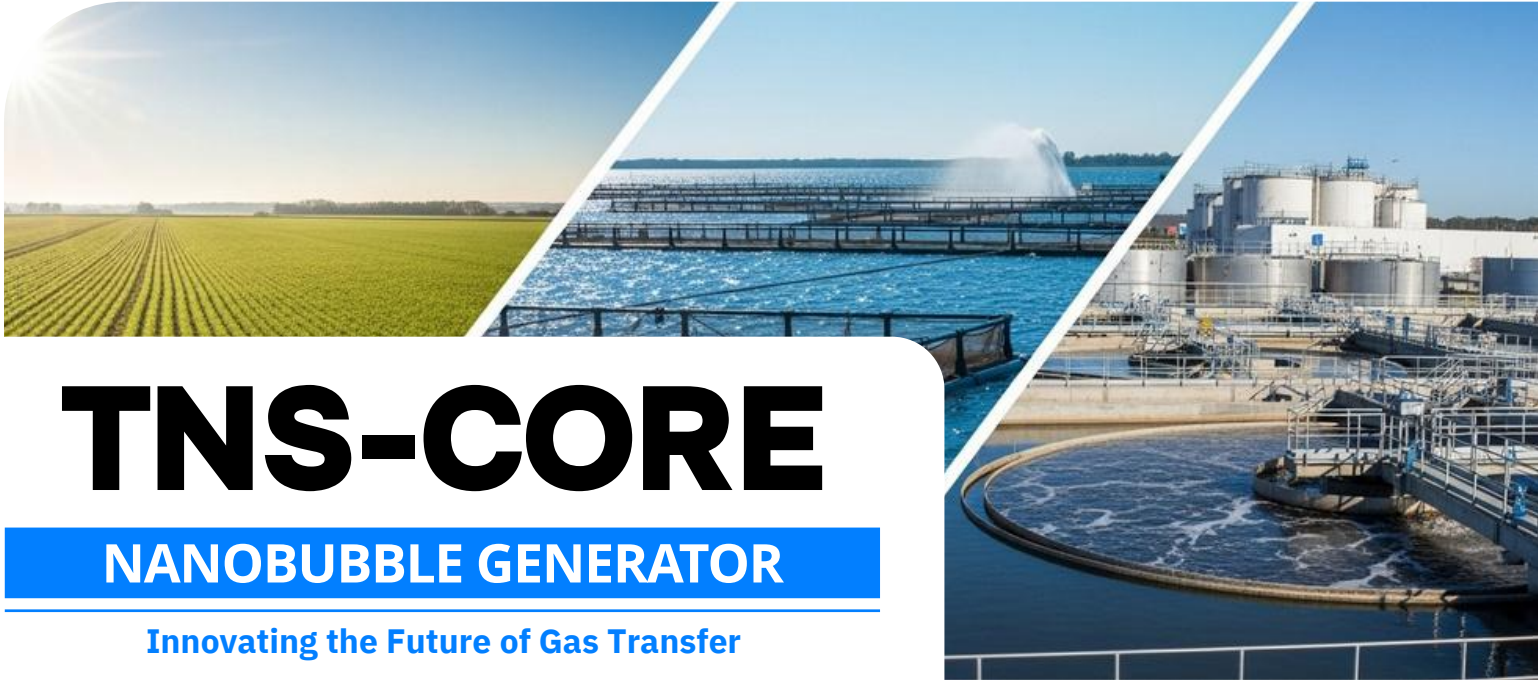




TNS-CORE

NANOBUBBLE GENERATOR

Innovating the Future of Gas Transfer

Trident's patented TNS-CORE redefines industrial gas transfer, delivering up to 99% transfer efficiency at industry-leading flow rates. It is the first system to provide operators with direct control over bubble size, allowing users to tune output from nanobubble to microbubble sizes. This unique control unlocks additional efficiency gains and maximizes return on investment.

Its optimized fluid architecture generates a dense, stable nanobubble field that performs across fluctuating flow and solids conditions. Delivering superior oxygenation, intensifying processes, and providing advanced oxidation and other nanobubble features.

Engineered for long-term reliability, the TNS-CORE features self-cleaning internals and minimal maintenance requirements. Its modular design supports flexible inline or submersible setups, making it the ideal solution for new and retrofit applications across industries.

