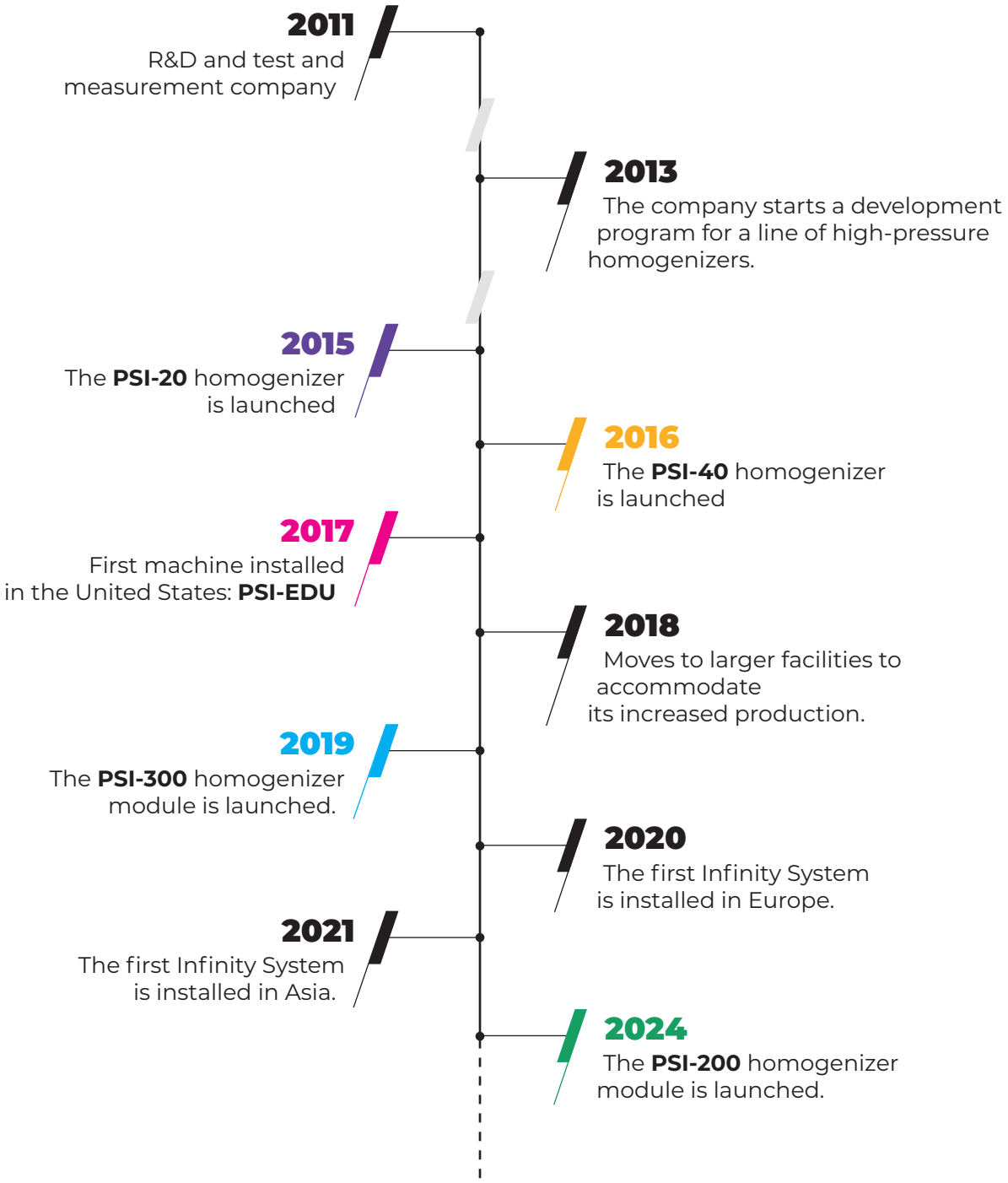
THE HIGH PRESSURE HOMOGENIZERS

PSI®
PSI Instruments

PSI-INSTRUMENTS.COM

MILESTONES


2011
R&D and test and measurement company
2013
The company starts a development program for a line of high-pressure homogenizers.
2015
The **PSI-20** homogenizer is launched
2016
The **PSI-40** homogenizer is launched
2017
First machine installed in the United States: **PSI-EDU**
2018
Moves to larger facilities to accommodate its increased production.
2019
The **PSI-300** homogenizer module is launched.
2020
The first Infinity System is installed in Europe.
2021
The first Infinity System is installed in Asia.
2024
The **PSI-200** homogenizer module is launched.

PSI Instruments

COMPANY PROFILE
ABOUT PSI INSTRUMENTS

PSI Instruments® is a leader in the design and production of cutting-edge high-pressure homogenizers. Its products are characterized by their innovative solutions, their high-quality manufacturing, and their extreme durability.
Thanks to their compact size and energy efficiency, the lab-scale models have been successfully used in academic and industrial settings, for applications ranging from pharmaceutical nano emulsions to the size reduction of hard-materials to the exfoliation of graphene and the production other nano materials.

The modular design of the Infinity System, designed for large-scale production, makes it possible to achieve virtually any flowrate and allows the creation of multi-pass pipelines, which is not possible with any other system on the market.

