

# LORENTZ PSk

Solar hybrid water pumping systems



**LORENTZ PSk is a solar water pumping system for medium to large applications (5-100kW). PSk provides the best of both worlds, powered by solar when possible and blending in alternative power sources when needed.**

With LORENTZ PSk you have a true hybrid pumping system. PSk hybrid always prioritizes your investment in solar power and will automatically blend grid power or generator power with the core solar power supply.

With advanced controls, support for multiple water sensors and remote management options you can be assured of reduced operational costs, improved water security and increased sustainability

**LORENTZ**   
*The Solar Water Pumping Company*

# Solar hybrid – the best of both worlds

Pumping water uses a significant amount of power. The sun provides us with an almost infinite energy source that with the right planning and equipment, means we can pump water anywhere without the needs for power infrastructure.

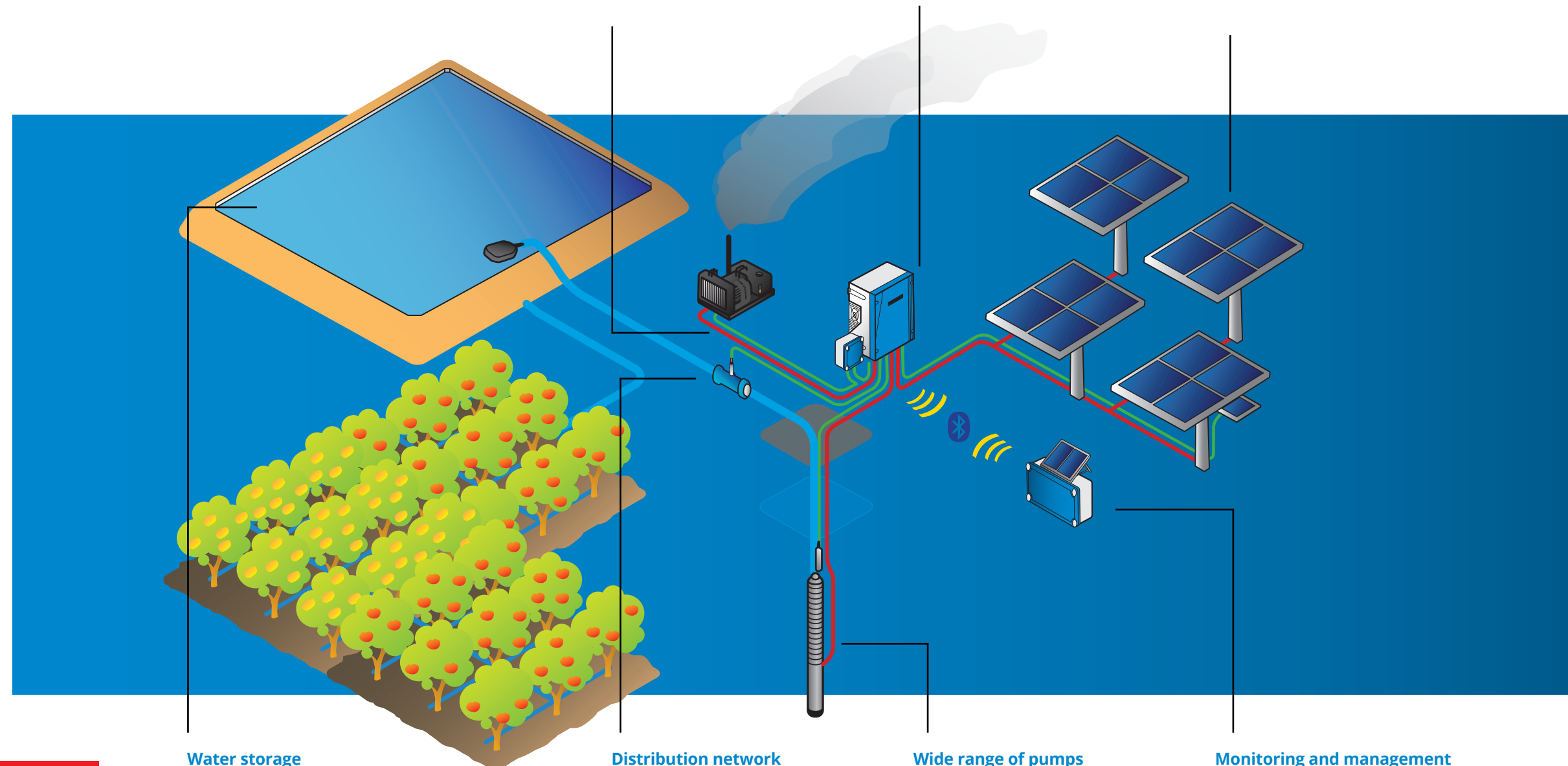
LORENTZ PSk is an advanced solar water pumping system. The system is designed specifically to use the power of the sun to move water, replacing the need for grid power or diesel.

