



DC stabilized voltage/current power supply User manual

Model: MGP/DDJ/MCK

Version: V1.0

Suzhou Mains Electronic Technology co., LTD.

Thank you for using the power supply products of Mains technology!

Please strictly follow all warnings and instructions on this manual and machine, and keep this manual in good condition. Do not operate the unit until you have read all the safety instructions and operate instructions.

Inspection before confirm receipt

1. The customer needs to check whether the package is complete, whether there is leakage, crack, contamination, wet condition before receiving the goods.
2. Check whether the products received are consistent with the model and quantity of the contracted goods. If there is any mistake, please do not open the box.
3. Check the attachment of the product against the packing list.
4. In case of any of the above situations, please fill in the product model and contact person name, contact information and a simple description of the problem, and contact us or our agent timely.

Safety precautions

safety of operation

1. Before using this product, please read the "safety precautions" carefully to ensure correct and safe use, and please keep the instructions properly.
2. When operating, please pay attention to all warning signs, and operate as required.
3. Avoid operate under direct sunlight, rain or wet environment.
4. This product cannot be installed near the heat source.
5. When placing the product, keep a safe distance to ensure ventilation. Please refer to the instruction manual when installing.
6. This machine is frosted surface, please use dry goods to wipe when cleaning.

Electrical Safety

Non-professional personnel should not open the case, please let authorized maintenance personnel to operate.

1. Please make sure that the product is properly grounded and check whether the connection is correct before power on.
2. When the power supply needs to be moved or rewired, all electrical connections of the power supply should be disconnected to ensure the power supply is completely shut down, otherwise the output end may still have electricity and risk of electric shock.
3. Please use the additional device and accessories specified by mains.
4. Be careful of electric shock.
5. It is forbidden to turn off directly under constant current condition.
- 6. When the rated voltage is equal or greater than 1000V, the default negative electrode is grounded.**

Please pay attention to safe wiring operation!

Disconnect the equipment from the power supply when maintaining the equipment powered by the power supply.

When maintaining and installing the power input and output terminals, please turn off the power supply and disconnect all connections of the power supply.

Operation maintenance

1. The environment and preservation method have certain influence on the service life and reliability of the product. Please do not use it in these following working environment:

- A. Exceeding technical specifications;

- B. The high and low temperature and damp environment(temperature 0 °C to 40 °C, relative humidity 20% ~ 90%);
 - C. The place where exist vibration and collision;
 - D. Places with metal dust, corrosive substances, salts and inflammable gases;
- 2.If you don't use power supply for a long time, please keep it in a dry environment, storage temperature range: -25 °C ~ + 55 °C . Have to make the environment temperature recovered to more than 0 °C , and maintain minimum 2 hours before turn on the power supply.

Briefly instruction

1. Product instruction

DC stabilized voltage stabilized current power supply is a high performance power source developed and produced independently by our company for scientific research and industrial application. High frequency switching power technology is adopted to reduce the heat output greatly, improve the power efficiency, and extend the service life of the machine. The wire of transformer is made of red copper to reduce heat loss. Radiator using the customized density of teeth to increase the cooling efficiency, use speed fan which can adjust the speed automatically according to the output power, reduce the noise of fan, prolong the service life of the fan. This power supply also adopted other high-quality domestic components to improve the performance of the power supply significantly.

This series product has performance such as simple operation, small size, high efficiency, high precision, and high stability, equipped with advanced LED/LCD display, has perfect protection function such as overvoltage, over current, over temperature, short circuit. Allow users to use the product more secure, more stable, and more reliable. It is the best choice for research unit, laboratory test, production line test and industrial application.

