Pump Protection Sand Separators

For Vertical Turbine & Submersible Pumps

Extends pump life by 4x
Sustains higher pump efficiency
Saves on repairs, replacements & energy costs

LAKOS®
FILTRATION SOLUTIONS

PPS

Sand Kills Pumps

Premature sand wear. Lost energy efficiency. Increased operating costs. Interrupted water service.

Excessive & abrasive sand erodes the pump impellers, creating imbalanced rotation & vibration, also stressing the pump's bearings. The wear and lost balance accelerates quickly to dramatically affect flow capacity. Costs include pulling the pump, impeller re-building and often complete pump replacement.

Lost pump efficiency demands longer pumping time to deliver the needed water, resulting in higher energy costs. Agricultural & municipal pumping calculations often reveal annual energy cost increases of $50,000 or more when efficiency drops.

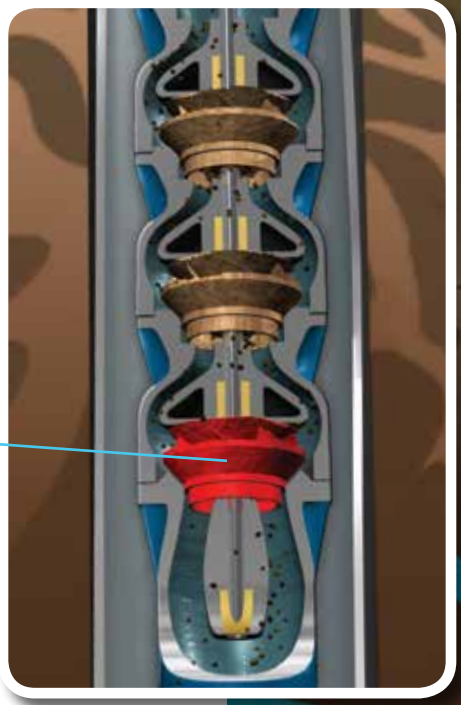
Pump downtime can occur at critical times, risking crop loss, demanding changes to pumping routines, forcing acceptance of higher-rate repair/replacement costs and limiting opportunities for bidding or sourcing more affordable longer-lead-time savings.

Alternative water sources during pump downtime and at peak demand are premium-priced with no time to search limited or better-priced options. Such short-term alternatives disrupt operating routines.

Higher capacity pumps in smaller water wells create greater flow velocity, which carries more sand into water wells.

More pumps operating within an aquifer create more sand movement into water wells.

Changing water tables (both lower and higher) create more movement of sand into water wells.



Abrasive sand directly attacks a pump's impellers and promotes mechanical damage, lost flow efficiency and increased energy costs.

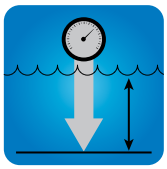
Old casings, cracks and aging allow more sand to infiltrate water wells.

Shifting ground formations, earthquakes and other casing damages cause increased sand infiltration.

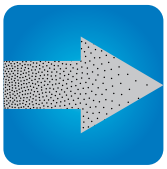
LAKOS Protects Pumps

Exclusive technology prevents pre-mature sand damage.
Extends pump life by 4x or more.

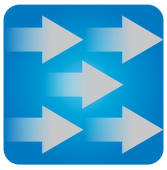
Centrifugal-action performance keeps unwanted sand out of the pump without screens to clog, backwash or service. Maintenance-free operation inside the well provides continuous protection and long-lasting results.



Head pressure from submergence pushes water through the separator to the pump's intake to provide cleaner water to the pump and to the surface. Note submergence requirements in the chart on page 6.



Particle removal performance keeps out 95% of all sand 100-mesh (150 microns). It's not meant to be a "perfect filter", but rather a *pump protector*, extending pump life. Finer sand particles won't harm the pump and are better removed above-ground by finer sand separators or filters. *Rule of thumb: Whatever settles in still water within 2 minutes or less is separable by a LAKOS Pump Protection Sand Separator.* Maximum Particle Size: ¼ inch (6.3 mm). Maximum Particle Concentration: 1,000 ppm.



Sustains optimum pump efficiency and saves the pump from excessive wear. Keeps pump energy costs lower, too.

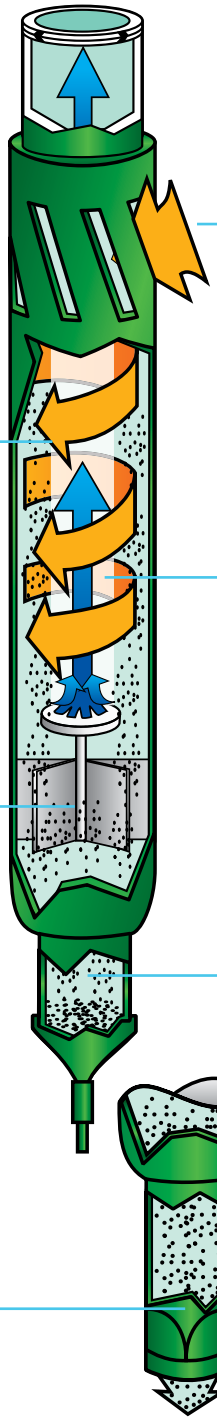
Extends pump life by 4x or more, reducing downtime, pump repairs/replacements and all the troubles that occur when pumps fail to deliver the water as needed.

