



Lindor *The gentle touch in mixing*



Welcome to Lindor

Welcome to Lindor, manufacturer of special mixers for sensitive and precious powders, granulate and natural products. Our mixers are used around the world for manufacturing Food, Fine Chemicals & Special Plastics as well as Pharmaceuticals. The applications all benefit from the unique characteristics of Lindor's gentle touch mixing technology.

Gentle touch mixer Lindor started as an engineering company in 1963. In the late eighties the first gentle touch mixers were built for a local manufacturer of instant products. To realise a homogeneous mix with optimal dissolving properties it was (and still is...) important that the particles maintain their size and shape during mixing. The concept has further evolved with designs for a wide range of models for many applications. Each machine is customized for its specific application and user requirements. By now, Lindor has delivered hundreds of gentle touch mixers around the world.

CO2 footprint reduction Due to its design without agitators, the Lindor mixer has an extremely low energy consumption. Nearly no energy is dissipated into the product, so no hot spots and product degradation. This together with high longevity - low maintenance and our policy to take back used mixers to place them in other applications helps reducing the CO2 footprint for all parties.

Innovation and development We build at least one new prototype each year. Developments over the last years have extended the capabilities of our machines from only batch mixing to many other functions like: continuous mixing, heating/cooling, drying, impregnating and more. The Gentle Touch Mixer is developing to a rotary "Gentle Touch Processing Vessel".

Quality and service Our aim is to ever increase the number of Lindor mixers operating in optimal condition around the world. For this we continuously and vigorously drive for better quality in design, product and service.

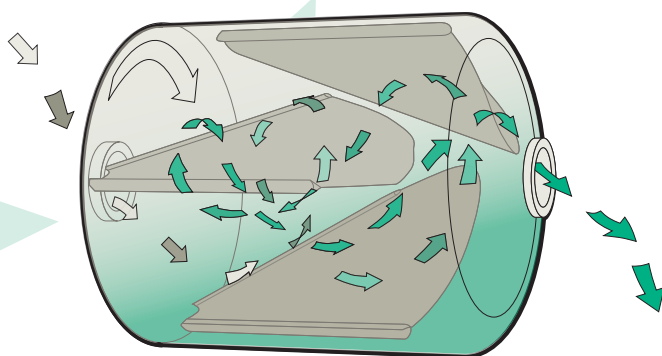


Bastiaan Soeteman
Managing Director

Mixing technology

The mixing principle is based on the free flow of product throughout a relatively slowly rotating vessel, which is equipped with specially shaped and oriented vanes. The product is introduced through the inlet at the centre line of the vessel. Rotation and gravity gently redistribute the product randomly. Accumulation of product at the outlet side causes a backflow. These flows combined create the gentle mixing action resulting in a homogeneous product within typically 1 – 5 minutes. After opening the outlet valve, the product leaves the mixer in a matter of a mere few minutes, gently propelled by the vanes. The mixer empties itself completely (typ. > 99.8%).

For example, a L1000 mixer which has 1000 litres net product capacity can mix 10 – 12 batches an hour. For a product with a bulk density of 0.6 kg/dm³ this amounts to 6 tons + per hour.



Due to the fact that each and every particle always moves, this principle is highly useful for other applications. Besides mixing, the Lindor machines are available in configurations for:

- Liquid injection:
- Wetting/Coating/Impregnation
- Drying
- Heating and Cooling
- Etc.

Key characteristics of "Gentle Touch" Mixing are:

- Excellent homogeneity - short mixing cycle
- No breakage and - frictional heat
- Minimum segregation
- Quick and easy to clean
- Very low energy consumption
- Variable batch size: 10% -100%
- Low maintenance
- Horizontal construction



Food

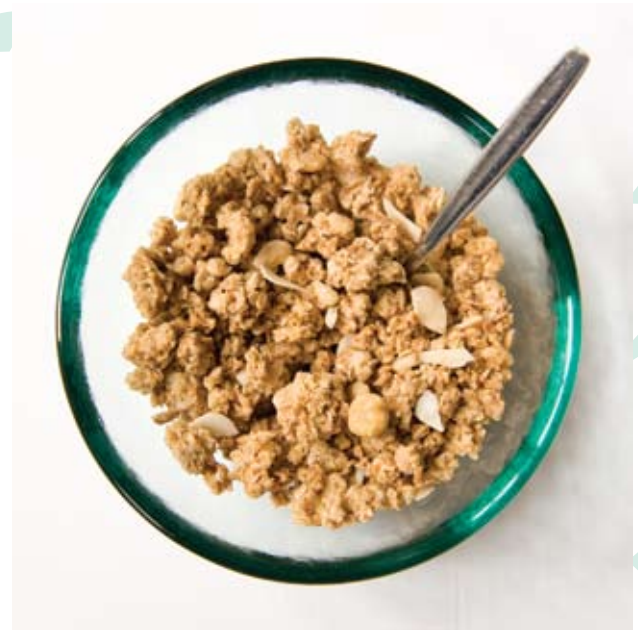
Over more than 20 years we have created hundreds of references worldwide in a wide range of Food applications. Typical products that benefit from the gentle touch mixing are

- Spray dried products
- Agglomerates
- Fragile products
- Dusty products
- Heat sensitive products
- Absorptive products



Typical products are:

- Tea
- Instant Drinks
- Infant Formula
- Breakfast Cereals/Mueslis
- Nuts and Fruits
- Herbs and Spices
- Etc.



