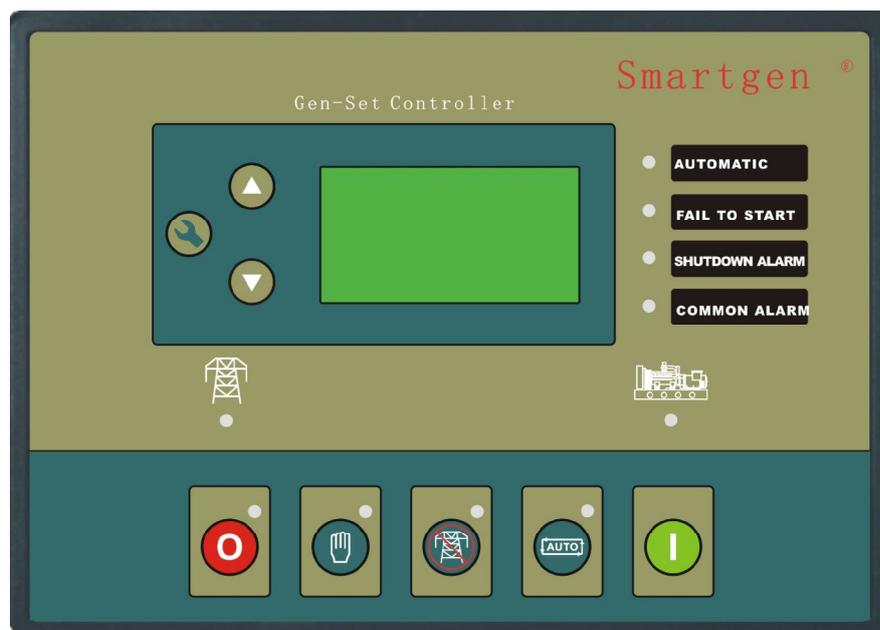


# Smartgen<sup>®</sup>

HGM6320T

AUTOMATIC GENERATOR MODULE

## OPERATING MANUAL



Smartgen Electronics

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## 1. SUMMARY

HGM6320T Series generator controller integrating digital, intelligent and network techniques is used for automatic control system of diesel generator. It can carry out functions including automatic start/stop, data measure and alarming. The controller uses LCD display, optional Chinese and English display interface with operation easy and reliable.

HGM6320T Series generator controller uses micro-processing technique which can carry out precision measure, constant value adjustment, timing and threshold setting and etc. of multi-parameters. It can be widely used in all types of generator automatic control system for compact structure, advanced circuits, simple connections and high reliability.

## 2. PERFORMANCE AND CHARACTERISTICS

- ◆ Using microprocessor as a core, graphics LCD with big screen and backlight, display between Chinese and English, key touch for operation.
  
- ◆ Precision measure and display of
  - mains voltage
  - mains frequency (Hz)
  - mains active power (kW)
  - mains apparent power (kVA)
  - mains power factor
  
  - generator voltage
  - generator current
  - generator frequency (Hz)
  - generator active power (kW)
  - generator apparent power (kVA)
  - generator power factor
  - generator hours count
  - generator cumulate electric energy (kWh)
  - generator temperature
  - generator pressure
  - generator fuel level
  - start battery voltage
  
- ◆ Configurable single phase 2 wires or three phase 3 wires or three phase 4 wires AC system input;
  
- ◆ Control protection: Automatic start/stop, load transfer and alarming of generator;

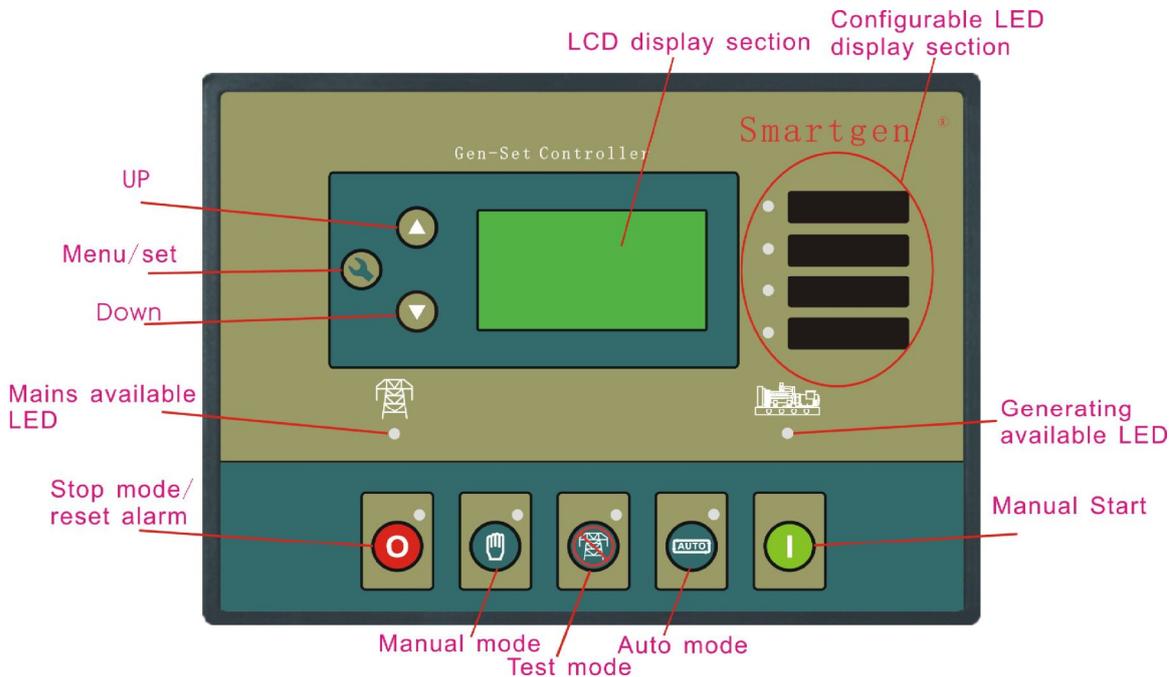
- ◆ Parameters setting: Allow user to modify setting and store them inside internal FLASH memory, the parameters can not be lost even with power down.
- ◆ Three channel analog inputs, may joint with Resistive-type temperature/ pressure/ fuel level sensors, Several temperature and pressure sensors can be used directly (ie. VDO, DATCON, CUMMINS), also may select “user defined” sensor via entering 16 point curves;
- ◆ Functions including RTC(real time clock) and hours count;
- ◆ Display of generator cumulated electric energy;
- ◆ Security password-protected programming levels.
- ◆ Several crank success conditions are optional;
- ◆ Built-in speed/frequency detecting units can accurately judge the states such as crank success and over speed;
- ◆ 200 historical records can be stored circularly and inquiring of the records can be made on site;
- ◆ Power supply range is wide, accommodating to different starting battery voltage environments;
- ◆ All parameters use digital modulation, abandoning analog modulation using conventional electronic potentiometer, reliability and stability are increased;
- ◆ Built-in watch dog can never be dead halt, ensuring smooth program execution;
- ◆ Modular configuration design, inserted type connection terminals, flush type installation, compact structure, easy installation.

### 3. SPECIFICATION

Operating Voltage	DC8. 0V to 35. 0V, Continuous Power Supply
Power Consumption	<3W
AC Input Range	
Single phase 2 wire	15V AC - 360 V AC (ph-N)
3-Phase 4 Wire	15V AC - 360 V AC (ph-N)
3-Phase 3 Wire	30V AC - 600 V AC (ph-ph)
2-Phase 3 Wire	30V AC - 600 V AC (ph-ph)
Alternator Input Frequency	50Hz - 60 Hz at rated engine speed
Magnetic Input Range	+/- 0. 5 V to 70 V Peak
Magnetic Input Frequency	10,000 Hz (max) at rated engine speed.
Start Relay Output	16 Amp DC at supply voltage.
Fuel Relay Output	16 Amp DC at supply voltage.
Auxiliary Relay Output (1-4)	( 1-3 ) 16 Amp DC at supply voltage, ( 4 ) 6A 250VAC
Close Mains Relay	16A 250VAC free voltage contact
Close Generator Relay	16A 250VAC free voltage contact
Dimensions	240mm x 172mm x 57mm
Panel cutout	214mm x 160mm
Charge Fail / Excitation Range	0 V to 35 V
Operating Temperature Range	-30 to +70°C
Storage Condition	Temperature: (-20 - 80)°C
C. T. Burden	2. 5VA
C. T. Secondary	5A
Weight	0. 90kg