2. Performance Characteristics

- ☆specification: Output voltage 0 - rated voltage, Output current 0 - rated current
- ☆ Voltage and current preset: The panel is equipped with a preset button to preset the voltage and current value
- ☆stabilized voltage stabilized current: The voltage current value is continuously adjustable from zero to the rated value; voltage and current are able to automatic convert.
- ☆ Overvoltage protection: Overvoltage protection value can be set. When the output voltage reaches or exceeds the overvoltage protection value, the output will be automatically closed.
- ☆Short circuit protection: Allow long - term short - circuit or short - circuit starting in any state.
- ☆Short circuit alarm: When short-circuited, the power supply acousto-optic alarm.
- ☆ Memory function: It has memory function, shutdown and save preset voltage and current, overvoltage protection value, etc.

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- ☆Output display: Voltmeter& ammeter is LED display (standard) LCD display (optional)
- ☆Pulse work: Can match time controller constitute dc pulse power (optional)
- ☆Intellectualization: RS-485 / RS-232 communication interface, using MODBUS RTU protocol, can realize remote control of computer and PLC (optional)
- ☆ Voltage compensation: Connect the external voltage sampling line, reduce the voltage error caused by too long output wire, switch the internal and external voltage sampling switch, and realize flexible switching of voltage sampling signal (optional)
- ☆ Analog signal: 0 ~ 5V or 0 ~ 10V or 4 ~ 20mA analog quantity can be selected to control the power output signal and read the power output signal (optional).
- ☆ Polarity switching: Output positive and negative polarity switching, custom time switching (optional)

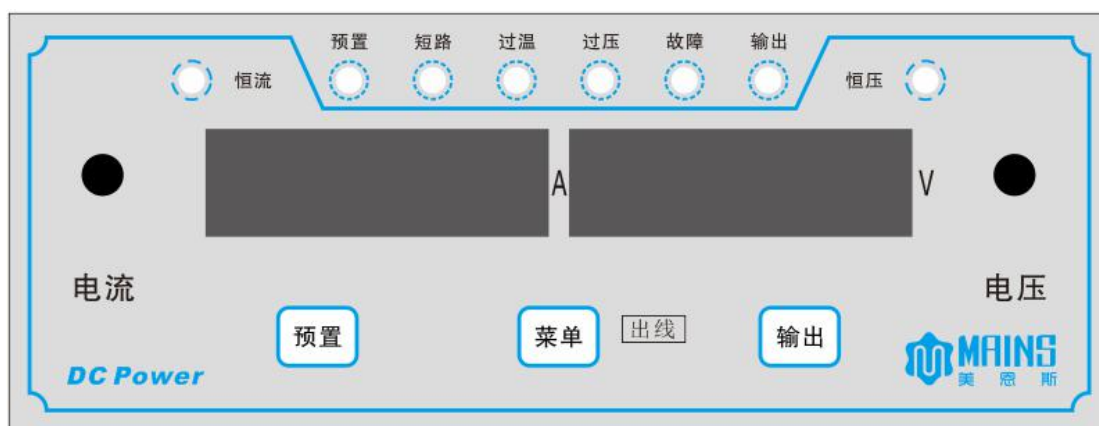
3. Technical index

Name	DC stabilized current power supply
AC input	Single phase: AC220V±10%, 50/60Hz Three-phase: AC380V±10%, 50/60Hz
DC output	Output voltage: 0V -- rated value adjustable (automatic conversion of stabilized voltage and current) Output current: 0A -- rated value adjustable (automatic conversion of stabilized voltage and current)
Source effect	≤0.1% rated value(output voltage change rate due to input voltage change +10%)
load effect	≤0.1% rated value(output voltage change rate due to load change from 10% to 90%)
time drift	voltage≤0.2% rated value (Output voltage change rate due to continuous working time greater than 8 hours) current≤1% rated value (Output current change rate due to continuous working time greater than 8 hours)
Temperature drift	voltage≤50ppm/ °C (output voltage change rate caused by ambient temperature within the power supply operating temperature range) current≤100ppm/ °C (output current change rate caused by ambient temperature within the power supply operating temperature range)
ripple	Voltage ≤0.5% rating value (effective value of V_{rms} , 10% rating value- when rating value changes) current ≤0.5% rating value (effective value of V_{rms} , 10% rating value- when rating value changes)
Current Accuracy	≤0.8% rated value
Voltage Accuracy	≤0.5% rated value