Key Capabilities

- ✓ **Tunable Bubble Size**
Precisely control bubble output from nanobubble to microbubble scales to meet specific process requirements.
- ✓ **Energy Efficient**
The ultra-low head loss design significantly reduces energy consumption and lowers operational costs.
- ✓ **Self-Cleaning and Maintenance-Free**
Integrated anti-fouling technology prevents scaling and buildup, ensuring continuous performance with minimal upkeep.
- ✓ **Robust Chemical & Solids Handling**
Tolerant to a wide pH range (2-14) and capable of processing high-solid slurries up to 50% by volume.
- ✓ **Flexible Gas Compatibility**
Supports a wide range of gases including Air, O₂, O₃, CO₂, N₂, and more natively.

Applications

- ✓ **Wastewater Treatment**
Enhance aerobic digestion, reduce odor, and improve contaminant oxidation with efficient gas transfer
- ✓ **Aquaculture Oxygenation**
Maintain optimal dissolved oxygen for fish health and yield enhancement in tanks, ponds, and raceways
- ✓ **Municipal Water Aeration**
Improve dissolved oxygen levels in municipal water, aiding in disinfection and advanced oxidation processes
- ✓ **Horticulture and Irrigation**
Increase root-zone oxygen availability in irrigation water, improving plant health and productivity

Technical Specifications

Parameter	Value / Range
Operating Temperature	5°C to 55°C (41°F to 131°F)
Operating pH Range	2 to 14
Maximum Solids Content	Up to 50% by volume
Supported Gases	Air, O2, O3, CO2, N2, and other common industrial gases
Head Loss (Freshwater)	~ 0.1 bar (1 mwc / 1.45 psi)
Installation Options	Inline or Submersible
Operating Pressure	0.25 to 10 bar (Dependent on enclosure)
Enclosure Options	Standard: PVC (up to 3 bar) Upgraded: SS316 (up to 10 bar)

Available Capacities

Model	Water Flow (Metric)	O2 Gas Flow @ 1 bar & 25°C (SLPM)	O2 Gas Flow @ 1 bar & 5°C (SLPM)	O2 Gas Flow @ 1 bar & 25°C (kg/h)	O2 Gas Flow @ 1 bar & 5°C(kg/h)
TNS-CORE-1	Up to 1 m³/h	0.7	1	0.05	0.08
TNS-CORE-10	Up to 10 m³/h	6.7	10	0.5	0.8
TNS-CORE-20	Up to 20 m³/h	13.3	20	1	1.7
TNS-CORE-30	Up to 30 m³/h	20	31	1.6	2.5
TNS-CORE-50	Up to 50 m³/h	33	50	2.6	4.2
TNS-CORE-100	Up to 100 m³/h	67	100	5.2	8.3
TNS-CORE-200	Up to 200 m³/h	133	200	10.3	16.6
TNS-CORE-500	Up to 500 m³/h	333	500	26	42
TNS-CORE-1000	Up to 1,000 m³/h	667	1,000	52	83



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TNS-CORE-XE

NANOBUBBLE GENERATOR

Armored for Abrasive & Viscous Fluids

Industrial processes involving abrasive slurries or viscous fluids demand equipment that can withstand constant punishment. The TNS-CORE-XE™ is Trident's answer: a nanobubble generator armored with a specialized protective coating to deliver reliable performance in the toughest conditions. It takes the proven efficiency of the CORE platform and reinforces it for environments where standard equipment would quickly fail. The durable XE coating prevents erosion from hard solids like sand and grit, while its unique properties unlock the ability to generate nanobubbles in high-viscosity fluids like heavy oils and biofuel precursors. For any operation facing challenging fluid dynamics, the TNS-CORE-XE™ provides a robust, long-lasting solution that ensures consistent gas transfer and operational uptime

Key Capabilities

- ✓ **Energy Efficient**
The ultra-low head loss design minimizes energy consumption and lowers operational costs.
- ✓ **Abrasion Resistance**
A durable protective coating prevents erosion when processing fluids containing hard suspended solids like sand and grit.
- ✓ **Flexible Gas Compatibility**
Supports a wide range of gases including Air, O₂, O₃, CO₂, and N₂, allowing for diverse process use.
- ✓ **High Viscosity Fluid Compatibility**
Unlocks the ability to generate nanobubbles in highly viscous fluids, including fuels and motor oils.