As solar power is not consistent through the day, the LORENTZ PSk constantly changes the pump parameters to optimize the amount of water available.

Being designed as an off-grid solar water pumping system, LORENTZ PSk has all of the inputs and outputs needed in an integrated self-managing system.

Where water demands cannot be met by solar power alone, the hybrid seamlessly blends in external power sources on demand.

The ability to prioritize cheap, clean solar power and top up with either grid or generator power automatically based on need means LORENTZ PSk provides the best of both worlds.



### Hybrid operation

LORENTZ PSk can use solar combined with either grid or generator power to provide 24 hour operation. The system seamlessly blends the available solar power with external power sources automatically. \*

### PSk controller

The controller is at the heart of the system, managing both system operations, power sources and constantly optimizing the system for maximum water output.

### Power source

Solar power is always the primary LORENTZ PSk power source. If necessary for the application, LORENTZ PSk seamlessly blends solar and grid or generator power, making it an automated hybrid system.

### Water storage

Introducing water storage to a solar water pumping system allows for increased seasonal demands to be met or simply for overnight water availability without a generator or grid power.

### Distribution network

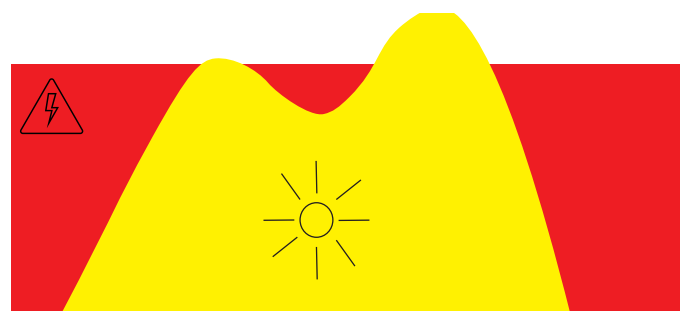
LORENTZ solar water pumping systems are used for drinking water, irrigation and industrial applications. Whatever the LORENTZ PSk system is connected to the system will optimize water delivery depending on the power available and inputs from the various sensors.

### Wide range of pumps

LORENTZ PSk has a wide range of submersible and surface pump systems available to meet your water needs. Submersible pumps are available that can pump from 330 m (1085 ft) depths and surface pumps available for flows of up to 767 m<sup>3</sup>/h (3375 US gal/min).

### Monitoring and management

All LORENTZ PSk systems have inbuilt data logging and a simple management interface. All systems can also be remotely monitored and managed along with any other LORENTZ systems you have via LORENTZ Global (i.e. the cloud based monitoring and management service).



01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

The best of both worlds - solar power (yellow) blended with grid or generator power (red) when you need it

\* LORENTZ PSk3 systems have hybrid connections included in the controller. For PSk2-21 to PSk2-100 the hybrid function requires a smartPSU - see the "LORENTZ PSk hybrid family" section for more information.

# Benefits you can realize



## No infrastructure to install

LORENTZ PSk means that you can install a pumping system almost anywhere, irrespective of power infrastructure availability and the associated costs. PSk is designed to operate in harsh environments and is proven around the world to deliver the water you need for almost any pumping application.

## Low operational costs

Operational cost savings are achieved as a solar direct system requires no fossil fuels, can be fully remotely managed and is designed to have a long working life. The result is low or even no operating costs. LORENTZ hybrid pumping only uses grid or diesel if your application requirements are not met by solar direct.

