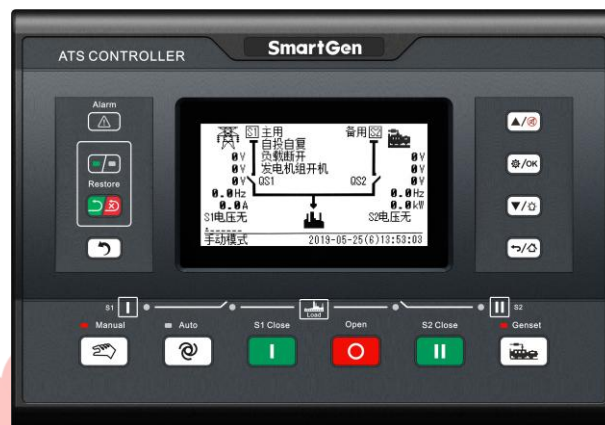




SmartGen
ideas for power

HAT820
(HAT820/HAT820S)
DUAL POWER ATS CONTROLLER
USER MANUAL



SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

4 SPECIFICATION

Table 3 Performance Parameters

Items	Description	
Operating Voltage	1. DC8.0V~35.0V continuous power supply; 2. AC power supply, voltage range: AC(90~576)V;	
Power Consumption	<6W(Standby mode:≤2W)	
AC Voltage Input	AC system	
	3P4W (L-L)	(80~625)V
	3P3W (L-L)	(80~625)V
	1P2W (L-N)	(50~360)V
	2P3W (A-B)	(80~625)V
Rated Frequency	50/60Hz	
Programmable Output 1~6 Relay Capacity	16A 250V AC, volts free output;	
Programmable Output 7~12 Relay Capacity	8A AC250V AC, volts free output;	
Digital Input of S1/S2 Close	Ground connected is active (B-);	
Programmable Input Port 1~8	Ground connected is active (B-);	
Programmable Input Port 9	DC (9~36)V, voltage input;	
Communication Method	1. 2 ways of isolated RS485 interface, MODBUS Protocol; 2. D-type USB port;	
Case Dimensions	260mmx180mmx54mm	
Panel Cutout	242mmx161mm	
Working Conditions	Temperature: (-25~+70)°C; Relative Humidity: (20~93)%RH	
Storage Condition	Temperature: (-30~+80)°C	
Protection Level	IP65: when waterproof gasket is inserted between the controller and the panel;	
Insulation Strength	Apply AC1.5kV voltage between high voltage terminal and low voltage terminal, and the leakage current shall be not more than 3mA within 1min;	
Weight	1.2kg	

5 MEASURE AND DISPLAY DATA

Table 4 Display Parameters

No.	Measuring & Display Data Items
1	S1/S2 Power Phase Voltage
2	S1/S2 Power Line Voltage
3	S1/S2 Power Voltage Phase
4	S1/S2 Power Frequency
5	Load 3-phase Current
6	Load 3-phase Active Power kW
7	Load Total Active Power kW
8	Load 3-phase Reactive Power kvar
9	Load Total Reactive Power kvar
10	Load 3-phase Apparent Power kVA
11	Load Total Apparent Power kVA
12	Load 3-phase Power Factor PF
13	Load Average Power Factor PF
14	Continuous Power Supply Time (Current)
15	Continuous Power Supply Time (Last Time)
16	S1 Accumulated Power Supply Time
17	S2 Accumulated Power Supply Time
18	Accumulated Automatic Transfer Running Time
19	S1 Accumulated Active Power kWh
20	S2 Accumulated Active Power kWh
21	S1 Accumulated Reactive Power kvarh
22	S2 Accumulated Reactive Power kvarh
23	QS1 Total Close Times
24	QS2 Total Close Times
25	Accumulated Automatic Transfer Times
26	Mains Outage Transfer Times
27	Switch Input/Output Terminal Status
28	Real Time Clock
29	Event Log
30	Black Box Log
31	Alarm Information
32	Communication Status
33	Synchronization Information (HAT820S)

6 OPERATION

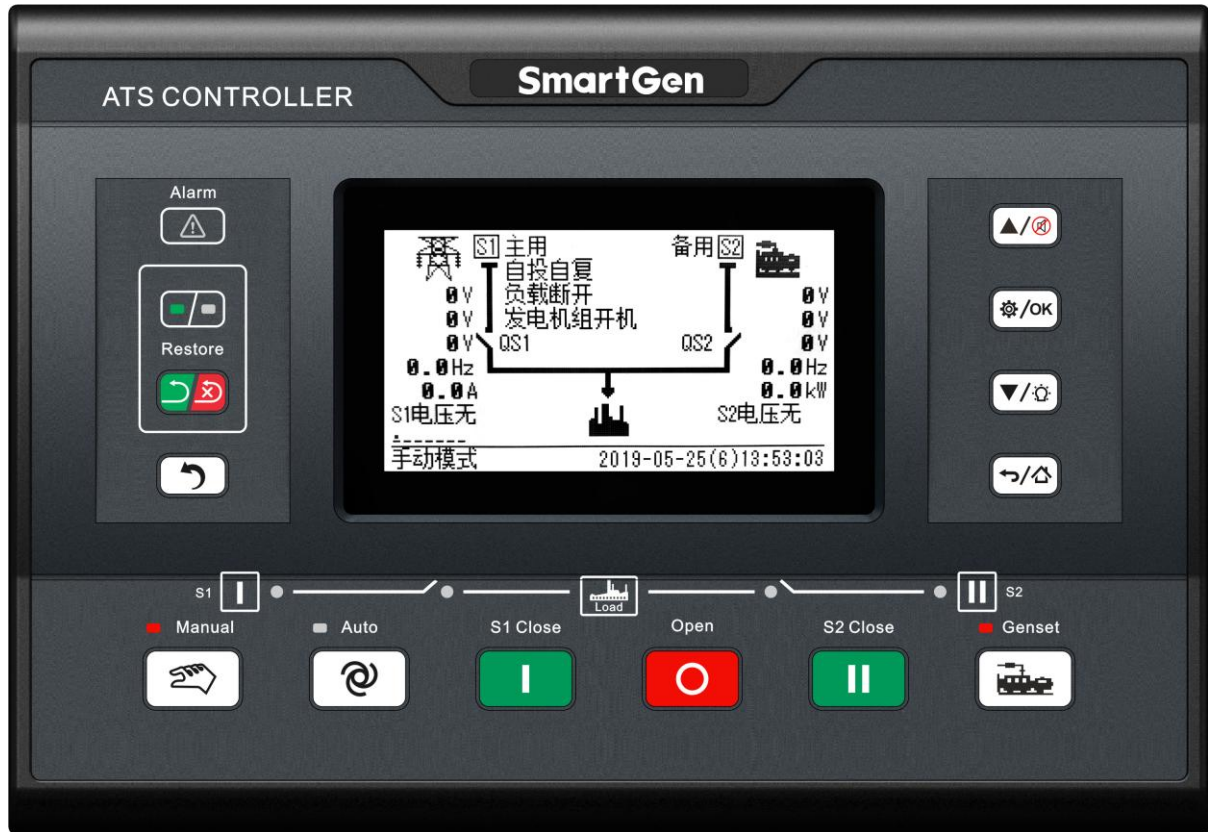


Fig. 2 Panel Indication Drawing













6.1 INDICATORS

Table 5 Indicators Description

Indicator Name	Description
Alarm Indicator	Slow flash (once per second) for warnings, fast flash (5 times per second) for faults;
Auto Trans./ Auto. Restore	Light on when it is Auto Trans./Auto Restore;
Auto Trans./ Non Restore	Light off when it is Auto Trans./Non Restore;
S1 Power Indicator	S1 power is normal, it is always bright; When abnormal, it flashes; When S1 power is shutdown, it is dark;
S1 Close Status Indicator	Light on when QS1 aux. contactor is active; light off when inactive; flashes when it is transferring to current status;
S2 Close Status Indicator	Light on when QS2 aux. contactor is active; light off when inactive; flashes when it is transferring to current status;
S2 Power Indicator	S2 power is normal, it is always bright; When abnormal, it flashes; When S2 power is shutdown, it is dark;
Manual Mode Indicator	When current mode is Manual, it is illuminated;
Auto Mode Indicator	When current mode is Auto, it is illuminated;
Genset Indicator	Light on when controller has issued engine start signal;

6.2 KEY FUNCTION DESCRIPTION






Table 6 Button Function Description

Icon	Key Name	Function Description
	Manual	Switch to manual mode;
	Auto	Switch to auto mode;
	S1 Close	It is active in manual mode; Press it and QS1 closes, and S1 supplies loading;
	Open	It is active in manual mode; Press it and loading is disconnected;
	S2 Close	It is active in manual mode; Press it and QS2 closes, and S2 supplies loading;
	Commissioning	Press and enter manual genset start/stop operation interface directly;
	Restore	Switchover between Auto Trans./Auto Res. and Auto Trans./Non Res.
	Alarm Reset	Clear up fault alarms by pressing it;
	Return/Home	It is return key and can return to upper menu when parameters is set; Return to first page of main menu when it is in main menu; Return to first page of main menu in other screens;
	Set/Confirm	Enter menu screen when it is in main screen by pressing it; After entering menu screen, move cursor and confirm set information;
	Up/Alarm Mute	Scroll up the screen by pressing it in main screen; After entering menu screen, move cursor and increase values for it by pressing it; It is alarm mute by pressing it longer, which can close alarm sound.
	Down/Lamp Test	Scroll down the screen by pressing it in main screen; After entering menu screen, move cursor and decrease values for it by pressing it; It is lamp test by pressing it longer in main screen; LCD backlight is illuminated, LCD displays dark, and all indicators are illuminated when lamp test is done;




