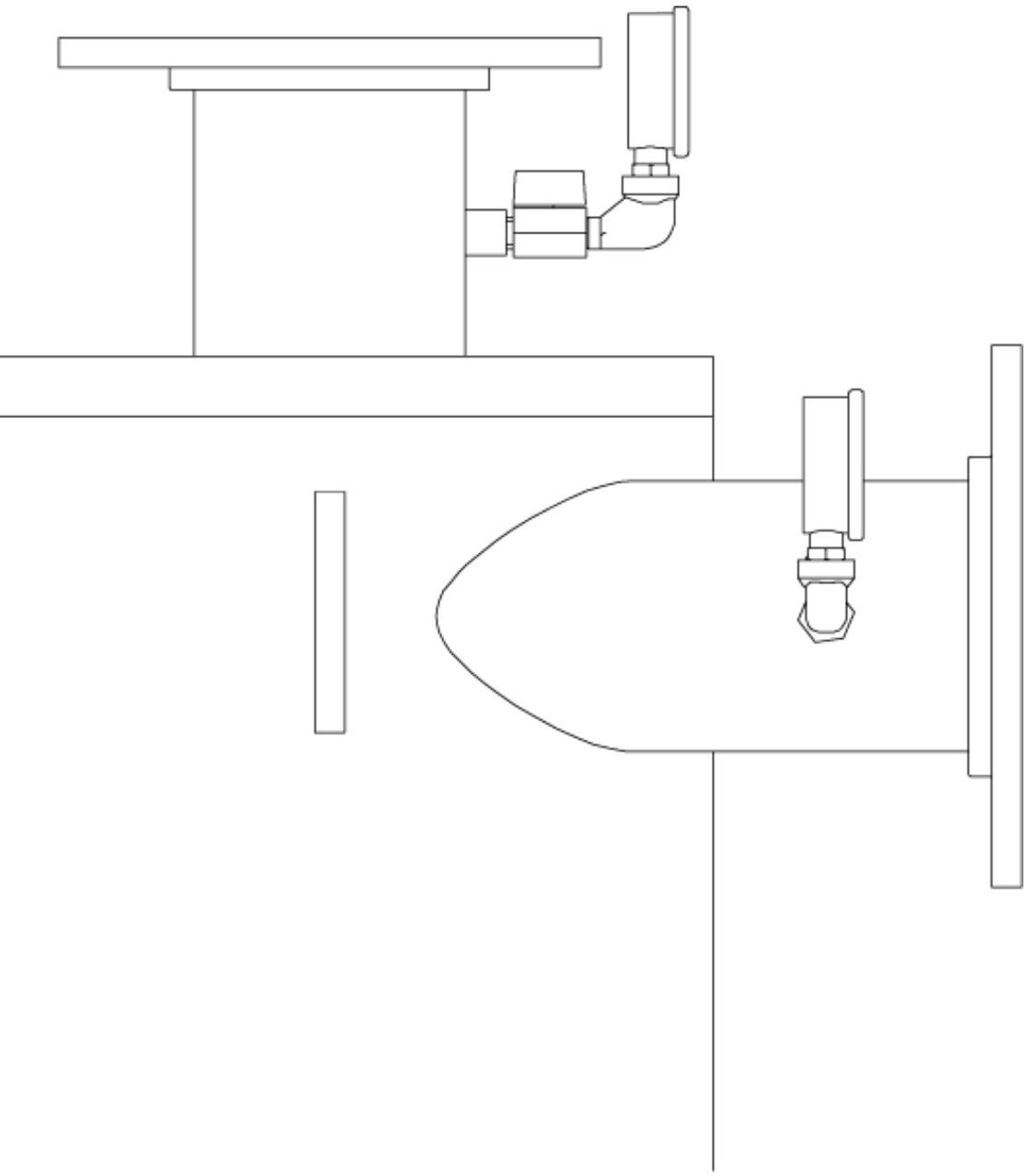


LAKOS Waterworks

PWC Series Sand Separators

Installation & Operation Manual

LAKOS FILTRATION SOLUTIONS

LS-829C (Rev. 11/18)