## “Right sizing”

With infinite smart motor control, LORENTZ PSk is very gentle on pump motors. This extends the life of the system along with using unique technology such as our SunSensor to further protect your system. Variable power and speed controls allows for any generators that are integrated into the system to be much smaller than for conventional pump systems.

## Lowest project risk

As LORENTZ PSk is designed to be a complete system, it has all of the necessary software and hardware for your water project. The result is that your projects are delivered on time, on budget and without technical risk. As PSk is CONNECTED, you can monitor and manage all of your systems from anywhere in the world.

***The Solar Water Pumping Company***

# How customers are using LORENTZ PSk

## Drinking Water

**For communities** – LORENTZ PSk has been deployed as the primary water delivery mechanism for communities of up to 400,000 people. By utilizing water storage, LORENTZ PSk systems deliver water reliably 24 hours per day.

**For utilities** – LORENTZ PSk is providing very economical solutions for both water abstraction, pressure boosting and water purification applications.

Water utilities are able to lower their operating costs by converting their pump systems from diesel power to solar or by choosing a solar / diesel hybrid system.



## Irrigation

**Solar pumps are a perfect match for irrigation – more sun equals more water.**

LORENTZ PSk is being used to transform unused land into productive farms. Bringing water to locations that do not have any existing infrastructure is improving food security and generating significant income for communities.

LORENTZ PSk systems provide water into irrigation systems all around the world. Drip, sprinkler, pivot or flood irrigation methods are all fully supported using this system. Most existing irrigation systems can easily be converted to solar power with the LORENTZ system while still maintaining very high flows and high pressures.

## Industry

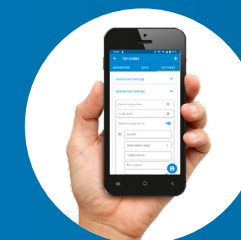
**Where an industrial process uses high volumes of water then LORENTZ PSk can significantly reduce energy costs and provide a reliable solution to water demands.**

Industry in both developed and developing countries can suffer from unreliable grid power or very high peak rate power. This has an adverse effect on productivity and competitiveness.

With a LORENTZ PSk system, pumps will operate purely using solar power during the daytime with the ability to call for a “top up” of power from the grid or a generator when needed to meet production deadlines or process requirements.

**The Solar Water Pumping Company**

# What makes PSk better for you ?



## Designed for Solar Water Pumping

LORENTZ PSk has been designed from the first whiteboard sketches to be a solar pumping system.

The system has been designed and built by an engineering team who only focus on solar water pumping. This experience means they design, test and build systems where operation in the harshest, most remote environments is normal.

Having a great feature set is only part of being a good solar water pumping system. What really matters is how efficient the system is. Efficiency defines how much water it will pump. LORENTZ PSk has class leading efficiency and optimized maximum power point tracking for best performance when conditions are not perfect. The system also has active power management to ensure that high ambient temperatures have minimal impact on water output.

**LORENTZ PSk makes the best use of the available power to deliver the most water possible.**

## Hybrid Power

LORENTZ PSk can be powered by solar alone or be configured as a hybrid system. With LORENTZ, hybrid means seamlessly blending solar power with grid or generator power sources.

The LORENTZ PSk becomes the brain of your water system, looking at what power is available, using solar power wherever possible and only starting a generator or putting a load on the power grid when there is not enough sun. This function is not a switching system, but rather an active blending of power sources. This means that your solar investment is fully utilized and that the use of expensive, non-renewable power is minimized.

The LORENTZ PSk hybrid system manages all of this for you, including generator auto start and stop, timed starts and also volume based decision making. This flexibility means that the most efficient and effective solutions can be built to meet any water need.

**Automatic blending of power sources based on your water requirements.**

## The Complete Solution

LORENTZ PSk is designed to be a complete solar water pumping system comprising of a specialized pump controller and carefully matched pumps.

LORENTZ PSk has eight sensor inputs that allow analogue and digital sensors to be connected. This combination of sensors with the powerful inbuilt software applications allows for full pump control and water specific applications.

The system also has an inbuilt Sun Sensor which measures the available irradiation and then makes decisions of what to do based on the available power. The SunSensor also avoids unnecessary stop start cycles which increase pump wear.

