HSM300

SYNCHRONOUS MODULE

USER MANUAL

SMARTGEN (ZHENGZHOU) TECHNOLOGY CO.,LTD.

Chinese trademark

English trademark

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

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Software Version

Date	Version	Content
2015-05-21	1.0	Original release.
2017-03-09	1.1	Add description of Raise/Drop Speed Relay Output Control; Modified parameters' default values of Rated Voltage, Under Frequency and etc.

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.

CONTENT

1 OVERVIEW

HSM300 Synchronous Module is special design for genset automatic parallel. On the basis of the parameters, the module automatically tests the conditions of paralleling (pressure difference, frequency difference and phase) and send parallel signal when the conditions meet parallel requirements.

HSM300 Synchronous Module is used for the occasions that gens synchronize to bus. The module is brief to operate, easy to install and widely used for ship genset and land genset.

2 PERFORMANCE AND CHARACTERISTICS

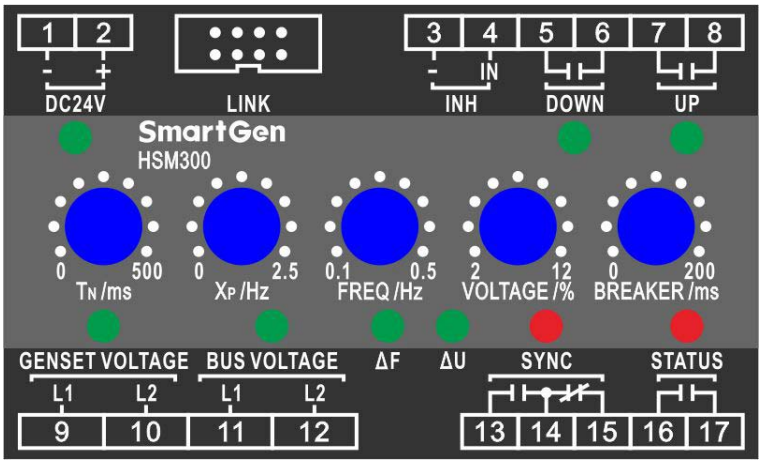
- Suitable for 3-phase 4-wire, 3-phase 3-wire, 2-phase 3-wire, single phase 2-wire systems with frequency 50/60/Hz;
- Adjustable potentiometer allows for set main parameters of synchronizing.
- The operating parameters can be set via upper computer test software. LINK port should be connected to upper computer via SG72 module (USB to LINK)
- 4 relays output, 2 relays are used for UP output, DOWN output, 1 SYNC relay is used for sync close output, 1 STATUS relay is used for status output after close;
- 1 INH “inhibit sync close output” digital input, when the input is active and gens synchronize with bus, the SYNC indicator will illuminate and sync close relay is inhibited to output.
- One test button, test relay output and panel indicators;
- Widely power supply range DC(8~35)V, suitable to different starting battery voltage environment;
- 35mm guide rail mounting;
- Modular design, pluggable terminal, compact structure with easy installation.

3 SPECIFICATION

Parameter	Details
Working Voltage	DC8.0V to 35.0V, continuous power supply.
Overall Consumption	≤1W(Standby mode≤0.5W)
AC Input	AC50V~ AC620 V (ph-ph)
AC Frequency	50Hz/60Hz
Relay Output	7A AC250V Volts free output
SYNC Output	5A AC250V/5A DC30V Volts free output
UP Output	5A AC250V/5A DC30V Volts free output
DOWN Output	5A AC250V/5A DC30V Volts free output
STATUS Output	5A AC250V/5A DC30V Volts free output
Case Dimensions	71.6mm x 89.7mm x 60.7mm
CT Secondary Current	Rated: 5A
Working Conditions	Temperature: (-25~+70)°C Humidity: (20~95)%
Storage Conditions	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.
Weight	0.20kg

4 PANEL INDICATORS AND TERMINALS DESCRIPTION

Mask as below:



LEDs Definition:

Indicators	Color	Description	Notes
Power	Green	Power indicator, the lamp illuminate when the power works well.	
UP	Green	When the raising speed pulse is sent, the lamp will illuminate.	
DOWN	Green	When the decreasing speed pulse is sent, the lamp will illuminate.	
GENSET	Green	When gens voltage and frequency normally, the lamp will illuminate; when gens voltage and frequency abnormally, the lamp will glitter; when there is no power, the lamp will extinguish.	
BUS	Green	When bus voltage and frequency normally, the lamp will illuminate; when bus voltage and frequency abnormally, the lamp will glitter; when there is no power, the lamp will extinguish.	
ΔF Freq Difference	Green	When gens and bus voltage, frequency normally, and real time frequency difference is within the setting limits, the lamp will illuminate.	
ΔU Pressure Difference	Green	When gens and bus voltage, frequency normally, and real time pressure difference is within the setting limits, the lamp will illuminate.	
SYNC Close	Red	When close relay outputs, the lamp will illuminate. Close pulse: 400ms.	
STATUS	Red	After close signal output, the relay output and the lamp will illuminate; when gens not synchronize with bus is detected, the relay will not output and the lamp will extinguish.	

Potentiometer Description:

Potentiometer	Range	Description	Note
TN/ms control length of pulse	(25-500)ms	Control min. last time of pulse.	
Xp/Hz proportion range	(0-±2.5)Hz	In this area, pulse width and deviation value of rated frequency are in direct proportion.	Pn is rated power
FREQ/Hz	(0.-0.5)Hz	Acceptable frequency difference.	
VOLTAGE/%	(2-12)%	Acceptable Voltage difference	
BREAKER/ms	(20-200)ms	The time of switch close.	

Terminal Description:

No.	Function		Cable	Note	
1.	B-		1.0mm^2	Connected with negative of starter battery.	
2.	B+		1.0mm^2	Connected with positive of starter battery.	
3.	INH	-	1.0mm^2	“Close Output Inhibit” Input	
4.		IN	1.0mm^2		
5.	DOWN Output		2.5mm^2	Output when speed reduces.	Normally open, close; Volts free output; 5A Rated
6.					
7.	UP Output		2.5mm^2	Output when speed raise.	Normally open, close; Volts free output; 5A Rated
8.					
9.	GEN L1		1.0mm^2	Gens AC voltage input.	
10.	GEN L2				
11.	BUS L1		1.0mm^2	Bus AC voltage input.	
12.	BUS L2				
13.	SYNC	Normally Open	2.5mm^2	Output when SYNC close.	Normally open, close; Volts free output; 7A Rated
14.		COM			
15.		Normally Close			
16.	STATUS		1.0mm	Output when close.	Normally open, close; Volts free output; 5A Rated
17.			1.0mm		
LINK	Used for parameters setting or software upgrade.				

PC Programme Connection Type

Parameters setting can be implemented via LINK port by using PC software and an SG72 adapter which produced by our company. As follows:

5 SCOPES AND DEFINITIONS OF PROGRAMMABLE PARAMETERS

No.	Items	Parameters	Defaults	Description
1.	AC System	(0-1)	0	0: 3P3W, 1: 1P2W,

No.	Items	Parameters	Defaults	Description
				2: 3P4W, 3: 2P3W
2.	Rated Voltage	(30-30000) V	400	
3.	PT	(0-1)	0	0: Disabled 1: Enabled
4.	PT Primary Voltage	(30-30000)V	100	
5.	PT 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) %	82	Threshold
12.		(70-100) %	84	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.		(0-3600) s	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.	Bus AC Supply Mode	(0-1)	0	0: 3P3W, 1: 1P2W, 2: 3P4W, 3: 2P3W
23.	Bus Rated Voltage	(30-30000) V	400	
24.	Bus PT Enable	(0-1)	0	0: Disabled 1: Enabled
25.	Bus PT Primary Volt	(30-30000)V	100	
26.	Bus PT Secondary Volt	(30-1000)V	100	
27.	Bus Over Volt	(0-1)	1	0: Disabled 1: Enabled
28.		(100-120) %	115	Threshold
29.		(100-120) %	113	Returned
30.		(0-3600) s	3	Delay
31.	Bus Under Volt	(0-1)	1	0: Disabled 1: Enabled
32.		(70-100) %	82	Threshold
33.		(70-100) %	84	Returned
34.		(0-3600) s	3	Delay
35.	Bus Over Freq	(0-1)	1	0: Disabled 1: Enabled
36.		(100-120) %	110	Threshold
37.		(100-120) %	104	Returned
38.		(0-3600) s	3	Delay
39.	Bus Under Freq	(0-1)	1	0: Disabled 1: Enabled
40.		(80-100) %	90	Threshold
41.		(80-100) %	96	Returned
42.		(0-3600) s	3	Delay
43.	Address	(1-254)	1	
44.	Tp	(1-20)	10	Speed regular pulse period=T_PxT_N