7 LCD DISPLAY

7.1 MAIN SCREEN

Table 7 Screen Display

Items	Display Contents
Home	S1 power status; S2 power status, genset start status, switch status; Power supply system map, QS1 is side switch of S1 power; QS2 is side switch of S2 power; S1/S2 voltage/frequency; S1/S2 master settings; Auto Trans./Auto Res. status; Load related paramters;
S1 Power S2 Power	S1 wire voltage, phase voltage, phase angle, frequency; S2 wire voltage, phase voltage, phase angle, frequency;
Load 	Load 3-phase current A(I1, I2, I3); Load 3-phase active power kW (P1, P2, P3); Load 3-phase reactive power kvar (Q1, Q2, Q3); Load 3-phase apparent power kVA (S1, S2, S3); Load total active power kW (sum of P1, P2, P3); Load total reactive power kvar (sum of Q1, Q2, Q3); Load total apparent power kVA (sum of S1, S2, S3); Load 3-phase power factor PF (PF1, PF2, PF3); Load average power factor PF (average of PF1, PF2, PF3);
Load 	S1 accumulated active power; S2 accumulated active power; S1 accumulated reactive power; S2 accumulated reactive power; S1 accumulated running time; S2 accumulated running time;
Time 	Continuous power supply time (current); Continuous power supply time (last); Accumulated automatic transfer running time;
QF Switch 	QS1 accumulated close times; QS2 accumulated close times; Accumulated automatic transfer times; Mains outage transfer times;
I/O Digital Switch 	Programmable digital input status and switch auxiliary status; Programmable digital output status;



Items	Display Contents
Communication 	RS485-1 communication status and baud rate; RS485-2 communication status and baud rate; USB communication status;
Alarms 	Present alarm information (including warning and fault alarms);
Synchronization 	Voltage difference; Frequency difference; Phase difference; Only displayed on HAT820S;
Status Row	Alarm status/working status; Real time clock; Status row is displayed in the last row of every page in main screen.

7.2 STATUS DESCRIPTION

Table 8 S1 Voltage Status

No.	Status Name	Description
1	S1 Available	S1 Normal Delay;
2	S1 Unavailable	S1 Abnormal Delay;
3	S1 Available	Power supply voltage is within the setting range;
4	S1 Blackout	Voltage is 0;
5	S1 Over Volt	Voltage is higher than the set upper limit value;
6	S1 Under Volt	Voltage has fallen below the set low limit value;
7	S1 Over Freq	Frequency is higher than the set upper limit value;
8	S1 Under Freq	Frequency has fallen below the set low limit value;
9	S1 Loss of Phase	Loss of one or two phases of A, B and C;
10	S1 Phase Sequence Wrong	A-B-C phase sequence is wrong.

Table 9 S2 Voltage Status

No.	Status Name	Description
1	S2 Available	S2 Normal Delay;
2	S2 Unavailable	S2 Abnormal Delay;
3	S2 Available	Power supply voltage is within the setting range;
4	S2 Blackout	Voltage is 0;
5	S2 Over Volt	Voltage is higher than the set upper limit value;
6	S2 Under Volt	Voltage has fallen below the set low limit value;
7	S2 Over Freq	Frequency is higher than the set upper limit value;
8	S2 Under Freq	Frequency has fallen below the set low limit value;
9	S2 Loss of Phase	Loss of one or two phases of A, B and C;
10	S2 Phase Seq Wrong	A-B-C phase sequence is wrong.



Table 10 Genset Status

No.	Status Name	Description
1	Genset Start Delay	The delay time before genset starts;
2	Genset Stop Delay	The delay time before genset stops;
3	Schedule Not Work	When it is active, the lasting time of scheduled not-working displays;
4	Schedule Work	When it is active, the lasting time of scheduled working displays;
5	Gen1 Cycle Run	When it is active, countdown of S1 circular start running begins;
6	Gen2 Cycle Run	When it is active, countdown of S2 circular start running begins;
7	S1 Genset Working	It is active if there are only two generators in the system and S1 is generating;
8	S2 Genset Working	It is active if there are only two generators in the system and S1 is generating;
9	Genset Working	Genset start signal outputs;
10	Genset Standby	There is not genset start signal outputting.

Table 11 Switch Status

No.	Status Name	Description
1	Ready to Transfer	Switch transfer begins;
2	QS1 Closing	QS1 closing delay is in progress;
3	QS1 Opening	QS1 opening delay is in progress;
4	QS2 Closing	QS2 closing delay is in progress;
5	QS2 Opening	QS2 opening delay is in progress;
6	Transfer Rest	Interval time between switch transfers;
7	Closing QS1 Again	It is the second closing time when the first QS1 opening is not successful, with the condition that the second closing delay setting is not 0;
8	Opening QS1 Again	It is the second opening time when the first QS1 closing is not successful, with the condition that the second opening delay setting is not 0;
9	Closing QS2 Again	It is the second closing time when the first QS2 opening is not successful, with the condition that the second closing delay setting is not 0;
10	Closing QS2 Again	It is the second opening time when the first QS2 closing is not successful, with the condition that the second opening delay setting is not 0;
11	Waiting QS1 PF	QS1 is waiting for input setting and gets ready for PF is active before QS1 closes;
12	Waiting QS2 PF	QS1 is waiting for input setting and gets ready for PF is active before QS1 closes;
13	Elevator Delay	Delay time before switch transfer, elevator control outputs;
11	S1 On Load	QS1 was already closed and S1 is taking load1;
12	S2 On Load	QS2 was already closed and S2 is taking load2;
13	Offload	Switch was already opened and load is disconnected.

When controller detects warning alarm, warning alarm is active; alarm indicator shall flash slowly (once per second); When warning is removed, alarm indicator shall be extinguished, that is, warning alarm is unlatched.

Table 12 Warning Alarms

No.	Status Name	Description
1	S1 Over Current Warn	Action is set to warning; current is over pre-set limit when S1 is taking load;
2	S2 Over Current Warn	Action is set to warning; current is over pre-set limit when S2 is taking load;
3	Forced Open Warn	It alarms when the forced open (Non-firefighting cutoff input) action is warning, and the forced open input is active;
4	Battery Under Volt	Battery voltage is lower than the set limit value and it alarms for delaying 60s;
5	Battery Over Volt	Battery voltage is higher than the set limit value and it alarms for delaying 60s;
6	Temp. Sensor Open	It alarms when temp. sensor is open circuit.

Fault alarms are active when controller detects the alarm signals. Alarm indicator will flash rapidly (5 times per second) and the alarm will last until it is removed manually. Fault alarms are latched.

Table 13 Fault Alarms

No.	Status Name	Description
1	QS1 Failed to Close	QS1 fails to close when it closes;
2	QS1 Failed to Open	QS1 fails to open when it opens;
3	QS2 Failed to Close	QS2 fails to close when it closes;
4	QS2 Failed to Open	QS2 fails to open when it opens;
5	S1 Over Current Trip	Action is set to trip; current is over preset limit when S1 is taking load;
6	S2 Over Current Trip	Action is set to trip; current is over preset limit when S2 is taking load;
7	Forced Open Fault	It alarms when the forced open (Non-firefighting cutoff input) action is fault, and the forced open input is active;
8	S1 Genset Fault	It is active if there are only two generators in the system, S1 is generating and S1 cannot start normally;
9	S2 Genset Fault	It is active if there are only two generators in the system, S2 is generating and S2 cannot start normally;
10	S1 Breaker Trip Alarm	S1 breaker trip alarm input is active;
11	S2 Breaker Trip Alarm	S2 breaker trip alarm input is active;
12	Sync Fail Fault	Sync. failure action is set to fault, when it is over delay time, fault alarms;
13	S1 Load End Dead	Fault alarms when S1 closes but load end is dead;
14	S2 Load End Dead	Fault alarms when S1 closes but load end is dead;

The indication information will continuously display for 2s after it is active.

Table 14 Indication Information

No.	Status Name	Description
1	Please reset the alarm	Reminder information for switching to auto mode manually before alarm is removed when fault alarm occurs;
2	QS1 was already closed	The indication information for pressing QS1 close key when QS1 has been closed;
3	QS2 was already closed	The indication information for pressing QS2 close key when and QS2 has been closed;
4	It was already opened	The indication information for pressing open key when the breaker has been opened.
5	Panel Locked	Indication information for pressing panel buttons (Man, Auto, S1 Close, S2 Close, Open, Commissioning) when Panel Locked is active;

Table 15 Other Status Information

No.	Status Name	Description
1	Start Inhibit	It displays when the genset start inhibition input is active;
2	S1 Close Inhibit	It displays when S1 close inhibition input is active;
3	S2 Close Inhibit	It displays when S2 close inhibition input is active;
4	NEL 1 Trip	It displays when NEL 1 unload outputs;
5	NEL 2 Trip	It displays when NEL 2 unload outputs;
6	NEL 3 Trip	It displays when NEL 3 unload outputs;
7	Remote Gen On Load	It displays when the remote start with load input is active;
8	Remote Gen Off Load	It displays when the remote start without load input is active;
9	Gen Start Mains NG	It displays when genset is starting and Mains is abnormal;
10	Cycle Gen Start Mode	It is active when S1 is generating and S2 is generating;
11	Balance Gen Hours Mode	It is active when S1 is generating and S2 is generating;
12	Gen Start Master	It is active when S1 is generating and S2 is generating;
13	Auto Mode	It displays when current mode is Auto mode;
14	Manual Mode	It displays when current mode is Manual mode.

7.3 MAIN MENU

In main screen, press **Set/Confirm** key and enter main menu interface.

<ul style="list-style-type: none"> 1. Configuration 2. Data Calibration 3. Historical Records 4. Black Box Records 5. Auto Trans./Restore 6. Language 7. About 	<p>Press Up/Down key to choose different parameter line (current line is highlighted with black) and then press Confirm key to enter the corresponding display screen.</p>
---	--


NOTE1: Password is needed to enter the parameter setting menu and the default password is 01234. Users can change the password in case that others change the controller configurations randomly. After changing please remember it carefully. If you forget it, please contact our company service personnel.

NOTE2: Data calibration is used by factory to calibrate controllers; it can be entered by inputting factory password and users cannot access to it.

8 GENSET START/STOP OPERATION

8.1 MANUAL MODE START/STOP

8.1.1 START/STOP ON THE PANEL

In the main interface, press  and it shall enter manual start operation screen directly when system type is "S1 Mains S2 Gen, S1 Gen S2 Mains, S1 Mains S2 Mains".