LORENTZ PSk is a complete solution "out of the box" without the need for building additional switching cabinets or PLC units.

**Everything to deliver your projects successfully, on time and with minimal risk.**

## CONNECTED

Every LORENTZ PSk system is CONNECTED.

The system is configured on site using LORENTZ CONNECTED apps, PumpScanner for PSk2 and LORENTZ Assistant for PSk3. Common configuration is done with three clicks and there is full access to configure system behavior based on additional sensor inputs.

The LORENTZ PSk constantly records operational data and provides access to rich information for both customers and technicians via rights managed and user friendly apps.

The LORENTZ PSk systems can also be connected to LORENTZ Global, our industry leading cloud based management service. This is a simple to use but powerful, monthly service that takes away the complexity of remote monitoring and management. One low monthly fee means that you can see exactly what the system is doing, make changes to settings, export data and receive proactive alerts irrespective of location.

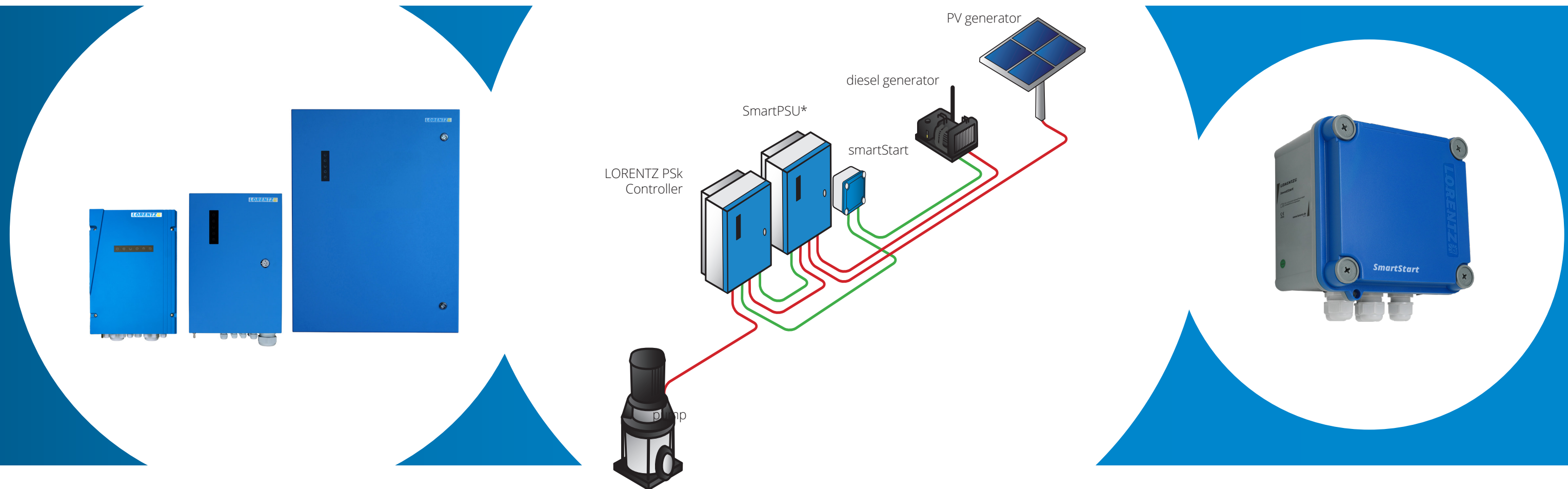
**Advanced, but simple monitoring and management of your system locally or remotely.**

# The LORENTZ PSk hybrid family

A family of systems to serve any application in a consistent way

**SmartPSU turns LORENTZ PSk into a hybrid pumping system. This functionality is included in PSk3-7 and PSk3-15, but delivered as a modular solution for larger systems.**

**The SmartStart integrates with the LORENTZ PSk to provide generator control and autonomous power.**



Like all LORENTZ systems, the PSk family of systems are designed to be fully featured and consistent. The family of systems have the same features, common design, installation and configuration methods to make them familiar to both technicians and system operators. While the features and functions are common there are some differences in modularity

and housing sizes depending on the system power. In larger power systems, hybrid functions are added by a fully integrated SmartPSU which is controlled by the pump system. This approach allows customers to choose how they have their system configured to optimize costs based on the specific use case. Hybrid operation on LORENTZ PSk manages the start

and end of day transition from solar to grid or from solar to generator power seamlessly and without the need for any operator intervention.

