







Goodrive100-01 Series Inverter Special for Solar Pump

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-  **Main application of GD100-01**
-  **Commissioning steps of GD100-01**
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Product Introduction

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Positioned in environmental-friendly and economical PV market, the product is applicable to PV pump system, replaces water storage with electric storage and needs no battery modules. The direct current generated by solar modules is input to the inverter and then converted into the alternating current to drive various pumps directly. Additionally, the output frequency is adjustable in real time according to sunlight intensity change.

Product features



1, Maximizing power generation efficiency of solar modules with the use of advanced MPPT control technology

2, Adjusting water outflow of pumps quickly on basis of sunlight intensity change

3, Automatic hibernation and wakeup

(1)Hibernate at high water level and wake up at low water level

(2)Hibernate at sunrise and sunset and wake up at strong sunlight

4, Underload protection and fault protection of water level sensor avoiding pumping off after water supply dries up

5, TI DSP technology and Infineon PIM design, with functions of over-current, over-voltage and over-temperature protection, built-in C3 filter, achieving reliable, automatic and unattended running

Introduction of MPPT

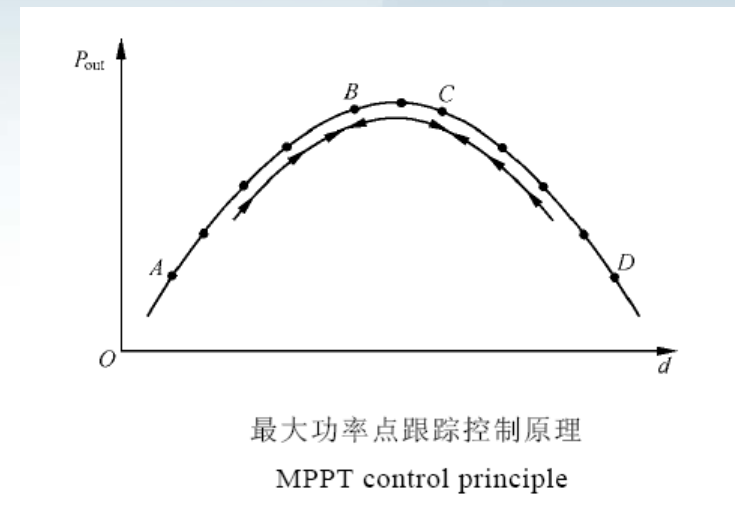
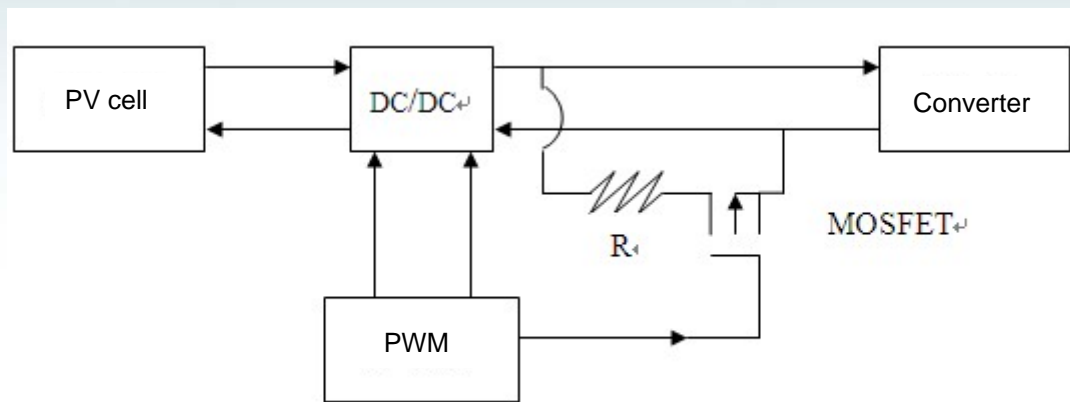
MPPT controller (Maximum Power Point Tracking) can adjust the output state to make the PV cell outputs more power to the load system. PV cell and MPPT controller can effectively solve the power supply problem for the area which can't be covered by the grid power.

