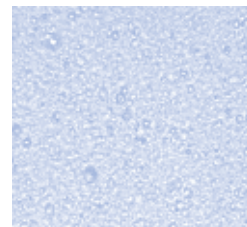
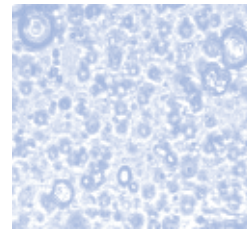




Niro Soavi
North America

High-Pressure Pumps and Homogenizers



Leading Technologies. Individual Solutions.

Niro Soavi

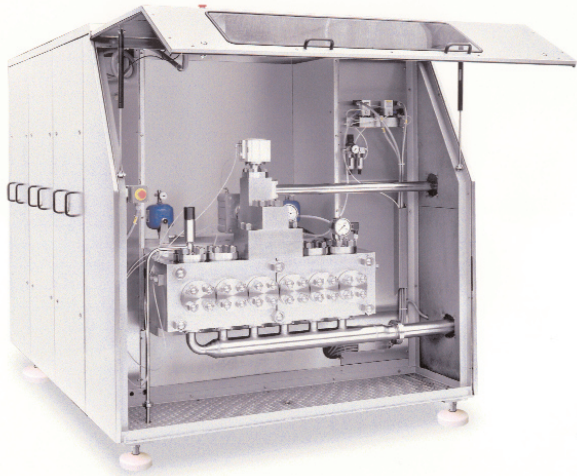
Established in 1947, today **Niro Soavi** is an international leader in High-Pressure Pumping and Homogenization. It is part of GEA, a global technology leader with more than 150 operating companies worldwide.

Niro Soavi North America's service, administration, and warehouse facilities are located in Bedford, New Hampshire. Niro Soavi North America has employed numerous regional sales and service engineers and technicians as well as regional spare parts stocking distributors – all part of the vision of being the best homogenizer partner in North America, in machine supply as well as service.

Niro Soavi North America is a full service technology center covering all your needs for units, systems, service and application development.

Niro Soavi North America is a reliable partner in your industry demonstrating an unmatched degree of application knowledge and expertise with more than 500 machines installed in North America and 5,000 worldwide.





Niro Soavi is a world leader in high pressure pumping and homogenization technology and offers an unparalleled range of high-efficiency machines i.e. operating pressures, flow rates and features to match your specific production and regulatory requirements.

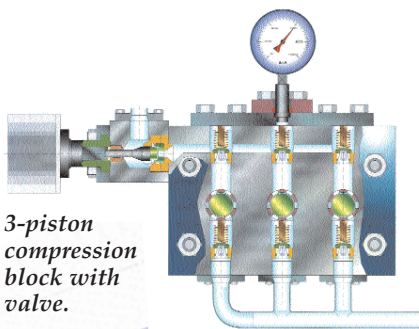
- High-pressure pumps
- High-pressure homogenizers
- Homogenizing valves – including NanoValve® technology
- Homogenizer cGMP skid systems
- Homogenizer parts and spare parts
- Controls and automation

Special design features and options include:

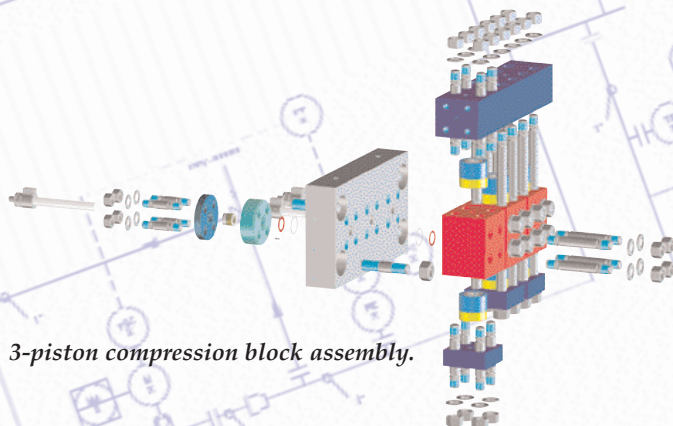
- Pumping valves can be changed freely between poppet and ball valves depending on the application.
- First and second stage homogenizer valves are adaptable modular parts prepared for easy reconfigurations.
- Non aseptic machines can be upgraded to full aseptic design.
- Interchangeable pumping pistons (plungers) - chrome plated, tungsten carbide or ceramic.
- The ceramic pumping pistons are made of solid ceramic and can be turned around for usage at both ends. Thermal cracking is less likely to occur with solid ceramic as opposed to coated ceramic plungers.
- The homogenizer valve parts can be changed to suit your applications as they develop.



