SAKO

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SAKO

SKI 650

Solar Pumping System

Hangzhou Sako Frequency Technology Co.,Ltd.


There is sunlight, There is energy,

SAKO

Digitization **Forerunner**

Sun energy is endless

COMPANY PROFILE

Hangzhou Sako Frequency Technology Co., Ltd. is specialized in R & D, production and sales for frequency inverter, which is mostly used in industrial control field. Sako company also provides maintenance services, consulting and training for frequency inverter. Sako company is one of the most advanced, most powerful frequency inverter manufacturers, which is located in Hangzhou of Zhejiang Province.

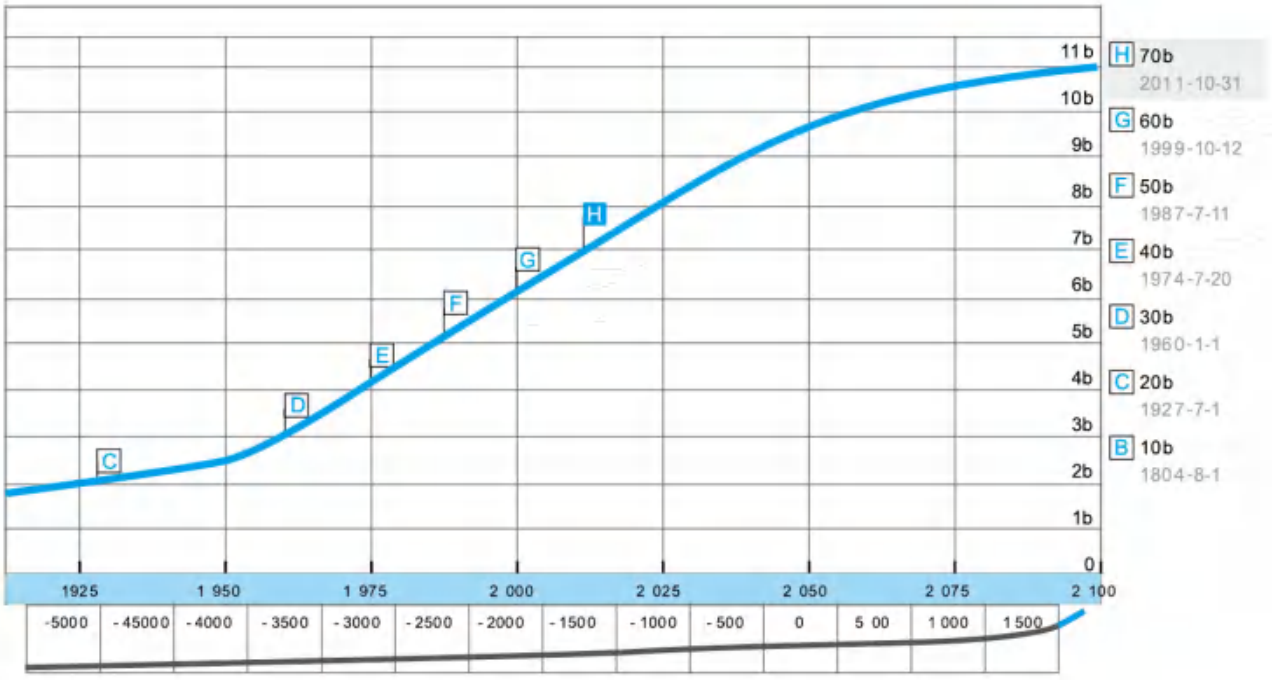
Sako company's leading product Sako SK Series frequency inverter has its own intellectual property rights. Under the premise of meeting international standards, the products also aim at the application needs of various industries, thus further enhancing the reliability and stability of the products. The products have been widely used in metallurgy, iron and steel, oil production, mining, building materials, pharmacy, chemical industry, paper making, plastics, machine tools, textile chemical fiber, municipal water supply, heating ventilating and other industries & equipment. The inverters mainly provide function of speed regulation, soft start and soft stop, improving power factors, intelligent control for types of load. At the same time, it can protect the motor and equipment effectively. It not only can greatly improve the product performance, improve the process, improve the efficiency, but also reduce the cost for the user and enhance the core value of the product.

Sako Company has strong technical strength, introduces advanced technology at home and abroad. Sako company establishes extensive cooperative relations with famous domestic universities, such as Zhejiang University and Wenzhou University, as well as scientific research institutions. Sako company continuously introduces professional series of inverters in order to meet the customer needs in different industries. Sako company has advanced production and testing equipment such as SMT, crest welder, assembly line, test line, packaging line, high temperature aging room, load test system, etc. Sako company has established a set of complete production process, such as feed, manufacturing process, final inspection, engineering test, etc. and has passed the ISO9001 quality management system and realized the "6S" field management.

