Thank you for purchasing the HGW series SCR power regulator. This manual mainly outlines precautions for installation and wiring. Before operation, please read it to understand how to assemble or use the product. Please keep this manual properly for future reference.

1.Appearance and Product Features

Product Features

- It adopts control technology of Microcontroller Unit (MCU) embedded single-chip and PID closed-loop, with 100% linear output.
- It supports digital display of input, output, current, voltage, and power.
- It has a dual-channel input signal design, supporting input of both current and voltage signals.
- It supports multiple control modes, including constant voltage, constant current, constant power, open-loop control, and cycle control;
- It is equipped with multiple protection functions, such as phase loss protection, overcurrent protection, overtemperature protection, and open-circuit protection;
- It features MODBUS RTU communication, allowing the host computer to directly control the output level.

Appearance

2. Safety Instructions, Warnings and Precautions

⚠ Safety

1.Before use, please carefully read the safety instructions. (those marked with this symbol contain important safety information and must be strictly followed).
2.If this product is used in equipment that may cause personal injury or major property loss, it must be equipped with double or triple protection devices before use.
3.When the SCR is not providing output, it is not completely isolated. It is recommended to install a No-Fuse Breaker (NFB) without fail.
4.When maintaining the equipment, the main power supply must be isolated. Simply turning off the SCR is insufficient, as its output terminal will still be live, which may lead to the risk of electric shock.
5.It is recommended that the alarm output function of the power regulator be used, ensuring an alarm is triggered and output promptly whenever any abnormality occurs.

⚠ Warning

1.To ensure the long-term use of this product, please use it at the standard rated input voltage correctly.
2.Unauthorized disassembly, processing, modification, or repair of this product is prohibited, as this may result in electric shock, fire or other hazardous situations.

⚠ Precautions

1.Please confirm that the product has not been damaged during transportation before use. The operating environment has a significant impact on the performance and service life of this product.
2.Please avoid the following environments: with corrosive gases or harmful gases (when such gases are present, achieve effective isolation using a control cabinet or control room).
3.When installing the product in a control cabinet, please drill holes in the upper part of the cabinet and install an exhaust fan for heat dissipation.
4.The ambient humidity for use shall be below 90% RH (no condensation).
5.Operating ambient temperature: 0°C ~ +40°C (maximum 60°C). When the ambient temperature is between +40°C and +60°C, the rated current must be derated by 1.2% for each 1°C increase.

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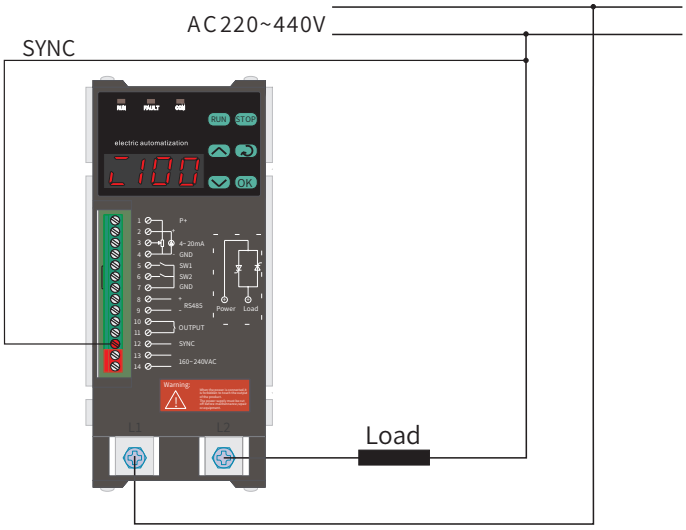
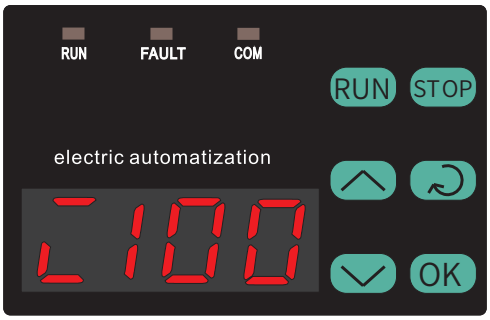
6.The wiring of input and output terminals must be securely fastened. The SCR is a 50cm high-current product; if the terminals are not fastened properly, arcing may occur, causing the current to increase severalfold.
7.The heatsink temperature is high during operation; do not touch it directly to prevent burns.
8.The input and output terminals pose an electric shock risk; avoid direct contact with conductors between these terminals and conductors.
9.Do not connect wires to unused terminals as this may cause circuit abnormalities.
10.Installation must follow the principles of thermal dynamics, and the product should be installed in a vertical (up-down) direction to ensure heat dissipation.
11.This product (including internal components) has a warranty period of 1 year under normal use conditions.
12.If the load is not connected or the load current is less than 0.6A, the SCR cannot be tested normally (a load current greater than 0.6A is required for normal operation/testing).