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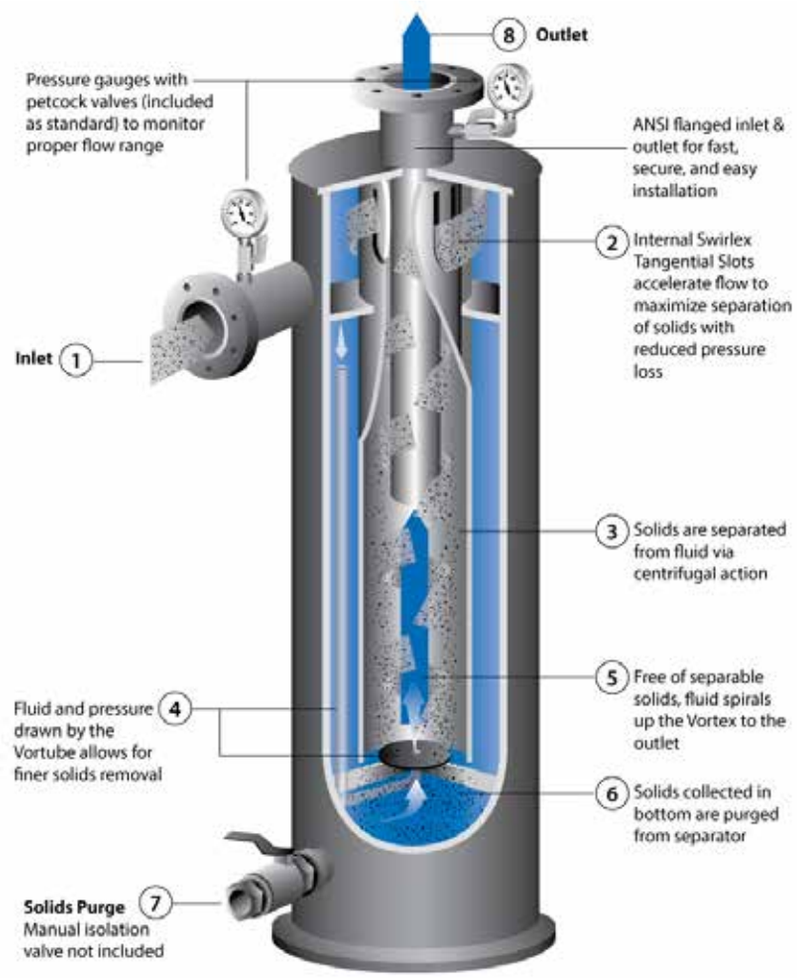
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Separator Operation



LAKOS Separators are designed specifically to remove solids from liquids. Each model is calculated for use within a prescribed flow range for maximum performance and solids removal. Flow rates above and below the recommended range may affect such performance.

Upon tangential entry, the liquid/solids are drawn through internal tangential slots and accelerated into the separation chamber where solids heavier than the carrying liquid are centrifugally separated and allowed to accumulate in the unit's collection chamber for eventual purging. The liquid (free of separable solids) is then drawn to the vortex and up through the separator's outlet.

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Separator Operation *continued...*

