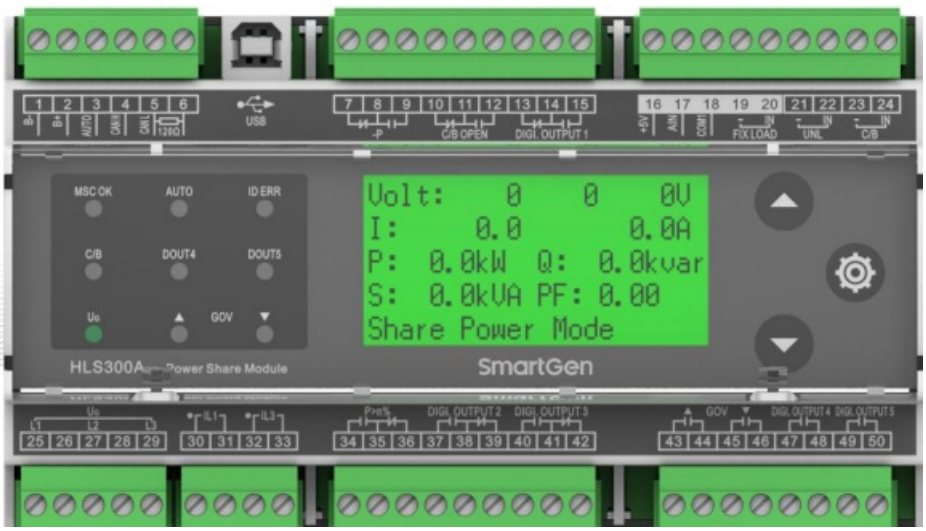
SmartGen HLS300A Power Share Module User Manual

Contents

SmartGen HLS300A Power Share Module



SmartGen Technology Co., Ltd.
No.28 Jinsuo Road, Zhengzhou, Henan Province, China
Tel: +86-371-67988888/67981888/67992951 +86-371-67981000(overseas)
Fax: +86-371-67992952
Web: www.smartgen.com.cn/ www.smartgen.cn/
Email: sales@smartgen.cn

Table 1 Software Version

Sign	Instruction
NOTE	Highlights an essential element of a procedure to ensure correctness.
CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.

OVERVIEW

HLS300A Power Share Module is a piece of upgrade product of HLS300. It is a special design for genset power share. On the basis of pre-set parameters, it can automatically complete power share in the process of genset running. Controller is upgraded to LCD graphic display, optional Chinese and English, control button and reactive power share function are added. The main function of HLS300A module is to share active power and reactive power proportionally and evenly to each operating genset based on genset capacitance. The module is easy to operate, convenient to install and can be widely used for ship genset and land genset.

PERFORMANCE AND CHARACTERISTICS

Main characteristics are as below:

- Suitable for 3-phase 3-wire, single phase 2-wire power systems with frequency 50/60Hz;
- 132×64 LCD display with backlight display, touch-button operations allowing to transfer display or set module running parameters;
- Module running parameters can be set by PC test software; module is connected with PC by USB nport in using;
- 10 relay outputs, 2 of which are used for GOV frequency raising and drop to control output, 5 are used for configurable output, 2 are used for -P, P>n% indication outputs, and 1 is used for C/B
- **OPEN output control;**
- 1 FIXLOAD mode, 1 UNL unloading, 1 close and 1 AUTO digital input;
- When genset is not working, press UP key longer for 3s in information display interface and it enters test mode, which can test whether LCD display, relay output and panel indicators are normal or not;
- Wide power supply range DC(8~35)V;
- Controller applies 35mm guide rail mounting;
- Modular structure design, pluggable connection terminal, compact structure with easy installation.

SPECIFICATION

Table 3 Product Parameters

Parameter	Details
Working Voltage	DC8.0V to DC35.0V continuous
Overall Consumption	2W (Standby mode≤1W)
AC Input	AC50V~ AC620V (ph-ph)
AC Frequency	50Hz/60Hz
Relay Output	6 10A AC250V Volt free outputs 4 5A AC250V Volt free outputs
CT Secondary Current	Rated: 5A
Working Temperature	(-25~+70)°C
Working Humidity	(20~95)%RH
Storage Temperature	(-25~+70)°C
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal; The leakage current is not more than 3mA within 1min.
Case Dimensions	161.6mm x 92.94mm x 60.7mm
Weight	0.49kg

