Goodrive100-01 Series Inverter Special for Solar Pump

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Product Introduction

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 gird 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;
Pmax=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:

最大功率点跟踪控制原理

MPPT control principle
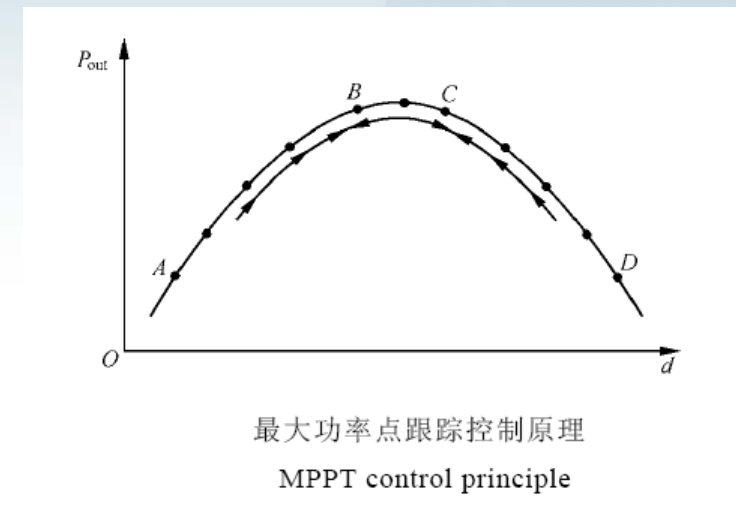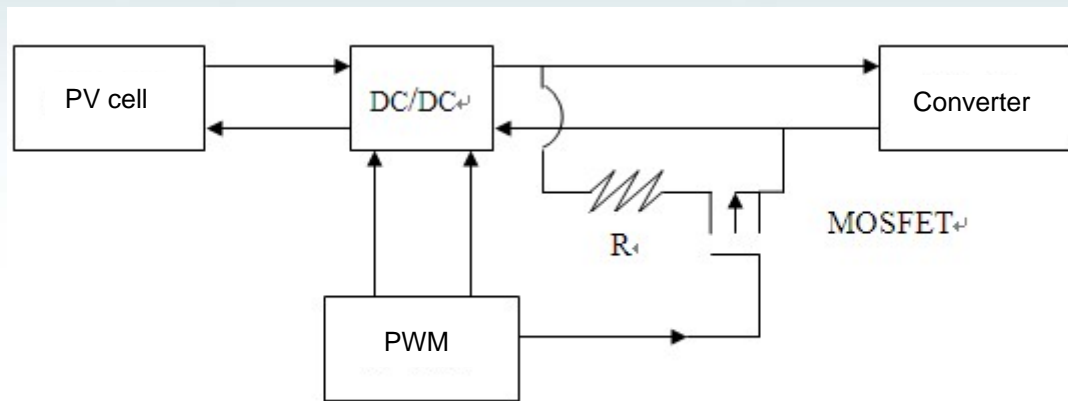
Change the duty cycle 'd'

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/㎡,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

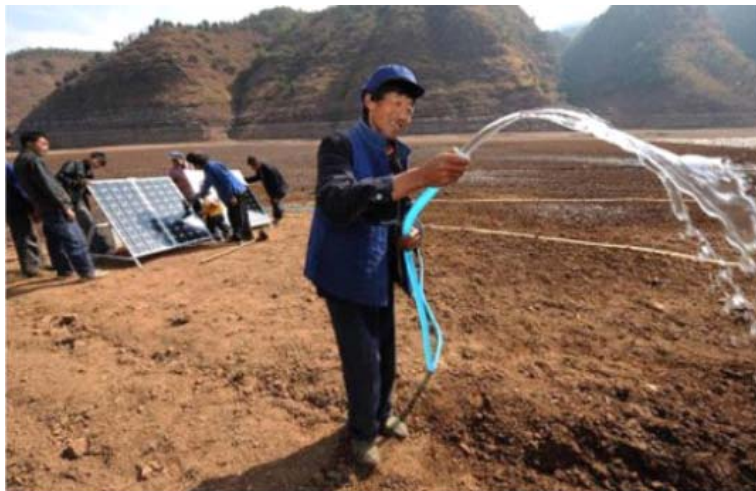Power： 1.2 times of inverter rated power

PCS/String=513V/module voltage

Total pcs= 1.2*inverter rated power/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