Applications

- ✓ **Mining & Aggregates**
Withstand abrasive slurries in mineral processing and water treatment circuits.
- ✓ **Biofuels**
Generate nanobubbles efficiently in viscous algae slurries and other biofuel feedstocks.
- ✓ **Oil & Gas**
Process production water, drilling muds, and heavy fuels containing abrasive particles.
- ✓ **Industrial Wastewater**
Treat abrasive or viscous industrial effluents that can damage conventional equipment.

Technical Specifications

Parameter	Value / Range
Operating Temperature	5°C to 55°C (41°F to 131°F)
Operating pH Range	2 to 14
Maximum Solids Content	Up to 50% by volume, enhanced for abrasive solids
Supported Gases	Air, O ₂ , O ₃ , CO ₂ , N ₂ , and other common industrial gases
Head Loss (Freshwater)	~ 0.1 bar (1 mwc / 1.45 psi)
Installation Options	Inline or Submersible
Operating Pressure	0.25 to 10 bar (Dependent on enclosure)
Enclosure Options	Standard: PVC (up to 3 bar) Upgraded: SS316 (up to 10 bar)

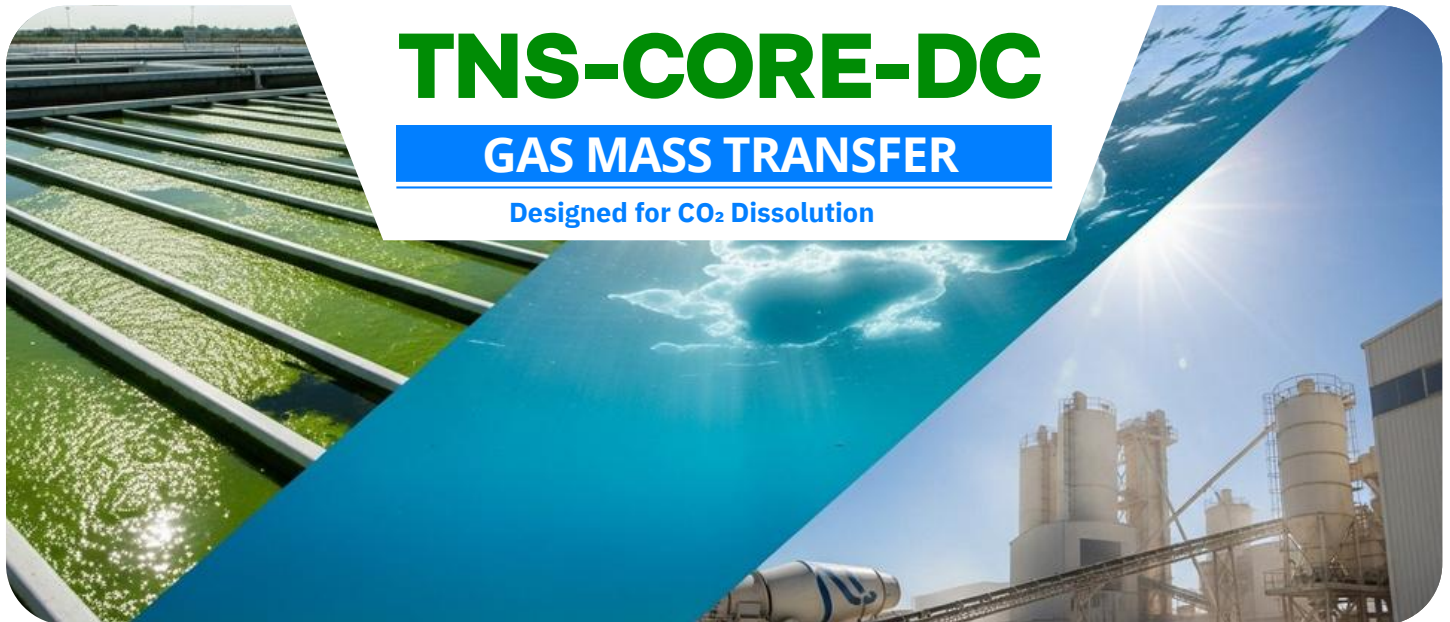
Available Capacities

Model	Water Flow (Metric)	O ₂ Gas Flow @ 1 bar & 25°C (SLPM)	O ₂ Gas Flow @ 1 bar & 5°C (SLPM)	O ₂ Gas Flow @ 1 bar & 25°C (kg/h)	O ₂ Gas Flow @ 1 bar & 5°C (kg/h)
TNS-CORE-XE-1	Up to 1 m ³ /h	0.7	1	0.05	0.08
TNS-CORE-XE-10	Up to 10 m ³ /h	6.7	10	0.5	0.8
TNS-CORE-XE-20	Up to 20 m ³ /h	13.3	20	1	1.7
TNS-CORE-XE-30	Up to 30 m ³ /h	20	31	1.6	2.5
TNS-CORE-XE-50	Up to 50 m ³ /h	33	50	2.6	4.2
TNS-CORE-XE-100	Up to 100 m ³ /h	67	100	5.2	8.3
TNS-CORE-XE-200	Up to 200 m ³ /h	133	200	10.3	16.6
TNS-CORE-XE-500	Up to 500 m ³ /h	333	500	26	42
TNS-CORE-XE-1000	Up to 1,000 m ³ /h	667	1,000	52	83



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Maximizing the efficiency of carbon dioxide dissolution is critical for the success of CCUS and industrial pH control applications. The TNS- CORE-DC™ is a specialized nanobubble generator engineered for one primary purpose: to dissolve CO₂ into fluids with unparalleled speed and efficiency. By optimizing our patented technology specifically for the properties of carbon dioxide, the TNS- CORE-DC™ achieves CO₂ gas transfer rates 2x to 4x higher than general nanobubble systems. This exceptional performance intensifies key chemical reactions, making processes like carbon mineralization faster and more economically viable. For any application where CO₂ is a key ingredient, the TNS-CORE-DC™ delivers precise, reliable, and cost-effective results, all while benefiting from an anti-fouling design that excels in precipitate-forming environments.