LORENTZ PSk with the SmartPSU\* will allow you to deliver your 24 hour water needs and manage seasonal demands simply and cost effectively.

\*SmartPSUk is not necessary for PSk3- 7 and PSk3-15 which has integrated hybrid. PS2-21 to PSk2-100 will require smartPSU for hybrid operations.

Adding SmartStart to any PSk system means the LORENTZ PSk can make decisions when there is no solar power available. An example would be if you wanted to start irrigating fields at 3 o'clock in the morning. SmartStart powers the system logic circuits allowing the PSk to check available power, switch on a generator or start to use a grid connection. As solar power becomes available, PSk automatically blends the power sources ensuring the investment

in solar is fully utilized. Automatic operation including switch on and switch off of generators based on water need, sensor inputs, timers or any other water focused features within PSk means that the system is available to start pumping 24 hours per day.

**The Solar Water Pumping Company**

# A complete system



**An effective solar water pumping system is made up of more than one component. When you choose a LORENTZ system you will get an integrated solution designed specifically for solar water pumping from a company with an absolute focus on this technology.**

### LORENTZ PSk Controller

LORENTZ PSk controllers are available from 7 to 100 kW. The controller includes the functions of a highly efficient digital inverter, a variable speed drive, all the inputs you will ever need, data logging plus intelligent control over the whole system to give you the most water possible.

### LORENTZ PSk Submersible Pumps

LORENTZ PSk 4" to 10" submersible multistage pumps perform equally well in irrigation projects and for wide area drinking water applications, reliably meeting the most demanding requirements. All LORENTZ pumps are preconfigured in our CONNECTED apps with a simple 3 click setup.

### LORENTZ PSk Surface Pumps

LORENTZ PSk single or multistage surface pumps perform equally well in irrigation projects and for wide area drinking water applications, reliably meeting the most demanding requirements. All LORENTZ pumps are preconfigured in our CONNECTED apps for simple 3 click setup of any system.

### SmartSolution Hybrid Components

The LORENTZ PSk SmartSolution hybrid components are used to enable seamless blending of an AC power source with solar power. PSk3 has integrated hybrid power. Learn more about hybrid pumping, the SmartStart for generator control and the SmartPSU for PSk2 systems in the 'LORENTZ PSk hybrid family' section.

### Accessories

To complete your LORENTZ PSk system, LORENTZ provide a wide range of compatible probes, sensors, solar power connection equipment, racking and PV modules. This enables a single source of tested and ready to integrate components to give you a complete solution.

**The Solar Water Pumping Company**

# LORENTZ PSk Features



## Electrical Features

### MPP Tracking

Highly efficient maximum power point tracking with pump system specific algorithms.

### Active power management for temperature

Automatic power management to ensure the system continues to run in even the most extreme temperature conditions. At ambient temperatures up to 50°C (122°F) the system operates on full power and then actively manages power above that temperature.

### Variable frequency output

Variable frequency output to allow maximum water to be pumped based on available power.

### Soft start

Soft start and infinite control of motor speeds for long life and low generator loads.



## I/O Features

### Digital inputs

For connection of well probe, tank full, pressure switches, remote switches and ancillary switching.

### Analogue inputs

For 2x 4-20mA sensors. Applications included for pressure and level monitoring and pump control.

### Sun Sensor function

Sun Sensor module is supplied to measure irradiation and control the pump based on available solar energy.

### Water meter input

Pulse water meter input for accurate collection of flow data.

### Water sensor input

For use with “wet electrodes” when sensing water is present in pipelines.

### Signal output

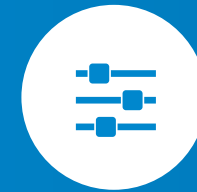
For controlling externally connected devices.

### SmartPSU connection (PSk2 only, integrated in PSk3)

To automatically control operation of the SmartPSUk2 when in hybrid pumping mode.

### Low voltage input for configuration

Low voltage DC input to allow bench / field configuration when 3 phase power is not available.