3. Power Circuit Wiring



4. Panel Function Description



Name	Function Description
LED Display	Displays the status /parameter values of input, output, voltage, current and power.
RUN Indicator Light	Green, illuminates when the power regulator operates normally.
FAULT Indicator Light	Red, illuminates when the device malfunctions .
COM Indicator Light	Yellow; illuminates during active network communication.

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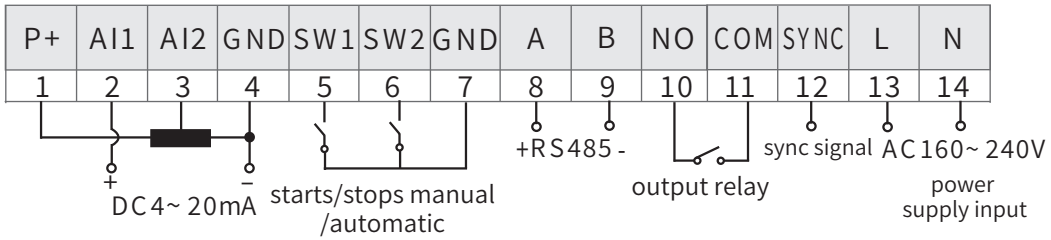
Buttons	Returns to the home screen; Switch to view the parameters of I, O, U, C, and P.
Buttons	Parameters backward switching: data increment key;
Buttons	Parameters forward switching: data decrement key;
Buttons OK	Enters parameter setting key and data modification confirmation key.
Buttons RUN	Keyboard stop.
Buttons STO	Keyboard start.

5.Function Description of Control Terminals



No.	Symbol	Function Description
1	P+	Reference power supply +5V: Used as the given reference for external potentiometers.
2	AI1	Analog input port 1: DC0~20mA/ DC4~20mA (input impedance 125Ω), which forms an input loop with terminal 4 (GND).
3	AI2	Analog input port 2: 0~5V input/ potentiometer input (center tap)/ DC 0~10V, which forms an input loop with GND.
4	GND	Signal common ground: Negative pole of analog signals, common terminal of digital signals.
5	SW1	Start/Stop control terminal: Cooperates SW1 with terminal 7 (GND) to form a start/stop control loop. When the two terminals are closed, the regulator operates; when open, it stops.
6	SW2	Analog input port selection: Cooperates SW2 with terminal 7 (GND). Foe closed-circuiting, selects analog input port 2; For opening-circuiting, selects input port 1.
7	GND	Signal common ground: Negative pole of analog signals, common terminal of digital signals
8	A	RS485 communication port, RS485+
9	B	RS485 communication port, RS485-
10	NO	By selecting function F-109 in the menu, this output terminal can be configured as either a running output signal or an alarm output signal. Load capacity: AC240V/5A, DC24V/5A
11	COM	
12	SYNC	Synchronous signal power lines. For specific wiring instructions, refer to Section 3 " Power Circuit Wiring" in the instruction manual.
13	L	Power supply for control board: AC160~240V
14	N	

⚠ Basic application wiring: For a 4-20mA control signal input, connect the positive terminal to Terminal 2 (AI1) and the negative terminal to Terminal 4 (GND). Connect the 220V control power supply to Terminals 13 and 14; there is no distinction between live and neutral lines here. The start terminals (Terminals 5 and 7) are connected at the factory, so it starts up by default. If a start switch needs to be installed on the control cabinet, Terminals 5 and 7 can be used as switch terminals.

