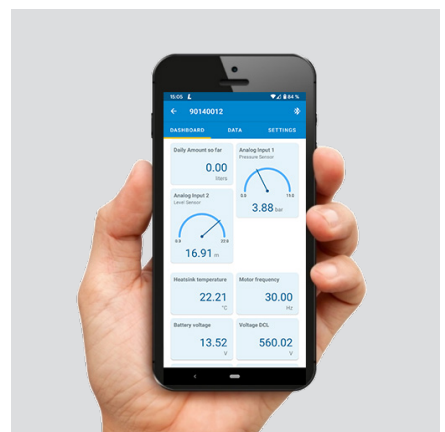




LORENTZ Energy Leachate Portfolio

Solutions to manage landfill leachate, to pump condensate and for gas well de-watering

- A better way to manage leachate extraction, gas well de-watering and condensate in landfills
- Designed to provide lowest operational costs
- Robust pumps with high efficiency DC brushless motors and intelligent controls
- Inbuilt IO, automation, data logging and remote management
- Analog and digital sensors for monitoring and automated system control
- Power choices, including solar, to provide solutions anywhere



A better way to solve your pumping challenges

LORENTZ high efficiency, intelligent leachate pumping solutions bring an innovative but well proven approach to the market.

LORENTZ pumps handle a wide range of fluids and remove many of the service challenges of both air pumps and non specialized electric submersibles and so reduce your operating costs.

The controls and sensor inputs allow for automatic measurement and management of liquid levels and pressures further reducing costs.

The systems are so efficient that you have power choices, allowing you to run from small grid, generators or solar power.

The challenges

Managing leachate presents two main challenges. How do you **meet compliance requirements** and environmental management responsibilities while keeping your **operational costs under control.**

The solution

Combining a well proven helical rotor pump (progressive cavity pump) with an ultra efficient DC brushless motor and an advanced controller provides the solution.

The HR pump can cope with varying conditions that other pumps can't. This results in significantly less maintenance and service visits.

The motor is so efficient at any speed that you have choices of how to power it, including solar power.

Built in monitoring, not only of the pump, but also external sensors provides you with a ready integrated monitoring and management system for leachate.

LORENTZ products differentiate themselves from the competition with the attention to engineering, choice of materials for hostile conditions, integrated management applications , excellent manufacturing standards and exceptional levels of testing of every manufactured product.



Designed and refined to perform

Since 1993 LORENTZ has been designing and manufacturing pumps for the most demanding of conditions.

Pumping leachate has some unique challenges that through study, design, testing, installing pumps in the most challenging environments, revising and repeating we have managed to conquer.

Over 10 years we have gained an ever growing reputation that our leachate pumps perform where others have failed.

Pumping leachate is a complex application due to the wide range of chemical compounds, viscosity, suspended solids and the “unknowns”.

The helical rotor design works very well in this application. The mechanism is, to a large extent, self cleaning. The DC brushless motor provides high torque, high efficiency and infinite control over speed.

As a fully integrated company we have the mechanical, material, electronic and software engineers in house to tailor solutions to fit the application and to continuously evolve designs as we overcome new challenges. As we are also manufacturing all of the pumps, motors and controllers in house we are in control of end to end quality and are very fast to change. New designs can be implemented, new prototype built and when proven integrated into the standard product portfolio.

Having a close working relationship with local sales and service partners allows for continuous improvement and evolution of our product range. This can be in design changes to overcome a specific chemical, temperature or pumping challenge



