase voltage power, connect the phase voltage (A phase) of 1# and 2# with N/C Terminal 8 and N/O Terminal 10 of programmable port 3, connect N phase of 1# and 2# with N/C Terminal 13 and N/O Terminal 11 of programmable port 4, then connect the COM of programmable port 3 and programmable 4 with ATS power supply. At last power on the controller, and enter parameter configuration page; set port 3 to corresponding phase voltage "ATS power A phase", and set port 4 to "ATS power N phase". If ATS is supplied by line voltage, the set method is as above. You only need to change N phase to phase voltage connection and for port 4 you also need to change according to settings.



ATS phase voltage power supply



ATS line voltage power supply

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

14 FAULT ALARM

Table 12 Critical Failure

No.	Items	Type	Description
1	1# Gens Alarm	Alarm	1# genset failure occurs.
2	1# Fail to Close	Alarm	1# close failure occurs.
3	1# Fail to Open	Alarm	When 1# open failure occurs.
4	2# Gens Alarm	Alarm	2# genset failure occurs.
5	2# Fail to Close	Alarm	2# close failure occurs.
6	2# Fail to Open	Alarm	When 2# open failure occurs.
7	Trip alarm	Alarm	Trip alarm input is active.

Table 13 Warning Types

No.	Items	Type	Description
1	1# Phase Sequence Wrong	Warning	1# phase sequence is not A-B-C.
2	2# Phase Sequence Wrong	Warning	2# phase sequence is not A-B-C.
3	Breaking compulsorily	Warning	Breaking compulsorily input is active.

15 COMMUNICATION CONFIGURATION

HAT560NC series controller has RS485 interface, which can provide a simple and practical dual power transfer management method for factories, telecom, industrial and civil buildings by using ModBus protocol/front-end intelligent device (YD/T 1363.3—2005) protocol via PC or software running on data collecting system, and can realize “remote control, remote measuring, remote communication” functions.

Communication Parameters

Module address 1 (range: 1-254, User-set)
Baud rate 9600 bps
Data bit 8bit
Parity bit None
Stop bit 2-bit

NOTE: Select DC power supply please in order to keep the continuity of communication.