Where does the sand go?

Separated sand is periodically discharged deep into the well. Experience has proven that accumulation is not an issue to fear. While rare cases occur where the sand accumulation requires bailing of the well, more often the actual flow of the aquifer serves to evacuate much of the sand to prevent troublesome builid-up. In addition, extensive research by Ohio State University addressed this exact concern (Water Well Journal, October 1985). Their study revealed that the accumulation of some sand in the well by a PPS Separator actually changes the inflow path into the well (making it less likely to carry sand into the well) and acts as a secondary filter (as the incoming water into the well now must also pass through the added layer of sand accumulation).

Flow range: 100 - 3,180 U.S. gpm (23 - 723 m^3/hr)
Sub-K models available for lower flow submersible pumps.
Options for VFD (constant pressure/variable flow) pumps available.

How It Works



Sandy water is drawn through tangential inlet slots into separation chamber.

Sand is centrifugally separated from water and tossed to perimeter of chamber.

Sand-free water is drawn to center of separator and up through vortex outlet to pump's suction.

Sand particles fall downward, along perimeter, to bottom of separator.

Flapper Valve CLOSED – Sand accumulates in separator.

Flapper Valve OPEN – Sand discharges deep into well.

PPS Separator

FOR SUBMERSIBLE PUMPS

PPS Separator

FOR TURBINE PUMPS

Four Simple Steps to Sizing a LAKOS Pump Protection Separator

1. **Know and use the actual flow rate.** Do not guess or oversize, since flow and performance are related with sand separators. Find your pump's actual flow in the chart. For VFD pumps, select the highest expected flow (at lower flows in larger pipes, the reduced velocity typically means less sand to worry about).

2. **Verify the minimum well ID.** The chart identifies the minimum requirement to fit the separator in the well and allow the expected flow around the separator. Note that there are often two or more models with different well ID requirements to accommodate a given pump's flow rate.

3. **Check the required submergence.** Does you well have the needed submergence to create head pressure to push water through the separator without causing pump cavitation? See chart. Check other model options for the same flow rate.

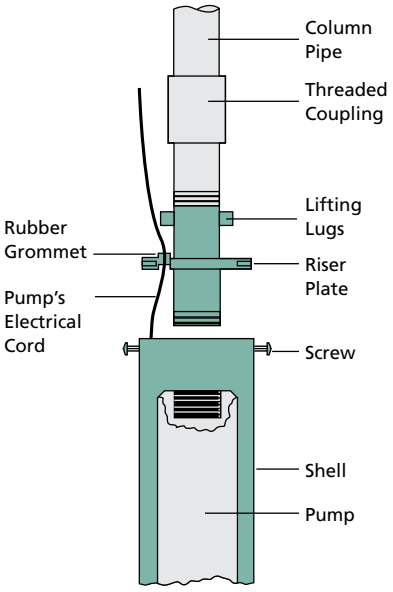
MODEL	1 FLOW RANGE		2 MINIMUM WELL I.D.		3 REQ MIN SUBMERGENCE	
	U.S. gpm	m^3/ hr	in	mm	ft	meters
PPS-100-D	100-175	23-40	6	152	30	9.2
PPS-125-E	125-250	29-57	7	178	30	9.2
PPS-150-F	150-325	34-74	8	203	30	9.2
PPS-325-GSA	325-520	74-118	9-3/4	248	60	18.4
PPS-520-GGA	520-710	118-161	9-3/4	248	60	18.4
PPS-325-G	325-650	74-148	10-3/4	273	30	9.2
PPS-600-HSA	600-910	136-207	12	305	60	18.4
PPS-880-HHA	880-1375	200-312	12	305	60	18.4
PPS-550-H	550-1110	125-252	13-1/4	337	30	9.2
PPS-1290-ISA	1290-1700	293-386	13-1/4	337	60	18.4
PPS-825-I	825-1450	187-329	15-1/4	387	30	9.2
PPS-1460-JSA	1460-2040	332-463	15-1/4	387	60	18.4
PPS-1010-J	1010-1800	230-409	17-1/4	438	30	9.2
PPS-1780-KSA	1780-2420	404-550	17-1/4	438	60	18.4
PPS-1640-K	1640-2560	373-582	19-1/4	489	30	9.2
PPS-2520-KKA	2520-3180	573-723	19-1/4	489	60	18.4

4. **Be sure to allow for clearance below.** A minimum space of 20 feet (6 meters) is recommended between the bottom of the separator and the bottom of the well for separated particle accumulation.

