

PURENANO™ MRT-CR5

The MRT-CR5 ensures mixing of the reactants to the nanometer scale inside a microliter size reaction zone. Typical applications include:

- Crystallization
- Chemical reactions
- Emulsion formation

Microfluidics has successfully demonstrated these applications on the lab scale (up to 0.5 liters/min).

Available Options

- Seal Quench
- Sanitary flush diaphragm pressure transducer
- NIST Traceable Calibration of Pressure Transducer
- NIST traceable Certificate of Calibration for Pressure Gauge
- IQOQ Documentation
- Factory Acceptance Test
- Start-Up Training
- Site Acceptance Test
- Preventive Maintenance Service
- 400 ml, 1.0 liter or 2.0 liter stainless steel feed reservoirs
- Extended warranty
- High chemical resistance seal kit



Model shown is subject to change depending on options selected

MRT-CR5 is a continuous microreactor system used for:

- Large scale production of nanoparticles with high purity and efficiency at low operational cost
- Synthesis of fine chemicals through single or multiphase reactions
- Process Intensification

MRT-CR5 utilizes a "bottoms up" proprietary approach whereby the particle is built up molecule by molecule in micro-seconds allowing not only for optimal and consistent sizing of the particles but also for the creation of smaller particle sizes not previously achievable. The process is continuous (versus batch) and results in extreme phase purity of products. In the lab, PureNano Continuous Crystallization was demonstrated to be more effective in producing optimally-sized, consistent nanosuspensions than standard particle size reducing methods for a wide variety of materials using solvent and anti-solvent crystallization.

High velocities through the energy zone are achieved by applying high pressures to the fluid upstream of the channels. Pressures up to 1380 bar (20,000 psi) are required for such velocities. Two opposing jets form as fluids flow through two microchannels within the chamber. The jets collide inside a microliter volume where the fluids mix in the nanometer scale. Average fluid velocities inside the micro-channels may exceed 400 m/s. A planar array of opposed pairs of such channels ensures effective scaling up of the technology to production levels. Impinging jet reactors have been used in the past for a variety of reactions. The flow inside Microfluidics chamber is intensely turbulent, unlike the flow in other reactors. The average channel velocities, jet Reynolds numbers and energy dissipation levels are orders of magnitude higher in Microfluidics chambers than in these other reactors.

Microfluidics reserves the right to change specifications without notice.



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MRT-CR5 Specifications

| | |
|--------------------------------|--|
| Flow-rate range | 100 to 500 ml/min (water) depending on operating pressure, product characteristics and chamber selection |
| Operating Pressure Range | 138 to 1,380 bar (2,000 to 20,000 psi) |
| Sample Size | 50 ml to continuous |
| Minimum product hold up volume | 42 ml |
| Dimensions: (H x W x D) | 58 x 119 x 66 cm (23" x 47" x 26") approximately, depending on options |
| Weight | 204 kg (450 lb.), approximately |

Standard Features Include:

- Ceramic Interaction Chamber (CIXC)
- Ceramic Auxiliary Processing Module (CAPM)
- Product contact surfaces include: 316 stainless steel, 17-4 PH stainless steel, PEEK, UHMWPE, Zirconia Ceramic, Aluminum Oxide Ceramic, Teflon, Polypropylene and Viton
- 17' product cooling coil with open jacket
- Single acting, hydraulically driven intensifier pump
- Variable secondary metering pump for precision feeding of reactant
- 4 kW (5 HP) electric motor 208 VAC/60 Hz/3 PH
- Manual controls for operating pressure, intensifier on/off, feed pump on/off and motor on/off
- (2) 300 ml glass feed reservoirs
- Emergency stop
- UHMWPE plunger seals.
- Viton static seals. Other materials available upon request
- Ceramic (Zirconia) plunger
- Process pressure gauge
- Electro-hydraulic power unit
- Stainless steel enclosure
- All required special tools
- CAPM replacement coupling
- Machine and operator training at Microfluidics Technology Center, one (1) day
- Spare parts package

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