<p>Manual Test Genset</p> <hr/> <p>Return Genset Stop Genset Start</p>	<p>Press Up/Down key to choose different parameter line (current line is highlighted with black) and then press Confirm key to confirm.</p>
--	---

Genset Stop: disconnect the outputted genset start signal and it can control the genset stop.

Genset Start: Control genset start signal output, that is, it can control the genset start.

When system type is "S1 Gen S2 Gen", manual Start/Stop menu screen is as follows:

<p>Manual Test Genset</p> <hr/> <p>Return S1 Genset Stop S1 Genset Start S2 Genset Stop S2 Genset Start</p>	<p>Press Up/Down key to choose different parameter line (current line is highlighted with black) and then press Confirm key to confirm.</p>
---	---




S1 Genset Stop: disconnect the outputted S1 genset start signal, that is, control S1 genset stop.

S1 Genset Start: Control S1 genset start signal output, that is, it can control S1 genset start.

S2 Genset Stop: disconnect the outputted S2 genset start signal, that is, control S2 genset stop.

9 PARAMETER CONFIGURATION

9.1 ILLUSTRATION

In the first page of main screen, press /OK and enter menu screen, choose **Configuration** and press  again to confirm, then it enters password confirmation interface. Input the correct password, and it enters main screen of parameter setting. Input wrong password and it shall exit to main interface directly. **Factory default password is 01234**. In parameter configuration interface, press  and it shall exit and return to the upper interface.

9.2 PARAMETER CONFIGURATION TABLE

Table 17 Parameter Configuration Item Form

No.	Item	Range	Default	Description
AC Settings				
1	S1 Available Delay	(0-3600)s	10	The check time for S1 from abnormal to normal;
2	S1 Unavailable Delay	(0-3600)s	5	The check time for S1 from normal to abnormal;
3	S2 Available Delay	(0-3600)s	10	The check time for S2 from abnormal to normal;
4	S2 Unavailable Delay	(0-3600)s	5	The check time for S2 from normal to abnormal;
5	Master-Slave Set	(0~1)	0	0: S1 Master 1: S2 Master
6	System Type Set	(0~3)	0	0: S1 Mains S2 Gen 1: S1 Gen S2 Mains 2: S1 Mains S2 Mains 3: S1 Gen S2 Gen
7	AC System	(0-3)	0	0: 3-Phase 4-Wire 1: 3-Phase 3-Wire 2: 2-Phase 3-Wire 3: Single Phase 2-Wire
8	PT Fitted	(0~1)	0	0: Disable 1: Enable
9	PT Primary Voltage	(30~30000)V	100	Primary voltage of AC PT ratio;
10	PT Secondary Voltage	(30~1000)V	100	Secondary voltage of AC PT ratio;
11	Rated Voltage	(0-30000)V	220	Rated voltage of AC system;
12	Over Volt Set	(0~1)	1	0: Disable 1: Enable
13	Set Value	(0-200)%	120	Upper limit value of voltage; it is abnormal



No.	Item	Range	Default	Description
				if the value has exceeded the set value.
14	Return Value	(0-200)%	115	Upper limit return value of voltage; it is normal only when the value has fallen below the set value.
15	Under Volt Set	(0~1)	1	0: Disable 1: Enable
16	Set Value	(0-200)%	80	Lower limit value of voltage; it is abnormal if the value has fallen below the set value.
17	Return Value	(0-200)%	85	Lower limit return value of voltage; it is normal only when the value has exceeded the set value.
18	Rated Frequency	(10.0-75.0)Hz	50.0	Rated frequency of AC system
19	Over Frequency Set	(0-1)	1	0: Disable 1: Enable
20	Set Value	(0-200)%	110	Upper limit value of frequency; it is abnormal if the value has exceeded the set value.
21	Return Value	(0- 200)%	104	Upper limit return value of frequency; it is normal only when the value has fallen below the set value.
22	Under Frequency Set	(0-1)	1	0: Disable 1: Enable
23	Set Value	(0- 200)%	90	Lower limit value of frequency; it is abnormal if the value has fallen below the set value.
24	Return Value	(0- 200)%	96	Lower limit return value of frequency; it is normal only when the value has exceeded the set value.
25	Phase Sequence Wrong	(0-1)	1	0: Disable 1: Enable
26	Load Volt Enable	(0-1)	0	0: Disable 1: Enable
Switch Settings				
1	Definite C/O Time	(0~1)	0	0: Disable 1: Enable Disable: Detect output time according to close status when close/open pulse outputs; longest time is the set time; Enable: close/open pulse output time is the set close/open time;
2	Close Delay	(0.1~20.0)s	5.0	Outputted pulse time of close relay;
3	Open Delay	(0.1~20.0)s	5.0	Outputted pulse time of open relay;
4	Transfer Time	(0~9999)s	1	Delay time from S1 open to S2 close; or



No.	Item	Range	Default	Description
				from S2 open to S1 close;
5	Auto Trans/Restore	(0-1)	1	0: Auto Trans./Non Res. 1: Auto Trans./Res.
6	Again Close Time	(0-20.0)s	1.0	If the first switch open is not successful, then the second close starts and again close delay starts; when the delay is over, then the second open starts; if the open cannot be conducted, then open failure alarm signal shall be sent out;
7	Again Open Time	(0-20.0)s	1.0	If the first switch close is not successful, then the second open starts and again open delay starts; when the delay is over, then the second close starts; if the close cannot be conducted, then close failure alarm signal shall be sent out;
8	Switch Type	(0~2)	0	0: Two Breakings 1: One Breaking 2: None Breaking
9	Forced Open Action	(0-1)	0	0: Warn Alarm 1: Fault Alarm
10	Continually Close	(0~1)	0	0: Disable 1: Enable It needs to be enabled when close control is continuous signal and close/open time is inactive at this time;
11	Sync Enabled	(0~1)	0	0: Disable 1: Enable
12	Volt Diff. Enabled	(0~1)	0	0: Disable 1: Enable
13	Volt Diff.	(0~50)V	5	Max. voltage difference when sync. is completed;
14	Freq Diff.	(0~0.50)Hz	0.20	Max. frequency difference when sync. is completed;
15	Phase Diff.	(0~20) °	5	Max. phase difference when sync. is completed;
16	Fail to Sync Action	(0~1)	0	0: Warn Alarm 1: Fault Alarm It continues to wait for sync when sync fails until it closes after sync; For warning alarm, it is removed when sync is completed or exit from sync. For fault alarm, it needs to press alarm reset to remove alarm.
17	Transfer in Sync Fail	(0~1)	0	0: Disable



No.	Item	Range	Default	Description
				1: Enable After sync fails, close without sync shall be conducted and fail to sync alarm also isn't issued;
18	Fail to Sync Delay	(0~9999)s	120	Time for waiting for sync success; if it is over time, then sync fails;
19	Breaker Feedback Time	(0.1~1.0)s	0.6	At the time of sync transfer, sync close/open output delay starts; during this period if correct close status is detected, then stop close/open pulse output; if delay is over and close status is not detected, then close/open failure alarm shall be initiated;
20	ATS Power Type	(0~1)	1	0: DC Power Supply 1: AC Power Supply
21	ATS Power Low Point	(0~100)%	70	Min. AC power for switch; if it is lower than this value, then switch cannot be transferred;
22	ATS Power High Point	(0~200)%	200	Max. AC power for switch; if it is higher than this value, then switch cannot be transferred;
Genset Settings				
1	Genset Start Delay	(0~9999)s	1	When genset prepares to start, delay starts, and when the delay is over, genset starting signal is sent out;
2	Genset Stop Delay	(0~9999)s	5	When genset prepares to stop, delay starts, and when the delay is over, genset starting signal is disconnected;
3	Gen-Gen Start Mode	(0~3)	0	0: Cycle Gens 1: Master-Slave Gens 2: Balance Gens Hours 3: Not Used
4	S1 Cycle Work Time	(0~9999)min	720	The running time of S1 at the mode of Cycle Gens;
5	S2 Cycle Work Time	(0~9999)min	720	The running time of S2 at the mode of Cycle Gens;
6	Genset Available Time	(0~9999)s	120	Time from issuing genset start signal to gen voltage is normal; if delay is over and gen voltage is still abnormal, then genset fault alarm is initiated;
7	Battery Volt Enable	(0~1)	0	0: Disable 1: Enable
8	Battery Low Volt Warn Enable	(0~1)	0	0: Disable 1: Enable



No.	Item	Range	Default	Description
9	Battery Low Volt Warn	(0~100.0)V	10.0	It occurs when battery voltage is lower than the set value;
10	Battery Low Volt Return	(0~100.0)V	10.5	When battery voltage is higher than the set return value, warning is removed;
11	Battery Over Volt Warn Enable	(0~1)	0	0: Disable 1: Enable
12	Battery Over Volt Warn	(0~100.0)V	30.0	It occurs when the battery voltage is higher than the set value;
13	Battery Over Volt Return	(0~100.0)V	29.5	It shall be removed if the battery voltage is lower than the set value;
Scheduled Start/Stop Settings				
1	Schedule Gen Enable	(0~1)	0	0: Disable 1: Enable
2	Schedule Load	(0~1)	0	0: Off Load 1: Load
3	Schedule Period	(0~2)	0	0: Monthly 1: Weekly 2: Daily
4	Schedule Monthly	(1~4095)	4095	Bit0: January Bit1: February Bit2: March Bit3: April Bit4: May Bit5: June Bit6: July Bit7: August Bit8: September Bit9: October Bit10: November Bit11: December
5	Schedule Date	(1~31)	1	Date of genset start in every month;
6	Schedule Weekly	(1~127)	1	Bit0: Sunday Bit1: Monday Bit2: Tuesday Bit3: Wednesday Bit4: Thursday Bit5: Friday Bit6: Saturday
7	Schedule Hours	(0~23)h	0	Scheduled start time;
8	Schedule Minutes	(0~59)min	0	
9	Schedule Work Time	(0~30000)min	30	The lasting time for scheduled start running;
10	Gen Inhibit Work	(0~1)	0	0: Disable 1: Enable