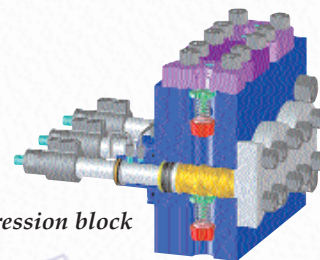
NS1001L 2K Panda 2K laboratory table-top homogenizer.



3-piston compression block with valve.



3-piston compression block assembly.



Aseptic design compression block

Applications...

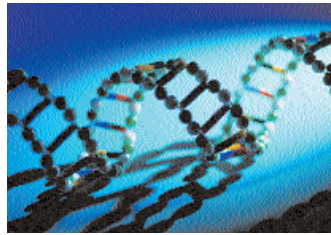
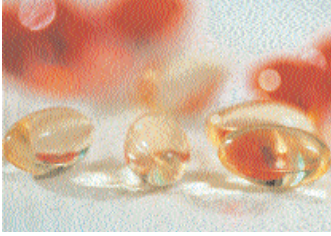
Niro Soavi technology can be used in numerous applications in the food, dairy, beverage, pharmaceutical and biotechnology industries. Thousands of Niro Soavi machines have been installed in these markets. Following are some of the main process applications all involving Niro core technologies.

...for Food, Dairy, and Beverage Industries



- Niro Soavi homogenization system, in aseptic design, integrates with UHT and HTST systems.
- Niro Soavi VHP technology provides stable flavor emulsions for both liquid and solid flavor applications.
- Niro Soavi VHP technology enables the extraction of valuable nutraceuticals for health food formulations.
- Niro Soavi high-pressure pumping and homogenization system integrated with Niro evaporation and spray drying technologies.
- Niro Soavi high-pressure pumping integrates in meat and poultry high pressure processing systems.





...for Pharmaceutical, Biotechnology and Cosmetics Industries

- Homogenization of cosmetic products in order to secure stable emulsions with micron level particle sizes and high water content.
- Homogenization of dispersions providing a stable and even distribution of particles.
- Niro Soavi VHP technology for high-efficient particle and cell rupture applications.
- Niro Soavi VHP technology for extraction of intracellular materials.

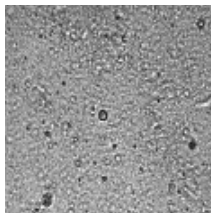


Note: Niro's GEA Liquid Processing Group in Columbia, MD is the exclusive supplier of Niro Soavi's range of cGMP high-pressure pumps, homogenizers, and homogenizer skid-mounted systems to the pharmaceutical and biotechnology industries.

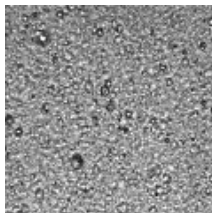
Multi-purpose biotechnology cell rupture skid system

Testing

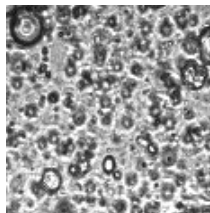
- Pilot plant testing facility.
- Comprehensive rental machine program including tabletop, pilot-, skid- and production size units.
- Particle size distribution analysis and digital photo analysis.