All the machines have in common a very high level of user friendliness made possible by an integral design of parts, control systems and user interfaces specifically designed and developed by PSI and specifically focused on ease of use and ease of maintenance. A continuous innovation and improvement program allows the design of new machines and the creation of specialty accessories and configurations to better serve a wider range of customers, and constantly improve the build quality and the usability of the machines.

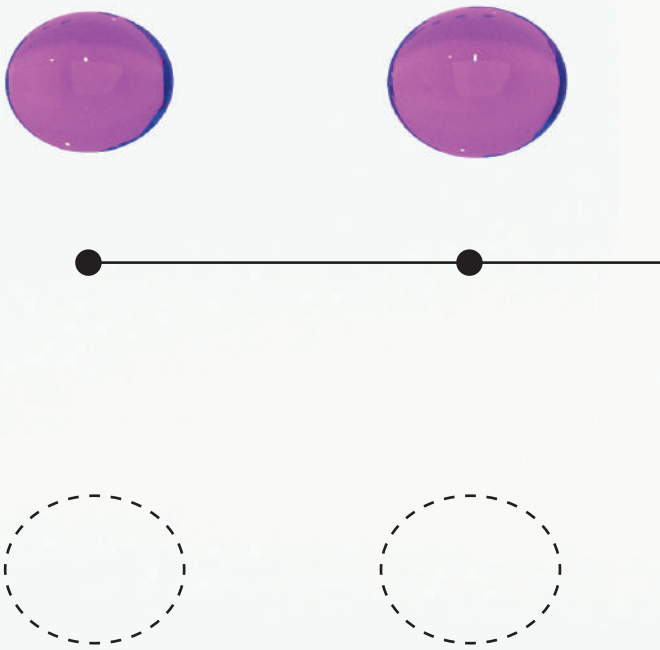
The high quality of all the machines, combined with an attentive technical service, are the main reason for the high level of customer satisfaction that characterizes PSI and its products and is a key component of the company's success.

HOW TO GET SMALLER AND HOMOGENOUS SIZES

To get even smaller size we need to reduce bore (to microns) and increase flow-rate. We need a **HIGH PRESSURE** (several hundreds of bars) to make this happen.

To reduce size and polydispersion we need a **FIXED GEOMETRY** and a **CONSTANT SHEAR**.

- **Constant shear** is obtained by constant flow
- **Constant flow** is obtained by accurate and fixed geometry, constant pressure, and constant physical properties of feeding material (temperature, formulation, etc.)