The output power of the PV cell is related to the working voltage of the MPPT controller. Only working at the suitable voltage, can the output power be maximum.

e...g...: $U=24V, I=1A$; $U=30V, I=0.9A$; $U=36V, I=0.7A$;
 $P_{max}=2.7W$ ($U=30V, I=0.9A$)

Principle of MPPT

Function of MPPT: Detect the DC bus voltage and output current, and calculate the output power, and trace the max power point. The schematic diagrams which apply perturbation and observation method to realize MPPT are as follows:



Change the duty cycle 'd'

Output current and voltage change

Compare the output power of duty cycle changing before and after

Product specification

| | |
|--------------------------------|--|
| Max input DC voltage | 800VDC |
| Recommended MPPT voltage range | 350~750VDC |
| Recommended input voltage | 513VDC |
| MPPT efficiency | 99.9% |
| Input channel | 1 |
| Rated output voltage | 3AC 380V |
| Output frequency range | 0~60Hz |
| Max efficiency of the machine | 97% |
| Cooling method | Air cooling |
| Protection degree | IP20 |
| Altitude | Below 1000m; above 1000m, derated 1% for every additional 100m |
| Standard | CE |

Power rating

| Inverter model | Max DC input current (A) | Rated output current (A) | Applicable water pump (kW) |
|-----------------|--------------------------|--------------------------|----------------------------|
| GD100-01-0R7G-4 | 4.2 | 2.5 | 0.75 |
| GD100-01-1R5G-4 | 6.1 | 3.7 | 1.5 |
| GD100-01-2R2G-4 | 7.1 | 5 | 2.2 |
| GD100-01-004G-4 | 16.5 | 9.5 | 4 |
| GD100-01-5R5G-4 | 23.9 | 14 | 5.5 |
| GD100-01-7R5G-4 | 30.6 | 18.4 | 7.5 |
| GD100-01-011G-4 | 39.2 | 25 | 11 |
| GD100-01-015G-4 | 49.0 | 32 | 15 |

Note: When the output voltage is 380V, the output current will be the rated value; when the output voltage is at 400V, 415V or 440V, the output current will be calculated according to power.

Recommended solar array configuration



| Inverter model | Max DC input current (A) | Open-circuit voltage degree of solar module | | | | | | | | | |
|-----------------|--------------------------|---|-----------------------------|-------------------|-----------------------------|-------------------|-----------------------------|-------------------|-----------------------------|-------------------|-----------------------------|
| | | 20±3V | | 30±3V | | 36±3V | | 42±3V | | | |
| | (A) | Module Power ±5Wp | Modules per string *strings | Module Power ±5Wp | Modules per string *strings | Module Power ±5Wp | Modules per string *strings | Module Power ±5Wp | Modules per string *strings | Module Power ±5Wp | Modules per string *strings |
| GD100-01-0R7G-4 | 4.2 | 30 | 29*1 | - | - | - | - | - | - | - | - |
| GD100-01-1R5G-4 | 6.1 | 60 | 30*1 | - | - | - | - | - | - | - | - |
| GD100-01-2R2G-4 | 7.1 | 90 | 30*1 | - | - | 145 | 18*1 | 175 | 15*1 | - | - |
| GD100-01-004G-4 | 16.5 | 85 | 28*2 | 220 | 22*1 | 140 | 17*2 | 160 | 15*2 | - | - |
| GD100-01-5R5G-4 | 23.9 | - | - | - | - | 195 | 17*2 | 220 | 15*2 | - | - |
| GD100-01-7R5G-4 | 30.6 | - | - | 215 | 21*2 | 175 | 17*3 | 200 | 15*3 | 300 | 15*2 |
| GD100-01-011G-4 | 39.2 | - | - | 200 | 22*3 | 195 | 17*4 | 220 | 15*4 | - | - |
| GD100-01-015G-4 | 49 | - | - | 205 | 22*4 | 200 | 18*5 | 240 | 15*5 | 300 | 15*4 |

*Recommended DC input power is about 1.2 times of inverter rated power

*STC:Irradiance 1000 W/m², module temperature 25 ° C, AM=1.5

How to select the solar modules?

