VA FILTRATION USA
125 Gateway Rd. E, Ste D
Napa, CA 94558
Tel : (707) 552 2616
Fax :(707) 552 3871
Web : www.vafiltration.com

OPERATING MANUAL – LO-CROSS-FLOW CF8-4-400SA

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TECHNICAL SPECIFICATIONS

Model	: CF8-4-400 Single Phase
Filtration rate	: 400-600 gallons per hour Max
Maximum operating pressure	: 50 psi
Power requirement	: 110V, single phase power
Maximum cleaning fluid temp	: 130°F
Cleaning chemicals	: TSP (non-chlorinated), Hydrogen Peroxide, Citric acid
Expected loss	: 3 – 5 gallons per run
Average NTU of filtered wine	: <0.5 NTU

TECHNICAL SUPPORT

Technical support is available Monday through Friday 7:30 am – 5:00 pm. We do not provide technical support on the weekends unless previously arranged.

What you need before you start:

- Cleaning sump/tank – about 50-60 gallons
- TSP; hydrogen peroxide (32%); citric acid
- Hoses
- Drain
- Nitrogen or Argon for purging
- Safety goggles
- Chlorine free hot (130F) and cold water

SAFETY

It is imperative that safety goggles are worn by all operators operating the equipment at all times!

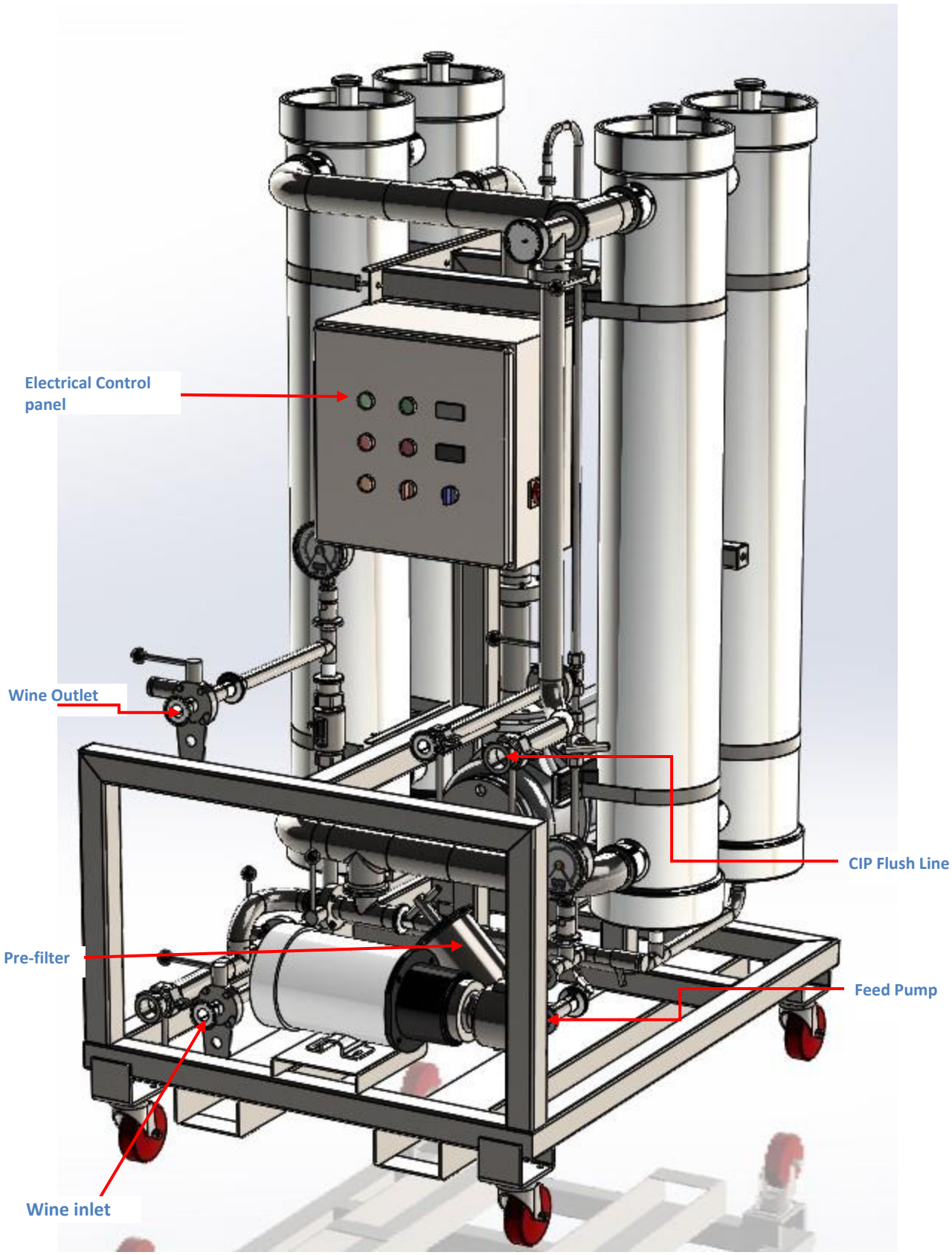
IMPORTANT TO REMEMBER!