## 4. OPERATION

### 4.1 HGM6320T FRONT PANEL



### 4.3 LCD DISPLAY

<p><b>SYSTEM IN STOP MODE</b>  <b>MAINS NORMAL</b>  <b>GENERATOR AT REST</b>  <b>ATS1-MAINS ATS2-MAINS</b></p>	<p>This LCD will show:  Generator state, Mains state, Breaker closed/ opened state and Alarms.</p>
<p><b>MAINS</b>  <b>UL-L 381 381 381 V</b>  <b>UL-N 220 220 220 V</b>  <b>F = 50.0 Hz</b></p>	<p>Pressing  or  key will show:  Mains voltage of (L1-L2, L2-L3, L3-L1) and (L1, L2, L3), Mains frequency.  This will not occur for HGM6310 module.</p>
<p><b>GENERATOR</b>  <b>UL-L 381 381 381 V</b>  <b>UL-N 220 220 220 V</b>  <b>F = 50.0 Hz 1500 RPM</b></p>	<p>Pressing  or  key will show:  Generator voltage of (L1-L2, L2-L3, L3-L1) and (L1, L2, L3), Frequency, Engine speed(Rotating Per Minute).</p>

<p>FUEL LEVEL 80 % ENGINE TEMP 80°C 176°F OIL PRESSURE1 110 KPa 16.0 PSI 1.10Bar</p>	<p>Pressing ▲ or ▼ key will show: Engine fuel level, temperature, oil pressure. Note: XXXX indicate no use; HHHH, LLLL indicate digit input; ++++ indicate sensor opening circuit.</p>
<p>PLANT BATTERY 27.6 V CHARGE ALT 27.6 V ENGINE SPEED 1500 RPM 05-06-16 (4) 08:16:01</p>	<p>Pressing ▲ or ▼ key will show: Battery voltage, charger WL voltage, engine speed (unit: rpm), present date and time. (It is week in the bracket).</p>
<p>GENERATOR STARTS 00008 num RUNTIME 000009:05:30 ENERGY 0000561.6 kWh</p>	<p>Pressing ▲ or ▼ key will show: Engine accumulative start numbers, generator accumulative energy and hours count(hour: minute: second).</p>
<p>LOAD IL 200 203 205 A POWER 140kW 179KVA Cosφ = 0.79</p>	<p>Pressing ▲ or ▼ key will show: Generator current, active power, apparent power and power factor.</p>
<p>AMBIENTTEMP 25°C 77°F PILE VOLT 53.5V OIL PRESSURE2 503KPa 73PSI 50.3Bar</p>	<p>Pressing ▲ or ▼ key will show: Ambient temperature, pile voltage, oil pressure</p>

#### 4. 4 KEY FUNCTION

	<p>Stop/ Reset key</p>	<p>This button places the module into its <b>Stop/reset</b> mode. When engine is running, pressing this key will stop the engine. When a shutdown alarm occur, pressing this key will reset alarm. In stop mode, pressing this key over 3 second will test LED mounted on the panel.</p>
	<p>Start key</p>	<p>In manual or manual test mode, pressing this key will start engine.</p>
	<p>Manual mode key</p>	<p>Pressing this key will set the module into manual mode.</p>
	<p>Manual test mode</p>	<p>Pressing this key will set the module into manual test mode.</p>
	<p>Auto key</p>	<p>Pressing this key will set the module into automatic mode. In setting parameter status, pressing this key</p>

		will shift cursor or confirm setting value.
	Menu/ Config 'enter' key	Press Menu key, can enter the menu interface When the constitution parameter, it is to confirm the key.
	Up/Config '+' key	In setting parameter status, pressing this key will increase setting value.
	Down/Config '-' key	In setting parameter status, pressing this key will decrease setting value.

## 4.5 AUTOMATIC OPERATION

The following description details the sequences followed by a module containing the standard '*factory configuration*'. Always refer to your configuration source for the exact sequences and timers observed by any particular module in the field.

This mode is activated by pressing the  pushbutton. An LED indicator beside the button confirms this action.

When a **Remote Start** signal is applied to the remote start input or when mains voltage occur over-voltage, under-voltage, over-frequency, under-frequency, the following sequence is initiated:

To allow for false signals the **mains abnormal timer** is initiated, Then the **Start Delay timer** is initiated. After this delay, if the pre-heat output option is selected then the pre-heat timer is initiated, and the corresponding auxiliary output (if configured) will energize.

NOTE: If the Remote Start signal is removed during the Start Delay timer, or if mains voltage is normal during the mains abnormal timer, the unit will return to a stand-by state.

After the above delays the Fuel Solenoid is energized, then one second later, the Starter Motor is engaged. The engine is cranked for a pre-set time period. If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the pre-set rest period. Should this sequence continue beyond the set number of attempts, the start sequence will be terminated and **Fail to Start** fault will be displayed on the LCD screen.

When the engine fires, the starter motor is disengaged and locked out at a pre-set frequency from the Alternator output. Alternatively a Magnetic Pickup mounted on the flywheel housing can be used for speed detection (This is selected by PC using the 6320T series configuration software). Rising oil pressure can also be used to disconnect the starter motor, however it cannot be used for under speed or over speed detection.

After the starter motor has disengaged, the **Safety On timer** is activated, allowing **Oil Pressure, High Engine Temperature, Under-speed, Charge Fail** and any delayed Auxiliary fault inputs to stabilize without triggering the fault.

Once the engine is running, the **Warm Up timer**, if selected is initiated, allowing the engine to stabilize before accepting the load.

If an auxiliary output has been selected to give a **load transfer** signal, this would then activate.

NOTE: A load transfer will not be initiated until the Oil Pressure has risen. Thus preventing excessive wear on the engine.

On removal of the Remote Start signal, the **Stop delay** timer is initiated, once it has timed out, the **load Transfer** signal is de-energized, removing the load. The **Cooling timer** is then initiated, allowing the engine a cooling down period off load before shutting down. Once the **Cooling timer** expires the **Fuel Solenoid** is de-energized, bringing the generator to a stop.

## 4. 6 MANUAL OPERATION

This manual mode is activated by pressing the  pushbutton. This manual test mode is activated by pressing the  pushbutton. An LED indicator beside the button confirms this action. In any of the two mode, pressing the  pushbutton will initiate the start sequence.

If the **pre-heat** output option is selected this timer is then initiated, and the auxiliary output selected is energized.

After the above delay the **Fuel Solenoid** is energized, then the **Starter Motor** is engaged.

The engine is cranked for a pre-set time period. If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the pre-set rest period. Should this sequence continue beyond the set number of attempts, the start sequence will be terminated and **Fail to Start** fault will be displayed on the LCD screen

When the engine fires, the starter motor is disengaged and locked out at a pre-set frequency from the Alternator output. Alternatively a Magnetic Pickup mounted on the flywheel housing can be used for speed detection (This is selected by PC using the HGM6320T series configuration software). Rising oil pressure can also be used to disconnect the starter motor, however it cannot be used for under

speed or over speed detection.

After the starter motor has disengaged, the Safety On timer is activated, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilize without triggering the fault.

Once the engine is running, the Warm Up timer, if selected is initiated, allowing the engine to stabilize before it can be loaded.

In **manual** mode, generator take no load.

In **manual test** mode, generator will take load regardless of mains supply normal or abnormal.

## 5. PROTECTION

### 5.1 WARNING ALARM /PRE-ALARM

Warnings or pre-alarms are non-critical alarm conditions and do not affect the operation of the generator system, they serve to draw the operators attention to an undesirable condition.

In the event of a warning alarm or pre-alarm, the module will display on the LCD screen.

Warning alarms is shown as the below:

**HIGH ENGINE TEMPERATURE:** if the module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm setting level after the Safety On timer has expired, a warning will occur.

**LOW OIL PRESSURE,** if the module detects that the engine oil pressure has fallen below the low oil pressure pre- alarm setting level after the **Safety On** timer has expired, a warning will occur.

**OVERSPEED,** if the engine speed exceeds the pre-alarm trip a warning is initiated.

**UNDERSPEED,** if the engine speed falls below the pre-set pre-alarm after the Safety On timer has expired, a warning is initiated.