For Submersible Pumps

A pump enclosure shell is necessary with submersible pumps to first direct water through the separator before entering the open area intake of a submersible pump. See illustration at right for details. Key dimensions for proper shell sizing are:

- Overall length of the combined pump & motor assembly
- Largest diameter of the pump/motor assembly
- Size of the submersible pump's riser connection



Shell Kit

you supply the pipe

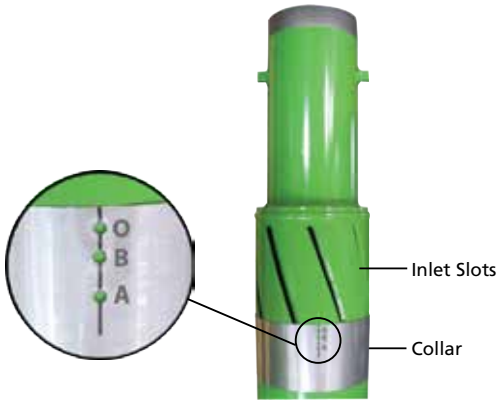
Two options are available for most shells. A *complete shell assembly* can be built by LAKOS and shipped ready-to-install. Typically, a lead-time of 5 days is necessary to build the shell to a pump's actual dimensions. Alternatively, a *submersible shell kit* can be shipped immediately with any in-stock LAKOS PPS Separator for *faster delivery and less shipping cost.* The kit requires only the appropriate length & diameter of shell pipe to be provided at the destination. Two pipe welds and the Shell Kit are ready-to-install.

Optimizing Separator Performance with the Flow Adjustment Collar

Selected models of the PPS Series feature a Flow Adjustment Collar for purposes of fine-tuning the performance of a separator. Properly positioned, the collar maintains optimum acceleration to enhance particle removal for a given flow rate.

Position A is recommended when the pump is operating at the lowest flow range within the separator's overall range for maximum acceleration at low flow.

Position B opens the slotting to allow for more flow in the mid-range.



Position O essentially uncovers the maximum slot opening for the higher flow range.

MODEL	FLOW RANGE U.S. gpm	FLOW RANGE m^3/ hr	POSITION OF COLLAR
PPS-125-E	125-200 200-250	27-45 45-57	Collar On Collar Off
PPS-150-F	150-210 210-275 275-325	34-48 48-62 62-74	A B Collar Off
PPS-325-G	325-425 425-525 525-650	74-97 97-119 119-148	A B Collar Off
PPS-550-H	550-675 676-825 826-1110	125-153 154-187 188-252	A B Collar Off
PPS-825-I	825-1050 1050-1225 1225-1450	187-238 238-278 278-329	A B Collar Off
PPS-1010-J	1010-1275 1275-1450 1450-1800	230-290 290-329 329-409	A B Collar Off
PPS-1640-K	1640-1890 1890-2250 2250-2560	373-429 429-511 511-582	A B Collar Off

When Pumps Operate at High-Flow & Continuous, Long-Term Duty

The LAKOS Tail Pipe is recommended when operating at the high-end of a PPS Separator's flow range and the pump operates continuously for long periods of time. Instead of the Flapper Valve, the tail pipe is not dependent on flow interruption or influenced by head pressure to open/close the flapper for sand discharge. The small-diameter tail pipe is always open to allow separated sand to continuously discharge without any concern for over-accumulation of sand.

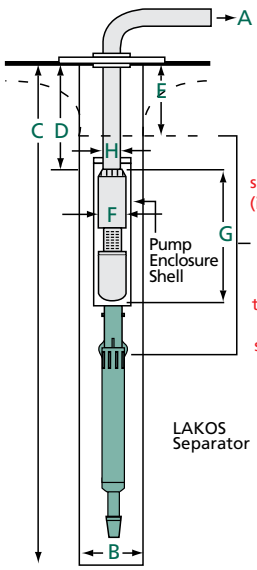
See the illustration at right and the flow recommendations for use of the tail pipe. LAKOS can provide the clamp-on tail pipe adapter connection or the entire tail pipe kit.