SAKO

Solar Pumping System

Human population has topped out at 7.2 billion by January 1,2014 and is expected to exceed nine billion by 2050,causing a 50 percent increase in the global demand for energy and a 30 percent increasing in the demand for fresh drinking water-resource that is already in short supply for about a third of the world's people.



In areas where connection to an electric utility is not available or reliable, the primary technologies for water access - hauling water, surface sources, or pumping have remained fairly constant for decades. As demands for higher quantities and quality of water, lower costs, improved reliability, and environmental concerns have increased, solar pumping systems will continue to be an important choice for more and more users as its simple installation, low maintenance, no fuel costs and environmental friendliness.

System type	Benefits	Disadvantages
Solar-powered pumping	Low maintenance; no fuel costs; easy installation; reliability; unattended operation; portable.	Higher initial costs; variable water delivery depending on sun intensity; higher return on investment depending on the insolation of the installation.
Diesel-powered pumping	Moderate initial costs; movable or portable; easy installation; requires certain system experience.	Requires regular maintenance and replacement of diesel; inadequate maintenance will reduce life expectancy; the higher cost of fuel and the long-term fuel cost trend is upward; environmental pollution of noise, smoke, and waste oil; requires an understanding of the installation environment.
Wind-powered pumping	Long life span; lower initial costs ; no fuel costs.	High maintenance and replacement cost; difficult to purchase the replace components locally; greatly influenced by season; requires special tools to install; high labor costs; only works when wind conditions are adequate.
Ram pumping	Lower initial costs; low maintenance costs; no fuel costs; easy installation; reliable; simple	Rushing water is required.
Hauling water	Lowest initial costs; excellent mobility.	Highest labor cost.

Sandia National Laboratories

A research written by America Sandia National Laboratories in 1993 shows that the initial investment may be as high as more than 5 times than other systems in remote and harsh conditions, such as those using diesel as drives, but during its lifetime, the solar system is more cost-effective.

A research of Battle Mountain Bureau of Land Management in Nevada shows that the cost of solar pumping systems for 200 inch dynamic head and 30gpm water output within 20 years is only 64 percent compared with those diesel systems within 10 years, while the human costs are only 14 percent compared with those diesel systems.

SKI650

Solar Pumping System

The SKI650 solar pumping system serves to provide water in remote applications where electrical grid power is either unreliable or unavailable. The system pumps water using a high-voltage DC power source such as a photovoltaic array of solar panels. Since the sun is only available during certain hours of a day and only in good weather conditions, the water is generally pumped into a storage pool or tank for furher usage. And water sources are those natural or special such as river, lake, well or waterway, etc.

Zero-carbon Emission

High ROI

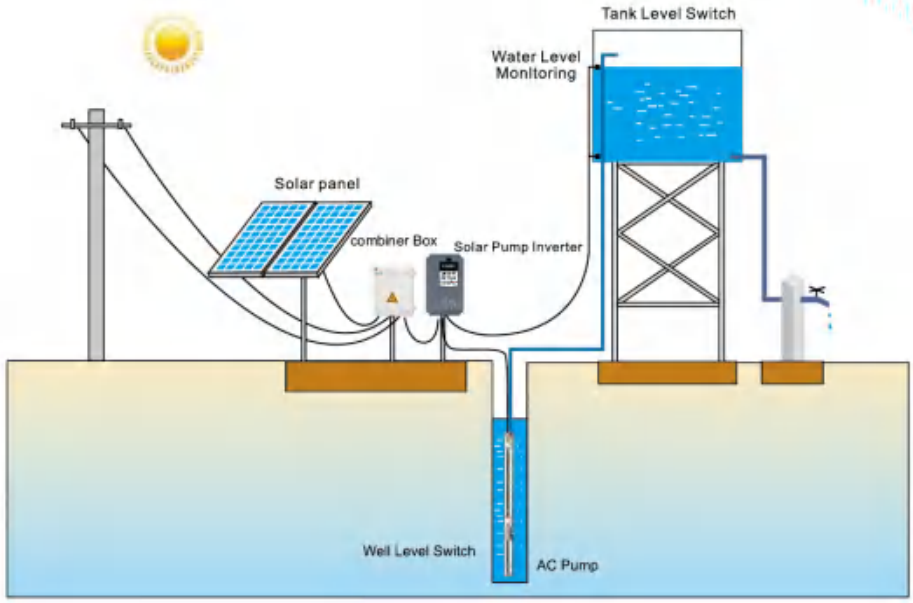
High Reliability

Features

- No fuel cost and very high ROI against diesel powered pomping systems
- Zero-carbon emission
- Long life expectancy and proven in international service record
- Designed for application in remote and harsh conditions
- Portable and scalable system solutions
- Fast and simple installation
- Smart modular design for simple and cost effective servicing and maintenance
- A wide range of pumps to closely and locally match each application and optimize effciency
- Compatible with popular solar modules
- Compatible with any standard IEC three-phase asynchronous motor pumps

Solar Pumping System

Solar pumping system,is constituted by solar module array,combiner box,liquid level switch,solar pump etc.It aims at providing solutions for the region that suffers water shortage,no power supply or uncertain power supply.