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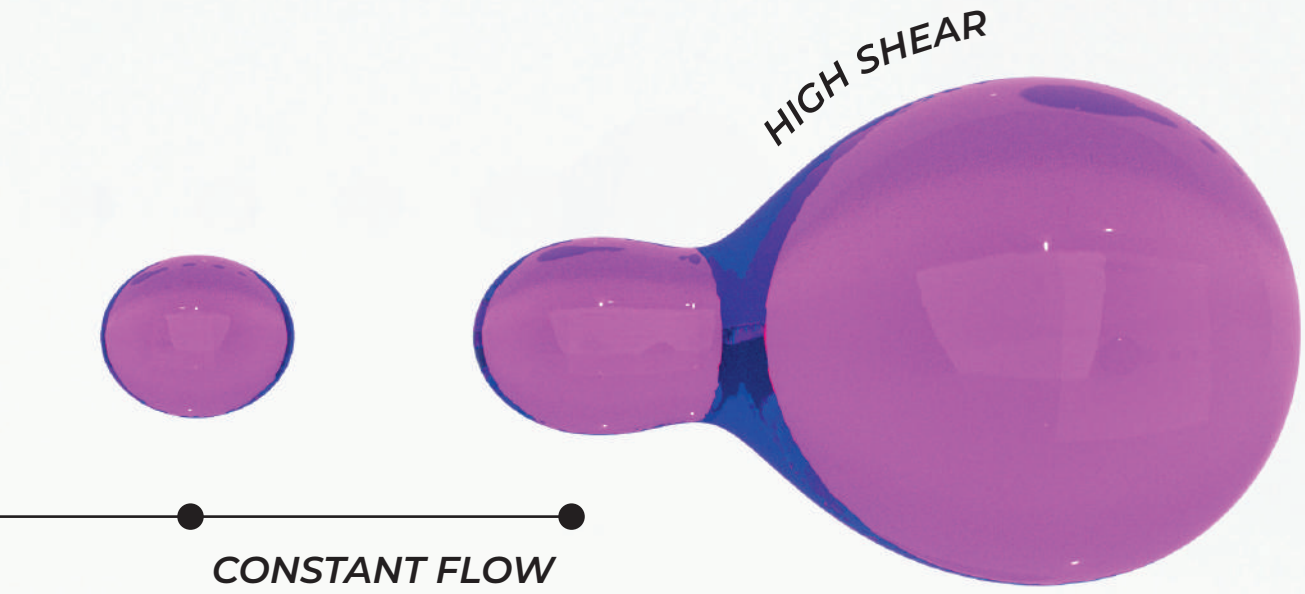
ACCELERATED PARTICLE