Key Capabilities

- ✓ **Exceptional CO₂ Transfer**
Achieves dissolved CO₂ transfer rates 2x to 4x higher than standard nanobubble generators
- ✓ **Anti-Fouling.**
Includes inherent scale and fouling mitigation, critical for applications where precipitates are formed.
- ✓ **Process Intensification**
High efficiency reduces the required system footprint and contact time
- ✓ **Optimized for CO₂**
Designed specifically for carbon dioxide to ensure maximum dissolution efficiency

Applications

- ✓ **Carbon Mineralization**
Rapidly dissolve CO₂ into slurries to create carbonates for permanent storage in CCUS processes
- ✓ **Concrete Manufacturing**
Efficiently carbonate recycled concrete aggregate or inject CO₂ during batching to improve strength
- ✓ **Industrial pH Control**
Provide precise and efficient reduction of pH in alkaline industrial water without using hazardous acids.
- ✓ **Algae Cultivation**
Enhance algae growth in open ponds and photo bioreactors by delivering bioavailable CO₂

Technical Specifications

Parameter	Value / Range
Operating Temperature	5°C to 55°
Operating pH Range	C2 to 14
Supported Gases	Carbon Dioxide (CO ₂)
Head Loss (Freshwater)	~ 0.1 bar (1 mwc)
Installation Options	Inline or Submersible
Operating Pressure	0.25 to 10 bar (Dependent on enclosure)
Enclosure Options	Standard: PVC (up to 3 bar) Upgraded: SS316 (up to 10 bar)

Available Capacities

Model	Water Flow (Metric)	Water Flow (Imperial)	CO2 Gas Flow
TNS-CORE-DC-1	Up to 5 m³/h	25 GPM	Gas Transfer Is Scalable To Demand. Please Call or Email for more info.
TNS-CORE-DC-10	Up to 10 m³/h	66 GPM	
TNS-CORE-DC-20	Up to 20 m³/h	100 GPM	
TNS-CORE-DC-30	Up to 30 m³/h	150 GPM	
TNS-CORE-DC-50	Up to 50 m³/h	250 GPM	
TNS-CORE-DC-100	Up to 100 m³/h	500 GPM	
TNS-CORE-DC-200	Up to 200 m³/h	1,000 GPM	
TNS-CORE-DC-500	Up to 500 m³/h	2,500 GPM	
TNS-CORE-DC-1000	Up to 1,000 m³/h	5,000 GPM	



TNS-HPT

NANOBUBBLE GENERATOR

Performance for Extreme Processes

For industrial processes that operate at the extremes of pressure and temperature, standard equipment is not an option. The TNS-HPT™ is an elite nanobubble generator engineered from advanced materials to perform flawlessly in these demanding environments. It provides a gateway to process intensification, enabling gas-liquid reactions in conditions that offer unparalleled physical strength and chemical resistance.

