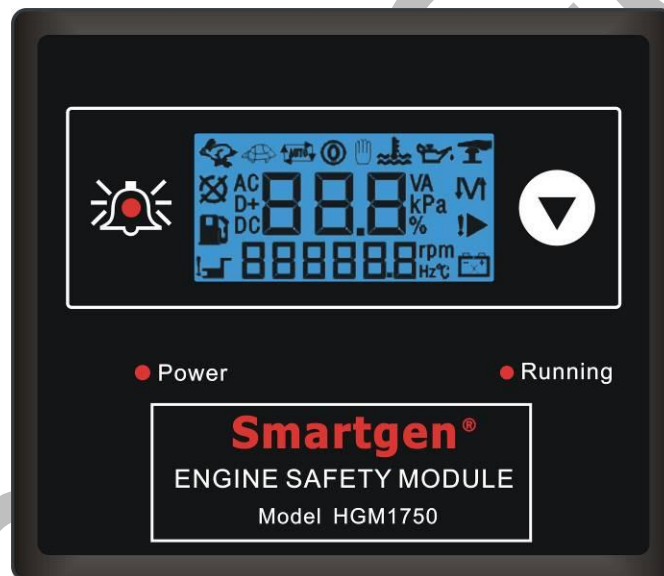


Smartgen®

HGM1750

Genset Security Module

USER MANUAL



Smartgen Technology

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Software Version

Version	Date	Note
2009-04-01	1.0	Original release.
2010-06-19	1.1	Modify the case format and the time of over speed/frequency (from 3s to 2s).
2010-07-21	1.2	Optimize some details in the manual.
2011-06-13	1.3	Change company name from Smartgen Electronic to Smartgen Technology.
2011-12-24	1.4	Modify Typical Application
2013-04-03	1.5	Add the description of sensor digital input.

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1. SUMMARY

HGM1750 Genset Security Module is a security module that can display electrical parameters (e.g. voltage, speed, temperature, oil pressure and fuel level) and stop the unit when faults occurs (e.g. low oil pressure, high water/cylinder temperature, emergency stop and over speed). Graphical LCD monitor on the front panel displays fault conditions and provides effective alarm signals.

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2. PERFORMANCE AND CHARACTERISTICS

- ☐ Based on microprocessor, fitted with LCD screen with graphic icons and blue backlight which can display engine parameters and alarms;
- ☐ Power supply range (8~35)VDC, compatibility with 12V or 24V starter batteries;
- ☐ Generator input port; speed, temperature, pressure, liquid level sensor input ports; digitalized electric quantity display.

Measured and displayed electric quantity:

Generator voltage	V
Generator frequency	Hz
Engine temperature	°C
Oil pressure	kPa
Engine Speed	rpm
Total running time	H
Battery voltage	V
Fuel level	%

- ◆ Generator voltage, battery voltage, engine speed, temperature, pressure, liquid level threshold value can be set.

Warnings and alarms are as following:

- High temperature
- Low oil pressure
- Low fuel level
- Generator over voltage
- Generator over frequency
- Over speed
- Emergency shutdown
- Fail to stop
- Charge Alt Fail
- Battery over voltage
- Battery under voltage

- ☐ The controller can be set as an engine controller via software (generator voltage input is deactivated);
- ☐ Running status and alarm status are indicated by red LED on the panel;
- ☐ Charging generator excitation function;



- Engine speed can be calculated by generator frequency or speed sensor.
- Compatibility with multiple temperature, pressure, fuel level sensors, which can be user-defined and used directly;
- With digital input ports, users can choose different functions;
- All parameters of the controller can be modified through configurable LINK port via PC software (SG72 adapter, produced by our company must be used). All parameters can be set via computer using one USB port of the computer, which also allows to avoid batteries: power supply for the controller can come directly from the PC USB port;
- Modular design, anti-flaming ABS plastic casing, embedded installation, compact structure, small volume, advanced SCM control, stable performance and convenient operation.