PANEL INDICATORS AND TERMINALS DESCRIPTION

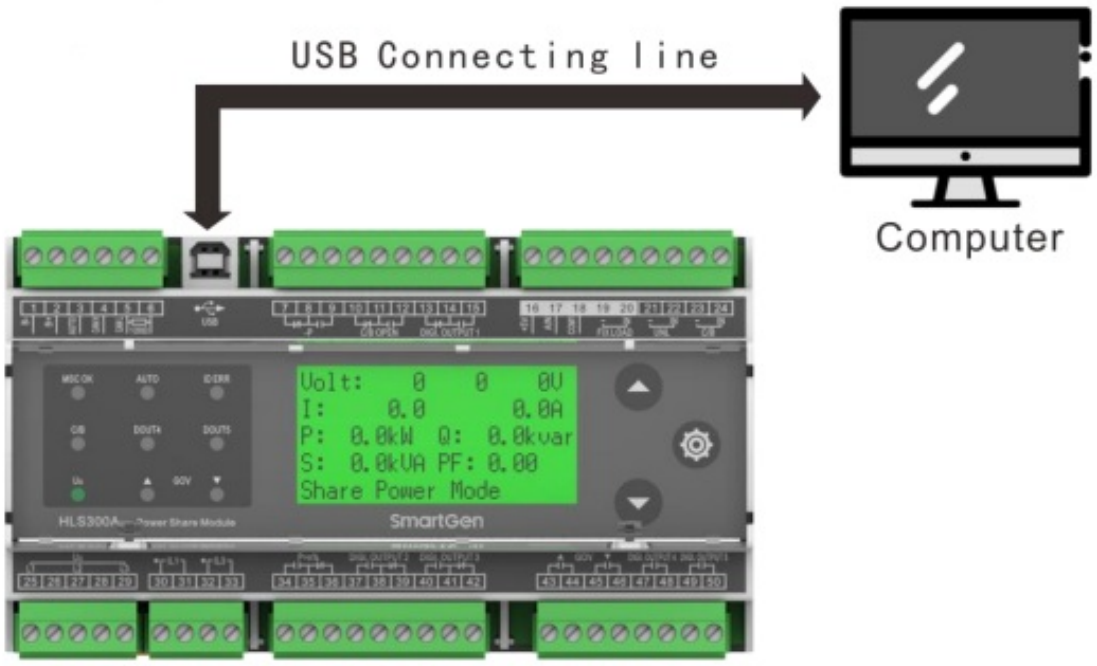


Table 4 LEDs Definition Description

No.	Function		Size	Note		
1	B-		1.5mm^2	Connected with negative of battery.		
2	B+		1.5mm^2	Connected with positive of battery.		
3	AUTO		0.5mm^2	Power share is enabled when both C/B input and this input are active.		
4	CANH		0.5mm^2	MSC communication.		
5	CANL		0.5mm^2			
6	Terminal Resistor Match			If terminal resistor short connecting with No. 4 terminal is needed, otherwise hung it up.		
7	Reverse Power Output	Normally Close	1.5mm^2	Output when reverse power has exceeded set value and the delay is over.	Normally contactor; free output; Rated	C/O Volts 10A
8		COM				
9		Normally Open				
10	Open Output	Normally Close	1.5mm^2	Output when open.	Normally contactor; free output; Rated	C/O Volts 10A
11		COM				
12		Normally Open				
13	Digi. Output 1	Normally Close		Configurable digital output port; can be configured to other function output.	Normally contactor; free output; Rated	C/O Volts 10A
14		COM				
15		Normally Open				
16	+5V		1.0 mm^2	Power adjustment.		
17	AIN		1.0 mm^2			
18	COM1		1.0 mm^2			
19	FIXLOAD	–	1.0mm^2	Fixed power mode input, active when it is		

20		IN		short connected.
21	UNL	–	1.0mm^2	Unload input, active when it is short connected.
22		IN		
23	C/B	–	1.0mm^2	Main switch close input, active when it is short connected.
24		IN		
25	L1 Phase Voltage Input		1.0mm^2	AC input.
26				
27	L2 Phase Voltage Input		1.0mm^2	
28				
29	L3 Phase Voltage Input		1.0mm^2	
30	IL1	CT A Phase Input	1.5mm^2	Externally connected to secondary coil of current transformer (rated 5A).
31				
32	IL3	CT C Phase Input	1.5mm^2	Externally connected to secondary coil of current transformer (rated 5A).
33				

Table 5 Terminal Description

No.	Function		Size	Note		
1	B-		1.5mm^2	Connected with negative of battery.		
2	B+		1.5mm^2	Connected with positive of battery.		
3	AUTO		0.5mm^2	Power share is enabled when both C/B input and this input are active.		
4	CANH		0.5mm^2	MSC communication.		
5	CANL		0.5mm^2			
6	Terminal Resistor Match			If terminal resistor short connecting with No. 4 terminal is needed, otherwise hung it up.		
7	Reverse Power Output	Normally Close	1.5mm^2	Output when reverse power has exceeded set value and the delay is over.	Normally contactor; free output; Rated	C/O Volts 10A
8		COM				
9		Normally Open				
10		Normally Close			Normally contactor; fr	C/O