**LOSS OF SPEED SIGNAL,** if the speed sensing signal is lost during cranking, a warning will occur.

**GENERATOR HIGH FREQUENCY** if the module detects a generator output frequency in excess of the pre-set pre-alarm, a warning is initiated.

**GENERATOR LOW FREQUENCY**, if the module detects a generator output frequency below the pre-set pre-alarm after the Safety On timer has expired, a warning is initiated.

**GENERATOR HIGH VOLTAGE** if the module detects a generator output voltage in excess of the pre-set trip a shutdown is initiated.

**GENERATOR LOW VOLTAGE** if the module detects a generator output voltage below the below the pre-set pre- alarm after the Safety On timer has expired, a warning is initiated.

**GENERATOR HIGH CURRENT**, if the module detects a generator output current in excess of the pre-set trip a warning is initiated.

**FAIL TO STOP**, If the module detects the engine is still running when the 'Fail to stop timer' expires, a warning is initiated.

**BATTERY HIGH VOLTAGE**, if the module detects that the plant DC supply has risen above the high volts setting level, a warning is initiated.

**BATTERY LOW VOLTAGE**, if the module detects that the plant DC supply has fallen below the low volts setting level, a warning is initiated.

**AUXILIARY INPUTS**, if an auxiliary input has been configured as a warning the appropriate information will be displayed.

**CONTROL AT GATE WARN**, Crash When the door open, send out the warning to report to the police the signal.

**GSM ERR**, When controller and GSM mold pieces can't normally communication, the controller sends out the warning to report to the police the signal.

**PILE UNDER VOLT WARN**, When the pile electric voltage value is is small in the scope of the enactment, the controller sends out warning to report to the police the signal.

**AMBIENT HIGH TEMP**, When the ambient temperature value is big in the ambient temperature(WARN) scope of the enactment, the controller sends out the warning to report to the police the signal

**MAINTAIN WARN**, When the controller circulates time to exceed the customer to establish of maintain time(WARN), the controller sends out the warning to report to the police the signal

## 5. 2 SHUTDOWNS

Shutdowns are latching and stop the Generator. The alarm must be cleared, and the fault removed to reset the module.

NOTE: The alarm condition must be rectified before a reset will take place. If the alarm condition remains it will not be possible to reset the unit (The exception to this is the Low Oil Pressure alarm, as the oil pressure will be low with the engine at rest). **Any subsequent warnings or shutdowns that occur will be displayed steady, therefore only the first-up shutdown will appear displaying.**

**EMERGENCY STOP**, removal of the **+ve DC** Supply from the Emergency Stop input initiates the following sequence, firstly it will initiate a controlled shutdown of the Generator and prevent any attempt to restart the Generator until the Emergency Stop push-button has been reset. Secondly it removes the **+ve DC** supply from both the Fuel Solenoid and Starter Solenoid.

**HIGH ENGINE TEMPERATURE** if the module detects that the engine coolant temperature has exceeded the high engine temperature trip setting level after the **Safety On** timer has expired, a shutdown will occur.

**LOW OIL PRESSURE**, if the module detects that the engine oil pressure has fallen below the low oil pressure trip setting level after the **Safety On** timer has expired, a shutdown will occur.

**OVERSPEED**, if the engine speed exceeds the pre-set trip a shutdown is initiated.

**UNDERSPEED**, if the engine speed falls below the pre-set trip after the **Safety On** timer has expired, a shutdown is initiated.

**LOSS OF SPEED SIGNAL**, if the speed sensing signal is lost during cranking, a shutdown is initiated.

**GENERATOR HIGH FREQUENCY** if the module detects a generator output frequency in excess of the pre-set trip a shutdown is initiated.

**GENERATOR LOW FREQUENCY**, if the module detects a generator output frequency below the pre-set trip after the **Safety On** timer has expired, a shutdown is initiated.

**GENERATOR HIGH VOLTAGE** if the module detects a generator output voltage in excess of the pre-set trip a shutdown is initiated.

**GENERATOR LOW VOLTAGE** if the module detects a generator output voltage below the below the pre-set trip after the **Safety On** timer has expired, a shutdown

is initiated.

**GENERATOR HIGH CURRENT**, if the module detects a generator output current in excess of the pre-set trip a warning is initiated. This warning will continue for a period of time depending upon the level of overload that the generator is subjected to, and the configuration setting for Generator Over Current in the 6320T series configuration software.

For instance the factory default settings for Generator High Current allow for a loading of the generator to 110% for one hour. That is to say if the generator load level exceeds the trip point by 10%, a warning alarm will occur while the overload condition exists. If the load level does not drop to normal levels within one hour, the engine is stopped, the 6320T module displaying either shutdown alarm or electrical trip alarm depend upon module configuration.

NOTE: Higher overload levels will result in a faster acting shutdown condition. For instance with the factory default configuration, an overload level twice that of the trip level ( typically 200%) will result in a Generator High Current shutdown condition after 36 seconds. For details of the relationship between the overload and the shutdown time, please see the Appendix section of this manual.

**FAIL TO START**, if the engine does not fire after the pre-set number of attempts has been made a shutdown will be initiated.

**OIL PRESSURE SENDER OPEN CIRCUIT**, if the module detects a loss of signal from the oil pressure sender (open circuit) a shutdown is initiated.

**AUXILIARY INPUTS**, if an auxiliary input has been configured as a shutdown the appropriate information will be displayed.

**MAINTAIN SHUTDOWN**, When the controller circulates time to exceed the customer to establish of maintain time(SHUTDOWN), the controller sends out the warning to report to the police the signal

## 5.3 ELECTRICAL TRIPS

Electrical trips are latching and stop the Generator but in a controlled manner. On initiation of the electrical trip condition the module will de-energize the '**Load Transfer**' Output to remove the load from the generator. Once this has occurred the module will start the Cooling timer and allow the engine to cool, off-load before shutting down the engine. The alarm must be accepted and cleared, and the fault removed to reset the module.

**GENERATOR HIGH CURRENT**, if the module detects a generator output current in excess of the pre-set trip a warning is initiated.

If this over current condition continues for an excess period of time, then the alarm is escalated to either a shutdown or electrical trip condition (depending upon module configuration). For further details of the over current alarm, please see Over Current Shutdown Alarm.

**AUXILIARY INPUTS**, if an auxiliary input has been configured as an electrical trip the appropriate information will be displayed.

## 5.4 SMS ALARM

Report the item

Num	Item	Remark
1	High Water Temp	Can choose
2	Low Oil Press Warn1#	Can choose
3	Over Speed Warn	Can choose
4	Under Speed Warn	Can choose
5	Gens High Volt Warn	Can choose
6	Gens Low Volt Warn	Can choose
7	Failed To Stop	Can choose
8	Low Fuel Level Warn	Can choose
9	Bat Charge Fail Warn	Can choose
10	Low Battery Voltage	Can choose
11	Control Gate Open	Can choose
12	Control Gate Close	Can choose
13	Low Pile Voltage	Can choose
14	emergency Stop	Can choose
15	high Temp Shutdown	Can choose
16	low Oil Press Stop	Can choose
17	over Speed Shutdown	Can choose
18	under Speed Shutdown	Can choose
19	loss Of Speed High Freq	Can choose
20	Shutdown	Can choose
21	Low Freq Shutdown	Can choose
22	high Volt Shutdown	Can choose
23	Low Voltage Shutdown	Can choose
24	OverCurrent Shutdown	Can choose
25	Failed To Start	Can choose
26	Pressure Sensor Open	Can choose
27	Input 1-6 Shutdown	Can choose
28	Mains Normal	Can choose
29	Mains Abnormal	Can choose
30	Be Out Auto Mode	Can choose
31	Generator Cranking	Can choose
32	Ambient Temp High	Can choose

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33	Ambient Temp Higher	Can choose
34	Generator Stop	Can choose
35	ats1 to gens	Can choose
36	ats1 to mains	Can choose
37	ats2 to gens	Can choose
38	Ats2 To Mains	Can choose
39	Generator Alarm Stop	Can choose
40	SMS Enabled	Can choose
41	SMS Disabled	Can choose

SMS Remote Control

Num	Command	Return SMS	Remark
1	SMS GENSET	GENSET ALARM	Shutdown or Electrical trips
		SYSTEM IN STOP MODE GENSET AT REST	
		SYSTEM IN MANUAL MODE GENSET AT REST	
		SYSTEM IN TEST MODE GENSET AT REST	
		SYSTEM IN AUTO MODE GENSET AT REST	
		SYSTEM IN STOP MODE GENSET IS RUNNING	
		SYSTEM IN MANUAL MODE GENSET IS RUNNING	
		SYSTEM IN TEST MODE GENSET IS RUNNING	
		SYSTEM IN AUTO MODE GENSET AT RUNNING	
2	SMS START	GENSET ALARM	Shutdown or Electrical trips
		STOP MODE NOT START	
		SMS START OK	TEST or MANUAL MODE
		AUTO MODE NOT START	
3	SMS STOP MODE	SMS STOP OK	Set STOP Mode
4	SMS MANUAL MODE	SMS MANUAL MODE OK	Set MANUAL Mode
5	SMS TEST MODE	SMS TEST MODE OK	Set TEST Mode
6	SMS AUTO MODE	SMS AUTO MODE OK	Set AUTO Mode
7	SMS DETAIL	Returning to contents can pass the PC software Set	Obtain a detail of generator

## 6. CONFIGURATION

Although full configuration of the module is possible using the HGM6320T series configuration software, selected parameters that may require adjustment in the field are able to be adjusted via the module's fascia.

