

Smartgen®

HGM6110/6120

Automatic Generator Module

OPERATING MANUAL



Smartgen Electronics

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1. SUMMARY

HGM6100 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.

HGM6100 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

- ◆ HGM6100 controller has two types:
 - HGM6110: ASM (Automatic Start Module)
 - HGM6120: AMF (Automatic Mains Failure Module)
- ◆ Using microprocessor as a core, graphics LCD with big screen and backlight, display between Chinese and English, key touch for operation.
- ◆ Have a RS485 port, can used for communicate to PC.
- ◆ Precision measure and display of
 - mains voltage
 - mains frequency (Hz)
 - mains current

 - generator voltage
 - generator current
 - generator frequency (Hz)
 - generator active power (kW)
 - generator inactive power (kVar)
 - generator apparent power (kVA)
 - generator power factor
 - generator starts count
 - generator hours count
 - generator cumulate electric energy (kWh)
 - generator temperature
 - generator pressure
 - generator fuel level
 - start battery voltage
- ◆ Configurable single phase 2 wires or 2 phase 3 wires or 3 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. All parameters can be set from the front panel, or be set by PC used SG72
- ◆ 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 8 point curves;
- ◆ 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;
- ◆ 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
Alternator Input Range 3-Phase 4 Wire 2-Phase 3 Wire Single phase 2 wire	15V AC - 360 V AC (ph-N) 15V AC - 360 V AC (ph-N) 15V AC - 360 V AC (ph-N)
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	7 Amp DC at supply voltage.
Fuel Relay Output	7 Amp DC at supply voltage.
Auxiliary Relay Output (1-4)	(1) 7 Amp DC at supply voltage, (2) 7A 250VAC free voltage contact, (3,4) 16A 250VAC free voltage contact.
Dimensions	200mm x 144mm x 50mm
Panel cutout	184mm x 139mm
Operating Temperature Range	-25 to +70°C
Storage Condition	Temperature: (-30 - 80)°C
C. T. Burden	2. 5VA
C. T. Secondary	5A
Weight	0. 55kg

4. OPERATION

4.1 KEY FUNCTION


	Stop/ Reset key	This button places the module into its Stop/reset 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.
	Start key	In manual or manual test mode, pressing this key will start engine.
	Manual mode key	Pressing this key will set the module into manual mode.
	Auto key	Pressing this key will set the module into automatic mode.

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	Manual test mode	Pressing this key will set the module into manual test mode., when generate electricity is normal, the generator will on-load(HGM6110 have not this key)
	Set/enter	Enter the set menu, or validate the setting
	Page up /increase	Page up, or In setting parameter status, pressing this key will increase setting value.
	Page down /decrease	Page down, or In setting parameter status, pressing this key will decrease setting value.

4.2 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 (Hgm6110) or when mains voltage occur over-voltage, under-voltage, miss phasic (Hgm6120), the following sequence is initiated:

To allow for false signals the **mains abnormal timer** is initiated (only Hgm6120), 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(Hgm6110) during the Start Delay timer, or if mains voltage is normal (Hgm6120) 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 **Failed to start alarm** 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 6100 series configuration software or form from the front panel). Rising oil pressure can also be used to disconnect the starter motor.

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.

4.3 MANUAL OPERATION

•**HGM6120**: 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 **Failed to start alarm** 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 6100 series configuration software, or form from the front panel). Rising oil pressure can also be used to disconnect the starter motor.

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 load or no load depend on mains supply, if mains is normal, it will not take load, otherwise it will take load.

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

●**Hgm6110**: This manual mode is activated by pressing the  pushbutton. An LED indicator beside the button confirms this action. In any of the two modes, pressing the  pushbutton will initiate the start sequence.

The start sequence is similar as the above.

In above process, when the Warm Up timer has expired, if the remote start signal is active, generator will take load, if inactive, generator will not take load.

In above process, pressing  key will bring the generator to a stop.

