

## NANO H2O QuantumFlux™ MBR/Submerged UF Membrane

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

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Successful system performance, both short term and long term, depends on handling, operation, and maintenance in accordance with all published guidelines and limits. Specific guidelines and limits can be found in:

- Performance Projection Software
- Membrane Specification Sheets
- Standard and Custom Warranties
- Technical Service Bulletins

Please refer to all appropriate documents to become familiar with the guidelines and limits for a specific project. As a membrane supplier, NANO H2O's scope of supply and liability is limited. The considerations and items presented below are intended as a general reference and are not to be considered all-inclusive for any specific project.

### Feedwater Source

- Analyze the feedwater source for contaminants, inorganic and organic matter, and suspended solids to ensure they are within the limits considered for the system design.
- Ensure pretreatment processes and associated equipment, especially coarse and fine screening, is installed and working properly.
- Ensure a stable and sufficient flow rate for the MBR or Submerged UF system.

### Instrumentation, Sampling, and Monitoring

Each train requiring monitoring and performance tracking contains, as a minimum, provisions for reporting:

- Feed water flow rate (m<sup>3</sup>/h) (gpm)
- Pressure gauges/transmitters, positioned to measure transmembrane pressure (kPa) (psi)
- Feed water temperature (°C) (°F)
- pH sensors installed in the biological reactor and filtrate lines for MBR
- Filtrate water turbidity (NTU) to monitor filtrate quality

Ensure that:

- Instruments are properly located and installed.
- Instruments are calibrated to the manufacturer's specifications.
- SCADA (Supervisory Control and Data Acquisition), if provided, is functioning and available for retrieval of historic operating data.
- Data collection routine for startup and long-term operation has been established.
- Arrangements have been made to use NANO H2O's data acquisition program or direct transmission of data (in spreadsheet form) to NANO H2O for review.
- Sample points are established for influent, mixed liquor, and filtrate.

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

---

### Key Parameters to Monitor:

- Mixed Liquor Suspended Solids (MLSS)
- Chemical Oxygen Demand (COD) for MBR
- Biochemical Oxygen Demand (BOD) for MBR
- Total Nitrogen (TN) for MBR
- Total Phosphorus (TP) for MBR
- Ammonia for MBR
- Nitrate
- Periodic microbial analysis for assessment of microbial community health
- Transmembrane pressure
- Feed water temperature
- Feed water flow rate
- Filtrate flow rate
- Product water turbidity

### Pre-Startup Checklist

Before loading cassettes into the tanks, confirm that the system is ready for commissioning and subsequent operation.

- Verify that all tanks and piping have been cleaned and are free of debris.
- Verify all mechanical installations are complete and secure.
- Confirm electrical connections and control systems are operational.
- Check that all valves are in the correct position.
- Verify that aeration systems are working properly.
- Test all pumps for proper operation.
- Confirm chemical dosing systems are ready (if applicable).
- Ensure all instrumentation is calibrated and functioning.
- The feed water quality is satisfactory, within design expectations.
- The drain system is ready.
- Auto control system is ready.
- Biological process equipment and controls have been checked and are ready to receive sludge (MBR).

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

### Prohibited Chemicals

In general, NANO H2O S-series modules have very high chemical tolerance. However, generally speaking, chemicals commonly known to be incompatible with PVDF, PVC, ABS, polyurethane, and EPDM should be avoided. The following is a non-exhaustive list of chemicals that should not come into contact with the UF modules:

Class	Examples
Non-Polar Solvents	Pentane, Heptane, Hexane, Toluene, Benzene, Chloroform, Cyclohexane
Slightly Polar Solvents	Chlorobenzene, Cyclohexanone, Acetaldehyde, etc.
Polar Aprotic Solvents	Acetone, Acetonitrile, Dimethylformamide (DMF), Dimethylacetamide (DMAC), Dimethyl sulfoxide (DMSO), N methyl-2-Pyrrolidone (NMP), Methyl ethyl ketone (MEK), Methyl Butyl Ketone (MBK), Methyl Isobutyl Ketone, Methyl Acetone etc.
Alcohols	High concentrations (E.g. >50%) of Methanol, Ethanol, Diacetone alcohol
Paint Thinners	Turpentine, Naphtha, Kerosene, Xylene, etc.
Ethers	Diethyl ether, Tetrahydrofuran, Isopropyl Ether, etc.
Esters	Ethyl acetate, Butyl acetate, Isopropyl Acetate, Cellulose acetate, Ethyl Benzoate etc.
Selected Strong Alkalis	50% NaOH
Chlorinated Compounds	Chlorinated solvents
Selected Acids	Chlorosulfonic Acid, Phosphoric Acid (molten and anhydride)

## NANO H2O QuantumFlux™ MBR/Submerged UF Membrane

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

---

### Confirmation Checklist Before MBR System Commissioning

1. Project Name:
2. Project process
3. Tasks to be commissioned (scope of work and responsibilities)
4. Overall commissioning plan (Table 1)

Work Content	Plan Start and Finish Time	Remarks
Official Electricity Connection		
Commissioning Water Connection		
Stand-alone Commissioning		
Clearwater Linkage Test Run		
Sewage Test Run		
Commissioning and Training Complete		

5. List of documents to be provided before commissioning (Table 2)

Document	Submission time	Remarks
Design	When requesting commissioning services	Final version
Design Notes	When requesting commissioning services	
Process Control Instructions	When requesting commissioning services	
PID	When requesting commissioning services	Final version
Process Construction Drawing	When requesting commissioning services	Final version
Change of Drawings	When requesting commissioning services	