- Do not use chlorine or Ozone for cleaning of membranes under any circumstances.
- DO NOT USE KOH OR NaOH UNDER ANY CIRCUMSTANCES FOR CLEANING PURPOSES. If used incorrectly membrane damage can occur.
- Check to make sure what voltage your system operates at before connecting to the power supply. This will be located on the front control panel.
- Before starting for the first time, check pump rotation on the crossflow pump and use an electrician if pumps are running the wrong direction. The feed pump won't matter since it is on a variable speed drive.
- Make sure you do not run the pumps against closed valves or without liquid.
- PLEASE, READ THESE INSTRUCTIONS COMPLETELY, PRIOR TO OPERATION. WE ARE NOT RESPONSIBLE FOR WINE LOSS DUE TO NEGLIGENCE OR FAILURE TO FOLLOW THE CORRECT OPERATING PROCEDURE!
- Check pre-filter regularly for debris build-up and clean if necessary

BACKGROUND ON THE SYSTEM

The CF8-4-400 Single Phase, hereinafter called the SYSTEM has been designed for the filtration of small to medium lots of wine. The system uses 0.2 um PVDF spiral wound membrane elements, selected for their quality and integrity under the most demanding filtration applications – they just don't break! Classic cross flow systems utilize hollow fiber membranes made up of between 5,000 and 50,000 hollow fibers, depending on the size of the system. If any of the fibers break during filtration, the integrity of the system is compromised and typically re-filtration is necessary. With flat sheet elements, this is not a factor.

Flow rates will greatly depend on the wine temperature, turbidity, RS levels and bacteria loads. The cleaner the wine, the longer the system is going to deliver a constant flow rate. The optimal wine temperature for filtration is White – Minimum 40°F and RED minimum 40°F. It is possible to filter at lower temperatures, but the operating pressure will be higher and the flow rates will be lower.


Electrical Control panel
Wine Outlet
CIP Flush Line
Pre-filter
Feed Pump
Wine inlet

GETTING STARTED

Electrical

- Connect the power cable to a 110V, 1 phase electrical outlet
- Do not turn the pumps on yet
- In order to start the feed pump, push the Green Start button marked Feed Pump.

Control System Explained

High Pressure Trip Alarm

This light indicates when the high pressure on the pressure gauge reaches the set point of 50 psi. When lit, the feed pump and crossflow pumps both switch off. To reset, press this same button. You will need to restart the pumps manually.

Low Flow Switch

This switch allows you to run the machine automatically. When the flow meter reaches a low flow setting (50 gal/hr), the machine automatically switches off. This is used when the machine is left unattended and starts plugging up. It will either trip on low flow or high pressure. Only switch this on AFTER starting up the machine and setting to the required flow rate. When on, the switch will glow orange. If the low flow is triggered, the light will blink on and off. **PLEASE MAKE SURE THIS SWITCH IS IN THE ON POSITION IF LEAVING THE MACHINE UNATTENDED. FAILURE TO TURN THIS ON CAN LEAD TO PRODUCT, PUMP AND/OR MEMBRANE DAMAGE.**

Batching

The batching feature allows you to filter a pre-set volume of wine. The volume is displayed in GALLONS. The switch needs to be in the ON position in order for batching to work. When switched on, the switch will light up blue. When batching is reached, the blue light will stay lit and the machine will be switched off. When the pre-set value is reached, the machine shuts off automatically. The preset volume is adjusted on the batch counter using the 4 grey buttons, they adjust up or down for each decimal place. The volume is in Gallons. The volume is reset using the rotary switch. Just turn to reset and the counter resets.