Water tank

Well

Solar Panel

VFD panel

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

Control panel

Case study

IP56 design: enhanced sealing rubber strip & inlet and outlet

Content

Solar array DC power supply
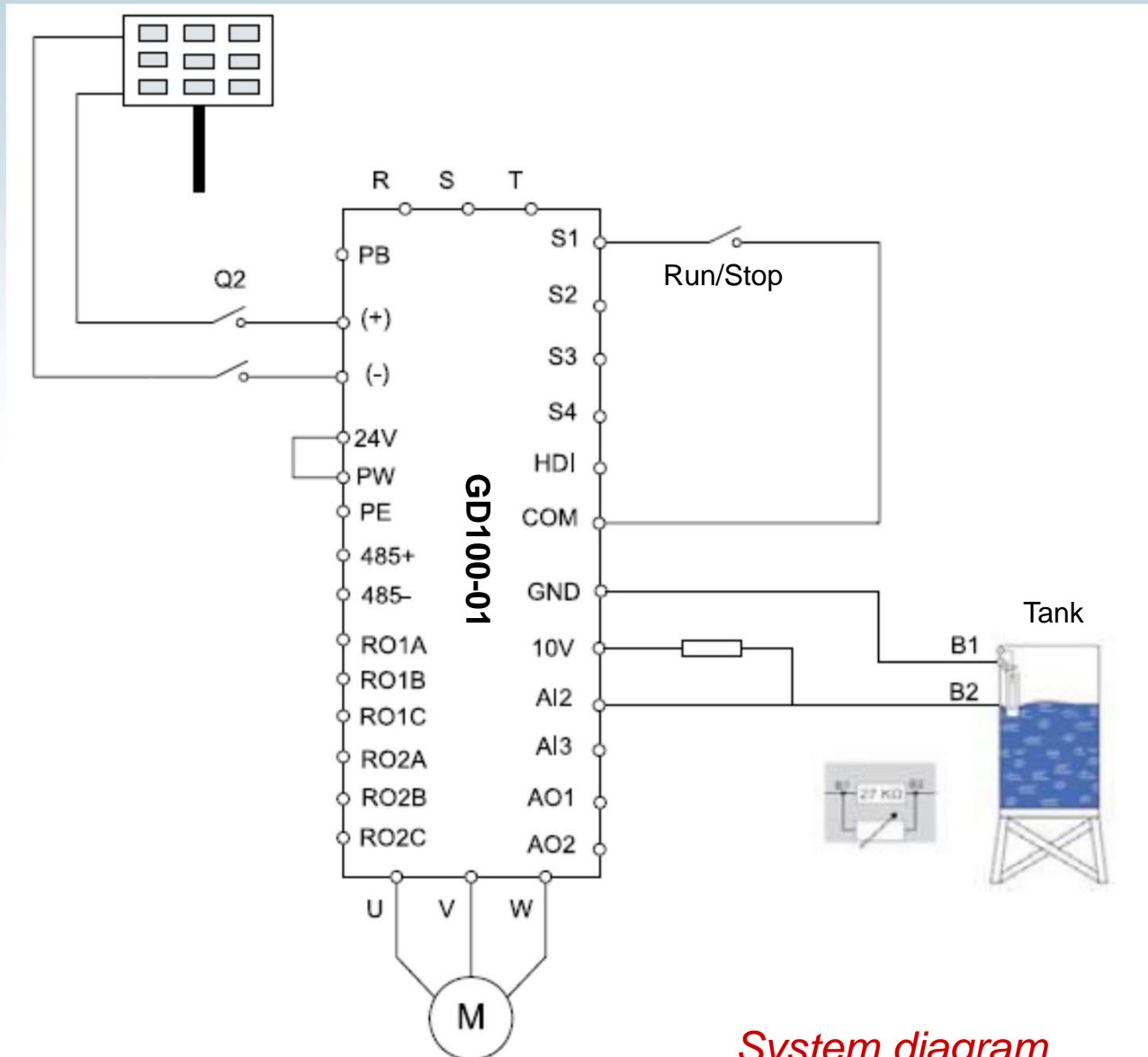
System diagram