The TNS-HPT™ is designed to operate reliably at pressures up to 200 bar (2900 psi) and temperatures up to 120°C (248°F). Its compatibility with aggressive fluids and corrosive gases like methane and HCL makes it an essential tool for high-value applications in chemical manufacturing, enhanced oil recovery, and supercritical fluid processes

Key Capabilities

- ✓ **Extreme Pressure Tolerance**
Operates reliably in systems with pressures up to 200 bar (2900 psi)
- ✓ **Corrosive Fluid & Gas Compatibility**
Compatible with aggressive fluids and reactive gases like methane and HCL
- ✓ **Self-Cleaning Design**
Integrated anti-fouling technology ensures consistent performance even in high-solids environments
- ✓ **High-Temperature Operation**
Maintains integrity and performance in fluid temperatures up to 120°C (248°F)
- ✓ **Superior Physical Strength**
Advanced ceramic composite construction engineered for strength and chemical inertness

Applications

- ✓ **Chemical Manufacturing**
Enhance gas-liquid reactions in high-pressure and high-temperature reactors
- ✓ **Supercritical Fluid Processes**
Ideal for applications involving fluids at or near their critical point, such as CO₂ extraction
- ✓ **Enhanced Oil Recovery (EOR)**
Efficiently inject gases like CO₂ or CH₄ into reservoirs under high pressure to boost recovery
- ✓ **Advanced Oxidation Processes (AOPs)**
Enable high-pressure ozonation for difficult-to-treat waste streams

Technical Specifications

Parameter	Value / Range
Operating Temperature	5°C to 120°C (41°F to 248°F)
Operating pH Range	1 to 14
Maximum Solids Content	Up to 50% by volume
Supported Gases	All common and corrosive gases, including Air, O ₂ , O ₃ , CO ₂ , N ₂ , Methane (CH ₄), HCl gas
Installation Options	Inline or Submersible
Operating Pressure	1 to 200 bar (14.5 to 2900 psi)
Enclosure	High-pressure rated housing (material specified per application)

Available Capacities

Model	Water Flow (Metric)	Water Flow (Imperial)	O ₂ Gas Flow (Metric)
TNS-HPT-1	Up to 1 m ³ /h	5 GPM	1 SLPM
TNS-HPT-10	Up to 10 m ³ /h	50 GPM	8 SLPM
TNS-HPT-20	Up to 20 m ³ /h	100 GPM	16 SLPM
TNS-HPT-30	Up to 30 m ³ /h	150 GPM	25 SLPM
TNS-HPT-50	Up to 50 m ³ /h	250 GPM	43 SLPM
TNS-HPT-100	Up to 100 m ³ /h	500 GPM	83 SLPM
TNS-HPT-200	Up to 200 m ³ /h	1,000 GPM	166 SLPM
TNS-HPT-500	Up to 500 m ³ /h	2,500 GPM	416 SLPM
TNS-HPT-1000	Up to 1,000 m ³ /h	5,000 GPM	833 SLPM



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TNS-HPT-XE

NANO BUBBLE GENERATOR

Uncompromising Durability for Hostile Environments

The TNS-HPT-XE™ was forged for the single purpose of performing in environments too hostile for any other nanobubble technology. It represents the pinnacle of durability, combining the extreme pressure and temperature capabilities of the TNS-HPT with a specialized coating for ultimate resistance to simultaneous chemical and physical attack. There is no compromise when it comes to performance in the most aggressive industrial fluids.

Operating reliably at pressures up to 200 bar and temperatures up to 120°C, the TNS-HPT-XE™ thrives in abrasive slurries and concentrated acids, with an unmatched operational pH range of -1 to 14. For processes in hydrometallurgy, petrochemical refining, and hazardous waste treatment, it is the definitive solution for ensuring reliability and process integrity.