NOTE: Care should be taken to ensure that changes made via the front panel editor are carefully recorded and fed back to the generator supplier if applicable. This is to safeguard against using the HGM6320T series configuration software to configure the module at a later date, possibly overwriting the changes made using the front panel editor. When using the HGM6320T series configuration software to make configuration changes, the first operation should be to "read configuration from controller" to ensure that any changes made to the controller's configuration by the front panel editor are 'loaded' into the PC before any changes are made. Full details of this procedure can be found in the HGM6320T series configuration software manual.

### 6.1 PARAMETER SETTING

Press the  key enters the menu interface, the choice **2 PARAMETER CONFIG**, enter the parameter to install the password confirmation interface. The default password is "1234" when it leaves factory. When setting each item, after selecting this item, press the key '**enter**' to enter the setting interface, then press the key '-' or '+' to adjust the numerical value, press the key '**enter**' to move the cursor, finally press the key '**enter**' to confirm the set parameter, here if the inner buzzer hoot for 3 times quickly, it indicate the setting t value in excess of the limited, if the inner buzzer hoot for one long period time, it indicate that the value has be saved.

In setting process, pressing  key will quit and return main LCD screen.

Configurable parameters is shown in the below table.

Num	Name	Range	Default	Remark
1	SMS Enabled	0-1	0 137	0 OFF 1 ON
2	PILE VOLT OVER	0~+100.0V	58.0V	voltage for pile to refresh complete, allow the generator to shutdown
3	PILE VOLT UNDER	0~+100.0V	45.0V	
4	AMBIENT TEMP OVER	18~50°C	28°C	

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Num	Name	Range	Default	Remark
5	AMBIENT TEMP UNDER	18~30	22°C	Allow to shutdown the ambient temp
6	LOAD CURRENT	(0~100)%	15%	Allow to shutdown the electric current
7	CHARGE LOWEST TIME	(5-360)m	30m	When establish the air condition wait for the start postpone time
8	CYC RUN START TIME	(0~600)m	0m	
9	CYC RUN STOP TIME	(0~600)m	0m	
10	NOT START TIME	(0~720)m	480m	The nighttime does not switch on to keep on time
11	NOTSTART STARTTIME	00:00~23:59	22:00	
12	LOW LEVEL WARN	(0-100)%	10%	
13	START DELAY	(0-9999s)	5s	
14	PRE-HEAT TIME	(0-300)s	0s	
15	CRANKING TIME	(3-60)s	5s	
16	CRANK REST TIME	(3-60)s	10s	
17	SAFETY ON DELAY	(5-60)s	10s	
18	START IDLE TIME	(0-3600)s	30s	
19	WARMING UP TIME	(0-3600)s	2s	
20	RETURN DELAY	(0-9999)s	30s	
21	COOLING TIME	(0-3600)s	60s	
22	STOP IDLE TIME	(0-3600)s	10s	
23	ETS TIME	(0-120)s	20s	
24	FAIL TO STOP DELAY	(10-120)s	30s	
25	GEN. TRANSIENT	(0-30)s	5s	
26	OVERCURRENT (%)	(0~120)%	100%(500A)	
27	MAINS UV(TRIP)	(50-360V /624) *1	184V	
28	MAINS OV(TRIP)	(50-360V /624) *1	276V	
29	GENERATOR UV(STOP)	(50-360V /624) *1	184V	
30	GENERATOR UV(WARN)	(50-360V /624) *1	196V	
31	GENERATOR OV(WARN)	(50-360V /624) *1	265V	
32	GENERATOR OV(STOP)	(50-360V /624) *1	273V	
33	BATTER UV (WARN)	(0-39.9 V)	8.0V	
34	BATTER OV (WARN)	(0.1-40V)	33.0V	

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Num	Name	Range	Default	Remark
35	FUEL PUMP OPEN	(0~100)	25%	
36	FUEL PUMP CLOSE	(0~100)	75%	
37	TEL NUMBER 1	At most 16 bit		
38	TEL NUMBER 2			
39	TEL NUMBER 3			
40	CHANGE PASSWORD	(0-9999)	1234	
*1 360V is Line-Nature voltage, 624V is Line-Line voltage (3-phase 3 wires).				

Other parameters configuration, (only adjust via 6320T configurable software)

Parameter	Default
Address	1
Start number	3
Fast loading feature	No
Oil pressure sensor	VDO 10Bar
Engine temperature sensor	VDO 120 degrees C
Fuel level sensor	VDO Ohm Range (10-180)
Fuel pump control	YES
Digit input1	Remote start on load, close to active
Digit input2	Control at gate, always active
Digit input3	Low oil pressure, Shutdown, close to active, Active from safety on
Digit input4	Low oil pressure, warn, close to active, always active
Digit input5	High oil temperature, Shutdown, close to active, active from safety on
Digit input6	Auxiliary inputs, Shutdown, close to active, always active
Digit output1	Preheat output (during preheat timer)
Digit output2	Common alarm
Digit output3	ETS output
Digit output4	Idle / run control
Digit output5	Close generator
Digit output6	Close mains
LED1	System in stop mode
LED2	Fail to start
LED3	Common shutdown alarm
LED4	Common alarm
Current transformer first side current	500A
Generator full current	500A
Delayed over current percent	100% (500A)

Parameter	Default
Time multiplier (over current)	36
Action (over current)	Electrical trip
Generator frequency (starter disconnect)	15Hz
Engine speed (starter disconnect)	450RPM
Oil pressure (starter disconnect)	Not used
Detect oil pressure during cranking	Yes
Schedule start	No

## 6. 2 EDITING THE CURRENT DATA/TIME

Press the  key enters the menu interface, the choice **5 TIME SET**. The setting sequence is year -month -date (week) hour :minute :second.

## 7. VIEW EVENT LOG

The model 6320T module maintains a log of the last 200 shutdown alarms to enable the operator or engineer to view the past alarms history. Only shutdown and electrical trip alarms are logged; warning alarms are not logged. Once the log is full (200 shutdown alarms), any subsequent shutdown alarms will overwrite the oldest entry in the log. Hence the log will always contain the 99 most recent shutdown alarms.

## 8. DEFINITION OF DIGIT INPUTS AND OUTPUTS

### 8. 1 DIGIT INPUT 1-6

The below parameters only can be set by HGM6320T configurable software.