Voltage: recommended value 513VDC



Current: can't be more than max DC input current

Power: 1.2 times of inverter rated power

$PCS/String = 513V / \text{module voltage}$

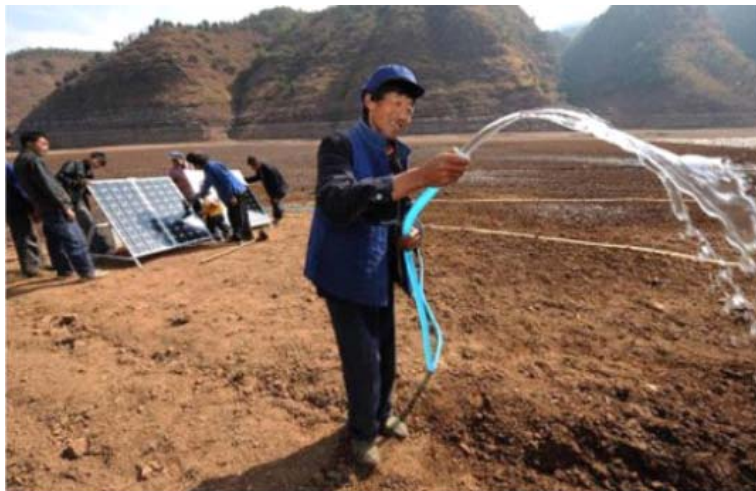
$Total\ pcs = 1.2 * \text{inverter rated power} / \text{module power}$

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Main application

Mainly used in the field of agriculture, forestry, irrigation, desert control , grassland animal husbandry, urban water and so on.



Case study



Case information: living water supply system in a factory.

Solar panel power rating 2kW;

Submersible pump parameters: 1.5kW, 380V, 50Hz, 2800rpm, 4A.

Inverter: GD100-01-1R5G-4

Case study



Control panel





Case study

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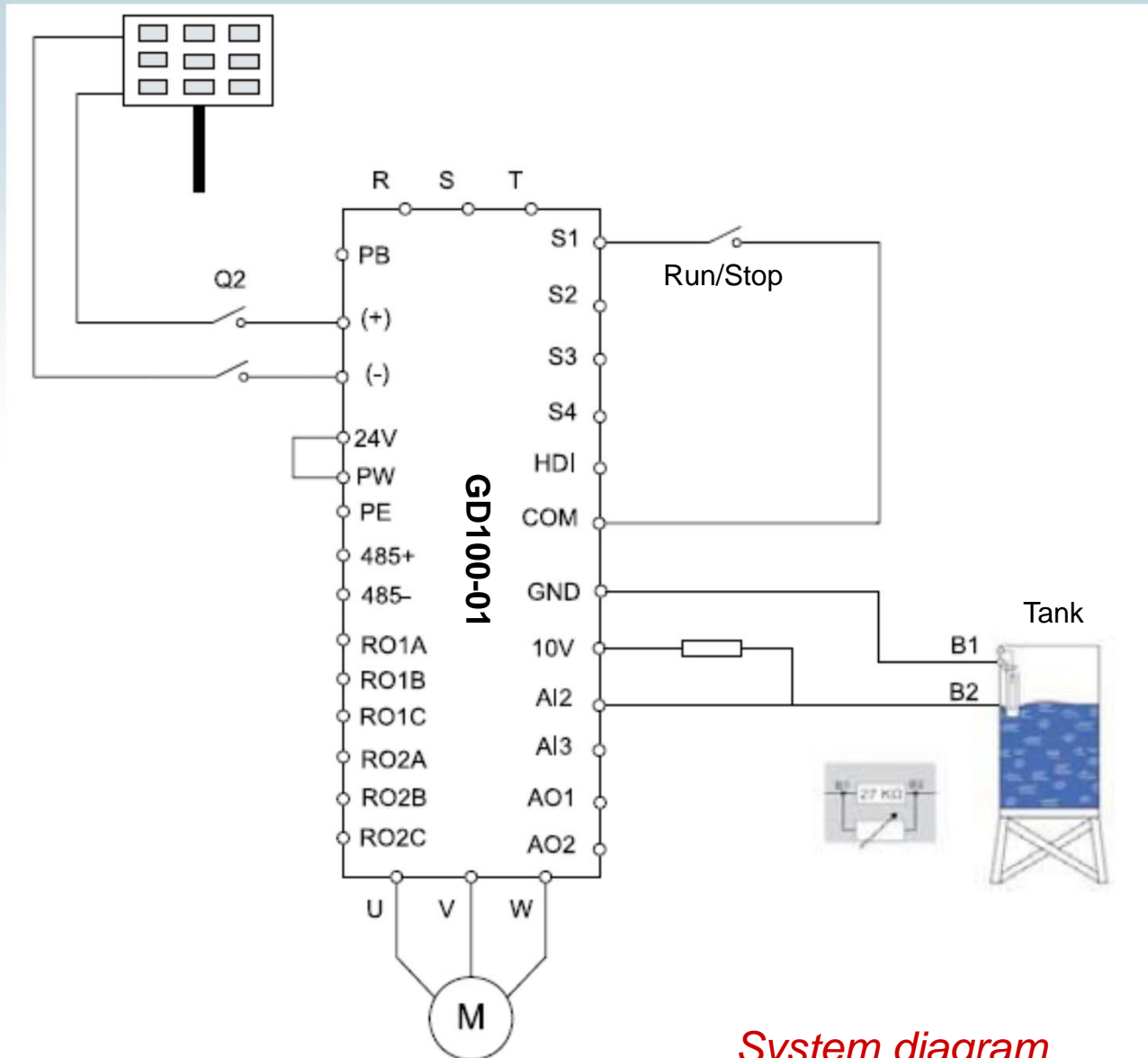


