

Microfluidizer Processor for Continuous High Shear Fluid Processing in Industrial Environments

M-700 Series Microfluidizer Processors – Models M-7125 and M-7250

Recommended for:

- Immiscible Liquid Emulsions
- Solids in Liquid Suspensions
- Submicron Particle Size Reduction
- Deagglomeration & Dispersion

Microfluidics produces patented Microfluidizer processor equipment with high-pressure, fixed-geometry interaction chambers that impart high shear rates to product formulations. The M-700 generates up to 30,000 psi operating pressure (40,000 psi available as special option) for premium results at an affordable cost.



Model shown is subject to change depending on options selected

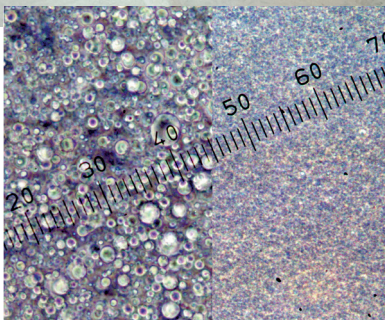
M-700 Series Microfluidizer processors combine superior, scalable results for pilot and production environments

Key benefits:

- Repeatable, uniform particle size results to submicron distributions with guaranteed scale-up from R&D to full production
- Continuous or batch mode; the model M-700 Series can process at a wide range of pressures and flows

Key features:

- Proven to be highly reliable at operating pressures up to 30,000 psi in pilot and production environments.
- Generates the highest shear rates of any fluid processor on the market today. This results most often, in achieving desired product quality in a single pass.
- Patented interaction chamber – wear-resistant construction; geometrically fixed design ensures that entire product stream will encounter equal energy per unit fluid volume.
- Model M-7250 units are standard with two synchronized intensifier pumps for increased flow rates.
- In-line cleaning with no disassembly required
- All stainless steel construction.



Patented Microfluidizer processor creates uniform dispersions with submicron size particles.

Applications

The M-700 series Microfluidizer™ processors have proven to be cost effective in a broad range of industries including pharmaceutical, biotechnology, chemical, coatings, inkjet inks, cosmetics and food additives. The M-700 utilizes our patented Microfluidizer process technology to deliver the finest and most uniform distribution of submicron particle size at the highest shear rates available of any processor technology. Emulsions and suspensions are more stable, and the performance of your final products are superior.

The two M-700 models have the same enclosure size. Pressure, flow, and resultant shear rates are selectable, and your choice of available interaction chambers help you achieve optimum results.

Models M-7125 and M-7250 machines incorporate 15 HP, 25 HP and 50 HP motors respectively. The M-7250 includes dual intensifier pumps that operate synchronously and produce a near **constant pressure**. This, in turn, results in less processing time and long-term reliability as compared to conventional homogenizers. All models are of stainless steel construction with stainless steel enclosures for easy external cleaning. All models are designed for clean-in-place with no disassembly required. For products that tend to be difficult to clean, all models can be fitted with our optional Ultra-Clean-In-Place (UCIP) feature, which, again, requires no disassembly.

Guaranteed Scaleup

The M-700 series utilizes leading edge interaction chamber technology. Our new Multi-Slotted chambers are now standard on all M-700 models, precisely replicating your required shear rates for the highest product quality, while maximizing flow rates to meet your production needs. As always, we guarantee the results you have obtained in your R&D are reproducible when you scale up.

In addition, Microfluidics is a service-oriented vendor. We will assist in helping you determine your preferential flow and pressure rates, and work with you in sampling your formulas in our applications laboratory, providing full confidential documentation of results. You will receive qualitative and quantitative analysis, particle size measurement and recommendations on how to best achieve desired results.

We work as your partner in product development and production, providing out-of-house expertise and ongoing applications assistance.

| | | | |
|-------|-------------------|-------------------|------|
| 5000 | 7125-10 | 7250-10 | 345 |
| 10000 | 2 gpm (7.5 lpm) | 4 gpm (15.2 lpm) | 690 |
| 15000 | 7125-20 | 7250-20 | 1034 |
| 20000 | 1 gpm (3.7 lpm) | 2 gpm (7.6 lpm) | 1380 |
| 25000 | 7125-30 | 7250-30 | 1725 |
| 30000 | .60 gpm (2.3 lpm) | 1.2 gpm (4.7 lpm) | 2069 |

All flow rates are at maximum pressure and are approximations on water.