5. PROTECTION

5.1 WARN

Warns 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 warn, the module will display at the last screen of LCD.

Warn is shown as the below:

HIGH ENGINE TEMPERATURE: if the module detects that the engine coolant temperature has exceeded the high engine temperature setting level after the Safety On timer has expired and the input of **Inhibit WTH stop** is activated, a warn will occur.

LOW OIL PRESSURE, if the module detects that the engine oil pressure has

fallen below the low oil pressure setting level after the Safety On timer has expired and the input of **Inhibit OPL stop** is activated, a warning will occur.

LOSS OF SPEED SIGNAL, if the speed sensing signal is lost, a warning will occur and the Lost speed delay set to zero, a warning will occur.

GENERATOR OVER CURRENT, if the module detects a generator output current in excess of the setting and the Over current delay set to zero, 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.

Low level warn, if the module detects that the engine oil level has fallen below the low level setting level has expired, a warning will occur.

Failed to charge warn, if the module detects that the charge of volts has fallen below the setting level has expired, a warning will occur.

5.2 Shutdown alarm

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).

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 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 setting level after the **Safety On** timer has expired, a shutdown will occur.

OVERSPEED, if the engine speed exceeds the setting value a shutdown is initiated.

UNDERSPEED, if the engine speed falls below the setting value after the Safety On timer has expired, a shutdown is initiated.

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

GENERATOR OVER FREQUENCY if the module detects a generator output frequency in excess of the setting value a shutdown is initiated.

GENERATOR UNDER FREQUENCY, if the module detects a generator output frequency below the setting value after the Safety On timer has expired, a shutdown is initiated.

GENERATOR OVER VOLTAGE if the module detects a generator output voltage in excess of the setting value a shutdown is initiated.

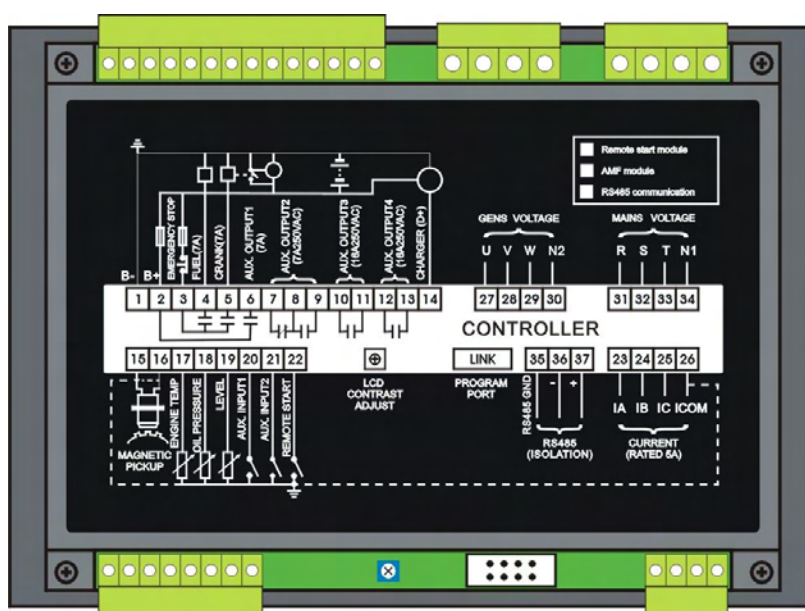
GENERATOR UNDER VOLTAGE if the module detects a generator output voltage below the setting value after the Safety On timer has expired, a shutdown is initiated.

GENERATOR OVER CURRENT, if the module detects a generator output current in excess of the setting value is initiated, a shutdown is initiated.

