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# SmartGen

## SmartGen MGC120 Genset Controller



## Product Usage Instructions

- Follow the recommended panel cutout dimensions to install the controller securely in place.
- Ensure proper insulation and grounding during installation.
- Connect the controller to the mains single-phase supply, generator single-phase supply, and alternator as per the provided wiring diagram.
- Ensure all connections are secure and properly insulated.
- Set up the controller for your specific system requirements, including voltage and frequency settings, relay outputs configuration, and any other parameters based on your generator setup.
- Power on the controller and monitor the display for any alerts or warnings.
- The controller will manage the generator functions automatically based on the input parameters and sensor readings.

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**Table 1 Version History**

Date	Version	Content
2017-11-07	1.0	Original release;
2019-02-22	1.2	Fixed the logic description for air flap control;  Fixed the default value for stepping motor as 250Hz.  Fixed the stepping motor wirings in the typical application diagram and add notes for it.
2022-08-18	1.3	Updated company logo and manual format.

## OVERVIEW

**MGC120 Petrol Genset Controller** belongs to AMF module, which is suitable for single petrol genset automation and monitoring control. It can realize auto start/stop genset, alarm protection and ATS switching control functions by data measuring. The controller applies LED display and button-press operation. Most parameters can be adjusted from the front pannel of the controller and all parameters can be changed by PC software via LINK port. With simple operation, reliable performance, and compact structure and convenient installation advantages, it can be widely used in various automation system for petrol genset.

## PERFORMANCE AND CHARACTERS

- Able to collect single phase voltage of Mains and generator, which is suitable for 50Hz/60Hz AC system;
- Switchable display parameters:
- Mains voltage (V)

- Generator voltage (V)
- Engine cylinder temperature (°C)
- Generator frequency (Hz)
- Battery voltage (V)
- Accumulated running time (H)
- Equipped with Mains electricity monitoring function and AMF function;
- Protection function for generator under/over volt, under/over frequency, low oil pressure, and start failure protection functions; when they occur, LED indicates alarm types, and controller conducts shutdown protection;
- Using stepper motor and programmable outputs to control air flap;
- Speed signals derive from ignition coil primary (diode needs to be in series);
- Able to choose from three crank disconnection conditions (generator frequency, speed, and speed + gen frequency);
- Equipped with 2 digital inputs with defaults: remote start input and low oil pressure input;
- Equipped with 3 stationary relay outputs (fuel output, start output and ignition control);
- Equipped with 2 programmable transistor outputs, which can be set as common alarm output, ETS control, idle speed control, preheating control, GCB close output, MCB close output and air flap blocking output;
- Equipped with LINK communication port (SmartGen SG72 adapter applied): it is able to realize controller parameter settings, remote monitoring control and firmware upgrade functions.
- Digital tube and LED display with button-press operation;
- Silicone panel and buttons with a higher ability to adapt to extremely high/low temperatures;
- Screen protection adopts hard acrylic screen material.
- Modular structure design, anti-flaming ABS plastic housing, embedded installation way; compact structure and easy installation.

## SPECIFICATION

**Table 2: Technical Parameters**

Items	Contents
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Working Voltage	Suitable for a DC12V power supply system
Overall Consumption	Regular working: <2W (stepper motor is excluded) Standby mode: <0.5W
AC Volt Input: Mains Single Phase  Generator Single Phase	AC 30V – AC 360V (ph-N) AC 30V – AC 360V (ph-N)
Alternator Frequency	50Hz/60Hz
Starter Relay Output	10A DC30V DC B+ supply output
Fuel Relay Output	10A DC30V DC B+ supply output
Ignition Relay Output	10A DC30V DC B- supply output
Flexible Transistor Output	1A connecting with DC B+ supply output
Stepper Motor Recommended	24BYJ48-12V(stepper angle 5.625° reduction ratio 16:1)
Overall Dimensions	95mm x 86mm x 46.5mm
Panel Cutout	78mm x 66mm
Working Temperature	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-25~+70)°C
Protection Level	Front panel IP55

Insulation Strength	<p>Apply AC2.2kV voltage between high voltage terminal and low</p> <p>voltage terminal and the leakage current is not more than 3mA within 1min.</p>
Weight	0.15kg