IP56 design: enhanced sealing rubber strip & inlet and outlet

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Solar array DC power supply



System diagram

Solar array DC power supply

1, Pump test

Set P00.06=6Hz, P01.08=1, P15.01=1.

Run the pump, monitor the water output. If strong sunshine and lower water output, that means the pump direction is wrong, the cable should be exchanged(**P00.13=0 can't be changed**).

2, PI adjusting

If the customer needs fast response, PI parameters should be adjusted(P15.06~P15.10). Big value, fast response, more fluctuation, or slow response, steady.

3, Commissioning of MPPT

P15.23 and P15.24 are the max and min voltage of MPPT. The experience values are as follows:

415V motor: 520~600V

380V motor: 500~550V

220V motor: 270~330V

Solar array DC power supply

4, Fault setting and delay time setting

Water level control: P15.11~P15.14;

Low-load protection: P15.16~P15.19;

Low sunshine protection: P15.20~P15.21

5, Parameter setting after commissioning

Terminal running: P00.01=1

Terminal running enable when power on: P01.18=1

Starting when power on: P01.21=1

Fault reset time: P08.28=5

AC grid power supply



- 1, Power on sequence: Q2 Off, then Q1 On;
- 2, Set P05.02=43, S2 On(or set 15.01=0);
- 3, If set P15.01=0, P15.02 should be adjusted according to the actual situation. It should be less than DC bus voltage.

Note:

If there is no diode protection at the bus input, Q1 and Q2 can't be switched on at the same time, or damage will occur to the solar module.

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Principle of solar pump control

Actually, the principle of solar pump control is PID control. DC bus voltage is the PID feedback source, and the PID setting source can be keypad setting(P15.02) or MPPT setting. The result of MPPT is a value of DC voltage, it can be monitored by P15.22.

P15.03~P15.10 are the relative parameters of PID。

Water level control



| Code | Name | Range | Description |
|--------|-------------------------------|--|---|
| P15.11 | Water level control selection | 0: invalid 1: AI1 2: AI2 3: AI3 | Input selection of water level control sensor |
| P15.12 | Water level threshold | 0.0~100.0% | If Input signal <P15.12, and after delay time P15.13, inverter outputs A-tF, and dormant. |
| P15.13 | Full level delay time | 0~10000s | Default 60s |
| P15.14 | Low level delay time | 0~10000s | When A-tF, input signal >P15.12 and after delay time P15.14, inverter will resume work. |
| P15.15 | Hydraulic probe damage points | 0.0~100.0% | Input signal >P15.15, inverter will output tSF and stop. |

Under load and low sunshine setting



| Code | Name | Range | Description |
|--------|--------------------------------------|--|---|
| P15.16 | Pump under-load running time | 0.0~1000.0s | Low load running and after delay time P15.16, inverter will output A-LL. |
| P15.17 | Under-load running current detecting | 0.0%: automatic detecting 0.1~100.0% | When running current is less than P15.17, and lasts P15.16 time, inverter will output A-LL. |
| P15.18 | Under-load reset delay time | 0.0~1000.0s | When A-LL, after delay time P15.18-P15.16, inverter will resume work. |
| P15.19 | Lag frequency threshold | 0.00~200.00Hz | Abs (running frequency-setting frequency) <P15.19, P15.17 works. |
| P15.20 | Low sunshine delay time | 0.0~3600.0s | When output frequency is less than P15.05 and lasts P15.20 or DC bus voltage less than P29.08+50V, inverter will output A-LS. |
| P15.21 | Low sunshine reset delay time | 0.0~3600.0s | When A-LS, after delay time P15.21, inverter will resume work. |

Providing cost-effective products and services for competence.

Thanks !