No.	Item	Range	Default	Description
11	Inhibit Period	(0~2)	0	0: Monthly 1: Weekly 2: Daily
12	Inhibit Monthly	(1~4095)	4095	Bit0: January Bit1: February Bit2: March Bit3: April Bit4: May Bit5: June Bit6: July Bit7: August Bit8: September Bit9: October Bit10: November Bit11: December
13	Inhibit Date	(1~31)	1	Date of not start in every month;
14	Inhibit Weekly	(1~127)	1	Bit0: Sunday Bit1: Monday Bit2: Tuesday Bit3: Wednesday Bit4: Thursday Bit5: Friday Bit6: Saturday
15	Inhibit Hours	(0~23)	0	Time for scheduled non-start;
16	Inhibit Minutes	(0~59)	0	
17	Inhibit Rest Time	(0~30000)	30	The lasting time for scheduled non-start;
Load Settings				
1	Current CT Enable	(0~1)	1	0: Disable 1: Enable
2	CT Primary	(5~6000)A	500	Primary Current of CT;
3	S1 Full Load Rating	(5~6000)A	500	Current of S1 full load;
4	S2 Full Load Rating	(5~6000)A	500	Current of S2 full load;
5	S1 Max kW Rating	(1~20000)kW	200	Max. active power of S1 full load;
6	S2 Max kW Rating	(1~20000)kW	200	Max. active power of S2 full load;
7	Over Current Enable	(0~1)	1	0: Disable 1: Enable
8	Over Current	(0~200)%	120	Limits for over current;
9	Over Current Protection	(0~1)	0	0: Warn 1: Trip
10	Over Current Type	(0~1)	0	0: Definite 1: Inverse Definite
11	Definite Delay Set (Value)	(0~3600)s	10	Over current delay value for definite time;
12	Inverse Delay Set	(1~36)	36	Over current delay multiplier for inverse



No.	Item	Range	Default	Description
	(Multiplier)			definite;
13	Elevator Enable	(0~1)	0	0: Disable 1: Enable
14	Elevator Delay	(0~300)s	300	Delay time for load power off or before switch transfer; used to control the running elevator stop at the nearest level until switch transfer is finished;
15	NEL Enable	(0~1)	0	0: Disable 1: Enable
16	NEL Over Power Val 1	(0~200)%	90	When load power is over the set value, unload control outputs after delay;
17	NEL Over Power Delay 1	(0~3600)s	5	
18	NEL Over Power Val 2	(0~200)%	100	When load power is over the set value, unload control outputs after delay;
19	NEL Over Power Delay 2	(0~3600)s	1	
20	NEL Return Enable	(0~1)	0	0: Disable 1: Enable
21	NEL Return Value	(0~200)%	50	When load power is lower than the set value, unload control is disconnected after delay;
22	NEL Return Delay	(0~3600)s	5	
23	NEL Num	(1~3)	3	NEL numbers;
24	Mains Load NEL Enable	(0~1)	0	0: Disable 1: Enable
Digital Input Settings				
1	Digital Input 1	(0~20)	1	Forced Open
2	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
3	Digital Input 2	(0~20)	0	S1 switch trip input
4	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
5	Digital Input 3	(0~35)	8	S2 switch trip input
6	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
7	Digital Input 4	(0~35)	9	Not Used
8	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
9	Digital Input 5	(0~35)	0	Not Used
10	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
11	Digital Input 6	(0~35)	0	Not Used
12	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate

No.	Item	Range	Default	Description
13	Digital Input 7	(0~35)	0	Not Used
14	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
15	Digital Input 8	(0~35)	0	Not Used
16	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
17	Digital Input 9	(0~35)	0	Not Used
18	Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
Digital Output Settings				
1	Digital Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
2	Digital Output 1	(0~92)	34	QS1 switch close control
3	Digital Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
4	Digital Output 2	(0~92)	35	QS1 switch open control
5	Digital Output 3 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
6	Digital Output 3	(0~92)	36	QS2 switch close control
7	Digital Output 4 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
8	Digital Output 4	(0~92)	37	QS2 switch open control
9	Digital Output 5 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
10	Digital Output 5	(0~92)	49	ATS Power L1
11	Digital Output 6 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
12	Digital Output 6	(0~92)	52	ATS Power N
13	Digital Output 7 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
14	Digital Output 7	(0~92)	0	Not Used
15	Digital Output 8 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
16	Digital Output 8	(0~92)	0	Not Used
17	Digital Output 9 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
18	Digital Output 9	(0~92)	0	Not Used
19	Digital Output 10 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
20	Digital Output 10	(0~92)	0	Not Used
21	Digital Output 11 Active Type	(0~1)	1	0: Close to activate; 1: Open to activate
22	Digital Output 11	(0~92)	32	Genset Start
23	Digital Output 12	(0~1)	0	0: Close to activate;




No.	Item	Range	Default	Description
	Active Type			1: Open to activate
24	Digital Output 12	(0~92)	0	Not Used
25	Combined 1 Or Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
26	Combined 1 Or Output 1 Contents	(0~92)	23	S1 voltage is normal;
27	Combined 1 Or Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
28	Combined 1 Or Output 2 Contents	(0~92)	25	S2 voltage is normal;
29	Combined 1 Or Output Active Type	(0~1)	1	0: Close to activate; 1: Open to activate
30	Combined 1 Or Output Contents	(0~92)	0	Not Used
31	Combined 2 or Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
32	Combined 2 or Output 1 Contents	(0~92)	0	Not Used
33	Combined 2 or Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
34	Combined 2 or Output 2 Contents	(0~92)	0	Not Used
35	Combined 2 or Output Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
36	Combined 2 or Output Contents	(0~92)	0	Not Used
37	Combined 3 or Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
38	Combined 3 or Output 1 Contents	(0~92)	0	Not Used
39	Combined 3 or Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
40	Combined 3 or Output 2 Contents	(0~92)	0	Not Used
41	Combined 3 or Output Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
42	Combined 3 or Output Contents	(0~92)	0	Not Used
43	Combined 4 or Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
44	Combined 4 or Output 1 Contents	(0~92)	0	Not Used
45	Combined 4 or Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate



No.	Item	Range	Default	Description
46	Combined 4 or Output 2 Contents	(0~92)	0	Not Used
47	Combined 4 or Output Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
48	Combined 4 or Output Contents	(0~92)	0	Not Used
49	Combined 5 or Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
50	Combined 5 or Output 1 Contents	(0~92)	0	Not Used
51	Combined 5 or Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
52	Combined 5 or Output 2 Contents	(0~92)	0	Not Used
53	Combined 5 or Output Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
54	Combined 5 or Output Contents	(0~92)	0	Not Used
55	Combined 6 or Output 1 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
56	Combined 6 or Output 1 Contents	(0~92)	0	Not Used
57	Combined 6 or Output 2 Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
58	Combined 6 or Output 2 Contents	(0~92)	0	Not Used
59	Combined 6 or Output Active Type	(0~1)	0	0: Close to activate; 1: Open to activate
60	Combined 6 or Output Contents	(0~92)	0	Not Used
Module Settings				
1	Power On Mode	(0~2)	0	0: Last Mode (reserved the mode before power off) 1: Manual 2: Auto
2	Language	(0~1)	0	0: Simplified Chinese 1: English
3	Password	(00000~65535)	01234	For entering parameter setting
4	Module Address	(1~254)	1	RS485 communication address
5	RS485-1 Baud Rate	(0~3)	2	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps
6	RS485-1 Stop Bit	(1~2)	2	1/2 bit can be set;




12 SWITCH OPERATION

12.1 MANUAL OPERATION

Press  key, and manual status indicator is illuminated. Controller is in manual mode.

After switch transfer key is pressed, switch transfers immediately. In the transferring process, the corresponding indicator flashes and it is always light when transfer is done.

Table 22 Manual Transfer Key

Icon	Function	Description
	S1 Close Key	Press and if load is disconnected, then QS1 closes and load is supplied by S1.
	S2 Close Key	Press and if load is disconnected, then QS2 closes and load is supplied by S2.
	Open Key	Press and load is disconnected.

12.2 AUTOMATIC OPERATION

Press  key, and auto mode indicator becomes light and the controller is in the auto mode.

Under auto mode, the controller will switch automatically to ensure power supply for loading according to S1&S2 status, switch priority and Auto Trans./Res. status.

Table 23 Auto Breaker Transfer Logic

Power Status	Breaker and Load Status	S1 Master	S2 Master
S1 Normal S2 Normal Auto Trans./Res.	Breaker Status	QS1 Close QS2 Open	QS1 Open QS2 Close
	Load Status	S1 Supply for load	S2 Supply for load
S1 Normal S2 Abnormal Auto Trans./Res.	Breaker Status	QS1 Close QS2 Open	QS1 Close QS2 Open
	Load Status	S1 Supply for load	S1 Supply for load
S1 Abnormal S2 Normal Auto Trans./Res.	Breaker Status	QS1 Open QS2 Close	QS2 Close QS1 Open
	Load Status	S2 Supply for load	S2 Supply for load
S1 Abnormal S2 Abnormal (Normal power supply for ATS)	Breaker Status	QS1 Open QS2 Open	
	Load Status	Load is power off.	

During the switching process, when breaker close failure or close inhibition occurs, the corresponding switch shall not conduct close action any more, and other switches that can execute close action shall supply power for load. If breaker open failure occurs, then switch shall do not any actions.

13 ATS POWER SUPPLY

Switch power supply can be set to DC supply or AC supply. If switch is DC supply, then it is considered that switch can be transferred at any time, including S1 and S2 both are outage. If switch is AC supply, then that switch power supply is normal or abnormal is judged by AN voltage status of S1 and S2 and switch power voltage range.

If ATS power is supplied by S1 and S2, controller controls power supply intellectually; Only one of S1 and S2 is normal can the ATS power supply be normal to ensure normal switch transfer.