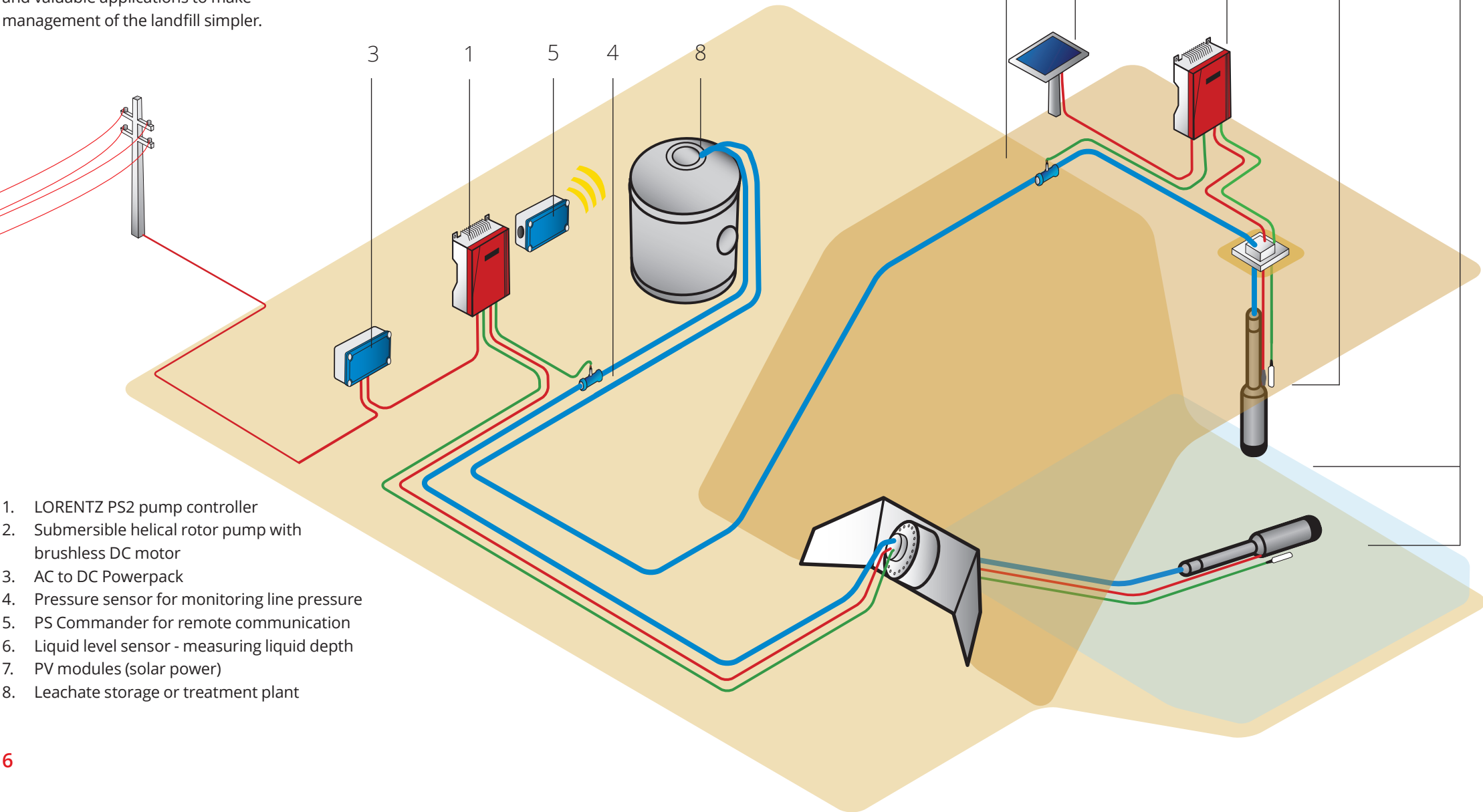
Landfill application examples

Side slope riser

In this example a LORENTZ leachate pump is installed in a side slope riser. The pump can be installed at any angle. A liquid level sensor provides monitoring of the depth of leachate and also ensures that the pump will only run when needed. All data is recorded in the pump controller. The pump controller provides speed control, on / off or timed cycles and valuable applications to make management of the landfill simpler.

The controller is powered from the grid in this example via a AC/DC Powerpack.

This pump system is connected to a PS Commander which provides remote monitoring and management via LORENTZ Global management system.



Vertical wells / condensate sumps

In this example the LORENTZ leachate pump is installed in a vertical well in the landfill.

Pressure and liquid level sensors have been installed to monitor line pressures and the depth of leachate.

The sensor inputs are used for reporting purposes and to control the system. Settings are in place to control the pump protecting the equipment, the environment and alerting automatically of problems.

The system is managed remotely and both site and central staff can see exactly what the landfill is doing and make changes to configurations remotely.

In this example the pump is powered by solar, further reducing operating costs. Using solar power can also significantly reduce the capital expenditure of running power cables and negotiating power grid connections.