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Display	Voltmeter& ammeter is LED display (standard) LCD display (optional)
display resolution	Voltmeter 0.1v ammeter 0.1a (the display of power of different specifications may be different)
Overvoltage protection	Overvoltage protection value can be set. After protection, the machine will lock itself and restart the machine to unlock itself.
overcurrent protection	Rated current output overload protection, short circuit protection (shut down output after short circuit, optional)
over-temperature protection	The protect value is 70 °C ± 5%, shut down the output after protection
phase absence protection	Three-phase power supply (optional)
Output polarity	Output positive (+) output negative (-) can be grounded
heat-dissipating method	Temperature-controlled and graded refrigeration, water-cooled (optional)
operating environment	designed for indoor application, temperature 0 °C ~ 40 °C; Humidity 10% ~ 85% RH
storage environment	Temperature - 20 °C ~ 70 °C; Humidity 10% ~ 90% RH
Structure Form	The cabinet is fixed to the ground by its own weight
Color	sand gray
special requirements	None

4. Front panel



Brief description of panel indicator and function key:

Constant current: Constant light indicates that the power supply is in constant current state.

Extinguishing means that the power supply is in a non-constant current state;

Preset: Constant light indicates that the power supply is in the preset state;

Flicker indicates that the power supply is under remote control;

Extinguishing means that the power supply is in a non-preset state;

Short circuit: light always on indicates that the power supply is in short circuit state;

Extinguishing means that the power supply is in normal state;

Over temperature: light always on indicates that the power supply is over temperature;

Extinguishing means that the power supply is in normal state;

Overvoltage: light always on indicates that the power supply is under overvoltage;

Extinguishing means that the power supply is in normal state;

Malfunction: light always on indicates that the power supply is malfunction;

Extinguishing means that the power supply is in normal state;

Output: light always on indicates that the power supply is in the output state;

Extinguishing means that the power supply is in a non-output state;

Constant voltage: Constant light indicates that the power supply is under constant pressures state;

Extinguishing means that the power supply is under non-constant pressure state;

Current regulating knob: The output current is adjusted by rotating the current regulating knob, increasing clockwise and decreasing counterclockwise.

Voltage regulating knob: The output voltage is adjusted by rotating the voltage regulating knob, increasing clockwise and decreasing counterclockwise.

preset button: Press down to enter the preset state, the preset indicator light is on, preset the output current and voltage value, and press again to exit the preset state.

Menu button: Press down to enter the overvoltage setting. The overvoltage indicator is always on, and set the overvoltage protection value.

Output button: Press down to enter the output state, the power output indicator light is always on, the constant current or constant voltage indicator light is always on; then press again to exit output state, the output indicator light is off, the constant current or constant voltage indicator is off.

5. Input terminal

The input terminals are AC 220V and AC 380V. The following figures show the two connection orders of the terminals. Please select the connection mode according to the actual input terminals of the power source:



Figure 1

figure 2

Single-phase AC 220V input, see figure 1:

L: fire wire; N: zero wire; G: ground wire;

Three-phase electricity AC 380V input, see figure 2:

A: fire wire; B: fire wire; C: fire wire; G: ground wire

No requirements for sequence of three fire wires of three-phase electricity; Three-phase input default no zero line, except for special customization requirements.

6. DB9 (optional)

The power supply default socket is DB9 bus head, see figure.

6.1 RS-485 wire socket

The interface of RS-485 is DB9 bus socket, 1: A+, 2:B-

6.2 Analog volume external control interface:

3: Vset: Output voltage setting line;

4: Iset: Output current setting line;

5: Vdisp: Output voltage display line;

6: Idisp: Output current display line;

7: ON: The passive signal line controlled by power start stop, when GND is connected, it means start, otherwise means stop.