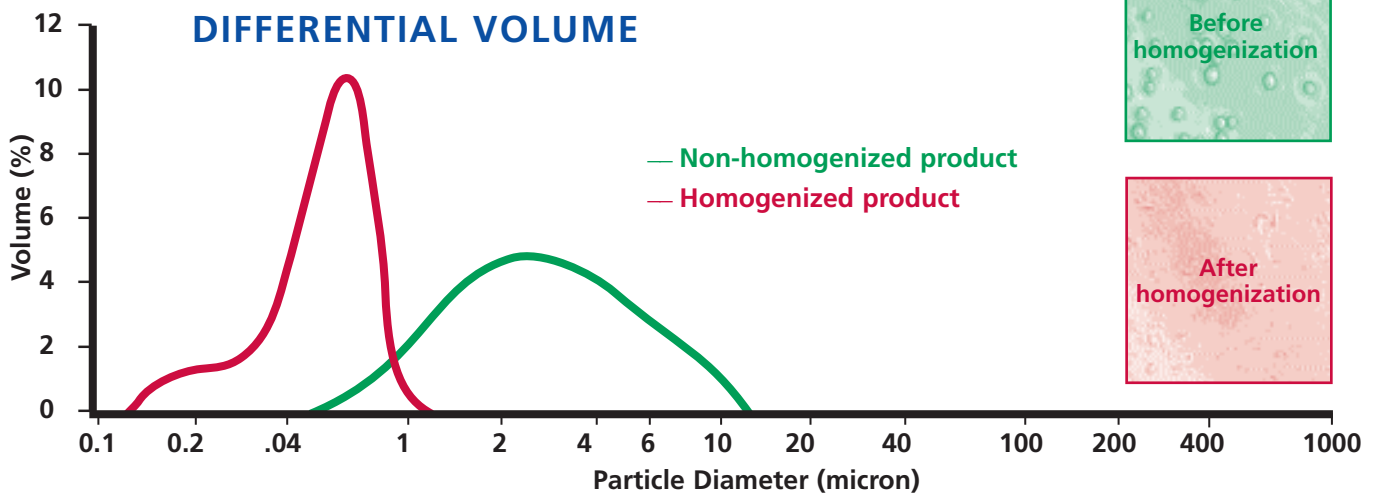
Baby lotion at 250 bar with 20% water added



Baby lotion at 250 bar



Baby lotion



Niro Soavi Machine Models

The relationship between capacity and operating pressures is given in the table below.

Metric Units (GB & US)

Machine Model	Max. Pressures (bar)															Max. kW	Foot Print W x D mm
	100	120	150	180	200	250	300	350	400	450	600	700	1000	1200	1500		
NS1001	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	1.0	415 x 780
NS2002	55	55	55	55	55	55	55	55	55	30	30					1.5	523 x 839
NS2006L/Pony	80	80	80	80	80	80	80	80	80	80	80	80	80	35	35	5.5	790 x 1195
NS3006L/Panther	120	120	120	120	120	120	120	120	120	120	120	120	120	50	50	5.5	790 x 1195
NS2006	650	650	650	450	450	320	250	250	200	200	80	80	80	80	35	5.5	655 x 800
NS3006	1000	1000	1000	750	700	600	500	400	350	300	220	120	120	120	50	5.5	745 x 915
NS3011	3000	2700	2200	1800	1600	1300	1100	900	800	700	550					11.0	1000 x 1410
NS3015	4500	3700	3000	2500	2200	1800	1500	1200	1100	900	750	600	400	270	170	15.0	1000 x 1410
NS3024/18	5000	4600	3700	3000	2700	2200	1800	1500	1300	950	900					18.5	1000 x 1560
NS3024	7200	6000	4800	4000	3500	2700	2100	2000	1500	1000	1000	700	550	310	300	30	1000 x 1560
NS3037/30	9500	8000	6500	5400	4800	3900	3200	2700	2400	2100	1600					30	1390 x 1925
NS3037	12000	10000	8000	6700	6000	5000	4000	3400	3000	2600	2000	1700	1200	900	800	37.0	1390 x 1925
NS3075/45	12000	12000	9800	8000	7300	5800	4900	4200	3600							45.0	1470 x 2035
NS3075/55	14000	14000	12000	10000	9000	7200	6000	5100	4500	4000	2800					55.0	1470 x 2035
NS3075			14000	12000	11000	8200	7000	6000	4900	4900	3100	2000	1400	1400	1000	75.0	1470 x 2035
NS3110/90	17500	17500	17500	16000	14500	11700	9800	8400	7300	6500	4900					90.0	1800 x 2445
NS3110	22000	22000	22000	20000	18000	15000	12000	1000	8500	7400	5500	4200	2600	2600	1800	110.0	1800 x 2445
NS5132	28000	28000	28000	23900	21500	17200	14300	12200	10700	9500	7000					132.0	2010 x 2890
NS5180	37000	37000	36000	32000	28000	24000	19500	16500	14000	12000	9500	7000	5500	4200	3000	180.0	1900 x 2735
NS6200	40000	40000	40000	35000	31000	25000	21500	18500	16000	14000	10800	9000				200.0	2100 x 3090
NS8315	52000	52000	52000	48000	45000	36000	28000	25000	21000	18000	14550	11500				315.0	2350 x 3105

