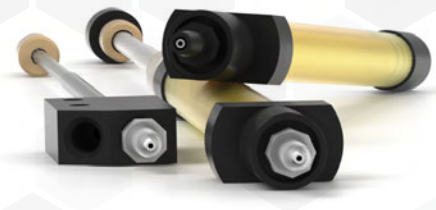
# Degassers

Degassers improve fluidic instrument precision and reliability by removing dissolved gases from fluids before they outgas and form problem causing bubbles. Three main types of bubble removing products are available. AF based degassers offer the widest range of chemical compatibility and are used to eliminate retention shifts and baseline fluctuations. Silicone based degassers offer the highest flow rate capabilities for water based systems such as diagnostic and life science instrumentation to improve dispense accuracy and reliability. Poridex based products provide rapid bubble remove for locations where bubble introduction cannot be avoided.

151 DEBUBBLERS

154 DEGASSING SYSTEMS

FLUIDICS



# Debubblers

## APPLICATION NOTE

- Liquid handling
- IVD
- HPLC/UHPLC
- $O_2$ and $CO_2$ removal

In medical analyzers, bubbles interfere with critical volumetric reagent dispenses and cause sample failures, wasting time and money. Because bubbles adhere to nearly every part of a dispensing system, high velocity or induced turbulent flow is often used to displace and discharge bubbles from the flow stream and into a waste area. These alternative processes waste reagents and are time consuming, unpredictable, and may additionally require designing the system to recognize bubbles are present. Regardless of how the systems are designed, aqueous systems will always be subject to the laws of physics that cause out-gassing during changes in fluid temperature, pressure, or chemicals mixture. In fluid applications like these, debubblers are the optimal solution to capture and remove formed bubbles to prevent sample dispense inaccuracies, and degassing is ideal to prevent downstream bubble formation from recurring.

## Remove Bubbles, Dissolved Gas, or Both!

Dissolved gases and bubbles in system liquids cause dispense volume anomalies in many instruments, negatively affecting both dispense precision and analytical accuracy. Now you have a choice of components for actively removing bubbles with or without also removing dissolved system gases. Online Vacuum Degassing offers operating convenience, high efficiency and low operating costs compared to other common degassing technologies.

## Debubbler/Degasser

**Combines Vacuum Degassing with Active Bubble Removal**

- Improves instrument performance — reduces downtime due to bubble formation.
- Fewer false positives due to reduction of partial reagent dispenses.
- Easily integrates into any pump, degassing tray, or stand-alone degassing application.
- Designed for use with water based solutions with no surfactants. Active degassers are recommended for other solutions.

## Active Debubbler

**Remove Bubbles in Fluid Stream Before or After the Pump**

- Improves instrument performance — reduces downtime due to bubble formation.
- Fewer false positives due to reduction of partial reagent dispenses.
- Easily integrates into any pump, degassing tray, or stand-alone degassing application.

## Transfer-Line Degasser

**Removes Dissolved Gases During Fluid Transfer**

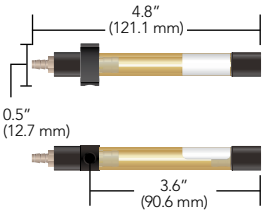
- Eliminates baseline fluctuations for improved detector sensitivity.
- Coaxial design reduces number of connections, improves reliability.
- Single lumen design increases degassing reliability.

## BENEFITS

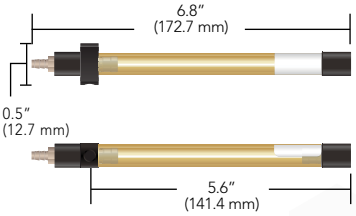
| | ACTIVE DEBUBBLER | DEBUBBLER/ DEGASSER | TRANSFER-LINE DEGASSER |
|---|---|---|---|
| Perfect for applications that require dissolved gas like oxygen for reaction kinetics | ✓ | | |
| Improves dispense precision by capturing and removing bubbles | ✓ | ✓ | |
| Eliminates false positives and reduces reagent waste by improving instrument performance | ✓ | ✓ | |
| Easily integrates into fluidic path | ✓ | ✓ | ✓ |
| Creates stable instrument performance across system and environmental fluctuations | ✓ | ✓ | ✓ |
| Prevents the formation of bubbles downstream of the degasser | | ✓ | ✓ |
| Eliminates fluctuations for improved detector sensitivity and accuracy by preventing bubble formation | | ✓ | ✓ |
| Improves fluidic system reliability because coaxial design reduces the number of connections | | | ✓ |
| Flexible design can be implemented as transfer line in new instruments or existing instruments that don't have space available | | | ✓ |
| Minimizes fluidic system internal volumes to reduce reagent cost | | | ✓ |