LORENTZ leachate systems technical data

	PS2-600 HRE-07 Energy-1	PS2-600 HRE-14 Energy-1
Controller type	PS2-600 Energy	PS2-600 Energy
Controller		
Power	0.7 kW	0.7 kW
Max input voltage	150 V DC	150 V DC
Max motor current	13 A	13 A
Efficiency	98%	98%
Ambient temperature	-40...50 C -36 ... 122 F	-40...50 C -36 ... 122 F
Enclosure class	IP68 (NEMA 6P)	IP68 (NEMA 6P)
Pump		
Max head	90 m 300 ft	50 m 160 ft
Max flow rate	1.4 m3/h 6.0 USG/min	2.6 m3/h 11.4 USG/min
Diameter	96 mm 3.8"	96 mm 3.8"
Liquid temperature range *	0 to 50 C * 32 to 122 F *	0 to 50 C * 32 to 122 F *
Material	Progressive Cavity Pump (PCP), Cast stainless steel stator housing Stainless steel rotor, FKM rubber stator Non corrosive materials used throughout Sacrificial anode for enhanced protection	
Motor		
Rated power	0.7 kW	0.7 kW
Input voltage (PWM)	45 V	45 V
Submersion	150 m 500 ft	150 m 500 ft
Max liquid temperature *	50 C * 122 F *	50 C * 122 F *
Material	AISA 304/316	AISA 304/316
Insulation class	F	F
Enclosure class	IP68	IP68
Efficiency	92%	92%
Speed	900 to 3300 rpm	
Technology	High efficiency ECDRIVE DC brushless and sensorless motor	
Hazardous environment	Water filled, resin encapsulated submersible motor with multiple run dry protection methods	

	PS2-1800 HRE-32 Energy-1	PS2-1800 HRE-07 Energy-1T	PS2-4000 HRE-32 Energy-1T	PS2-4000 HRE-07 Energy-1BT
	PS2-1800 Energy	PS2-1800 Energy	PS2-4000 Energy	PS2-4000 Energy
	1.8 kW	1.8 kW	4.0 kW	4.0 kW
	200 V DC	200 V DC	375 V DC	375 V DC
	14 A	14 A	14 A	14 A
	98%	98%	98%	98%
	-40...50 C -36 ... 122 F	-40...50 C -36 ... 122 F	-40...50 C -36 ... 122 F	-40...50 C -36 ... 122 F
	IP68 (NEMA 6P)	IP68 (NEMA 6P)	IP68 (NEMA 6P)	IP68 (NEMA 6P)
	50 m 160 ft	90 m 300 ft	80 m 260 ft	90 m 300 ft
	5.9 m3/h 26 USG/min	1.4 m3/h 6.0 USG/min	6.0 m3/h 26 USG/min	1.4 m3/h 6.0 USG/min
	96 mm 3.8"	96 mm 3.8"	96 mm 3.8"	96 mm 3.8"
	0 to 50 C * 32 to 122 F *	40 to 80 C * 104 to 176 F *	40 to 80 C * 104 to 176 F *	80 to 120 C * 176 to 248 F *
	Progressive Cavity Pump (PCP), Cast stainless steel stator housing Stainless steel rotor, FKM rubber stator Non corrosive materials used throughout Sacrificial anode for enhanced protection			
	1.7 kW	1.7 kW	4.0 kW	4.0 kW
	95 V	95 V	240 V	240 V
	150 m 500 ft	150 m 500 ft	150 m 500 ft	150 m 500 ft
	50 C * 122 F *	80 C * 176 F *	80 C * 176 F *	120 C * 248 F *
	AISA 304/316	AISA 304/316	AISA 304/316	AISA 304/316
	F	F	F	F
	IP68	IP68	IP68	IP68
	92%	92%	92%	92%
	900 to 3300 rpm			
	High efficiency ECDRIVE DC brushless and sensorless motor			
	Water filled, resin encapsulated submersible motor with multiple run dry protection methods	Oil filled, submersible motor with multiple run dry protection methods		

LORENTZ pump controller features

System sizing and planning

- Sizing and planning with LORENTZ COMPASS, the industry leading planning and simulation tool
- Fit the right system first time
- Ensure your pumping needs are met

Installation and wiring

- Easy wall or pole mounting
- Ample cable entries and space to work inside for wiring
- Clear terminal labeling and use of spring connectors for reliability
- Full range of power connection accessories such as PV Disconnect / combiner / protection device to manage large PV arrays efficiently

