

SOLAR SUBMERSIBLE PUMPSET

**POSITIVE DISPLACEMENT PUMP SERIES
(NORTH AMERICA)**



SHAKTI

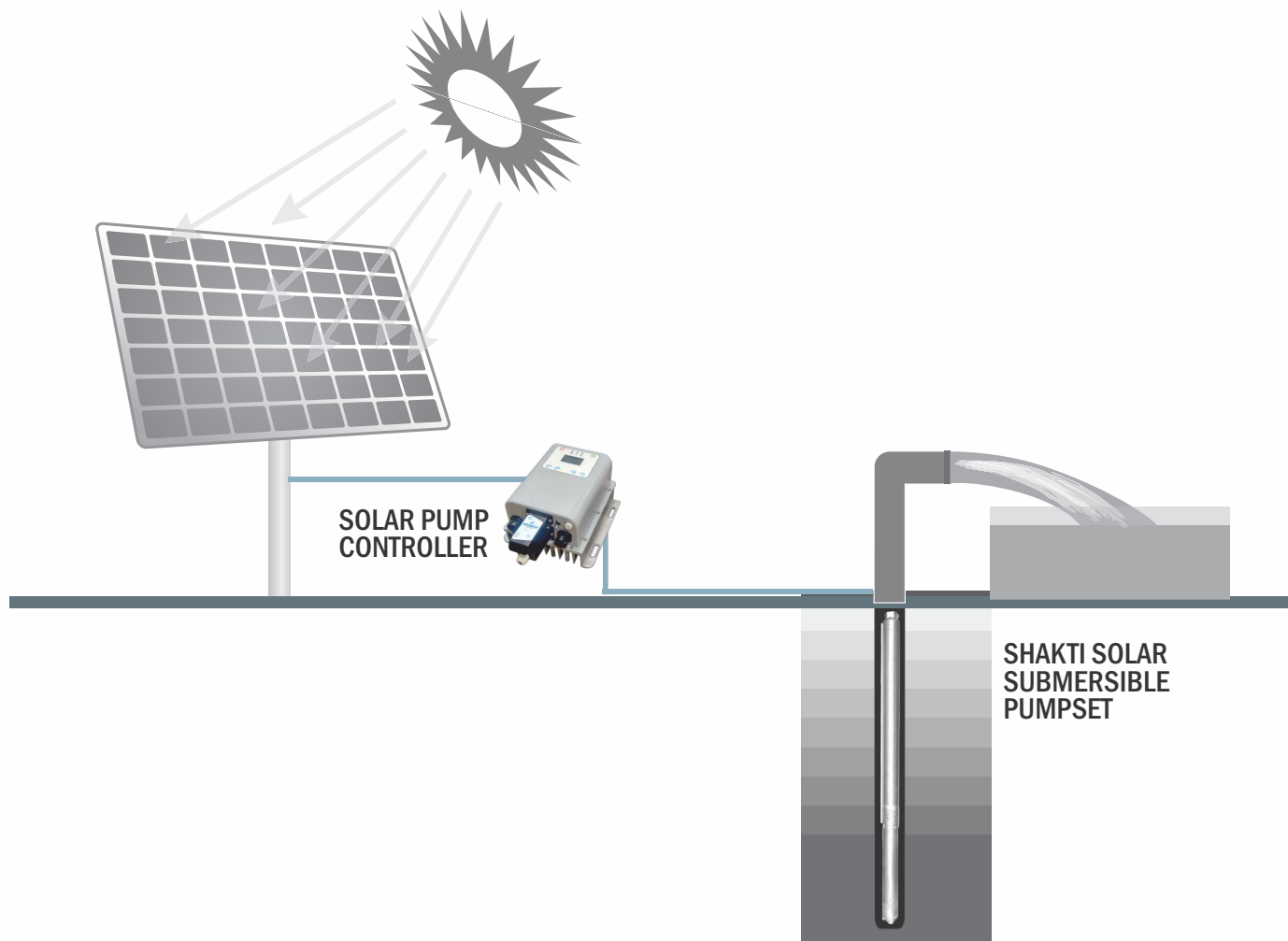
THE POWER OF INNOVATION, EFFICIENCY & TECHNOLOGY.

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INTRODUCTION

NOWADAYS Solar pumping system is becoming more and more popular, it is being applied to daily use (underground water), agriculture irrigation, forestry irrigation, desert control, pasture animal husbandry, water supply for islands, wastewater treatment engineering, and so on. In recent years, with the promotion of the utilization of non conventional energy resources, solar pumping systems are being used more and more in municipal engineering, city centre squares, parks, tourist sites, resorts and hotels, the landscapes and fountain systems in the residential areas. This system is composed of a solar array, a pump and a pump controller. Based on the design philosophy that it is better to store water than electricity, there is no energy storing device such as battery in the system.



Structure of solar pumping system

The solar array, an aggregation of many solar modules connected in series and/ or parallel. This array absorbs radiation from sunlight and converts it into electrical energy thus helps in providing dynamical water as a whole system. The pump controller controls and adjusts the system operation, according to the variation of intensity of sunlight to realize the maximum power point tracking (MPPT). The pump is able to draw water from the deep wells or rivers and lakes to pour into the storage tank or reservoir, or directly connect to the irrigation system, fountain system, etc. According to the actual system demand and installation conditions, different types of pump such as centrifugal pump, axial flow pump, mixed-flow pump or deep-well pump may be used.

Applications

- Ground water lowering
- Irrigation systems
- Industrial Application
- Drip irrigation & sprinkler
- Tank / Cistern filling
- Wildlife refuge
- Rural water supply for ranches, cabins, and cottages
- Fountains

Features

- High flow system for faster tank filling and significant water output.
- Proven motor and pump technology for long-term reliability
- Clean and pollution free energy, Eco-friendly.
- Ideal for remote areas, where electricity is not available or availability is capital intensive.
- Suitable for day time irrigation, Continuous supply for 6-8 hours in a day.
- MPPT – Max Power Point Tracking for maximizing efficiency of input power
- Soft start feature prevents water hammer and increases system life Easy to operate.
- Simple installation and maintenance free.

All-in-One Package

The Solar drive is used as a solution for specific pumping requirements of the solar pumping system. Using Shakti components, our technical expertise in groundwater pumping, and innovative thinking based on global market inputs, we have developed a rugged, high-output system which tackles the challenges of remote and harsh environments. No other system delivers the features, benefits, and reliability of solar drive in just one package!

The Solar water pumping system includes

- Shakti High Efficient Submersible motor
- Shakti Submersible pump
- Solar Panel and its mounting structure
- Solar Drive controller
- Cable
- Pipes
- Variety of flow rates available in: 3 to 22 US GPM
- Motor and drive ratings available in: 1400 to 4800 Watt

Identification

Type key for helical rotor pumps

11

DCSSP

1400

Rated flow [gpm]

Solar Submersible Pump

Power (Watts)

*Note : 1. Input Power at Motor End.

2. Do not operate pump above its recommended duty head.

DCSSP

GENERAL DATA

The DCSSP system is a reliable water supply system based on renewable energy sources, such as solar. It incorporates a submersible pump. Very flexible as to its energy supply and performance, it can be combined and adapted to any need according to the conditions on the installation site. DCSSP pumps are high quality products designed for variety of high heads and small flows requirement. DCSSP pumps are suitable for both continuous and intermittent operation for a variety of applications.