MODEL	APPLICABLE FLOW RANGE U.S. gpm	APPLICABLE FLOW RANGE m^3/ hr	TAIL PIPE SIZE diameter in	TAIL PIPE SIZE diameter mm	TAIL PIPE SIZE length ft	TAIL PIPE SIZE length meters
PPS-100-D	160-175	36-40	3/4	19.1	20	6.1
PPS-125-E	225-250	51-57	1	25.4	20	6.1
PPS-150-F	290-325	66-74	1	25.4	20	6.1
PPS-325-GSA	480-520	109-118	1-1/4	31.7	40	12.2
PPS-520-GGA	670-710	152-161	1-1/4	31.7	40	12.2
PPS-325-G	585-650	133-148	1-1/4	31.7	20	6.1
PPS-600-HSA	845-910	192-207	1-1/2	38.1	60	18.3
PPS-880-HHA	1275-1375	290-312	1-1/2	38.1	60	18.3
PPS-550-H	995-1110	226-252	1-1/2	38.1	20	6.1
PPS-1290-ISA	1620-1700	368-386	1-1/2	38.1	60	18.3
PPS-825-I	1325-1450	301-329	1-1/2	38.1	20	6.1
PPS-1460-JSA	1925-2040	437-463	2	50.8	60	18.3
PPS-1010-J	1640-1800	372-409	2	50.8	20	6.1
PPS-1780-KSA	2292-2420	521-550	2	50.8	60	18.3
PPS-1640-K	2375-2560	539-581	2	50.8	20	6.1
PPS-2520-KKA	3045-3180	692-722	2	50.8	60	18.3

Important Dimensions

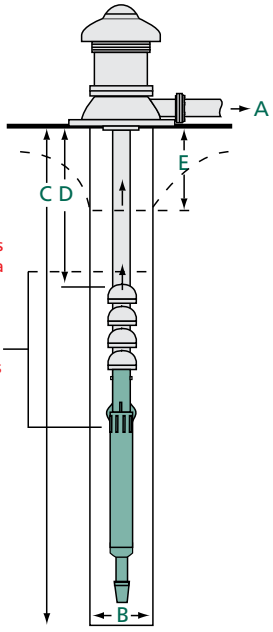
MODEL	OUTSIDE DIAMETER		LENGTH W/ RISER & FLAPPER VALVE		RISER SIZE	WEIGHT	
	in	mm	in	mm	N.P.T.	lbs	kg
PPS-100-D	4-7/8	124	88-3/8	2245	2-1/2"	93	42
PPS-125-E	5-9/16	141	107	2718	3"	142	64
PPS-150-F	6-5/8	168	120-1/4	3054	4"	220	100
PPS-325-GSA	8-5/8	219	124-3/16	3154	6"	191	87
PPS-520-GGA	8-5/8	219	130	3302	6"	213	97
PPS-325-G	8-5/8	219	132-5/8	3369	6"	267	121
PPS-600-HSA	10-5/8	270	141-1/2	3594	8"	281	128
PPS-880-HHA	10-5/8	270	145-3/4	3702	8"	315	143
PPS-550-H	10-3/4	273	147-1/2	3747	8"	390	177
PPS-1290-ISA	10-3/4	273	150-3/4	3829	8"	393	178
PPS-825-I	12-3/4	324	153-1/4	3893	8"	454	206
PPS-1460-JSA	12-3/4	324	158	4013	10"	492	223
PPS-1010-J	14	356	163	4140	10"	526	239
PPS-1780-KSA	14	356	170	4318	10"	575	261
PPS-1640-K	16	406	185	4699	10"	703	319
PPS-2520-KKA	16	406	201	5105	12"	754	342

For Submersible Pumps



IMPORTANT
Separator models with single-letter designations (i.e. D, E, F, etc.) require a minimum submergence of 30 feet (9.2m) below the drawdown water level. Models with three-letter designations require 60 feet (18.3m) submergence. Minimum clearance below separator's purge discharge: 20 feet (6m)

For Turbine Pumps



A long history of pump protection

It was in the early 1950's that Claude Laval Jr. first invented downhole camera technology to examine water well conditions deep within a well. This revolutionary equipment provided not only clear details of a water well's condition, but also confirmed that sand infiltration was a common occurrence, especially when water wells are asked to provide maximum water production with more open area to allow water (and sand) into the well.

Thousands of Pump Protection Sand Separators have been installed over the years. Today, the technology is largely the same. It is superior to pump shrouds or other techniques for keeping sand out of the pump. Water wells in sandy aquifers naturally pass sand. LAKOS Pump Protection Sand Separators provide the only logical alternative without causing reduced flow productivity.

Other LAKOS Filtration Products

Low Flow Sand Separators

Hi-Flow Centrifugal-Action Sand Separators

PC Self-Cleaning Pump Intake Screens

Low-Flow Submersible Pump Protection Separators

SST- Stainless Steel Sand Media Filtration Systems

PROII- Powder-Coated Carbon Steel Sand Media Filtration Systems

LAKOS FILTRATION SOLUTIONS

LS-990D (Rev. 12/21)

1365 North Clovis Avenue Fresno, California 93727 USA
Telephone: (559) 255-1601 | info@lakos.com | www.lakos.com