Imperial Units (GB & US)

Machine Model	Maximum Pressure (psi)															Max. HP	Machine Size W x D inches
	1,500	1,700	2,200	2,600	2,900	3,600	4,400	5,100	5,800	6,500	8,700	10,000	15,000	17,000	22,000		
NS1001	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	1.3	16.3 x 30.7
NS2002	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	8	8					1.3	20.6 x 33
NS2006L/Pony	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	7.9	7.9	7.4	31 x 47
NS3006L/Panther	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	13.2	13.2	7.4	31 x 47
NS2006	172	172	172	119	119	85	66	66	53	53	21	21	21	21	7.9	7.4	25.8 x 31.5
NS3006	264	264	264	198	185	159	132	106	92	79	58	32	32	32	13	7.4	29.3 x 36
NS3011	793	713	581	476	423	343	291	238	211	185	145					15	39.4 x 55.5
NS3015	1189	977	793	660	581	476	396	317	291	238	198	159	106	71	45	20	39.4 x 55.5
NS3024/18	1321	1215	977	793	713	581	476	396	343	251	238					25	39.4 x 61.4
NS3024	1902	1585	1268	1057	925	713	555	528	396	264	264	185	145	85	79	40	39.4 x 61.4
NS3037/30	2510	2113	1717	1427	1268	1030	845	713	634	555	423					40	54.7 x 75.8
NS3037	3170	2642	2113	1770	1585	1321	1057	898	793	687	528	449	317	238	211	50	54.7 x 75.8
NS3075/45	3170	3170	2589	2113	1928	1532	1294	1110	951							60	57.9 x 80.1
NS3075/55	3698	3698	3170	2642	2378	1902	1585	1347	1189	1057	740					74	57.9 x 80.1
NS3075			3698	3170	2906	2166	1849	1585	1294	1294	819	528	370	370	264	100	57.9 x 80.1
NS3110/90	4623	4623	4623	4227	3830	3091	2589	2219	1928	1717	1294					121	70.9 x 96.3
NS3110	5812	5812	5812	5283	4755	3693	3170	2642	2245	1955	1453	1109	687	687	476	147	70.9 x 96.3
NS5132	7397	7397	7397	6314	5680	4544	3778	3223	2827	2510	1849					177	79.1 x 113.8
NS5180	9744	9744	9510	8454	7397	6340	5151	4359	3698	3170	2510	1849	1453	1110	793	241	74.8 x 107.7
NS6200	10577	10577	10577	9246	8189	6604	5680	4887	4227	3698	2853	2378				268	82.7 x 121.7
NS8315	13737	13737	13737	12680	11888	9510	7397	6604	5548	4755	3844	3038				422	93.1 x 127.2

Machine Model Nomenclature:

N - Niro
S - Soavi
3 - Number of pistons, e.g. 3
0 }
7 } - Motor size,
5 } e.g. 75 kW (100 HP)
H - Homogenizer (H),
 High-Pressure Pump (P),
 Laboratory Unit (L).

The capacity data are subject to updates and revisions.