Applications

DCSSP system especially suitable for water supply application, such as

- Villages, School, Hospitals, Single-family houses etc.
- Farms
 - Watering cattle
 - Irrigation of fields and greenhouses
- Game parks and game farms.
 - Watering applications

DCSSP pumps offer the following features:

- Dry-Run protection
- Highly efficient pump and motor
- Protection against up-thrust
- Over-voltage and under-voltage protection
- Overload protection

The DCSSP pump models incorporate an innovative motor design. With the use of permanent-magnet technology within the motor, the DCSSP pumps deliver unmatched performance. By combining permanent-magnet motors and SHAKTI'S own micro frequency converter, we are now able to control and communicate with the pump in ways never before possible. A few of the features that come out of this combination are Constant Pressure Control, and integrated Dry-Run protection. These are just a few of the many features that the DCSSP pumps can offer. The DCSSP pump models operate at a constant speed much like today's conventional pumps. The difference between it and traditional pumps is you get all the benefits of an electronically controlled permanent magnet motor that cannot be accomplished with a conventional induction motor.

Pumped liquids

Pumps are applicable in thin clean, non-aggressive, non-explosive liquids, not containing solid or long-fibered particles larger than sand grains.

PH value: 5 to 9

Liquid temperature: +32°F to +104°F (0°C to +40°C)

Sand content

Maximum allowable sand content: 50 ppm. A higher sand content will reduce the pump life considerably due to wear.

Salt content (chloride ions Cl-)

The table below shows the resistance of stainless steel to Cl-. The figures in the table are based on a pumped liquid with a pH value of 5 to 9.

Stainless steel AISI	Cl-content [ppm]	Liquid temperature [°F(°C)]
304	0-300	<104 (40)
	300-500	<86 (30)

CONTROLLER OVERVIEW

The controller starts the pumps slowly and adjust it's speed according to pumping load and power available from solar array.

Power output from the solar array is optimally matched to the load by maximum power point tracker(MPPT) through out all conditions.

The Shakti Solar drive is designed with the high standard of reliability expected of Shakti products. The controller attempts to drive the pump and motor to deliver water even under adverse conditions, reducing output as necessary to protect the system components from damage, and only shutting down in extreme cases.

Descriptions and Features

The Shakti Solar drives controller continuously monitors system performance and incorporates a number of features for pump system protection. In the event of a fault, the Shakti Solar drives will indicate the type of fault through the displays.

- Internal diagnostics will tolerate a lower input voltage.
- Whenever possible, the controller attempts to regulate the pump load in a manner that optimizes for maximum power transfer from the solar array.

An easy to use interface is provided to enhance configurability and enable remote system monitoring.

- A graphical display provides a detailed indication of system status.
- A small keypad offers flexibility for selection of user options.
- A continuous data connection for remote telemetry is made available

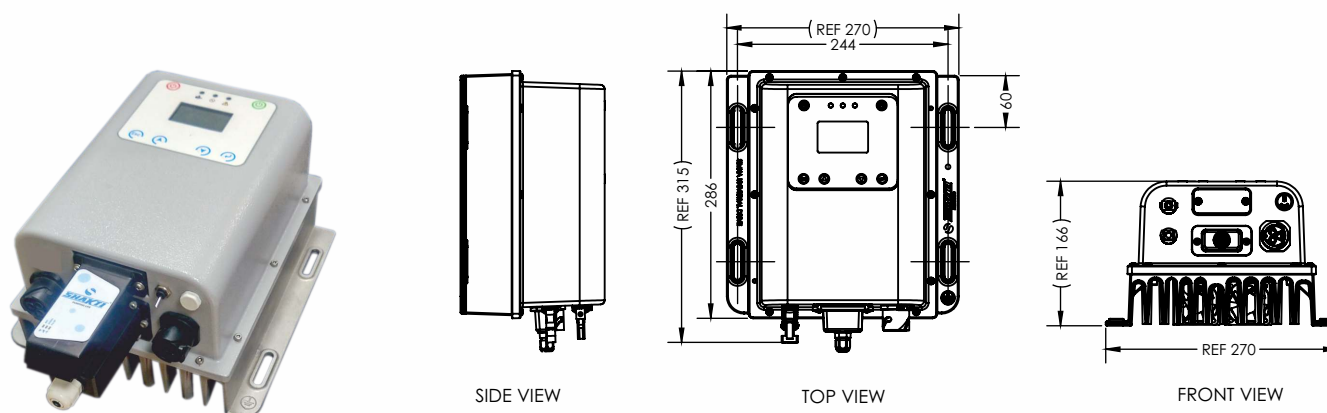
PROTECTION FEATURES

- Dry run Protection ➤ Overload Protection ➤ Open Circuit Protection ➤ Short Circuit Protection ➤ Over Heat

SOLAR PUMP DRIVE SPECIFICATION

Material Code	Model Description	Input				OutPut			NET WEIGHT (KG)	GROSS WEIGHT (KG)
		Min. Voltage (VAC)	Min. Voltage (VDC)	Max. Voltage (VAC)	Max. Voltage (VDC)	Nominal Voltage (VAC)	Max. AC Current (A)	Max Efficiency %		
9600000139	SIMHA UNIVERSAL DRIVE+ 3P 15A 450VDC-GPD	1Ø - 90	30	1Ø - 270	450	3Ø - 300	15	96	6	7.5
9600000140	SIMHA UNIVERSAL DRIVE+ 3P 20A 850VDC-GPD	3Ø - 200	200	3Ø - 460	850	3Ø - 415	20	96	6	7.5

Note: Use Change over switch with this controller to run pumps by solar power and electricity both.



SHAKTI CONTROLLER

PERFORMANCE CURVE

CURVE CONDITIONS

Specific performance charts

The specific performance charts in the Performance Curves section of this booklet are based on the following guidelines:

- All curves show mean values.
- The curves must not be used as guarantee curves.
- Typical deviation: $\pm 15\%$.
- The measurements have been made at a water temperature of $+68\text{ }^{\circ}\text{F}$ ($+20\text{ }^{\circ}\text{C}$).
- The curves apply to a kinematic viscosity of $1\text{ mm}^2/\text{s}$ (1 cSt). If the pump is used for liquids with a viscosity higher than that of water, this will reduce the head and increase the power consumption.

Pressure loss

The QH curves are inclusive of inlet and valve losses at actual speed.