PS2 controller features and protection

- High efficiency pump system controller
- Maximum power point tracking
- Simple LED status and on off switch
- Speed control, timers, constant pressure, constant flow, level and pressure controls
- Under voltage
- Over voltage
- Over current
- Under current
- Short circuit
- Active Temperature Management
- Commutation loss

Simple setup and management via LORENTZ PumpScanner app

- No complex programing
- The system is running with 3 selections
- Leachate focused built in applications
- Technicians and customers use the PumpScanner app for different features (rights managed)

Data-logging and connectivity

- Built in Bluetooth for wireless local connectivity
- All system data, operational data and sensor values are recorded
- Historic or real-time data via LORENTZ PumpScanner app
- High customer value in tracking system performance
- High technician value for troubleshooting
- Remote management and monitoring via the LORENTZ Global IoT service, a low cost, professional, cloud based management system unique in the market

I/O, sensors and inbuilt applications

- Inputs for flow meter, analogue (pressure, level, temperature) sensors, digital switches and other sensors
- Built in applications including constant pressure, constant flow and daily amount plus control by pressure, level and flow

- Included SunSensor (PS2-1800, PS2-4000) to control by solar irradiation level
- Active temperature management, reduces power when needed to avoid system damage while still delivering liquid.

Serviceability

- Should the worst happen through accidents, vandalism, external influences or a breakdown, PS2 is designed to be serviced in the field
- Modular design
- Common spare parts across models
- Fast board changes and low cost spares



Controller supplementary information

Mounting options

- Wall or panel mount using 4 holes
- Pole mounting with optional pole mount kit

Approvals and standards

- IEC/EN 61702:1995
- IEC/EN 62253 Ed.1
- UL 508

Product Content

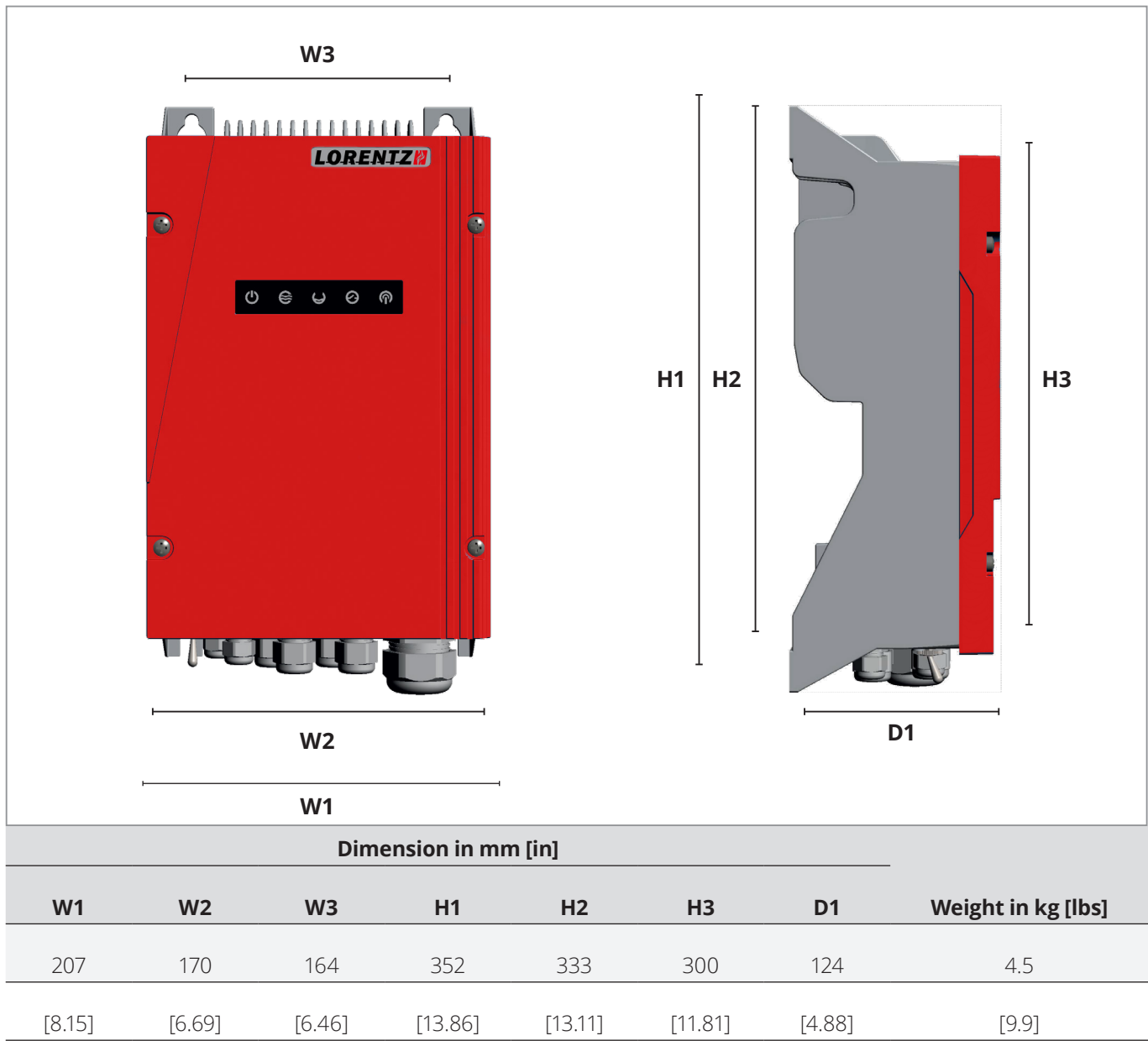
- PS2 Controller
- SunSensor (PS2-1800)
- Manual for installation and operation