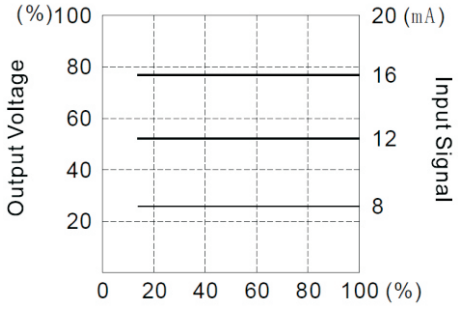
⚠ Safety Reminder: When designing electrical circuits, it is recommended to utilize the alarm output function of the power regulator. The power regulator provides comprehensive protection for both the load and the power supply, and it can immediately alarm when any abnormality occurs.

6. Function Description of Control Modes

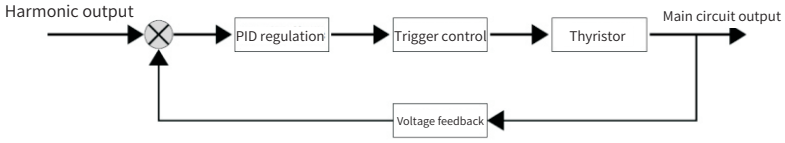
Constant Voltage Control Mode

- Control mode setting: Parameter F-86 = 7
- It is a control method that keeps the output voltage constant at the given voltage. When the grid voltage fluctuates or the load impedance changes, the regulator adjusts according to the PID law. Suitable for inductive, resistive and capacitive loads.

Constant Voltage Output Characteristic Diagram



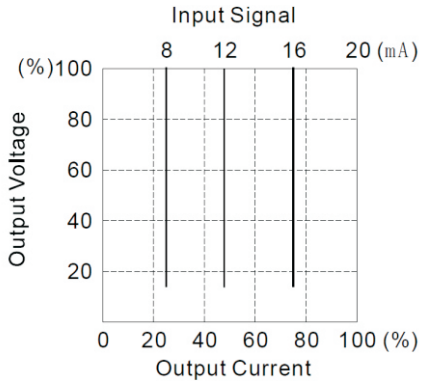
Constant Voltage Logic Control Block Diagram



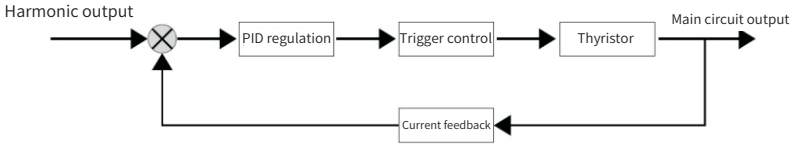
Constant Current Control Mode

- Control mode setting: Parameter F-86 = 8
- It is a control method that keeps the output current constant at the given current. When the grid voltage fluctuates or the load impedance changes, the regulator adjusts according to the PID law. Suitable for inductive, resistive and capacitive loads.

Constant Current Output Characteristic Diagram



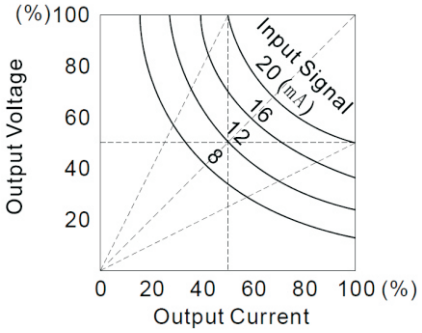
Constant Current Logic Control Block Diagram



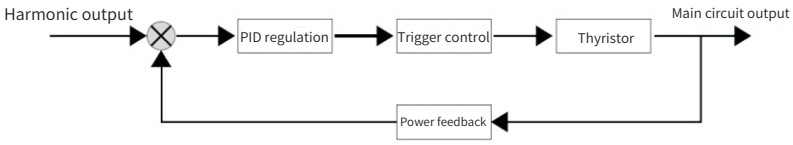
Constant Power Control Mode

- Control mode setting: Parameter F-86 = 9
- It is a control method that keeps the output power constant at the given power. When the grid voltage fluctuates or the load impedance changes, the regulator adjusts according to the PID law. Suitable for inductive, resistive and capacitive loads.