If ATS power is supplied by controller, only when controller detects ATS normal power, can the switch conducts close/open actions. Users shall select supply voltage (phase voltage or wire voltage) according to ATS type. If it is phase voltage supply, it is needed to connect the phase voltages of S1&S2 separately with the normally close contact (Terminal 21) and the normally open contact (Terminal 22) of digital port 5. The N phase of S1&S2 shall be connected separately with the normally close contact (Terminal 24) and the normally open contact (Terminal 25) of digital port 6. Afterwards connect the common port of port 5 and port 6 with ATS power supply. At last enter parameter setting interface and set port 5 as the corresponding phase voltage "ATS power L1", and set port 6 as "ATS power N". It is the same when ATS is supplied by wire voltage. It is only needed to change N phase as phase voltage input and port 6 is also needed to change according to the settings. Wire connection is as below:

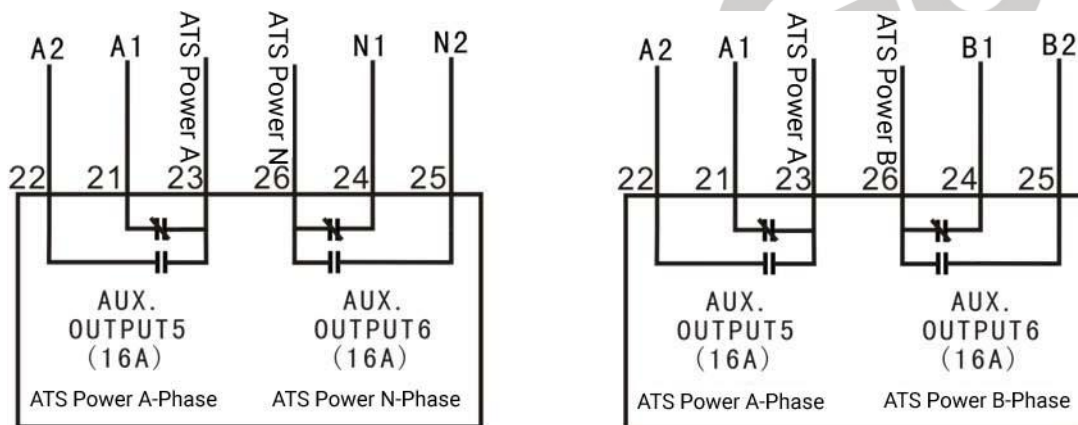


Fig. 3 ATS Power Supply Wiring Drawing

14 NEL CONTROL

14.1 ILLUSTRATION

Non-essential Load is NEL for short, which refers to the load that can be unloaded first when genset power is not enough.

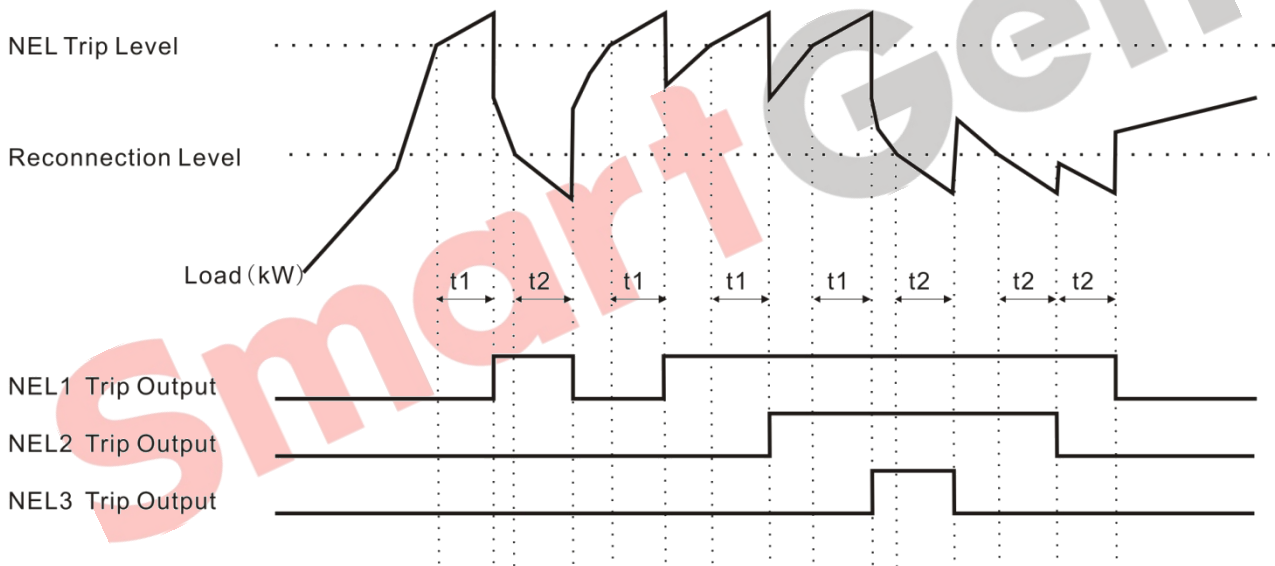
Controller can control 3 ways of NEL trip and the essentiality is: NEL 3>NEL 2>NEL 1.

14.2 AUTOMATIC OPERATION

When NEL auto trip is enabled: If genset power has exceeded NEL trip value, after trip delay NEL1 will trip for the earliest, and next is NEL2, NEL3;

When NEL auto reconnection is enabled: If genset power has fallen below the auto reconnection set value, after the auto reconnection delay NEL3 will be reconnected for the earliest, and next is NEL2, NEL1;

t1: NEL Trip Delay
t2: Reconnection Delay



14.3 MANUAL TRIP

If NEL manual trip input is active (falling edge is active), NEL1 will trip without delay; If NEL manual trip input is active again, NEL2 will trip; If NEL manual trip input is active for the third time, NEL3 will trip. During this process, the controller does not detect if the genset power has exceeded the NEL trip value or not.

If NEL manual reconnection input is active (falling edge is active), NEL3 will be reconnected without delay; If NEL manual reconnection input is active again, NEL2 will reconnect; If NEL manual reconnection input is active for the third time, NEL1 will reconnect. During this process, the controller detects the genset power: if the genset power has fallen below the NEL reconnection value, then the input is active; if it doesn't, the input is deactivated.

NOTE: When auto trip and auto reconnection are enabled, manual trip is still active.

15 COMMUNICATION CONFIGURATION AND CONNECTION

HAT820 Dual Power ATS controller is equipped with 2 RS485 communication ports, which allow it to connect with LAN (Local Area Network) with open structure. It applies MODBUS communication protocol and via software on PC or on data collection system it can provide a simple and practical dual power switching management project for factories, telecom, industry and civil buildings to achieve “remote control, remote measuring, and remote communication” functions.

More information about Communication Protocol, please refer to *HAT820 Communication Protocol*.

Communication parameters:

Module address	1 (range: 1-254)
Baud rate	9600 bps (2400/4800/9600/19200bps)
Data bit	8-bit
Parity bit	None (None/Odd/Even)
Stop bit	2 bits (1 bit or 2 bits)

Controller also has a D-type USB communication port, which can be used to connect PC test software to do configuration parameters and at the same time used for module software upgrade.

