SmartGen HSM300 Synchronous Module User Manual

SmartGen

MAKING CONTROL SMARTER

HSM300 Synchronous Module
User Manual

Contents

HSM300 Synchronous Module

Table 1 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.
2018-08-21	1.2	"Widely power supply range DC(8-35)V, suitable to different starting battery voltage environment changed as "Widely power supply range DC(8-35)V" in section 2.
2019-05-16	1.3	Fixed wiring connection typical diagram.
2022-09-16	1.4	Updated company logo and manual format.

Table 2 Symbol Description

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

HSM300 Synchronous Module is specially designed for genset automatic parallel. On the basis of the parameters, the module automatically tests the conditions of paralleling (volt difference, frequency difference and phase) and sends 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.

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;
- Widely power supply range DC(8~35)V;
- 35mm guide rail mounting;
- Modular design, pluggable terminal, compact structure with easy installation.

SPECIFICATION

Item	Content
Working Voltage	DC8.0V to 35.0V, continuous power supply.
Overall Consumption	slW (Standby modes0.5W)
AC Input	AC50V— AC620V (ph-ph)
AC Frequency	50Hz/60Hz
SYNC Output	7A AC250V Volts free output
UP Output	5A AC250V/5A DC3OV Volts free output
DOWN Output	5A AC250V/5A DC3OV Volts free output
STATUS Output	5A AC250V/5A DC3OV Volts free output
Case Dimensions	71.6mm x 89.7mm x 60.7mm
Working Temperature	(-25-1-70)°C
Working Humidity	(20-95)%RH
Storage Temperature	(-25-1-70)°C
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage termi nal; The leakage current is not more than 3mA within 1min.
Weight	0.20kg

PANEL INDICATORS AND TERMINALS DESCRIPTION

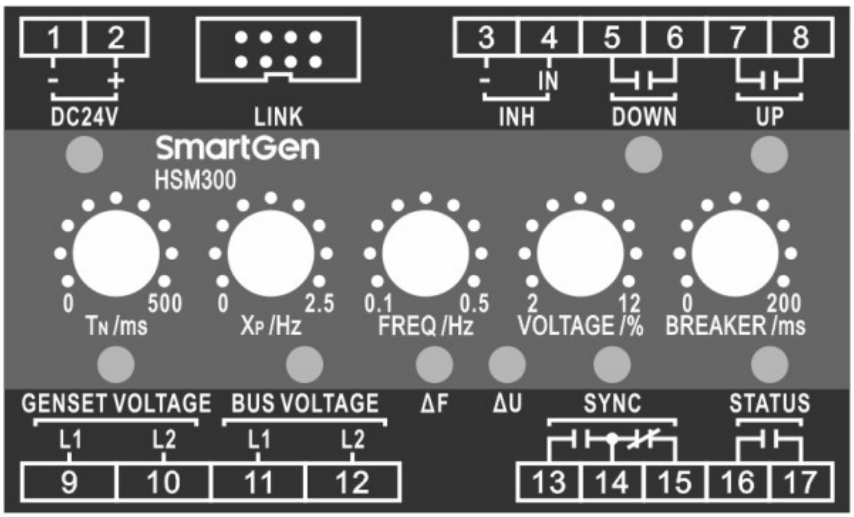

Fig.1 Mask Drawing

Table 4 LEDs Definition Description

Indicators	Color	Description	Notes
DC 24V	Green	Power indicator, the lamp will 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.	
AF Freq. Diff.	Green	When gens and bus voltage, frequency normally, and real time frequency difference is within the setting limits, the lamp will illuminate.	
AU Volt Diff.	Green	When gens and bus voltage, frequency normally, and real time voltage diff erence 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; whe n gens not synchronize with bus is detected, the relay will not output and t he lamp will extinguish.	

Table 5 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.	Xp/Hz proportion r ange
FREQ/Hz	(0.1-0.5)Hz	Acceptable frequency difference.	
VOLTAGE/%	(2-12)%	Acceptable Voltage difference.	
BREAKER/ms	(20-200)ms	The time of switch close.	