Operating Principle

Each M-700 series machine contains an electric-hydraulic system providing power to one or two single-acting intensifier pumps, depending on the model selected. The pump amplifies the hydraulic pressure to the selected level which, in turn, imparts that pressure to the product stream. Process pressures range from 2,500 to 30,000 psi, resulting in high velocity, high shear process streams.

The intensifier pump is designed to supply the desired pressure at a constant rate to the product stream. As the pump travels through its pressure stroke, it drives the product through precisely defined fixed-geometry microchannels within the interaction chamber. As a result, the product stream accelerates to high velocities, creating shear rates within the product stream that are orders of magnitude greater than any other conventional means. All of the product experiences identical processing conditions, producing the desired results, including: uniform particle and droplet size reduction (often submicron), deagglomeration and high yield cell disruption.

At the end of the power stroke, the intensifier pump reverses direction and the new volume of product is drawn in. The intensifier pump again reverses direction and pressurizes the new volume of product, repeating the process.

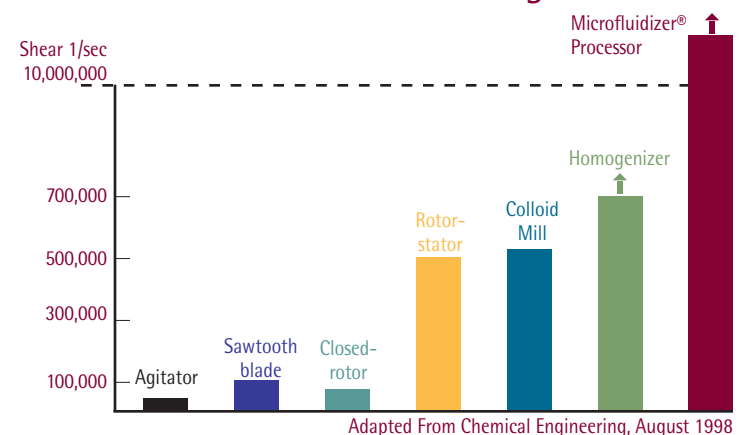
Upon exiting the interaction chamber, the product may be directed through an optional heat exchanger, recirculated through the system for further processing or directed to the next step in the process.

Interaction Chamber Choices

The interaction chamber is a patented device which allows you to achieve formulations with characteristics that would not be possible or economical with other available techniques. Interaction chambers are of fixed internal geometries through which materials are processed at extreme pressures (up to 40,000 psi) and velocities creating shear rates that are of orders of magnitude greater than any other conventional means. All of the product experiences identical processing conditions resulting in uniform, submicron particle and droplet sizes.