Key Capabilities

- ✓ **Ultimate Chemical Resistance**
Operates in extremely aggressive fluids with a pH range of -1 to 14
- ✓ **Maximum Abrasion Resistance**
XE coating provides robust protection against erosion from hard solids at high pressures and temperatures.
- ✓ **Corrosive Gas Compatibility**
Safely injects all common and corrosive gases into aggressive and abrasive process streams
- ✓ **High Viscosity Fluid Compatibility**
Enables nanobubble generation in viscous fluids under extreme process conditions
- ✓ **Extreme Pressure & Temperature Tolerance**
Operates reliably at pressures up to 200 bar and temperatures up to 120°C.

Applications

- ✓ **Acid Leaching & Hydrometallurgy**
Process ore using highly corrosive acids and abrasive slurries at elevated temperatures.
- ✓ **Petrochemical Refining**
Process corrosive crude fractions and chemical intermediates at high temperature and pressure.
- ✓ **Pharmaceutical Synthesis**
Use in reactive chemical processes involving aggressive solvents and reagents under extreme conditions
- ✓ **Hazardous Waste Treatment**
Neutralize and oxidize complex, corrosive, and abrasive industrial waste streams

Technical Specifications

Parameter	Value / Range
Operating Temperature	5°C to 120°C (41°F to 248°F)
Operating pH Range	-1 to 14
Maximum Solids Content	Up to 50% by volume, enhanced for abrasive solids
Supported Gases	All common and corrosive gases, including Air, O ₂ , O ₃ , CO ₂ , N ₂ , Methane (CH ₄), HCl gas
Installation Options	Inline or Submersible
Operating Pressure	1 to 200 bar (14.5 to 2900 psi)
Enclosure	High-pressure rated housing (material specified per application)