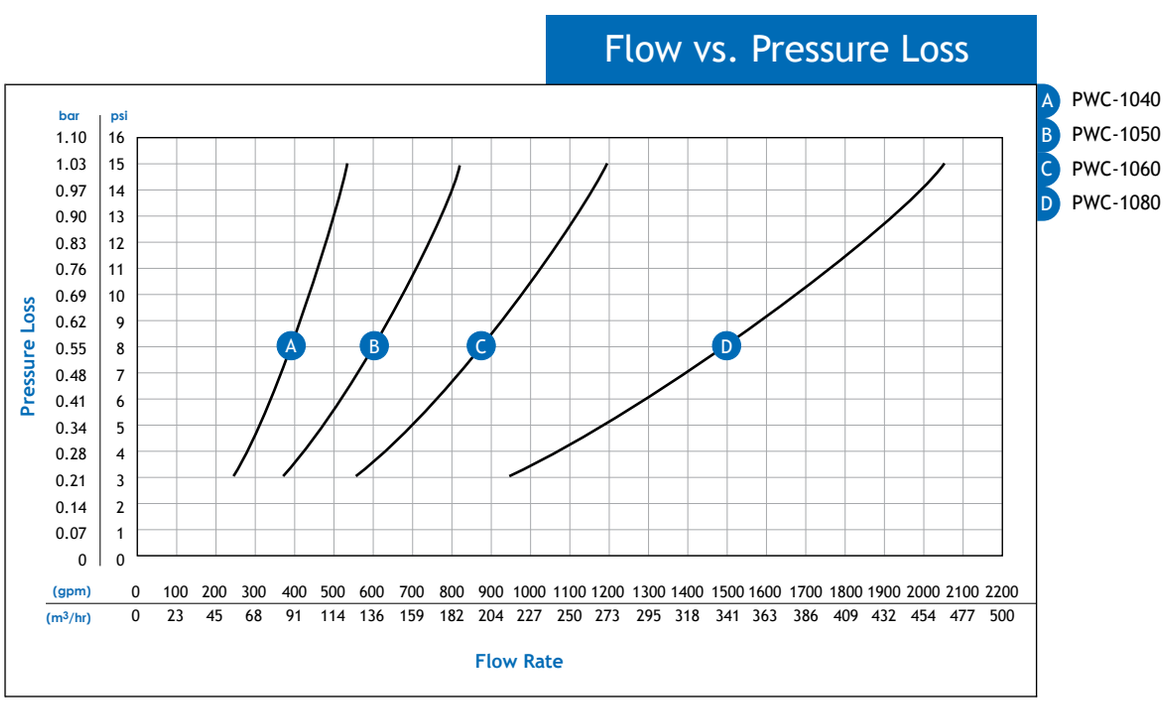
Separator Model and Flow Chart

Flow range is critical for model selection. Do not use flange size.

Model*	Flow Range** U.S. gpm	Flow Range** m^3/hr	Inlet/Outlet ANSI Flange	Purge Size Male N.P.T.	Collection Chamber Capacity gal	Collection Chamber Capacity liters	Weight Empty lbs.	Weight Empty kg	Weight with Water lbs	Weight with Water kg
PWC-1040-L	240-540	55-123	4 inch	1-1/2"	0.8	3.1	547	248	889	403
PWC-1040-V					1.6	5.9	495	224	815	370
PWC-1050-L	370-820	84-186	6 inch	1-1/2"	0.7	2.5	775	351	1394	632
PWC-1050-V					3.0	11.2	752	341	1370	621
PWC-1060-L	550-1200	125-273	6 inch	1-1/2"	1.3	4.8	1108	502	2304	1045
PWC-1060-V					6.4	24.3	1103	500	2297	1042
PWC-1080-L	940-2060	213-468	8 inch	1-1/2"	2.1	8.1	1694	768	3858	1750
PWC-1080-V					7.8	29.4	1689	766	3757	1704

* Models ending with "L" are low profile; "V" are vertical profile

** Flow range is critical to separator performance. Do not oversize separator or use pipe size for model selection



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Installation Instructions

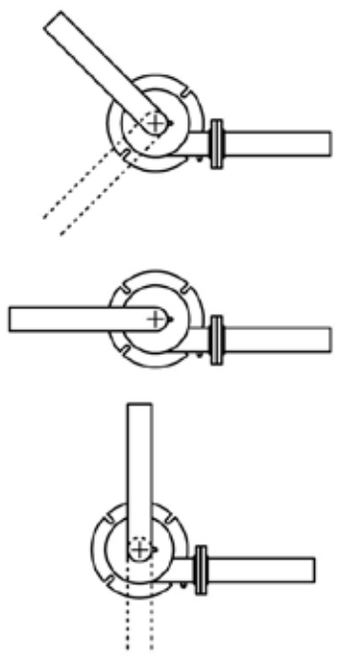
1. LAKOS Separators are shipped on skids or in wooden crates. Support legs (22 ½° low profile models only) are detached and included with shipping. Lifting lugs, located on the unit's side, are provided for hoisting as necessary.
2. A suitable foundation is necessary to accommodate the LAKOS Separator's weight *including liquid* (see chart, page 4). Anchor bolts are recommended in the base of the legs (low profile) or skirt (vertical profile).
3. Prior to installation, inspect the inlet/outlet/purge connections for foreign objects incurred during shipping/storage.
4. Inlet/outlet pipe connections to the LAKOS Separator should be a straight run of at least five pipe diameters to minimize turbulence and enhance performance.
5. Proper purge hardware and/or solids-handling equipment is required to flush separated solids from the separator.
6. All LAKOS Separators operate within a prescribed flow range (pipe size is not a factor in model selection). Use appropriate hardware to match the inlet/outlet to system piping. Connection hardware for the inlet/outlet is not included with the separator.
7. Inlet pressure to the LAKOS Separator must be at least equal to or greater than the anticipated pressure loss through the separator plus 15 psi (1 bar) plus whatever downstream pressure is required. See (page 4) for "Flow vs. Pressure Loss" chart.
8. Pressure gauges (included) are required at both the inlet and outlet of the separator in order to monitor pressure loss and proper flow. If separator operates with an open discharge, a valve (not included) should be installed, after the separator's outlet to create a back pressure of at least 5 psi (0.3 bar).
9. Winterizing is important if the LAKOS Separator is to remain idle in freezing temperatures. Drain liquid as necessary to avoid expansion of water to ice and related damage.