Transport and shipping

- Packed volume in mm [inch]: 335 [13.2] x 500 [19.7]x 275 [10.8]

Packaging

- Sustainable, environmentally friendly pulp packaging



Remote monitoring and management

LORENTZ Global provides a simple and cost effective solution to manage and monitor your LORENTZ leachate systems from anywhere in the world!

The platform serves a wide range of customers from a single pump on a site to a global network of pumping systems and storage tanks.

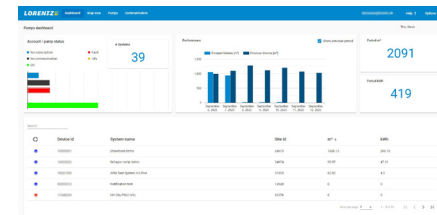
Performance and compliance data is recorded and can be automatically exported to external systems for incorporation into other platforms.

LORENTZ Global is an easy to use, cloud based, pay monthly service that takes away the complexity of remote monitoring and management. Access to real-time data and configuration settings allows you to get the most out of any application while at the same time reducing maintenance trips and improving customer service.

Full consolidation of data across sites is provided to complement the detailed information on fluid levels, pressures, pumped volumes, power consumption, temperatures and other critical application information.

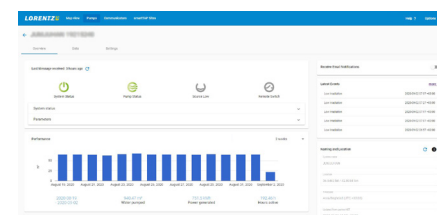
Use the dashboard view to monitor your systems in real time

- Access all of your systems, pump status and performance conveniently on one dashboard
- Drill down to see what each system is doing



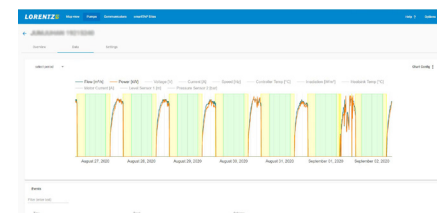
Data at your fingertips to monitor system performance

- Access system information including live pump status, liquid pumped, power generated, hours active and much more.
- All status events are tracked and it is easy to compare data across time periods.