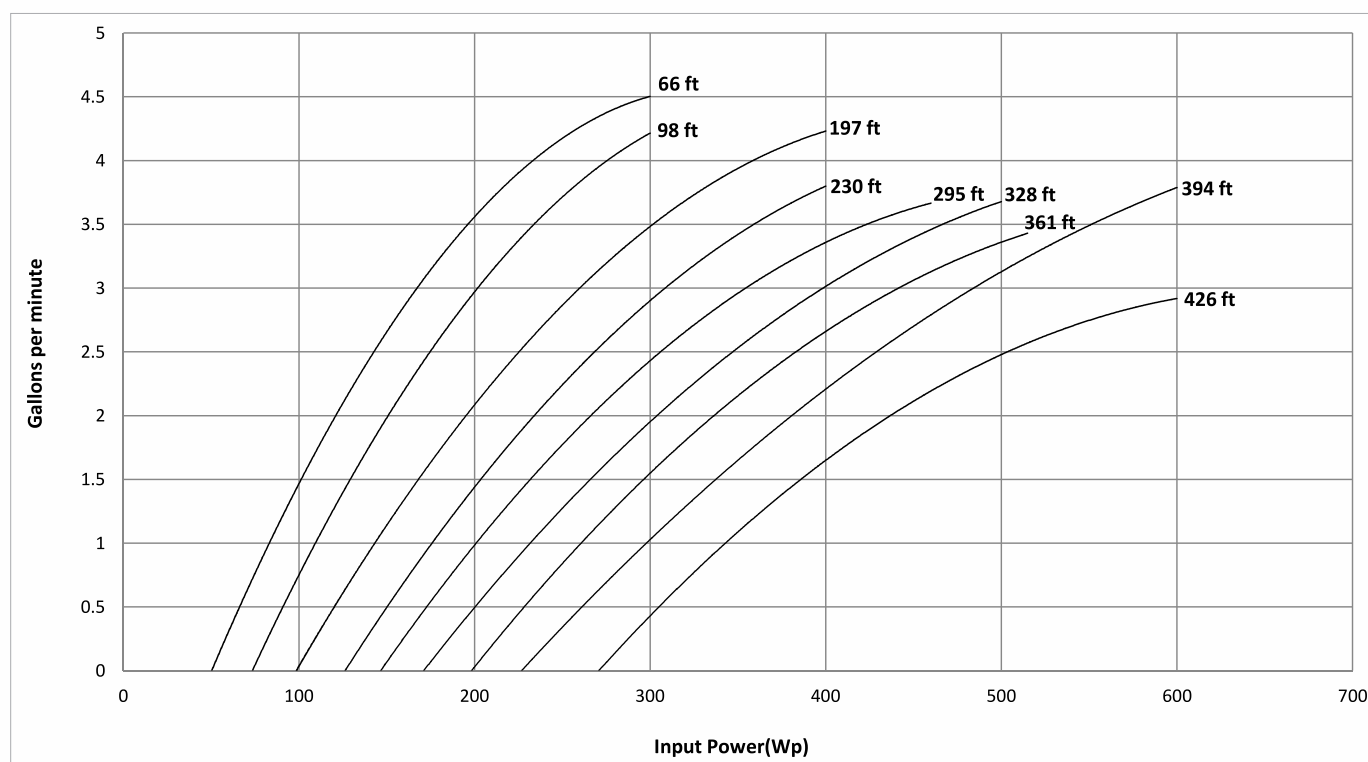
SOLAR 4 DCSSP 1400 MAX (3X3) (GPM)

NPT 1.25" (3X3)

Pumpset Code : 9500002891

Duty Head (Feet) : 197, 295, 394

Solar PV Array Power : 1400 Watt



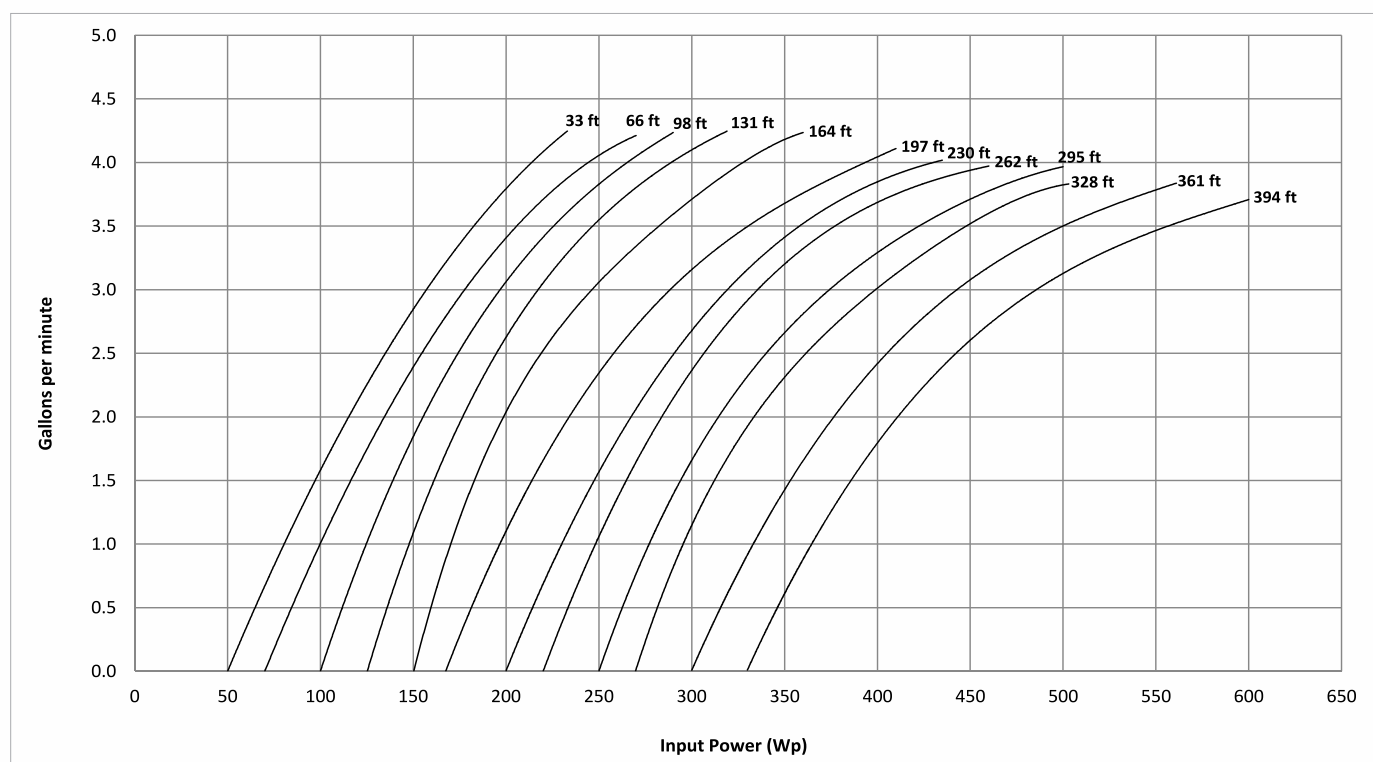
SOLAR 4 DCSSP 1400 MAX (GPM)

NPT 1.25" (4X4)

Pumpset Code : 9500002886

Duty Head (Feet) : 197, 295, 394

Solar PV Array Power : 1400 Watt



*NOTE :- Subject to technical change without notice.