Table 6 Terminal Description

No.	Function		Cable	Note	
1.	DC 24V –		2.5mm2	Connected with negative of starter battery.	
2.	DC 24V +		2.5mm2	Connected with positive of starter battery.	
4.	INH	–	1.0mm2	“Close Output Inhibit” Input.	
		IN	1.0mm2		
	DOWN Output		2.5mm2	Output when speed reduces.	Normally open; Volts free output; 5A Rated.
6.					
7.	UP Output		2.5mm2	Output when speed raise.	Normally open; Volts free output; 5A Rated.
9.	GEN L1		1.0mm2	Gen AC voltage input.	
10.	GEN L2				
11.	BUS L1		1.0mm2	Bus AC voltage input.	
12.	BUS L2				
13.	SYNC	N/O	2.5mm2	Output when SYNC close.	Normally open/close; Volts free contact output; 7A Rated.
14.		COM			
15.		N/C			
16.	STATUS		2.5mm2	Output when close.	Normally open, Volts free output; 5A Rated.
17.			2.5mm2		
LINK	Used for parameters setting or software upgrade.				

Fig.2 PC Programming Connection

NOTE: Parameters setting and real-time monitoring can be implemented via LINK port by using PC software and an SG72 adapter which produced by our company.

SCOPES AND DEFINITIONS OF PROGRAMMABLE PARAMETERS

Table 7 Module Configurable Parameters

No.	Items	Parameters	Defaults	Description
1.	AC System	(0-3)	0	0: 3P3W, 1: 1P2W, 2: 3P4W, 3: 2P3W
2.	Rated Voltage	(30-30000) V	400	
3.	PT Fitted	(0-1)	0	0: Disabled 1: Enabled
4.	PT Primary	(30-30000)V	100	
5.	PT Secondary	(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)5	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)5	3	Delay
14.	Over Frequency	(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 Frequency	(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 System	(0-3)	0	0: 3P3W, 1: 1P2W, 2: 3P4W, 3: 2P3W
23.	Bus Rated Voltage	(30-30000)V	400	
24.	Bus PT Fitted	(0-1)	0	0: Disabled 1: Enabled
25.	Bus PT Primary	(30-30000)V	100	
26.	Bus PT Secondary	(30-1000)V	100	
27.	Bus Over Voltage	(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 Voltage	(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 Frequency	(0-1)	1	0: Disabled 1: Enabled
36.		(100-120)%	110	Threshold

No.	Items	Parameters	Defaults	Description
37.		(100-120)%	104	Returned
38.		(0-3600)s	3	Delay
39.	Bus Under Frequency	(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=ToxIN

FUNCTION DESCRIPTION

HSM300 Synchronous Module is to synchronize generator to bus. When voltage difference, frequency difference and phase difference are within pre-set value, it will send synchronization 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 PC. 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.