Constant Power Output Characteristic Diagram



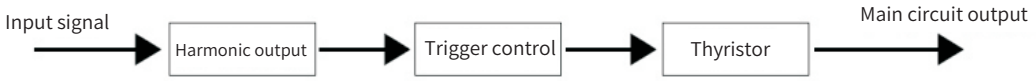
Constant Power Logic Control Block Diagram



Open-Loop Control Mode

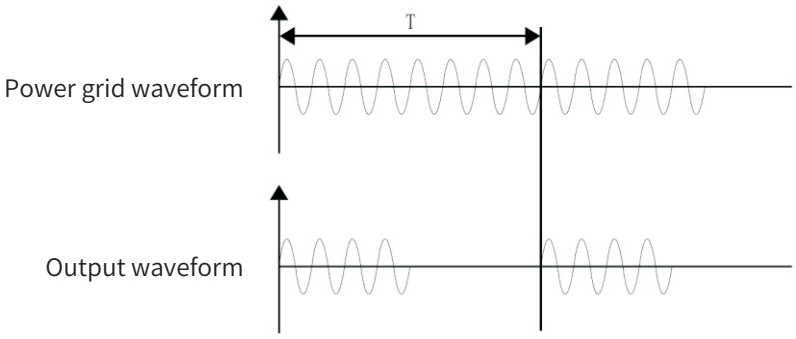
- Control mode setting: F-111 parameter =0.
- It is a control method that directly controls the thyristor’ s turn-on level based on the input value. When the grid voltage fluctuates or the load impedance changes, the voltage or current cannot remain constant. Suitable for inductive, resistive and capacitive loads.

Open-Loop logic control block diagram



Cycle Zero-Crossing Control Mode:

- Control Mode: F-114 parameter =1, F-119 parameter=0 is used to select fixed-period zero-crossing mode; F-114 parameter =1, F-119 parameter=1 is used to select cycle zero-crossing mode.
- A control method that does not cause harmonic pollution to the power grid. The number of cycles that the thyristor turns on in 100 cycles is determined by the input value, which is suitable for pure resistive loads.
- Schematic diagram of the zero-crossing power regulation output waveform, showing a given 50%.



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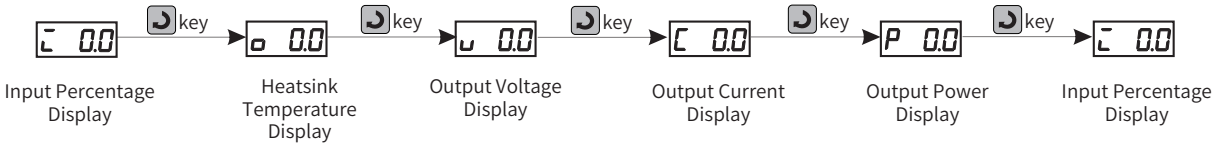
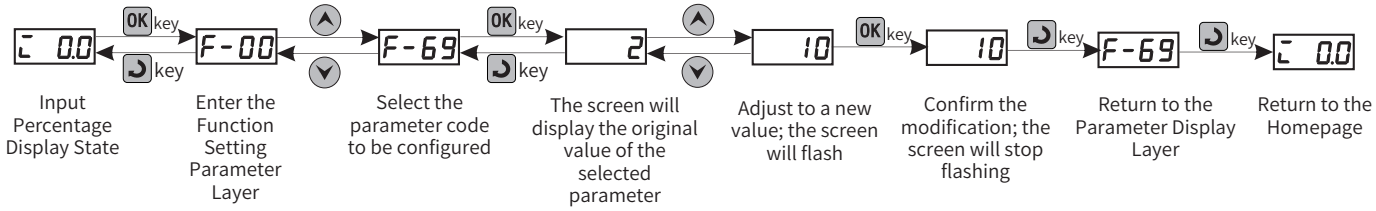
7. Parameter description

Display parameter layer: key switches the input display and cycles display of heat sink temperature, voltage, current, and power.