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

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

6. 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 32A)
4	Fuel relay Output	2.5mm	Plant Supply +ve from pin 3. 7 Amp rated.
5	Start relay Output	2.5mm	Plant Supply +ve from pin 3. 7 Amp rated.
6	Auxiliary Output relay 1	1.5mm	Plant Supply +ve from pin 2. 7 Amp rated.
7	Auxiliary Output relay 2	1.5mm	Free voltage contacts. 7 Amp rated
8			
9	Auxiliary Output relay 3	2.5mm	Free voltage contacts. 16 Amp rated
10			
11			
12	Auxiliary Output relay 4	2.5mm	
13			
14	Charge fail / excite	1.0mm	Do not connect to ground (battery -ve)
15	Magnetic pickup +ve	Connect to Magnetic Pickup device	
16	Magnetic pickup -ve		

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Pin	Function	Dim	Description	
17	Coolant Temperature Input	Connect to Coolant Temperature sender	Reference table 4	
18	Oil Pressure Input	Connect to Oil pressure sender		
19	Fuel Level input	Connect to Fuel Level sender		
20	Auxiliary input 1	1.0mm	Switch to -ve	Reference table 3
21	Auxiliary input 2	1.0mm	Switch to -ve	
22	Remote start input	1.0mm	Switch to -ve	
23	CT Secondary for L1	2.5mm	Connect to secondary of L1 monitoring CT	
24	CT Secondary for L2	2.5mm	Connect to secondary of L2 monitoring CT	
25	CT Secondary for L3	2.5mm	Connect to secondary of L3 monitoring CT	
26	CT secondary common	2.5mm	Connect to secondary of all monitoring CT's	
27	Generator L1 voltage monitoring	1.0mm	Connect to Generator L1 output (Recommend 2A fuse)	
28	Generator L2 voltage monitoring	1.0mm	Connect to Generator L2 output (Recommend 2A fuse)	
29	Generator L3 voltage monitoring	1.0mm	Connect to Generator L3 output (Recommend 2A fuse)	
30	Generator Neutral input	1.0mm	Connect to Generator Neutral terminal (AC)	
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)	
34	Mains Neutral input	1.0mm	Connect to mains Neutral terminal	
35	RS485 port Common	0.5mm	Use only 120Ω RS485 approved cable	
36	RS485 port A(-)	0.5mm		
37	RS485 port B(+)	0.5mm		

Note:

1. These terminals of 31, 32, 33, 34 are not used for HGM6110 module.
2. The terminal of LINK on the rear panel is an interface for upgrading module software.
3. Sensor sensing input. Connect to resistive type sender.

7. PARAMETER RANGE AND DEFINE

All parameters of HGM6100 as follows:

7.1 PARAMETERS TABLE (TABLE 1)

Num	Parameter	Range	Default	Remark
1	Mains normal delay	(0-3600)S	10	Mains transient delay, suited for ATS(automatic transfer switch)
2	Mains abnormal delay	(0-3600)S	5	
3	Mains under volt	(30-360)V	184	When mains voltage is under than the point, mains under voltage is active. When the point is zero, mains under voltage is disabled.
4	Mains over volt	(30-360)V	276	When mains voltage is over than the point, mains over voltage is active. When the point is 360V, mains over voltage is disabled.
5	Transfer rest time	(0-99.9S)	1.0	It's the delay from mains is opened to generator closing or from generator is opened to mains closing.
6	Start delay	(0-3600s)	1	It's the delay from remote start signal is active or mains is failure, to start generator.
7	Stop delay	(0-3600s)	1	It's the delay from remote start signal is inactive or mains is normal, to stop generator.
8	Number of Crank	(1-10)次	3	Numbers of crank cycles.
9	Preheat time	(0-300)S	0	
10	Cranking time	(3-60)S	5	
11	Crank rest time	(3-60)S	10	
12	Safe time	(1-60)S	10	
13	Start idle time	(0-3600)S	0	
14	Warming up time	(3-3600)S	10	
15	Cooling time	(3-3600)S	10	
16	Stop idle time	(0-3600)S	0	
17	ETS solenoid hold	(0-120)S	20	It's the delay for energizing to stop.
18	Fail to stop delay	(0-120)S	0	
19	ATS close time	(0-10)S	5.0	Mains or Generator switch closing pulse width, when it is zero, output is continuous.
20	Flywheel teeth	(10-300)	118	
21	Gens Volt Abnorm Time	0-20.0S	10.0	