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
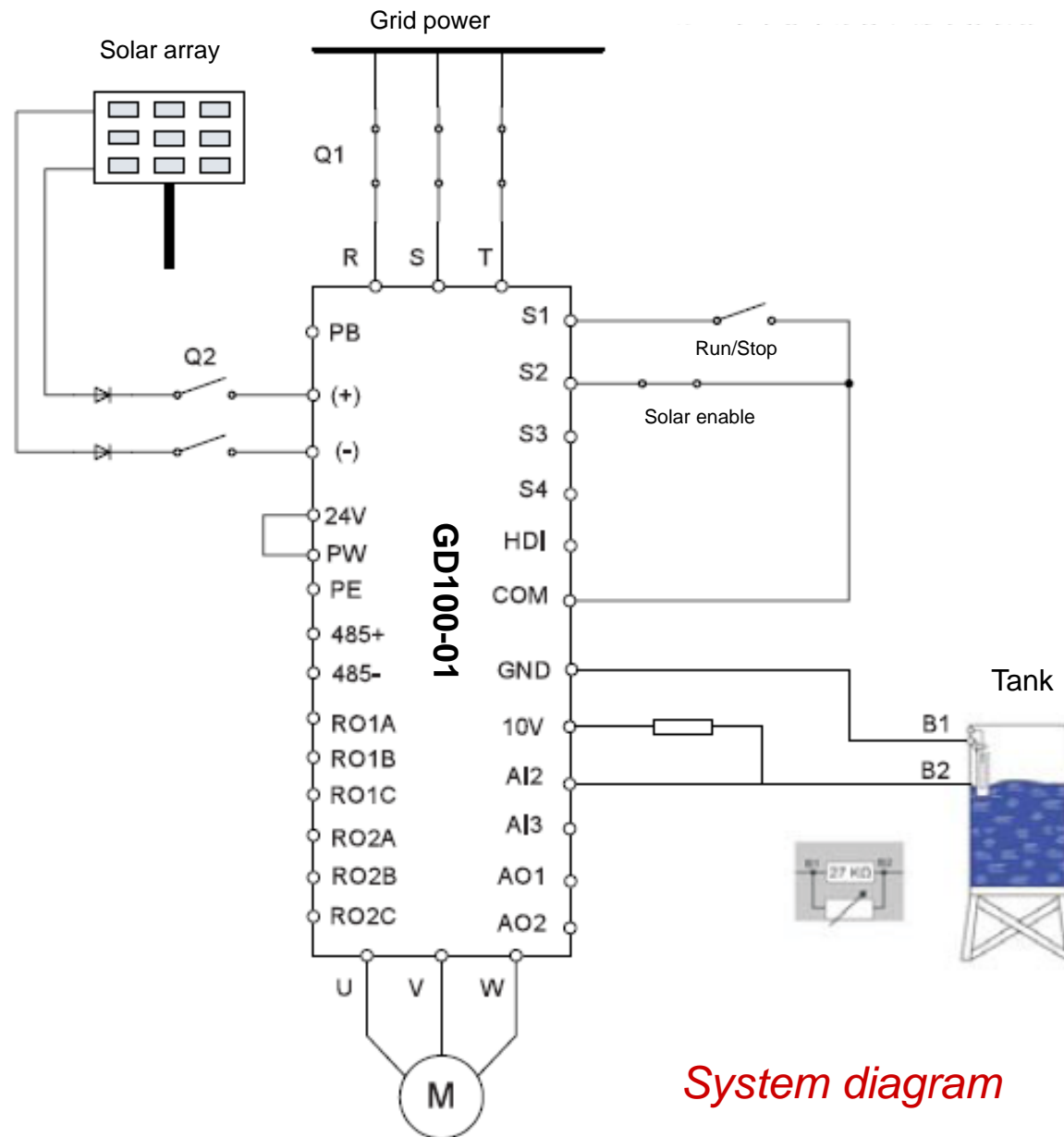

5, Parameter setting after commissioning

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

System diagram

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 then 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.