# Debubblers (Cont.)

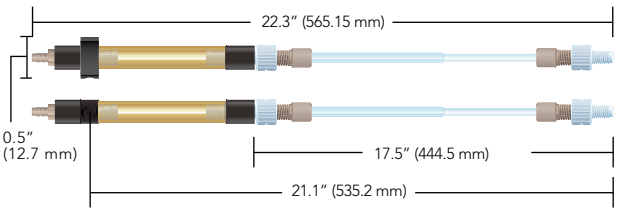
## Overall Dimensions *Please note: These drawings are not actual size.*



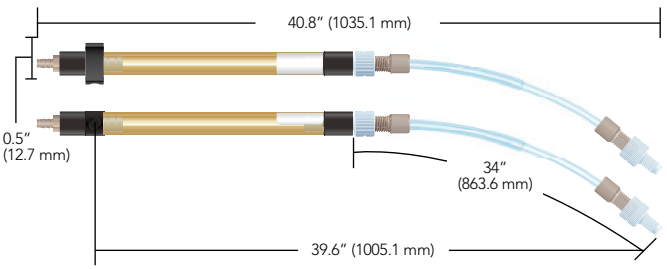

**9000-1540**
Active Debubbler, 2.5 mL



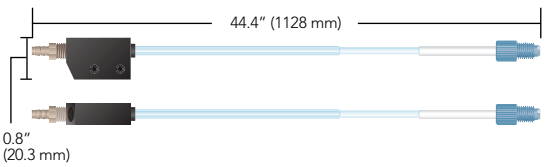

**9000-1541**
Active Debubbler, 5 mL




**9000-1544**
Debubbler / Degasser, 2.5 mL



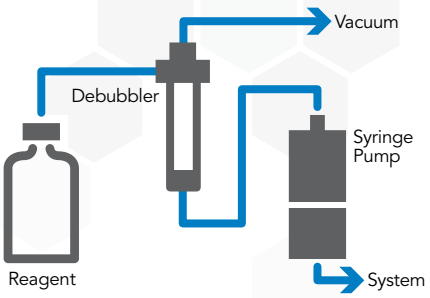

**9000-1545**
Debubbler/Degasser, 5 mL



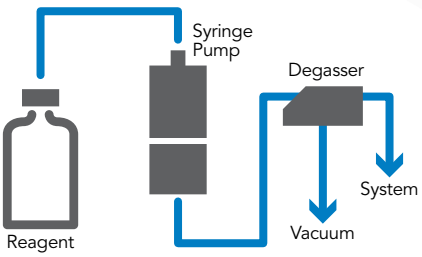

**9000-1549**
Transfer-Line Debubbler, 1.1 meter

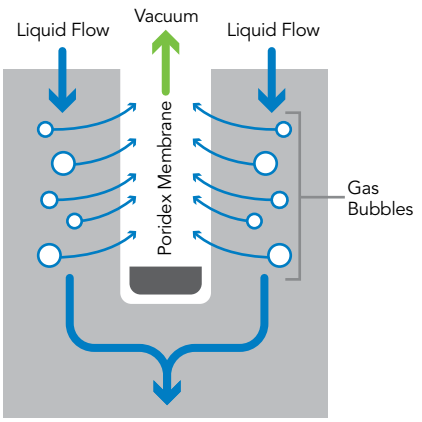
## IMPLEMENTATIONS

### Typical Debubbler Implementation




### Transfer-Line Degasser Implementation



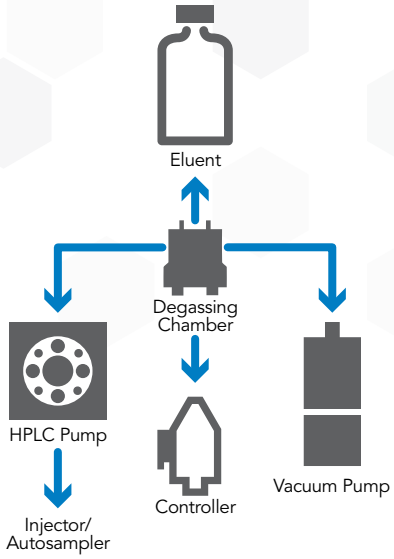

Gas bubbles are actively removed from a flowing liquid stream by vacuum via the PORIDEX membrane.