16 TERMINAL DEFINITION

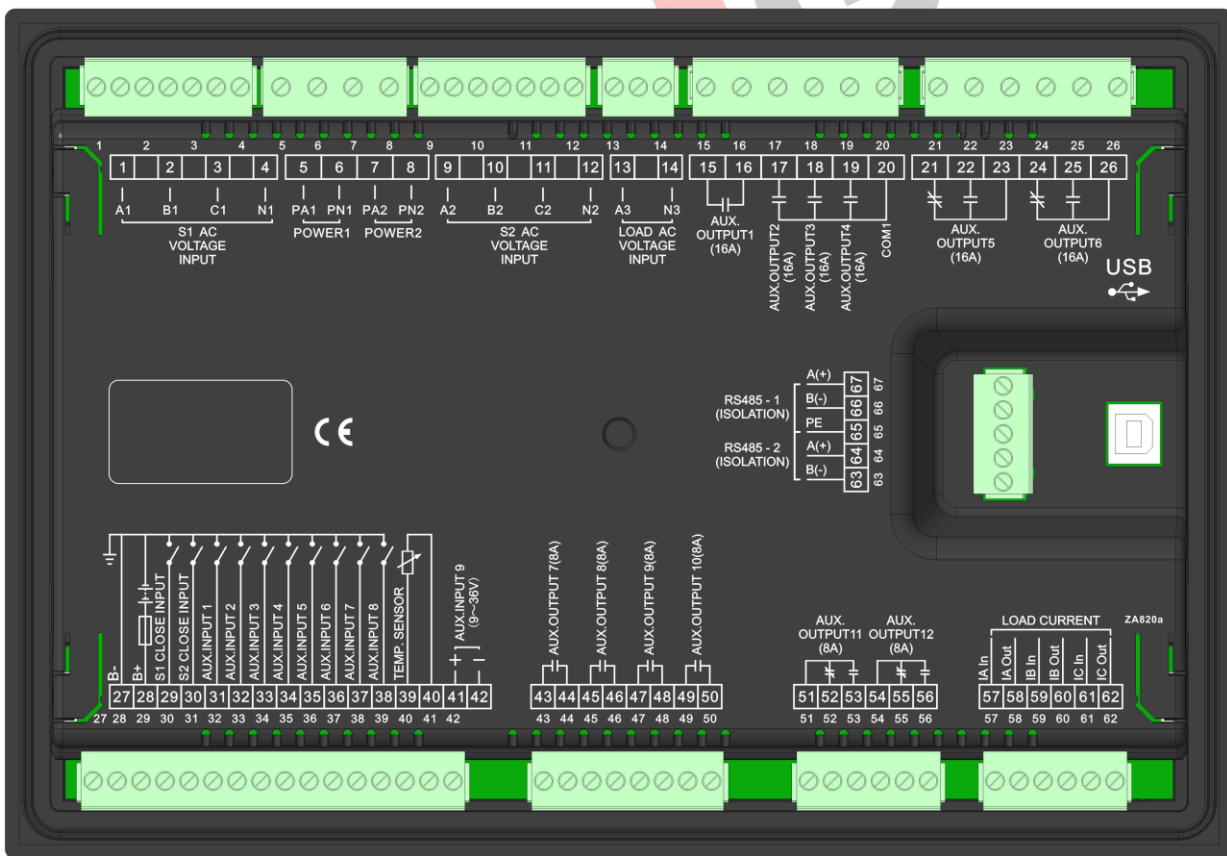


Fig. 4 Controller Rear Panel Drawing

Table 24 Input/Output Function Description

No.	Items	Description	Remark
1	A1	S1 AC System 3P4W voltage input	For single phase, only connect A1, N1.
2	B1		
3	C1		
4	N1		
5	PA1	Power 1 AC supply input	Phase voltage or wire voltage; Supply range AC(90~576)V
6	PN1		
7	PA2	Power 2 AC supply input	Phase voltage or wire voltage; Supply range AC(90~576)V
8	PN2		
9	A2	S2 AC System 3P4W voltage input	For single phase, only connect A2, N2.
10	B2		
11	C2		
12	N2		
13	A3	Voltage input for load;	When load end is connected, "Load Volt Enable" is enabled; Default is Disable;
14	N3		
15	AUX. OUTPUT 1	Programmable output 1	Default: QS1 close control; Volts free relay; Normally Open output. Capacity: 16A 250VAC
16			
17	AUX. OUTPUT 2	Programmable output 2	Default: QS1 open control; Volts free relay; Normally Open output. Capacity: 16A 250VAC
18	AUX. OUTPUT 3	Programmable output 3	Default: QS2 close control; Volts free relay; Normally Open output. Capacity: 16A 250VAC
19	AUX. OUTPUT 4	Programmable output 4	Default: QS2 open control; Volts free relay; Normally Open output. Capacity: 16A 250VAC
20	COM	Public point	Public point of Aux. outputs 2,3,4;
21	AUX. OUTPUT 5	N/C	Programmable output 5
22		N/O	
23		COM	
24	AUX. OUTPUT 6	N/C	Programmable output 6
25		N/O	
26		COM	
27	B-	Negative of DC power	Ground connected terminal for module;
28	B+	Positive of DC power	DC positive input (8-35)V; controller power supply;
29	QS1 CLOSE INPUT	QS1 close status input	Check QS1 close status; volts free contact input; Ground connected is active;
30	QS2 CLOSE INPUT	QS2 close status input	Check QS2 close status; volts free contact input; Ground connected is active;
31	AUX. INPUT 1	Programmable input 1	Defaults: Forced open

No.	Items	Description	Remark	
			Active if it is connected with ground;	
32	AUX. INPUT 2	Programmable input 2	Defaults: S1 trip input; Active if it is connected with ground.	
33	AUX. INPUT 3	Programmable input 3	Default: S2 trip input; Active if it is connected with ground.	
34	AUX. INPUT 4	Programmable input 4	Default: Not Used; Active if it is connected with ground.	
35	AUX. INPUT 5	Programmable input 5	Default: Not Used; Active if it is connected with ground.	
36	AUX. INPUT 6	Programmable input 6	Default: Not Used; Active if it is connected with ground.	
37	AUX. INPUT 7	Programmable input 7	Default: Not Used; Active if it is connected with ground.	
38	AUX. INPUT 8	Programmable input 8	Default: Not Used; Active if it is connected with ground.	
39	TEMP. SENSOR	Temp. sensor input	Connect resistor sensor externally;	
40	COM	COM for ground connected	Connected with B- internally;	
41	AUX. INPUT 9	+	(9~36)V	Default: Not Used;
42		-		
43	AUX. OUTPUT 7	Programmable output 7	Default: Not Used; volts free relay; N/O output; Capacity: 250V 8A	
44				
45	AUX. OUTPUT 8	Programmable output 8	Default: Not Used; volts free relay; N/O output; Capacity: 250V 8A	
46				
47	AUX. OUTPUT 9	Programmable output 9	Default: Not Used; volts free relay; N/O output; Capacity: 250V 8A	
48				
49	AUX. OUTPUT 10	Programmable output 10	Default: Not Used; volts free relay; N/O output; Capacity: 250V 8A	
50				
51	AUX. OUTPUT 11	COM	Programmable output 11	Default: Genset start; N/C output. volts free relay; N/C (N/O) output; Capacity: 250V 8A
52		N/C		
53		N/O		
54	AUX. OUTPUT 12	COM	Programmable output 12	Default: Not Used; volts free relay; N/C (N/O) output; Capacity: 250V 8A
55		N/C		
56		N/O		
57	IA Input	Secondary A-Phase		
58	IA Output	Current Input of CT		
59	IB Input	Secondary B-Phase		
60	IB Output	Current Input of CT		
61	IC Input	Secondary C-Phase		
62	IC Output	Current Input of CT		
63	RS485-2 B(-)	RS485-2 communication port	120Ω resistor shall be connected according to local network organization.	
64	RS485-2 A(+)			
65	PE	GND terminal for communication port		

No.	Items	Description	Remark
66	RS485-1 B(-)	RS485-1 communication port	120Ω resistor shall be connected according to local network organization.
67	RS485-1 A(+)		
USB	USB	D-type USB communication port	Used for parameter configurations and software upgrade by connecting with PC.

17 TYPICAL APPLICATION DIAGRAM

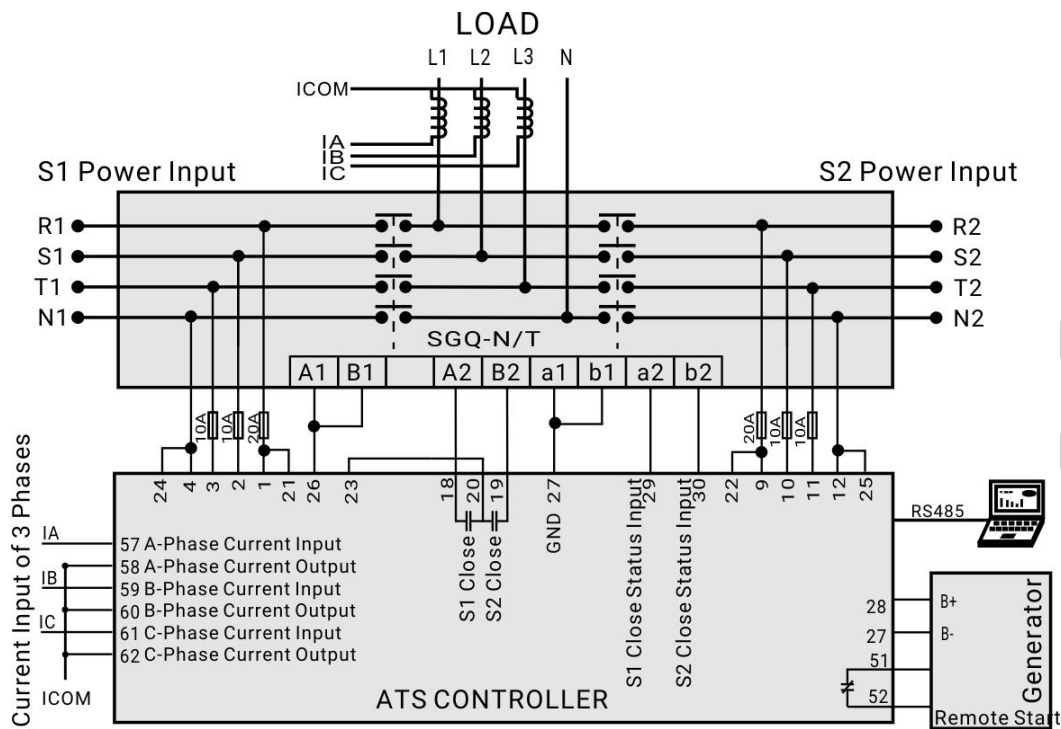


Fig. 5 SGQ-N/T Application Diagram

Table 25 Corresponding Settings

Parts of Parameter Settings	
Switch Type	No Breaking
Programmable output 2	Not Used
Programmable output 3	QS1 Close Output
Programmable output 4	QS2 Close Output
Programmable output 5	ATS Power L1
Programmable output 6	ATS Power N
Programmable output 11	Genset Start Output

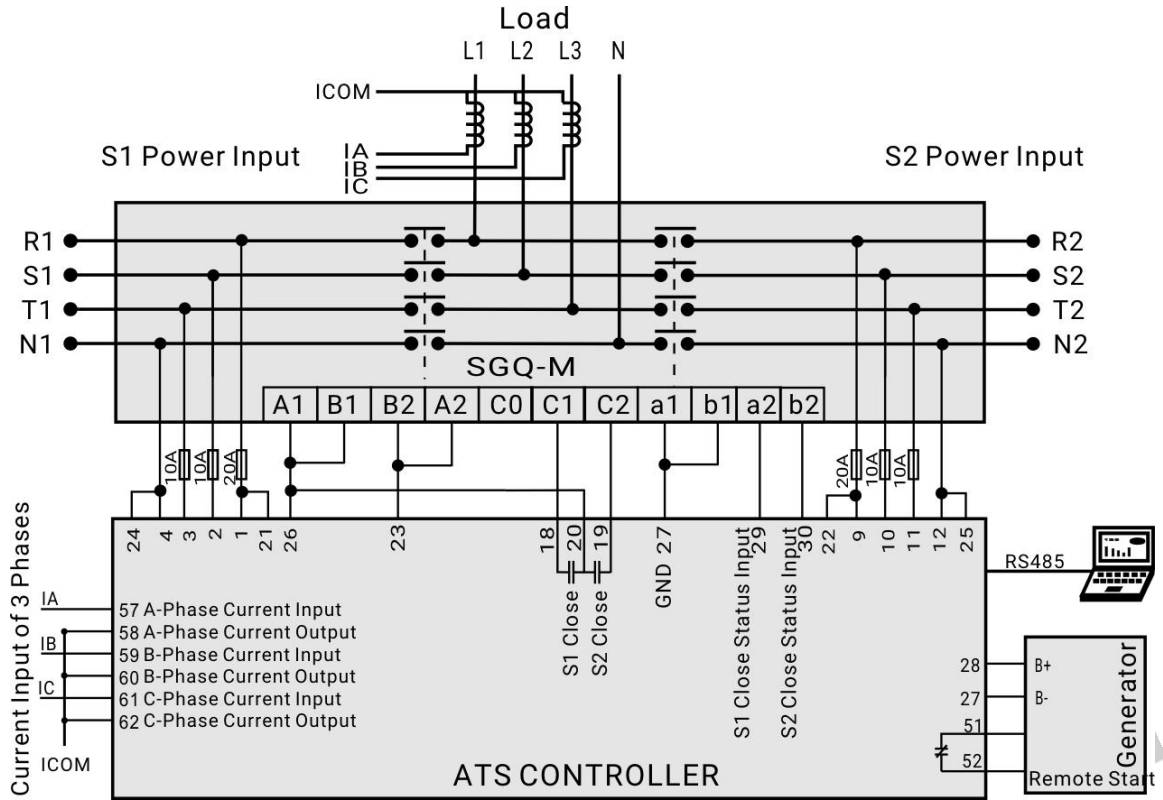


Fig. 6 SGQ-M Application Diagram

Table 26 Corresponding Settings

Parts of Parameter Settings	
Switch Type	No Breaking
Programmable output 2	Not Used
Programmable output 3	QS1 Close Output
Programmable output 4	QS2 Close Output
Programmable output 5	ATS Power L1
Programmable output 6	ATS Power N
Programmable output 11	Genset Start Output