11	Open Output	COM	1.5mm^2	Output when open.	ee output; Rated	Volts 10 A
12		Normally Open				
13	Digi. Output 1	Normally Close		Configurable digital output port; can be configured to other function output.	Normally contactor; free output; Rated	C/O Volts 10 A
14		COM				
15		Normally Open				
16	+5V		1.0 mm^2	Power adjustment.		
17	AIN		1.0 mm^2			
18	COM1		1.0 mm^2			
19	FIXLOAD	–	1.0mm^2	Fixed power mode input, active when it is short connected.		
20		IN				
21	UNL	–	1.0mm^2	Unload input, active when it is short connected.		
22		IN				
23	C/B	–	1.0mm^2	Main switch close input, active when it is short connected.		
24		IN				
25	L1 Phase Voltage Input		1.0mm^2	AC input.		
26						
27	L2 Phase Voltage Input		1.0mm^2			
28						
29	L3 Phase Voltage Input		1.0mm^2			
30	IL1	CT A Phase Input	1.5mm^2	Externally connected to secondary coil of current transformer (rated 5A).		
31						
32	IL3	CT C Phase Input	1.5mm^2	Externally connected to secondary coil of current transformer (rated 5A).		
33						

NOTE: About PC programming connection, please connect PC with USB connecting wire. Through the PC software of our company, parameters can be set. Please see Fig.2

SCOPES AND DEFINITIONS OF PROGRAMMABLE PARAMETERS

Table 6 Module Configurable Parameters

No.	Items	Parameters	Defaults	Description	
1	AC System	(0-1)	0	0: 3P3W; 1: 1P2W	
2	Rated Voltage	(30-30000)V	400	/	
3	Volt Trans.	(0-1)	0	0: Disabled; 1: Enabled	
4	Volt Trans. Primary Voltage	(30-30000)V	100	/	
5	Volt Trans. Secondary Voltage	(30-1000)V	100	/	
6	Over Volt	(0-1)	1	0: Disabled; 1: Enabled	
7		(100-120)%	115	Threshold	
8		(100-120)%	113	Returned	
9		(0-3600)s	3	Delay	
10	Under Volt	(0-1)	1	0: Disabled; 1: Enabled	
11		(70-100)%	75	Threshold	
12		(70-100)%	77	Returned	
13		(0-3600)s	3	Delay	
14	Over Freq	(0-1)	1	0: Disabled; 1: Enabled	
15		(100-120)%	110	Threshold	
16		(100-120)%	104	Returned	
17			3	Delay	
18	Under Freq	(0-1)	1	0: Disabled; 1: Enabled	
19		(80-100)%	90	Threshold	
20		(80-100)%	96	Returned	
21		(0-3600)s	3	Delay	
22	Loss of Phase	(0-1)	1	0: Disabled; 1: Enabled	
23	Phase Rotation Monitor	(0-1)	1	0: Disabled; 1: Enabled	
24	CT Ratio/5	(5-6000)	500	/	
25	Full Load Rated Current	(5-6000)A	500	/	
26	Rated Active Power	(0-6000)kW	276	/	

27	Rated Reactive Power	(0-6000)kvar	207	/	
28	Reverse Power Threshold	(0-20)%	10	/	
29	Reverse Power Delay	(1-3600)s	3	/	
30	Low Power Threshold	(0-20)%	10	/	
31	Low Power Delay	(1-3600)s	3	/	
32	20% Power Threshold	(0-50)%	20	Total active power/rated active power×100% ≤ the set value and duration ≥ the corresponding delay value, the output voltage signal is effective if programmable outlet configuration is P<20% .	
33	20% Power Delay	(1-3600)s	3	/	

No.	Items	Parameters	Defaults	Description
34	80% Power Threshold	(0-120)%	80	Total active power/rated active power×100% ≥ the set value and duration ≥ the corresponding delay value, the output voltage signal is effective if programmable outlet configuration is P>80%.
35	80% Power Delay	(1-3600)s	3	/
36	Loss of Excitation Threshold	(0-50)%	20	/
37	Loss of Excitation Delay	(1-3600)s	3	/
38	Unbalance Threshold of Active Share	(0-50)%	15	/
39	Unbalance Delay of Active Share	(1-3600)s	90	/
40	Unbalance Threshold of Reactive Share	(0-50)%	20	/
41	Unbalance Delay of Reactive Share	(1-3600)s	3	/
42	Digi. Output 1 Type	(0-1)	0	0: Normally Open 1: Normally Close
43	Digi. Output 1 Contents	(0-30)	12	Default: Load Transfer Output; Refer to Output Contents.
44	Digi. Output 2 Type		0	0: Normally Open 1: Normally Close