Content	Description
User configured	<p>The input is configured to perform an auxiliary function, this may be any of the following:</p> <p><b>Indication</b> (annunciation only, no alarm or shutdown)  <b>Warning</b> (Alarm only, no shutdown)            Shutdown (Alarm and shutdown)  <b>Electrical Trip</b> (Alarm/off-load generator followed by shutdown after cooling)</p> <p>The function also has an activation time associated with it chosen</p>

Content	Description
	<p>from the following list:</p> <p><b>Never</b> active -This switches off the input if not in use.</p> <p><b>Always</b> active -The input selected to be an indication or alarm even when the module is in the STOP/RESET MODE.</p> <p><b>Active from starting</b> -The Auxiliary input is only active once an attempt to start the generator is made. It will remain active until the generator is at rest again.</p> <p><b>Active from safety on</b> - Auxiliary inputs are only active once the Safety On timer has timed out. This allows a delay on start up for faults, such as Oil Pressure and High Engine Temperature Warnings, or other shutdown conditions which require a delay during start-up, such as Under-voltage.</p>
Alarm mute	When active, this will disable an output configured to 'audible alarm', without resetting the module's alarm condition.
Reset alarm	When an alarm is active, it will be cleared.
Control at gate input	When the control at gate switch input, sending out to report to the police the signal
Auxiliary Mains Fail	The <b>6320T</b> module will monitor the incoming single or three phase supply for Over Voltage, Under Voltage, Over Frequency or Under Frequency. It may be required to monitor a different mains supply or some aspect of the incoming mains not monitored by the module. If the devices providing this additional monitoring are connected to operate this input, the <b>6320T</b> will operate as if the incoming mains supply has fallen outside of limits, the generator will be instructed to start and take the load. Removal of the input signal will cause the module to act if the mains has returned to within limits.
Reversed	This input is used to provide feedback to allow the <b>6320T</b> to give true indication of the contactor or circuit breaker switching status. It should be connected to the generator load switching device auxiliary contact.
Reversed	
Lamp Test	This input is used to provide a test facility for the front panel indicators fitted to the <b>6320T</b> module. When the input is activated all LED and LCD indicators will illuminate.
Reversed	
Reversed	
Panel Lock	This input is used to provide security to the installation. If the Panel lock input is active, the module will not respond to operation of the Mode select or start buttons. This allows the module to be placed into a specific mode (such as Auto) and then secured. The operation of the module is not affected and the operator will still be able to view the various instrumentation pages etc. ( <i>Front panel configuration access is barred while system lock is active</i> ). When active, the  icon will display on line 1 of the LCD display.

Content	Description
Remote Start on load	If this input is active, the <b>6320T</b> will operate thus: To use this function the <b>6320T</b> should be placed in the <b>AUTO</b> mode. The module will perform the start sequence as described earlier in this manual.
Remote Start off load	If this input is active operation will be similar to the 'Remote Start on load' function except that the generator will not be instructed to take the load. This function can be used where an engine only run is required e. g. for exercise.
Scheduled run inhibit	In automatic mode, this will inhibit the engine to scheduled run.
Reversed	

## 8. 2 DIGIT OUTPUT 1-6

The below parameters can only be set by **6320T** configurable software.

Content	Description
Output Not Used	The output in not used.
Air flap Relay	The output controls the closing of the air-flaps in an Emergency Stop or Over-speed situation.
Audible alarm	This output is intended to drive an external Klaxon or alarm indicator and will be active upon the module triggering a warning, shutdown or electrical trip alarm. This external alarm can be 'muted', without resetting the module's alarm condition by activating an auxiliary input that has been configured to "Alarm Mute".
Battery High Voltage	This output indicates that a Battery High Voltage alarm has occurred.
Battery Low Voltage	This output indicates that a Battery Low Voltage alarm has occurred.
Wind machine control	When the temperature exceeds the scope of the enactment, opening the Wind machine. When the temperature is low in set the scope, the close Wind machine
GSM communication failure	When GSM mold piece can't normally communication act
GSM Power	Control a power supply, be GSM mold piece can't normally communication, control the GSM mold piece to re- start
Start relay energized	The output mimics the operation of the start relay. Can be used to control external logic circuitry.
Fuel relay energized	The output mimics the operation of the fuel relay.

Content	Description
	Can be used to control external logic circuitry.
Calling for Scheduled run	This output indicates that a scheduled run in is progress.
Charge alternator failure	This output indicates that a failure of the auxiliary charging alternator on the generator has occurred.
ATS2 control	Control the ATS2 switch
Reversed	
ATS1 control	Control the ATS1 switch
Reversed	
Combined under & over Frequency warning	The output indicates that either an under frequency or over frequency warning has been activated.
Combined under & over Frequency shutdown	The output indicates that either an under frequency or over frequency shutdown has been activated.
Combined under & over voltage shutdown	The output indicates that either an under voltage or over voltage shutdown has been activated.
Combined under & over voltage warning	The output indicates that either an under voltage or over voltage warning has been activated.
Common alarm	The output indicates that a warning, electrical trip or shutdown alarm has been activated. Reset rules as above, depending on whether it is a Warning or a Shutdown fault.
Common Electrical Trip alarm	The output indicates that an electrical trip alarm has been activated. This output can only be reset by removal of the fault and by then pressing the Stop Reset button.
Common Shutdown alarm	The output indicates that a shutdown alarm has been activated. This output can only be reset by removal of the fault and by then pressing the Stop Reset button or by using an external 'Alarm Reset' Input.
Common Warning alarm	The output indicates that a warning alarm has been activated. This output is normally self-resetting on removal of the fault. However, it is possible to configure the module such that the warning alarms are
Coolant temperature high pre-alarm	This output indicates that a high engine coolant temperature warning (pre-alarm) has occurred.
Coolant temperature high shutdown	This output indicates that a high engine coolant temperature shutdown has occurred.
Cooling down timer in progress	This output source will be active when the cooling off-load timer is running.
Reserved	
Digital Input 1 active	This output indicates that Digital input 1 is active.
Digital Input 2 active	This output indicates that Digital input 2 is active.

Content	Description
Digital Input 3active	This output indicates that Digital input 3 is active.
Digital Input 4active	This output indicates that Digital input 4 is active.
Digital Input 5active	This output indicates that Digital input 5 is active.
Digital Input 6active	This output indicates that Digital input 6 is active.
Emergency Stop	This output indicates that an Emergency stop alarm has occurred.
Energize to stop	The output controls the fuel solenoid on an ETS type generator, energizing for the time period selected in the Edit Timer Menu. The normal fuel output (pin 4) should not be connected to the fuel solenoid, however it can be used for controlling panel instruments and other functions required whilst the engine is running.
Fail to start alarm	The output indicates that the engine has not started after the specified number of attempts, selected in the Edit Miscellaneous Menu.
Fuel Pump Control	The output is used to control a fuel transfer pump. Once the 'fuel pump on' level has been reached the module will activate the fuel pump control output. This output will remain active until the 'fuel pump off' level is reached.
Generator Available	This output indicates when the generator is ready to accept load, i. e. after safety on and warm up timers have timed out. It could be used to connect to an Automatic Transfer System or PLC to give a signal that the set is available.
Generator High Frequency Pre-alarm	This output indicates that a Generator High Frequency Warning (pre- alarm) has occurred.
Generator High Frequency Shutdown	This output indicates that a Generator High Frequency Shutdown has occurred.
Generator High Voltage Pre-alarm	This output indicates that a Generator High Voltage Warning (pre- alarm) has occurred.
Generator High Voltage Shutdown	This output indicates that a Generator High Voltage Shutdown has occurred.
Generator Low Frequency Pre-alarm	This output indicates that a Generator Low Frequency Warning (pre- alarm) has occurred.
Generator Low Frequency Shutdown	This output indicates that a Generator Low Frequency Shutdown has occurred.
Generator Low Voltage Pre-alarm	This output indicates that a Generator Low Voltage Warning (pre- alarm) has occurred.
Generator Low Voltage Shutdown	This output indicates that a Generator Low Voltage Shutdown has occurred.
Louver control	The output controls the opening of the louvers on engine starting and closure when engine has