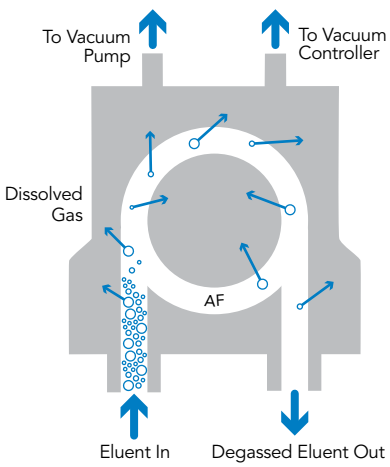
## SPECIFICATIONS (ALL PLATFORMS)

| | ACTIVE DEBUBBLERS | DEGASSER/DEBUBBLERS | 200 KPA (30 PSI) @ 25 °C |
|---|---|---|---|
| **Bubble Removal (volume of air removed/min @ 10 mL/min $H_2O$)** | Up to 30 cc | Up to 30 cc | N/A |
| **Degassing Efficiency† @ 1 mL/min $H_2O$** | N/A | 2.5 mL size: 36% $O_2$ removal, 5.0 mL size: 55% $O_2$ removal | < 4 ppm dissolved $O_2$ at 5 mL/min |
| **Membrane Material** | PORIDEX® | PORIDEX | PORIDEX |
| **Wetted Materials** | PORIDEX, Polyolefin, FEP, ETFE, Ultem® | PORIDEX, Polyolefin, FEP, ETFE, Ultem | PORIDEX, Polyolefin, FEP, ETFE |
| **Solvent Compatibility** | Solutions > 50% aqueous. Not compatible with detergent concentrations > 0.05%. | Solutions > 50% aqueous. Not compatible with detergent concentrations > 0.05%. | Solutions > 50% aqueous. Not compatible with detergent concentrations > 0.05%. |
| **Standard Bubble Trap Volume** | 2.5 / 5.0 mL | 2.5 / 5.0 mL | N/A |
| **Transfer-Line Volume** | N/A | 2.5 / 5.0 mL | < 4 mL |
| **Max. Operating Pressure** | 200 kPa (30 psi) @ 25 °C | 200 kPa (30 psi) @ 25 °C | 200 kPa (30 psi) @ 25 °C |
| **Max. Operating Temperature** | 40 °C | 40 °C | 40 °C |
| **Recommended Vacuum Level** | Minimum 16 kPa absolute | Minimum 16 kPa absolute | Minimum 16 kPa absolute |
| **Liquid Connection** | 1/4-28 fitting system | 1/4-28 fitting system | 1/4-28 fitting system |
| **Vacuum Connection** | Tubing vacuum port(s) for 1/8" (3 mm) ID elastomeric tubing | Tubing vacuum port(s) for 1/8" (3 mm) ID elastomeric tubing | Tubing vacuum port(s) for 1/8" (3 mm) ID elastomeric tubing |
| **Pressure Drop** | 0.8 mm Hg / mL / min (assumes laminar flow and viscosity of 1 cP) | 0.8 mm Hg / mL / min (assumes laminar flow and viscosity of 1 cP) | 0.8 mm Hg / mL / min (assumes laminar flow and viscosity of 1 cP) |

† *Debubbling / degassing efficiency can be optimized based on flow rate, fluid to be degassed, and gas to be removed.*

## TYPICAL DEGASSER IMPLEMENTATION




Dissolved gases are actively removed from a flowing liquid stream by vacuum via the IDEX Health & Science AF® membrane.

## APPLICATION NOTE

### Why Degas Your Mobile Phase?

Dissolved air in HPLC mobile phases can result in flow rate instability and baseline disturbance.

**Flow rate instability:** Non-degassed mobile phase can outgas in the pump head, causing bubbles to be formed and trapped inside the head or check valves. These bubbles can cause flow disturbances and pressure fluctuations, resulting in flow rate instability.

**Baseline disturbance:** As the mobile phase passes through the column, it experiences a large pressure drop. Non-degassed mobile phase can outgas due to this pressure differential, causing air bubbles to form. Air bubbles passing through or lodging in the flow cell cause detection disturbances, exhibited as baseline noise.