8: RM: The passive signal line of the external power supply control is detected when the power supply is started. The change after starting is invalid. When GND is connected, it represents external control, otherwise represents internal control of power supply.

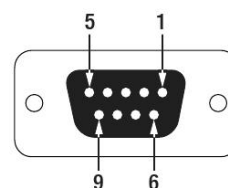
9: GND: ground.

Iset, Vset, Idisp, Vdisp have 4-20ma, 0-5v and 0-15v Settings, which are selected before delivery.

Vset, Iset have 3 settings: voltage control only, current control only, voltage and current control, which was set before delivery. Please select the connection mode according to the customization requirements!

Note: rs-485 and analog external control interface are optional and only one of them can be selected.

Please select the corresponding connection mode according to the customized model!



7. Voltage compensation (optional)

2P Socket: connect to load terminal.



1. Shift switch: external, collect voltage signal from 2P socket. 2P socket should be connected with signal line, otherwise the voltage error will increase, and the internal protection resistance will be burnt out after a long time working.

2. Shift switch: inside, collect the voltage signal from the internal output terminal of the power supply. 2P socket cannot be connected with signal line, otherwise sampling signal will be confused and output abnormal.

3. It is forbidden to disconnect the main output first and then the sampling line, otherwise the output will be out of control. If there is a switch between the power output and the load, the voltage compensation line cannot be connected to the load skipped over the switch; otherwise the power supply will be out of control when the switch is disconnected.

Erection joint

This product is a universal dc power supply, for the convenience to the operator, this series of product only configure voltage regulation knob and current regulation knob, can satisfy the vast majority of the use of dc power supply requirements. The operation of this product is convenient and simple. Please follow the following operating procedures when using it.

I. primary power supply:

Check whether the output control line connection of this product is consistent with the requirements carefully and make sure the connection is correct.

Check whether AC input voltage is consistent with the input voltage of this product carefully and make sure the connection is correct.

Check whether the load is consistent with the output connection of the product carefully and make sure the connection is correct.

II. Operation

The machine must be checked for input, output and other connections before starting up.

1. Push over; press the power button to power up.
2. Preset;

After power on, power supply enters the preset state. The preset indicator light is always on. The digital tube displays the preset value, set parameters by adjusting voltage and current knob in this state.

III. Operation instructions of rotary encoder

3. The rotary encoder is equipped with a key switch, and the knob can be pressed as a key to realize relevant functions.

4. Preset button:

Press down to enter the preset state, adjust the current and voltage rotary encoder, and set the current voltage value. Press the preset button again to exit the preset state and save the preset value. The preset value will not be lost after shutdown.

When the power supply is in a state of output, if you want to adjust the output value, press down the preset button to enter preset state, adjust the target voltage, current value, and then press down the preset button again to exit the preset state, the power supply will output target power automatically according to the latest voltage and current value.

5. Current regulating knob, voltage regulating knob:

In the preset state, rotate the knob clockwise, the Numbers increase from low to high step by step, to the highest returns to its lowest level, value of 0-9 cycles; rotate the knob counterclockwise, the numbers decrease from high to low step by step, to the lowest return to its highest level, value of 0 to 9 cycles.

Default regulation started from the second bit from the bottom, the bit highlighting, press the knob, the higher bit highlighted, rotates the knob to adjust the value, then press the knob, a higher bit highlighted, rotates to adjust the value, then press the knob, the lowest highlighted. Thus, the last four values of voltage and current can be adjusted in a cycle to realize the function of coarse adjustment and fine adjustment.

6. Output button

When settled all the above operations, presses the output button, the power supply is in a state of the output, the output light is normally on, the constant voltage light or the constant current light is normally on, current digital tube and voltage digital tube display the actual output

current and voltage values.

Press the output button again, the power supply is in standby state, the output light is extinguished, the constant voltage light and the constant current light extinguished, current digital tube and voltage digital tube display actual output current and voltage value is 0.