## OPERATION

### CONTROL PANEL

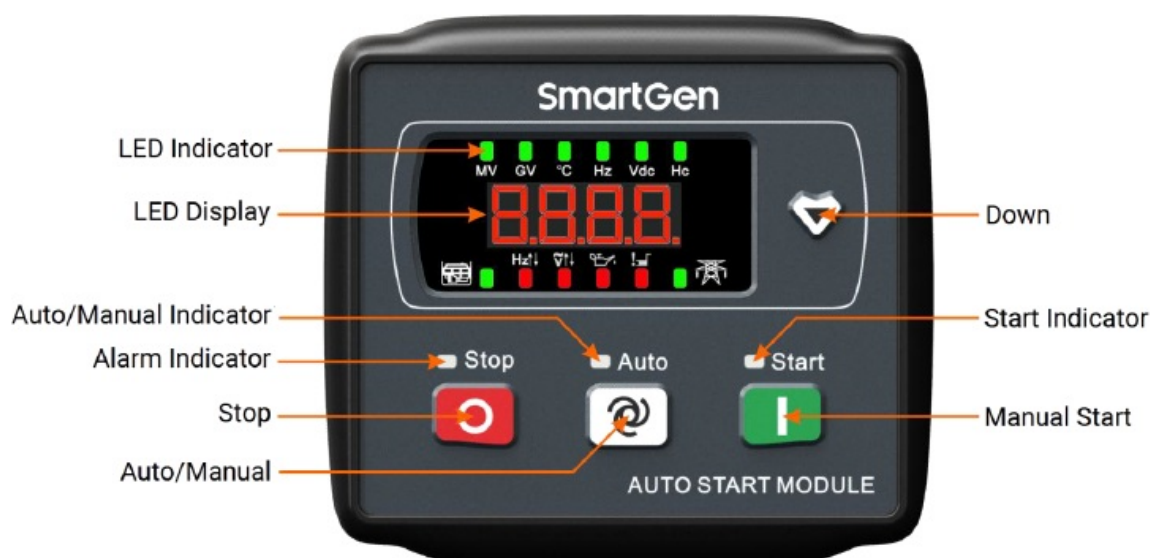


Fig.1 Front Panel Description

- Start indicator: it is always light from genset start to normal running, and in other status, the indicator will extinguish.
- Stop indicator: it flashes when genset enter enters stop procedure; it is always light in the process of stop and in other status the indicator will extinguish.

### INDICATOR DESCRIPTION

#### Table 3 Indicator Description

Icon	Definition	Icon	Definition
	Mains voltage indication		Generator under/over frequency alarm shutdown
	Generator voltage indication		Generator under/over voltage alarm shutdown
	Engine cylinder temperature indication		Low oil pressure alarm shutdown
	Generator frequency indication		Start failure
	Battery voltage indication		Generator indication
	Total running time indication		Mains indication

## NOTES:


1. Generator indicator: light-on when the generator is running; flash when the generator is abnormal; light-off when the generator is unavailable.
2. Mains indicator: light-on when mains is normal; flash when mains is abnormal; light-off when mains is unavailable.

## PUSH BUTTONS

**Table 4 Button Description**

Icons	Function	Description
	Stop/Reset	Stop the running genset both in manual mode and in auto mode, and change controller to the manual mode. In stop process, re-press this button to stop generator immediately. In alarm status, press this button to reset any shutdown alarms. In stop mode, press this button for more than 3s to test if the digital tube and LED indicators are OK. In parameter setting process, press this button to exit the setting.
	Auto/Manual Value Increase	Press this key, if auto indicator lights on, controller is in auto mode; if auto indicator lights off, controller is in manual mode. In parameter setting, press this key to downturn or increase the values.
	Start Value Decrease	In manual mode, press this key to start genset. In parameter setting, press this key to upturn or decrease the values.
	Down	Changeover the display contents of digital tube. Enter the parameter setting by pressing it for more than 3 second. In parameter setting, it confirms the set information.

## AUTO START/STOP OPERATION

- Press  key and the indicator besides lights on, which means the generator is in auto mode.

## **Auto Start Sequence**

1. When remote start signal is active or mains failure (over/under voltage) delay expires, “StartDelay” time is initiated;
2. When start delay is over, preheating relay outputs (if configured), “preheat delay” is initiated;
3. After the above delay, the fuel relay outputs, and one second later, the start relay outputs. During the starting time if the genset fails to start, fuel relay and start relay stop outputting, enter “Crank Rest Time” and wait for next start;
4. If the genset fails to start during the set starting attempts, LED indicator will display start failure;
5. If the genset starts successfully during the starting attempts, it enters “Safety On” time, during which low oil alarm types are inactive; After “Safety On” time, it enters “Start Idle Delay” (if configured);
6. During “Start Idle Delay”, under frequency and under volt alarms are inhibited; When this delay is over, “Warming Up Delay” is initiated (if configured);
7. After the “warming up delay”, the genset will enter into Normal Running status. If the genset voltage or frequency is abnormal, the controller alarm shutdown will be initiated.

## **Auto Stop Sequence**


1. When the remote start input is invalid or mains normal delay expires, “Stop Delay” time is initiated;
2. Once this “stop delay” has expired, the “Cooling Down Delay” is then initiated;
3. When “Stop Idle Delay” (if configured) starts, idle speed relay outputs;
4. When “ETS Solenoid Hold” begins, the ignition control relay is energised and fuel relay is de-energised; the Genset enters standby status.



## **NOTE:**



1. Press stop key in auto start status, the generator will stop and enter into manual mode simultaneously.
2. Total running timer starts when the generator meets crank disconnection conditions; meanwhile, the last decimalpoint of the digital tube flashes to indicate that the generator is running.