3. SPECIFICATION










Item	Content
Working Voltage	DC8. 0V to 35. 0V, Continuous Power Supply
Power Consumption	Standby mode: 12V: 0.3W, 24V: 0.4W Working mode: 12V: 1W, 24V: 1.1W
Alternator voltage Input	1P2W 30V AC ~ 360 V AC (ph-N)
Alternator Frequency	50/60Hz
Magnetic Pickup Voltage	1V to 24V (RMS)
Magnetic Pickup Frequency	Max. 10kHz
Max. accumulative run time	99999.9 hours (After decimal point there is 1/10 of an hour, and it changes every six minutes)
Stop Relay Output	7Amp B+ power supply
Alarm Relay Output	7Amp B+ power supply
Digital Input	Active when connected to B-
Case Dimensions	90mm x 78mm x 44mm
Panel Cutout	78mm x 66mm
Working conditions	Temperature: (-25~+70)°C Humidity: (20~90)%RH
Storage Condition	Temperature: (-30~+80)°C
Protection Level	IP55: When waterproof rubber gasket installed between the controller and panel fascia. IP42: When waterproof rubber gasket is not installed between the controller and panel fascia.
Insulation Intensity	Object: among input/output/power Quote standard: IEC688-1992 Test way: AC1.5kV/1min Leakage current: 1mA
Weight	0.16kg

4. OPERATION

◎ PANEL KEYS

Item	Definition	Description
	Turn Page	Using this button you can scroll pages of the LCD monitor.
	Alarm Indicator	This indicator will flash when an alarm occurs.
Power	Power Indicator	This indicator will illuminate when controller is powered on.
Running	Running Indicator	This indicator will illuminate when engine is start.

◎ LCD ICON

Item	Definition	Item	Definition
	High Temp. Alarm		Normal Running
	Low Oil Pressure	AC	Gens Volts Indication
	Over Speed Alarm	DC	Battery Volts Indication
	Emergency Stop	rpm	Speed Unit (Per Minute)
V	High Voltage	kPa	Oil Pressure Unit
	Fail To Stop	V	Voltage Unit
	Battery Volts abnormal	%	Fuel Level Unit (%)
	Auxiliary Alarm	°C	Temperature Unit
	Fuel Level Low	Hz	Frequency Unit
		H	Hours Count

5. PROTECTION

1. **Low Oil Pressure (Pre-alarm/Shutdown):** Once started successfully, after 10s delay, detection begins; if low oil pressure lasts for 2s, alarm or shutdown;
2. **High temperature (Pre-alarm/Shutdown):** Once started successfully, after 10s delay, detection begins; if high temperature lasts for 2s, alarm or shutdown;
3. **Low fuel level warning:** if fuel level stays below the pre-set level for 10 seconds, low fuel level warning signal is sent. Only warning and not shutdown, moreover, the warning is not latching ;
4. **Over speed shutdown:** When speed over the preset for 2s, alarm or shutdown;
5. **Generator over voltage (Pre-alarm/Shutdown):** if it is detected that voltage is above the pre-set level for 5 seconds, generator over voltage signal is sent and shutdown or pre-alarm is initiated;
6. **Generator over frequency shutdown:** if it is detected that frequency is above the pre-set level for 2 seconds, generator over voltage signal is sent and shutdown is initiated;
7. **High Battery Voltage:** if battery voltage stays above the pre-set value for 10 seconds, high battery voltage warning signal is sent. Only warning and not shutdown;
8. **Low Battery Voltage:** if battery voltage stays below the pre-set value for 10 seconds, low battery voltage warning signal is sent. Only warning and not shutdown;
9. **Emergency Shutdown:** if emergency shutdown input is activated, ETS output is immediately energized and emergency shutdown alarm is initiated.
10. **Charge Alt fail:** Once started successfully, after 10s delay, detection begins; if charger voltage D+ (WL) under 3V for 5s, charge alt fail warning signal is sent. Only warning and not shutdown;
11. **Fail to stop:** if the generator has not stopped after stop delay, fail to stop warning is initiated, moreover, the warning is not latching;
12. **Common alarm:** in case of over speed, over frequency, over voltage, high temperature, low oil pressure, emergency shutdown, fail to stop, charge alt fail, high battery voltage, low battery voltage (include pre-alarm), alarm indicator flashing and common alarm output is activated.

NOTE:

Conditions of crank disconnect:

1. When oil pressure is over 200kPa;
2. When generator frequency is over 40% of the rated frequency (e.g. set as 20Hz if the rated is 50Hz);
3. When engine speed is over 40% of the rated speed (e.g. set as 600rpm if the rated is 1500rpm)

Any one of above is satisfied, crank disconnects and protection begins.