WORK SMARTER

COMPACT LINE
FROM THE LAB TO PILOT

- up to 2000 bar
- up to 70 L/h
- less than 70dBA
- compact footprint

PSI 20 | PSI 30 | PSI 40

FOOTPRINT
W×L×H 650×900×1126 mm

POWER
3×220V 60Hz, 3×460V 60Hz
3×380V 50Hz, 3×400V 50Hz

WEIGHT
155 kg

FLOWRATE
20 L/h

MAX PRESSURE
2000 bar

FOOTPRINT
W×L×H 650×900×1126 mm

POWER
3×220V 60Hz, 3×460V 60Hz
3×380V 50Hz, 3×400V 50Hz

WEIGHT
162 kg

FLOWRATE
40 L/h

MAX PRESSURE
2000 bar

FOOTPRINT
W×L×H 650×900×1126 mm

POWER
3×220V 60Hz, 3×460V 60Hz
3×380V 50Hz, 3×400V 50Hz

WEIGHT
170 kg

FLOWRATE
70 L/h

MAX PRESSURE
2000 bar

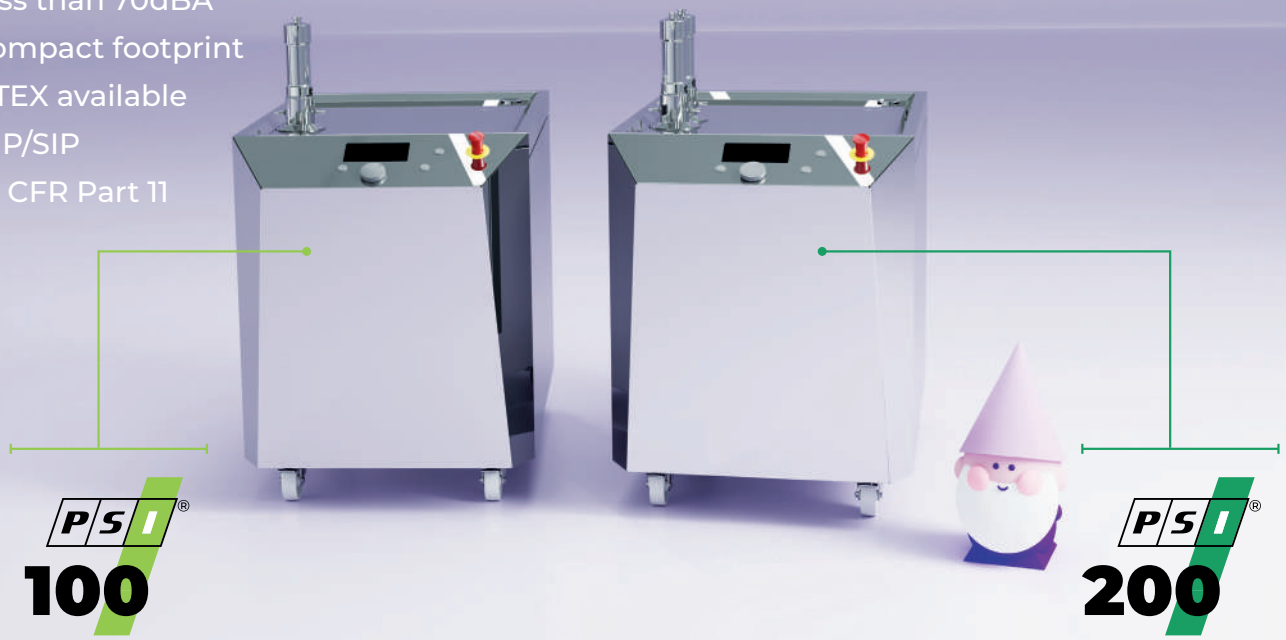
PSI EDU

ASK ABOUT OUR ACADEMIC PROGRAMS

PSI Instruments

POWER LINE
MEDIUM TO LARGE BATCHES

- up to 2000 bar
- up to 210 L/h per module
- virtually unlimited throughput in modular configuration
- less than 70dBA
- compact footprint
- ATEX available
- CIP/SIP
- 21 CFR Part 11