Stop/Tripped Lights

Use the RED push buttons to stop the pumps. If these glow RED, then this indicates that the overload has tripped inside the panel. To reset, it is necessary to open the control panel and reset the overload switches to clear this fault.

Water rinse

1. The *SYSTEM* is stored in citric-sulfur solution.
2. Open ALL valves.
3. Liquid will drain out of the system via gravity, when liquid is just dripping, close all valves.
4. Remove the *PRE-FILTER HOUSING* and check for build-up or debris.
5. Fill up a 30-gal tub with clean, cold water.
6. Connect sanitized wine hoses to the *WINE INLET* and *WINE OUTLET* valves.
7. Insert the end of the hose connected to *WINE INLET* valve into the tub and the *WINE OUTLET* hose to the drain.
8. Open *VALVES 1, 2, 3* and *8*. Keep all other valves closed.
9. Switch the *FEED PUMP* on.
10. Water will fill the *SYSTEM* and eventually exit through *VALVE 2*.
11. When water is seen exiting the *VALVE 2*, close *VALVE 2.* This indicates that the *SYSTEM* is filled.
12. Turn on the *CROSSFLOW PUMP.* The *SYSTEM* is now in the filtration mode and is being rinsed of residual citric – sulfur solution.
13. Open *VALVE 6* for 60 seconds to ensure that the entire system is rinsed and then close it.
14. Periodically taste the water exiting from the *WINE OUTLET.* When no citric-sulfur can be tasted any more, turn the *CROSSFLOW PUMP* off first and then turn off the *FEED PUMP.*
15. Open all valves and allow the *SYSTEM* to fully drain.
16. When the water is only dripping, connect the nitrogen line to the *VALVE 2*.
17. Open *VALVES 2, 4* and *5* and close all other valves.
18. Purge the *SYSTEM* with nitrogen for 5 minutes making sure that the pressure doesn't exceed 25 PSI.
19. Shut off and disconnect the nitrogen.
20. Close *VALVES 4* and *5*.
21. The *SYSTEM* is now ready for wine filtration.

Wine processing

1. Connect the *WINE INLET* hose to the inlet of the *SYSTEM* and to the tank containing the wine that is to be filtered.
2. Connect the *WINE OUTLET* hose to the tank to which you are filtering into with a T valve to taste out for water.
3. Open the valves on both wine tanks and make sure the tanks are vented.
4. Open *VALVES 1, 2, 3* and *8* on the *SYSTEM* and make sure that all other valves are closed including the *VALVE 6* (needle valve).
5. Turn on the *FEED PUMP* and wait for wine to exit *VALVE 2* – Close when wine seen exiting.
6. Start the *CROSS-FLOW PUMP.*
7. The *SYSTEM* is now in the filtration mode.
8. Open the *VALVE* 6 fully by turning it counterclockwise.
9. Monitor the flow of the wine on the *FLOW METER* and the operating pressure on the *PRESSURE GAUGES.*
10. The operating pressure and the flow rate are controlled with *VALVE 6* (Needle Valve). If the pressure is increasing rapidly, open *VALVE 6* to maintain system pressure under 50 PSI.
11. The operating pressure should not exceed 50 PSI and the maximum flow rate is 3.5gpm (210 gal/ hour)
12. If the flow rate of the *SYSTEM* drops below 0.5 gpm, the system will have to be cleaned. Follow the cleaning instructions below.

