



Food and Beverage

Oenoflow™ PRO XL System

Pall's expertise at your fingertips





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Pall's new **Oenoflow PRO XL system** simplifies process control for the modern winemaker by connecting your specific operation with Pall's global experience.

Oenoflow PRO XL systems deliver a first in its class technology to enhance filtration throughput and reduce filtration operating expenses.



The Oenoflow PRO XL system introduces Pall's new **Optimizer algorithm** which automatically adjusts system settings in real time based on the wine's individual physical and chemical characteristics.

These optimized settings replace standard settings that are not efficient for every production cycle. The Oenoflow PRO Optimizer algorithm learns and adjusts settings to help wineries get the best results from each filtration.

With this highly enhanced performance, wineries with the new Oenoflow PRO XL system can realize an estimated 10% savings in OPEX when compared to traditional Oenoflow systems.^{1,2} A summary of field trial results that measured operating expense improvements is shown below.

Combined OPEX Improvement Based on Phase 1 and Phase 2 Site-Aggregated Expenses

Aggregated OPEX (Sites GR1 and SO)						
Week	Baseline (Phase 1)			Optimizer-Enabled (Phase 2)		
		Baseline Volume	AVG Baseline		Optimized Volume	AVG Optimized
	Total OPEX (€)	Total Production (hl)	BASELINE OPEX (€/hl)	Total OPEX (€)	Total Production (hl)	OPTIMIZER OPEX (€/hl)
		47,167 hl	0.30 €/hl		59,808 hl	0.25 €/hl
1	1,629	6,107	0.27			
2	1,909	7,090	0.27			
3	4,162	13,243	0.31			
4	4,192	12,920	0.32			
5	2,225	7,808	0.28			
6				4,550	19,057	0.24
7				2,047	6,338	0.32
8				2,697	13,579	0.20
9				4,153	15,837	0.26
10				1,442	4,997	0.29

With the Oenoflow PRO system's advanced automation and ease of use, customers can expect fewer operator errors and eliminate the performance variability between operators.

Oenoflow PRO with Optimizer even allows new operators to manage the system at full efficiency on their first day by harnessing the global filtration experience of Pall coupled with the ease of use of the new Oenoflow PRO system software.



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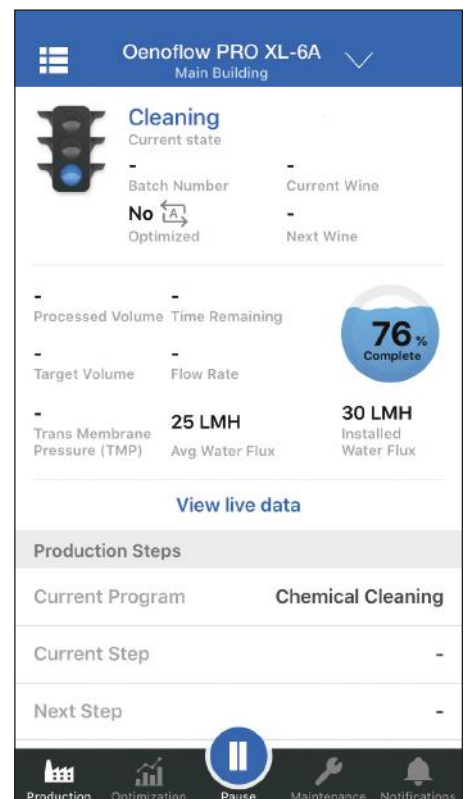
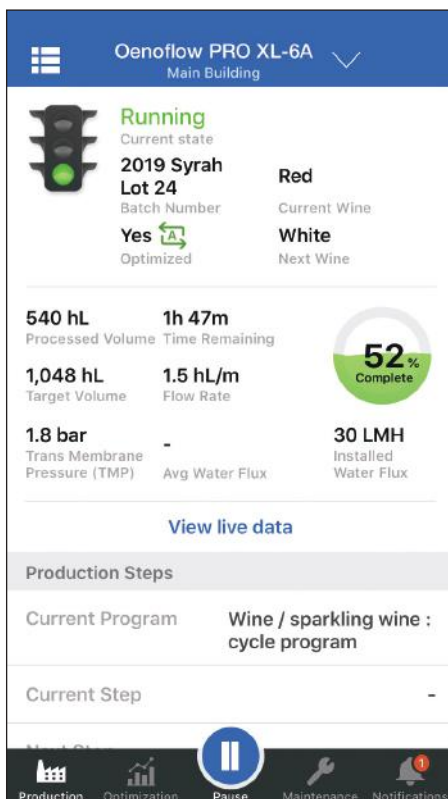
The Oenoflow PRO system is composed of 4 main components:

1 The Oenoflow PRO System runs Pall's new Optimizer algorithm and is connected to Pall servers via a secure connection.³

- The Optimizer algorithm receives updates via remote connection, but the system will continue to operate if the connection is interrupted.
- The Optimizer algorithm adjusts all filtration related system settings; the user only needs to input some limited batch information at the start of filtration.
- The algorithm can easily be enabled or disabled by the user at any time.