## MANUAL START/STOP OPERATION

Press  key, the indicator beside the lights off, which means the generator is in manual mode.

- Manual start: press  to start genset (Please refer to 4.4,a), 2~7). If low oil pressure and abnormal voltage occur during the running process, the controller shall protect it to stop quickly.
- Manual Stop: press  and it can stop the running genset (Please refer to 4.4,b), 2~4).

## AIR FLAP CONTROL

- The engine cylinder temperature sensor is applied:  
Before the genset starts up, If the cylinder temperature is below the set cylinder temperature limit of air flap blocking, the air flap is at the position of full blocking; if it is between the temperature limits of air flap dropping and air flap opening, then the air flap is at the position of half opening; if it is above the temperature limit of air flap opening, the air flap shall be at the position of full opening;
- In the cranking process when the starting countdown goes more than half, the air flap opens 1/3 at the current position; when start delay is finished but starting is not completed, next pre-start cylinder temperature estimation starts;
- After a successful start, the air flap opens 1/3 again at the present position; when the cylinder temperature is over the temperature limit of air flap opening, the air flap shall open completely.
- Engine cylinder temperature sensor is applied, or the sensor is open-circuited:
- Before genset starts up, air flap is at the position of full blocking. For the first starting attempt, the air flap opens from full blocking and it shall open completely in 2s; for the second starting attempt, the air flap opens from the position of half blocking and in 2s

it opens completely; if two both attempts failed, the opening time for air flap becomes 10s.

- After a successful start, air flap opens 1/3 at the present position and meanwhile, after air flap blocking delay the air flap opens completely.

## **ATS SWITCHING CONTROL**

- Auto mode: if Mains is available, ATS switches it to Mains; if Mains is abnormal and genset is running normally, ATS switches it to the generator. In other status, ATS lies at the Mains position.
- Manual mode: if the generator's close input is active, then when genset is running normally, the generator breaker shall be closed; if the generator's close input is inactive or the generator is not running normally, then the Mains breaker shall be closed.

**NOTE:** To use ATS control function, the programmable output ports shall be configured as GCB close output and MCB close output, and meanwhile input port shall be configured as GCB close input.

## **PROTECTION**

1. Generator overvoltage shutdown: alarm occurs when the controller detects generator voltage exceeds the overvoltage limit and the duration exceeds the generator abnormal delay value.
2. Generator under voltage shutdown: the controller detects after the genset normal running and when the generator voltage is below under voltage limit and the duration exceeds the abnormal delay value alarm occurs.
3. Generator over frequency shutdown: alarm and shutdown occur when the generator frequency is over the over-frequency limit and the duration exceeds over over-frequency shutdown delay.
4. Generator under frequency shutdown: the controller detects after the generator-set normal running and alarm and shutdown occur when the generator frequency is below the under frequency limit and the duration exceeds under frequency shutdown delay.
5. Low oil pressure input shutdown: the controller detects after safety on delay, alarm, and shutdown occur when low oil pressure input is active and lasts for 2s.

6. Fail to start: alarm occurs when start still fails after pre-set start attempts.

CONNECTION



Fig.2 Back Panel

Table 5 Terminal Connection Description

No	Function	Cable Size	Note
1	B-	2.0mm2	Connected with the negative of the starter battery.
2	B+	2.0mm2	Connected with the positive of the starter battery.  Max. 20A fuse is recommended.

3	Crank Output	1.5mm <sup>2</sup>	<p>B+ power is supplied by terminal 2, rated 10A.</p> <p>Connected with the start coil of the starter.</p>
4	Fuel Output	1.5mm <sup>2</sup>	<p>B+ power is supplied by terminal 2, rated 10A.</p>
5	Ignition Control	1.5mm <sup>2</sup>	<p>B- power is supplied by terminal 1, rated 10A.</p>
6	Remote Start Input	1.0mm <sup>2</sup>	<p>Aux. input 1, discrete signal input,</p> <p>Ground-connected is active (B-).</p>
7	Oil Pressure Input	1.0mm <sup>2</sup>	<p>Aux. input 2, discrete signal input, Ground</p> <p>connected is active (B-).</p>
8	Engine Temp. Sensor	1.0mm <sup>2</sup>	<p>Connected with a resistor-type temperature sensor.</p>
9	Aux. Output 1	1.0mm <sup>2</sup>	<p>B- power is supplied by terminal 1, rated 1A.</p>
10	Aux. Output 2	1.0mm <sup>2</sup>	<p>B- power is supplied by terminal 1, rated 1A.</p>
11	Speed Signal Input	1.0mm <sup>2</sup>	<p>Connected with the ignition coil primary, and a diode in series is needed. (Over rated 1A, reverse durable voltage is over 1000V.)</p>

12	Motor S22	Apply stepper motor self-contained wires	Connect with the blue cable of the stepper motor.
13	Motor S21		Connect with the yellow cable of the stepper motor.
14	Motor S12		Connect with the pink cable of the stepper motor.
15	Motor S11		Connect with the orange cable of the stepper motor.
16	Mains Phase Voltage	1.0 mm <sup>2</sup>	Connect with mains output port (2A fuse is recommended).
17	(L-N) Monitoring Input	1.0 mm <sup>2</sup>	