End of Filtration

1. At the end of filtration while the *SYSTEM* is running, disconnect the hose from the now empty tank and "walk" it to the *WINE INLET* valve with the filter running.
2. After all the wine has been sucked from the hose into the system, switch off both pumps and close *VALVE 1* immediately.
3. Check feed tank and ensure that filtration is complete.
4. Connect the nitrogen line to the *WINE INLET* and set pressure at 20 PSI.
5. Make sure *VALVE 6* is closed at this point.
6. Open *VALVES 1* and *3* and watch for flow at the *FLOW METER.*
7. Make sure that the pressure on the machine does not exceed 30 PSI at this point.
8. Purge for a few minutes or until bubbling and foaming is observed in the flow meter. This indicates that most of the wine has been pushed through.
9. Stop the nitrogen flow and close *VALVES 1* and *3* and close your filtered wine tank valve.
10. Disconnect the nitrogen line.
11. Open *VALVE 2* **slowly** to bleed excess nitrogen from the system and close.
12. Proceed to cleaning.

Machine Fouled

1. When filtration drops below 0.83gpm (50gph) or the pressure reaches 50 PSI, the machine will switch off the pumps. When this happens, close valve on the tank containing unfiltered wine.
2. Check the *PRE-FILTER* for possible blockage. If heavily fouled, rinse and continue filtration. Otherwise, proceed to cleaning the *SYSTEM.*
3. Connect the nitrogen line to the *WINE INLET VALVE* hose or the valve directly and set pressure at 20 – 25 PSI.
4. Close *VALVE 6.*
5. Start purging the *SYSTEM* with nitrogen to push all clean wine into the filtered wine tank.
6. Make sure that pressure on the pressure gauges on the machine does not exceed 50 PSI at this point. If the pressure starts to rise, depressurize the machine by **slowly** opening the *VALVE 2*.
7. When foaming and bubbling are seen in the flowmeter, shut off and disconnect the nitrogen line.
8. Open *VALVE 2* **slowly** to bleed excess nitrogen from the system and close it.
9. Proceed to cleaning.

Middle of the run cleaning – hot water flush

1. Open *VALVES 4, 5* and *7* and allow the system to drain – this will be unfiltered wine.
2. Allow it to drain from the *SYSTEM*. You may collect this unfiltered portion of wine and return it into the **unfiltered wine tank** or you can simply discard it.
3. Connect the hot water line to the *MEMBRANE DRAIN.*
4. Open *VALVES 4, 5 and7*. Close the VALVE 8. Flush the system with hot water (120 F maximum) until the water exiting the *VALVE 7* is clear or slight pink.
5. Turn off the hot water and run the cold water through the *SYSTEM* for a couple of minutes to cool it off.
6. Open the *VALVE 8* to ensure that the entire system is rinsed.
7. Shut off the water.
8. Open all the valves and let the *SYSTEM* drain.
9. Connect the nitrogen line to the *VALVE 2.*
10. Open *VALVES 2, 4* and *5.*
11. Purge the *SYSTEM* with nitrogen for 5 minutes ensuring that the pressure does not exceed 25 PSI.
12. Shut off and disconnect the nitrogen line and close *VALVES 4* and *5*.
13. The system is now ready for the filtration to be continued.

Cleaning Chemicals - Alternatives

It is possible to clean the system with the following alternative chemicals:

TSP – Recommended
Mix 1 lb (500 grams) per 25 gallons (100 liters)

Soda Ash – Alternative to TSP
Mix 0.5 lb (250 grams) per 25 gallons (100 liters)

Hydrogen Peroxide
Assuming you have a 30%-35% strength solution, mix 200 ml in with the TSP or Soda Ash or if you only have a 7% strength solution, add 800 ml of the 7% strength to the TSP or Soda Ash

End of filtration cleaning

1. Follow "End of filtration" procedure to get the system empty.

2. Follow "Middle of filtration cleaning – hot water flush" procedure.

3. Drain the system. Nitrogen is no longer needed and compressed air can be used. Please make sure you check the pre-filter and clean it out before starting the rest of the cleaning process.

4. Dissolve 1 lb TSP in 30 – 50 gallons of hot water.

5. Pump this solution through the system and into the drain following the "water rinse" procedure.

6. Drain the system.

7. Dissolve another 1 lb TSP in 30 – 50 gallons of **cold** water and circulate this solution through the system for 10 minutes by placing both, inlet and outlet hoses into the tub containing the TSP solution.