2 iOS and Android Oenoflow PRO apps are available and will connect to the customer's Oenoflow PRO system(s).

- Multiple user levels assignable by winery's "Supervisor" role for site specific access control
- Push notifications for alarms and status updates
- Live data view for real time visualization of production data and for remote diagnosis
- Operating expense summaries by machine and site classified by expense type
- Remote "System Pause" function available if enabled by customer, no remote restart possible
- Storage of customer manuals, spare parts lists and service contacts.
- Service event history entry





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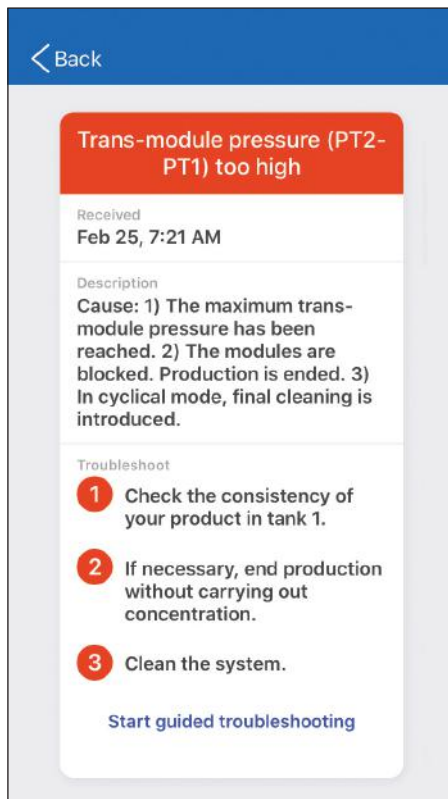
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3 Browser based dashboard for desktop access. www.OenoflowPRO.pall.com

- Multiple user levels are assignable by customer's "Supervisor" role for site specific access control
- Push notifications for alarms and status updates
- Live data view for real time visualization of production data
- Operating expense summaries by machine and site classified by expense type
- Batch history for full traceability

- Storage of manuals, spare parts lists and service contacts.
- Service event history entry
- Customer managed system document storage for items such as audit reports, customer SOP's etc

4 New HMI (Human Machine Interface) for simplified operation and consistency with Oenoflow PRO app and dashboard appearance.



¹ For current customers who already own an Oenoflow XL-A or XL-S system, please contact a Pall representative for details on how to upgrade the existing unit.

² 10% Operating expense saving is based on prior experiences and should not be used to predict future performance.

³ Data/Connectivity FAQ available



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Summary

- Executives/managers can track OPEX for each system, each winery or for the entire winery group as needed. The Oenoflow PRO system simplifies operations by aggregating data from each machine into customer specific dashboard.
- Production supervisors can access data in the dashboard and download reports showing the filtration history of each machine, including rinse verification recorded by the included conductivity meter.
- Operators can use the new Oenoflow PRO system's mobile or desktop app to view live production status, volume remaining to be filtered and alarms. This will allow them more freedom to perform other duties while operating the Oenoflow PRO system. The HMI screen on the Oenoflow PRO system itself is also updated further enhancing ease of use.
- Maintenance personnel can use the new Oenoflow PRO mobile or desktop app to access manuals, spare parts lists, service records and even request a service visit from Pall technicians.
- Pall technicians can start remote diagnosis of system issues as soon as they are notified. This saves significant time and may in some cases completely avoid the need for an on-site visit.

The new Oenoflow PRO system and its unique Optimizer algorithm combine sixty years of Pall expertise with the very latest in filtration technology. These advances, coupled with the additional ease of use, deliver a truly innovative system that meets the needs of a 21st century winery.

XL Modules Have More Than Twice the Area of Most Competitive Modules

By eliminating the drawbacks of traditional diatomaceous earth (DE) and sheet filtration, Oenoflow filtration systems have become the preferred technology in the wine-making industry.

The hollow fiber system enables wineries to remove suspended contaminants from wine in a reliable, reproducible and single process step. Clarification is achieved without the need for filter aids, centrifugation or interference with the chemical, physical or organoleptic components of the wine.

Cost savings is realized by reducing wine loss, consumables and labor. Furthermore, with a DE-free process and no solid waste for landfill, both environmental and operator safety are improved.