16 CONNECTION

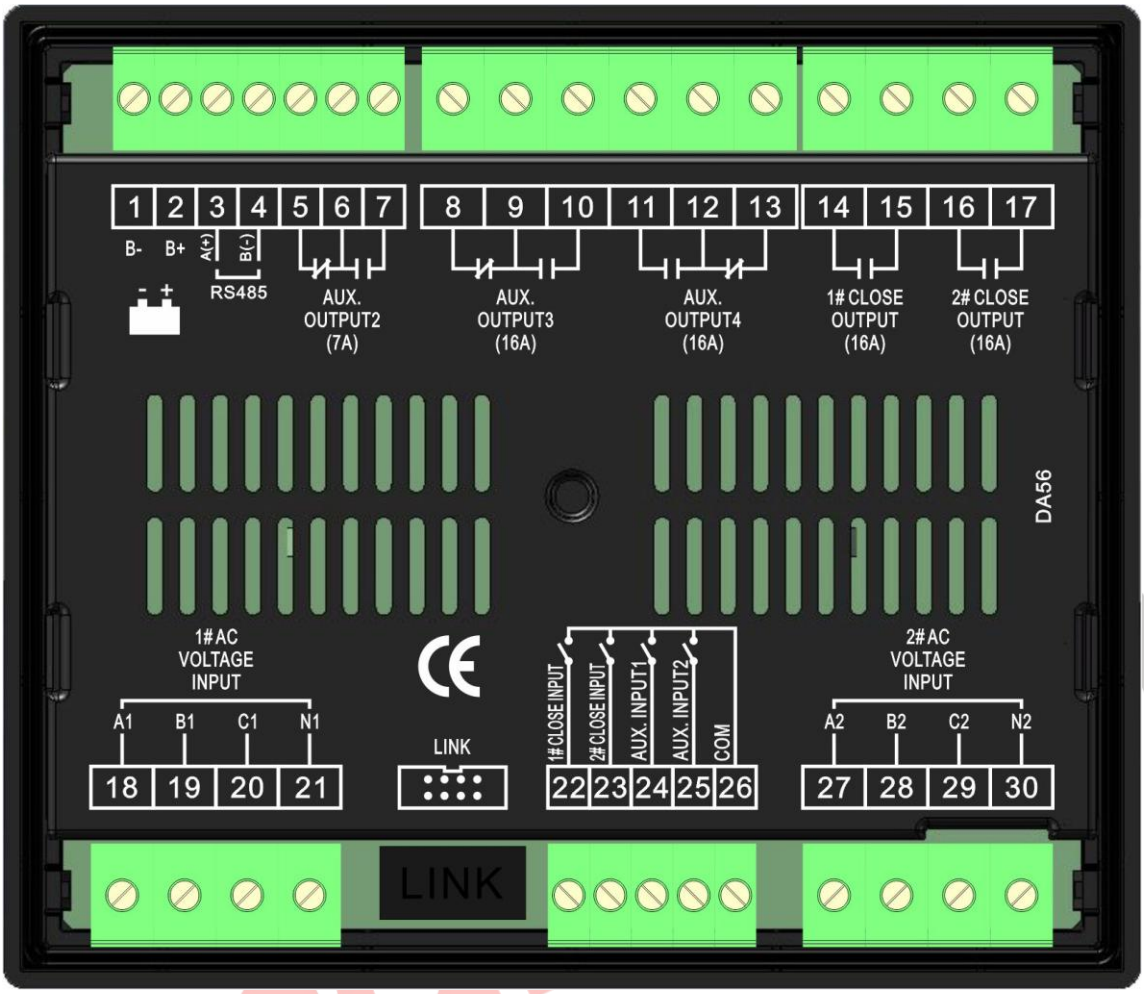


Fig. 2 HAT560NC/HAT560NBC Back Panel

Table 14 Terminal Description

No.	Functions	Description		Remark
1	B-	Connected with negative of starter battery.		DC input B-
2	B+	Connected with positive of starter battery for genset start;		DC (8-35)V, Power supply for controller;
3	RS485 A+	RS485 Communication Port		
4	RS485 B-			
5	Aux. output 2	N/C	Default: Oil Engine Start Output (N/O)	Relay contact output; volts free; rated 7A
6		COM		
7		N/O		
8	Aux. output 3	N/C	Default: ATS Power A	Relay contact output; volts free; rated 16A
9		COM		
10		N/O		
11	Aux. output 4	N/O	Default: ATS Power N	Relay contact output; volts free; rated 16A
12		COM		
13		N/C		
14	1# Close Output	Relay contact output; volts free;		Relay contact output; volts free; rated 16A
15				
16	2# Close Output	Relay contact output; volts free;		Relay contact output; volts free; rated 16A
17				
18	A1	1# AC System 3P4W voltage input		For single phase, only connect A1, N1
19	B1			
20	C1			
21	N1			
22	1# Close Input	Detect the 1# ATS close status. Auxiliary contact input.		Ground connected is active.
23	2# Close Input	Detect the 2# ATS close status. Auxiliary contact input.		Ground connected is active.
24	Aux. Input 1	User-defined.		Ground connected is active.
25	Aux. Input 2	User-defined.		Ground connected is active.
26	COM	GND		
27	A2	2# AC System; 3P4W voltage input		For single phase, only connect A2, N2
28	B2			
29	C2			
30	N2			
LINK	Communication port	Used for PC communication/ software updating.		