## Software Applications

### Constant pressure and flow

In-built applications to limit or to provide minimum pressure and flow.

### Pump control on pressure or flow

Control of pump system using pressure sensors for remote control applications and pressure dependent processes.

### System timers

In-built timers for providing time of day or interval timing control.

### Liquid level monitoring

Application software included to use pressure sensors for liquid level monitoring and pump control by level.

### Power choice control

Ability to prioritize water delivery or power type (cost) in hybrid applications.



## Display and Connectivity

### Simple configuration

Simple system configuration and operational control from LORENTZ CONNECTED apps, PumpScanner and Assistant, smartphone apps for both installers and customers.

### Data logging

Automatic logging of all running pump data. Recording frequency is configurable with capacity for up to 10 years.

### Customer display

Simple LED display to

indicate system status.

### App enabled (included)

Detailed information and configuration via LORENTZ CONNECTED smartphone apps (Assistant or PumpScanner).

### CONNECTED

Local and remote monitoring and management with the LORENTZ CONNECTED infrastructure.



# Technical Data

## Controller Technical Data

Model	LORENTZ PSk3-7	LORENTZ PSk3-15	LORENTZ PSk2-21	LORENTZ PSk2-25	LORENTZ PSk2-40	LORENTZ PSk2-60	LORENTZ PSk2-70	LORENTZ PSk-100
Power (max)	8.3 kW	16 kW	21 kW	25 kW	37 kW	58 kW	68 kW	90 kW
Input voltage	max. 850 V							
Input current (DC)	14 A	27 A	39 A	48 A	70 A	110 A	120 A	170 A
Optimum $V_{mp}$	> 575 V							
Motor voltage	3 x 380/400/415/460/480 V 0 - 60 Hz		3 x 380/400/415 V 0 - 60 Hz					
Rated motor current	3 x 13 A	3 x 24.5 A	3 x 33 A	3 x 40 A	3 x 65 A	3 x 95 A	3 x 115 A	3 x 160 A
Efficiency	max. 98 %							
Ambient temperature	-25 ... 60 °C (-13 ... 140°F)		-30 ... 50 °C (-22 ... 122°F)			-10 ... 50 °C (14 ... 122°F)		
Enclosure class	IP 66 Cast aluminum outdoor housing		IP 66 Stainless steel and powder coated outdoor housing			IP 54 Stainless steel and powder coated outdoor housing		
Hybrid functionality	included				SmartPSU			

## Controller Technical Data

PSk3-7 PSk3-15



PSk2-21 PSk2-25 PSk2-40



PSk2-60 PSk2-70 PSk2-100



## Pump Technical Data

### Submersible pumps

Motor technology	4", 6" and 8" high efficiency 3-phase 380 V AC motor – 25 to 55 Hz operation
Speed	1,400 to 3,080 rpm – depending on pump end
Pump ends	Multi-stage centrifugal – premium materials, AISI 304 stainless steel

### Surface pumps

Motor technology	High efficiency air cooled 3-phase 380 V AC motor – 25 to 55 Hz operation
Speed	700 to 2,905 rpm – depending on pump end
Pump ends	Vertical multi-stage centrifugal premium materials, AISI 304 stainless steel      Single stage centrifugal premium materials, cast iron body

Please see COMPASS datasheets for individual system specific information

# Choosing and designing your system

## Partner Network

LORENTZ PSk is available from approved LORENTZ partners across 130 countries. Our sales and service partners have the local knowledge, access to the right tools and information to plan a system accurately. This high degree of certainty and real world experience removes risk from your project.