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Recommended Inlet and Outlet Piping

The direction of inlet and outlet piping connections is important to minimize any potential effects from vibration.

LAKOS recommends the following inlet & outlet piping connection configurations. Consult factory for other options if these piping configurations cannot be accommodated.



Purging

1. **LAKOS Separators must be purged regularly.** Otherwise, the accumulation of separated solids will overfill the separator's collection chamber, substantially affecting performance and causing undo wear.

2. Several purging options are available and all may be performed while the LAKOS Separator is in full operation.
    a. Manual: A full-port, straight-through valve may be installed on the standard purge opening and actuated manually as necessary to purge separated solids.
    b. Automatic: Ensures that this important function is performed regularly to optimize particle removal performance. Timer-based motorized ball valve and other techniques are available. Consult LAKOS for more details.

3. A manual valve should be installed between the purge outlet of the LAKOS Separator and any automatic purge hardware. This provides a simple means for maintaining full operation, closing the purge outlet and operating the purge manually, should the automatic valve require servicing or replacement.

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4. ***Important:*** All purge hardware should be installed prior to any elbows or turns in the purge piping. Avoid "uphill" purging, which can clog piping and hinder effective solids evacuation.

5. To determine the necessary frequency, purge often at first and calculate the proper rate with regard to the actual volume of separated solids. Purge duration should be long enough to evacuate the purge chamber of solids. Frequency of purge should prevent the time it takes to fill the collection chamber more than approximately ⅓ its collection chamber capacity. Purging should prevent separated solids from accumulating in collection chamber for longer periods of time. Consult your LAKOS representative for specific recommendations regarding your application.

6. When operating in sub-freezing temperatures, be sure to protect the separator's collection chamber and all purge line piping from freezing.

Maintenance Recommendations

Periodic inspection of selected separator components is recommended to assure proper long-term operating performance.

1. Purge valve: Inspect the purge valve for proper operation. Use manual override button to initiate a purge cycle; observe purge flow and note that it should run clear before valve begins to close; if not, re-set programming to purge for a longer duration. If valve leaks, replace necessary parts.

2. Hand-hole clean-out: At least annually (or when separator is shut-down for other system servicing routines), open the hand-hole clean-out and inspect for solids accumulation or unwanted build-up in the separator's collection chamber. If necessary, remove excessive debris. Inspect gasket and replace if necessary. Check purge programming to be sure it is adequate to remove separated solids; if not, re-set to extend duration and/or frequency of valve actuation.

3. Pressure Gauges: The gauges installed on the inlet & outlet of the LAKOS Separator help monitor proper flow through the separator. They are NOT indicative of solids accumulation and should NOT be used to determine when to purge the separator. Gauges should read a pressure differential loss of 3-15 psi from inlet to outlet and that differential should remain steady with the flow of water through the separator. Fluctuations in gauge readings indicate:
    a. A change in pump flow – Inspect pump for proper operation and/or downstream piping/equipment for conditions that could create backpressure on the system flow.
    b. An obstruction in the separator – Internal slots may be clogged by unusual solids. Use inspection plug and a video scope to examine & remove blockages from internal slotting. Consult LAKOS if necessary.

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c. Gauge blockage – Close petcock valve, remove gauge and check for debris clogging the gauge port, which could affect an accurate gauge reading.

Trouble-shooting Guidelines for Separator Installations

1. Verify Actual Flow Rate: Use pressure gauges to indicate differential pressure and/or flow meter to verify flow rate. (Multiple pumps used to increase flow are installed in parallel (into common manifold); multiple pumps to increase pressure are installed in series (one after another)).

   Flow meters should be installed prior to the separator. Flow meters installed after the separator may indicate erroneous data.

2. Plumbing Two Separators: Do not plumb two separators from two independent pumps into the same outlet header without installing balancing valves on the discharge of each separator. The balancing valves must be set to achieve a pressure loss across each separator that indicates a proper flow rate (according to that model's published flow chart) equal to the flow rate anticipated through the pump that feeds each separator.