Function Setting Parameter Layer

Parameter Modification Operation Description (Take changing the soft start time parameter F-69 from 2 seconds to 10 seconds as an example, other parameter modification steps are similar)



Note: 1. When the display is in the parameter setting window, if no operation is performed for 2 minutes, it will automatically return to the basic display state. At this time, unsaved modified parameters will become invalid.

Parameter Description

The parameter number is the communication address. For example, for F - 1, the communication address is 1. The following is the description of key parameters.

F-0	Total set value	Range	0.0 - 100.0%, one decimal	Factory Value	-	Attribute	Read-only
F-1	Numerical Set value Display	Range	0.0 - 100.0%, one decimal	Factory Value	-	Attribute	Read-only
F-2	Ramp Output Value	Range	0.0 - 100.0%, one decimal	Factory Value	-	Attribute	Read-only
F-3	PID Regulator Output Value	Range	0.0 - 100.0%, one decimal	Factory Value	-	Attribute	Read-only
F-4	Current Output Voltage	Range	Output voltage detected in real time	Factory Value	-	Attribute	Read-only
F-5	Current Output Current	Range	Output current detected in real time	Factory Value	-	Attribute	Read-only
F-6	Current Output Power	Range	Output power detected in real time	Factory Value	-	Attribute	Read-only

F-30	Communication Set Percentage	Range	0.0 - 100.0%	Factory Value	0	Attribute	Read-write

When setting the input percentage of the communication, that is, when setting F60 = 51, the host computer writes data to this address (30), where 0.0 - 100.0 corresponds to 0.0 - 100.0% of the input signal.

F-33	Regulator's Current Operating Status	Range	0~2	Factory Value	-	Attribute	Read-only

0: The regulator is in a stopped state; 1: The regulator is operating normally; 2: The regulator is in a fault state where last fault can be checked through parameter F-125.

F-34	Start-stop Signal Status	Range	0~1	Factory Value	-	Attribute	Read-only

0: Start-stop signal is deactivated; 1: Start-stop signal is activated.

F-36	SW1 Status	Range	0: Open; 1: Closed	Factory Value	-	Attribute	Read-only

F-38	SW2 Status	Range	0: Open; 1: Closed	Factory Value	-	Attribute	Read-only

Status of SW1 (Terminal 5 and 7) and SW2 (Terminal 6 and 7), 0: Open; 1: Closed.

F-55	Menu Permission Setting	Range	0~3000	Factory Value	0	Attribute	Read-only

0: Only display read-only parameters; 35: Display read-only parameters and simple application parameters; 53: Display debugging engineering parameters; 66: Display all

F-60	Set Selection 2 (Signal Source)	Range	33~54	Factory Value	50	Attribute	Read-write

50: Analog setpoint; 51: Communication set value.

F-61	Set Selection 3 (Signal Source)	Range	33~54	Factory Value	50	Attribute	Read-write

50: External set value; 51: Keyboard set value (Set input percentage via the increase/decrease keys on the keyboard)

F-65	Selection 4 (Signal Source)	Range	0~1	Factory Value	0	Attribute	Read-write

0: Keyboard; 1: External switch quantity

F-67	Set Minimum Limit	Range	0~100%	Factory Value	0	Attribute	Read-write

Minimum limit percentage of input signal.

F-68	Set Maximum Limit	Range	0~100%	Factory Value	100	Attribute	Read-write

Maximum limit percentage of input signal.

F-69	Soft Start Time Setting	Range	0 - 120 seconds	Factory Value	2	Attribute	Read-write

F-70	Soft Shut-down Time Setting	Range	0 - 120 seconds	Factory Value	2	Attribute	Read-write

Soft start time is the time required for the regulator output to rise from 0% to 100% (see t1 in the figure as below); soft shut-off time is the time required for the regulator output to drop from 100% to 0% (check t2 in the figure as below).

F-71	Communication Control Start/Stop Input	Range	33~54	Factory Value	36	Attribute	Read-write

36: Start/stop via SW1 switch;
Start the power regulator by writing 51 to F-71 through communication, and stop by writing 50.