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Num	Parameter	Range	Default	Remark
22	Gens over volt	(30-360)V	264	When generator voltage is over than the point, generator over voltage is active. When the point is 360V, generator over voltage is disabled.
23	Gens under volt	(30-360)V	196	When generator voltage is under than the point, generator under voltage is active. When the point is 30V, generator under voltage is disabled.
24	Under speed	(0-6000)RPM	1200	When the engine speed is under than the point and hold great than 10 seconds, generator under speed is active.
25	Over speed	(0-6000)RPM	1710	When the engine speed is over than the point and hold great than 2 seconds, generator over speed is active.
26	Gens under freq	0-75.0Hz	45.0	When generator frequency is low than the point, generator low frequency and hold great than 10 seconds is active.
27	Gens over freq	0-75.0Hz	57.0	When generator frequency is over than the point and hold great than 2 seconds, generator over frequency is active.
28	High temperature	(80-140)°C	98	When engine temperature sensor value is large than this point and remain for 2 seconds, send out shutdown alarm. When the value is 140, send out warning alarm. (It's suited for engine temperature sensor only).
29	Low oil pressure	(0-400)kPa	103	When engine oil pressure sensor value is less than this point and remain for 2 seconds, send out shutdown alarm. When the value is zero, send out warning alarm. (it's suited for oil pressure sensor only)
30	Low fuel level	(0-100)%	10	When fuel level sensor value is less than this point and remain for 10 seconds, send out warning alarm.

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Num	Parameter	Range	Default	Remark
31	Lost speed delay	0-20.0S	5.0	When speed is zero and remain for the delay, send out shutdown alarm. When the delay is zero, send out warning alarm.
32	Charge fail volt	(0-30)V	6.0	During generator is running, when charge alternator WL/D+ voltage is low than this point and remain for 5 seconds, generator will warning alarm.
33	Battery over volt	(12-40V)	33.0	When generator battery voltage is over than the point and hold for 20 seconds, battery over voltage signal is active. It's a warning alarm.
34	Battery under volt	(4-30V)	8.0	When generator battery voltage is less than the point and hold for 20 seconds, battery under voltage signal is active. It's a warning alarm.
35	CT rate	(5-6000)/5	500	Current transformer rate
36	Full load current	(5-6000)A	500	Mains or generator set maximum rated current.
37	Over current	(50-130)%	120	When the load current is over than the point, the over current delay is initiated.
38	Over current delay	(0-3600)S	1296	When load current is over than the point and hold great than the timer, send out over current signal. When the delay is zero, over current is disabled.
39	output1 set	(0-9)	2	Energized to stop
40	Output2 set	(0-9)	3	Idle control
41	Output3 set	(0-9)	5	Close gens
42	Output4 set	(0-9)	6	Close mains
43	Digit input1 set	(1-16)	1	High Temperature input
44	Digit input1 delay	0-20.0S	2.0	
45	Digit input2 set	(1-16)	2	Low Oil Pressure input
46	Digit input2 delay	0-20.0S	2.0	
47	Passwords set	(0-9999)	1234	
48	Crank disconnect	(0-5)	2	Setting Item Is Given in Table 5.
49	Speed disconnect	(0-3000)RPM	360	When engine speed is large than this point, starter will disconnect.
50	Freq disconnect	(10-30)Hz	14	When generator frequency is large than this point, starter will disconnect.