No.	Function	Cable Size	Note
18	Generator Phase	1.0 mm <sup>2</sup>	Connect with the generator voltage output port (2A fuse is recommended).
19	Voltage (L-N) Monitoring Input	1.0 mm <sup>2</sup>	

**NOTE:** The COM (red cable) for stepper motor shall be connected to battery positive.

## DEFINITION AND RANGE OF PARAMETERS

### PARAMETER SETTING CONTENTS AND RANGE

**Table 6 Controller Parameters Configuration**

No.	Items	Range	Default	Description
P00	Mains Normal Delay	(0-3600)s	10	Time duration for Mains voltage from abnormal to normal or from normal to abnormal is used for ATS to switch.
P01	Mains Abnormal Delay	(0-3600)s	5	
P02	Mains Under Voltage Value	(30-360)V	184	If the voltage sample is lower than it, under-voltage of Mains is considered; When it is set 30V, under voltage signal shall not be detected.
P03	Mains Over Voltage Value	(30-360)V	276	If the voltage sample is higher than it, overvoltage of Mains is considered; When it is set 360V, overvoltage signal shall not be detected.
P04	Transfer Delay	(0-99.9)s	1.0	It is the time interval for transferring switch from mains open to generator close or from generator open to mains close.

P0 5	Mains Options	(0-1)	0	0: AMF (mains abnormal start enabled in auto mode)  1: Display Only (only monitoring mains voltage)
P0 6	Start Delay	(0-3600)s	1	Time duration from remote start signal is active to engine startup.
P0 7	Stop Delay	(0-3600)s	1	Time duration from remote start signal to engine stop.
P0 8	Start Attempts	(1-10)	3	It is the maximum start attempts when starter fails  to start. When it reaches set attempts controller shall send out start failure signal.
P0 9	Cranking Time	(3-60)s	8	Time for the starter to be energised every time.
P1 0	Crank Rest Time	(3-60)s	10	The waiting time before second power-up when engine start fails.
P1 1	Safety On Delay	(1-60)	10	Alarms for low oil pressure, under frequency and under voltage are deactivated.
P1 2	Warming Up Time	(0-3600)s	10	Warming-up time before breaker close after high-speed running for genset.
P1 3	Cooling Time	(3-3600)s	10	Radiating time before genset stop after genset is unloaded.

P1 4	ETS Solenoid Hold	(0-120)s	20	The time for Stop electromagnet to be energised before genset stop.
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No.	Items	Range	Default	Description
P1 5	Breaker Close Time	(0-10.0)s	0	Pulse width for mains close and generator close. 0s stands for constant output.
P1 6	Engine Cylinders	(1-2)	1	It is used for judging starter disconnection conditions and detecting engine speed.
P1 7	Generator Poles	(2-64)	2	Number of engine poles. This value is used for calculating engine speed when the controller is without speed sensor.
P1 8	Generator Abnormal Delay	(0-20.0)s	10.0	Alarm delay for generator under/over voltage.
P1 9	Generator Over Volt limit for Shutdown	(30-360)V	264	When generator voltage is higher than this threshold and lasts for the set generator abnormal delay, then it shall consider over voltage and shutdown alarm will be initiated. (No detection for over volt signals if it is set as 360V).



P20	Generator Under Volt limit for Shutdown	(30-360)V	196	<p>When sample voltage falls below this threshold and lasts for the delay time, it is considered under voltage and shutdown alarm shall be initiated.</p> <p>(No detection for under volt signals if it is set as 30V).</p>
P21	Under Frequency Shutdown	(0-75.0)Hz	45.0	<p>When generator frequency falls below this threshold and lasts for the delay time, then it is considered under frequency and shutdown alarm signal will be initiated.</p>
P22	Over-Frequency Shutdown	(0-75.0)Hz	57.0	<p>When generator frequency is over than this threshold and lasts for the delay time, then it is considered over frequency and a shutdown alarm signal will be initiated.</p>
P23	Under Frequency Shutdown Delay	(0-60)s	10	<p>Delay value of generator under frequency.</p>
P24	Over Frequency Shutdown Delay	(0-60)s	2	<p>Delay value of generator over frequency.</p>

P2 5	Air Flap Blocking Delay	(0-60)s	5	It is available for not applying engine cylinder temp. Sensor. After successful start, the air flap shall keep at the present position for such time and then shall open completely.
P2 6	Air Flap Blocking Cylinder Temp.	(0-200)°C	30	In the starting process if cylinder temperature is lower than this value, air flap shall close.
P2 7	Air Flap Open Cylinder Temp.	(0-200)°C	60	After genset starts successfully, if cylinder temperature is higher than this value, air flap shall open. If it is between the blocking value and opening value, the air flap opens 1/2.
P2 8	Aux. Output 1	(0-9)	5	Default function: generator close output. For details please see Table 8.