F-75	Output Voltage Calibration	Range	50~150%	Factory Value	10	Attribute	Read-write

The output voltage value can be calibrated.

F-77	Rated Load Voltage	Range	1~500V	Factory Value	380	Attribute	Read-write

This parameter can be modified according to the actual load voltage, but the modified parameter cannot exceed the rated value marked on the nameplate.

F-79	Output Current Calibration	Range	50~150%	Factory Value	10	Attribute	Read-write

The output current value can be calibrated.

F-81	Load Rated Current	Range	1~500A	Factory Value	100	Attribute	Read-write

This parameter can be modified according to the actual load current, but the modified parameter cannot exceed the rated value marked on the nameplate.

F-86	Closed-Loop Control Mode	Range	7: Constant Voltage; 8: Constant Current; 9: Constant Power	Factory Value	7	Attribute	Read-write

For the specific description of the control mode, please refer to the explanation of the control mode function on Page 4.

F-87	Coefficient of Proportionality	Range	0~200	Factory Value	10	Attribute	Read-write

The proportional gain is multiplied by the system error to generate the correction value. Increasing this parameter reduces system damping and accelerates the system’ s dynamic response. For a given load, if this parameter is excessively large, it will render the system unstable. The optimal setting is the maximum value just before the system begins to destabilize.

F-88	Coefficient of Integral	Range	0~200	Factory Value	10	Attribute	Read-write

The integral gain is multiplied by the system error to generate the correction value. This correction value ensures zero steady-state error in the system. Increasing this parameter accelerates the system’ s recovery rate after a disturbance. If this parameter is excessively large, the system will tend to oscillate instead of recovering quickly.

F-89	Coefficient of Derivative	Range	0~200	Factory Value	0	Attribute	Read-write

The derivative gain is multiplied by the rate of error change to generate a correction value, which provides a damping effect. Optimal system performance is achieved through the best combination of the three PID parameters (proportional, integral, and derivative).

F-97	AI1 Signal Type Selection	Range	0:0~20mA; 1:4~20mA	Factory Value	1	Attribute	Read-write
F-98	Input Current Signal (AI1) Calibration	Range	50 - 150%	Factory Value	1000	Attribute	Read-write

Zero point and full-scale accuracy calibration can be performed on the current signal input to AI1.

F-99	AI2 Signal Type Selection	Range	0:0~5V; 1: 0~10V	Factory Value	0	Attribute	Read-write
F-100	Input Voltage Signal (AI2) Calibration	Range	50 - 150%	Factory Value	1000	Attribute	Read-write

Zero point and full-scale accuracy calibration can be performed on the voltage signal input to AI2.

F-109	Output Relay Function Selection	Range	0~3	Factory Value	0	Attribute	Read-write

Function selection for the relay outputs of terminals 10 and 11. 0: Fault signal; 1: Operating signal.

F-111	Phase Control Mode Selection	Range	0: Open-loop; 1: Closed-loop	Factory Value	1	Attribute	Read-write
F-114	Control Mode Selection	Range	0: Phase; 1: Zero	Factory Value	0	Attribute	Read-write
F-118	Grid Power Frequency	Range	0~2	Factory Value	0	Attribute	Read-write

Set the frequency of the regulator according to the real-time power grid. 0: 50HZ; 1: 60HZ; 2: Automatic identification.

F-119	Zero-crossing Control Mode Selection	Range	0: Fixed period; 1: Cycle zero crossing	Factory Value	1	Attribute	Read-write
F-120	Load Type Selection	Range	0: Ordinary load; 1: Transformer load	Factory Value	1	Attribute	Read-write

Zero-crossing control F119=1, F120=0.

F-125	Previous Fault Type Inquiry	Range	0~10	Factory Value	-	Attribute	Read-only

Query the code of the last fault that occurred. For details, see 8: Fault Code Description.

F-126	Allowance for Load Overcurrent Protection	Range	0: Closed, 1: Enabled	Factory Value	1	Attribute	Read-write
F-127	Allowance for Power Supply Phase Failure Protection	Range	0~2	Factory Value	2	Attribute	Read-write

0: Closed; 1: Alarm; 2: Alarm, and relay output, shut down. When the load power supply is phase-failure, the regulator alarms. The fault is automatically cleared when the load power supply is connected.