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

### 6. Confirmation of completion of works prior to commissioning (Form 3)

Categories	Content of Work	Completion	Remarks
<b>1. Pre-treatment System</b>	Are the installation and commissioning of the Coarse grid and lift pump house complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and commissioning of the fine grid complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and commissioning of the grit tank complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Installation and commissioning of the membrane grid is complete (including grid body, filter press, flushing, automatic control, etc.)?	Y <input type="checkbox"/> N <input type="checkbox"/>	
<b>2. Bio-system</b>	Is the installation of agitators, propellers, return pumps, biochemical blowers, aerators, and instrumentation complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the stand-alone commissioning complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the pipeline and valve installation complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is pipeline purging, pressure testing completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is biochemical dosing pumps, storage tanks, pipework installation completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the commissioning of the dosing pumps completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the pressure test and leak test completed for each dosing line?	Y <input type="checkbox"/> N <input type="checkbox"/>	
<b>3. Membrane System</b>	<b>3.1 Membrane tanks and their facilities</b>		
	Is the installation of the membrane tank inlet and outlet gates complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Completion of closed water test on inlet and outlet gates of membrane tanks.	Y <input type="checkbox"/> N <input type="checkbox"/>	

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

Categories	Content of Work	Completion	Remarks
<b>3. Membrane System</b>	Is the membrane tank inlet baffle installed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the membrane tank corrosion protection complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the membrane tank cleaned of debris?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Membrane skid guide rails installed in accordance with requirements.	Y <input type="checkbox"/> N <input type="checkbox"/>	The distance between the two points on the inside and the top of the guide rail is required to be controlled at L+25, with an error of no more than ±5mm.
	Is the membrane skid levelling complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	The height difference between the 4 fixed feet of the membrane skid placed on the bottom of the same membrane tank should be controlled within ±5mm in the length direction, ±3mm in the width direction, and ±5mm in the bottom of each membrane tank.
	Is the membrane skid inside the membrane tank and filled with water?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and calibration of the membrane tank level gauge complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and calibration of the membrane tank inlet channel level gauge complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and calibration of the membrane tank return channel level gauge complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and calibration of the membrane tank return channel level gauge complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
Is the installation of the membrane tank return pump complete?	Y <input type="checkbox"/> N <input type="checkbox"/>		
Completion of stand-alone commissioning of membrane tank return pumps.	Y <input type="checkbox"/> N <input type="checkbox"/>		

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

Categories	Content of work	Completion	Remarks
3. Membrane System	Is the membrane tank crane installation complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the crane quality control test completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the commissioning of the membrane tank crane complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	<b>3.2 Membrane permeate facilities</b>		
	Is the installation of the permeate pump complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is stand-alone commissioning of permeate pumps complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation and purging of the permeate pipeline complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the pressure test of the permeate pipeline completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation of the permeate control valve complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation of electromagnetic flow meters for permeate pipelines complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	Guaranteed full pipes and easy maintenance
	Is the installation of the pressure transmitter for the permeate pipeline complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation of the turbidity meter in the permeate pipeline complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	It is recommended that water is taken from the side of the pipe and not at the top.
	Is the blowing and pressure testing of the permeate pipeline completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	<b>3.3 Vacuum facilities</b>		
	Suction pump/kit installation and commissioning completed (if designed).	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Vacuum pipeline airtightness test completed (if designed to do so).	Y <input type="checkbox"/> N <input type="checkbox"/>	

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

Categories	Content of work	Completion	Remarks
<b>3. Membrane System</b>	<b>3.4 Membrane aeration facilities</b>		
	Is the installation and commissioning of the membrane blower complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation of the membrane aeration pipe valves and purging completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation of membrane aeration flow meter, pressure monitor and other instruments complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	<b>3.5 MC facilities</b>		
	Is the backwash pump installation complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	No taking water at the top of the permeate pipeline
	Is the backwash pump stand-alone commissioning complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Backwash pipe installation and purging completed.	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the backwash flow control valve installation complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Backwash pipeline pressure test/leak test completed.	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the backwash flowmeter installed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the MC dosing pump installation complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Are the other MC dosing pump installation complete, if more than one?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the stand-alone commissioning of the MC dosing pump(s) complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the MC chemical storage tank installed in position?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the MC dosing pipeline installed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Leak testing and pressure testing of MC dosing pipes completed.	Y <input type="checkbox"/> N <input type="checkbox"/>	
	MC chemicals in place.	Y <input type="checkbox"/> N <input type="checkbox"/>	

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

Categories	Content of work	Completion	Remarks
<b>5. Instrument air system</b>	Is the installation of air cleaners and air compressors complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the stand-alone commissioning of air cleaners and air compressors completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the installation of the air storage tank complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Completion of quality inspection of air storage tanks.	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Installation and purging of instrument air system pipeline completed.	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the instrument air system pipeline pressure test complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
<b>6. Electro-instrumental systems</b>	Completion of automatic control programming.	Y <input type="checkbox"/> N <input type="checkbox"/>	This part should be completed before the automatic control equipment leaves the factory
	Completion of the automatic program simulation.	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the PLC cabinet screen complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the host computer screen complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the communication between the PLC cabinet and the host computer complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Is the communication between each machine, pump and instrument and the PLC cabinet complete?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	Power supply and distribution system installation and power-on testing completed?	Y <input type="checkbox"/> N <input type="checkbox"/>	

# Technical Service Bulletin 802

## MBR & Submerged UF System Pre-Startup Considerations and Checklist

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### 7. Others

7.1 Are the required operational and management personnel in place during commissioning, experienced in the commissioning or operation of similar processes, and trained in the operation and management of similar process wastewater treatment plants?

7.2 Are the necessary chemicals available for commissioning?

7.3 Are sludge transport and final disposal outlets coordinated? Are contracts commissioned.

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