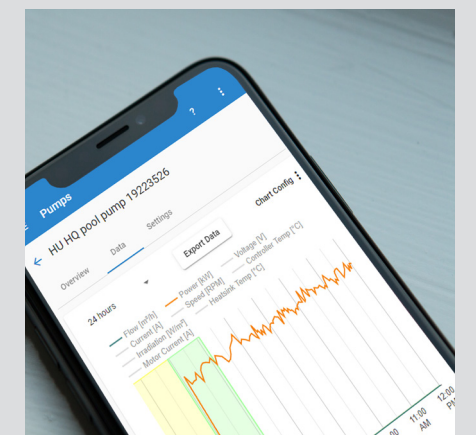
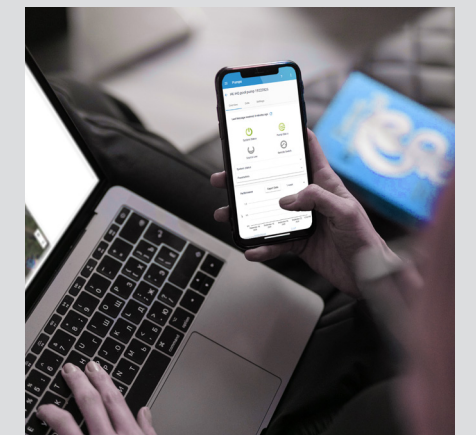
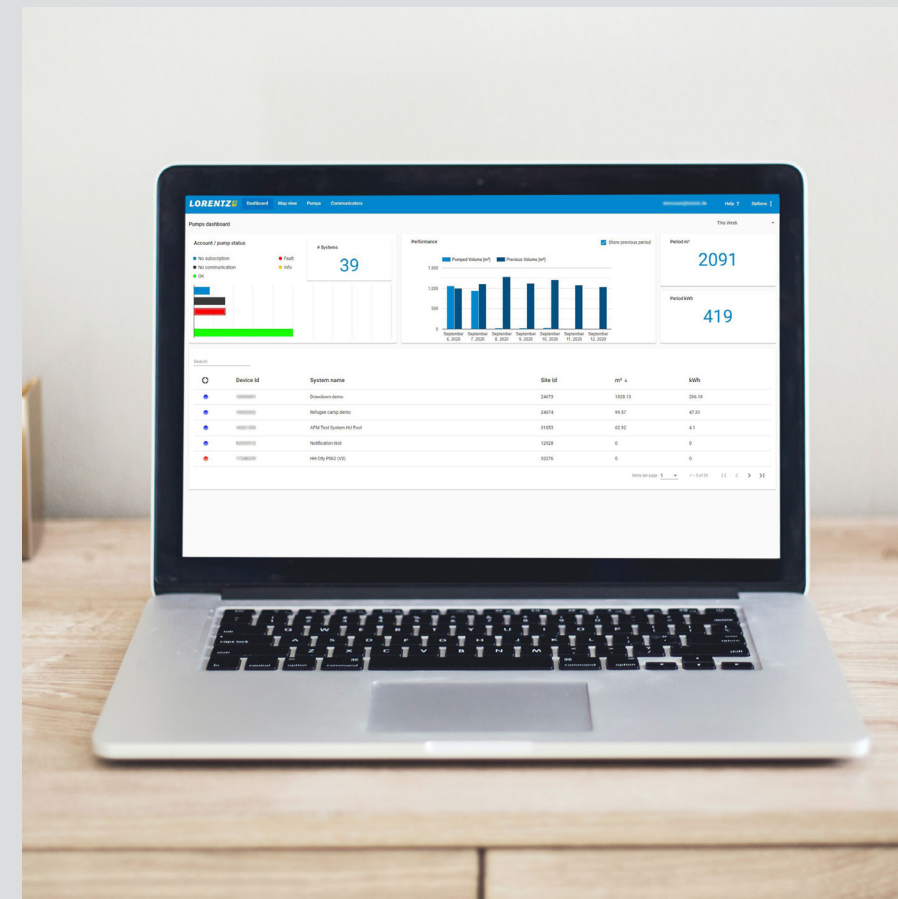
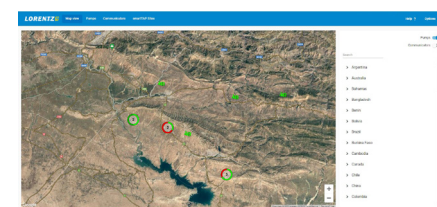
Get into the details when you need to

- You can see values and trends for system voltages, current, power, temperature, irradiation and levels from pressure and level sensors.
- Full system configuration is available remotely.



Active alerts and a map view

- LORENTZ Global will send fully configurable pro-active alerts via email.
- The map view complements this to let you visualize the status of your systems.



Sensors and accessories

The complete solution

To complement the range of leachate pumping systems LORENTZ provide an extensive range of accessories and ancillary equipment.