F-128	Allowance for Load Open-Circuit Protection	Range	0~3	Factory Value	0	Attribute	Read-write

0: Closed; 1: Alarm; 2: Alarm, and relay output; 3: Alarm, relay output and shut down.

F-129	Threshold of Load Open-Circuit Protection	Range	1~70%	Factory Value	70	Attribute	Read-write

To utilize the load open-circuit protection function: First, set F-81 (Rated Current) to the maximum current value of the load under full-load operation, which is essential for the effective operation of the open-circuit protection function. Second, Set F-128 to 1 to enable the protection function, then configure F-129 (Protection Threshold) as a percentage of the rated current. Load open-circuit protection threshold current calculation formula:
Input percentage (F-00) × Rated current × Open-circuit protection threshold percentage (F-129) = Threshold current.

F-130	Allowance for Thyristor Fault Protection	Range	0: Closed, 1: Open	Factory Value	1	Attribute	Read-write
F-131	Allowance for Heat Sink Overheat Protection	Range	0: Closed, 1: Open	Factory Value	1	Attribute	Read-write

When the heat sink overheat protection is enabled, when the heat sink temperature exceeds 80°C, the power regulator automatically stops outputting.

F-133	Communication Address	Range	1 ~247	Factory Value	123	Attribute	Neither readable nor writable
F-134	Baud Rate	Range	0, 1, 2, 3, 4	Factory Value	2	Attribute	Neither readable nor writable

Selection for communication baud rate: 0: 2400, 1: 4800, 2: 9600, 3: 19200, 4: 38400.

F-135	Data Format	Range	0:8N2; 1:8E1; 2:8O1	Factory Value	1	Attribute	Neither readable nor writable

Data format: 0: 8 data bits, 2 stop bits, no parity;
1: 8 data bits, 1 stop bit, even parity;
2: 8 data bits, 1 stop bit, odd parity;

- The power regulator supports the MODBUS communication protocol and supports four functions: 3, 4, 6, and 16. Parameter values are 16-bit unsigned registers. Writing of decimal points is not supported. For example, parameters should be adjusted to integer 567 before writing 56.7. The parameter address is the parameter number. For example, when writing the soft start time, just write the parameter address as 567.
- Note: Each frame cannot exceed 20 bytes, and each frame can read at most 10 parameters.
- Special setting description:

1.For input signal 4~20mA and manual potentiometer limitation, the parameter settings are as follows: F56 = 12, F136 = 10, F137 = 11, F138 = 52, F139 = 4.
2.For communication setpoint setting, set parameter F60 = 51, and then write data from 0 to 1000 to parameter F30, corresponding to the input signal of 0.0 - 100.0%.
3.For communication start/stop setting, use the communication method to control the start and stop of the regulator. Set parameter F71 = 51 to start and F71 = 50 to stop.

8. Abnormal Code Description

- The power regulator has multiple fault protection functions. When a fault occurs, the regulator will automatically provide protection and display the corresponding fault code in the display window. Users can determine the fault range based on the displayed fault code and take corresponding fault handling measures.

Fault Phenomenon	Fault Name	Fault Cause and Handling Plan
No display	Control board has no power	1, Check the control power supply; 2, Check the connection between the control board and the display board.
Output out of control	Output cannot be controlled	1, Check whether the parameter settings are correct.
Output unstable	Output cannot be stabilized	1, Check the PID parameter settings.
E002	Main power supply fault	1, Check whether the load power supply is energized; 2, Inspect if the contactor or fuse is damaged.

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E003	Load overcurrent fault	Check for any issues with the load.
E004	Load open-circuit fault	Load disconnection: Disconnection current = Set percentage × Rated current × Load threshold. When the difference between the set current value and the actual detected value exceeds the disconnection current, the alarm will be activated. This may be caused by: 1.Load disconnection; 2.Excessively small load current or excessively large rated current setting; 3.Excessively small load threshold setting (F-129).
E005	Heat sink overheating fault	The power regulator is overheated: When the heat sink temperature is detected to exceed 80°C, the alarm is activated. Possible causes: 1. The ambient temperature exceeds 45°C; 2. The cooling fan is damaged; 3. The air duct is dusty.
E009	Load Short Circuit Alarm	1, Check whether the load is short-circuited.
E010	Thyristor Module Breakdown	1, Measure whether there is resistance between L1 and L2. A very small resistance indicates that the module is broken down.