This system does not have storage batteries, completely powered by solar energy, thus realizing a cost-effective purpose.

An appropriate water tank can be prepared to store water for later use.

High-efficient AC submersible/surface pump is adopted for the system, satisfying different requirements.

The system is characterized by Maximum Power Point Tracker technology, regulating the working of the pump automatically to realize the maximum generated energy for the system.

Automatic control is adopted for the system such as: automatic start-up and shut-off respectively in the morning and evening, automatic shut-off for full tank and water shortage in the well. Protection measures are taken for the rotation jam of the pump, 3-phase equilibrium etc. thus prolonging the service lifetime of both the pump and controller.

PV array

Photovoltaic array is composed of a number of solar modules in parallel. It absorbs sunlight radiation energy and converts into electrical power.

DC Power

Solar pump controller

Adjust and control solar pumping system;maximize power output and adjust output frequency in real-time according to insolation.

AC Power

AC pump with motor

Pump from water source into the pool or irrigation system.

SKI650 Power:0.75kW~45kW

SKI 650 - 5D5G - 4

- Output voltage(V) 1: 3ph 220V 4: 3ph 380V
- Adaptable power(KW)
  5D5: 5.5KW G: Constant torque
- Product series
- SKI: Business code

Solar Pumping Inverter

In order to satisfy the demands of various pumping applications the SKI650 solar pump controller adopts Max Power Point Tracking and proven motor drive technology to maximize output from solar modules. It supports both DC and AC power inputs. When solar power is not available, the controller can be switched to an alternate single-phase or three-phase AC input such as a generator or inverter from battery, if available. The controller provides fault detection, motor soft start,and speed control.The SKI650 controller is designed to proceed these features with the plug and play ease of installation.