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Num	Parameter	Range	Default	Remark
51	OP disconnect	(0-400)kPa	200	When engine oil pressure is large than this point, starter will disconnect.
52	Select AC system	0 3P4L 1 2P3L 2 1P2L	0	3P4L(3 phase 4 wire)
53	Select temp curve	(0-8)	04	SGD(120°C)
54	Select press curve	(0-8)	04	SGD(10Bar)
55	Select level curve	(0-5)	0	Not used

7.2 OUTPUT 1-4 TABLE (TABLE 2)

Num	Content	Description
0	Not used	
1	Common alarm	The designated programmable output relay will energize when any warning or shutdown fault circuit has been activated.
2	Energised to stop	The designated programmable output relay will energize when a stop signal has been activated. The output will remain energized for pre-set timer once the engine has come to a complete stop, then de-energizes.
3	Idle control	The designated programmable output relay will energize when the idle delay is not zero. The output contact would typically be connected to the "idle/run" input control of an electronic governor.
4	Preheat control	The designated programmable output relay will energize during the preheat delay timer period and also energize until the engine receive a crank success signal. The preheat output is typically used for an engine starting aid such as glow plugs.
5	Close Gens	Switch generator breaker on.
6	Close mains	Switch mains breaker on.(HGM6120)
7	Open ATS	Switch breaker off. The output delay is 3 seconds.
8	Raise speed control	It's active from entering warming to switching load on.
9	Drop speed control	It's active from idling in stopping to engine has been stopped.
10	Reserve	

7.3 DIGIT INPUT 1-2 TABLE (TABLE 3)

Num	Content	Description
0	Not used	

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Num	Content	Description
1	high Temp input	High engine temperature digital input
2	Low OP input	Low oil pressure digit input
3	Auxiliary warn	Auxiliary warn alarm digital input.
4	Auxiliary shutdown	When power on, if active, generator will stop immediately.
5	Stop after cooled	During engine running, if the engine occur high temperature shutdown, when the input is active, the engine will first initiate cooling delay and then stop, else will stop immediately.
6	Gen closed input	The input state of generator closed.
7	Mains closed input	The input state of Mains closed.
8	Inhibit WTH STOP	When it is active, during engine running, if the engine occur high temperature, the engine will only send out high temperature warning alarm, not stop.
9	Inhibit OPL STOP	When it is active, during engine running, if the engine occur low oil pressure, the engine will only send out low oil pressure warning alarm, not stop.
10	Reserve	

7.4 SENSOR (TABLE 4)

Num	Item	Content	Remark
1	Temperature Sensor	0 Not used 1 Defined curve 2 VDO 3 SGH 4 SGD 5 CURTIS 6 DATCON 7 Reserve 8 Reserve	Defined curve input resistance range is 0-999.9 ohm, Default is SGD
2	Oil pressure Sensor	0 Not used 1 Defined curve 2 VDO 10Bar 3 SGH 4 SGD 5 CURTIS 6 DATCON 10Bar 7 Reserve 8 Reserve	Defined curve input resistance range is 0-999.9 ohm, Default is SGD


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Num	Item	Content	Remark
3	Level Sensor	0 Not used 1 Defined curve 2 SGH 3 SGD 4 Reserve 5 Reserve	Defined curve input resistance range is 0-999.9 ohm, Default is Not used

7.5 CONDITION OF CRANK SUCCEED (TABLE 5)






Num	Content
0	Speed
1	Frequency
2	Speed + Frequency
3	Speed + Oil pressure
4	Frequency + Oil pressure
5	Frequency + Speed + Oil pressure

8. SETTING PARAMETER

After the controller is powered up, press the key  to enter into the setting interface:

- 1 Set Parameters
- 2 Information
- 3 Set Language/语言

◆ Set parameters

The default password is “1234” when it leaves factory. The senior setting password is fixed as “0318”. When setting each item, after selecting this item, press the key  to enter the setting interface, then press the key  or  to adjust the numerical value, press the key  to move the cursor, finally press the key  to confirm the set parameter.

NOTE:


- a. Please set parameters in stop mode, else shutdown or other

event may occur.

- b. The over value point must be great than the under value.
- c. The configurable output 1 to 4 allow to set as same item.

◆ Information

LCD will display the controller software version, issue date. Note:

press the key  will display the states of configurable input 1, 2 and all outputs.