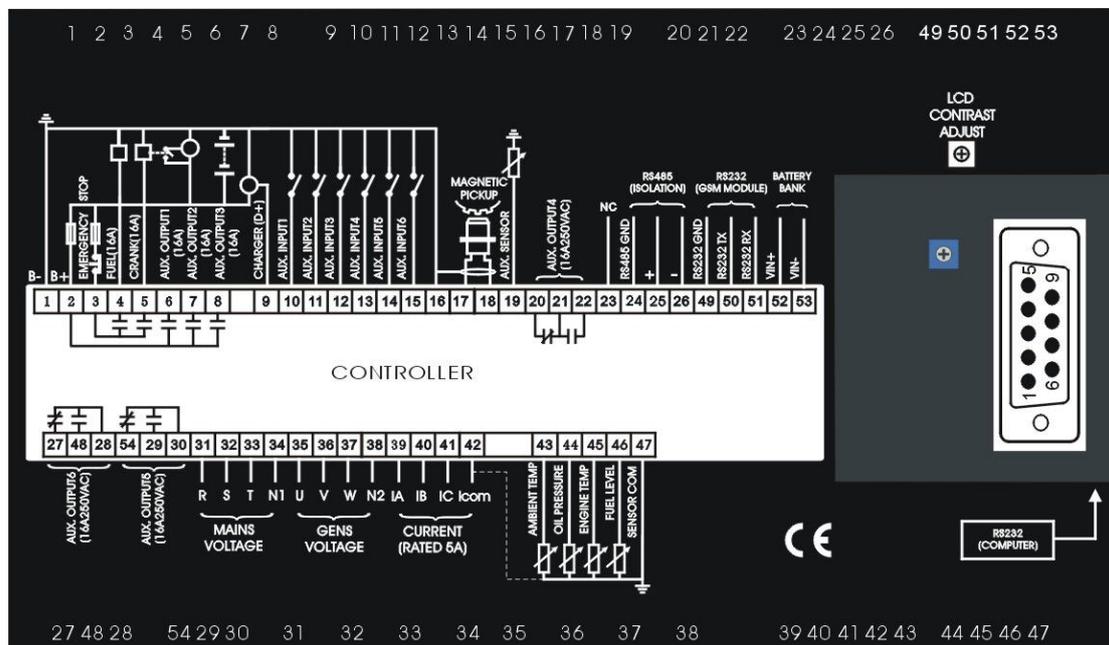
Content	Description
	stopped.
Low Fuel Level	This output indicates that the level of fuel has fallen below the low fuel alarm trip point.
Loss of speed	This output indicates that a loss of speed alarm has occurred.
Mains Failure	This output indicates that the module has sensed that a failure of the incoming AC mains supply. This output will become active whenever the mains voltage or frequency goes out of limits, or if the auxiliary mains failure input active (if used) and the mains transient timer has expired.
Mains High frequency	This output indicates that the module has sensed that the incoming AC mains supply has exceeded the frequency limit setting.
Mains High voltage	This output indicates that the module has sensed that the incoming AC mains supply voltage has exceeded the voltage limit setting.
Mains Low frequency	This output indicates that the module has sensed that the incoming AC mains supply has fallen below the frequency setting.
Mains Low voltage	This output indicates that the module has sensed that the incoming AC mains supply voltage has fallen below the voltage limit setting.
Oil pressure low Pre-alarm 1#	This output indicates that a low oil pressure warning (pre-alarm) has occurred.
Oil pressure low Shutdown 1#	This output indicates that a low oil pressure shutdown has occurred.
Oil Press sender Open circuit	This output indicates that the module has detected an open circuit failure in the Oil Pressure transducer circuit.
ATS to Mains	Mains on load
ATS to Gens	Gens on load
Reserve	
Reserve	
Over current Pre-alarm	This output indicates that the over-current warning (pre-alarm) level has been reached.
Over current trip	This output indicates that the over-current trip level has been reached.
Over speed Pre-alarm	This output indicates that an over speed warning (pre-alarm) has occurred.
Over speed Shutdown	This output indicates that an over speed shutdown has occurred.
Pre-heat (during preheat timer)	The output controls the pre-heater. Pre-heat output is available for the duration of the pre-heat timer,

Content	Description
	which terminates prior to cranking.
Pre-heat (until end of cranking)	The output controls the pre-heater. As 'Pre-heat (during preheat timer)' mode but pre-heat is also available during cranking.
Pre-heat (until end of warming)	The output controls the pre-heater. As 'Pre-heat (until safety on)' but pre-heat continues to be available until the warm-up timer has elapsed
Pre-heat (until safety on)	The output controls the pre-heater. As 'Pre-heat (until end of cranking)' but pre-heat is also available while waiting for the delayed alarms to become active.
Open breaker	This output source is intended to be used to control the load switching device. Whenever the 6320 module has taken load this control source will be active.
System in Manual Test Mode	This output indicates that the module is in the test mode.
System in Auto Mode	The output indicates that the module is in the Auto mode.
System in Manual Mode	This output indicates that the module is in the manual mode.
System in Stop Mode	The output indicates that the module is in the Stop mode.
Under speed Warning	This output indicates that an under speed warning (pre-alarm) has occurred.
Under speed Shutdown	This output indicates that an under speed shutdown has occurred.
Waiting for manual restore	This output indicates that an auto restore inhibit has occurred.
Idle/ run control	This output is active from cranking, continues to be active until the start idle timer has elapsed; Also this output is active during the period of the stop idle timer, continues to be active until the engine has stopped.
Reversed	-
Raise speed	This output is active during the warming up timer.
Excite generator	This output is available for the period of the crank timer. This output will energize for 2 second during the period of the safety on timer if generator has no voltage.
Drop speed	This output is available during the period of the coolant down timer, and remain until the engine has stopped.
Preset to Lubricate	This output is active from cranking, continues to be

Content	Description
	active until the safety timer has elapsed.
Ambient temperature Very high	The temperature lead high, and exceeded the warning the temperature value give alarm
Reserve	
Oil pressure low pre-alarm for 2#"	This output indicates that a low oil pressure warning (pre-alarm) has occurred.
Oil pressure low shutdown for 2#	This output indicates that a low oil pressure shutdown has occurred.

### 9. BACK BOARD

The back board of HGM6320T Controller is shown as follows:



### 10. CONNECTING TERMINAL

Pin	Function	Dim	Description
1	DC Plant Supply Input (-ve)	2.5mm	System DC negative input. (Battery Negative).
2	DC Plant Supply Input (+ve)	2.5mm	System DC positive input. (Battery Positive).(Recommended Maximum Fuse 20A)
3	Emergency Stop Input	2.5mm	Plant Supply +ve. Also supplies fuel & start outputs. (Recommended Maximum Fuse

## HGM6320T AUTO START MODULE

Pin	Function	Dim	Description
			32A)
4	Fuel relay Output	2. 5mm	Plant Supply +ve from pin 3. 16 Amp rated.
5	Start relay Output	2. 5mm	Plant Supply +ve from pin 3. 16 Amp rated.
6	Auxiliary Output relay 1	2. 5mm	Plant Supply +ve. 16 Amp rated.
7	Auxiliary Output relay 2	2. 5mm	Plant Supply +ve. 16 Amp rated.
8	Auxiliary Output relay 3	2. 5mm	Plant Supply +ve. 16 Amp rated.
9	Charge fail / excite	1. 0mm	Do not connect to ground (battery -ve)
10	Auxiliary input 1	1. 0mm	Switch to -ve
11	Auxiliary input 2	1. 0mm	Switch to -ve
12	Auxiliary input 3	1. 0mm	Switch to -ve
13	Auxiliary input 4	1. 0mm	Switch to -ve
14	Auxiliary input 5	1. 0mm	Switch to -ve
15	Auxiliary input 6	1. 0mm	Switch to -ve
16	Functional Earth	1. 0mm	Connect to a good clean earth point
17	Magnetic pickup +ve	1. 0mm	Connect to Magnetic Pickup device
18	Magnetic pickup -ve	1. 0mm	
19	Not connected	-	
20	Auxiliary Output relay 4	2. 5mm	Free voltage contacts. 16 Amp rated.
21			
22			
23	Not connected	-	
24	RS485 port Common	0. 5mm	Use only 120Ω RS485 approved cable
25	RS485 port A(+)	0. 5mm	
26	RS485 port B(-)	0. 5mm	
27 28 48	Auxiliary Output relay 6 (close mains output)	2. 5mm	Free voltage contacts, N/C, 16 Amp rated.
29 30 54	Auxiliary Output relay 5 (Close generator output)	2. 5mm	Free voltage contacts, N/O, 16 Amp rated.
31	Mains L1 voltage monitoring	1. 0mm	Connect to mains L1 output (Recommend 2A fuse)
32	Mains L2 voltage monitoring	1. 0mm	Connect to mains L2 output (Recommend 2A fuse)
33	Mains L3 voltage monitoring	1. 0mm	Connect to mains L3 output (Recommend 2A fuse)