7. Manu button

Press the button to enter the overvoltage protection value state and set the overvoltage protection value of the power supply. When the output voltage of the power supply reaches the overvoltage protection value, the overvoltage indicator light is on and the power supply shut down the output.

Product warranty, after - sales, maintenance, service commitment

Suzhou Mains Electronic Technology co., LTD. in the spirit of "high quality, excellent service, pursues development", with the concept of "high quality products, reasonable prices, and attentive services" makes a solemn commitment to you:

1. Service

1. The product shall be issued with the operation manual and inspection certificate to ensure the correct installation and application of our products.

2. Our products are all manufactured and inspected in accordance with the manufacturer standards, unqualified products will not leave the factory, strictly implement the relevant provisions of the national industrial product after-sales service, and make product warranty commitments after consignment within twelve months. If the buyer can confirm the product itself has a design, material or process defect, and provide a written application to our company, our company will be responsible for defect product recall free maintenance, replacement, or a refund of the price.

3. If user has quality objection to our products, the company guarantee to make processing opinion in 2 hours after receiving proposals, if the site service is necessary, company will send professional and technical personnel to the field for problem analysis, the service personnel will not leave until the quality problems is solved. Our company will keep records of the quality problem and the processing result of each feedback from our user.

4. Service purpose: high efficiency, responsibility and solution.

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2. Warranty: non-person warranty for damage for 12 months

3. Commitment:

Customers in Suzhou area can respond immediately and arrive at the equipment use site (Suzhou area) on the same day for inspection, repair and maintenance. In other areas, solutions are provided in the shortest time possible.

4. Guarantee:

We provide free repair or replacement of parts within warranty period. If the warranty period is expired, the company shall provide paid maintenance services (charging standard: the cost of raw materials shall be charged, and no labor hours shall be charged).

During the warranty period, if the product fails, the company shall be solely responsible for the failure of the product and the loss of the product. The company shall not bear the loss of load and all other joints.

Warranty limits

The above warranty does not apply to damage caused by the following circumstances:

Customer violates the usage Regulations of this manual;

The customer disassembles the machine or maintains the product independently;

Unauthorized modification or misuse;

Operate the product outside the specified environment;

The relevant laws stipulate irresistible factors.

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Communication protocol

Protocol format

1、 interface standard RS-485

Baud rate 9600 data bit 8, stop bit 1, check bit none。

Note: the baud rate is 9600 by default, except for customized machines.

2、 adopt MODBUS protocol

This device adopts MODBUS protocol for communication, adopts RTU communication format.

This device supports instructions: read multiple writable register instructions (0x03), read multiple read-only register instructions (0x04), write multiple register instructions (0x10), and write a single register instruction (0x06).

Reading and writing multiple registers can only read and write registers with consecutive addresses at one time. If you need to write a register, you can write multiple register instructions and write the number of registers as 1.

In addition, the device's serial port buffer is only 256 bytes long, and the total length of sending instructions over 256 bytes will be error, reading more than 125 registers at one time will be error.

The register address is the number of 16 bits in length of one word. See the following table for details.

Register content is the number of 16 bit in length of one word, the default is unsigned type.

The device only supports the number of fixed points. The data related to voltage and current is actually the number of words according to the displayed resolution, which requires the customer to change according to the number of decimal points displayed.

Please check the display on the back panel of the power supply. The decimal place is generated according to the power supply specifications and cannot be changed after

delivery.

For example: 50V300A power supply, 4-digit display, voltage 2-digit decimal point, current 1-digit decimal point. Voltage 5000 represents 50V and current 3000 represent 300A. 1000V10A power supply, 5 digit display, voltage 1-digit decimal point, current 3-digit decimal point. Voltage 500 represents 50V, current 3000 represent 3A.