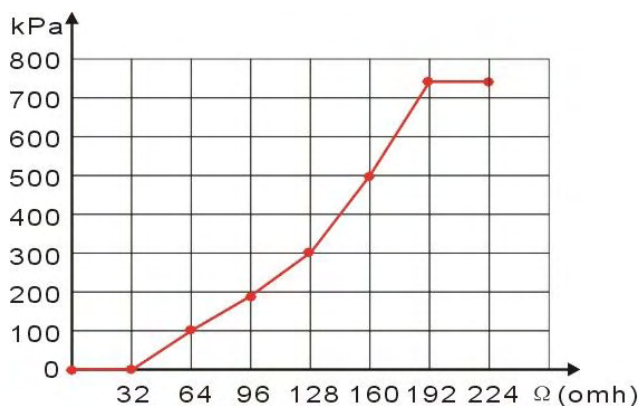
◆ Set language

User may set display interface language as Chinese or English.

* Hint: Press the key  will exit at any time.

Note :Sensor config

1. If the used sensor curve is not same as the standard curve, please adjust in “Sensor curve”.
2. When entering the sensor curve, X value (voltage or resistance) must be from small value to big value.
3. If the oil pressure sensor is not exist and the oil pressure alarm switch is exist, please set “Oil pressure sensor” as “not used”, else low oil pressure shutdown will occur.
4. If the sensor curve slope is positive, please according to the below curve Diagram



Common units conversion table

	1N/m ² (pa)	1kgf/cm ²	1bar	(1b/in ²) psi
1Pa	1	1.01972×10 ⁻⁵	1×10 ⁻⁵	1.45038×10 ⁻⁴
1kgf/cm ²	9.80665×10 ⁴	1	0.980665	14.2233
1bar	1×10 ⁵	1.01972	1	14.5038
1psi	6.89476×10 ³	7.0307×10 ⁻²	6.89476×10 ⁻²	1

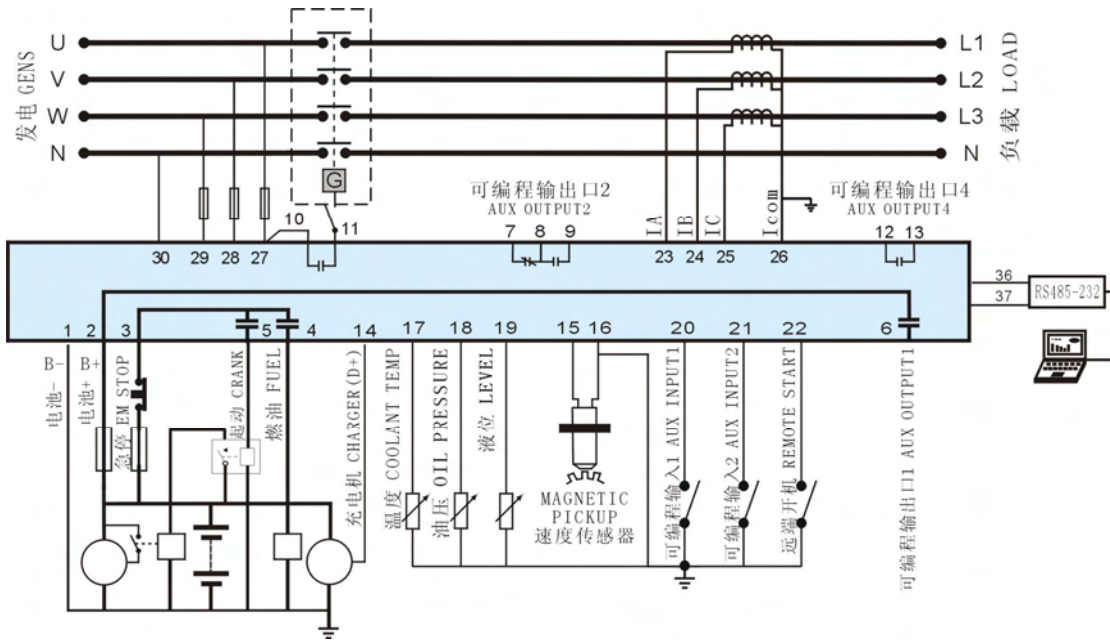
9. TEST RUN

Before operation, inspections that are recommended as follows should be carried out:

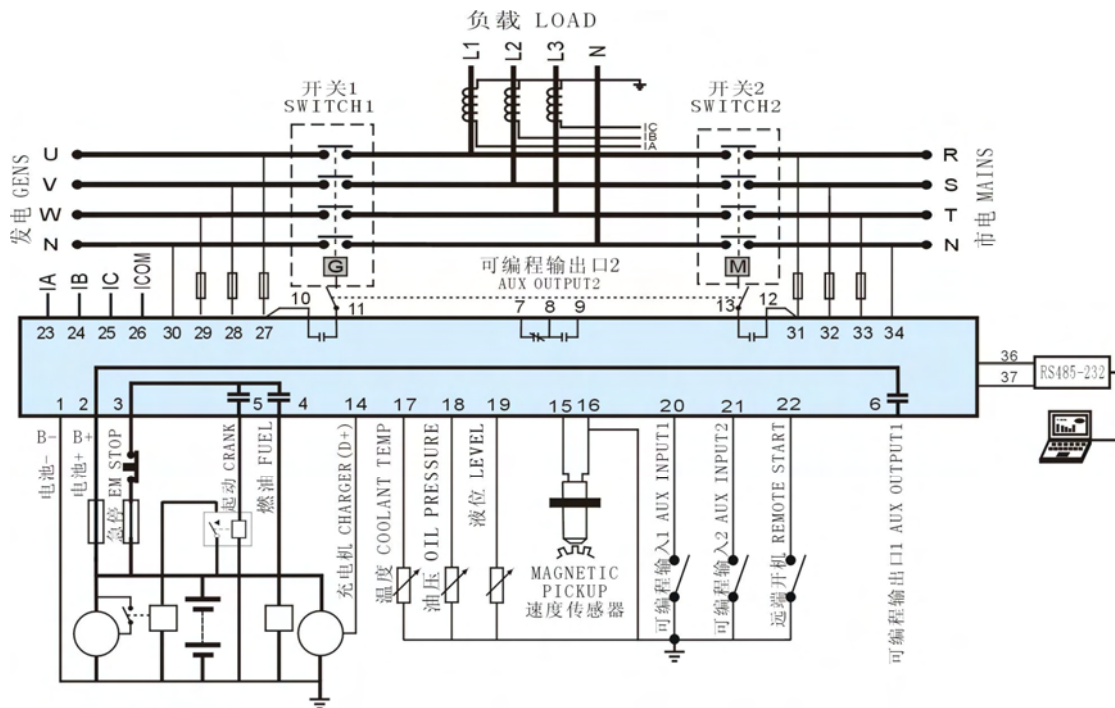
- a. Check and assure that all connections are correct, and that diameter of wire is suitable;
- b. The DC power supply of controller is equipped with fuse, and the positive supply (+Ve) and negative supply (-Ve) connected with battery are connected correctly;
- c. The emergency stop input is connected with the positive supply (+Ve) of the battery through the NC terminal and fuse of emergency stop button;
- d. The suitable operation should be taken to prevent the engine from crank success (such as dismantling the connection of fuel), check and assure that it is correct, then connect with battery, select manual mode, the controller will execute program;
- e. Press down the starting button on the panel of controller, the engine will crank, after starts have been carried out according to setting crank numbers, the controller sends the signal that indicates crank failure; Press the Stop/Reset key to make the controller resetting;
- f. Restore the measure that prevents the engine from crank success (such as restoring the connection of fuel), press down the starting button again, the engine will crank, if crank is normal, the generator will operate from idle operation (if idle has been set) to normal operation. In the meantime, observe the operation situation of engine and the voltage and frequency of the AC generator. If there is abnormal, stop the generator, then check connections of each part according to this handbook;
- g. Select automatic state through front panel, then switch on the mains voltage, the controller switches over ATS (if it exist) to mains on load after pass through the mains normal delay, after cooling time, and then shut down to go into standby state until the mains is abnormal again;
- h. After the mains is abnormal again, the Generator will automatically crank into normal operation state, and then close generator relay, control the ATS to switch transfer to generator on load. If the situation is not same as described above, check the connection of control part of the ATS according to this handbook;
- i. If there are other questions, please contact the technical personnel of our company in time.

