NANOH2O QuantumFlux™ MBR/Submerged UF Membrane

Technical Service Bulletin 807

MBR & Submerged UF System Troubleshooting

The MBR & Submerged UF System troubleshooting are covered in this TSB under the following sections:

General Membrane Troubleshooting

Submerged UF System Troubleshooting

MBR System Troubleshooting

Emergency Response Procedures

Performance Recovery Strategies

Preventive Measures

If the operating problems are not addressed here, contact NANOH2O for support.

General Membrane Module Troubleshooting

The following are critical to maintain stable operation and produce high quality water over the long term:

1. Properly pre-treated feed water
    a. Pretreatment equipment should remain in proper working condition.
    b. Feedwater should be within the ranges provided in Table 1. The purpose of controlling these parameters is to minimize the risk of membrane damage and/or fouling. These ranges apply to all systems using NANOH2O Submerged UF and MBR modules. Selection of operating parameters depends on the specific project.
2. Appropriate filtrate flux
3. Suitable filtration cycle time
4. Sufficient air scour flow rate
5. Targeted chemical cleaning regime

Membrane tank water quality should be monitored closely. Changes in feed water quality may require adjustment of operational settings. Careful attention to how the membrane performance is affected by changing feed water quality is required to make necessary system adjustments.

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Table 1 : Allowable Membrane Tank Sludge Quality

Parameter	Allowed Range	Comments
pH in membrane tank	1 – 10 (TIPS)	1—14 allowed during cleaning (TIPS)
Particle Size[1]	≤ 2.0 mm	≤ 2 mm by automatic screening Perforated plate or punched hole type is recommended
Mixed Liquor temperature ^{o}C (^{o}F)	5 – 45 (41 – 113)	
MLSS in membrane tank, mg/L (MBR only)	5,000 – 12,000	Normal range 6,000 – 8,000 Check with NANOH2O if higher MLSS higher
Oil	< 2 mg/L (TIPS)	To prevent membrane fouling
Dissolve Oxygen (mg/L)	> 2	For MBR
Total hardness (mg/L as $CaCO_3$)	Non-scaling	Dependent on pH and scaling Scaling to be removed by acid cleaning
Soluble BOD5 Concentration (mg/L)	< 3	
NH_3-N concentration in mixed liquor entering membrane tanks (mg/L)	≤ 1.0	
Colloidal TOC (cTOC) concentration in mixed liquor entering membrane tanks (mg/L)	≤ 10	
Soluble alkalinity of mixed liquor entering membrane tanks (mg/L as $CaCO_3$)	50 – 150	

[1] Primarily concerned with the entry of sharp objects into the treatment system such as branches, plastic pieces, sand etc., and fibrous material, such as hair.

* This is not an extensive list and does not constitute the only conditions for a valid warranty claim. Refer to your project specific warranty document for all conditions that apply to your warranty.

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Submerged UF System Troubleshooting Basics

Symptom	Possible Causes	Solutions
High TMP	Fouling of the membrane Low air scour flow rate Faulty instrument readings	Undergo suitable cleaning; Adjust filtration flux; Adjust filtration cycle time; Adjust air scour rate; Verify automated cleanings are occurring correctly
Rapid rise in TMP over 24-48 hours	Sudden feed water quality deterioration	Review recent feed water quality data
	Chemical cleaning system failure	Verify chemical dosing systems
	Air scouring system malfunction	Check air scouring equipment and distribution
Low air scouring flow rate	Blower fault	Check the blower
	Valve closed	Check the piping and valve
Low filtrate flow	Membrane fouling	Review cleaning protocol effectiveness
	Loss of filtrate pump prime	Air removal system not operating properly or frequently enough
	Control system failure	Check filtrate pump PID and flow meter
	Pressure meter fault	Calibrate the flow meter
Low membrane tank level	Feed/RAS pump failure	Check feed and RAS pump and piping
	Valve failure	Check feed and RAS valves; Check drain valve
Motor failure	No electricity	Check power supply
	VFD failure	Check the VFD unit
	Motor Overload	Check the setting of overload for the motor; If the value is exceeded, contact the supplier
Uneven Air Distribution	Air header damage or Improper leveling of modules or Blocked air pathways	Clean or replace diffusers Inspect air distribution system Level module racks Clear air flow channels
Valve failure	No open or close action	Check the compressed air; Check the solenoid valve.
	Switch fault	Check the switch and the 24V power supply
High TSS or turbidity of product water	Air in the turbidimeter	Check the water pipe and eliminate the air
	Membrane skid or module integrity breach	Perform integrity test and repair
	O-ring failures or module sealing issues	Check module connections and seals

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MBR System Troubleshooting Basics

Symptom	Possible Causes	Possible Solutions
High TMP	Membrane fouling	Confirm filtrate flowrate; Initiate suitable cleaning
		Verify automated cleanings are occurring correctly
	Low air scouring flow rate	Check the blower; Check the piping and valve
		Adjust air scour flow rate; Confirm aeration is even
	High MLSS	Waste sludge to bring into correct range; Increase RAS pumping rate
		Confirm WAS system is functioning properly
	Biological system performance	Verify DO concentration; Verify filtrate BOD concentration
	Faulty reading	Check for presence of air in filtrate line; Operate air removal system, as needed
High filtrate TSS or turbidity	Membrane skid or module integrity breach	Perform integrity test and repair
	Air in the turbidimeter	Check the water pipe and eliminate the air.
Low filtrate flow	Membrane fouling	See above
	Loss of filtrate pump prime	Air removal system not operating properly or frequently enough
	Control system failure	Check filtrate pump PID and flow meter
	Pressure meter fault	Calibrate the flow meter
Low membrane tank level	Feed/RAS pump failure	Check feed and RAS pump and piping
	Valve failure	Check feed and RAS valves; Check drain valve
Motor failure	No electricity	Check power supply
	VFD failure	Check the VFD unit
	Motor Over load	Check the setting of overload for the motor; If the value is exceeded, contact the supplier
Valve failure	Will not open or close	Check the compressed air supply pressure; Check the solenoid valve
	Switch fault	Check the switch and the 24V power supply

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Response Procedures

Critical Failure Response

1. Implement immediate system shutdown if:

- TMP exceeds maximum allowable limit
- Multiple fiber breaks detected
- Chemical leak identified
- Major mechanical failure occurs

2. Documentation Requirements:

- Record all alarm conditions
- Log operator actions taken
- Document system parameters at time of failure
- Photograph any visible issues

3. Recovery Steps:

- Isolate affected modules
- Implement temporary bypass if possible
- Contact technical support
- Prepare incident reports

Performance Recovery Strategies

Short-term Recovery

- Implement extended chemical cleaning
- Increase air scouring frequency
- Reduce flux temporarily
- Enhance pretreatment chemical dosing

Long-term Solutions

- Evaluate membrane replacement criteria
- Assess operating protocols
- Review maintenance procedures
- Consider system modifications

Preventive Measures

Early Warning Signs

- Gradual increase in TMP
- Minor permeate quality fluctuations
- Unusual noise or vibration
- Changes in chemical consumption

Risk Mitigation

- Implement regular integrity testing
- Monitor critical spare parts inventory
- Maintain detailed operational logs
- Conduct regular operator training
- Perform preventive maintenance according to schedule