3. Verify Actual Inlet Pressure: Actual inlet pressure must be at least 15 psi (1.03 Bar). A minimum backpressure of 5 psi (.34 Bar) must be created at the separator discharge. This may be accomplished via process equipment, piping, or a valve. Unrestricted open discharge to a pit, sump, etc., will result in unacceptable performance.

   Be sure that no source of vacuum/suction exists in the piping arrangement. If vacuum/suction exists (i.e. downward piping after the separator, pump suction installation, booster pump etc.), put a valve between the separator and the suction source and pressure gauges on either side of the valve. Throttle the flow until the pressure loss across the separator indicates the published flow rate which most closely resembles the anticipated flow rate through the separator.

4. Vibration: Mild vibration is possible in some installations and should be considered normal. Excessive vibration is typically due to entrained air (use air vents), improper piping (follow the installation instructions) or system vibration (amplified at the separator).

   Units should be secured properly to the floor or wall. If separator is hung, stabilizers may need to be added. The foundation must be sturdy enough to support the weight of the product (see page 4 for separator weight with water).

   The use of expansion joints is advisable with all separator installations. It is particularly recommended that these devices be employed when piping arrangements cannot comply with the configurations suggested by LAKOS product literature.

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5. Vertical Units: Be aware that solids may accumulate within the separator for a period of time until the solids reach the level of the purge outlet. The purge outlet is not flush with the bottom of the solids collection chamber.

6. Purging: Purge line piping should be as straight as possible to desired disposal destination. Avoid uphill piping, multiple elbows and low points where solids may accumulate and block the piping. Unless advised otherwise, do not reduce the piping size from that of the separator's purge outlet size; restrictions can cause blockage and prevent proper purging of separated solids.

   Purge duration should be long enough to not only evacuate solids from the separator, but also to push the solids through the entire length of purge line piping to desired disposal. Typically, we recommend that you program automatic valves, especially motorized ball valves, to purge for no less than 25 seconds. This provides time for the valve to remain fully open long enough to flush a separator's collection chamber. Consult LAKOS for unusual circumstances.

   IMPORTANT: Note that the collection chamber capacity of each separator (see page 4) should typically not be exceeded by more than 1/3-full (or less); the solids must include sufficient fluid to navigate the purge valve & purge line piping. It depends on the solids' capacity to compact and the time frame it takes to accumulate in the separator. Generally, solids should not be allowed to accumulate in the separator's collection chamber for long periods of time; purging at least daily is recommended when the separator is in operation, more often if the solids tend to compact tightly/easily.
   Continuous purging should not exceed 10% of the inlet flow. The use of a valve to bleed solids from a separator must be monitored to be sure that the reduced orifice does not become clogged with solids.

   Oversizing the purge line piping may allow solids to settle in the piping; be aware that velocity is needed to flush solids through the purge line piping.

   Estimated water & solids volume through a 1 ½ inch purge outlet is estimated at 35-150 gallons (135-720 liters); that's a combination of both solids and liquid. The variable takes into account the separator size, flow rate and system pressure. Allow adequate drainage or retention capacity for this volume per purge cycle. Consult LAKOS for options to further concentrate solids and recover/manage purged liquid.

7. Bi-Sep Configuration: Two-stage separators installed in series must be purged separately. Do not join purge outlets from two or more separators.

8. Flanges: All flanges should have the appropriate gasket/seal in order to ensure a leak-free installation. All hand-hole clean-out ports and other internal access devices should also be properly re-sealed after use.

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Trouble-shooting Guidelines for Separator Installations *continued…*

9. Air Relief Ports: The appropriate air relief ports should be used at start-up to expel air from the separator.

   If the separator will be drained periodically or exposed to entrained air or gases from the piping system, air vents should be permanently installed.

10. Down Stream Filtration: The use of finer filtration (polishing) downstream from the separator is a common application. Be aware, however, that the barrier filter (as it accumulates more solids) causes an increasing pressure loss, which may cause the flow rate of the system to be reduced - sometimes below the recommended flow rate of the separator. This situation will often reveal itself when typically separable solids begin to show up regularly on the downstream barrier filter (leading to the assumption that the separator is not operating as expected). Always check for variations in the flow rate when downstream conditions change.

Notes

Separator Model: _____

Sales Order #: _____

Purchase Date: _____

Distributor: _____

System Flow: _____

Inlet-to-Outlet Differential: _____

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