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6. PARAMETER RANGE AND DEFINATION

6.1 PARAMETER DEFINITION AND RANGE

No	Items	Range	Default	Description
1	High Temp. Shutdown	(80-140)°C	102	When the temperature value of the external temperature sensor exceeds this threshold, high temperature signal is sent. If the set value is 140, high temperature signal will not be sent (this only concerns temperature sensor, not high temperature signal via config. input port).
2	High Temp. Warn	(80-140)°C	95	When the temperature value of the external temperature sensor exceeds this threshold, high temperature signal is sent (Only warning and not shutdown). If the set value is 140, high temperature signal will not be sent (this only concerns temperature sensor and does not concern high temperature warning signal via configurable input port).
3	Low OP Shutdown	(0-600)kPa	103	When the external pressure sensor value falls below this threshold, low oil pressure signal is sent. If the set value is 0, low oil pressure signal will not be sent (this only concerns pressure sensor and does not concern low oil pressure warning signal via configurable input port)
4	Low OP Warn	(0-600)kPa	124	When the external pressure sensor value falls below this threshold, low oil pressure signal is sent (Only warning and not shutdown). If the set value is 0, low oil pressure signal will not be sent (this only concerns pressure sensor and does not concern low oil pressure warning signal via configurable input port)

No	Items	Range	Default	Description
5	Low Fuel Level Warn	(0-100)%	10	When the liquid level of the external sensor falls below this value and stays so for 10 seconds, low liquid level signal is send (Only warning and not shutdown). If the set value is 0, low fuel level signal is not detected.
6	Rated Voltage	(80-300)V	230	Rated phase voltage of generator.
7	Generator Over Voltage Shutdown	(20-150)%	150	When generator voltage exceeds this value and stays so for 5s, it is regarded as over voltage and Generator Over Voltage Shutdown alarm is initiated. If the set value is 150%, over voltage signal is not detected.
8	Generator Over Voltage Warn	(20-150)%	115	When generator voltage exceeds this value and stays so for 5s, it is regarded as over voltage and Generator Over Voltage Warning is initiated (Only warning and not shutdown). If the set value is 150%, over voltage signal is not detected.
9	Rated Freq.	(25-60)Hz	50	Rated frequency of genset.
10	Over Freq.	(20-150)%	115	When generator frequency exceeds this value and stays so for 3s, it is regarded as over frequency and Generator Over Frequency Shutdown is initiated. If the set value is 150%, over frequency signal is not detected.
11	Poles	(2-16)	4	Poles number of generator
12	Flywheel Teeth	(10-300)	118	Tooth number of the engine, for inspecting the engine speed and over/under speed protection.
13	Rated Speed	(750~5000)rpm	1500	Rated speed of engine.
14	Over Speed Shutdown	(20-150)%	115	When engine speed exceeds this value and stays so for 3 seconds, this is regarded as over speed and Over Speed Shutdown signal is sent. If the set value is 150%, over speed signal is not detected.

No	Items	Range	Default	Description
15	Battery Voltage Over	(12-40V)	33.0	When battery voltage exceeds this value and stays so for 10 seconds, this is regarded as battery over voltage and Battery Over Voltage Warning signal is sent (Only warning and not shutdown).
16	Battery Voltage Under	(4-30V)	8.0	When battery voltage below this value and stays so for 10 seconds, this is regarded as battery under voltage and Battery Under Voltage Warning signal is sent (Only warning and not shutdown).
17	ETS Solenoid Hold	(0-120)s	20	The time of powering up the electromagnet during stop procedure.
18	Digital Input	(0-4)	2	Default: Aux. shutdown.
19	Digital Input Delay	(0-20.0)s	2.0	Active delay time for digital input ports.
20	Temp. Sensor	(0-10)	06	SGD(120°C Resistor type)
21	Pressure Sensor	(0-10)	06	SGD(10Bar Resistor type)
22	Fuel Level Sensor	(0-7)	0	Not Used

6.2 DIGITAL INPUT

No	Description	Notes
0	Not used	
1	Auxiliary Warn	Only warning and not shutdown if the input is active.
2	Auxiliary Shutdown	Shutdown alarm will be immediately initiated if this input is active.
3	Not used	
4	Not used	