45	Digi. Output 2 Contents	(0-30)	15	Default: P<20% Output, Refer to Output Contents.
46	Digi. Output 3 Type	(0-1)	0	0: Normally Open 1: Normally Close
47	Digi. Output 3 Contents	(0-30)	16	Default: Low Power Output; Refer to Ou tput Contents.
48	Digi. Output 4 Type	(0-1)	0	0: Normally Open 1: Normally Close
49	Digi. Output 4 Contents	(0-30)	20	Default: Voltage Up Output; Refer to Out put Contents.
50	Digi. Output 5 Type	(0-1)	0	0: Normally Open 1: Normally Close
51	Digi. Output 5 Contents	(0-30)	21	Default: Voltage Down Output; Refer to Output Contents.
52	60Hz Enable	(0-1)	0	0: Disable; 1: Enable
53	Module Address	(1-254)	1	Address of communicating with PC soft ware.
54	Language Selection	(0-1)	0	0: Simplified Chinese; 1: English
55	Module ID	(0-15)	1	Module ID number connected in the sa me CAN bus.
56	Load Ramp Rate	(0.1-100.0)%/s	3.0	/
57	Load Ramp Rate Delay Percentage	(0.1-40.0)%	10.0	/
58	Load Ramp Rate Delay	(0-3600)s	0	/
59	Load Parallel Ramp	(0-100)%	5	Load value of unload and breaker

No.	Items	Parameters	Defaults	Description
34	80% Power Threshold	(0-120)%	80	Total active power/rated active power×1 00% ≥ the set value and duration ≥ the c orresponding delay value, the output vol tage signal is effective if programmable outlet configuration is P>80%.
35	80% Power Delay	(1-3600)s	3	/
36	Loss of Excitation Threshold	(0-50)%	20	/
37	Loss of Excitation Delay	(1-3600)s	3	/
38	Unbalance Threshold of Active Share	(0-50)%	15	/

39	Unbalance Delay of Active Share	(1-3600)s	90	/
40	Unbalance Threshold of Reactive Share	(0-50)%	20	/
41	Unbalance Delay of Reactive Share	(1-3600)s	3	/
42	Digi. Output 1 Type	(0-1)	0	0: Normally Open 1: Normally Close
43	Digi. Output 1 Contents	(0-30)	12	Default: Load Transfer Output; Refer to Output Contents.
44	Digi. Output 2 Type		0	0: Normally Open 1: Normally Close
45	Digi. Output 2 Contents	(0-30)	15	Default: P<20% Output, Refer to Output Contents.
46	Digi. Output 3 Type	(0-1)	0	0: Normally Open 1: Normally Close
47	Digi. Output 3 Contents	(0-30)	16	Default: Low Power Output; Refer to Ou tput Contents.
48	Digi. Output 4 Type	(0-1)	0	0: Normally Open 1: Normally Close
49	Digi. Output 4 Contents	(0-30)	20	Default: Voltage Up Output; Refer to Out put Contents.
50	Digi. Output 5 Type	(0-1)	0	0: Normally Open 1: Normally Close
51	Digi. Output 5 Contents	(0-30)	21	Default: Voltage Down Output; Refer to Output Contents.
52	60Hz Enable	(0-1)	0	0: Disable; 1: Enable
53	Module Address	(1-254)	1	Address of communicating with PC soft ware.
54	Language Selection	(0-1)	0	0: Simplified Chinese; 1: English
55	Module ID	(0-15)	1	Module ID number connected in the sa me CAN bus.
56	Load Ramp Rate	(0.1-100.0)%/s	3.0	/
57	Load Ramp Rate Delay Percentage	(0.1-40.0)%	10.0	/
58	Load Ramp Rate Delay	(0-3600)s	0	/
59	Load Parallel Ramp	(0-100)%	5	Load value of unload and breaker

No.	Items	Parameters	Defaults	Description
				control pulse.
79	Voltage Governor T	(0.01-10.00)s	2.00	/
80	Voltage Governor Xq	(0-±50)%	50	During the area pulse width is in direct ratio with current reactive power and rated reactive power deviation value.
81	Voltage Governor Xu	(0-±20)%	20	During the area pulse width is in direct ratio with current voltage and rated voltage deviation value.
82	Voltage Governor q	(1-15)%	5	Reactive power adjusting accuracy; it won't adjust the reactive power if this has exceeded the set area.
83	Voltage Governor u	(0.1-15.0)%	2.0	Frequency modulation accuracy; it won't adjust the voltage if frequency has exceeded the set area.

