



# SOLAR DIRECT PUMPING SYSTEM CABINET

## User's Manual





# SOLAR DIRECT PUMPING SYSTEM CABINET AC-15/22/40/55/75



## I. FUNCTIONING

ISO FOTON pumping systems use standard three phases pumps to get the required water flow. However, the energy used comes from a PV generator and it supplies a variable DC power that depends on the ambient conditions (irradiance, temperature, etc). Due to that, it is necessary to use an electronic device to transform de available DC power into the AC power required for the pump.

This device is a speed regulator that, through the software programmed by ISO FOTON, modifies output voltage and frequency that supplies the pump depending on the input power available forcing to work the PV array in its maximum power point.

In this way, the system starts automatically early in the morning, stopping also automatically, during sunset, extracting all time a flow rate as a function of the speed of the motor-pump that depends directly on the irradiance.

As the system only can work during a certain number of hours per day, if water consumption is supposed during non-irradiance hours, it will be necessary a water tank to store and later use.

Another important function of the ISO FOTON AC control cabinets is the electronic detection of the borehole water level. It stops automatically the system when the dynamic level is below the pump, avoiding its dry running, restarting again when the water level is reestablished.

## II. CONNECTING THE CONTROL CABINET

Next steps are suggested to connect the control cabinet:

1. Check the input DC breaker is opened.
2. Connect the pump to its corresponding terminals with the right phases sequence.
3. Connect (optional) a N.C. contact from a remote on/off switch, tank gauge, pressure sensor, etc in the terminals marked as "presostato". If this option is selected there must be disconnected the wire connected by default into them
4. Connect the PV generator into the DC switch.



### III. STARTING THE SYSTEM

After connecting the cabinet as described before, the DC switch must be closed.

The speed regulator's screen will light and, if the irradiance is high enough then the frequency will be increased to the optimal working frequency under these ambient conditions.

### IV. STOPPING THE SYSTEM

To stop the system it is only needed to open the input breaker.

### V. ALARMS AND ERROR MESSAGES

ISO FOTON direct pumping systems are whole systems. It means that they have been designed and sized to cover the concrete requirements of every system and its software is adapted to this.

So, the suggested PV configuration must be maintained (number of strings and modules per string) in order to ensure the right functioning of the system.

If these points are respected, any alarm must be produced during the normal working of the system. However, on the speed regulator screen can be shown the next messages:

ERROR	DESCRIPCION
Ou	<b>High PV generator voltage</b>
Uu	<b>Low PV generator voltage</b>
Oc	<b>Output overcurrent</b>
OH	<b>Overtemperature</b>
OI 1	<b>Motor overload</b>
OI 2	<b>Converter overload</b>
PF	<b>Voltage failure in the principal circuit</b>
LF	<b>Pump phase open</b>
SC	<b>Pump shortcircuit</b>
FAN	<b>Fan failure</b>
OH3	<b>Converter overheating</b>
GF	<b>Earth failure</b>
EF	<b>External failure</b>

If some of these messages appear, ask your vendor/installer.

**NOTE:** If the flow rate is lower than the expected, then check the phase sequence of the pump and change the wiring position of two phases.



## VI. WATER LEVEL ELECTRONIC DETECTION

Most of the pumping systems need a water sensor to avoid the dry running of the pump that can damage it due to its overheating.

There are in the market systems that use low reliability floating switches that are not recommended due to its difficulty to place/replace.

Trying to give an answer to this need, ISOFOTON has included a wireless software water level detector. When the speed regulator detects by itself the water level below the pump, the system stops automatically for a programmed time (1 hour by default) waiting the water recovery of the well, restarting again.

## VII. MODIFYING THE RECOVERY TIME OF THE BOREHOLE

The control cabinet is programmed by default to start 1 hour after the low water level disconnection.

If this time is not adequate for a concrete well, it can be modified on the timer by the user/installer as described:

1. Push the OK key.
2. On the screen appear:  
MONITOR  
STOP  
°PARAMETER  
SET CLOCK
3. Push the ARROW DOWN key and select PARAMETER menu.
4. Push OK.
5. Push the ARROW DOWN key until RES<sub>o</sub> flashes.
  - a. Change the digits values with the UP/DOWN ARROWS, selecting a new digit with the LEFT/RIGHT ARROWS (the time format is hh:mm).
6. Push OK to validate.
7. Push ESC to quit the programming menu.
8. Push again ESC.



## VII. PLC DISPLAY WARNINGS

### 1. *System OK*

I ●●○○

Q ■■■□

### 2. *Borehole empty.*

The system stops 30 minutes (configurable). T0 on the PLC.

I ●●○○

Q □■■□

### 3. *Water tank full*

The system stops 10 minutes (configurable). . T1 on the PLC.

I ●●○○

Q ■□■□

### 4. *Low Irradiance*

#### 5.

The system stops 10 minutes (configurable). . T3 on the PLC.

I ●●○○

Q ■■□□