RAISE/DROP SPEED RELAY OUTPUT CONTROL

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

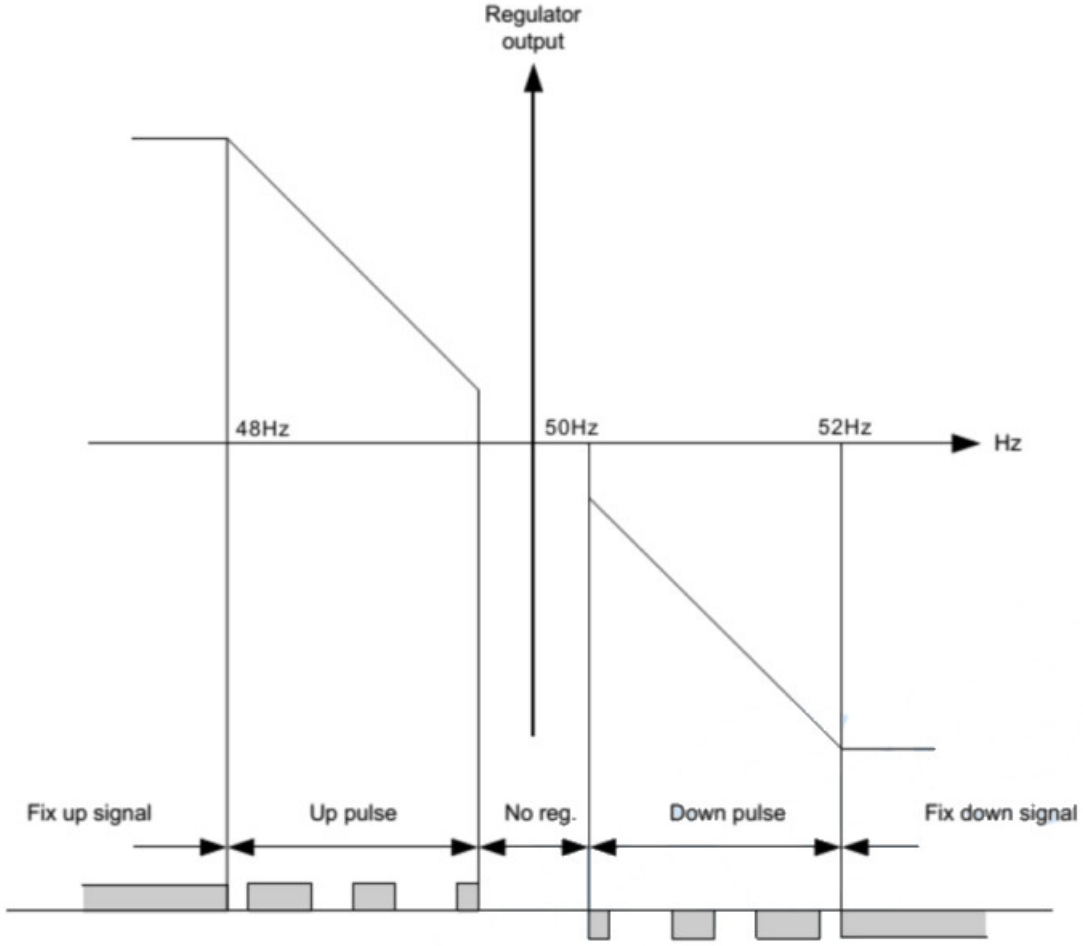

Fig.3 Working Principle of Raise/Drop Speed Relay

Table 8 Five Steps for Relay Output Regulation Function

No.	Range	Description	Note
1	Fix Up Signal	Continuously raise signal	Activation adjusting. Since too large adjust error, as cending frequency relay will continuously be activa ted.
2	Up Pulse	Raise the pulse	System activates regulatory function, then ascending frequency relay will eliminate deviation i n 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 fr equency relay will eliminate deviation in the pulse way.
5	Fix down signal	Continuously drop down signal	System activates regulatory function, descending fr equency relay will continuously be activated.

As showing in fig.3, when adjusting deviation XP exceeds pre-set value, the relay will be in the continuous activate status; when XP 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.