A Remarkable Membrane

Wine is a fluid rich in complexity with a delicate chemical and physical balance. It is essential to work with an inert filtration membrane to preserve the taste and balance. At the same time, the contaminants, whether from wine's natural evolution or a result of the manufacturing process, can be very small in size. The membrane must be designed to handle these solids whilst preventing blockage.

Manufactured in polyvinylidene fluoride (PVDF), the Oenoflow membrane has a balanced solid-void ratio that permits operation even with high solids loading. The homogenous structure guarantees resistance to abrasion and high flow rates without compromising reliability, even with aggressive cleaning regimes.

Twenty years of experience in the field and absolute excellence in performance, clearly demonstrates the technical superiority of this proprietary membrane.



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XL Modules

The large diameter Oenoflow XL modules incorporate Pall's proven PVDF membrane with 21.5 m² of surface area the XL modules have at least twice the area of most competitive hollow fiber membranes

These high flow modules allow Pall to manufacture more compact and therefore more economical systems. With a smaller footprint and less water and chemical consumption, Oenoflow XL systems are in line with many wineries sustainability programs. Oenoflow XL modules have been qualified for compliance to specific regulatory standards for products coming into contact with foodstuffs. For further details, please contact Pall.

Additional Oenoflow PRO XL System Benefits

- On-board concentration and filtrate tanks for operation independent of winery conditions
- Low capital investment per m² of filter area
- Low water and chemical consumption
- Maximum respect for the organoleptic wine characteristics
- Consistent filtrate quality: low turbidity (<1 NTU), reduced filterability index and low microbiological count
- High yield and low waste volumes due to the patented final concentration step (Typical loss < 0.3 %)
- No additional pre-clarification or separation requirement
 - fewer wine movements
 - reduced labor costs
- No filter aid requirement
 - reduced product handling
 - reduced waste disposal for landfill
- Compact footprint for easy installation and flexible operation throughout the winery
- Meeting Expectations

To meet the different needs and expectations of wineries of all sizes, the Oenoflow PRO XL system is available in different configurations. Whilst the system size and level of automation may vary, they all share the same operating principles, membranes, performance, warranties, product quality, reliability and safety.

Oenoflow PRO XL-S

- Fully automatic operation capable of combining filtration, recovery and cleaning cycles with the **Pall Oenoflow PRO Optimizer** algorithm
- From 3 to 6 modules
- On-board process and cleaning tank
- Simple and logical PLC control with touch screen
- Automatic chemical dosing
- Small batch filtration program
- High efficiency "solo" water backwash cleanings
- Customizable options include: LCV (Low Concentration Volume), remote wine transfer pump, dual pre-filter screens, external bleed.





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Oenoflow PRO XL-A

- Fully automatic operation capable of combining filtration, recovery and cleaning cycles with the **Pall Oenoflow PRO Optimizer** algorithm
- From 5 to 18+ modules.
- On-board process and cleaning tank with incoming wine transfer pump
- Simple and logical PLC control with color touch screen
- Automatic chemical dosing
- High efficiency "solo" water backwash cleanings
- Data monitoring and process trend recording
- Automatic Module Gross Failure Test
- Wide selection of customizable options: turbidity meter, automatic dual pre-filter screens, LCV (Low Concentration Volume), TDS (Tank Distribution System) for 3 inlets and 3 outlet



Oenoflow XL-E Systems are not currently available with Oenoflow PRO software.



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Oenoflow XL Application Range

While the flow rates are strongly influenced by the type of wine, the level of pre-treatment and settling time, the table below provides a guideline for average flow rates considering 6 to 8 hours of continuous operation.

Number of Modules	System		Average Flow	
	XL-S	XL-A	hl/h	US gph
3	✓		30 - 45	800 - 1180
4	✓		40 - 60	1050 - 1580
5	✓	✓	50 - 75	1300 - 2000
6	✓	✓	60 - 90	1580 - 2375
8		✓	80 - 120	2100 - 3170
10		✓	100 - 150	2640 - 3950
12		✓	120 - 180	3170 - 4750
14		✓	140 - 210	3700 - 5550
16		✓	160 - 240	4225 - 6350
18		✓	180 - 270	4750 - 7100

Quality and Maintenance

The Oenoflow PRO XL systems utilize components with proven reliability from well-known, industry-accepted manufacturers. This allows for convenient supply of spare parts anywhere in the world.

Qualified Pall personnel are available to carry out scheduled maintenance service for objective verification of the operating system, ensuring optimal use.



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Please contact Pall Corporation to verify that the product conforms to your national legislation and/or regional regulatory requirements for water and food contact use.

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