Shear Rates For Various Technologies

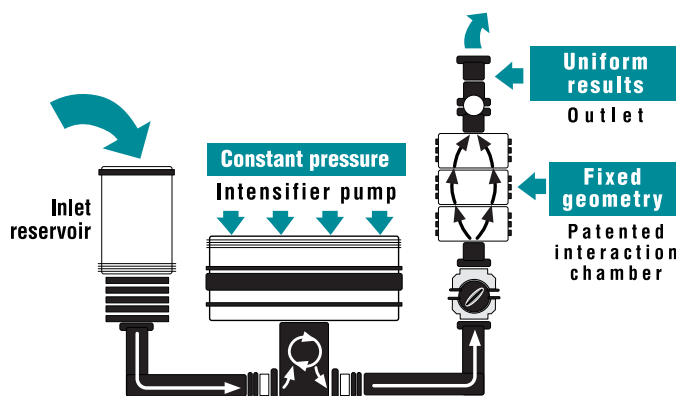


Typical Results Achieved Using M-700 Series Processing Equipment

| Sample | Pressure | Passes | Results |
|--|------------|----------|--|
| Emulsions | | | |
| Oil-in-water emulsions: 10% Mineral Oil, 1% HLB 12 in water | 10,000 psi | 1 pass | Small, uniform particle distribution (175 nm \pm 37%) resulting in long-term stability. |
| Cellulose Fibers | 20,000 psi | 3 passes | Formed a thick, creamy emulsion. |
| Dispersions | | | |
| Dispersion of steriods/water | 22,000 psi | 6 passes | Starting size 100 microns. Achieved average particle size under 2 microns. |
| Cosmetic Color Dispersion | 19,500 psi | 1 pass | Reduced particle size, increased uniformity and enhanced color intensity. |
| 30% Iron Oxides (Fe3O4) in solvent | 10,000 psi | 1 pass | Total deagglomeration in one pass for magnetic coating. Continuous process. |
| Phthalocyanine pigment (blue in polymer and solvent | 15,000 psi | 3 passes | Deagglomerated and dispersed polymer/pigment uniformly in solvent. |
| Gasket Material: Carbon Black and rubber in MEK and other solvents | 18,000 psi | 4 passes | Replaced media mill; easy to operate and clean with no media contamination. Produced better, smoother dispersion for making gasket compound. |

Standard Features

- Fixed-Geometry Interaction Chamber Employs No Moving Parts – abrasion-resistant ceramic or optional diamond construction.
- Highly Durable Intensifier Pumping System – efficient at ultrahigh pressures.
- High-Pressure Plunger Seals and Check Valves – made to withstand abrasive and corrosive formulations. Both seals and check valves are accessible and can be replaced easily.
- Open Isolator – prevents process fluid and hydraulic fluid contact.
- Simple and Efficient Electric/Hydraulic Drive System.
- Stainless Steel Frame and Enclosure – protects the high pressure components from damage, contains spills and features panels which are easily removable.
- Coned and Threaded Tubing and Fittings – these connections provide a high degree of reliability and in-line cleaning convenience.
- Materials of Construction – wetted parts of: 316 Stainless Steel, alumina, Ultra High Molecular Weight Polyethylene (UHMWPE), Teflon™ (PTFE), polyetheretherketone (PEEK), 17.4 PH Stainless Steel, Nitronic 60, 15.5 PH Stainless Steel.
- Validatable for cGMP and cGAMP applications.