Flexibility

Compatible with IEC standard three-phase asynchronous induction motors

Compatible with popular PV arrays

Grid supply option

Remote Monitoring

Standard RS485 interface equipped for each solar pump controller

Optional GPRS/Wi-Fi/Ethernet RJ45 modules for remote access

Spots value of solar pump parameters monitoring available from anywhere

History of solar pump parameters and events lookup support

Android/iOS monitoring APP support

Cost effectiveness

Plug-and-play system design

Embedded motor protection and pump functions

Battery-free for most applications

Effortless maintenance

Reliability

10-year market proven experience of leading motor and pump drive technology

Soft start feature to prevent water hammer and increase system life

Built-in overvoltage, overload, overheat and dry-run protection

Smartness

Self-adaptive maximum power point tracking technology up to 99% efficiency

Automatic regulation of pump flow

Self-adaptation to the motor used in the installation

Protection

Surge protection

Overvoltage protection

Undervoltage protection

Locked pump protection

Open circuit protection

Short circuit protection

Overheat protection

Dry run protection

General Data

Ambient Temperature Range: -20℃ ~60℃ ,
>45℃ , Derating as required

Cooling Method: Fan Cooling

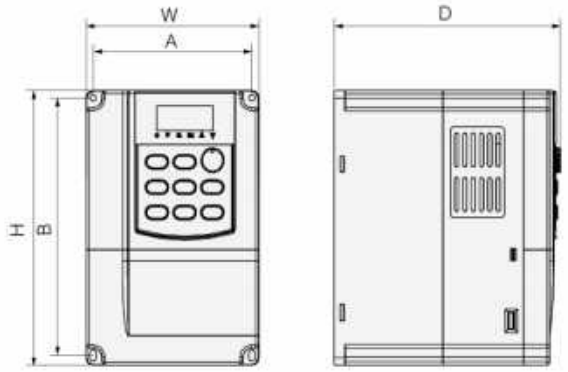
Ambient Humidity: ≤ 95%RH

The Main Technical Parameters

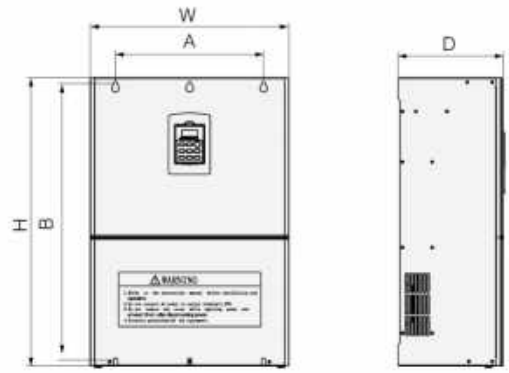
Controller Model	SKI650-0D7G-1	SKI650-1D5G-1	SKI650-2D2G-1	SKI650-2D2G-4	SKI650-4D0G-4	SKI650-5D5G-4
Input Data						
PV Source						
Max Input Voltage(Voc)[V]	450					
Min Input Voltage, at mpp[V]	180					
Recommended voltage ,at mpp	280VDC~360VDC					
Recommed Amps Input,at mpp[A]	4.7	7.3	10.4	6.2	11.3	16.2
Recommend Max Power at mpp[kW]	1.5	3	4.4	11	15	22
Alternate AC Generator						
Input voltage	220/230/240V AV(±15%) , Single Phase					
MaxAmps(RMS)[A]	8.2	14.0	23	5.8	10.0	15
Power and VA capability [kVA]	2.0	3.1	5.1	5.0	6.6	9.0
Output Data						
Rated Output Power[kW]	0.75	1.5	2.2	2.2	4	5.5
Rated Output Voltage	220/230/240V AC, Three Phase					
Max Amps(RMS)[A]	4.5	7.0	10	5.0	9.0	13
Output Frequency						
Pump System Configuration Parameters						
Recommended Sola Panel Power (KW)	1.0-1.2	2.0-2.4	3.0-3.5	3.0-3.5	5.2-6.4	7.2-8.8
Solar Panel Connection (for reference)	250W×5P×30V	250W×10P×30V	250W×14P×30V	250W×20P×30V	250W×22P×30V	250W×40P×30V 20 series 2 parallel
Applicable Pump (KW)	0.37-0.55	0.75-1.1	1.5	1.5	2.2-3	3.7-4
Pump Motor Voltage (V)	3 phase 220	3 phase 220	3 phase 220	3 phase 380	3 phase 380	3 phase 380

SKI650-7D5G-4	SKI650-011G-4	SKI650-015G-4	SKI650-018G-4	SKI650-022G-4	SKI650-030G-4	SKI650-037G-4	SKI650-045G-4
		750					
		350					
		500VDC~600VDC					
21.2	31.2	39.6	46.8	56.0	74.0	94.0	113
30	22	30	37	44	60	74	90
		380V AV(±15%) , Three Phase					
20	26.0	35.0	46.0	62.0	76.0	76.0	90.0
13.0	17.0	23.0	25	30.0	41.0	50.0	59.2
7.5	11	15	18.5	22	30	37	45
		380V AC, Three Phase					
17	25.0	32.0	37	45	60	75	90
0-50Hz/60Hz							
9.8-12	14.3-17.6	19.5-24	24-29.6	28.6-35.2	39-48	48.1-59.2	58.5-72
250W×48P×30V 24 series 2parallel	250W×60P×30V 20 series 3parallel	250W×84P×30V 21 series 4parallel	250W×100P×30V 20 series 5 parallel	250W×120P×30V 20series 6parallel	250W×200P×30V 20 series 10parallel	250W×240P×30V 22series 12parallel	250W×320P×30V 20series 16parallel
4.5-5.5	7.5-9.2	11-13	15	18.5	22-26	30	37-40
3 phase 380	3 phase 380	3 phase 380	3 phase 380	3 phase 380	3 phase 380	3 phase 380	3 phase 380

External Dimension



FigureA–1:Dimensoins(15KW and below)



FigureA–2:Dimensoins(18.5KW – 45KW)

	A(mm)	B(mm)	H(mm)	W(mm)	D(mm)	Mounting Aperture
SKI650-0D7G-1	115	175	185	125	160	4
SKI650-1D5G-1						
SKI650-2D2G-1						
SKI650-0D7G-4	115	175	185	125	160	4
SKI650-1D5G-4						
SKI650-2D2G-4						
SKI650-4D0G-4	136	230	246	150	176	5
SKI650-5D5G-4						
SKI650-7D5G-4						
SKI650-011G-4	201	306	320	218	215	5
SKI650-015G-4						
SKI650-018G-4	175	313	335	220	218	6.5
SKI650-022G-4	175	360	375	205	209	9
SKI650-030G-4	175	460	477	290	229	8
SKI650-037G-4						
SKI650-045G-4						

Scenic Spot of Daocheng Yading,Shangri-la:

System installed in Scenic Spot of Daocheng Yading,Shangri-la to cloth barren mountains with greenery scene.3pcs 37kW solar pumps,3pcs SKI650-37G-4 Solar Pump Controllers.

System capacity:160kW

Panels:245W

Altitude:3400M

Pumping height:250M

Flow:69m^3/h