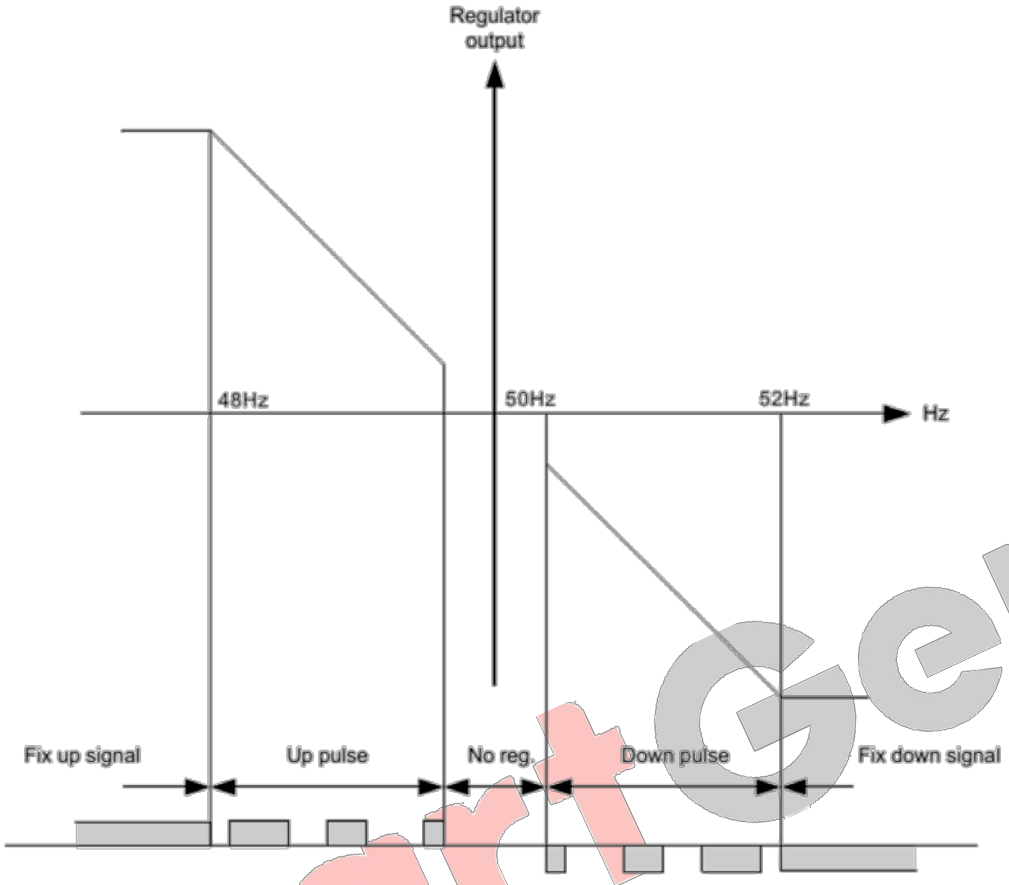
6 FUNCTION DESCRIPTION

HSM300 Synchronous Module is to synchronize generator to bus. When pressure difference, frequency difference and phase difference are within pre-set value, it will send synchronize signal to close gens switch. Because its switch close response time can be set, the module can be used for gensets of various source powers.

Thresholds of over voltage, under voltage, over frequency and under frequency of gens and bus can be set via monitoring software of upper computer. When the module detects voltage and frequency of gens and bus are normal, it will begin to adjust speed. When pressure difference, frequency difference and phase difference are within pre-set value, it will send synchronize signal to close gens switch.

7 RAISE/DROP SPEED RELAY OUTPUT CONTROL

When deviation area X_P is set as 2Hz, the working principle of raise/drop speed relay is as follows,