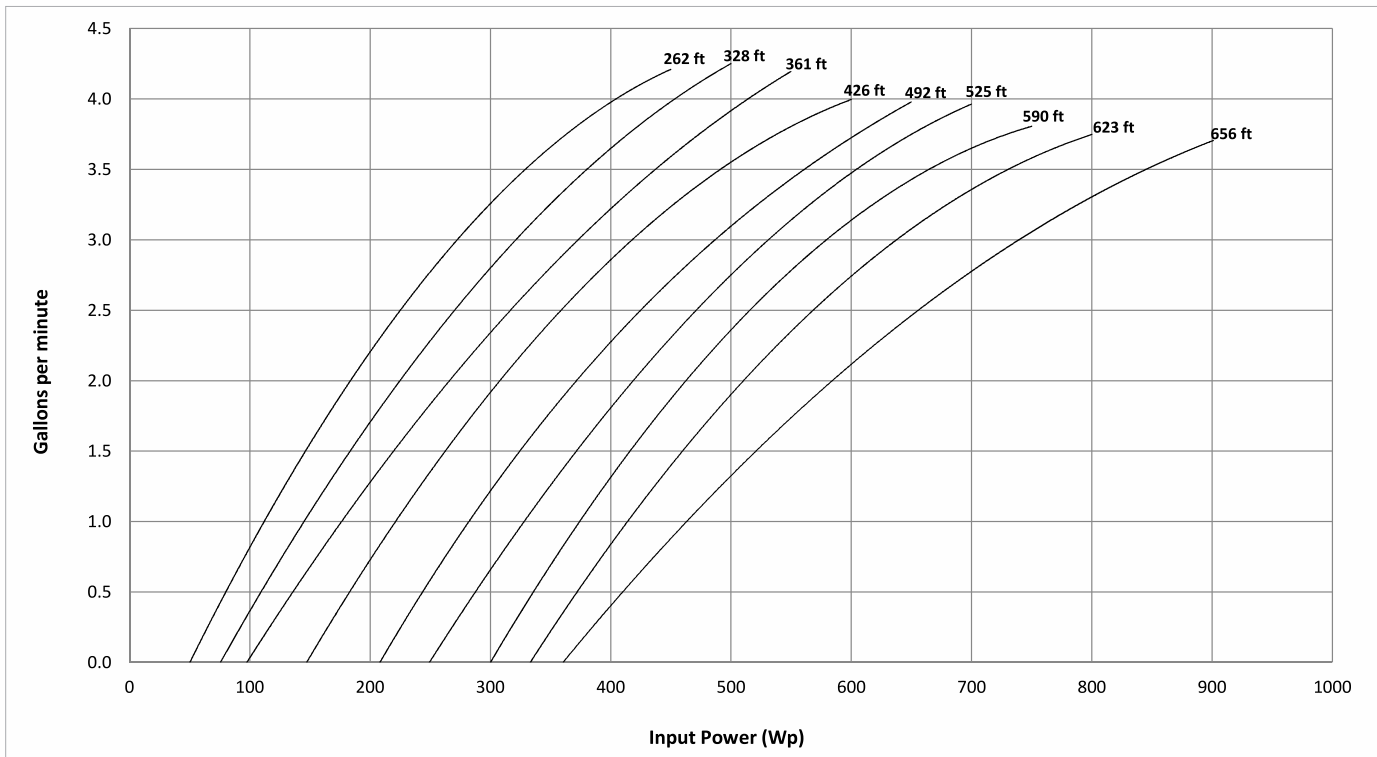
SOLAR 3 DCSSP 1400 MAX (GPM)

NPT 1.25" (4X4)

Pumpset Code : 9500002723

Duty Head (Feet) : 492, 590, 656

Solar PV Array Power : 1400 Watt



*NOTE :- Subject to technical change without notice.

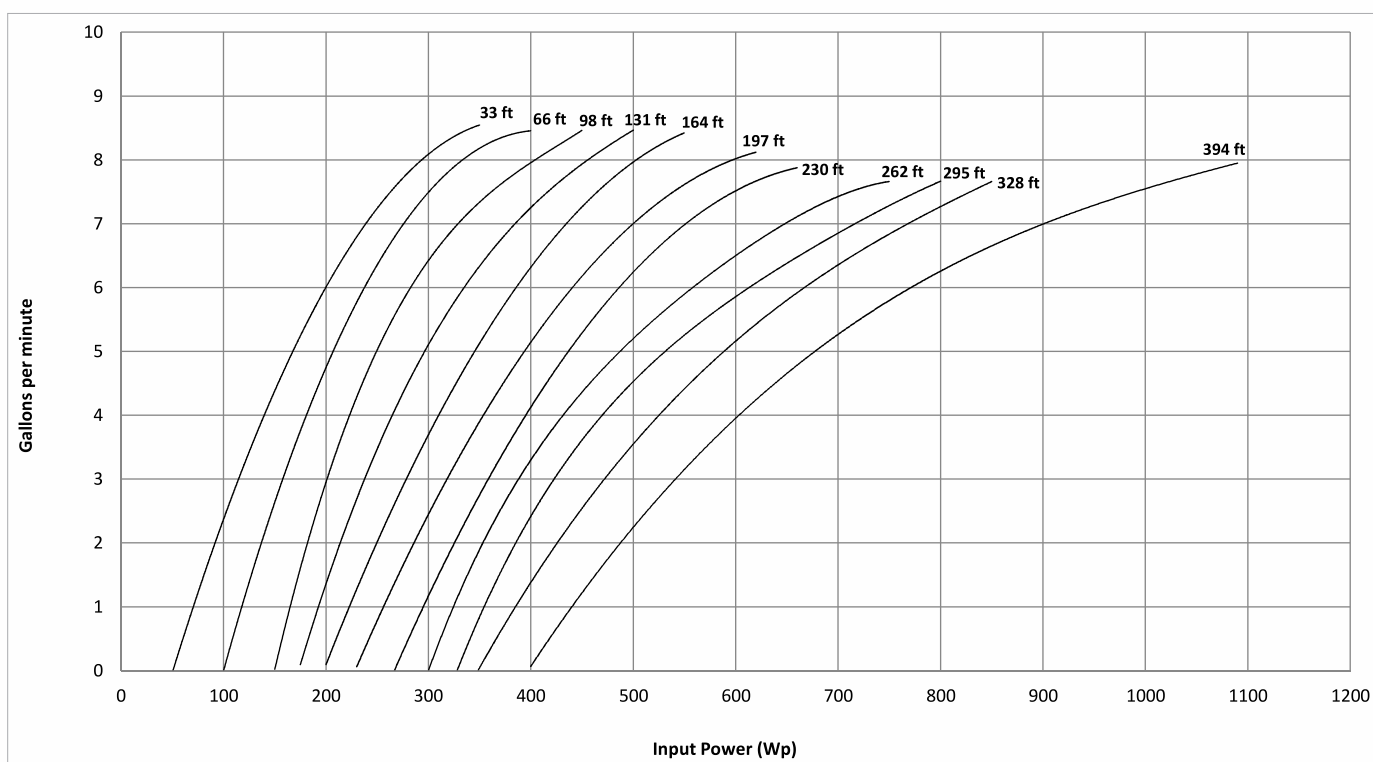
SOLAR 6 DCSSP 1400 MAX (3X3) (GPM)

NPT 1.25" (3X3)

Pumpset Code : 9500002892

Duty Head (Feet) : 197 , 295 , 394

Solar PV Array Power : 1400 Watt



*NOTE :- Subject to technical change without notice.