PSI 100

FOOTPRINT
W×L×H 725×1140×1260 mm

POWER
3×220V 60Hz, 3×460V 60Hz
3×380V 50Hz, 3×400V 50Hz

WEIGHT
290 kg

FLOWRATE
130 L/h

MAX PRESSURE
2000 bar

PSI 200

FOOTPRINT
W×L×H 725×1140×1260 mm

POWER
3×220V 60Hz, 3×460V 60Hz
3×380V 50Hz, 3×400V 50Hz

WEIGHT
330 kg

FLOWRATE
210 L/h

MAX PRESSURE
2000 bar

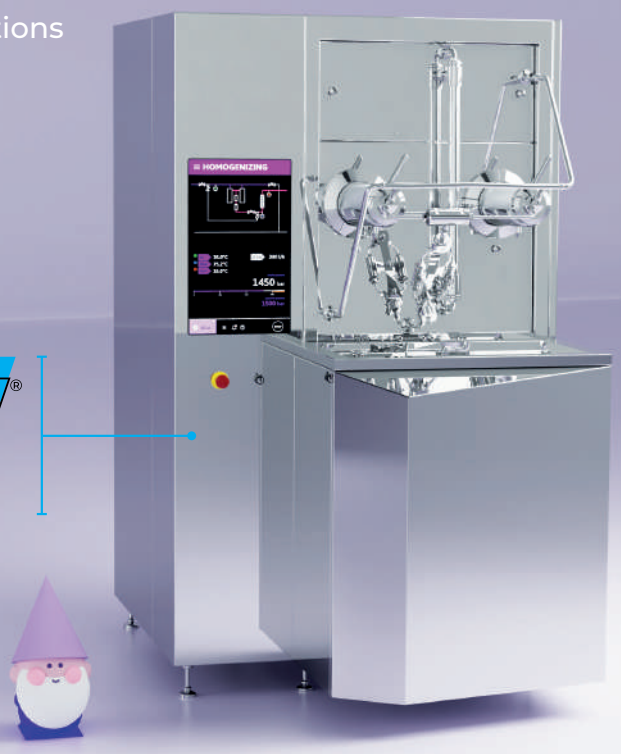
WORK SMARTER

INFINITY LINE
TO THE STARS AND BEYOND

- up to 2000 bar
- up to 500 L/h per module
- virtually unlimited throughput in modular configuration
- less than 70dBA
- flexible configurations
- ATEX available
- CIP/SIP
- 21 CFR Part 11

INFINITY SYSTEM

PSI 300



FLOWRATE
330 L/h

MAX PRESSURE
2000 bar

FLOWRATE
440 L/h

MAX PRESSURE
1500 bar

FLOWRATE
550 L/h

MAX PRESSURE
1200 bar

FOOTPRINT
W×L×H 1310×1900×2245 mm

POWER
3×400V 50Hz, 3x480V 60Hz
PN 25 kW, IN 56A

WEIGHT
1850 kg

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THE MODULAR ADVANTAGE

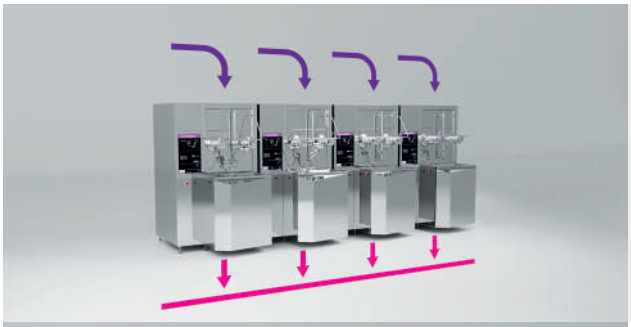
The Infinity system allows multiple modules to be linked and controlled together, thus making it possible to achieve very high flowrates. But a modular architecture brings much more than that

- **FUTURE-PROOF**
  It is always possible to add more modules, to increase the throughput, making it possible to start conservatively and expanding the system as demand grows.
- **REDUNDANCY**
  Maintenance costs can be cut dramatically by adding extra capacity: in case of a failure, being able to run at reduced capacity, rather than not running at all, makes a huge difference in mission-critical productions.

as a single system or independently. There are several options:

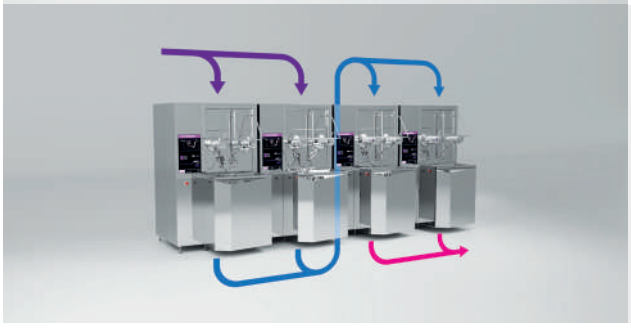
- **REMOTE CONTROL**
  Our data box can be easily integrated with customer-supplied control rooms. Choice of Modbus, Profinet and other industry-standard protocols. All the process parameters are accessible for control and recording.
- **LOCAL CONTROL**
  Each module is equipped with a user-friendly HMI, and we can also provide a large-screen HMI, either wall-mounted
  or lectern-style, with data recording functions and 21 CFR Part XI compliance options.
  External devices can be integrated to the local HMI, allowing a single point of control.