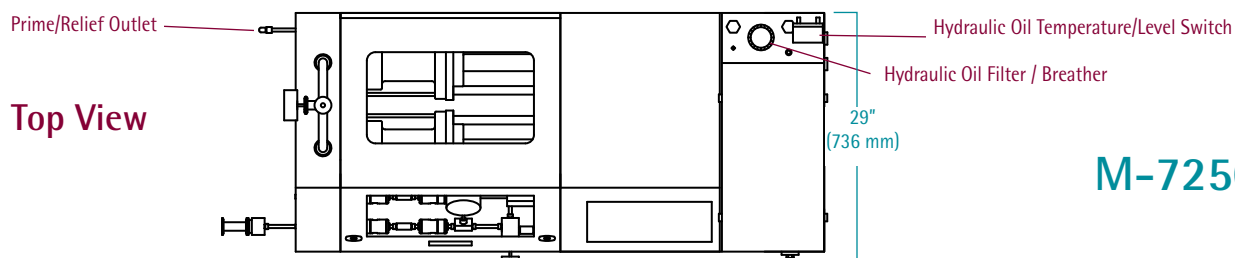


Equipment Options

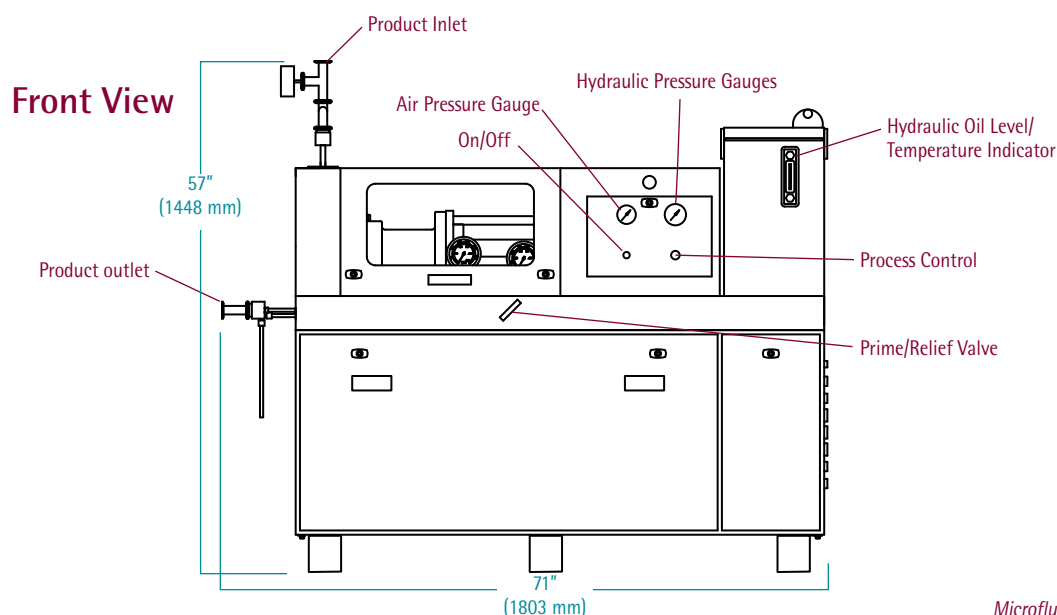
- Automatic operations via PLC controls available.
- Chamber Sets – additional sets of interaction chambers are available in different sizes or with diamond interiors to suit application requirements.
- Explosion Proof Configuration – for hazardous environments, NEC 500 and CE Atex compliant.
- Integration to process automation DCS or SCADA available.
- Flush Diaphragm Pressure Transducer and Indicator – for electronic readings of the system pressure.
- Steam-In-Place (SIP) for aseptic manufacturing.
- Ultra-Clean-In-Place (UCIP)
- Constant Pressure on M-7250 models (for more information, request technical bulletin TB-CP).

M-700 Series Specifications

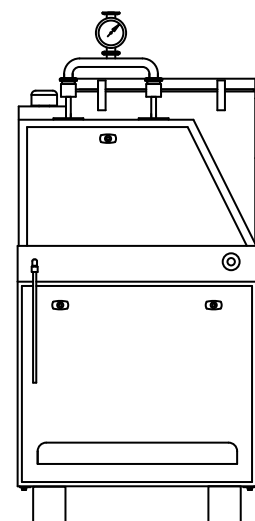
| | M-7125 | M-7250 |
|---------------------------|---|---|
| Pressure Range | up to 40,000 psi (2755 bar) | |
| Flowrate @ 25 strokes/min | 10K- 2.06 gpm (7.78 lpm) 20K- 1.05 gpm (3.96 lpm) 30K- .67 gpm (2.53 lpm) | 4.13 gpm (15.6 lpm) 2.11 gpm (7.97 lpm) 1.35 gpm (5.10 lpm) |
| Feed Temperature | Maximum 165°F (75°C) | |
| Power Requirements | 3 phase electrical service, 208/230/380/460/575V | |
| | 25 HP (18.5 kw) | 50 HP (37 kw) |
| Utility Requirements | Cooling water for hydraulic oil heat exchanger and process fluid heat exchanger, compressed air (50-150 psi 1 scfm@ 50 psi, pressure dew point of 0-35°F) | |
| Dimensions | 29"L x 71"W x 57"H (74 x 180 x 145 cm) | |
| Weight | 1,700 lbs (765 kg) | 2,000 lbs (900 kg) |



M-7250 Model Show



Side View



Microfluidics reserves the right to change specifications without notice.



Microfluidics International Corporation
90 Glacier Drive, Suite 1000 • Westwood, MA 02090, USA
Tel: 617-969-5452 • 800-370-5452 • Fax: 617-965-1213
Email: mixinginfo@idexcorp.com • www.microfluidicscorp.com



IDEX Material Processing Technologies
Bramley Drive, Vale Park West, Evesham, Worcestershire, WR11 1JH, UK
Tel: (+44) (0) 1386 769 007 • Fax: (+44) (0) 870 1911116
Email: mixinginfo@idexcorp.com • www.microfluidicscorp.com

Distributed in Canada by:
ATS Scientific Inc.
4030 Mainway
Burlington ON L7M 4B9
1-800-661-6700
www.ats-scientific.com