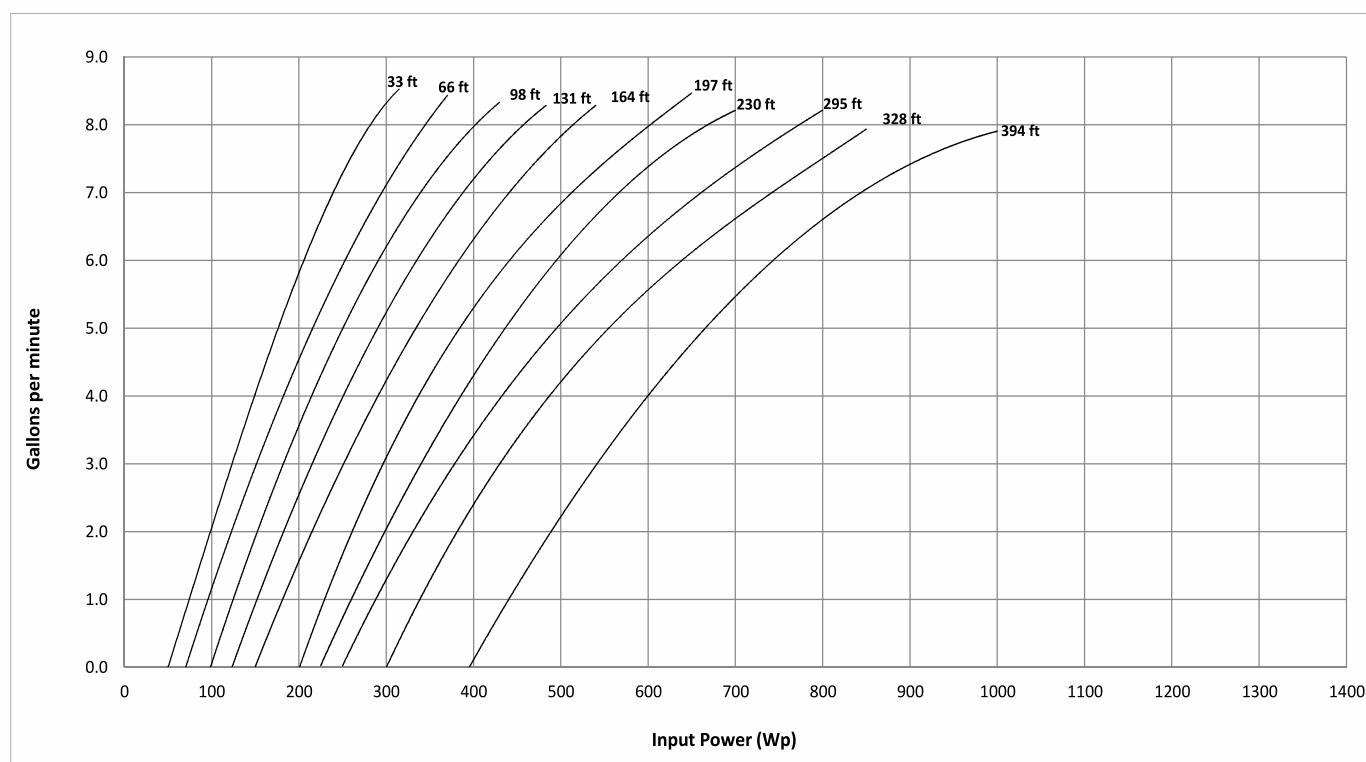
SOLAR 6 DCSSP 1400 MAX (GPM)

NPT 1.25" (4x4)

Pumpset Code : 9500002657

Duty Head (Feet) : 197, 295, 394

Solar PV Array Power : 1400 Watt



DCSSP

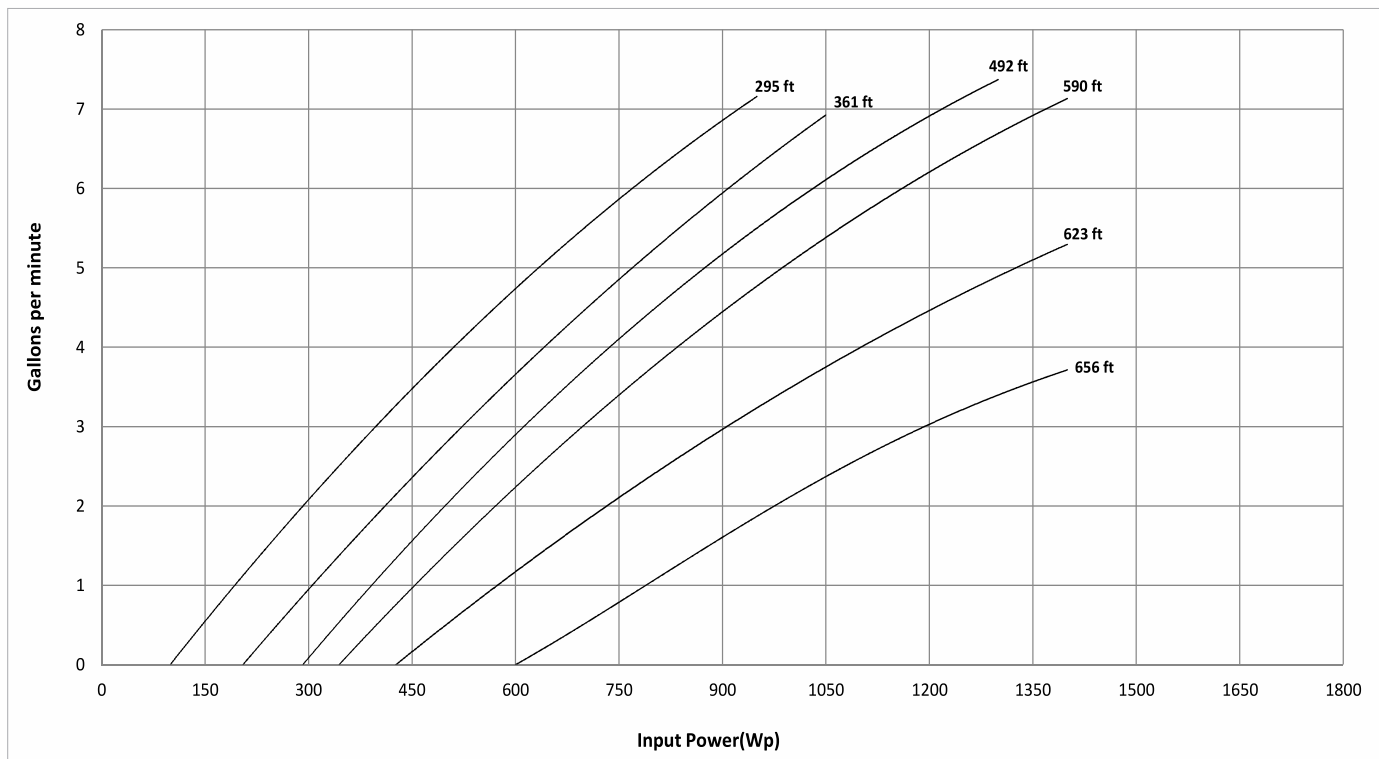
SOLAR 7 DCSSP 1400 MAX (GPM)

NPT 1.25" (4x4)