17 TYPICAL WIRING DIAGRAM

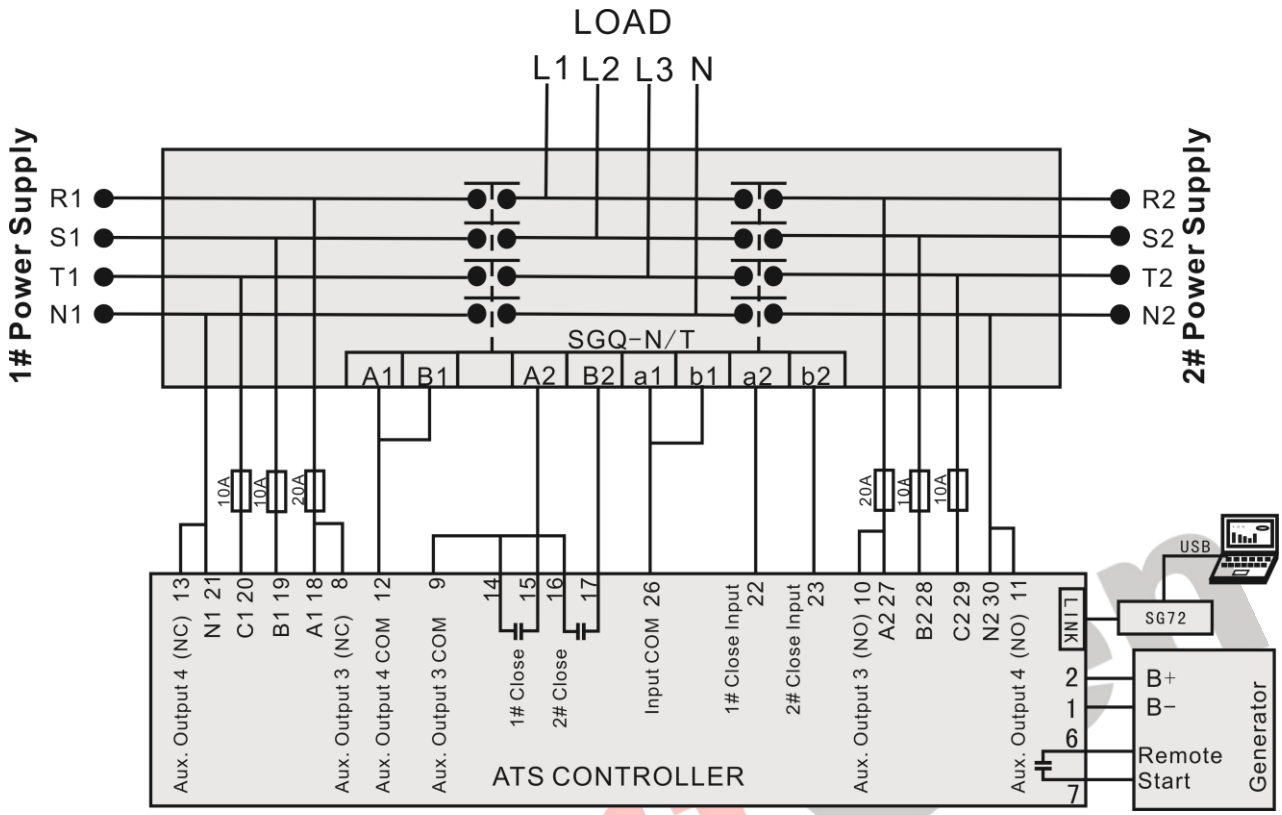


Fig. 3 SGQ-N/T Wiring Diagram

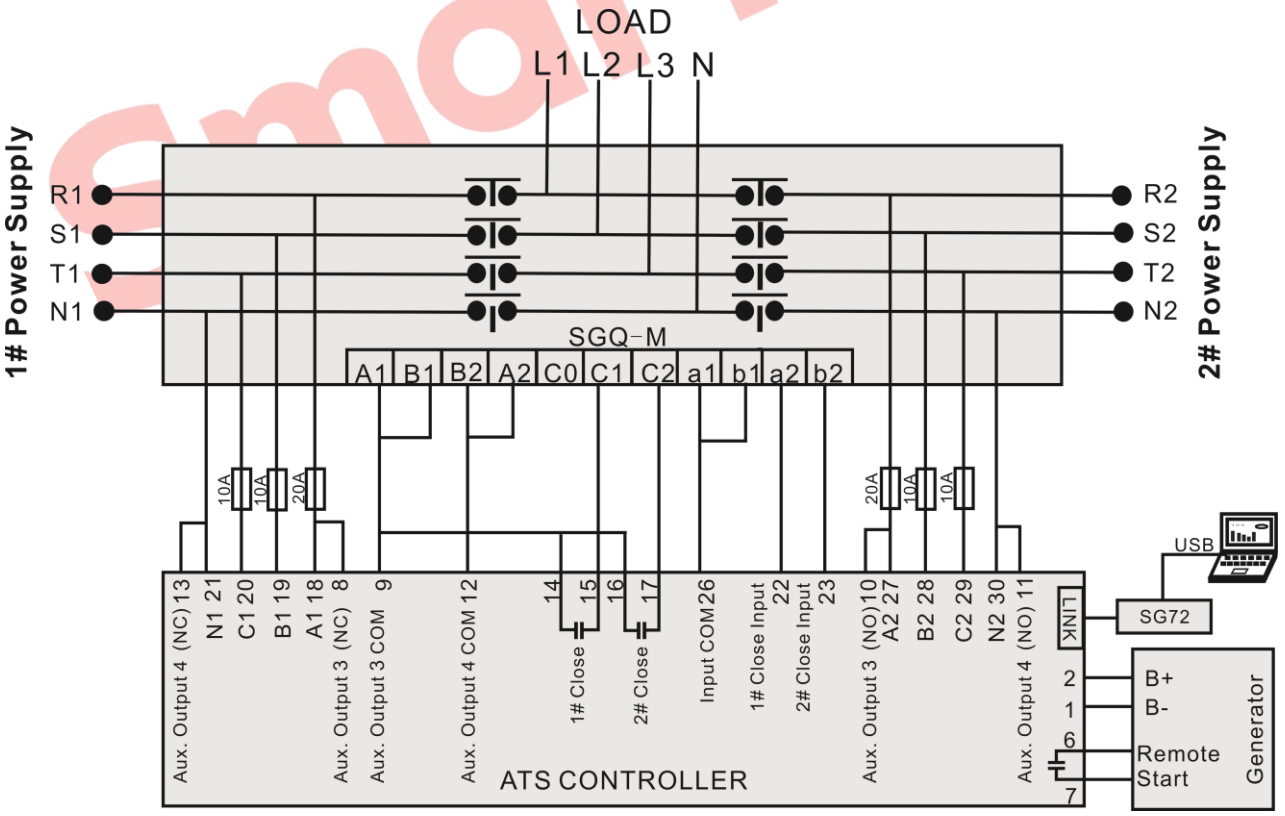


Fig. 4 SGQ-M Wiring Diagram

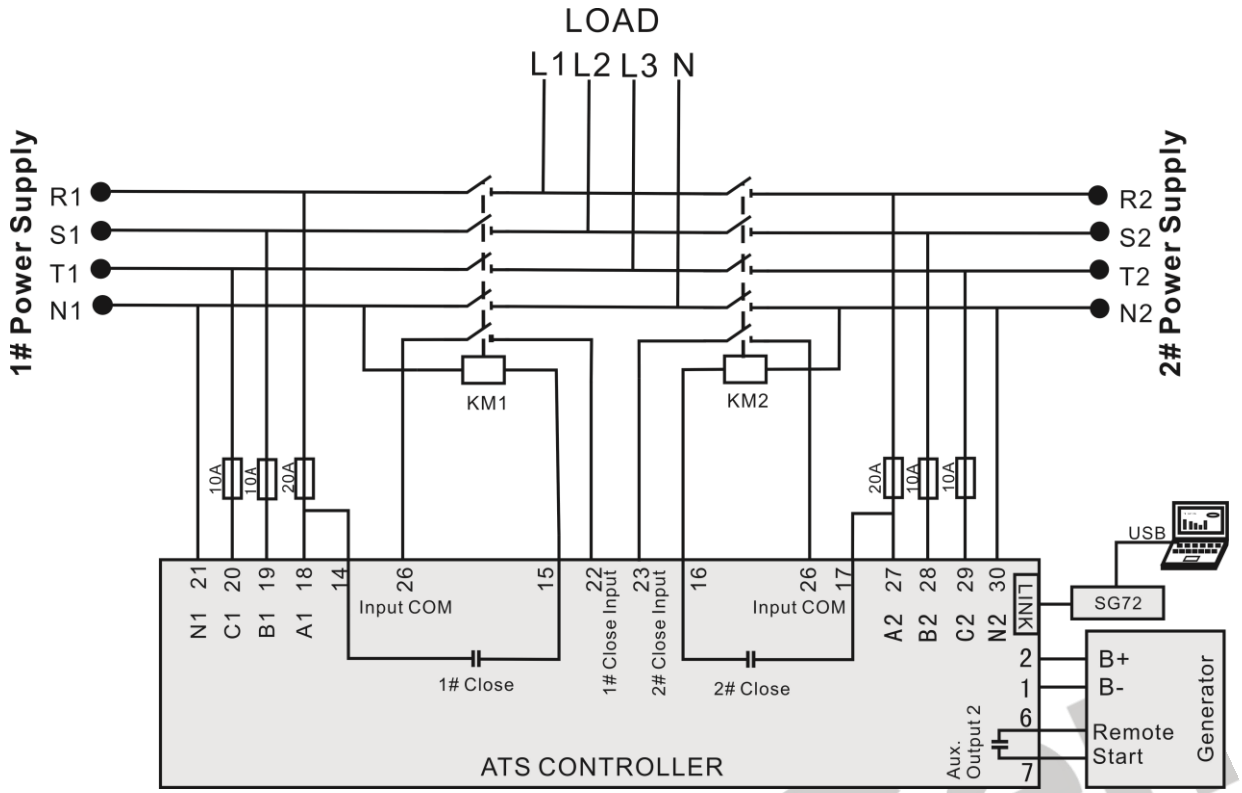


Fig. 5 Contactor Wiring Diagram

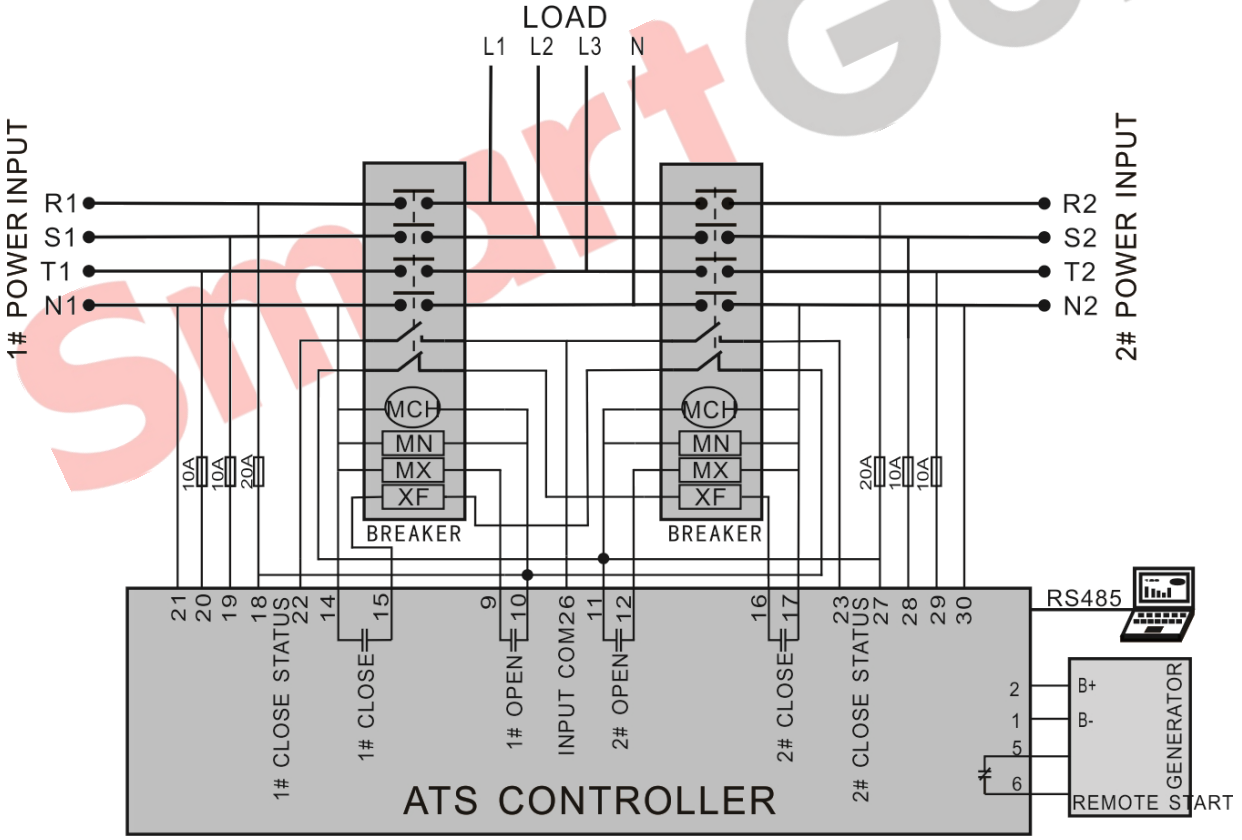