Pin	Function	Dim	Description
34	Mains Neutral input	1.0mm	Connect to mains Neutral terminal
35	Generator L1 voltage monitoring	1.0mm	Connect to Generator L1 output (Recommend 2A fuse)
36	Generator L2 voltage monitoring	1.0mm	Connect to Generator L2 output (Recommend 2A fuse)
37	Generator L3 voltage monitoring	1.0mm	Connect to Generator L3 output (Recommend 2A fuse)
38	Generator Neutral input	1.0mm	Connect to Generator Neutral terminal (AC)
39	CT Secondary for L1	2.5mm	Connect to secondary of L1 monitoring CT
40	CT Secondary for L2	2.5mm	Connect to secondary of L2 monitoring CT
41	CT Secondary for L3	2.5mm	Connect to secondary of L3 monitoring CT
42	CT secondary common	2.5mm	Connect to secondary of all monitoring CT's
43	Ambient temperature	1.0mm	Connect to Ambient Temperature sender
44	Oil Pressure Input	1.0mm	Connect to Oil pressure sender
45	Coolant Temperature Input	1.0mm	Connect to Coolant Temperature sender
46	Fuel Level input	1.0mm	Connect to Fuel Level sender
47	Sender Common Return	1.0mm	Return feed for senders*.
49	RS232 port Common	0.5mm	To GSM SMS module communications (2-RXD, 3-TXD, 5-GND)
50	RS232 TXD	0.5mm	
51	RS232 RXD	0.5mm	
52	Pile VIN+	1.0mm	Connect to pile
53	Pile VIN-	1.0mm	
COM port	RS232 COMPUTER		Supervise and control and install the parameter
LCD adjust	LCD CONTRAST ADJUST		

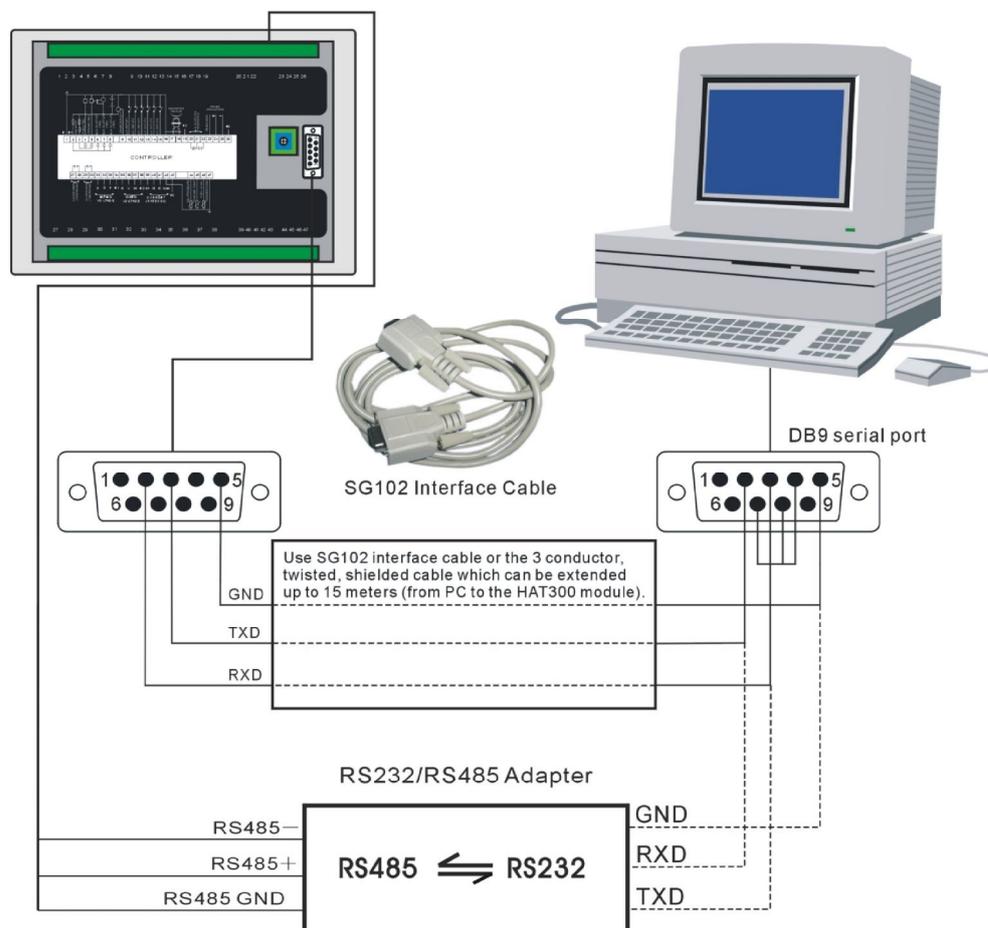
## PART CONNECTOR FUNCTION DETAILS

1. Emergency Stop input. Internally linked to Starter and Fuel outputs. If this input is not connected to positive the module will be locked out, and if the engine is running it will shutdown immediately. The Positive Supply is also removed from Starter and Fuel outputs, therefore only a single pole Emergency Shutdown button is required.

2. Charge Fail input / Excitation output. Supplies excitation to the Plant Battery Charging Alternator, also an input for the Charge Fail detection circuitry.
3. Auxiliary input. This is a negative switched configurable input. It is possible to configure the input to be a normally closed signal or a normally open signal.
4. RS485 port. Use only screened 120Ω cable approved specifically for use in RS485 applications.
5. Sensor sensing input. Connect to resistive type sender.

## 11.LINK TO PC

This below figure show the link from PC to HGM6320T module.



## 12. FAULT FINDING

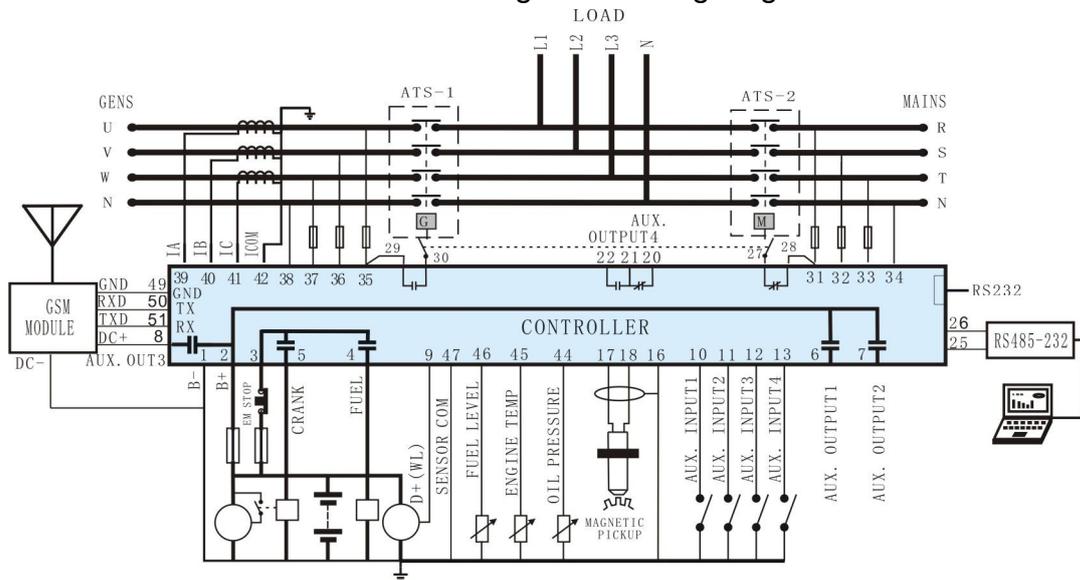
Symptom	Possible Remedy
Unit is inoperative	Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse.
Unit shuts down	Check DC supply voltage is not above 35 Volts or below 8 Volts. Check the operating temperature is not above 70 °C. Check the DC fuse.
Unit locks out on Emergency Stop	If an Emergency Stop Switch is not fitted, ensure that a positive is connected to the Emergency Stop input. Check emergency stop switch is functioning correctly. Check Wiring is not open circuit.
Intermittent Magnetic Pick-up sensor fault	Ensure that Magnetic pick-up screen is only connected at one end, if connected at both ends, this enables the screen to act as an aerial and will pick up random voltages.
Low oil Pressure fault operates after engine has fired	Check engine oil pressure. Check oil pressure switch/sender and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sender is compatible with the 6320T Module and is correctly configured.
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch/sender and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sender is compatible with the 6320T Module.
Shutdown fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Warning fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Fail to Start is activated after pre-set number of attempts to start	Check wiring of fuel solenoid. Check fuel. Check battery supply. Check battery supply is present on the Fuel output of the module. Check the speed sensing signal is present on the 6320T inputs. Refer to engine manual.
Continuous starting of generator when in <b>AUTO</b>	Check that there is no signal present on the "Remote Start" input. Check configured polarity is correct.
Generator fails to start on receipt of Remote Start signal.	Check Start Delay timer has timed out. If remote start fault, check signal is on "Remote Start" input. Confirm input is configured to be used as "Remote Start".
Pre-heat inoperative	Check wiring to engine heater plugs. Check battery supply. Check battery supply is present on the Pre-heat output of module. Check pre-heat has been selected in your configuration.
Starter motor inoperative	Check wiring to starter solenoid. Check battery supply. Check battery supply is present on the Starter output of module. Ensure that the Emergency Stop input is at +Ve.