Pumpset Code : 9500002893

Duty Head (Feet) : 492 , 590 , 656

Solar PV Array Power : 1400 Watt



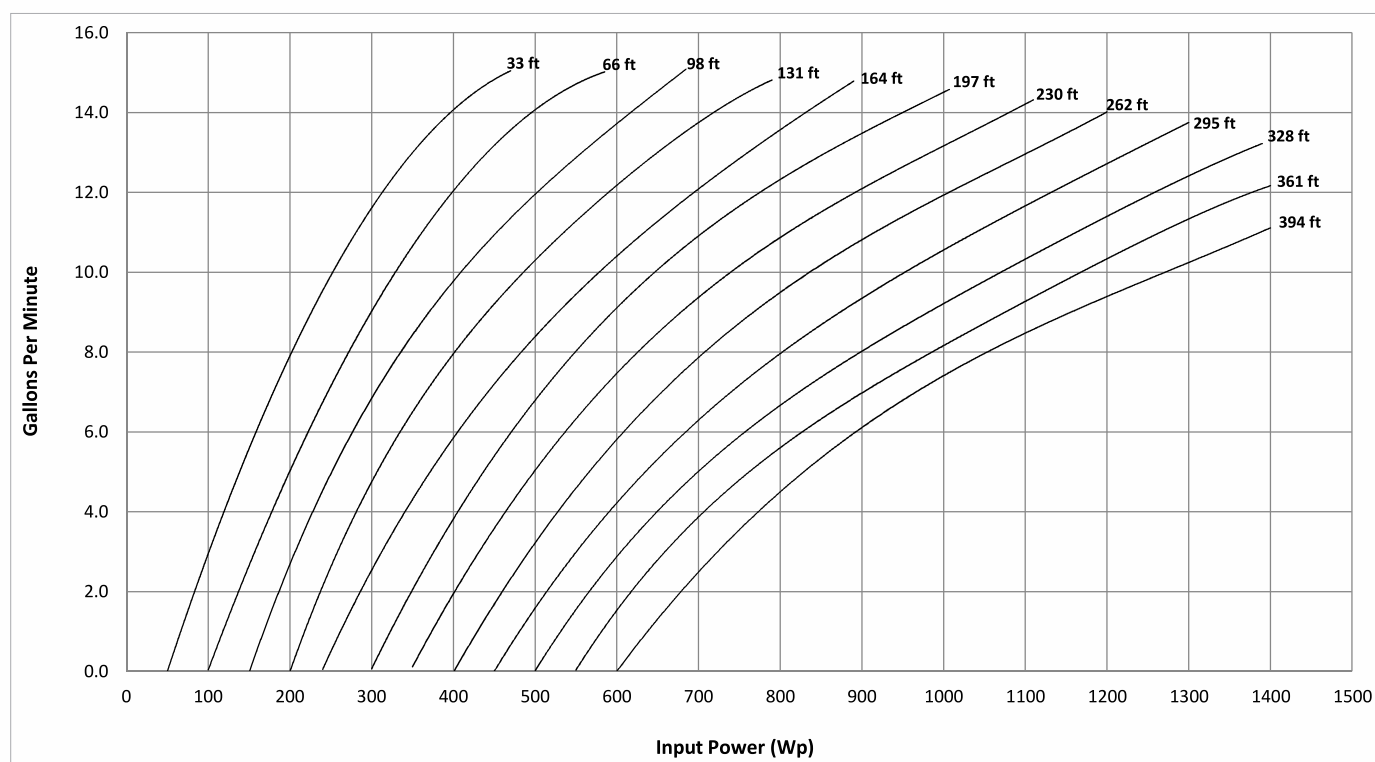
SOLAR 11 DCSSP 1400 MAX (GPM)

NPT 1.25" (4x4)

Pumpset Code : 9500002658

Duty Head (Feet) : 197, 295, 394

Solar PV Array Power : 1400 Watt



*NOTE :- Subject to technical change without notice.

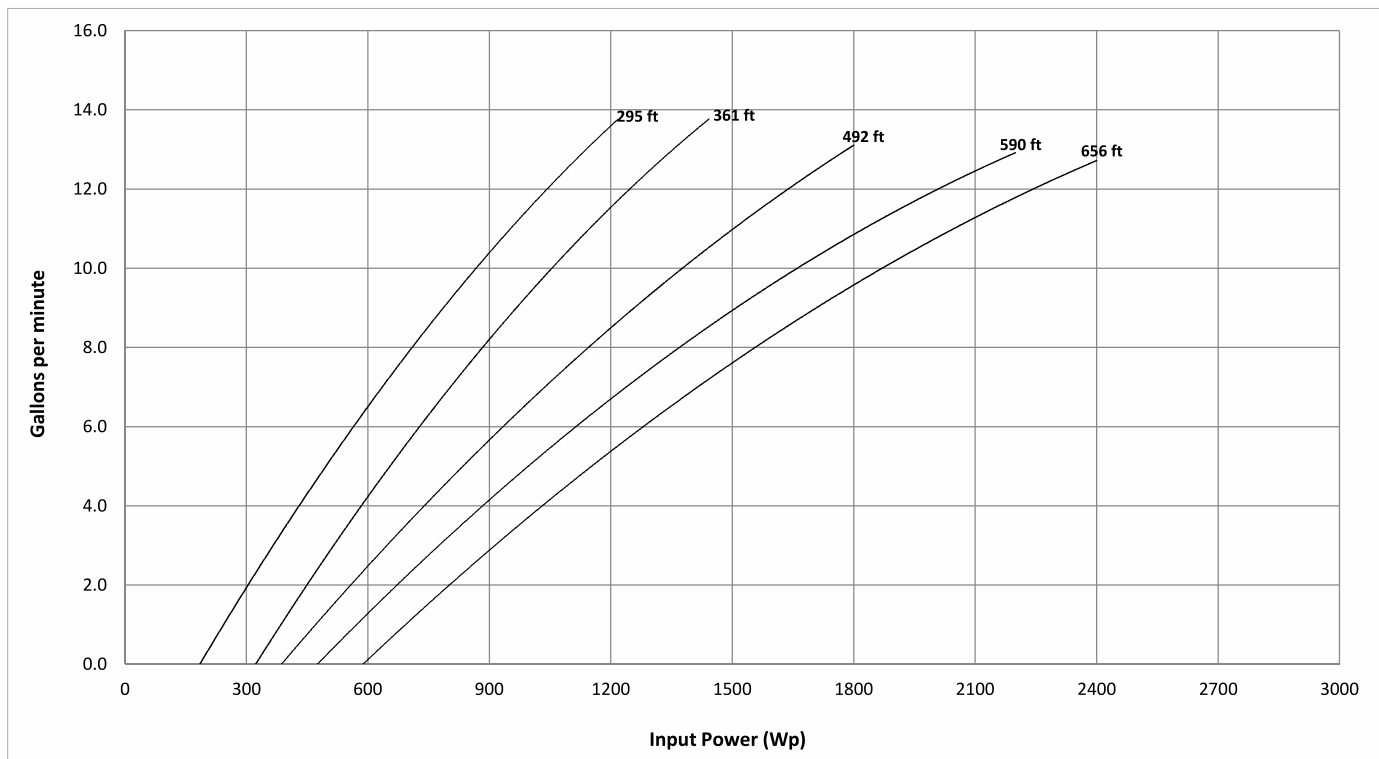
SOLAR 11 DCSSP 3000 MAX (GPM)

NPT 1.25" (4X4)

Pumpset Code : 9500002887

Duty Head (Feet) : 492, 590, 656

Solar PV Array Power : 3000 Watt



*NOTE :- Subject to technical change without notice.