8. After 10 minutes, add 200 ml (1 quart) of Hydrogen Peroxide to the solution and let it circulate for another 10 minutes.

9. Switch off the *CROSSFLOW PUMP* and then the *FEED PUMP* and close the *WINE INLET* and the *WINE OUTLET* valves.

10. Open the *VALVE 2* so that the *SYSTEM* can gas off.

11. Unplug the *SYSTEM* and disconnect the hoses.

12. If rented, the *SYSTEM* should be returned to VA Filtration in this state.

13. If purchased, leave the *SYSTEM* in this state overnight to soak. The following morning, drain the machine and re-circulate 1 lb TSP in 30 gallons of hot water. Repeat if necessary. The liquid should appear pale yellow and the pressure should not exceed 5 PSI. This indicates that the *SYSTEM* is clean.

14. Turn off both pumps, drain the *SYSTEM* and repeat the "water rinse".

15. Dissolve one scoop of citric acid in 30 gallons of cold water and recirculate through the *SYSTEM* for 10 minutes.

16. Add 30 ppm to 80 ppm (3 to 8 grams in 30 gallons) of a potassium metabisulfate to the solution and recirculate for another 10 minutes.

17. Switch both pumps off, unplug the *SYSTEM* and disconnect the hoses. Wipe off the SYSTEM and store in this state.

Note that If the system will be stored for a couple of days or longer, it is absolutely necessary to perform an extended soak and use citric/meta for storage purposes. Do not leave in TSP for more than 2 days.

Clean Check – recommended after every clean or soak cycle

After the soak cycle, rinse the machine with cold water and carry out the following procedure.

1. Fill the cleaning tank/sump with cold water to a preset level. Same level used for TSP or citric wash is fine.
2. Fill the machine and make sure the permeate line is connected and returning to the cleaning tank/sump.
3. Open valves 1, 2, 3, 8, 6 (needle valve).
4. Start the feed pump and then start the crossflow pump
5. Assuming that the machine is full, once the crossflow pump starts, liquid will begin flowing through the permeate line. Please record this flow rate when you know the machine is clean (new is best). This will be your reference flow rate that you will always need to get back to with just the crossflow pump running and the sump at the same level. Typically we get 480 gph on a new machine with just the crossflow pump running. Feed pressure is 7.2 psi and the permeate pressure is 4.4 psi at these flow conditions.
6. Note that if permeate flow is low or non-existent, try refilling the machine (including the crossflow loop) to make sure there is no air trapped.

TROUBLESHOOTING

The filtered wine flow rate is too slow

Cause

- The wine is dirty – high turbidity
    - Excess turbidity (greater than 50 NTU) in the wine can cause a rapid deterioration in flow rate through the membrane elements. Purging out lees from the system from time to time will increase flow rate if this is the cause.
- Pre-filter is blocked
    - If the pump starts making a mechanical sound that is not typically present, this can indicate that the pre-filter is blocked. Remove, check for debris and clean if necessary.
- High RS level
    - In some instances, high RS can lead to higher viscosity which impacts filtration flow rate.
- High bacteria level
    - High bacteria loading can slow down the flow rate and or increase the required pressure.
- The system is fouled and requires cleaning
- A soak cycle was not carried out on the membranes.
- The operating pressure is too low
    - Increase the speed of the feed pump, which in turn will increase the flow of filtered wine.

The filter starts up great but within 20 minutes the pressure increases and permeate flow rate drops.

- 90% of the time this is related to membranes that are not clean. We suggest a clean/soak (TSP/Peroxide) cycle overnight to recover the membranes. Use the clean check flow rate to make sure the machine is clean after the clean/soak cycle.
- If 2-3 overnight soaks do not recover the membranes, check that you are using the correct strength of Hydrogen Peroxide and TSP. If you feel your procedures are correct and you are still not able to recover the machine, then please call the factory for a technician visit.

The Feed Pump is making a mechanical sound during cleaning

- Due to a pressurized feed in excess of 15 psi. Make sure you don't send pressurized water through the feed pump. Pump should always suck in water where possible.