9. Specification and Model Table

HGW 8 — □ — □ — □□□ — □

Specification	Code
Single-phase	1

Main power supply	Code
110~220V	2
330~440V	4

Current	Code	Current	Code	Current	Code
30A	030	75A	075	125A	125
40A	040	80A	080	150A	150
50A	050	90A	090		
60A	060	100A	100		

Control mode setting	Code
Phase constant voltage and current limiting	P
Phase constant current	C
Phase constant power	CV
Cycle zero-crossing power regulation	Z
Fixed-cycle zero-crossing power regulation	ZV

- Formula for Current Calculation

Single-phase: SCR Amp Rating = 1.2 × (Load (KW) × 1000) / Line Voltage (V)

Specification and Model Table

Specification and Model:	Current	Load Power (KW)		Appearance Dimensions (mm)			Fixed Dimensions (mm)		Weight (kg)	Screw and Locking Torque:		Cooling Method
		220V	380V	Length	Width	Height	Length	Width				
HGW8-1-4-030-P	30	5.2	9.1	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-040-P	40	7.0	12.1	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-050-P	50	8.8	15.2	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-060-P	60	10.5	18.2	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-075-P	75	13.2	22.8	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-080-P	80	14.0	24.3	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling

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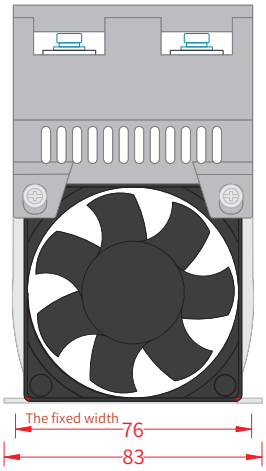
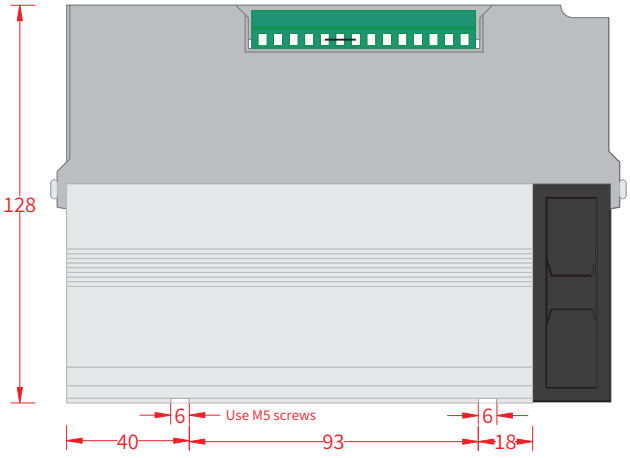
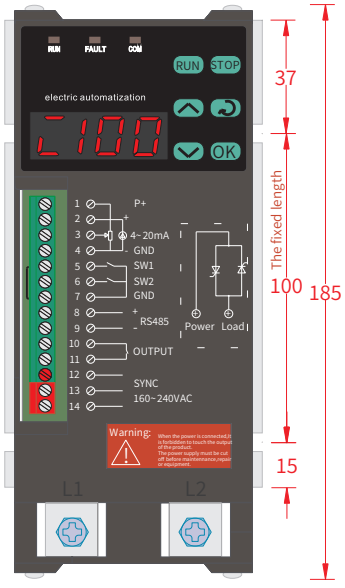
HGW8-1-4-090-P	90	15.8	27.3	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-100-P	100	17.6	30.4	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-125-P	125	22.0	38.0	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling
HGW8-1-4-150-P	150	26.4	45.6	185	83	128	100	76	1.2	M6	40kgfcm	forced air cooling

* The above parameters are for reference only. The actual parameters are subject to the material.







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