TYPICAL APPLICATION DIAGRAM

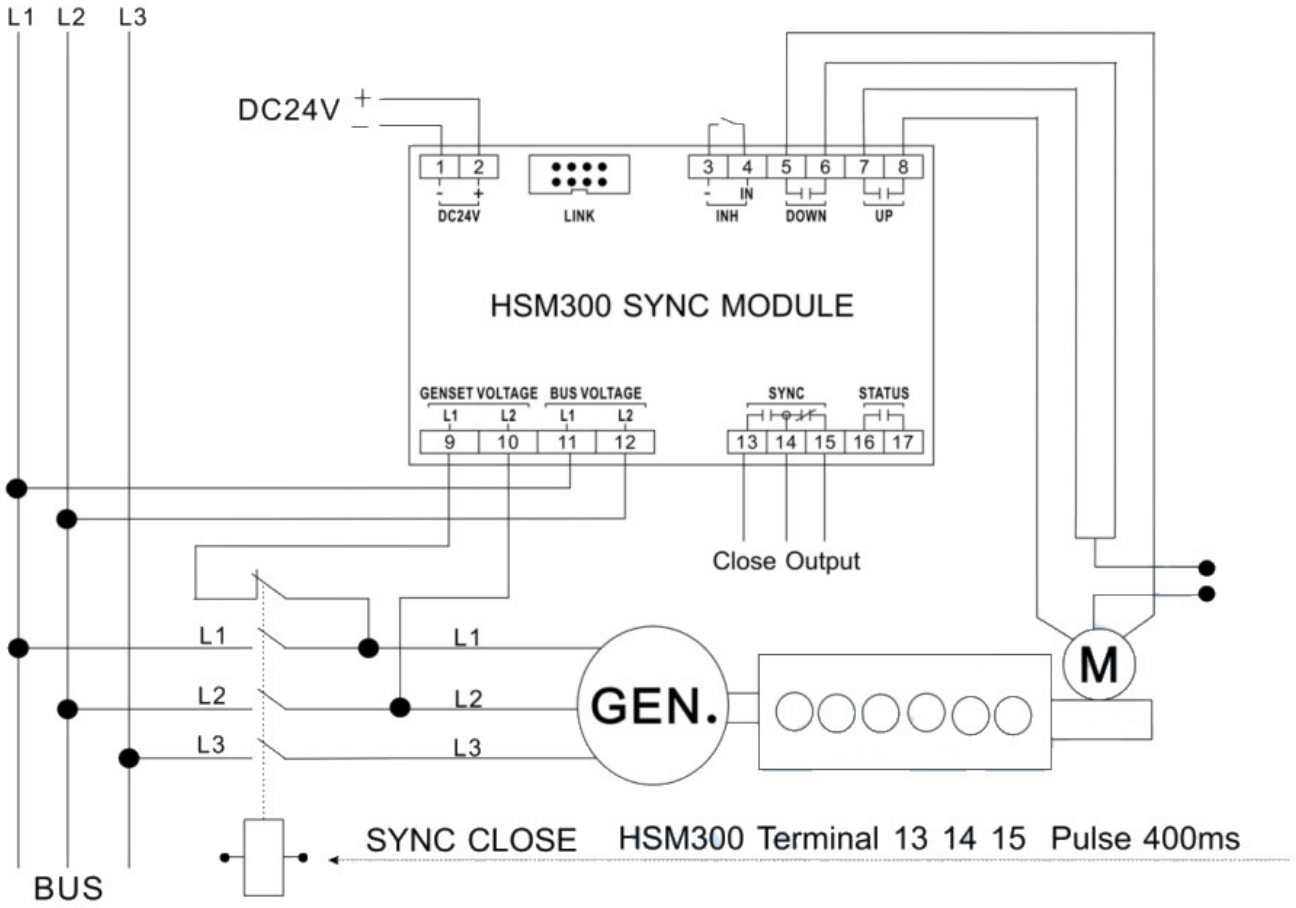

Fig.4 HSM300 3Phase 3Wire Typical Application

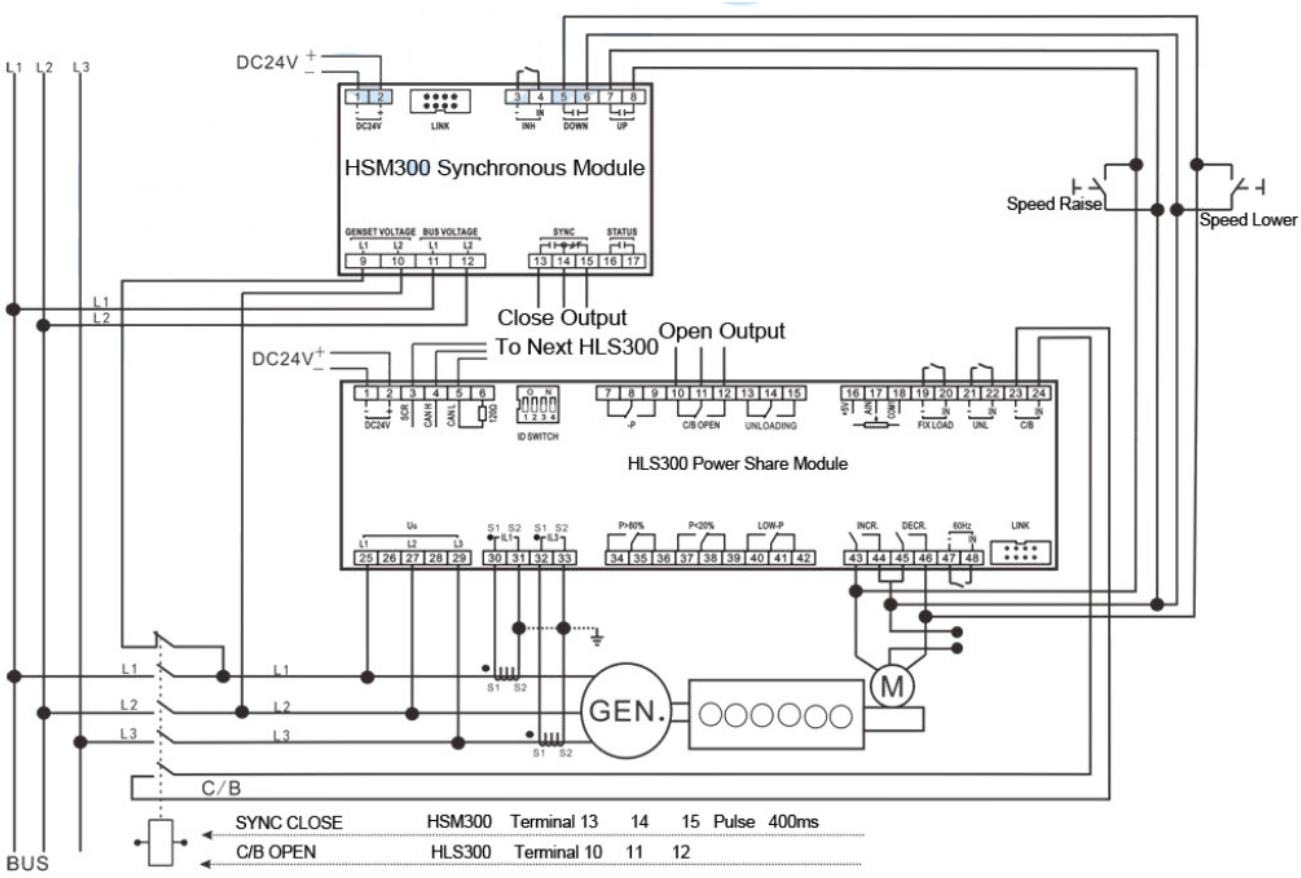

Fig.5 HSM300-HLS300 3Phase 3Wire Typical Application

CASE DIMENSION

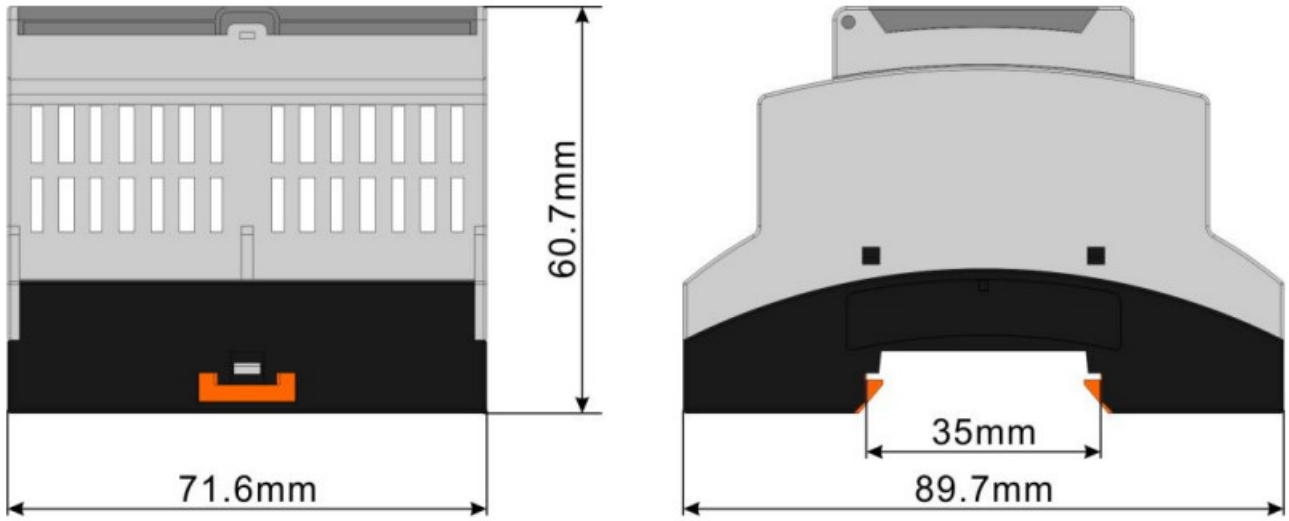

Fig.6 Overall Dimensions

INSTALLATION NOTES

10.1 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 have DC current) or add resistance-capacitance return circuit (when coils of relay have AC current), in order to prevent disturbance to controller or others equipment.

10.2 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.

Documents / Resources

	SmartGen HSM300 Synchronous Module [pdf] User Manual HSM300, Synchronous Module, HSM300 Synchronous Module, Module

References

- 众智
- 众智