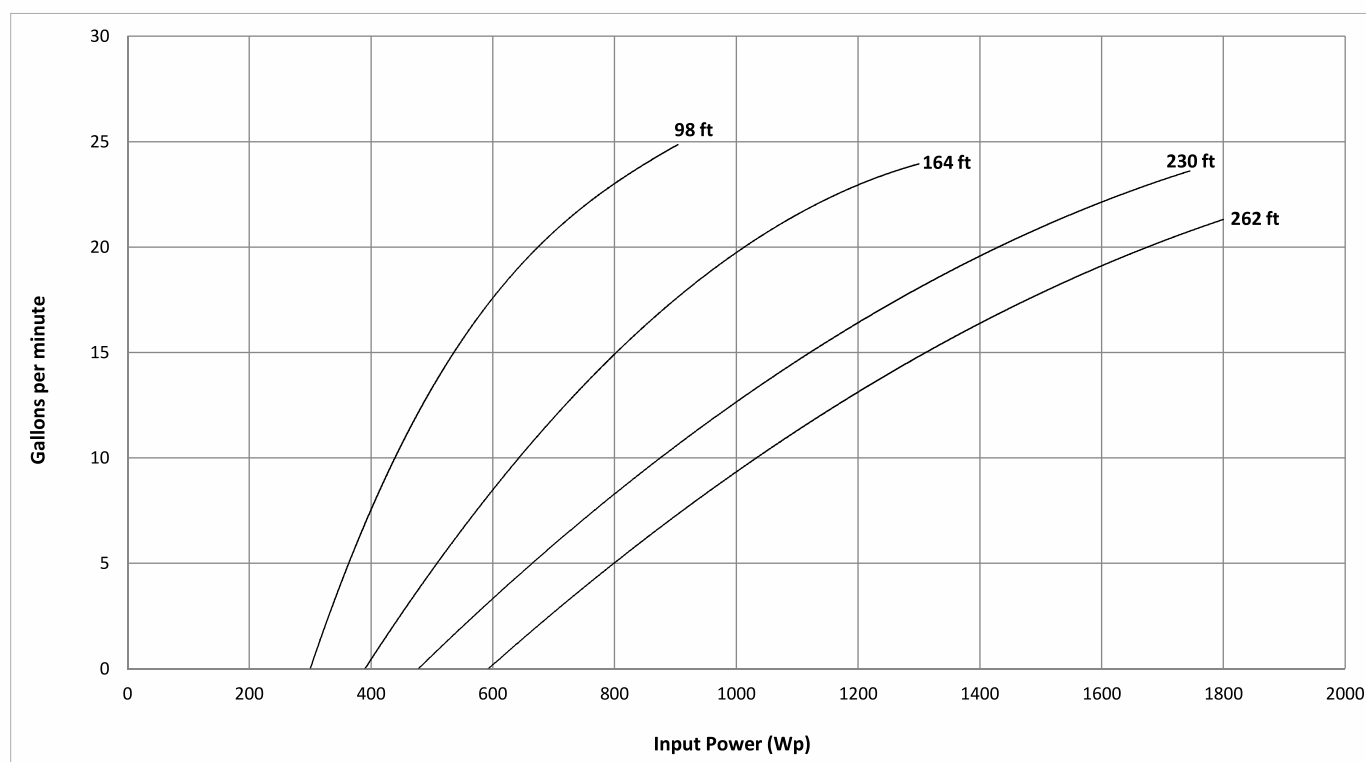
SOLAR 22 DCSSP 1800 MAX (GPM)

NPT 1.5" (4X4)

Pumpset Code : 9500002902

Duty Head (Feet) : 230

Solar PV Array Power : 1800 Watt



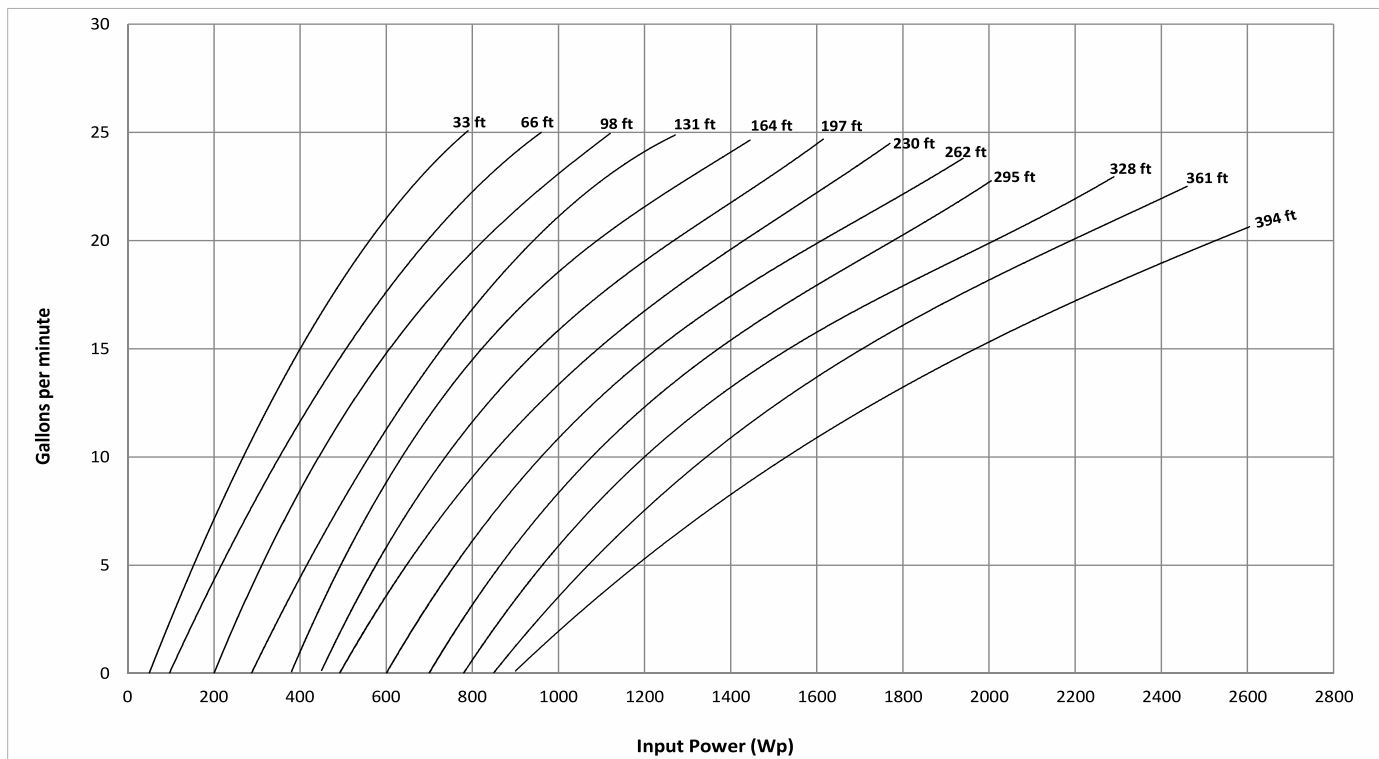
SOLAR 22 DCSSP 3000 MAX (GPM)

NPT 1.5" (4X4)

Pumpset Code : 9500002659

Duty Head (Feet) : 295, 394

Solar PV Array Power : 3000 Watt



*NOTE :- Subject to technical change without notice.