The modules of the machine can be controlled together



PARALLEL CONFIGURATION
This is the standard setup of the Infinity system.
Each module receives the same fluid from a common line and emits the processed product to a common output. The flow rates are cumulative in this case, but the machine only performs one pass at a time. Tanks for the intermediate passes must be provided and cleaned as needed.

SERIAL CONFIGURATION
As an option, the modules can be configured in a pipeline, where each module feeds the next. The resulting flow rate will be that of a single module, but it is possible to go from premix to final product without intermediate steps, also allowing for continuous production.



HYBRID CONFIGURATION
It is also possible to mix and match the various combinations to tailor the machine exactly to the production needs.
And if the needs change, the machine can be reconfigured with them.
All the connections between

EXCELLENCE
EXCELLENT BY DESIGN

GUARANTEED SCALABILITY
PROCESS SCALE UP WITHOUT COMPROMISES

COMPACT SIZE
FITS ANYWHERE IN YOUR LAB

LOWEST NOISE
A HOMOGENIZER THAT IS EASY ON YOUR EARDRUMS

HIGHEST SHEAR
THE HIGH PERFORMANCE OF FIXED GEOMETRY

HIGH THROUGHPUT
THE WIDEST RANGE IN THE MARKET

TRAINING AND MAINTAINANCE
SUPPORT ON ALL THE ASPECTS OF OUR INSTRUMENTS

We offer support on all the aspects of our instruments, from installation to training, to preventative maintenance, to on-site assistance contracts.

But we can also provide our expertise to help you analyze your homogenization process.

EASE OF USE
INTUITIVE DISPLAY

All the process parameters are visible in an intuitive display.
A pressure gauge represents the process pressure in real-time, calculated from the values measured by the oil pressure sensor.

This method is accurate and eliminates the need of an inline high-pressure sensor. If needed, we still offer an inline digital high-pressure sensor as an option. Up to four temperature points are available, either in Type K or Type T thermocouples. Inline thermocouples and gaskets are available in our catalogue.

The machine calculates approximate volumes and flowrates from its motion sensors. A precise flow-meter can also be provided as an option.
The machine can also be monitored or controlled remotely through an HMI display, or it can be integrated with your existing control system via Modbus.

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MATERIALS
BEST MATERIALS
AND TREATMENTS
AVAILABLE

We use the best materials and treatments available to make our machines suitable to the most stringent requirements.

All the low-pressure tubings and accessories are in AISI 316L electropolished to ensure high cleanability.

High-pressure components are either electropolished or passivated to guarantee the best surface finish available within the constraints of small bores and orifices.

We also offer choice of silicone, PTFE or PTFE-enveloped FKM for our sanitary gaskets, and UHMWPE or PTFE for our high-pressure seals to adapt to various chemical resistance requirements including USP/FDA grade..

All the other materials are chosen with their chemical resistance and cleanability in mind: from the zirconia plunger to the PEEK supports.

Mirror Finish

All our instruments are encased in 316 stainless steel shells, with our signature mirror finish. Excellent for the biopharmaceutical industry and any other application where cleanability is a must, it also underscores the design of the instruments and makes them a perfect fit in any high-tech laboratory.

Anti-Fingerprint Finish

As an option, for harsher environments, we also offer a special anti-fingerprint finish: the 316 stainless steel surfaces first undergo a special micro shot-peening treatment and are then electropolished to create a bright, silk-smooth surface that doesn't compromise on cleanability or esthetics.

INTERACTION CHAMBERS

Interaction chambers are a critical component of a fixed-geometry homogenizer and the main driver of quality and customer success.