No.	Items	Range	Default	Description
P2 9	Aux. Output 2	(0-9)	6	Default function: mains close output. For Details please see Table 8.
P3 0	Power On Mode Selection	(1-2)	1	1: Manual Mode 2: Auto Mode

P3 1	Module Address	(1-254)	1	Communication address with PC software.
P3 2	Password	(0-9999)	0318	Controller password.
P3 3	Crank Disconnection Conditions	(0-2)	2	0: Generator frequency  1: Engine Speed  2: Generator frequency + engine speed  It is used for judging the crank disconnection condition.
P3 4	Disconnection Engine Speed	(0-3000)r/min	840	When the engine speed is over this value, the start is considered successful and the starter will be disconnected.
P3 5	Disconnection Gen. Frequency	(0-30.0)Hz	14.0	In the starting process, when the generator frequency exceeds this value, the start is considered successful, and the starter will be disconnected.
P3 6	Temp Sensor Types	(0-4)	0	0: Not used  1: PT100  2: NTC-1K  3: Reserved  4: User-defined resistor curves

**Table 7 HMI Configurable Parameters**

No.	Items	Range	Default	Description
1	Pre-heat Delay	(0-300)s	0	Time for heater plug to be energized in advance before starter is powered on.
2	Start Idle Time	(0-3600)s	0	Idling speed running time when genset is starting.
3	Stop Idle Time	(0-3600)s	0	Idling speed running time when genset is stopping.
4	Stepper Motor Frequency	(100-500)Hz	250	Rotation steps for the motor per second.
5	Stepper Motor Steps	(0-2000)	128	Step numbers needed for motor rotating 90°; calculation formula: $360 \times \text{reduction ratio} / (\text{step angle} \times 4)$ ; For example: $128 = 360 \times 16 / (5.625 \times 4)$ .
6	Ignition Output	(0-1)	0	0: Output when stop 1: Output when start
7	Fuel Output	(0-1)	0	0: Fuel Output 1: ETS Output

8	Digital Input 1	(0-6)	1	Configure the function of controller terminal 6; Default: remote start input, for details please
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No.	Items	Range	Default	Description
				see Table 9.
9	Digital Input 2	(0-6)	2	Configure the function of controller terminal 7; Default: low oil pressure input, for details Please see Table 9.

**NOTE:** when parameter settings are conducted via PC software, it is needless to entry the password if default password (0318) has not been changed; if it has been changed and it is the first time to conduct parameter settings via PC software, it is needed to entry the module password on the password screen.

## DEFINABLE CONTENTS OF PROGRAMMABLE OUTPUT PORTS

**Table 8 Definable Contents of Programmable Output Ports**

No.	Items	Function Description
0	Not Used	When this is chosen, output port won't output.
1	Common Alarm	When stop alarm is initiated, this alarm will self-lock untill alarm reset.
2	ETS Control	It is used for some gensets with stop electromagnet. Pull-in occurs when "stop idle speed" ends. Open occurs when "ETS Delay" ends.

3	Idle Speed Control	It is used for engines with idling speed. Pull-in occurs when the engine starts. Open occurs when it enters "Warming-up". Pull-in occurs in the stopping process of idling speed and open occurs when the genset stops completely.
4	Preheating Control	Close before start, open before energisation.
5	Gen Close Output	The generator close outputs when generator is normally running.
6	Mains Close Output	Mains close outputs after mains normal delay ends.
7	Air Flap Choke	It outputs when engine starts, and it disconnects when engine has started.
8	Reserved	
9	Reserved	


## DEFINED CONTENTS OF PROGRAMMABLE INPUT PORTS

Table 9 Definable Contents of Programmable Input Ports (All GND(B-) Active)

No.	Items	Remark
0	Not Used	
1	Remote Start Input	In auto mode, the genset starts up if this signal is active.
2	Low Oil Pressure Input	After safety on delay is finished, the generator shutdown alarm occurs immediately if this signal is active.
3	Gen Close Input	In manual mode, and under the condition that genset is normally running, the generator close outputs when this signal is active; otherwise, mains close outputs.











4	Reserved	
5	Reserved	
6	Reserved	

## CONTROLLER FUNCTION SETTINGS

Under standby status, press  for 3s, it will enter the password entry screen (Fig.3). At this moment the first digital flashes.



**Fig.3 Password Entry Screen**

- Press  and the flashing number adds 1; Press  and it decreases 1. After the correct setting, press  to move.
- For the 2/3/4 digitals, it is the same as a) above.
- After the password is passed, it will enter the parameter setting screen (Fig.4). At this moment, it displays the serial number of the setting item. Press  and the setting item goes down; Press  and the setting item goes up.
- Press  and it enters the setting status of the current parameter value. Press  or  and the parameter value can be adjusted. After the adjustment press  and the data shall be saved. Press  and the parameter setting screen shall exit.