WARNINGS

When controller detects warning signals, it issues warning alarm signal and LCD displays warning alarm type.

Table 7 Warnings

No.	Warning Type	Description
1	Gens Over Voltage	When controller detects Gens Voltage/Rated voltage x100%>=threshold of over voltage setting and lasting time >= delay value of over voltage sett ing, it issues warning signal, meanwhile LCD displays Gens Over Voltage warning.
2	Gens Under Voltage	When controller detects Gens Voltage/Rated voltage x100%>=threshold of under voltage setting and lasting time >= delay value of under voltage s etting, it issues warning signal, meanwhile LCD displays Gens Under Volt age warning.
3	Gens Over Frequency	When controller detects Gens frequency/Rated frequency x100%>=thres hold of over frequency setting and lasting time >= delay value of over freq uency setting, it issues warning signal, meanwhile LCD displays Gens Ov er Frequency warning.
4	Gens Under Frequency	When controller detects Gens frequency /Rated frequency x100%>=thres hold of under frequency setting and lasting time >= delay value of under fr equency setting, it issues warning signal, meanwhile LCD displays Gens Under Frequency warning.
5	Reverse Power	
6	Reverse Phase Sequence	When controller detects Gens Ub phase>Gens Uc phase and lasting time >=3s, it issues warning alarms, meanwhile LCD displays Reverse Phase Sequence Wrong warning.
7	Loss of Phase	When controller detects one phase is lost, it issues warning alarms, mean while LCD displays loss of phase warning.
8	Loss of Excitation	When controller detects current reactive power percentage <0, absolute v alue >= loss of excitation value and lasting time >= loss of excitation dela y, controller issues warning signal, meanwhile LCD displays Loss of Excit ation warning.
9	Active Unbalance Share	When controller detects active unbalance percentage >=active share unb alance threshold and lasting time >=active share unbalance delay value, i t issues warning alarm signal, meanwhile LCD displays active power shar e unbalance warning.
10	Reactive Unbalance Share	When controller detects reactive unbalance percentage >=reactive share unbalance threshold and lasting time >=reactive share unbalance delay v alue, it issues warning alarm signal, meanwhile LCD displays reactive po wer share unbalance warning.
11	Failed to Unload	When unloading input is active, after failed to unload delay, current active power percentage >minimum loading percentage, it issues
No.	Warning Type	Description
		warning alarm signal, meanwhile LCD displays failed to unload warning.
12	MSC ID Set Wrong	When controller detects module IDs in the same CAN bus are the same, it issues warning signal, meanwhile LCD displays MSC ID set wrong.

OUTPUT CONFIGURATION CONTENTS

Table 8 Output Contents

No.	Output Contents		Description
00	Not Used		/
01	Over Voltage		When Gens voltage/rated voltage x100% >=over voltage threshold and lasting time >=over voltage delay, then over voltage is active.
02	Under Voltage		When Gens voltage/rated voltage x100% <=under voltage threshold an d lasting time >= under voltage delay, then under voltage is active.
03	Over Frequency		When Gens frequency/rated frequency x100% >=over frequency thresh old and lasting time >= over frequency delay, then over frequency is acti ve.
04	Under Frequency		When Gens frequency/rated frequency x100% <= under frequency thre shold and lasting time >= under frequency delay, then under frequency i s active.
05	Reverse Power		When total active power <0, absolute value/rated active power x100% >=reverse power threshold and lasting time >=reverse power delay, the n reverse power is active.
06	Reverse Phase Sequence		When Gens Ub phase >Gens Uc phase and lasting time >=3s, then rev erse phase sequence is active.
07	Loss of Phase		
08	Loss of Excitation		When current reactive power percentage<0, absolute value>=loss of ex citation threshold, and lasting time>=loss of excitation delay, loss of exc itation is active.
09	Unbalance of Power Share	Active	When unbalance percentage of active power >=unbalance threshold of active share and lasting time>=unbalance delay of active share, unbala nce of active power share is judged.
10	Unbalance of Power Share	Reactiv e	When unbalance percentage of reactive power>=unbalance threshold of reactive share and lasting time >=unbalance delay of reactive share, unbalance of reactive share is judged.
11	Breaker Open Output		/
12	Load Transfer Output		Loading transfer output is active in the unloading process.
13	Common Alarm Output		When any alarm in Table 7 occurs, common alarm is considered.
14	P>80% Output		When total active power/rated active power x100%>=80% power thres hold and lasting time >=80% power delay, P>80% is active.
15	P<20% Output		When total active power/rated active power x100% <=20% power thres hold and lasting time >=20% power delay value, P<20% is active.
16	LOW-P Output		When total active power/rated active power x100% <= low power thres hold and lasting time >= low power delay value, low power is active.
17	MSC ID Wrong		When module IDs in the same CAN bus are the same, then MSC ID wr ong is judged.