3、 MODBUS protocol interpretation

Read multiple registers

Upper computer transmission: device address read instruction register address high 8 bit register address low 8 bit register number high 8 bit register number low 8 bit CRCL CRCH

Lower computer response: device address read instruction data bytes high 8-bit data low 8-bit data CRCL CRCH

Example 1: take 50V300A power supply (voltage 2-bit decimal, current 1-bit decimal) as an example. Check the actual output voltage and current of the power supply. According to the definition in "see register address and function list", register address is 1000 (0X03e8), 1001 (0X03e9), 2 consecutive addresses, and the attribute is read-only. Read multiple read-only register instructions (0X04). The lower computer ID is 1.

Upper computer transmit: Id command addrH addrL amountH amountL crcL crcH

01 04 03 e8 00 02 f1 bb

Power supply response: Id command bytes dataH dataL dataH dataL crcL crcH

01 04 04 0e d8 01 00 78 c7

0X0ed8 Converts to decimal is 3800, the voltage has two decimal points, representing 38V.

0X0100 converts to decimal is 256, and the current has one decimal point, representing 25.6A.

Write multiple registers

Upper computer transmits: device address / write instruction / register address high 8 bit / register address low 8 bit / register number high 8 bit / register number low 8 bit / data

bytes / high 8-bit data / low 8-bit data / CRCL / CRCH

Lower computer response: device address/ write instruction / register address high 8 bit
/register address low 8 bit / register number high 8 bit / register number low 8 bit / CRCL
CRCH

explanation of nouns: id: The power station no. Command: command addrH: register
address high 8 bit addrL: register address low 8 bit amountH: register number high
8 bit amountL: register number low 8 bit bytes: data length crcL: Checksum 8 bits
lower crcH: Checksum 8 bits higher dataH: data high 8 bit dataL: data low 8 bit

Example 2: Take 50V300A power supply (voltage 2-bit decimal, current 1-bit decimal) as
an example. Set the voltage reference and current reference of the power supply as 38V and
25.6a respectively. The voltage has two decimal points and 38V is 3800=0X0ed8. The
current has one decimal point and 25.6a is 256=0X0100. According to the definition in "see
register address and function list", register address is 2001 (0X07d1), 2002 (0x07d2), are
two consecutive addresses. Write multiple read-only register instructions (0x10). The lower
computer ID is 1.

Upper-computer transmits:

```
id command addrH addrL amountH amountL bytes dataH dataL dataH dataL crcL crcH
01 10 07 d1 00 02 04 0e d8 01 00 9a 4c
```

Power supply response: id command addrH addrL amountH amountL crcL crcH

```
01 10 07 d1 00 02 10 85
```

Example 3: Take 50V300A power supply (voltage 2-bit decimal, current 1-bit decimal) as
an example. Turn on the power output. According to the definition in "see register address
and function list", register address is 2016(0X07e0). Write multiple read-only register
instructions (0x10). 0Xffff means open output and 0X0000 means shut down output.

Upper-computer transmits:

```
id command addrH addrL amountH amountL bytes dataH dataL crcL crcH
01 10 07 e0 00 01 02 ff ff c7 40
```

Power supply response: id command addrH addrL amountH amountL crcL crcH

01 10 07 e0 00 01 01 4b

4、 Internal control, external control mode

Internal control mode:

The starting and stopping of power supply and the output current voltage are controlled by buttons and knobs on the power panel. When the power is on, the default mode is the internal control mode.

Enter the external control mode when modifying the writable register value through the rs-485 instruction.

External control mode:

The power supply is controlled by the remote host through the rs-485, and the buttons and knobs on the panel are invalid.

Exit external control mode when the value of reference voltage register 2001 is set to 0xFFFF.

5、 CRC-16

CRC-16 adopts MODBUS RTU standards CRC algorithm, calculation formula:

$x^{16}+x^{15}+x^2+1$.

"Appendix A: CRC-16 computational code C language version" is for reference.

6、 Device address

The default device address of power supply is 0x01, and the RMS value is 1-254, 0 is the broadcast address, which can be used to query the unknown address machine. Change the mode by setting register 2000.