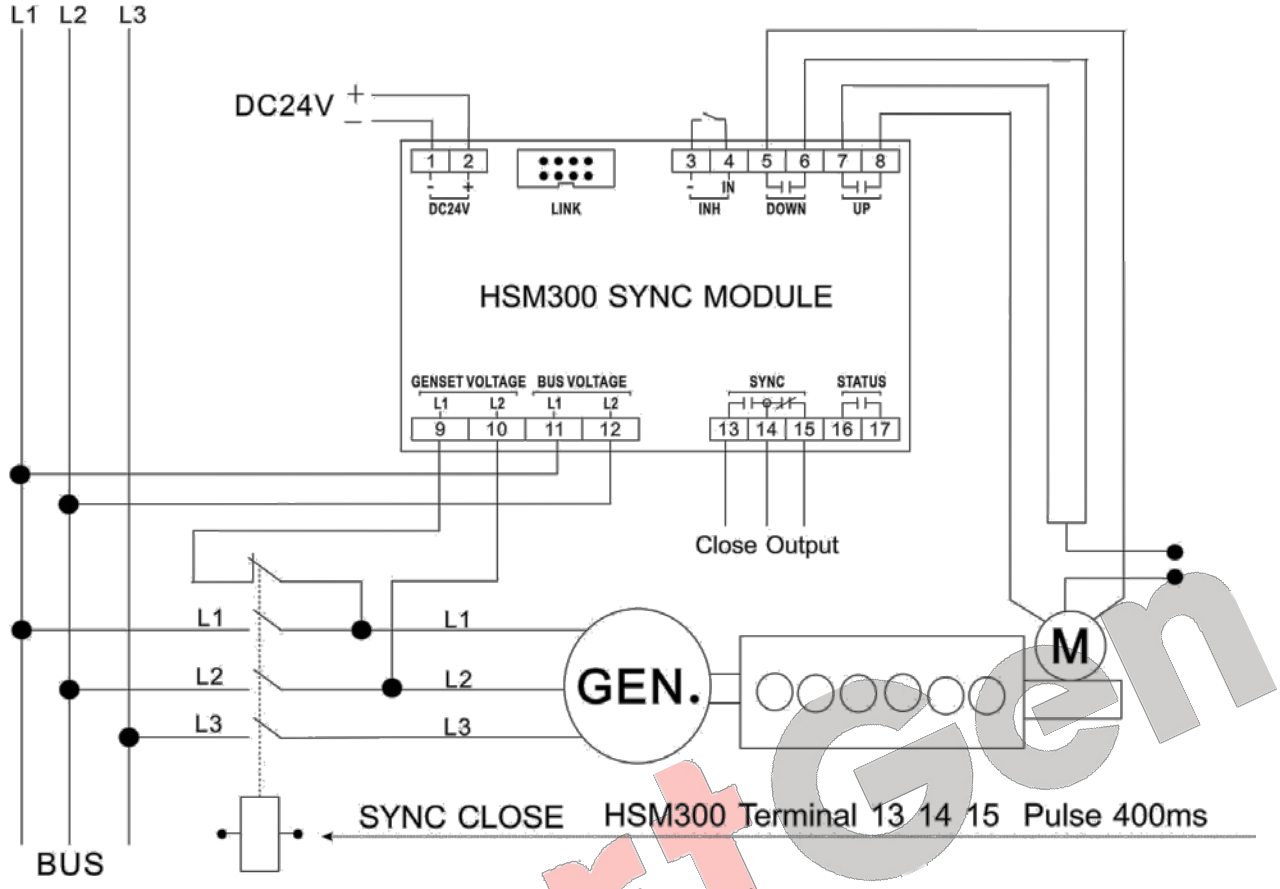


Five steps for the relay to output regulatory function,

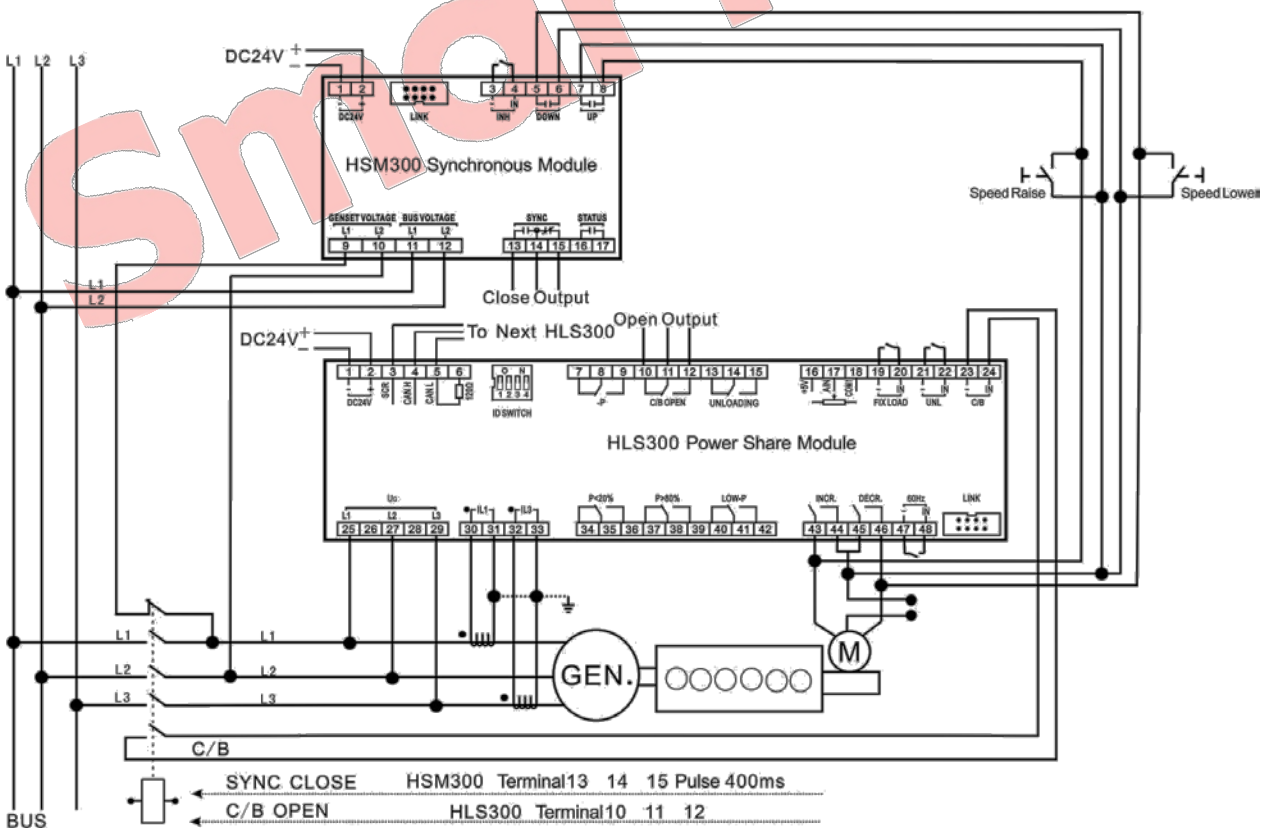
No.	Range	Description	Note
1	Fix Up Signal	Continuously raise signal	Activation adjusting. Since too large adjust error, ascending frequency relay will continuously be activated.
2	Up Pulse	Raise the pulse	System activates regulatory function, then ascending frequency relay will eliminate deviation in the pulse way.
3	No Reg.	No regulation	No regulation in this area.
4	Down pulse	Drop down the pulse	System activates regulatory function, descending frequency relay will eliminate deviation in the pulse way.
5	Fix down signal	Continuously drop down signal	System activates regulatory function, descending frequency relay will continuously be activated.