High-Pressure Technology – *Pumping and Homogenization*

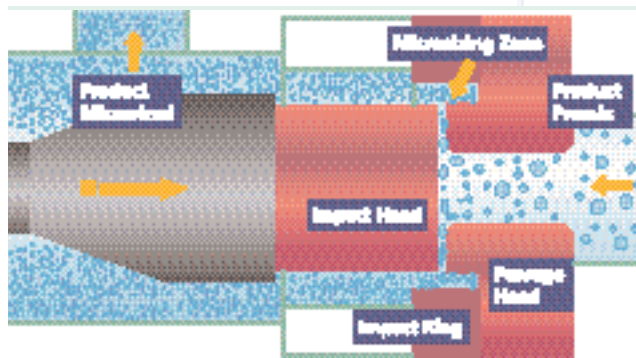
Handling fluids under high pressure, up to 1,500 bar / 21,750 psi under continuous full-scale operation, is a technology in its own right. This incorporates the disciplines of machine design, strength of materials, and a significant fluid mechanical knowledge, which combines the highest skills in mechanical engineering and more than 50 years of expertise.

Homogenization is a fluid mechanical process that involves the subdivision of particles or droplets into micron sizes to create a stable dispersion or emulsion for further processing.

This is an important stage in the treatment for many products. It provides improved product stability, shelf life, digestion, and taste. Homogenizing can also significantly reduce the amount of additives required. It prepares feeds so that subsequent spray drying produces the best quality of powders. This is especially important for baby foods and many dairy and food products.

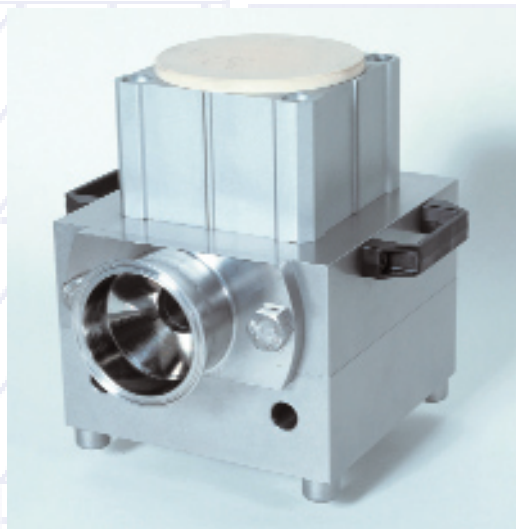
After homogenization, the particles are of a uniform size, typically from 0.2 to 2 micron, depending on the operating pressure. The homogenizer is the most efficient device for particle and droplet size reduction. The actual properties of the product vary with pressure and product type in a complex relationship. In general, higher processing pressure produces smaller particles.

The process occurs in a special homogenizing valve, the design of which is the heart of the homogenizing equipment. The fluid passes through a minute gap in the homogenizing valve. This creates conditions of high turbulence and shear, combined with compression, acceleration, pressure drop, and impact. Causing the disintegration of particles and dispersion throughout the product.

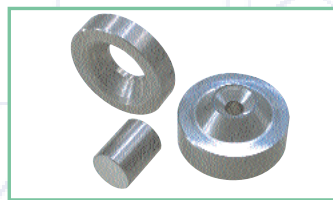


Homogenizing valve

The patented NanoValve® enables homogenization in standard milk applications to take place at a lower homogenizing pressure through a more efficient valve design for low pressure and a high flow rate application.



The special Niro Soavi rupture type (R-type) valve is particularly suitable for cell rupture applications. This proprietary Niro Soavi technology can also be applied to existing production units in order to improve performance on old machines.