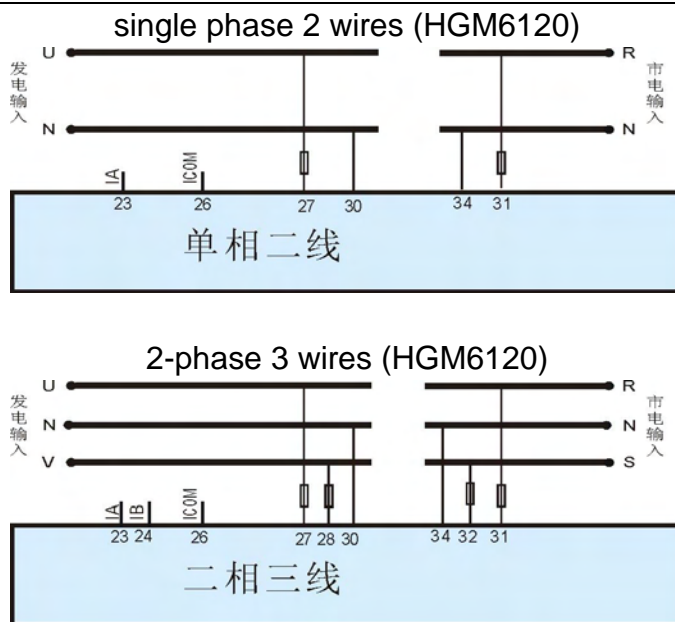
10.TYPICAL WIRING DIAGRAM

HGM6110 Typical wiring diagram



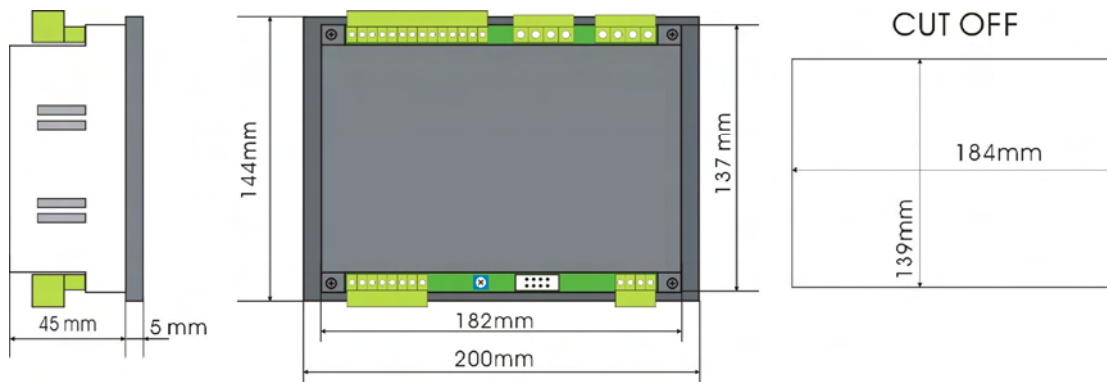
HGM6120 Typical wiring diagram





11.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:



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.
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch/sender and wiring. Check configured polarity (if applicable) is correct.
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 6100 inputs. Refer to engine manual.
Continuous starting of generator when in AUTO	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.
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.