All accessories have been developed for use with LORENTZ leachate pumps to offer the most flexibility in application design and for high reliability.

Sensors and measurement

Liquid level sensor

- Measures the level of liquid in a well, pipe or vessel relative to atmospheric pressure



Liquid pressure sensor

- Measures the pressure in a pipe or vessel



Combination sensors

- Sensors to measure pressures and temperatures in liquid



Accessories for LORENTZ Global monitoring

PS Commander

- Cellular communication device for collecting data from pump controllers and sensors



PV Module for PS Commander

External antenna

Installation accessories

Splice kits

- To join submersible cables

Riser pipe and cable

- A range of pipes, cables and ancillaries designed for leachate applications

Well head



Pole mount accessory bracket

- To mount pump controller to a pole

Sacrificial anode (replacement)

- Replacement for the sacrificial zinc anode to provide enhanced corrosion protection

Installation sleeve

- To ease installation in side slope risers



Accessories for solar power

PV Modules

- Wide range of PV modules to fit local market conditions



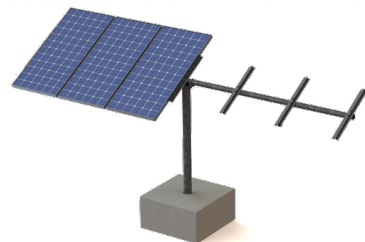
PV disconnect

- For connecting multiple PV modules together and to provide safety isolation



PV mounting systems

- Range of mounting options to meet landfill installation requirements



Accessories for grid power

PowerPack

- To convert AC power to DC to run the LORENTZ pump systems



Accessories for additional lightning protection and isolation

Accessory Surgeprotector

- To provide galvanic separation between the pump controller and any sensors or switches



Lightening surge protection (PV)

- Surge protection to manage external voltage spikes on the incoming solar power supply

Sensors and accessories

Example applications

Case Study Lake Area Landfill

Customer: Republic Services
Sales & Service Partner: GES (Groundwater & Environmental Services, Inc.)
Application: Side Slope Risers
Installation Date: 2019

Challenge: The existing electrics from a well known manufacturer had a very short life and required removing from the risers several times per month for cleaning. Higher viscosity leachate was resulting in motor failures, high costs and pumping downtime.

Results: LORENTZ helical rotor pumps and DC brushless motors pump without failure. Operation and maintenance costs and downtime were significantly reduced. The pumps operated constantly for 18 months before they were pulled for routing cleaning. In addition, full operational data, pump performance data, and fluid level data is available to the customer in real-time from any location via LORENTZ Global.

Case Study Pine Bend Landfill

Customer: Republic Services
Sales & Service Partner: GES (Groundwater & Environmental Services, Inc.)
Application: Condensate Sumps
Installation Date: 2020

Challenge: Cost to run power to the site was prohibitively expensive

Results: Four solar powered pumping systems were installed with battery backup for 24/7 run time capability. The systems were also sized to handle power requirements for heat trace keeping the pipes from freezing. The customer made capital cost savings of \$75,000 with zero ongoing electric power costs. The low power, high performance LORENTZ pumps maintain appropriate levels in the condensate sumps and provide remote management data to the customer.

Case Study - a St. Louis, Missouri Landfill

Sales & Service Partner: Landmarc Environmental
Application: Landfill gas well de-watering
Installation Date: 2020

Challenge: Both pneumatic pumps and electric pumps, from reputable companies, proved unreliable with frequent need for maintenance work. Scaling on the site resulted in the need to frequently pull pumps for cleaning and replacement. With repeated downtime and inadequate performance, the pumps were unable to maintain desired liquid levels within gas extraction wells.

Results: The customer installed a LORENTZ HR-32 system. In the first year of running there has only been one maintenance event and only one day of lost pumping time. The pump system routinely pumps over 1 million gallons a month. The first 14 months of operation extracted 14,184,136 gallons of leachate. The liquid level is now 20' lower than any pump had previously achieved resulting in improved gas extraction. The customer has real time access to liquid level, discharge pressure, liquid temperature, and casing pressure while monitoring pump performance remotely.





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.

Using LORENTZ experience and engineering excellence, a range of products for specialized pumping applications have been developed. These are marketed under the LORENTZ Energy brand and include pumps for oil pumping, landfill liquid extraction and remediation applications.



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