When adjusting deviation X_P exceeds pre-set value, the relay will be in the continuous activate status; when X_P is not large, the relay will work in pulse way, and the pulse will become shorter along with the deviation became smaller. When regulator output value is close to “No Reg.”, pulse width will be the shortest value; when regulator output value is nearest to the “Down Pulse”, pulse width will be the longest value.

8 TYPICAL DIAGRAM

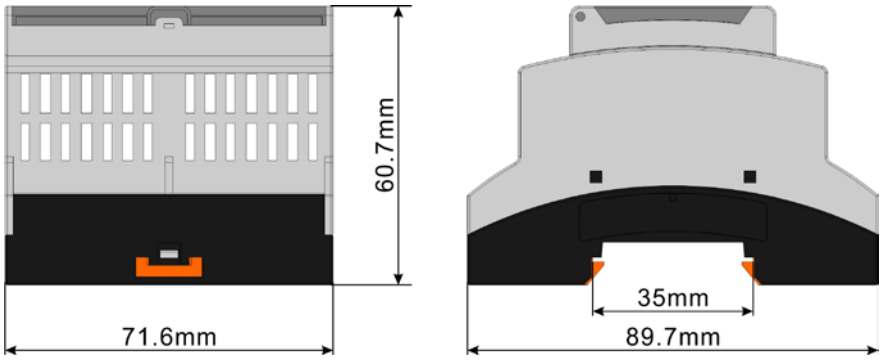


HSM300 3Phase 3Wire



HSM300-HLS300 3Phase 3Wire

9 CASE DIMENSION



10 INSTALLATION NOTES

1) Output And Expand Relays

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

2) Withstand Voltage Test

⚠ **CAUTION! When relay had been installed in control panel, if need the high voltage test, please disconnect relay's all terminal connections, in order to prevent high voltage into relay and damage it.**