**Fig.4 Parameter Serial Number Screen**

## NOTES

- Please change the parameters (such as crank disconnection condition selections, digital inputs, output configurations and all delays) in standby status; otherwise, alarm shutdown or other fault information may occur.
- For the serial numbers of setting items, please refer to the serial numbers in Table 6.

- Overvoltage threshold must be larger than the undervoltage threshold; otherwise, under-/over overvoltages may occur at the same time.
- Generator frequency shall be set as low as possible when the engine has started, so that the start motor can separate as soon as possible.

## **COMMISSIONING**

Before official operation, the following checks are suggested to do :

- Check all the connections are correct and wire diameter is proper.
- Make sure that the controller DC power has fuse, and it is correctly connected to the positive and negative of the start battery.
- Take proper action to prevent the engine from cranking successfully (e. remove the connection wire of gas valve). Make sure everything is correct. Connect the starter battery power, and the controller shall conduct the procedure procedure;
- Press the Start button, and the genset will start. After the set cranking times, the controller will send a signal of Start Failure, and then press “ Stop” to reset the controller.
- Recover the action of preventing engine from cranking successfully (e. recover the wire of gas valve)valve). Press Start button again, and the genset will start. If everything goes well, the genset will normalnormally running. During this period, please observe the engine's running state, AC generator's voltage and frequency carefully. If there is something unusual, stop the running genset and check all wire connections according to this manual.
- For any other questions, please contact SmartGen service personnel.