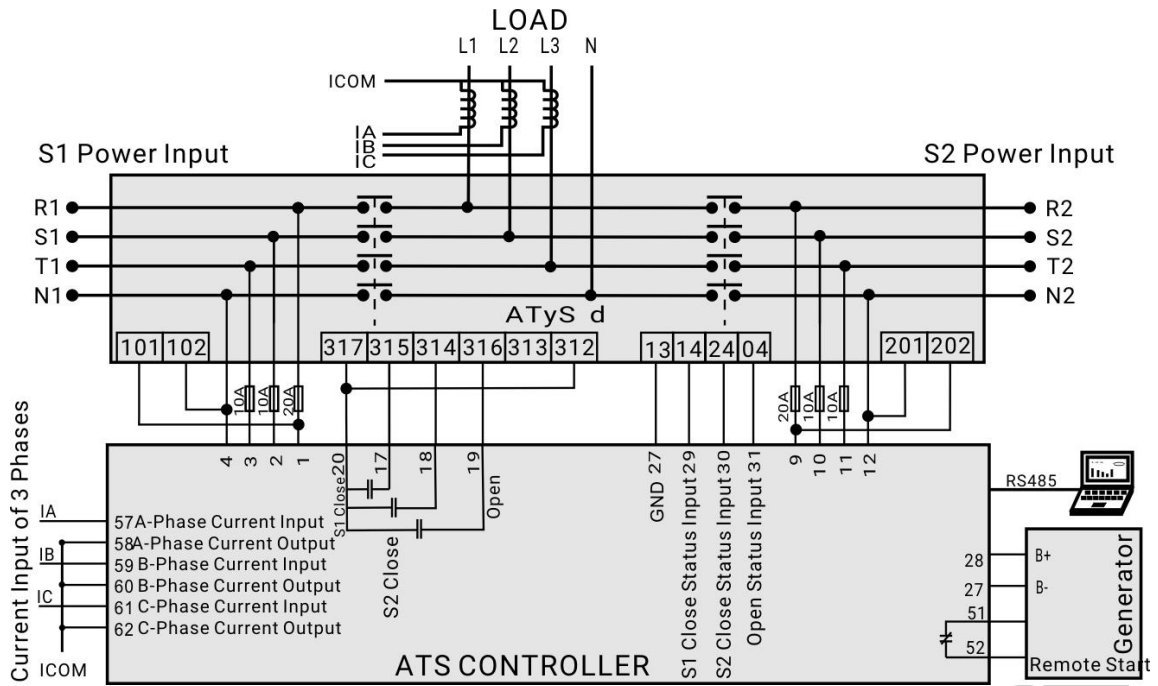


Fig. 7 ATyS d Application Diagram

Table 27 Corresponding Settings

Parts of Parameter Settings	
Switch Type	One Breaking
Programmable output 2	QS1 Close
Programmable output 3	QS2 Close
Programmable output 4	QS1 Open
Programmable output 11	Genset Start
Programmable input 1	QS1 Open Input

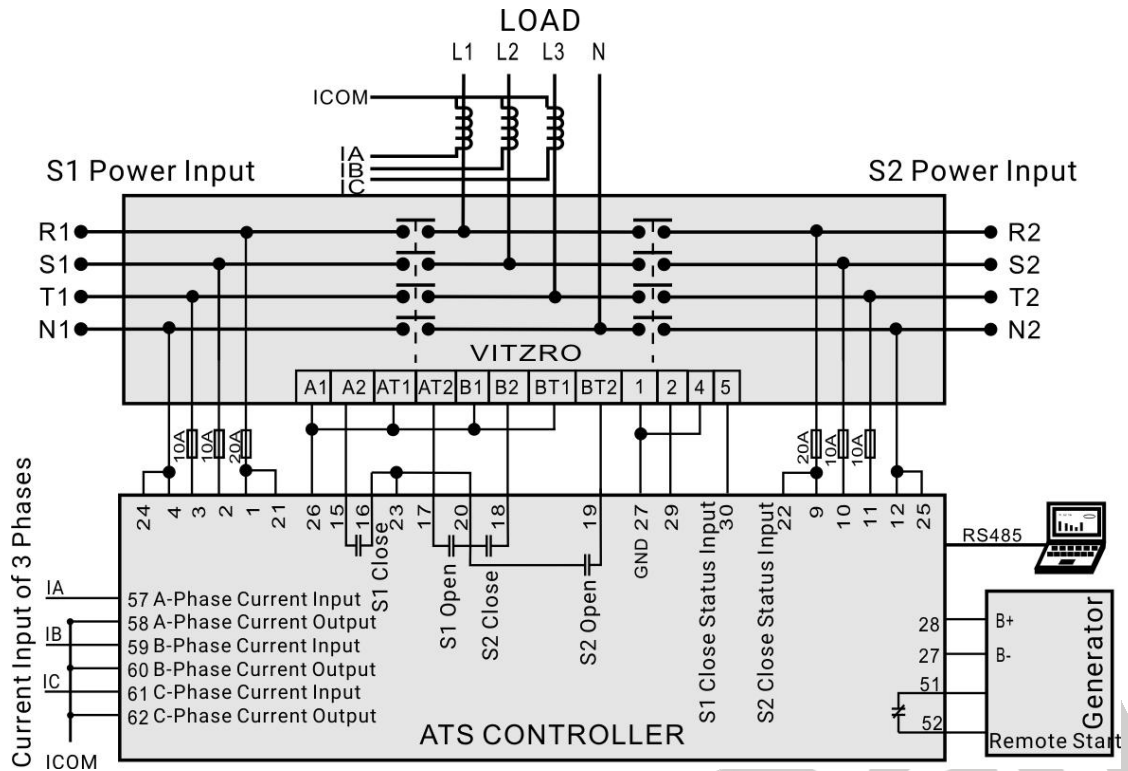


Fig. 8 VITZRO Application Diagram

Table 28 Corresponding Settings

Parts of Parameter Settings	
Switch Type	Two Breakings
Programmable output 1	QS1 Close
Programmable output 2	QS1 Open
Programmable output 3	QS2 Close
Programmable output 4	QS2 Open
Programmable output 5	ATS Power L1
Programmable output 6	ATS Power N
Programmable output 11	Genset Start

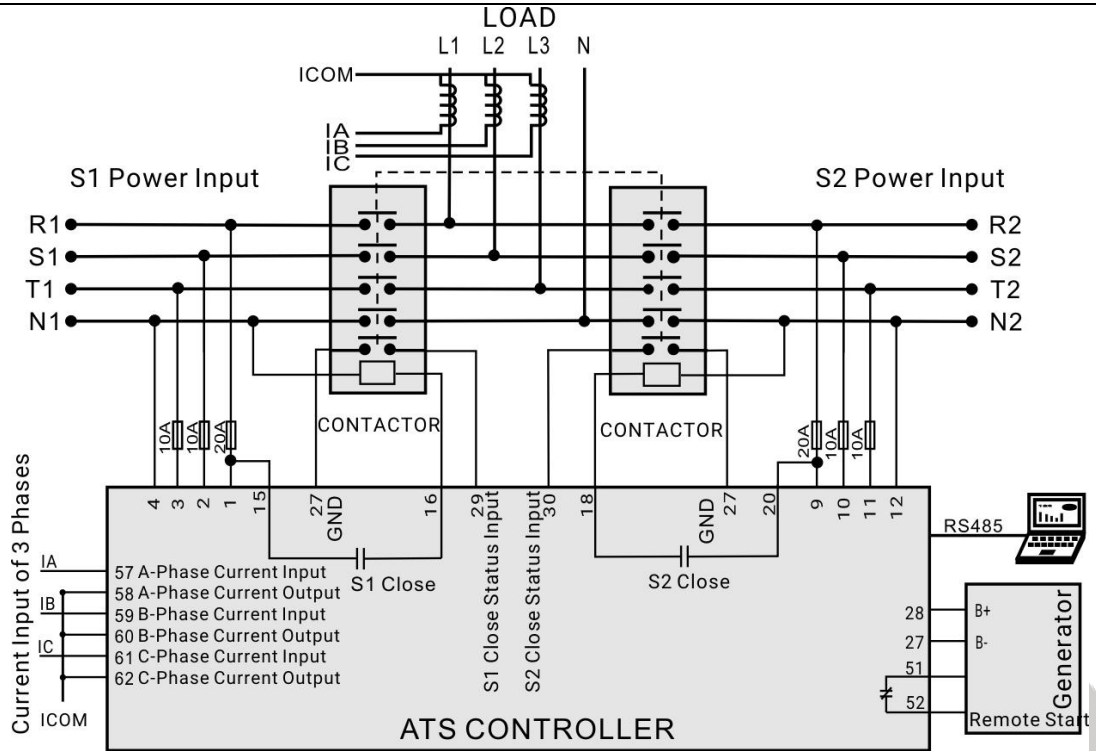


Fig. 9 Contactor Application Diagram

Table 29 Corresponding Settings

Parts of Parameter Settings	
Switch Type	Two Breakings
Continually Close	Enable
Transfer Time	10s (set based on actual situation)
Programmable output 1	QS1 Close
Programmable output 3	QS2 Close
Programmable output 11	Genset Start