Fig. 6 Breaker Wiring Diagram

MCH: Energy Storage Motor; MN: Under Volt Trip; MX: Open Coil; XF: Close Coil

NOTE 1: Aux. output 3 is configured to 15: 1# breaker open output;

NOTE 2: Aux. output 4 is configured to 17: 2# breaker open output;

NOTE 3: Aux. output 2 is configured to 12: Oil Engine Start N/C output;

NOTE: Select fuse capacity according to actual power consumption on-site, and users cannot take that in the diagram as

standard. If there is not DC power supply, please select relay N/C output for genset start control. For ACB application, please refer to breaker wiring diagram, and switch trip must be connected to controller input terminal during the usage.

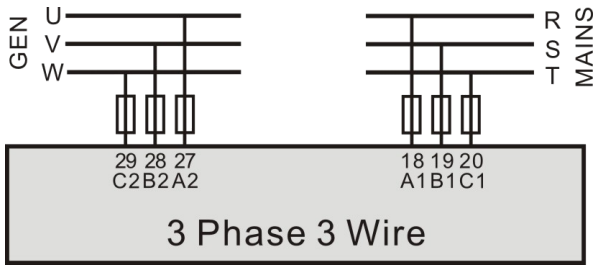


Fig. 7 3-phase 3-wire Wiring Diagram (take 1#Mains 2#Gens as an example)

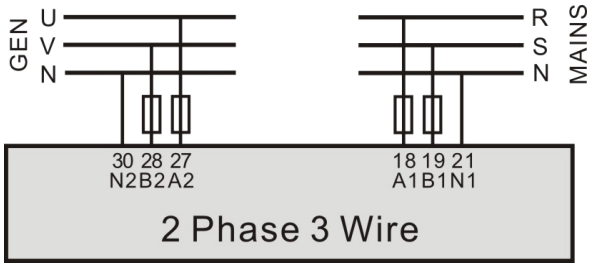


Fig. 8 2-phase 3-wire Wiring Diagram (take 1#Mains 2#Gens as an example)