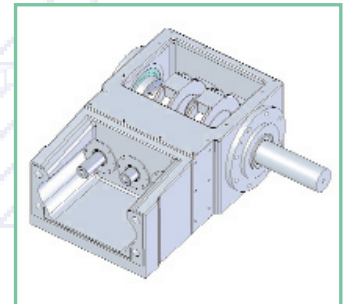
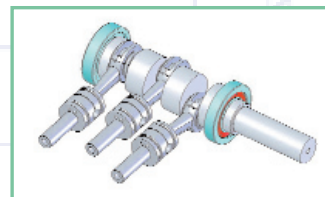
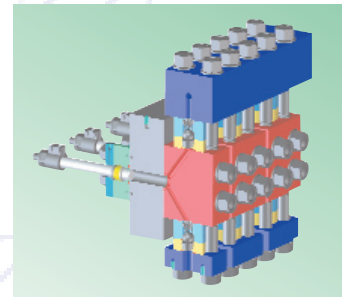
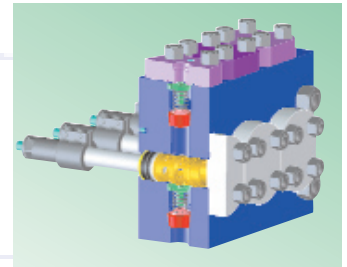


Homogenizing valve group

A properly designed positive displacement pump is crucial to the homogenization process. This involves Finite Element Method (FEM) and Finite Volume Method (FVM) for mechanical structure and fluid mechanical analysis. A constant sourcing of the best stainless steel, high alloy compositions and new ceramic materials enables the incorporation of highly abrasive resistant and durable components.

Operating continuously at full industrial scale from 600 to 1,500 bar (8,700 to 21,750 psi) requires a unique mechanical design. Niro Soavi identifies this class of machines as VHP (Very-High-Pressure).

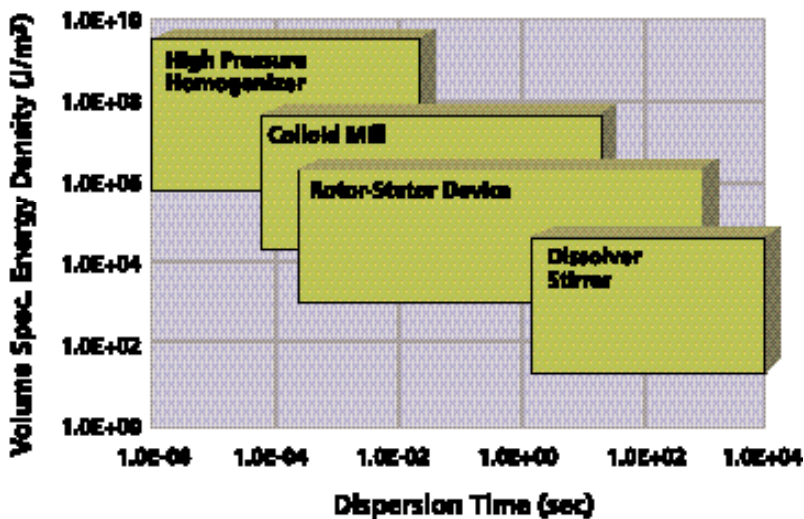
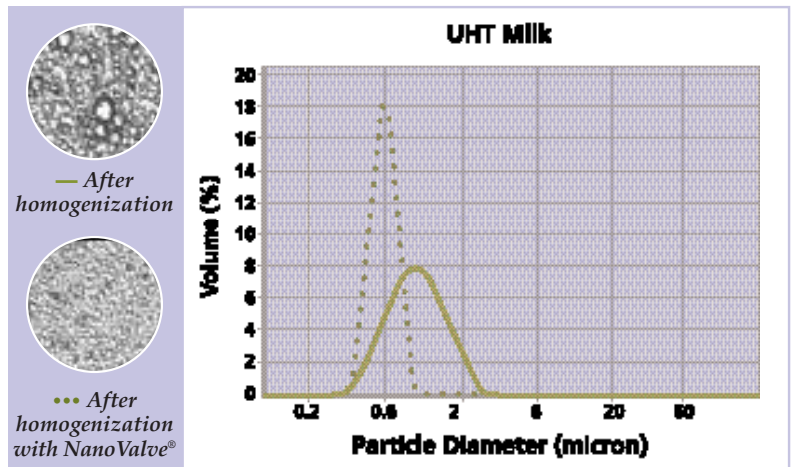
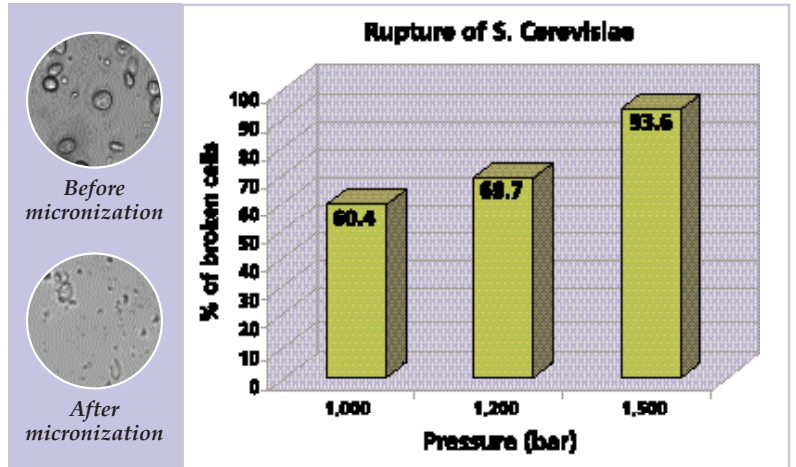
The Soavi crankcase is heavy duty cast iron, containing the power end components that create the reciprocating movement of the pumping plungers. The crankshaft is machined from a solid forged bar and supported by roller bearings at the ends, and by sleeve bearings between each crank pin.