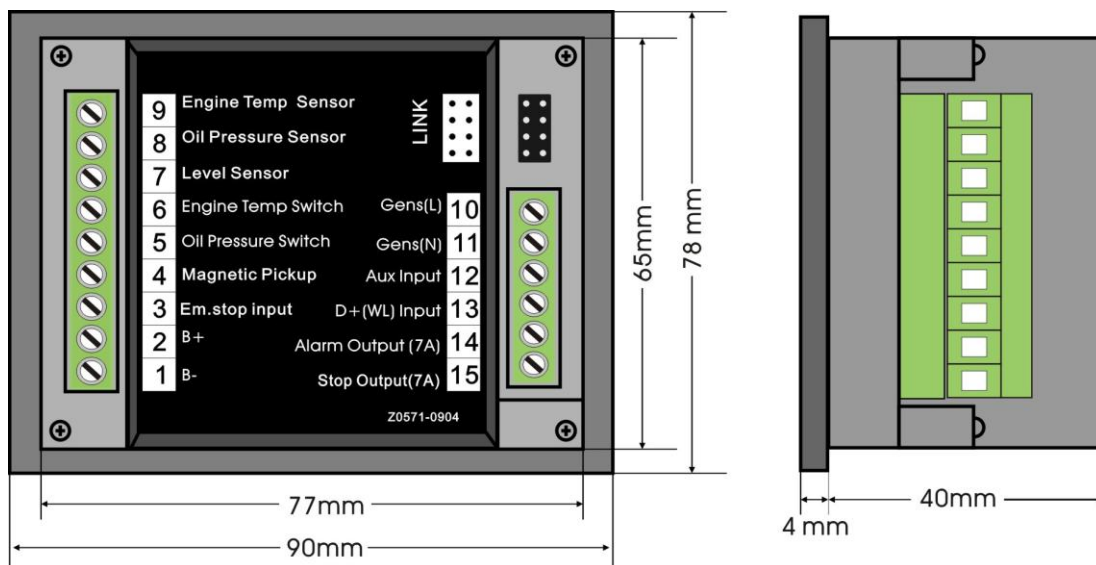
6.3 SENSOR SELECTION (TABLE 3)

No	Item	Content	Remark
1	Temperature sensor	0 Not used 1 Digital closed 2 Digital open 3 User defined resistor type 4 VDO 5 SGH 6 SGD 7 CURTIS 8 DATCON 9 VOLVO-EC 10 Not used	Digital closed and Digital open both are digital signal; low or high electrical level can be selected to be active, connecting to earth point will mean that low electrical level is selected, hang in air means high electrical level is selected; can not be connected to power supply positive. The range of user-defined resistor type sensor is 0-999.9 Ohm, by default SGD sensor is selected.
2	Oil pressure Sensor	0 Not used 1 Digital closed 2 Digital open 3 User defined resistor type 4 VDO 10Bar 5 SGH 6 SGD 7 CURTIS 8 DATCON 10Bar 9 VOLVO-EC 10 Not used	Digital closed and Digital open both are digital signal; low or high electrical level can be selected to be active, connecting to earth point will mean that low electrical level is selected, hang in air means high electrical level is selected; can not be connected to power supply positive. The range of user-defined resistor type sensor is 0-999.9 Ohm, by default SGD sensor is selected.
3	Fuel oil level sensor	0 Not used 1 Digital closed 2 Digital open 3 User defined resistor type 4 SGH 5 SGD 6 Not used 7 Not used	Digital closed and Digital open both are digital signal; low or high electrical level can be selected to be active, connecting to earth point will mean that low electrical level is selected, hang in air means high electrical level is selected; can not be connected to power supply positive. The range of user-defined resistor type sensor is 0-999.9 Ohm, by default "Not used" is selected

7. CONNECTIONS

- Terminal 1 (B-): Connect to the negative of the start battery.
- Terminal 2 (B+): Connect to the positive of the start battery.
- Terminal 3 (Em. stop input): Emergency stop input (active when connect to B+), external connect to emergency shutdown normally closed button.
- Terminal 4 (Magnetic pickup): Magnetic pickup signal input, shielded wire is recommended. Connect to GND at one end only.
- Terminal 5 (Oil Pressure Switch): Low oil pressure input port, active when connected to B-.
- Terminal 6 (Engine Temp Switch): High water/cylinder temperature input port, active when connected to B-.
- Terminal 7 (Level Sensor): Liquid level sensor input, can connect fuel level sensor.
- Terminal 8 (Oil Pressure Sensor): Oil pressure sensor input port.
- Terminal 9 (Engine Temp. Sensor): High water/cylinder temperature sensor input port.
- Terminal 10 (L), 11 (N): External connect to generator voltage signal to judge successful start and provide over frequency protection.
- Terminal 12 (Aux. Input): Programmable digital input port, active when connected to B-.
- Terminal 13 (D+ Input): Connect to charging generator WL (or D+) terminals. Controller provides charge current. When the charger charging fails (D+ terminal voltage < 3V), charge alt fail alarm is sent. (Only warning and not shutdown)
- Terminal 14 (Alarm Output): Alarm output port (B+ voltage output). Contact capacity is 7A.
- Terminal 15 (Stop Output): ETS (energized to stop) output port (B+ voltage output). Contact capacity is 7A.
- PC configurable socket (LINK): Connect to SG72 module and PC via USB port for parameter setting.

8. CASE DIMENSIONS (Panel Cutout 78*66mm)



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9. TYPICAL APPLICATION