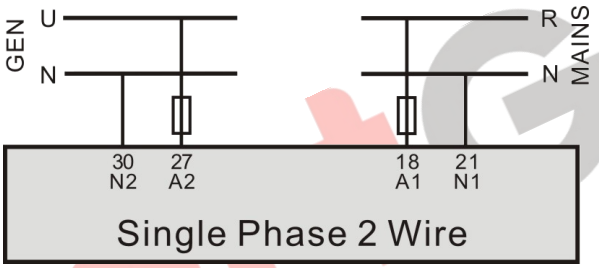


Fig. 9 Single phase 2-wire Wiring Diagram (take 1#Mains 2#Gens as an example)

18 INSTALLATION

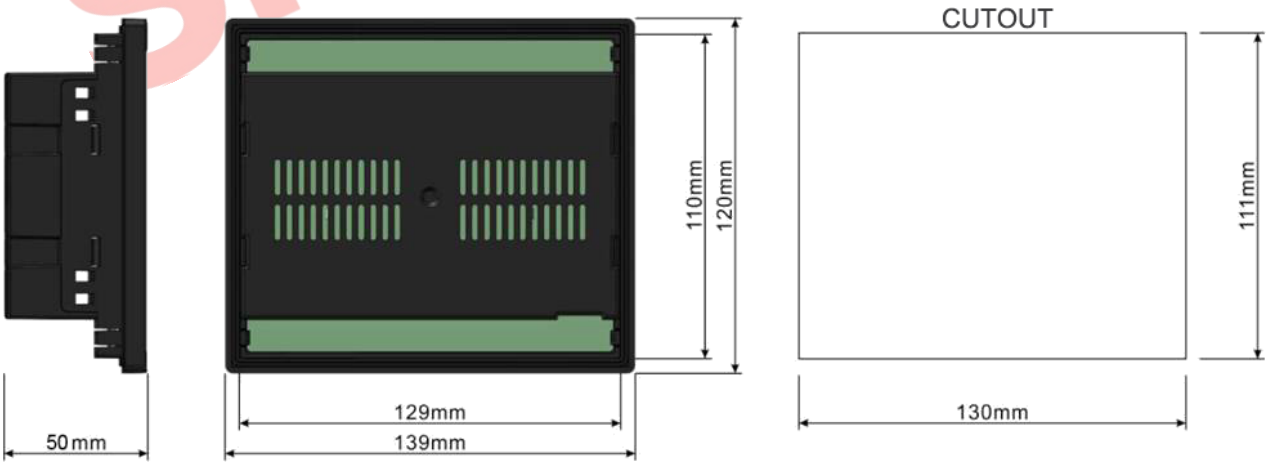


Fig. 10 Installation and Cutout Size

19 FAULT FINDING

Table 15 Fault Finding

Symptom	Possible Solutions
Controller no response with power.	Check battery voltage;
RS485 communication failure	Check RS485 positive and negative connections. Check RS485 converter. Check module address in parameter settings. Recommend to add 120Ω resistor between RS485 A and B.
LINK communication failure	If SG72 module is fitted, check its connections. Check module address in parameter settings.
Auxiliary Output Error	Check auxiliary output connections, paying attention to normally open contact and normally close contact. Check the output settings in parameter settings.
Auxiliary Input Abnormal	Ensure that the auxiliary input is soundly connected to GND when it's active, while hung it up when it is inactive. (**NOTE**: The input port will be possibly destroyed when connected with voltage.)
Genset running but ATS not transfer	Check ATS. Check the connection wirings between controller and ATS. Check whether ATS breakings are in accordance with the set breakings.