No.	Output Contents		Description
18	Speed Raise Output	/	

19	Speed Drop Output	/	
20	Voltage Raise Output	/	
21	Voltage Drop Output	/	
22	Reserved	/	
23	Reserved	/	

FUNCTION DESCRIPTION

ILLUSTRATION

The function of HLS300A Power Share Module is to proportionally share active power and reactive power to each operating genset according to genset capacitance. When “FIXLOAD” input is active, the module works in fixed power mode; otherwise the module works in power share mode. Press UP button for 3s in information display interface, and it will enter into test mode, which is used to test relay output and indicator status.

FIXED POWER MODE

Target active power can be set via the external device connected with terminal 16, 17, 18. When close input and fixed power input are active, the module will adjust present power to target power and active power will stabilize in the area between △f and △p, while reactive power will stabilize in the area between △u and △q.

POWER SHARE MODE

Multiple modules are connected with each other via CAN bus and operate in power share mode together. Target power is an average of present power sum of these modules. When close input is active, the module will adjust present power to target power and active power will stabilize in the area between △f and △P, while reactive power will stabilize in the area between △u and △q.

TEST MODE

When Generator is not working, press UP button for 3s in information display interface, and the module will enter into test mode. For each time press UP key, there will be one relay outputting and one indicator illuminating. When relay output is completed (for each time only one relay output and one indicator light on), module will exit from test mode. When module is in test mode, if no key is pressed in 20 seconds, then module will exit from test mode automatically.

NOTE: Test mode is prohibited to enter for module when generator is working.