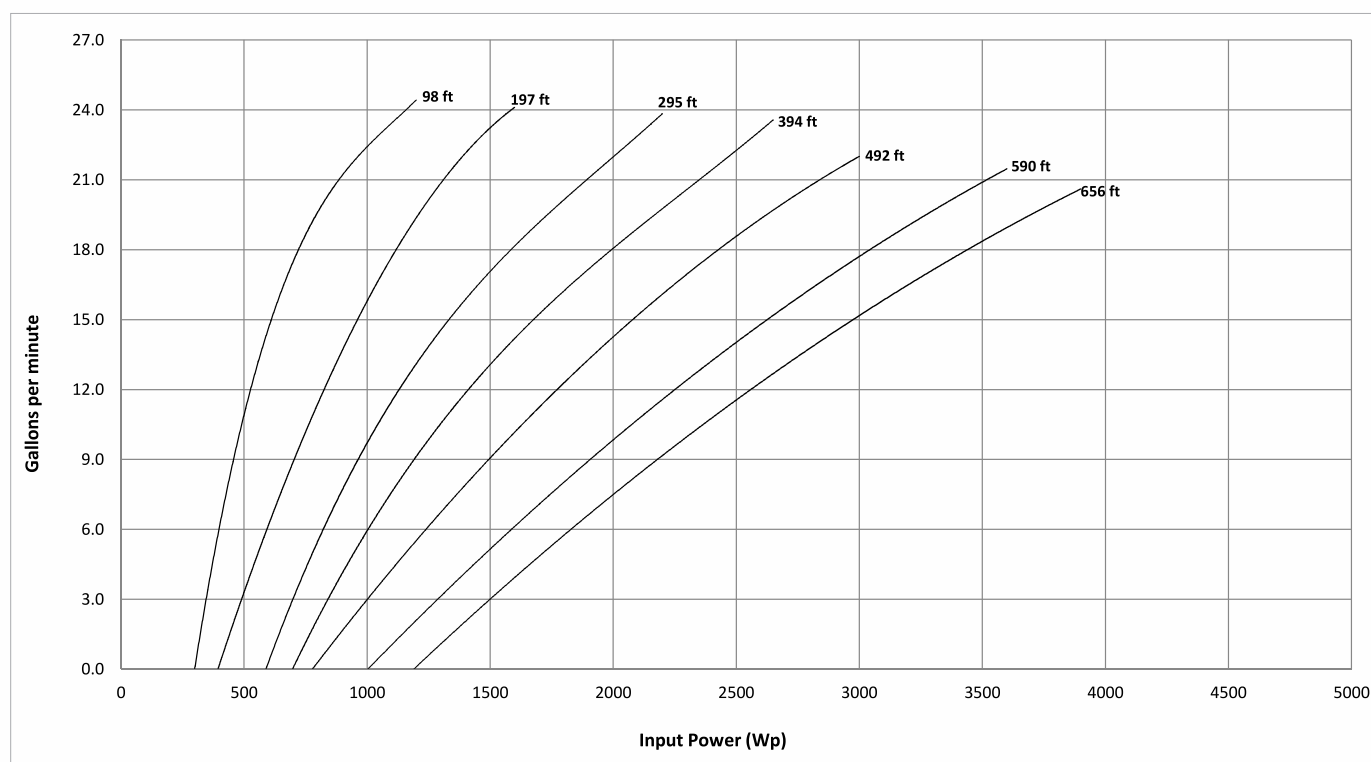
SOLAR 22 DCSSP 4800 MAX (GPM)

NPT 1.5" (4X4)

Pumpset Code : 9500002888

Duty Head (Feet) : 492, 590

Solar PV Array Power : 4800 Watt



*NOTE :- Subject to technical change without notice.

TECHNICAL DATA

Dimensions and Weight



SR. NO.	PUMPSET CODE	DESCRIPTION	DIMENSIONS IN (inch)						NET WEIGHT * (lbs)
			A	B	C	ØD	E	Rp (NPT)	
1	9500002891	SOLAR 4 DCSSP 1400 MAX (3X3) (GPM)	45.2	16.1	29.1	2.6	2.8	1.25	23.1
2	9500002886	SOLAR 4 DCSSP 1400 MAX (GPM)	41.5	12.4	29.1	3.7	3.7	1.25	35.2
3	9500002723	SOLAR 3 DCSSP 1400 MAX (GPM)	44.2	12.4	31.9	3.7	3.7	1.25	37.4
4	9500002892	SOLAR 6 DCSSP 1400 MAX (3X3) (GPM)	47.9	16.1	31.9	2.6	2.8	1.25	33
5	9500002657	SOLAR 6 DCSSP 1400 MAX (M)(GPM)	44.2	12.4	31.9	3.7	3.7	1.25	37.4
6	9500002893	SOLAR 7 DCSSP 1400 MAX (GPM)	50.7	14.7	36.0	3.7	3.7	1.25	44
7	9500002658	SOLAR 11 DCSSP 1400 MAX (M)(GPM)	46.6	14.7	31.9	3.7	3.7	1.25	48.4
8	9500002887	SOLAR 11 DCSSP 3000 MAX (GPM)	54.4	18.5	36.0	3.7	3.7	1.25	50.6
9	9500002902	SOLAR 22 DCSSP 1800 MAX (GPM)	52.3	17.2	35.0	3.7	3.7	1.5	46.2
10	9500002659	SOLAR 22 DCSSP 3000 MAX (M)(GPM)	53.5	18.5	35.0	3.7	3.7	1.5	44
11	9500002888	SOLAR 22 DCSSP 4800 MAX (GPM)	56.0	16.3	39.7	3.7	3.7	1.5	52.8

* Weight = Pump + Motor (complete set).

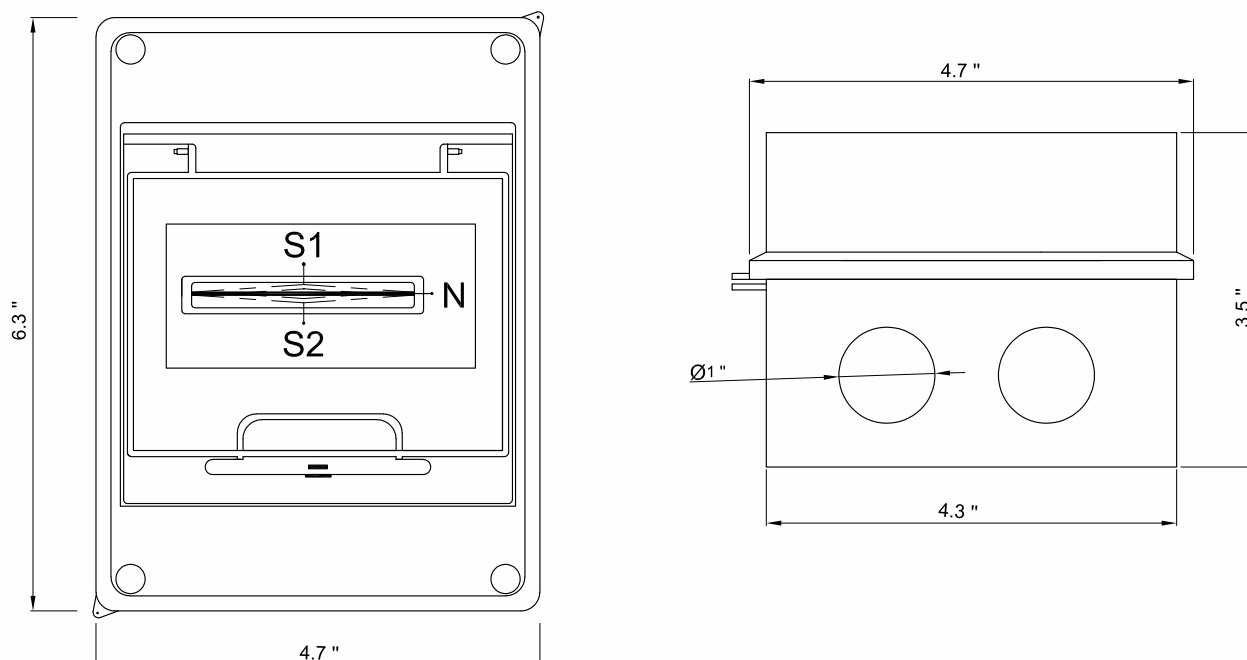
NOTE :- Subject to technical change without notice.

ACCESSORY

Change over switch

A change-over switch is a dual input single output device, which is used to change the input power source to the controller. It is generally used with controllers/drives which have options to run from solar as well as from grid. There are three operative positions in change-over switch corresponding to S1, S2, (Up and Down) & N (Middle). In case of S1 and S2 positions the corresponding sources are connected to output whereas and in N position none of the sources are connected to output. Conventionally the name of the sources is marked in S1 and S2 position for convenience of the user. These change-over switches are provided in a dust and rainproof boxes.

Note: It should be noted that while changing the power source through changeover the N position should be used until the display of the controller turns off. This intermediate use of N position avoids inrush currents through the changeover switch and improves its life.



CHANGE OVER SWITCH CODE - 3100000056

Note :- All Dimensions in Inch

SAP No. 2000017379

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