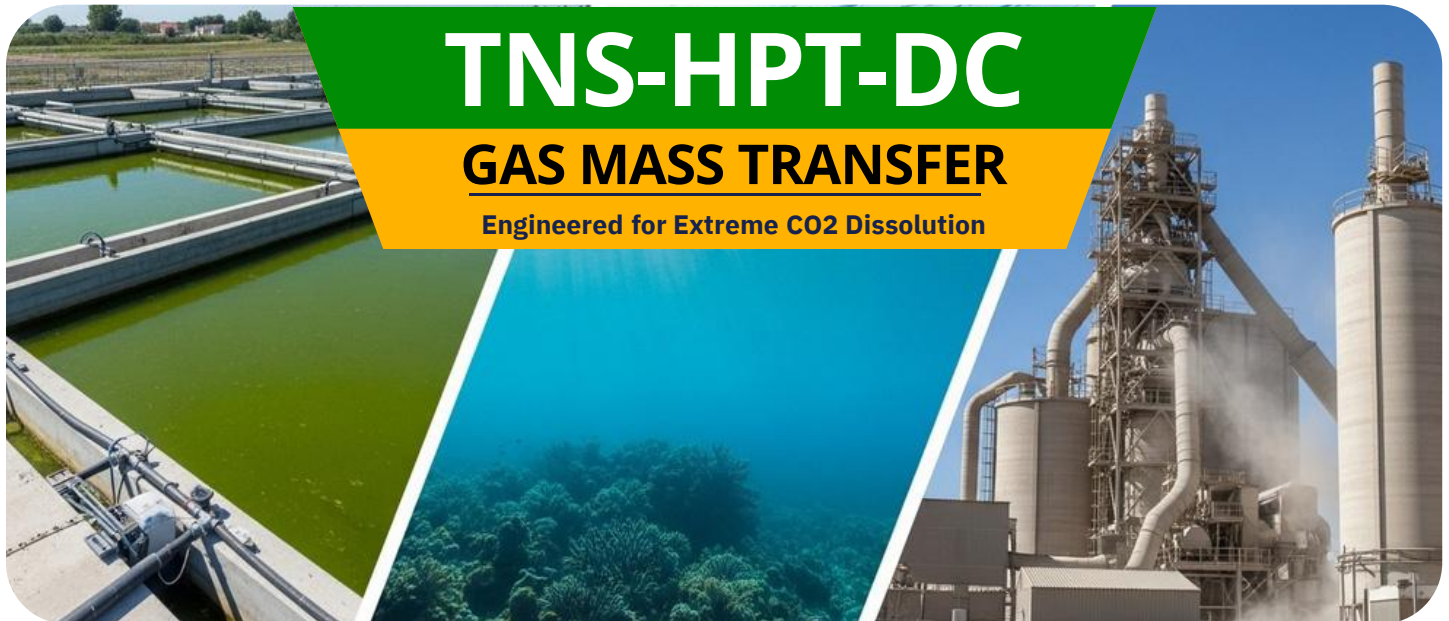
Available Capacities

Model	Water Flow (Metric)	Water Flow (Imperial)	O ₂ Gas Flow (Metric)
TNS-HPT-XE-1	Up to 1 m ³ /h	5 GPM	1 SLPM
TNS-HPT-XE-10	Up to 10 m ³ /h	50 GPM	8 SLPM
TNS-HPT-XE-20	Up to 20 m ³ /h	100 GPM	16 SLPM
TNS-HPT-XE-30	Up to 30 m ³ /h	150 GPM	25 SLPM
TNS-HPT-XE-50	Up to 50 m ³ /h	250 GPM	43 SLPM
TNS-HPT-XE-100	Up to 100 m ³ /h	500 GPM	83 SLPM
TNS-HPT-XE-200	Up to 200 m ³ /h	1,000 GPM	166 SLPM
TNS-HPT-XE-500	Up to 500 m ³ /h	2,500 GPM	416 SLPM
TNS-HPT-XE-1000	Up to 1,000 m ³ /h	5,000 GPM	833 SLPM



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Success in large-scale EOR and CO₂ sequestration hinges on dissolving CO₂ efficiently under immense pressure and high temperatures. The TNS-HPT-DC™ is an elite nanobubble generator engineered specifically for these high-stakes applications. It integrates the robust, high-pressure construction of the HPT platform with our specialized DC optimization to deliver maximum CO₂ mass transfer where it matters most. By achieving CO₂ transfer rates 2x to 4x higher than standard systems under extreme downhole conditions, the TNS-HPT-DC™ ensures the most efficient use of injected gas. For critical CCUS projects that demand reliability at extreme pressures and temperatures, it is the definitive technology for maximizing performance and economic viability.

Key Capabilities

- ✓ **Exceptional CO₂ Transfer**
Achieves dissolved CO₂ transfer rates 2x to 4x higher than standard nanobubble generators under extreme conditions
- ✓ **Process Intensification**
High efficiency reduces the required system footprint, contact time, and overall cost
- ✓ **Robust HPT Construction**
Built with advanced materials for unparalleled physical strength and chemical resistance.
- ✓ **Extreme Condition Performance**
Delivers reliable performance at high temperatures (up to 120°C) and pressures (up to 200 bar)
- ✓ **Engineered for High-Pressure Co₂**
Designed to handle the challenges of high-pressure CO₂ injection

Applications

- ✓ **Enhanced Oil Recovery (EOR)**
Efficiently inject CO₂ for reservoir re-pressurization and to reduce oil viscosity for improved recovery.
- ✓ **High-Pressure Carbon Mineralization**
Accelerate the reaction of CO₂ with mineral feedstocks under high pressure to form stable carbonates
- ✓ **Geologic Sequestration**
Ensure the rapid dissolution of CO₂ in deep saline aquifers for permanent and secure geologic storage
- ✓ **Supercritical CO₂ Applications**
Efficiently dissolve CO₂ into various fluids for use in supercritical extraction and reaction processes

Technical Specifications

Parameter	Value / Range
Operating Temperature	5°C to 120°C
Operating pH Range	1 to 14
Supported Gases	Carbon Dioxide (CO ₂)
Installation Options	Inline or Submersible
Operating Pressure	1 to 200 bar
Enclosure	High-pressure rated housing (material specified per application)

Available Capacities

Model	Water Flow (Metric)	Water Flow (Imperial)	CO2 Gas Flow
TNS-HPT-DC-1	Up to 5 m³/h	25 GPM	Gas Transfer Is Scalable To Demand. Please Call or Email for more info.
TNS-HPT-DC-10	Up to 10 m³/h	66 GPM	
TNS-HPT-DC-20	Up to 20 m³/h	100 GPM	
TNS-HPT-DC-30	Up to 30 m³/h	150 GPM	
TNS-HPT-DC-50	Up to 50 m³/h	250 GPM	
TNS-HPT-DC-100	Up to 100 m³/h	500 GPM	
TNS-HPT-DC-200	Up to 200 m³/h	1,000 GPM	
TNS-HPT-DC-500	Up to 500 m³/h	2,500 GPM	
TNS-HPT-DC-1000	Up to 1,000 m³/h	5,000 GPM	



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