TYPICAL DIAGRAM

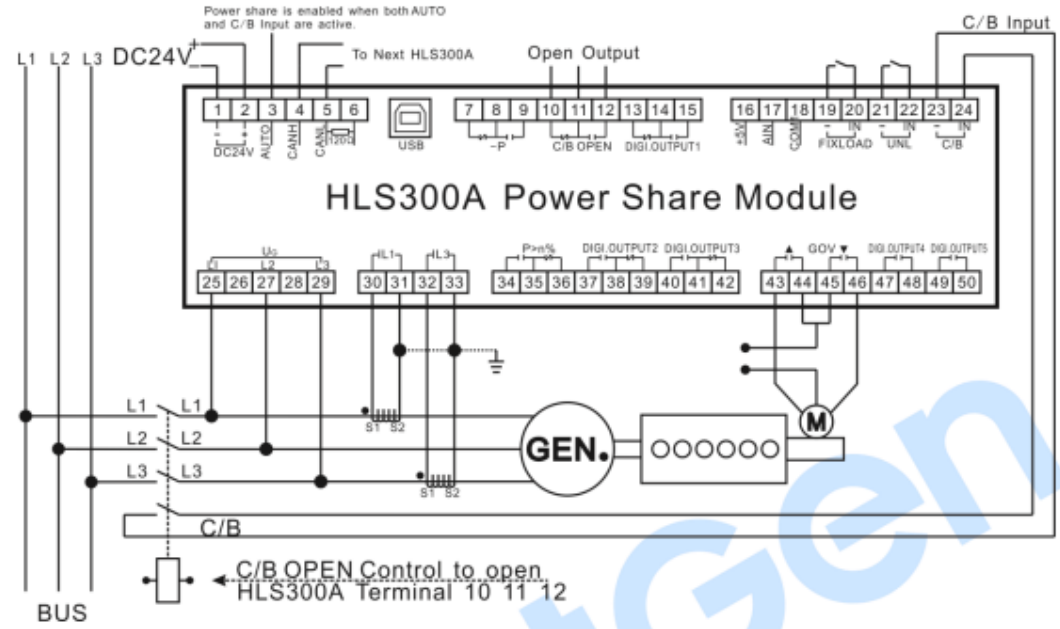


Fig.3 HLS300A 3Phase 3Wire Typical Application

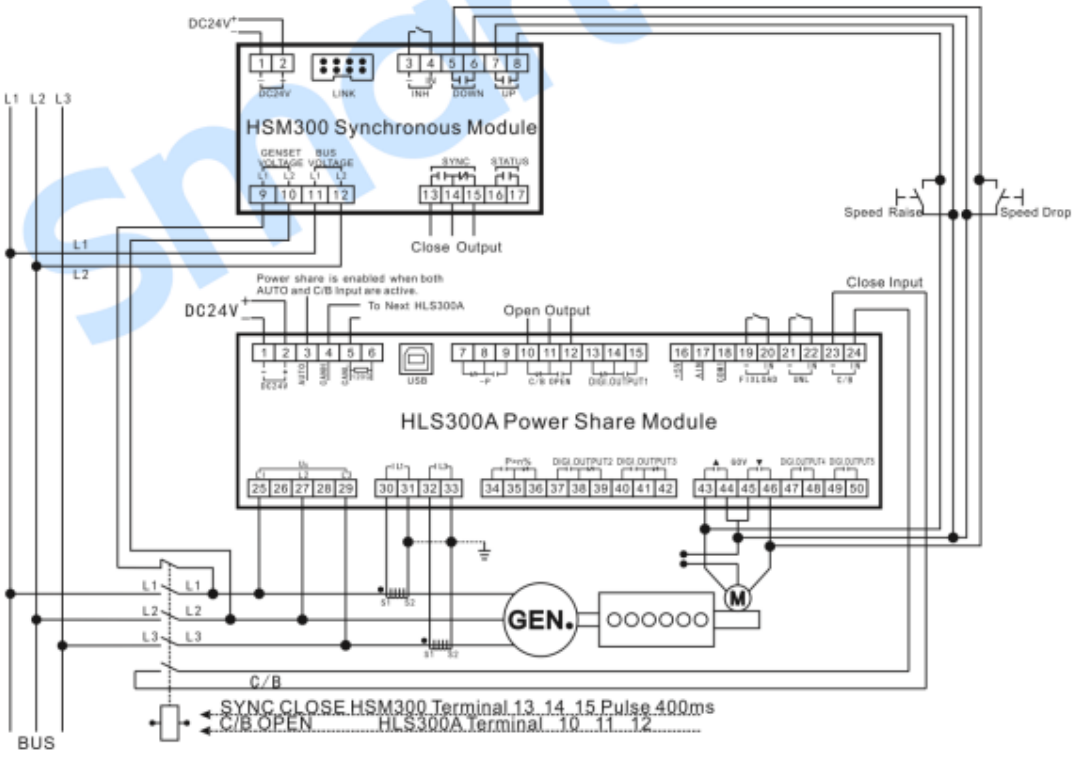


Fig.4 HSM300-HLS300A 3Phase 3Wire Typical Application

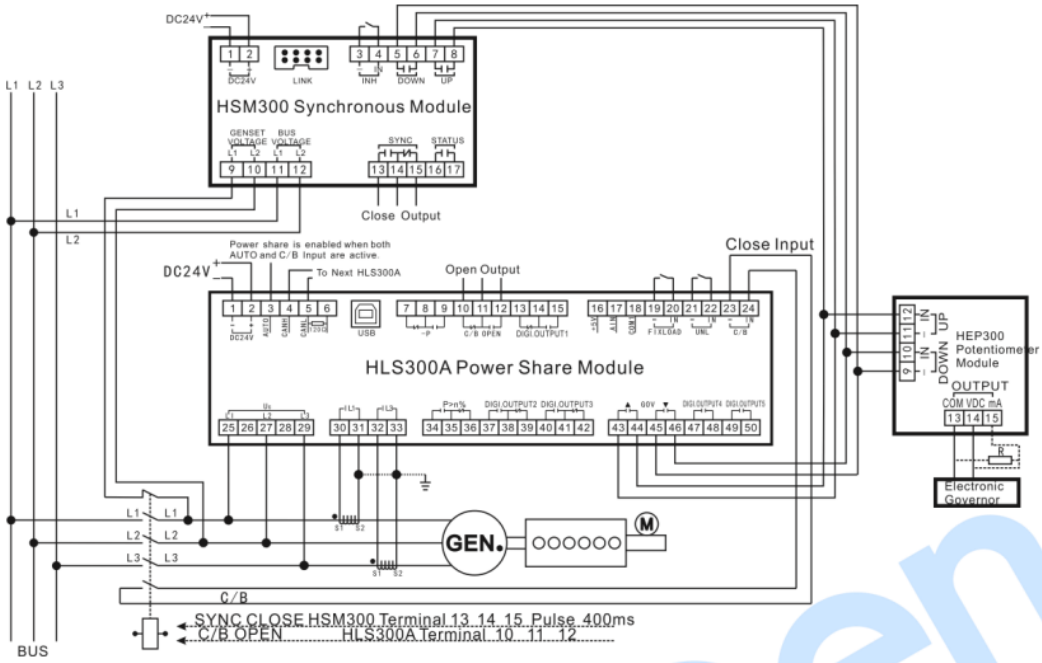


Fig.5 HSM300-HLS300A-HEP300 3Phase 3Wire Typical Application

CASE DIMENSION

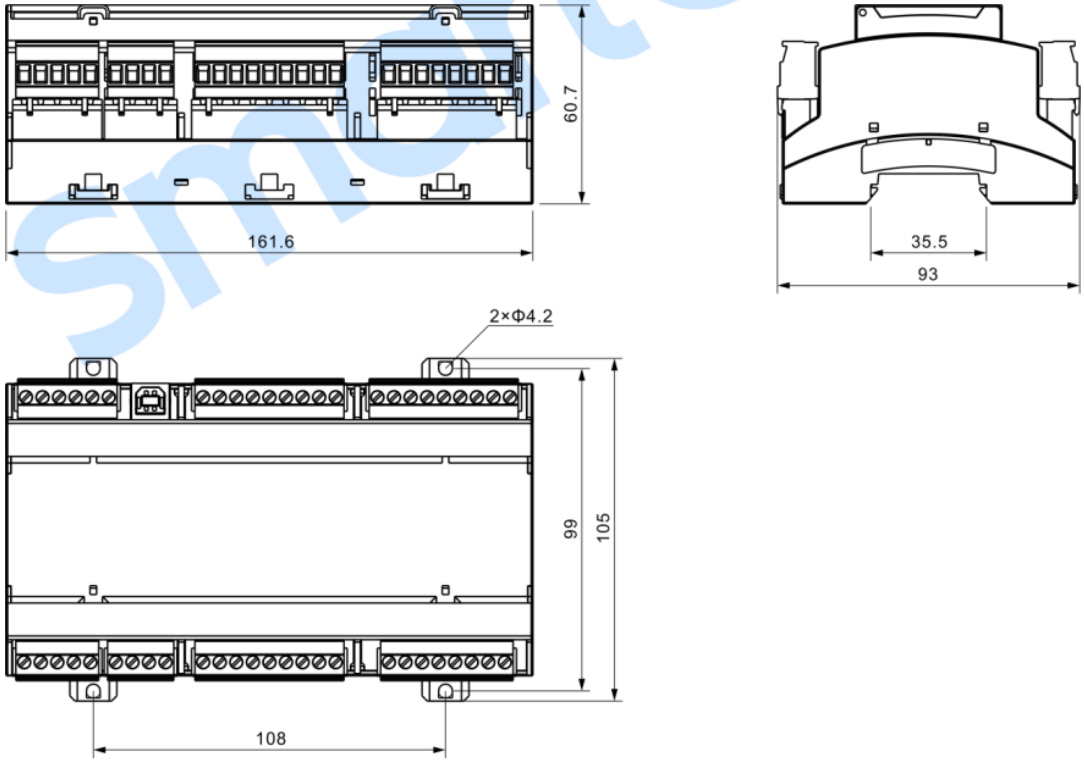


Fig.6 Overall Dimensions (Unit: mm)

INSTALLATION PRECAUTIONS

OUTPUT AND EXPAND RELAYS

All outputs are relay contact output type. If it needs to expand the relays, please add freewheel diode to both ends of expand relay's coils (when coils of relay have DC current) or, add resistance-capacitance return circuit (when coils of relay have AC current), in order to prevent disturbance for controller or other equipments.

AC INPUT

Current input must be connected to outside current transformer. And the current transformer's secondary side current must be 5A. Meanwhile the phases of CT and input voltage must be correct, otherwise the sampling current and active power may be incorrect.

NOTE: When there is load current, transformer's secondary side is prohibited to have open circuit.

WITHSTAND VOLTAGE TEST
CAUTION! When controller has been installed in control panel, if it needs doing the high voltage test, please disconnect all terminal connections, in order to prevent high voltage entering controller and damaging it.

FAULT FINDING

The followings are the common faults and troubleshooting methods during the use process of our company controllers. If other unsolvable faults occur, please contact our company.

Table 9 Fault Finding

Fault Symptom	Possible Measures
Controller no response with power on	Check controller connection wirings;
Speed and voltage cannot be regulated.	Check speed regulator and voltage governor connecting wires and check whether voltage regulation output is enabled.
Unbalanced power share	Check voltage governor and speed regulator wirings; Check whether breaker close feedback input and AUTO input are normal or not;
Cycle high and low distribution of grid-connected gensets (unstable operation)	Dead area of power distribution setting is too small; Speed and voltage governor parameter configurations make output flexibility too high; Speed and voltage governor flexibility is too high.

Documents / Resources

	SmartGen HLS300A Power Share Module [pdf] User Manual HLS300A, Power Share Module, HLS300A Power Share Module, Share Module, Module

References

- 众智____
- 众智____