We design and manufacture a wide range of interaction chambers, with different geometries aimed at different applications to provide the right amount of shear force needed and achieve the perfect results, replicating, or improving the observations reported in the scientific literature. We also use different materials for different applications, ranging from sapphire to single-crystal diamonds, ensuring a long service life and the ability to process the hardest abrasives.

The extreme manufacturing accuracy made possible by the use of cutting-edge nano-milling technologies allows us to achieve unsurpassed quality levels and reproducibility of results.

All our chambers can be provided in different styles of high-pressure connectors, and with an effective internal cooling system to prevent product degradation.

While our range is extensive, our specialists can develop a custom chamber to fit your product needs, or to optimize the throughput of your machine.

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BASIC ACCESSORIES

All PSI homogenizers come equipped with tri-clamp connectors, making integration into any process easy and affordable. However, if you prefer a stand-alone installation, we offer an extensive selection of accessories and instrumentation, including feed systems, heat exchangers, sensors, data recording tools, and remote-control devices.

Whether the goal is expanding an existing setup or building a customized solution, our range of accessories ensures flexibility and efficiency. And if you need help integrating our machines into your system, we can help you design and manufacture the parts you need.

All our accessories are designed with painstaking care to integrate seamlessly with our homogenizers and are manufactured using high-quality materials and components.

SKID SYSTEMS
TURNKEY AND COMPOSABLE

PSI Instruments

ALL THE FLEXIBILITY YOU NEED

Thanks to our strategic partnerships, we can design, manufacture, and provide turnkey skids for any volume and for the most demanding applications.

We also proudly provide modular skid systems, based on composable carts, that provide maximum flexibility in setting up new productions or scaling up existing ones.

Our modular skid system typically includes:

- A preparation station made of tanks with a choice of pumps, stirrers, rotor-stator mixers, temperature control and a wide range of sensors.
- One or more processing stations, with the tanks and instrumentation needed to handle multiple homogenizations passes.
- Optional special stations to provide the fluids needed to clean the lines for CIP or SIP, when required, and the means to properly collect the waste.

All of our skids are highly customizable and provide a high degree of automation and data recording. They are also equipped with an easy-to-use HMI for local or remote control, but thanks to a standard-based data interface can also be integrated into an existing control system.

IN PARTNERSHIP WITH MACHINARIA

WORK SMARTER

ADVANCED ACCESSORIES
INSTRUMENTATION AND SOFTWARE

The open structure of our homogenizers allows us to easily integrate specialty devices and sensors to address specific requirements.

Our high-tech sensors include, for instance:

- Inline qualitative and quantitative particle sizers (e.g. for USP729);
- Inline dispersed fraction homogeneity tomographic analyzers.
- Mass flowmeters.
- Turbidimeters.
- UV/VIS/NIR Photometers.
- pH meters.
- Conductivity meters.

It is also possible to integrate most industrial sensors on the market, or we can provide equivalent devices.
Specialty feed systems and heat exchangers can be designed to address specific needs, such as abrasive fluids, products with high sedimentation rates, special chemical compatibility requirements.

All our systems can be optionally upgraded to provide:

- CIP
- SIP
- ATEX compliance
- 21 CFR Part 11 compliant operation
- Enhanced automation
- Customized control or connectivity
- Industry 4.0 cloud-based integration and management

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WORK SMARTER

SUPPORT

We prioritize customer satisfaction through a collaborative effort between our skilled technicians and our extensive distributor network.

Our technicians are highly trained and provide timely and efficient support, and we rely on our effective and comprehensive service program, based on training and preventive maintenance, to keep the customer experience smooth and uneventful.

Even with our excellent ratings, we constantly monitor customer satisfaction and follow a strict improvement program based on feedback and observation.
The key to our excellence is our distributor network, on which we rely to provide our front-line troubleshooting and assistance.

- up to 2000 bar
- up to 500 L/h per module
- virtually unlimited throughput in modular configuration
- less than 70dBA
- compact footprint

WORK SMARTER.

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