### Why Use a Degassing System?

Helium sparging is a common means of degassing HPLC solvents. This method has its drawbacks, however. Helium tanks are expensive and bulky, and solvent backup and contamination are concerns. In addition, helium sparging can change the composition of a premixed mobile phase over time, due to the difference in the evaporation rates of mobile phase components.

In contrast, the IDEX Health & Science Degassing System has none of these drawbacks, and it is extremely fast and efficient at removing dissolved gases — more efficient than helium sparging or PTFE-based degassing systems.

### Tubing Connections

We recommend ETFE tubing (page 27) be used to limit regassing of mobile phase between the degasser and your pump. ETFE is recommended because of its superior impermeability to gases (compared to PTFE, FEP, and PFA tubing). Applicable flangeless fittings for 1/8" OD tubing are found on page 45.

### GPC and HFIP Applications

Standard degassing chambers, with PEEK bulkhead unions, are not recommended for GPC applications or for use with HFIP (hexafluoroisopropanol). Special GPC "hardened" versions are available. Please contact us for more information.

## NOTE

Degassing tubing is flexible and therefore can be coiled to shorten the overall length or used to transfer the fluid within an instrument to the next desired location.

## Debubblers

| Part No. | Description | Standard Bubble Trap Size | Transfer Line Length | Internal Volume | Max Bubble Capacity | Qty. |
|---|---|---|---|---|---|---|
| DEBUBBLER SERIES – AVAILABLE STANDARD CONFIGURATION | | | | | | |
| **9000-1540** | 2.5 mL Active Debubbler | 2.5 mL | — | 2.5 mL | 2.5 mL | ea. |
| **9000-1541** | 5 mL Active Debubbler | 5 mL | — | 5 mL | 5 mL | ea. |
| **9000-1544** | 2.5 mL Debubbler/Degasser | 2.5 mL | 17.5" (444.5 mm) | 2.5 mL in transfer line + 2.5 mL in bubble trap | 2.5 mL | ea. |
| **9000-1545** | 5 mL Debubbler/Degasser | 5 mL | 34" (863.6 mm) | 5 mL in transfer line + 5 mL in bubble trap | 5 mL | ea. |
| **9000-1549** | 1.1 m Transfer-Line Degasser | — | 1.1 m (43") | 4 mL | N/A | ea. |

BUY NOW

# Full Stand Alone Degassing Systems

- Analytical and Prep scale models
- Ultra-high degassing efficiency
- Low volume, easy to prime
- Patented control eliminates baseline fluctuations
- Inert flow path
- 5+ year lifetime

Our Stand-Alone MINI and Prep-Scale HPLC vacuum degassing systems are high-efficiency, in-line modules that remove dissolved gases from the mobile phase. Their unique design assures reliable continuous operation and the highest level of performance available without the need for helium sparging. Up to five solvent lines may be degassed simultaneously by one unit.

## ZHCR® Control with Built-in Test Diagnostics

- Microcontroller self-test vacuum sensor validation on power-up
- Continuous vacuum system monitoring to ensure optimum operational conditions are maintained
- Vacuum system fault detection and shutdown function indicators

## AF / ZHCR Degassing Technology

Flow-through vacuum degassing chamber with a single amorphous perfluorinated copolymer (IDEX Health & Science AF®) degassing membrane, enabling degassing efficiency 50 times that of PTFE.

The ZHCR (Zero Hysteresis / Constant Run) vacuum pump employs a patented closed-loop, micro-stepping rpm control strategy permitting the pump to run with continuously variable speed, providing quick pull-down at high rpm, and then sustaining a consistent vacuum level at low rpm.

Fluctuations in detector baseline due to changes in vacuum level are eliminated by not having to repeatedly stop and start a single-speed pump. This also greatly reduces wear and noise.

The brushless motor enables quiet operation and is appropriate for environments where solvent vapors may be present.

## SPECIFICATIONS

| STAND-ALONE DEGASSING MODULES | |
|---|---|
| **Maximum Number of Degassing Channels** | 5 |
| **Degassing Efficiency† @ 1 mL / min MeOH** | > 70% $O_2$ Removal |
| **Membrane Material** | IDEX Health & Science AF |
| **Other Wetted Materials** | PEEK, PPS(GF), PTFE(GF), FEP |
| **Solvent Compatibility** | Not compatible with fluorinated solvents. Special version available for GPC solvents. |
| **Flow Path ID[1]** | 1.14 mm (0.045") |
| **Internal Volume** | 480 µL (standard) |
| **Maximum Pressure (@ 25 °C)** | 0.5 MPa (70 psi) |
| **Pressure Drop** | 0.18 kPa/mL/min |