Homogenization compared to Mixing and Blending

Homogenization is often wrongly categorized together with mixers, mills and other low pressure blending devices. Niro Soavi is bench marking high-pressure homogenization and has for a long time educated the industry via the leading technology forums about the substantial differences between traditional blending devices and the added benefits that can only be achieved in a Niro Soavi high-pressure homogenizer.

The difference is considerable from a technological point of view and more importantly the result in any product application is dependent on the right choice of technology. The increasingly more complex food and dairy recipes as well as biotech cell rupture applications require true and reliable high-pressure technology.

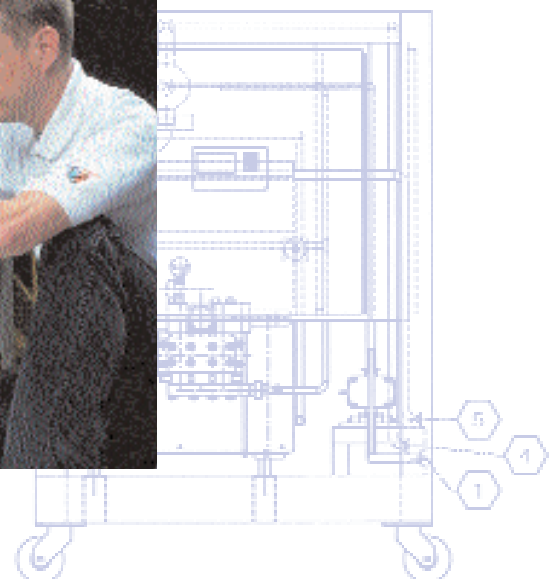


Services

74 007

After Sales Service and Spare Parts

- Full spare parts coverage and service
- 24-hour emergency spare parts and technical service
- Preventive maintenance programs



Setting Standards

The Niro Soavi product and service range provides the best of both European and North American standards.



- **FDA approved materials.**

FDA approved and certified materials, in addition to 3A approved plastic and rubber materials, are available.



- **ISO 9001 approved.**

The Niro Soavi machines are manufactured and tested in accordance with the ISO9001 credited QA program. This includes full testing of each machine verified by a test certificate audited by Det Norske Veritas (DNV).



- **3A sanitary standard.**

Niro Soavi has an active role in the continuous fulfillment and improvement of the 3A sanitary standards.



- **USDA accepted.**

Niro Soavi has obtained an acceptance based on a focused cooperation with the USDA.



- **cGMP compliance.**

Niro Soavi is designing its products in compliance with cGMP. Customized control systems are available in line with GAMP guidelines.

This total knowledge base is unmatched in the industry and secures the optimum solution for our customers' specific needs.

WWW.NIROSOAVI.COM

NSNA F&D/P&B 1/2006