## **TYPICAL APPLICATION**



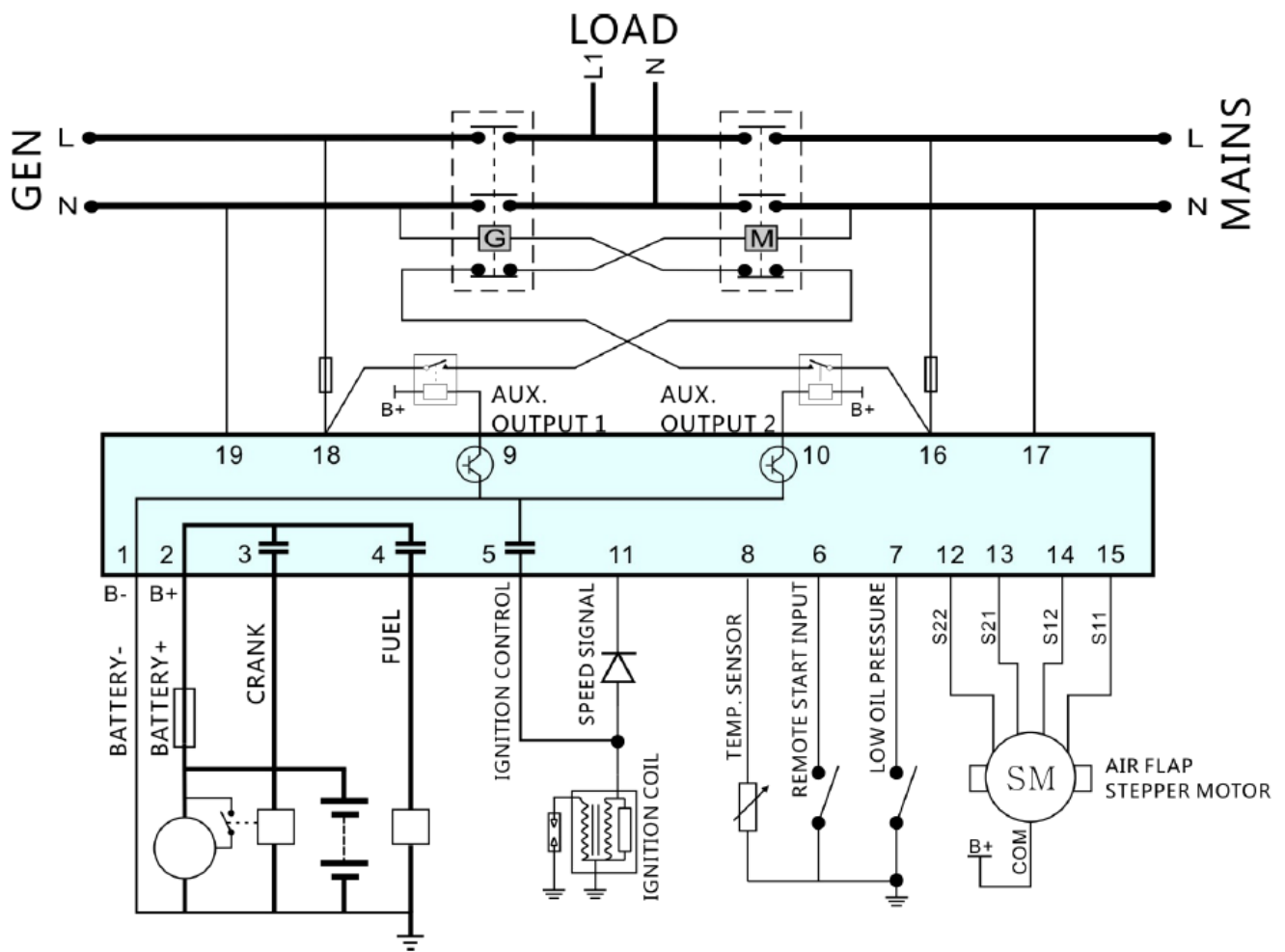


Fig.5 MGC120 Typical Application Diagram 1

#### NOTES:

1. S11, S12, S21, S22 are separately connected with orange wire, pink wire, yellow wire, and blue wire, and the stepper motor COM (red wire) shall be connected with the battery positive.
2. Terminal 11 must be connected in series with a diode. Diode capacity shall be over 1A, and reverse-pressure-standing value shall be over 1000V.
3. The maximum incoming current for programmable output 1 and output 2 shall be 1A.

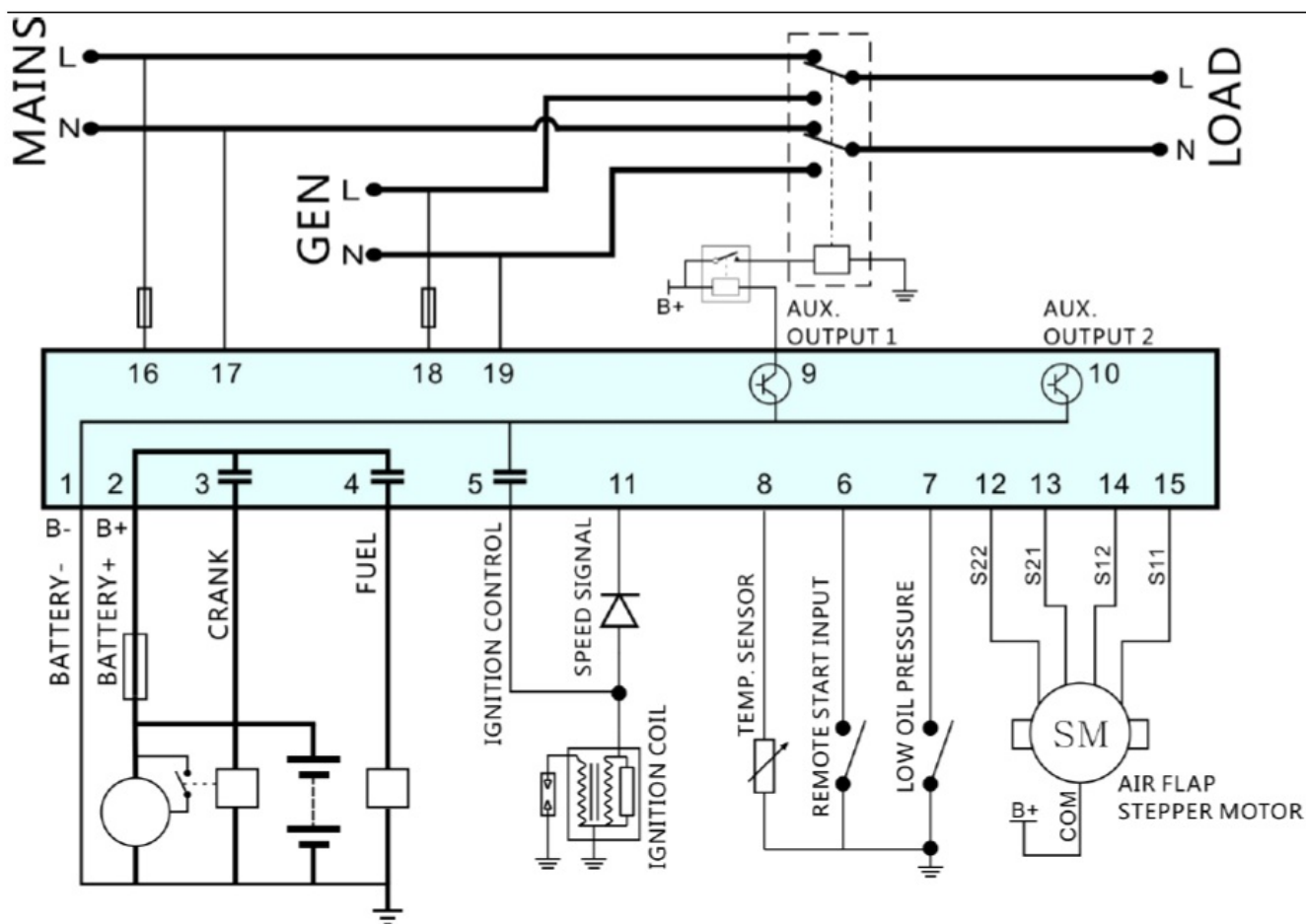


Fig.6 MGC120 Typical Application Diagram 2

## NOTES:

1. Programmable output 1 shall be set to "Generator Close Output".
2. S11, S12, S21, S22 shall be connected separately with the stepper motor orange wire, pink wire, yellow wire and blue wire; stepper motor COM (red wire) shall be connected with battery positive.
3. Terminal 11 must be in series with the diode. Diode capacity shall be over 1A and the reverse pressure-standing value shall be over 1000V.

## INSTALLATION

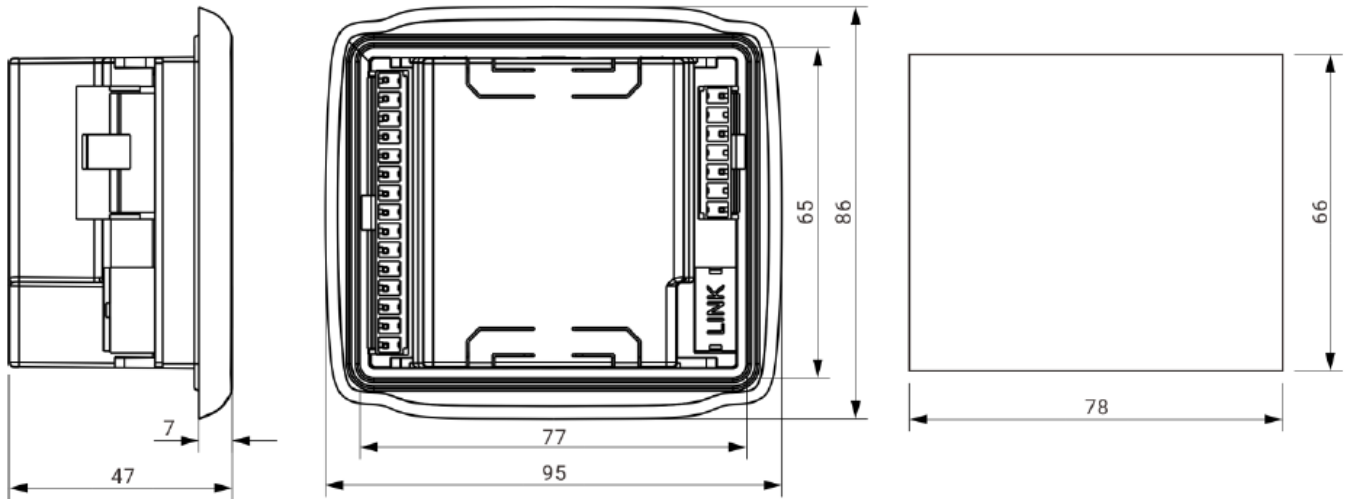
### FIXING CLIPS

- The controller is a panel-embedded design and the panels are fixed by clips in installation.
- Twist the fixing clip screw anticlockwise until it reaches the proper position.
- Pull the fixing clip backwards (towards the back of the module), ensuring two clips are right inside their allotted slots.

- Turn the fixing clip screws firmly clockwise until they are fixed on the panel.

**NOTE:** Pay attention to that the clip screws shall not be turned too tightly.

## OVERALL AND CUTOUT DIMENSIONS



**Fig.7 Overall and Cutout Dimensions (Unit: mm)**

## Battery Voltage Input

The MGC1 20 controller is only suitable for DC 12 V battery voltage environment. battery Negative must be connected with the engine shell securely. The diameter of the wire which connects controller power B+/B B- and battery positive/negative must be over (or equal to) 1.5mm<sup>2</sup>. If a loading charger is configured, please firstly connect the charger output wires to the battery's positive and negative directly, and then connect the battery's positive and negative and controller's power's positive and negative individually by another wires in order to prevent charge charger from disturbing the controller's normal working.

**Warning:** In the running process, removing the start battery is strictly prohibited.

## With stand Voltage Test

When the controller has been installed in the control panel, if the high voltage test is conducted, please disconnect controller's all terminals in order to prevent high voltage from entering the controller and damaging it.

## FAULT FINDING

**Table 10 Fault Finding List**

Symptoms	Possible Solutions
Controller no response with power	Check starting batteries. Check controller connecting wirings; Check DC fuse.
Genset shutdown	Check AC generator voltage.
Low oil pressure alarm after successful start	Check oil pressure sensor and the wiring.
Shutdown alarm in running process	Check related switches and the wirings according LED indicators.
Start failure	Check fuel circuit and its connections; Check starting batteries; Check the speed sensor and its connections. Refer to the engine manual.
Non-response for starter	Check starter connections. Check starting batteries.
Air flap stepper motor contrarotation or rotation only in one direction	Check the connection wiring order of the stepper motor.

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## FAQ


Q: How do I reset the controller?

A: To reset the controller, locate the reset button on the device and press it for a few seconds until the unit restarts.

Q: What should I do if the controller displays an error code?

A: Refer to the user manual for a list of error codes and possible solutions. If the issue persists, contact customer support for further assistance.

## Documents / Resources

	<p><a href="#">SmartGen MGC120 Genset Controller [pdf]</a> User Manual</p> <p>MGC120 Genset Controller, MGC120, Genset Controller, Controller</p>
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## References

- [User Manual](#)

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