*† Degassing efficiency can be optimized based on flow rate, fluid to be degassed, and gas to be removed.*
*[1] Standard ID; other sizes available.*

NOTE

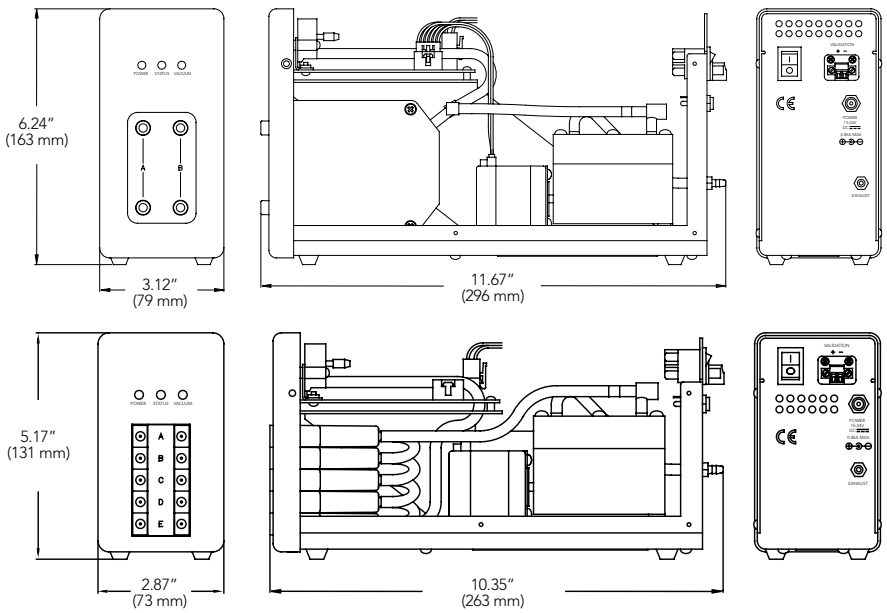
### Power Requirement

**Input Power required with AC Adapter (included):** 100 to 240 V AC (±10%), 1A, 50 to 60 Hz (±3 Hz). Four interchangeable wall sockets are supplied with the AC Adapter: North America/Japan, U.K., Continental Europe, Australia.

### CE Certification

This product has been certified under the following CE testing standards: EN61326-1; EN55011; EN61300-3-2; EN61300-3-3, & EN61010-1.

### Overall Dimensions




## Full Stand Alone Degassing Systems

| Part No. | Number of Channels | Channel Volume | Max HPLC Gradient Flow Capability | Pressure Drop[E] | Degassing Flow Path ID | Qty. |
|---|---|---|---|---|---|---|
| **STAND ALONE MINI VACUUM DEGASSING SYSTEMS — AVAILABLE CONFIGURATIONS[A]** | | | | | | |
| **0001-6500** | 2 | 480 µL | 2.0 mL/min[C] | 0.18 kPa/mL/min | 0.045″ (1.14 mm) | ea. |
| **0001-6501** | 4 | 480 µL | 2.0 mL/min[C] | 0.18 kPa/mL/min | 0.045″ (1.14 mm) | ea. |
| **STAND ALONE PREP SCALE VACUUM DEGASSING SYSTEMS — AVAILABLE CONFIGURATIONS[A, B]** | | | | | | |
| **0001-6482** | 2 | 8.4 mL | 20 mL/min[D] | 0.04 kPa/mL/min | 0.065″ (1.65 mm) | ea. |
| **0001-6484** | 2 | 13.8 mL | 40 mL/min[D] | 0.06 kPa/mL/min | 0.065″ (1.65 mm) | ea. |

*A. Custom configurations are available. Consult us for your own OEM solution to your specific application.*
*B. The standard prep scale chambers are not recommended for GPC applications or for use with HFIP (hexafluoroisopropanol).*
*C. The flow rates given are for a gradient mixture of 50/50 MeOH/$H_2O$, with a typical low pressure gradient mixing valve. Higher flow rates are possible with high pressure mixing.*
*D. The flow rates given are for a gradient mixture of 60/40 MeOH/$H_2O$, with a typical low pressure gradient mixing valve. Higher flow rates are possible with high pressure mixing.*
*E. Estimated tubing pressure per unit change in flow assuming laminar flow with a viscosity of 1.0 cP*