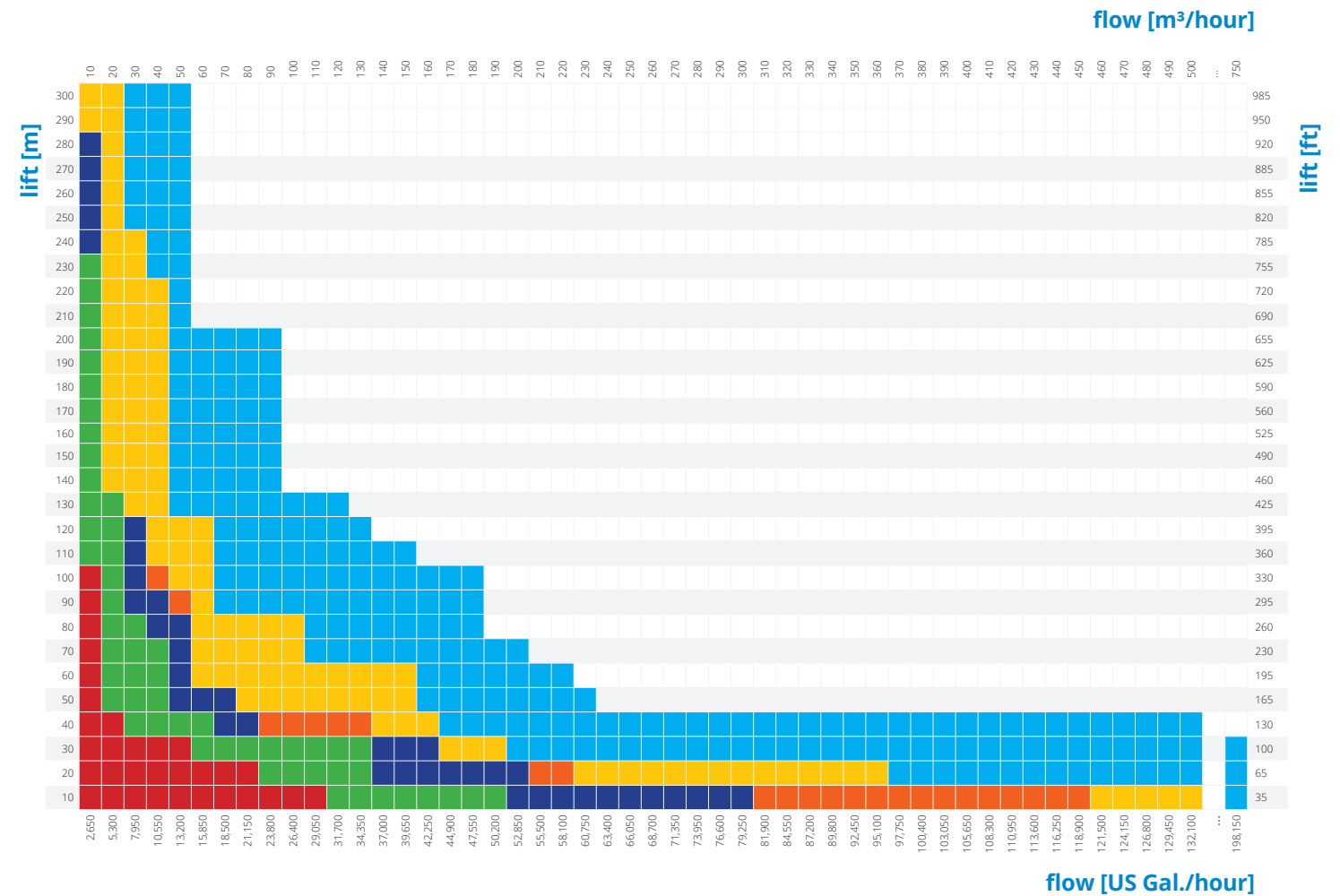
To find a partner near you, visit [www.lorentz.de/partners](http://www.lorentz.de/partners)

## COMPASS

Our industry leading COMPASS system planning software gives a detailed simulation of the water delivery through the year for your exact site location. This detailed modeling application provides a high degree of confidence that your system will perform as you require it to.



## Performance



■ PSk3-7 
 ■ PSk3-15 
 ■ LORENTZ PSk2-21 
 ■ LORENTZ PSk2-25 
 ■ LORENTZ PSk2-40 
 ■ LORENTZ PSk2-100

## About LORENTZ

LORENTZ is the global market leader in solar powered water pumping solutions. Founded in Germany during 1993 LORENTZ has pioneered, innovated and excelled in the engineering and manufacturing of solar powered water pumping. Today LORENTZ is active in over 130 countries through a dedicated network of professional partners. LORENTZ technology uses the power of the sun to pump water, sustaining and enhancing the life of millions of people, their livestock and crops.

Simply – **Sun. Water. Life.**



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