Symptom	Possible Remedy
Engine runs but generator will not take load	Check Warm up timer has timed out. Ensure generator load inhibit signal is not present on the module inputs.
Incorrect reading on Engine gauges	Check engine is operating correctly. Check sender and wiring paying particular attention to the wiring to terminal 47. Check that sender is compatible with the 6320T Module and is correctly configured.

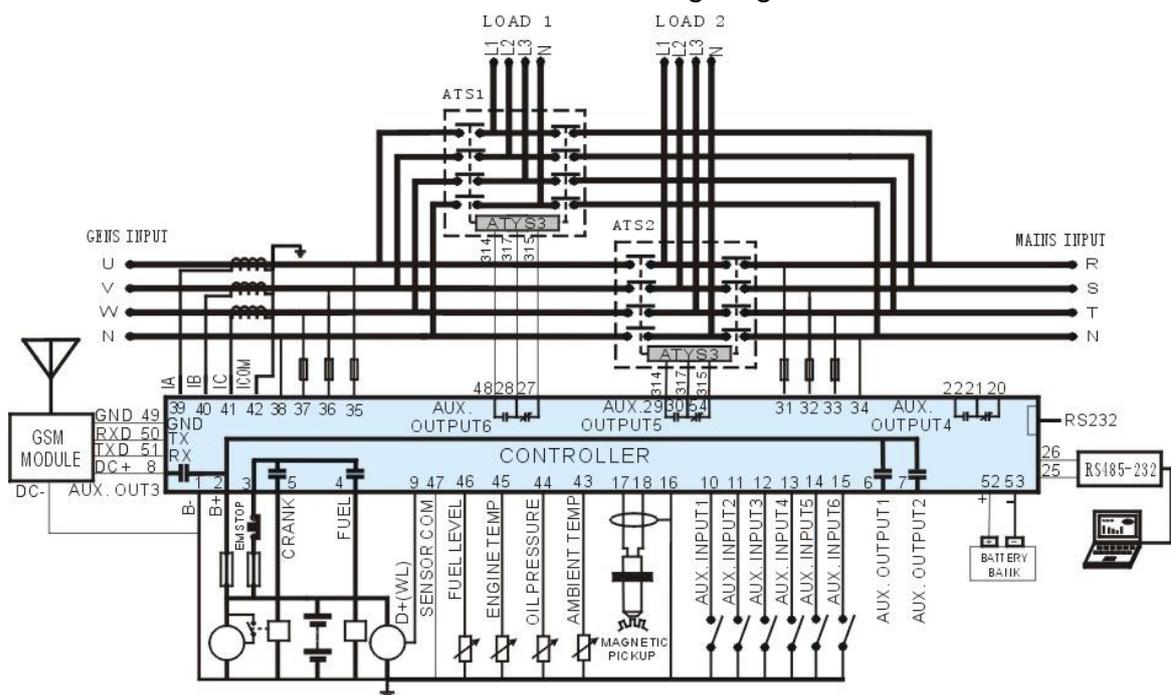
### 13.TYPICAL WIRING DIAGRAM

#### 13.1 3-PHASE 4 WIRES

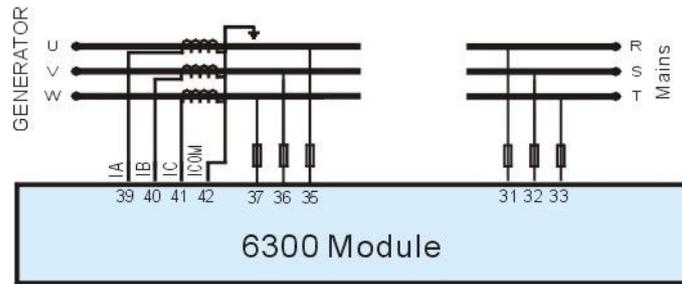
HGM6320T general wiring diagram



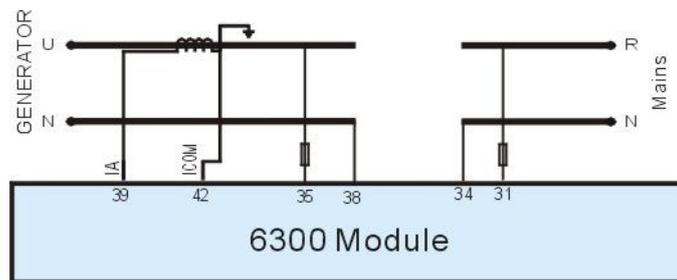
HGM6320T extend wiring diagram



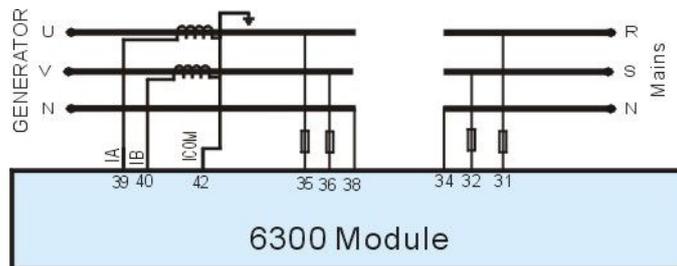
### 13.2 3-PHASE 3 WIRES



### 13.3 SINGLE PHASE 2 WIRES

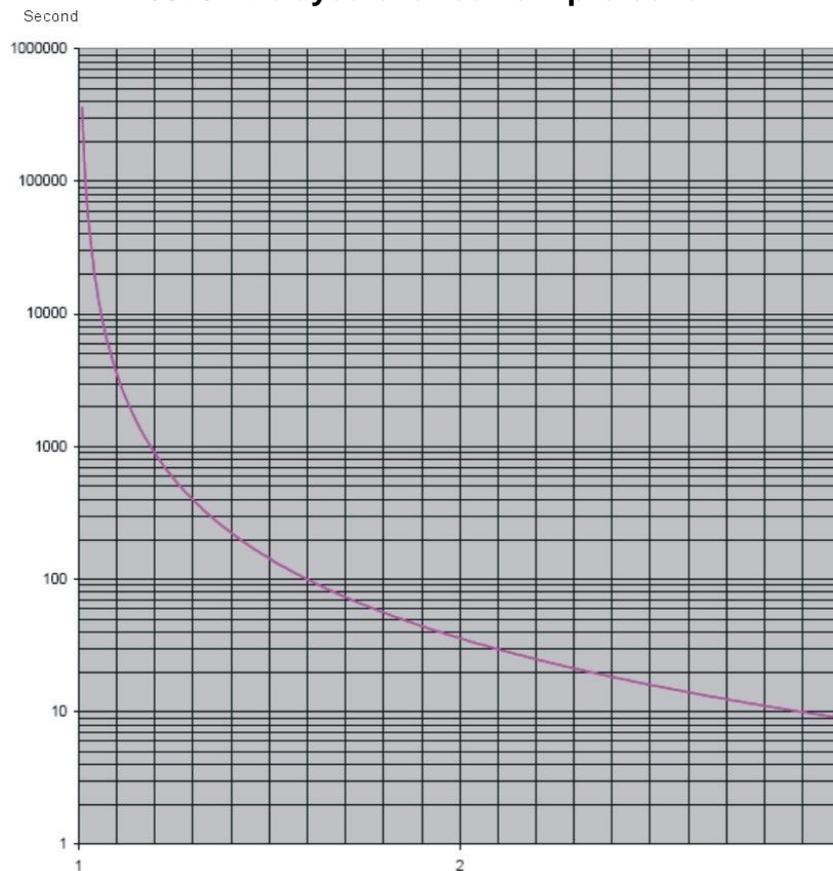


### 13.4 2-PHASE 3 WIRES



## 14. IDMT TRIPPING CURVES (TYPICAL)

### 6320T Delayed over-current protection



**Current as a multiple of the trip-point setting (tripping curve = 36)**

The details refer to 'hgm6320T configurable software manual'.

## 15. INSTALLATION

The controller is designed to panel installation mode, and it is fixed by clamps when it is installed. The overall dimension and panel tapping dimension are given as follows:

