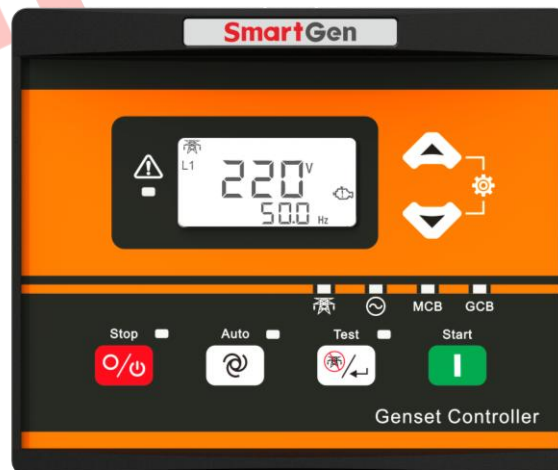




SmartGen
ideas for power

MGC310/MGC320 GENSET CONTROLLER USER MANUAL



SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.



Chinese trademark

SmartGen English trademark

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Table 1 Version History

| Date | Version | Content |
|------------|---------|------------------|
| 2019-10-15 | 1.0 | Original release |
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1 OVERVIEW

MGC300 Series Genset Controller is applicable for single unit automation control to realize auto start of single unit and AMF. The controller integrates digitalization with intelligence and applies LCD graphic display, which is simple for operation and reliable for running.

MGC300 Series Genset Controller applies 32-bit micro-processor technology, realizing precise measuring for various parameters, set-value adjusting, and timing, and limit value setting functions etc. A majority of parameters can be adjusted from the front panel, and all parameters can be configured by RS485 on PC. It has compact structure, simple wiring, high reliability, which can be used for all types of genset automation system.

MGC300 Series Genset Controller includes true low power consumption (power off) and feign low power consumption (awakening, but screen light not on, stop indicator flashing, not do any action).

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2 PERFORMANCE AND CHARACTERS

- Graphic LCD display (backlight), LED indicators, push-button operation;
- Acrylic material for hard screen protection;
- Wide power supply range DC (8-35)V, which can suits different environments of starter battery voltages;
- Collect and display mains/gen 3-phase voltage, 3-phase current, frequency, and power parameters;

Mains

Line voltage (L12, L23, L31)
Phase voltage (L1, L2, L3)
Frequency (Hz)

Gen

Line voltage (L12, L23, L31)
Phase voltage (L1, L2, L3)
Frequency (Hz)

Load

Current (Ia, Ib, Ic)

Unit: A

Total active power P

Unit: kW

- Mains has over volt, under volt, over frequency, under frequency, and loss of phase functions; Gen has over volt, under volt, over frequency, under frequency, over current, over power, and loss of phase functions;
- Precisely measure all parameter values of engines:
 - Temperature °C Fuel level %
 - Battery voltage V Accumulated running time H (max. 199999 hours)
 - Speed RPM Accumulated start times (max. 199999 times, display only on PC software)
- Genset fault protection and display function;
- Controller has 4 working modes: manual, auto, stop, and test mode, and MGC310 has stop, manual, auto modes, and MGC320 has manual, auto, stop, and test mode;
- Parameter setting function: allows users to change and set the parameters, which won't be lost on system power off; a majority of parameters can be adjusted from front panel, and all parameters can be configured by RS485 on PC;
- 1 programmable input port, 2 fixed input ports;
- 2 fixed relay output ports (fuel output, start output);
- 2 programmable relay output ports;
- All parameters are adjusted digitally, improving the whole case's reliability and stability;
- Sealing gasket is designed between the closure and the control window, whose dustproof and waterproof performance can be reached to IP65;
- Metal fixing clips are used to stable the controller;
- Modular structure design, pluggable wiring terminal, and built-in installation, make it compact in structure and easy to install.

3 SPECIFICATION

Table 2 Technical Parameters

| Items | Contents |
|-------------------------|--|
| Working Voltage | DC (8.0-35.0)V continuous |
| Overall Consumption | ≤1.4W (Standby mode: ≤0.35W, 0W=low power consumption); |
| AC Volt Input: | |
| 3 phase 4 wire | 30V AC - 360V AC (ph-N) |
| 3 phase 3 wire | 30V AC - 620V AC (ph-ph) |
| Single phase 2 wire | 15V AC - 360V AC (ph-N) |
| 2 phase 3 wire | 15V AC - 360V AC (ph-N) |
| Alternator Frequency | 50Hz/60Hz |
| Starter Relay Output | 7A 24V DC power supply |
| Fuel Relay Output | 7A 24V DC power supply |
| Flexible Relay Output 1 | 7A 250V AC volt free output |
| Flexible Relay Output 2 | 7A 250V AC volt free output |
| Overall Dimensions | 126mm x 106mm x 46.5mm |
| Panel Cutout | 111mm x 91mm |
| CT Secondary Current | Rated: 62.5mA |
| Working Condition | Temperature:(-25~+70)°C Humidity:(20~93)%RH |
| Storage Condition | Temperature:(-30~+80)°C |
| Protection Level | Front panel IP65 |
| Insulation | Apply AC2.2kV voltage between high voltage terminal and low voltage terminal and the leakage current is not more than 3mA within 1min. |
| Weight | 0.27kg |

4 OPERATION

4.1 CONTROL PANEL

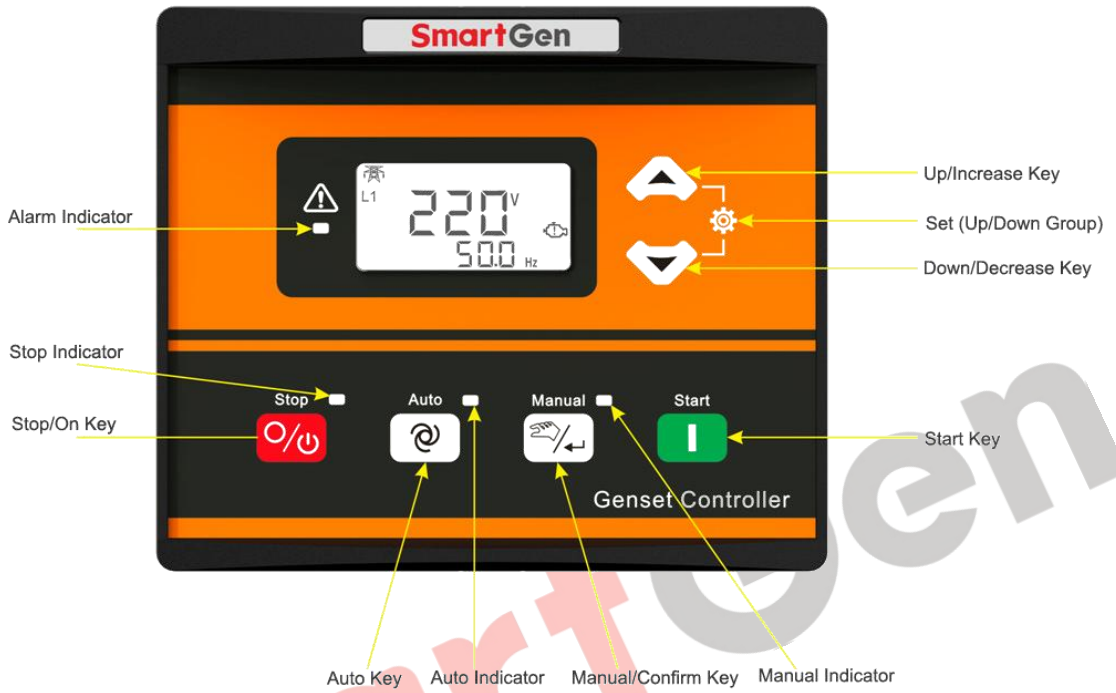


Fig. 1 MGC310 Front Panel

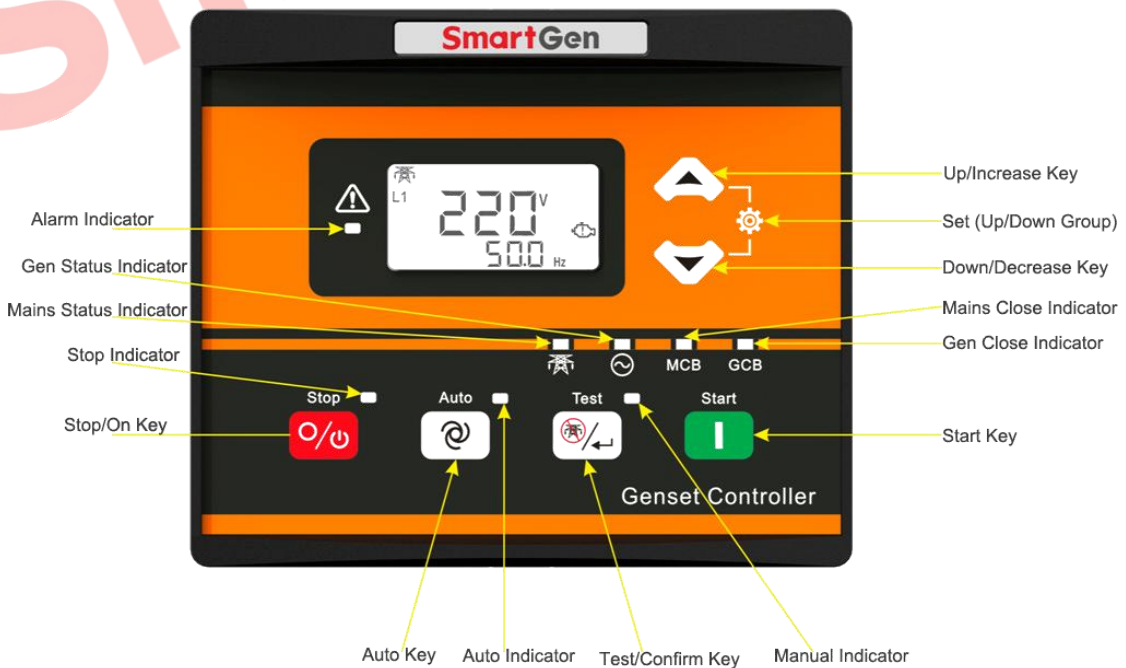









Fig. 2 MGC320 Front Panel

4.2 PUSH BUTTONS

Table 3 Button Description

| Icons | Function | Description | |
|---|----------------|---|---|
|  | Stop/On | <p>Stop the running genset both in manual mode and in auto mode;</p> <p>In alarm status, press this button to reset any shutdown alarms.</p> <p>In stop mode, press this button and Down to test if LCD icons and LED indicators are OK.</p> <p>In stop mode, press this button and Up to set backlight always on;</p> <p>In stop process, re-press this button to stop generator immediately.</p> <p>In parameter setting process, press this button to exit the setting quickly;</p> <p>In stop status, press this button to start;</p> <p>In start status, press for 3s to stop;</p> | |
|  | Auto | Press this key and controller enters to Auto mode; under this mode, genset can be controlled by remote start input signals; | |
|  | Start | Press this key and genset will start; | |
|  | Down/Decrease | LCD page scroll; In parameter settings, decrease the value where the cursor is; | Press the two keys simultaneously to enter parameter settings page; |
|  | Up/Increase | LCD page scroll; In parameter settings, increase the value where the cursor is; | |
|  | Manual/Confirm | <p>Confirm key for parameter settings page;</p> <p>Manual key for other pages and press it to make controller in Manual mode;</p> <p>This key is especially for MGC310;</p> | |
|  | Test/Confirm | <p>Confirm key for parameter settings page;</p> <p>Test key for other pages and press it to make controller commissioning;</p> <p>This key is especially for MGC320;</p> | |



4.3 INDICATOR DESCRIPTION

Table 4 LCD Icons

| Icon | Definition | Icon | Definition |
|------|---|------------|-------------------------------|
| | Generating power indicator | FL | Level sensor indicator |
| | Mains power indicator | L1 | AC phase voltage indicator |
| | Start countdown (crank disconnect is satisfied) | L12 | AC line voltage indicator |
| | Over frequency alarm | DC | Battery voltage indicator |
| | Under frequency alarm | A | Load current unit |
| | Temp high alarm | H | Accumulated running time unit |
| | Fuel level low | Hz | Frequency unit |
| | Outside input alarm | °C | Temperature unit |
| | Engine oil pressure low alarm | rpm | Speed unit (r/min) |
| | Crank failure | kW | Active power unit |
| | Stop failure | V | Voltage unit |
| | Battery voltage abnormal | % | Percentage |
| | Gen voltage high | | I# Mains Close |
| | Gen voltage low | | II# Gen Close |
| | Load over current | | |

4.4 DISPLAY DISCRIPTION

Mains: Phase Voltage L1, Frequency F



Mains: Phase Voltage L2, Frequency F



Mains: Phase Voltage L3, Frequency F



Gen: Phase Voltage L1, Curent IA



Gen: Phase Voltage L2, Current IB



Gen: Phase Voltage L3, Current IC



Mains: Line Voltage L12, Frequency F



Mains: Line Voltage L23, Frequency F



Mains: Line Voltage L31, Frequency F



Gen: Line Voltage L12, Frequency F



Gen: Line Voltage L23, Frequency F



Gen: Line Voltage L31, Frequency F



Battery Voltage, Speed



Fuel Level, Temp.



Active Power, Accumulated Running Time






NOTE1: When temp. and level sensor are not displayed, it means they are not used; when OFF is displayed, it means that sensor is open.

4.4.1 LOW POWER CONSUMPTION OPERATION

Controller applies low power consumption method at hardware aspect, which reduces the power consumption greatly in the period of stop. With this battery cost is largely decreased, because it reduces the battery change times.


Controller has true low consumption (power off) and feign low consumption (awakening, LCD light not on, only stop indicator flashing, not do any action).

- a. Power on the controller, and controller is running as usual;
- b. After power on, press  and controller enters normal running; if  is not pressed, controller will judge the status according to the last stop situation; If controller is stopped manually, it will enter true low consumption as remote start signal is inactive; if it is active, controller enters feign low consumption; Otherwise, controller will run normally.
- c. In standby status, Press  for 3s and controller will be powered off.


NOTE 1: When low consumption time is set to 0, controller will not enter it automatically (base pin of power control is always energized).

NOTE 2: When low consumption time is not set to 0, if genset is in the standby mode and doesn't have data communication, controller will enter low consumption based on the set low consumption time.


4.4.2 INSTRUCTION

Press  and the indicator beside will be on, which means genset is in the auto mode.

4.4.3 AUTO START SEQUENCE

- a. When remote start signal is active (Terminal No. 6 connects B-), "Start Delay" time is initiated;
- b. When start delay is over, preheating relay outputs (if configured), "preheat delay" is initiated;
- c. 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;
- d. If the genset fails to start during the set starting attempts, LCD displays  and it means start failure alarm and meanwhile alarm indicator flashes;
- e. If the genset starts successfully during the starting attempts, it enters "Safety On" time, during which low oil pressure, water temperature high alarms are inactive; After "Safety On" time, it enters "Start Idle Delay" (if configured);
- f. During "Start Idle Delay", under speed, under frequency and under volt alarms are all inactive; When this delay is over, "Warming Up Delay" is initiated (if configured);
- g. After the "warming up delay", genset will enter into Normal Running status. If genset voltage or frequency is abnormal, controller will issue shutdown alarm and stop the genset.


4.4.4 AUTO STOP SEQUENCE

- a. When remote start input is invalid, “Stop Delay” time is initiated;
- b. Once this “stop delay” has expired, the “Cooling Down Delay” is then initiated;
- c. When “Stop Idle Delay” (if configured) starts, idle speed relay is energized and outputs;
- d. When “ETS Solenoid Hold” begins, ignition control relay is energized and fuel relay is de-energized;
- e. When controller enters "Wait for stop" time, it will judge whether genset has stopped completely;
- f. After complete stop, controller will enter standby status; if genset cannot stop controller will issue alarm (LCD displays ).

NOTE 3: Press stop key in auto start status, generator will stop and enter into stop mode simultaneously.

NOTE 4: In the procedure of crank rest time, when fuel output is disconnected and crank rest countdown is less than 7s, preheating and ETS stop output; after crank rest time, ETS stop output is disconnected and fuel outputs; Preheating is stopped before crank.











4.4.5 MANUAL START/STOP OPERATION

Manual Start: press  to start genset (Please refer to start procedure b~g of AUTO START SEQUENCE). If water temp. high, over speed, and abnormal voltage occur during the running process, controller shall protect it to stop quickly.

Manual Stop: press  to stop the running genset (Please refer to stop procedure b~f of AUTO STOP SEQUENCE).

5 PROTECTION

Table 5 Alarm Types

| Icons | Alarm Contents | Type | Trigger |
|---|-----------------------------------|----------|--|
|  | Over Frequency Stop | Shutdown | Gen frequency is above over frequency limit for 2s, it will issue alarm; |
|  | Under Frequency Stop | Shutdown | Detected when genset is running normal; gen freq. is less than under frequency limit for 10s, and it alarms. |
|  | Temp. High | Shutdown | Detected after safety on delay; when temp. high is above high temp. limit for 3s, it will issue alarm; |
| | Temp. High Input | Shutdown | Detected after safety on delay; when temp. high input is active, it will issue alarm; |
|  | Oil Pressure Low Input | Shutdown | Detected after safety on delay; it alarms when oil pressure low input is active; |
|  | Gen Over Current | Warning | Action is set to Warning; Gen current is over pre-set value, and lasting time surpasses delay time, it alarms; |
| | Gen Over Current | Shutdown | Action is set to Shutdown; Gen current is over pre-set value, and lasting time surpasses delay time, it alarms; |
| | Gen Over Current Cooling Shutdown | Shutdown | Action is set to Cooling Shutdown; gen current is over pre-set value and lasting time is over delay, it alarms; |
|  | Gen Voltage High | Shutdown | Detected after safety on delay; gen voltage is over the threshold, and this lasts for over delay, and it alarms; |
|  | Gen Voltage Low | Shutdown | Detected after genset running; gen voltage is lower than threshold for over the delay time, and it alarms; |
|  | Fail to Crank | Shutdown | It alarms when starter doesn't start the engine in the range of the pre-set start times; |
|  | Outside Shutdown Alarm Input | Shutdown | When "outside shutdown alarm" is configured for the input port, and when the input is active, it alarms; |
|  | Fuel Level Low | Warning | When fuel level is lower than the threshold for 10s, it alarms; |
| | Fuel Level Low Input | Warning | When fuel level low input is active, it alarms; |
|  | Fail to Stop | Warning | Complete stop time is over but genset still stops completely and controller will alarm; |
|  | Battery Voltage Low | Warning | Battery voltage is lower than the threshold for 20s, it alarms; |
| | Battery Voltage High | Warning | Battery voltage is higher than the threshold for 20s, it alarms; |

NOTE 1: Shutdown alarms are latched signals and alarms can be removed by using Stop key (in stop status); warning alarms are not latched.

6 CONNECTION

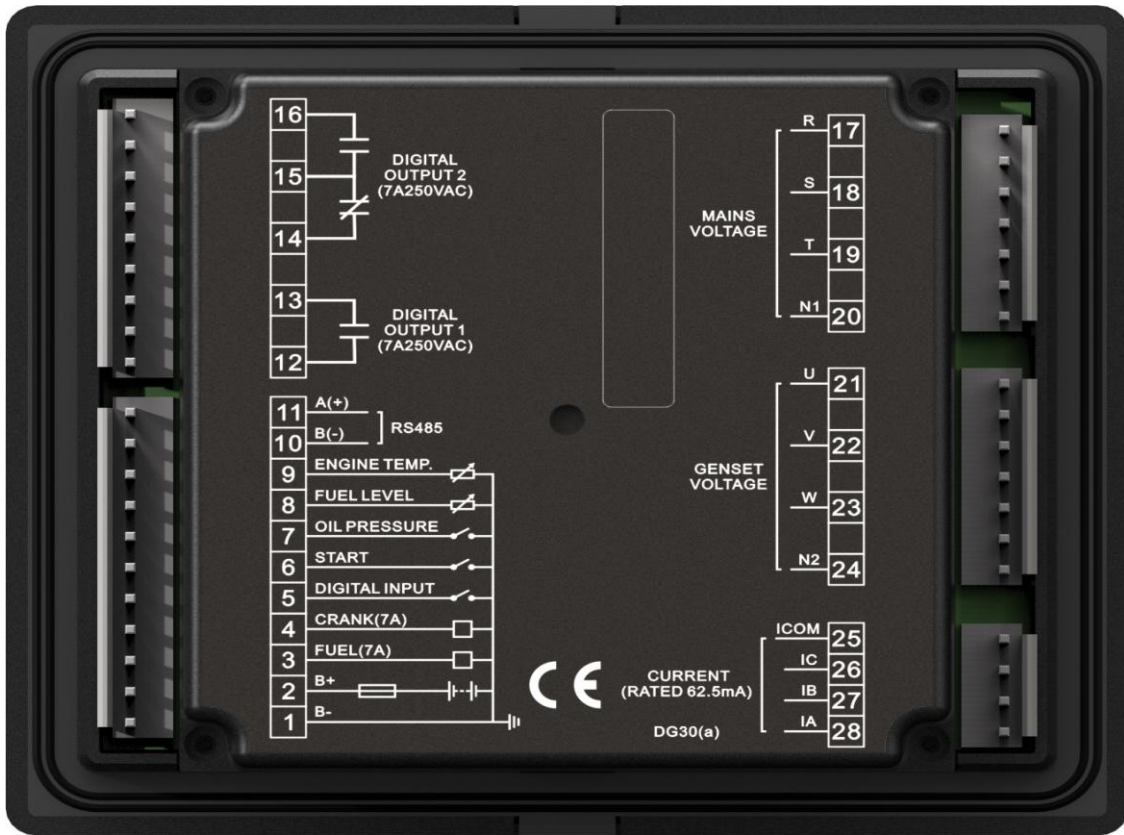


Fig. 3 Back Panel

Table 6 Terminal Connection Description

| No. | Function | Cable Size | Note |
|-----|-------------------------|--------------------|---|
| 1 | B- | 1.5mm ² | Connected with negative of starter battery. |
| 2 | B+ | 1.5mm ² | Connected with positive of starter battery. |
| 3 | Fuel Relay Output | 1.0mm ² | B+ power is supplied by terminal 2, rated 7A. |
| 4 | Crank Relay Output | 1.0mm ² | B+ power is supplied by terminal 2, rated 7A. |
| 5 | Digital Input | 1.0mm ² | Digital input; GND connected is active (B-); Level sensor; connected with level low signal or level resistance sensor; |
| 6 | Remote Start Input | 1.0mm ² | GND connected is active (B-); |
| 7 | Oil Pressure Input | 1.0mm ² | Connected with digital signals of oil pressure low; |
| 8 | Fuel Level Sensor Input | 1.0mm ² | Level sensor input; |
| 9 | Temp. Input | 1.0mm ² | Connected with water/cylinder digital signals or temp. sensor resistance; |
| 10 | RS485- | 1.0mm ² | |
| 11 | RS485+ | 1.0mm ² | |
| 12 | Digital Output 1 | 1.0mm ² | Relay N/O connector, volt free output, rated 7A; |
| 13 | | | |
| 14 | Digital Output 2 | 1.0mm ² | N/C output, rated 7A; |
| 15 | | | Relay COM |
| 16 | | | N/O output, rated 7A; |
| 17 | Mains R Voltage | 1.0mm ² | Connected to Mains R Phase; |
| 18 | Mains S Voltage | 1.0mm ² | Connected to Mains S Phase; |
| 19 | Mains T Voltage | 1.0mm ² | Connected to Mains T Phase; |
| 20 | Mains N1 Input | 1.0mm ² | Connected to Mains N wire; |
| 21 | Gens U Voltage | 1.0mm ² | Connected to genset output U Phase; |
| 22 | Gens V Voltage | 1.0mm ² | Connected to genset output V Phase; |
| 23 | Gens W Voltage | 1.0mm ² | Connected to genset output W Phase; |
| 24 | Gens N2 Input | 1.0mm ² | Connected to genset output N wire; |
| 25 | CT COM | 1.0mm ² | |
| 26 | CT IC | 1.0mm ² | Outside connected with CT secondary coil (rated 62.5mA); |
| 27 | AT IB | 1.0mm ² | Outside connected with CT secondary coil (rated 62.5mA); |
| 28 | CT IA | 1.0mm ² | Outside connected with CT secondary coil (rated 62.5mA); |

7 DEFINITION AND RANGE OF PARAMETERS

7.1 PARAMETER SETTING CONTENTS AND RANGE

Table 7 Controller Configuration Parameters

| No. | Items | Parameter Range | Default | Description |
|-----|------------------------|-----------------|---------|---|
| P00 | Mains Normal Delay | (0-3600)s | 10 | Check time duration for Mains voltage from abnormal to normal or from normal to abnormal to be used for ATS transfer. |
| P01 | Mains Abnormal Delay | (0-3600)s | 5 | |
| P02 | Mians Under Volt Value | (30-60000)V | 184 | If the voltage sample is lower than it, Mains under voltage is considered; When it is set 30V, under voltage signal shall not be detected; return difference is 10V; |
| P03 | Mains Over Volt Value | (30-60000)V | 276 | If the voltage sample is higher than it, Mains over voltage is considered; When it is set 60000V, overvoltage signal shall not be detected; return difference is 10V; |
| P04 | Mains Options | (0-1) | 0 | 0: AMF 1: Display Only |
| P05 | Start Delay | (0-3600)s | 1 | Time duration from mains abnormal or remote start signal is active to genset startup. |
| P06 | Stop Delay | (0-3600)s | 1 | Time duration from mains normal or remote start signal is deactivated to genset stop. |
| P07 | Start Attempts | (1-10) times | 3 | It is maximum start attempts when starter fails to start. When it reaches set attempts controller shall send out start failure signal. |
| P08 | Pre Heating | (0-300)s | 0 | Pre-heating plug pre-energization time before starter is powered on; |
| P09 | Cranking Time | (3-60)s | 8 | Time for starter to be energized every time. |
| P10 | Crank Rest Time | (3-60)s | 10 | The waiting time before second power up when engine start fails. |
| P11 | Safety On Delay | (1-60)s | 10 | Alarms for low oil pressure, temp. high, under speed, under frequency and under voltage are deactivated. |
| P12 | Start Idle Delay | (0-3600)s | 0 | Time for genset idle running at starting; |
| P13 | Warming Up Time | (0-3600)s | 10 | Warming-up time before breaker close after high speed running for genset. |
| P14 | Cooling Time | (3-3600)s | 10 | Radiating time before genset stop after genset is unloaded. |
| P15 | Stop Idle Delay | (0-3600)s | 0 | Time for genset idle running at stopping; |
| P16 | ETS Solenoid Hold | (0-120)s | 20 | The time for Stop electromagnet to be energized before genset stop. |
| P17 | Wait for Stop | (0-120)s | 0 | Time from idle delay to complete stop when ETS stop output is set to 0; when the output time is not 0s; it's time from ETS stop end to |



| No. | Items | Parameter Range | Default | Description |
|-----|-----------------------------------|-----------------|---------|---|
| | | | | complete stop; |
| P18 | Generator Poles | (2-64) | 2 | When engine speed is over this value for 2s, over speed is considered; controller issues over speed alarm shutdown signal; |
| P19 | Gen Abnormal Delay | (0-20.0)s | 10.0 | Alarm delay for gen under/over voltage. |
| P20 | Gen Over Volt limit for Shutdown | (30-60000)V | 264 | When generator voltage is higher than this threshold and lasts for the set gen 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 60000V) |
| P21 | Gen Under Volt limit for Shutdown | (30-60000)V | 196 | When sample voltage falls below this threshold and lasts for the delay time, it is considered under voltage and shutdown alarm shall be initiated. (No detection for under volt signals if it is set as 30V) |
| P22 | Level High to disable Fuel Pump | (0-100)% | 80 | When fuel level is over the pre-set value for 2s, fuel pump is off; |
| P23 | Level Low to enable Fuel Pump | (0-100)% | 25 | When fuel level is under the pre-set value for 2s, fuel pump is on; |
| P24 | Under Frequency Shutdown | (0-75.0)Hz | 45.0 | When generator frequency falls below this threshold (not 0) and lasts for the delay time, then it is considered under frequency and shutdown alarm signal will be initiated. |
| P25 | Over Frequency Shutdown | (0-75.0)Hz | 57.0 | When generator frequency is over than this threshold and lasts for the delay time, then it is considered over frequency and shutdown alarm signal will be initiated. |
| P26 | Under Frequency Shutdown Delay | (0-60)s | 10 | When generator frequency falls below this threshold (not 0) and lasts for the delay time, then it is considered under frequency and shutdown alarm signal will be initiated. |
| P27 | Over Frequency Shutdown Delay | (0-60)s | 2 | When generator frequency is over than this threshold and lasts for the delay time, then it is considered over frequency and shutdown alarm signal will be initiated. |
| P28 | Temp. High Shutdown Value | (80-140)°C | 98 | When outside temp. sensor is above this value, and Temp. High signal is issued; This is detected only after safety on delay and only for externally connected Temp. sensor; When set value is 140, Temp. High signal is not issued (only for Temp. sensor, excluded |



| No. | Items | Parameter Range | Default | Description |
|-----|-------------------------------|-----------------|---------|---|
| | | | | the temp. high alarm signal of input port); |
| P29 | Level Low Warning Value | (0-200)% | 50 | When level is under this value for 10s, level low warning is issued (only warning, not stop); |
| P30 | Battery Over Voltage Warning | (12-40)V | 33.0 | When battery voltage is higher than this value for 20s, battery voltage abnormal signal is issued; (only warning, not stop) |
| P31 | Battery Under Voltage Warning | (4-30)V | 8.0 | When battery voltage is lower than this value for 20s, battery voltage abnormal signal is issued; (only warning, not stop) |
| P32 | CT Ratio | 500A/62.5mA | 500 | CT ratio for externally connected CT; |
| P33 | Full Load Current | (5-6000)A | 500 | Rated current of genset; used for full load current calculation; |
| P34 | Over Current % | (50-130)% | 120 | When full load current is higher than this, over current delay started; |
| P35 | Over Current Delay | (0-3600)s | 60 | Finite over current delay; when load current is over the pre-set value for pre-set time, over current is considered; when delay is 0s; it only gives warning, not stop; |
| P36 | Over Current Action | (0-2) | 0 | 0: Warning 1: Shutdown 2: Cooling Shutdown |
| P37 | Digital Output 1 Set | (0-9) | 5 | See Table 8 for detailed output contents; |
| P38 | Digital Output 2 Set | (0-9) | 6 | See Table 8 for detailed output contents; |
| P39 | Fuel Output Time | (1-60)s | 1 | Fuel output time for genset start; |
| P40 | Power On Mode Selection | (0-2) | 0 | 0: Stop 1: Manual Mode 2: Auto Mode |
| P41 | Module Address | (1-254) | 1 | Communication address |
| P42 | Password | (0-9999) | 318 | Controller password. |
| P43 | Disconnection Gen. Frequency | (0.0-30.0)Hz | 14.0 | In the starting process when gen frequency exceeds this value, it is considered that start is successful and starter will be disconnected. |
| P44 | AC System | (0-3) | 0 | 0: 3P4W 1: 2P3W 2: 1P2W 3: 3P3W |
| P45 | Temp Sensor Types | (0-12) | 8 | See Table 10 for Temp. sensor type; |
| P46 | Level Sensor Selection | (0-5) | 3 | See Table 10 for level sensor type; |
| P47 | Input 1 Set | (0-8) | 4 | See Table 9 for input contents; |
| P48 | Digital Input 1 Delay | (0-20.0)s | 2.0 | Digital input acts when input is delaying; |
| P49 | Low Consumption | (0-180)s | 0 | Low power consumption time setting |

7.2 DEFINABLE CONTENTS OF OUTPUT PORTS

Table 8 Definable Contents of Output Ports

| No. | Items | Function Description |
|-----|--------------------|--|
| 0 | Not Used | When this is chosen, output port won't output. |
| 1 | Common Alarm | Includes all shutdown alarms and warnings; when there is only warning alarm input, alarm is not latched; when shutdown alarms occur, alarms are latched until they are 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 energization. |
| 5 | Gen Close Output | Generator close outputs when generator is normally running. |
| 6 | Mains Close Output | Mains close outputs after mains normal delay ends. |
| 7 | High Speed Output | Outputs when enters warming up time; disconnects after cooling; |
| 8 | Fuel Pump Output | Outputs when fuel pump works; |
| 9 | Reserved | |

7.3 DEFINABLE CONTENTS OF INPUT PORTS

Table 9 Definable Contents of Input Ports (GND Connected is active for all)


| No. | Items | Remark |
|-----|---------------------------------|--|
| 0 | Not Used | |
| 1 | Temp. High Alarm Input | After safety on delay is finished, generator shutdown alarm occurs immediately if this signal is active. |
| 2 | Oil Pressure Low Input | |
| 3 | Reserved | |
| 4 | Outside Shutdown Input | If this signal is active, genset will immediately shutdown; |
| 5 | Cooling Shutdown for Temp. High | When this signal is active and genset is running normally, if Temp. high occurs, controller will stop after cooling delay; when this signal is inactive, if Temp. high occurs, controller will stop immediately; |
| 6 | Reserved | |
| 7 | Reserved | |
| 8 | Reserved | |

7.4 SENSOR SELECTION

Table 9 Sensor Selection

| No. | Items | Contents | Remark |
|-----|-------------------|--|--|
| 1 | Temp. Sensor | 0: Not Used 1: Customized Resistance Curve 2: VDO 3: SGH 4: SGD 5: CURTIS 6: DATCON 7: VOLVO-EC 8: SGX 9: Digital Low Input Active 10: Digital High Input Active 11: Reserved 12: Reserved | Customized resistance input range: 0Ω-6000Ω; Default: SGX Sensor |
| 2 | Fuel Level Sensor | 0: Not Used 1: Customized Resistance Curve 2: SGH 3: SGD 4: Digital Low Input Active 5: Digital High Input Active | Customized resistance input range: 0Ω-6000Ω; Default: SGD Sensor |

8 CONTROLLER PARAMETER SETTINGS

- a. Under standby status, press   at the same time, it will enter password entry screen (Fig. 4). At this moment the first digital flashes.

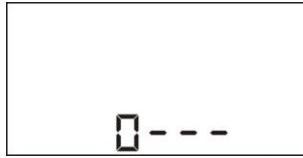






Fig. 4 Password Entry Screen

- b. Press  and the flashing number adds 1; Press  and it decreases 1. After correct setting, press   to move.





- c. After the password is passed it will enter parameter setting screen (Fig. 5). At this moment it displays the serial number of the setting item and the set value. Press  and the setting item goes down; Press  and the setting item goes up.



Fig. 5 Parameter Setting Screen

- d. Press   and it enters the setting status of the current parameter value. At this time the first digital number is flashing and the setting method is same as Step a;

9 SENSOR SETTING

- Sensor types that can be connected inside controller are all resistance sensors; Parts of standard curves (Table 10) have been put inside the controller for users. If customized sensor curves are planned to use, users must set by PC software;
- When customized sensor curve is set, X value (resistance) must be inputted from small to big, otherwise mistake may occur;
- When Not Used is selected for sensor, sensor curve won't work, and at the same time LCD won't display sensor data;
- Y value of the foremost points and the last few points can be set the same as below:

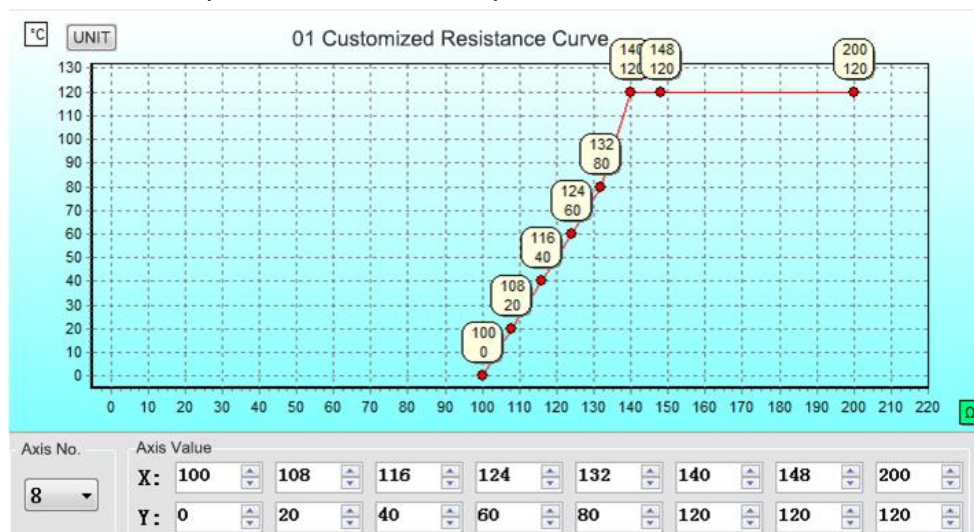


Fig. 6 Sensor Curve

10 COMMISSIONING

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

- a) Check all the connections are correct and wire diameter is proper.
- b) Make sure that the controller DC power has fuse, and it is correctly connected to the positive and negative of start battery.
- c) Take proper action to prevent engine from cranking successfully (e. g. remove the connection wire of gas valve). Make sure everything is correct. Connect starter battery power, and the controller shall conduct the procedure;
- d) Press "Start" button, and genset will start. After the set cranking times, controller will send signal of Start Failure; and then press "Stop" to reset controller.
- e) Recover the action of preventing engine from cranking successfully (e. g. recover the wire of gas valve). Press Start button again, and genset will start. If everything goes well, genset will go normally running after idle running (if configured), and Mains and Gen will close. During this period, please observe 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.
- f) For any other questions please contact with SmartGen service personnel.

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11 TYPICAL APPLICATION

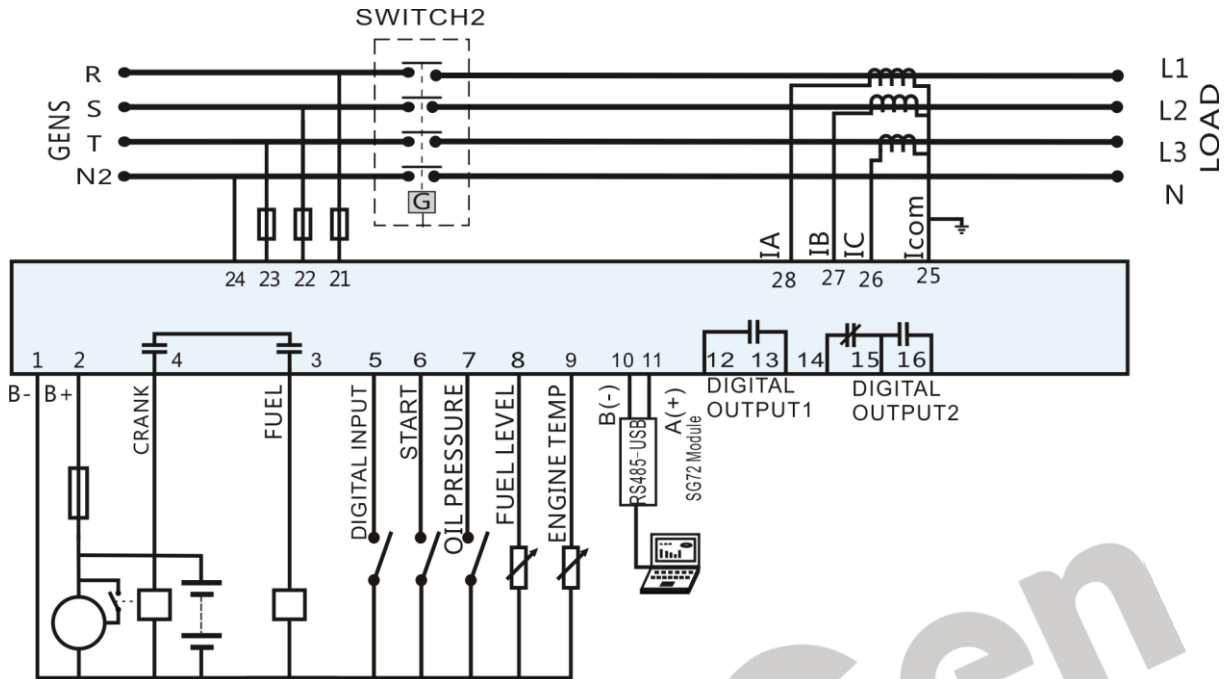


Fig. 5 MGC310 Typical Application Diagram

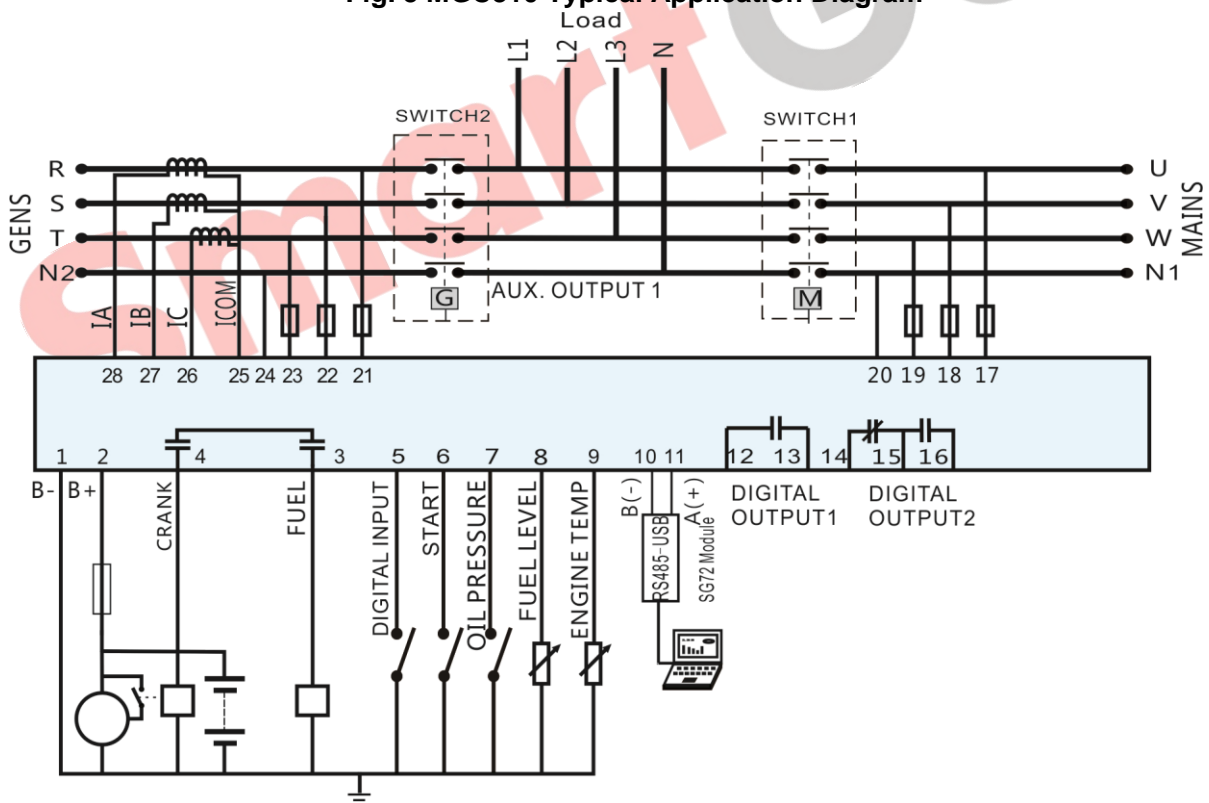


Fig. 6 MGC320 Typical Application Diagram

CAUTION! Crank, fuel output ports shall expand big capacity relays;

CAUTION! When sensor port is configured to "Figure High Input Active", hung up means High Electrical Level, and Power positive connected is prohibited.

12 INSTALLATION

12.1 FIXING CLIPS

- The controller is panel-embedded design and the panels are fixed by clips in installation.
- Twist the fixing clip screw anticlockwise until it reaches 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 not to over tighten the clip screws.

12.2 OVERALL AND CUTOUT DIMENSIONS

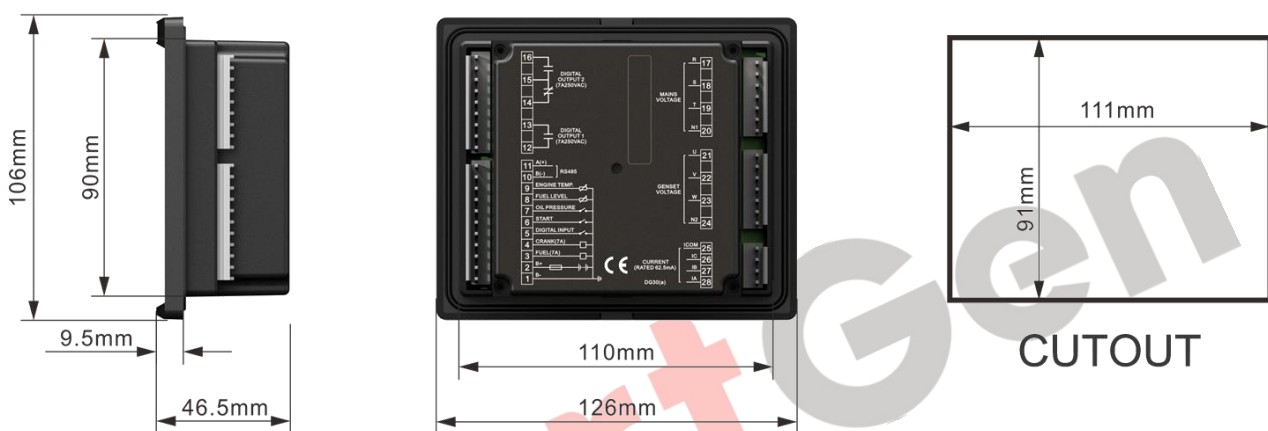


Fig. 7 Overall and Cutout Dimensions

1) Battery Voltage Input

MGC300 controller is only suitable for DC12V battery voltage environment. Battery negative must be connected with the engine shell soundly. The diameter of the wire which connects controller power B+/B- and battery positive/negative must be over (or equal to) 1.5mm^2 . If floating charger is configured, please firstly connect charger output wires to battery's positive and negative directly, and then connect battery's positive and negative and controller power's positive and negative individually with separated wires in order to prevent charger disturbing the controller's normal working.

2) Output and Expand Relays

All outputs are relay contactor outputs. If relay expansion is needed, please add flyback diode (expansion relay coil has DC) to the two ends of expansion relay coils, or add resistance-capacity circuit (when coil is AC current), and the purpose is to prevent disturbing controller or other devices.

3) AC Current Input

MGC300 controller current input must connect outside CT. CT secondary side rated current must be 62.5mA, and at the same time CT phase and input voltage phase must be correct, otherwise the current sampling and active power may not be right.



Warning: When there is load current, CT secondary side open circuit is strictly prohibited.


4) Withstand 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 entering controller and damaging it.

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13 FAULT FINDING

Table 10 Fault Finding

| Symptoms | Possible Solutions |
|---|--|
| Non response when controller is powered on. | <ul style="list-style-type: none"> Check starting batteries; Check controller wirings; Check DC fuse; Check whether  is pressed for 3s; |
| Genset shutdown | <ul style="list-style-type: none"> Check water/cylinder temp. is too high or not; Check AC generator voltage; Check DC fuse; |
| Low oil pressure alarm after successful start | Check pressure digital input port and the wirings. |
| Temp. high alarm after successful start | Check water temp. sensor and wire connections; |
| Shutdown Alarm in running process | <ul style="list-style-type: none"> Check related switches and the wirings according LED indicators; Check digital input port; |
| Start Failure | <ul style="list-style-type: none"> Check fuel circuit and its connections; Check starting batteries; Check speed sensor and its connections; Refer to engine manual. |
| Non response for starter | <ul style="list-style-type: none"> Check starter connections; Check starting batteries. |
| Cannot connect PC software | <ul style="list-style-type: none"> Check whether 485 wires are connected reversely; Check whether PC software is right or not; |