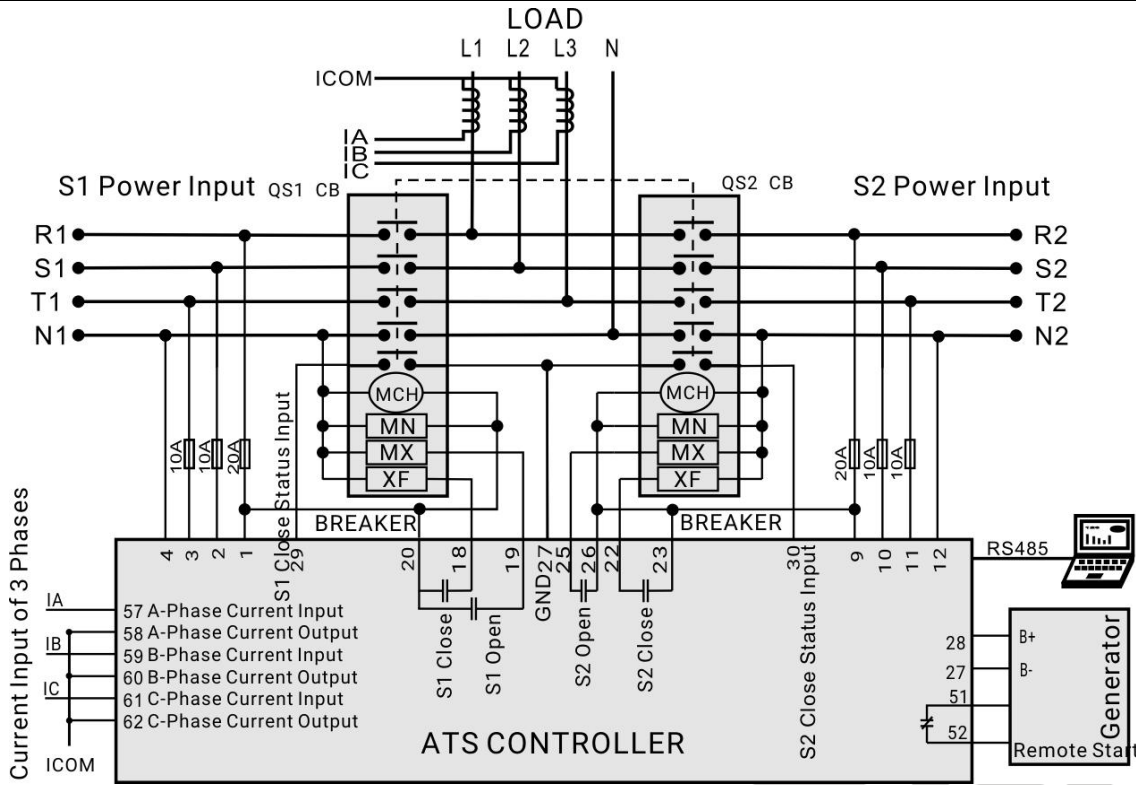


Fig. 10 Breaker Application Diagram

Table 30 Corresponding Settings

Parts of Parameter Settings	
Switch Type	Two Breakings
Programmable output 3	QS1 Close
Programmable output 4	QS1 Open
Programmable output 5	QS2 Close
Programmable output 6	QS2 Open
Programmable output 11	Genset Start

NOTE: Above application diagrams are only examples. Users shall do wiring connection according to actual situation.

18 INSTALLATION

The controller is panel-embedded design and they are fixed by clips in installation.

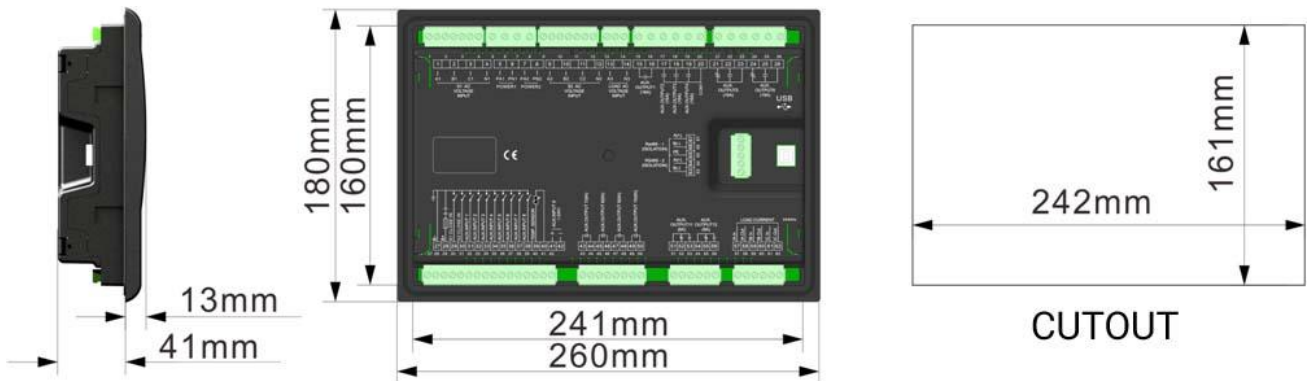


Fig. 11 Overall & Cutout Dimensions

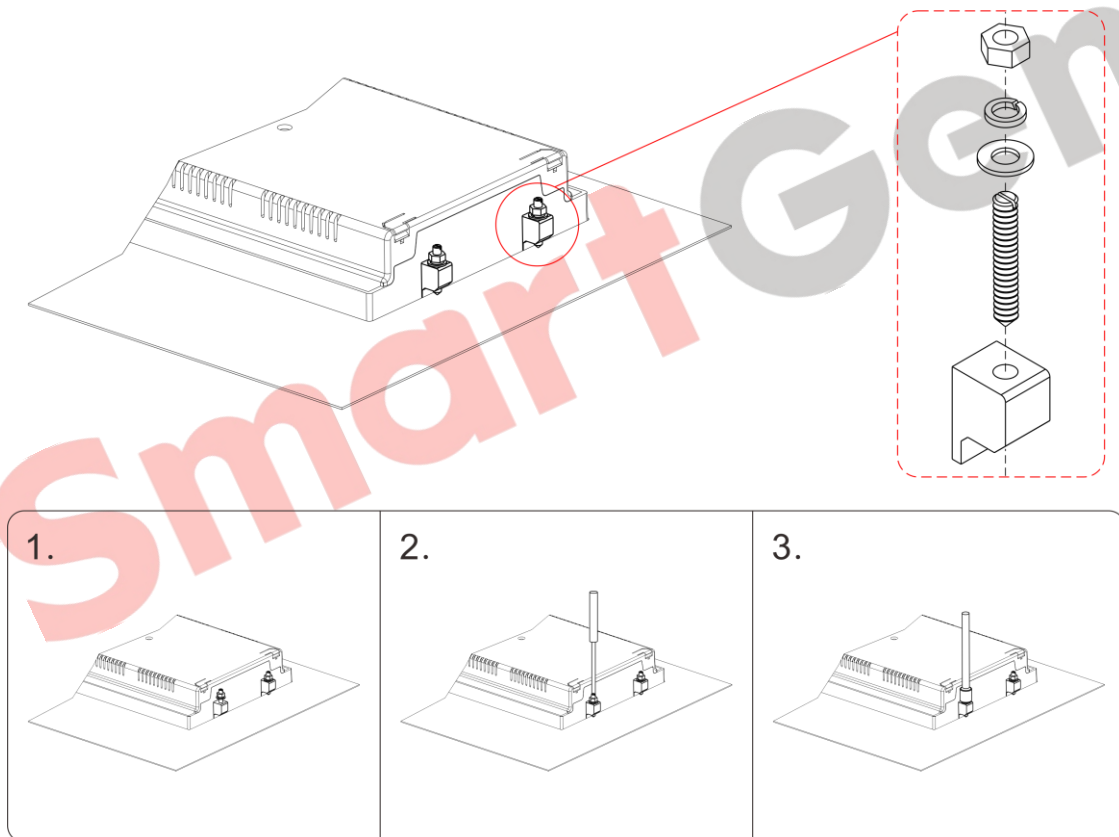


Fig. 12 Clip Installation Illustration

Installing Steps:

- Step 1: Mount the 4 clips in sequence and put them in the front panel trough in order;
- Step 2: Tighten the four fixing bolts by straight screwdriver;
- Step 3: Tighten the four hex nuts by M4 Sleeve;

19 TROUBLE SHOOTING

Table 31 Troubleshooting

Symptoms	Possible Solutions
Controller no response with power.	Check DC voltage; Check DC fuse; Check AC Power supply.
RS485 communication is abnormal	Check RS485 positive and negative poles are connected correctly or not; Check RS485 transfer is normal or not; Check the module address in the parameter settings is correct or not; If above methods can't solve the problem, try to parallelly connect 120Ω resistor between RS485 A terminal and B terminal.
Auxiliary Output Error	Check auxiliary output connections, pay attention to normally open contact and normally close contact; Check the output setting function and output type in parameter settings.
Auxiliary Input Abnormal	Check that the auxiliary input is soundly connected to GND when it's active, it shall be hung up when it is inactive; (NOTE: The input port will be possibly destroyed when it is connected with overvoltage.) Check the output setting function and output type in parameter settings.
Breaker Shift Abnormal	Check the breakers; Check the wirings between the controller and the breakers; Check related parameter settings about breakers.
Genset Start Control Abnormal	Check system type settings; Check function setting and output type of the output ports; Check all Start/Stop function settings.