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The address and function list of the register

Register address (decimal)	attribute	meaning	note
1000	read-only	The output voltage	
1001	read-only	The output current	
1002	read-only	Current time period	multiple output modes make sense only
1003	read-only	Residual circulation	multiple output modes make sense only
1004	read-only	Remaining hours	timed aging pattern makes sense only
1005	read-only	Remaining minutes	timed aging pattern makes sense only
1006	read-only	Remaining seconds	timed aging pattern makes sense only
1007	read-only	Equipment state	See state mode
2000	Writable	Equipment address	
2001	Writable	Reference voltage	Do not save
2002	Writable	Reference current	Do not save
2003	Writable	Overpressure value	
2004	Writable	Under voltage value	
2005	Writable	Over flow value	
2006	Writable	Under flow value	
2007	Writable	output frequency	Customized hardware needed
2008	Writable	Output duty ratio	Customized hardware needed
2009	Writable	Aging hours	Regular aging mode
2010	Writable	Aging minutes	Regular aging mode
2011	Writable	Aging seconds	Regular aging mode
2012	Writable	Total time period	Multiple output mode
2013	Writable	cycles	Multiple output mode
2014	Writable	Working model	See state mode
2015	Writable	Simulation of the internal resistance	Unit milliohm, Customized hardware needed
2016	Writable	Output control	0 :start output,the rest :stop output
2017	Writable	Discharge reference stack	Self-contained electronic load
2018	Writable	Output fine tuning step	Fine tuning during work
2019	Writable	Soft start time	
2020	Writable	Constant current protection delay	Start with the output start
2021	Writable	Reference voltage	Save, write 10,000 times
2022	Writable	Reference current	Save, write 10,000 times

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Note: 1. When the current or voltage reference is 0, the starting output will report failure.

The default reference voltage and reference current may be 0. Please write the required voltage and current parameters before starting the output!

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Status & mode register

1007	Working status	
No.	0 Implication	1 Implication
0	Output closure	Output start
1	Non-constant flow model	constant flow model
2	Non-constant voltage model	constant voltage model
3	Internal control mode	External control mode
4	Without overheating	overheating
5	Without over-flow	over-flow
6	Without overvoltage	overvoltage
7	Without short circuit	short circuit
8	Non booster stage	Booster stage
9	Non Step-down phase	Step-down phase
10	Without undervoltage	Under voltage
11	Without Under flow	Under flow
12-14	Reservation	Reservation
15	Without Fault	Fault

2014	Working status	
No.	0 Implication	1 Implication
0	Prohibition of overvoltage protection	Allowable overvoltage protection
1	Prohibition of undervoltage protection	Allowable undervoltage protection
2	Prohibition of over flow protection	Allowable over flow protection
3	Prohibition of undercurrent protection	Allowable undercurrent protection
4	Prohibition of multi segment mode	Allowable multi segment mode
5	Multistage constant pressure mode	Allowable multistage constant pressure mode
6	Prohibition of timed aging mode	Allowable timed aging mode
7	Prohibition of soft start	Allowable soft start
8	Prohibition of constant current shutdown	Allowable constant current shutdown
9	Digital tube lighting	External control mode extinguishes digital tube
10	High range	Low range (customized hardware needed)
11	Beeping (abnormal condition)	Silent buzzer
12、13	Start without output	output directly after starting 1
14	pulse output prohibited	Allowable pulse output

15	Using CRC	Using 0xefef instead of CRC
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Appendix A: CRC-16 computer code C language

```
#define u8      unsigned char
#define u16     unsigned int

u16 CRC16(u8 *buf, u8 len)
{
    u16 crc = 0xFFFF;
    u8 i = 0;
    u8 j = 0;
    u8 Data = 0;

    for (j = 0; j < len; j++)
    {
        crc=crc^*buf++;
        for (i=0; i<8; i++)
        {
            if((crc&0x0001) > 0)
            {
                crc=crc>>1;
                crc=crc^0xa001;
            }
            else
            {
                crc=crc>>1;
            }
        }
    }

    return crc;
}
```