The fact that the Lindor mixers exercise virtually no shear forces make them particularly suitable for use with fragile and/or heat sensitive products. Also the option to add liquids (e.g. aromas, oils) proves to be a valuable feature.

For food, sanitary design and easiness of cleaning are essential. Special attention and effort are put into the quality of the welds and surface finish.

All metal parts that come in contact with the product are made of stainless steel (AISI 316L or AISI 304). All other parts are made of FDA approved materials. On request, frame and other parts can also be made of stainless steel.

To facilitate extra quick and easy cleaning and maintenance the mixer can be equipped with retractable inlet and outlet – QSR.

In this configuration ample access for cleaning and inspection is given to areas like outlet valve, seals, inlet, outlet and to connections with feeding and discharge systems. With one push on a button and simply pulling a lever, the inlet or outlet is retracted and now fully accessible.



Relevant options and special features are:

- Retractable inlet/outlet - QSR
- Extra large easy opening doors with gas cylinder support
- Liquid injection
- Stainless steel frame
- Dual air purged seals, FDA gland seals
- Washing in place (WIP/CIP)
- ATEX 21/22
- Etc.

Fine Chemicals & Plastics

Lindor mixing installations have proven to be a highly valuable part in the processing of a variety of chemical products.

The fact that the Lindor mixers exercise virtually no shear forces make them particularly suitable for use with fragile and/or heat sensitive products. Also the option to add liquids (e.g. reacting agents) proves to be a valuable feature in many manufacturing processes.

In chemicals there is an even wider variety of specific products the Lindor mixers are used for.

Some typical products are:

- Special polymers, compounds, engineering plastics
- Detergents
- Metal salts, battery powders
- Ceramics
- Super adsorbent powder
- Metal powders
- Highly abrasive products like Quartz and SiC (carborundum) etc.



For the processing of chemicals often larger mixers are used. Lindor mixers can be delivered in sizes with a batch capacity of up to 25 m³ or 15 tons of product.

The mixers can be equipped with a double wall for water or steam heating and/or cooling. Also heating/cooling/drying can be applied by means of an air flow through the vessel.

The mixer can be delivered in a continuous flow configuration with a servo controlled throughput and variable average residence time.

For many applications the mixer is used as a rotating processing vessel rather than just a mixer.



Relevant options and special features are:

- Liquid injection
- Water jacket, Steam jacket
- Continuous mixing
- Air drying/heating/cooling
- N₂ blanket
- ATEX 21/22



Special Features & Innovation

Liquid injection

The mixer can be equipped with a liquid injection system. The installed nozzle(s) atomize the liquid in very fine droplets. The droplets form a mist in the mixing drum through which the powder will pass.

We offer three liquid injection systems for different percentages to be injected:

- Single phase for 5 – 50%
- Two phase for 1 – 5%
- Ultra sonic for 0 – 1%

With ultrasonic liquid injection very precise amounts in the range of ml's/min. can be evenly dispersed.

Washing/Cleaning in Place (WIP/CIP)

For applications with specific sanitary requirements, the mixer can be equipped with WIP/CIP. This configuration enables the product facing parts to be cleaned thoroughly with (hot) water and cleaning agents. There will be several water spraying nozzles installed at the inlet, drum and outlet. Water will be sprayed in the rotating mixing vessel turning the mixer into a "washing machine". The vessel can be thoroughly and effectively cleaned in this way.

ATEX

Due to its lack of internal moving parts and max. speed at less than 1 m/s, Lindor mixers are highly suitable for ATEX configuration.

The Lindor mixer in ATEX configuration will be suited for use in Zone 21 inside the mixing drum and Zone 22 at a perimeter of 1 meter outside the mixing drum.

Furthermore the mixer can easily be configured to have a blanket with inert gas and a sensor to monitor O₂.

Mixer with Heating/Cooling drum

By equipping the mixer with a double wall and with double walled scoops, the drum can be heated or cooled with water and steam. This can be used for heat treatment, keeping product hot or cold and drying. This option can be delivered in combination with liquid injection and other options.

Continuous mixing

The mixer can be configured as a continuous mixer. The product flow rate and average residence time of the product is controlled by a special servo controlled valve.

Air Drying/Heating/Cooling

The mixer can be equipped with special ducting to allow for a continuous airflow through the drum while the product is mixed.

With the airflow the product can be heated, cooled and or dried. This set up can also be used to dry the product.

Customization for specific needs

There are many more options and possibilities than described in this brochure. Our engineering department is capable of designing a machine to meet the specific requirements of a client.



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Testing & Service

Testing

To meet the requirements of our customers worldwide we can rely on a modern factory and a spacious test facilities. Here mixing tests with typical product formulations are conducted with (prospective) customers. During these tests information about the mixing effects and final properties of the mixed product is obtained.

Besides the test facilities at our premises, Lindor has a testing facility at the NIZO Food Research Institute in Ede, the Netherlands, and at DJK in Osaka, Japan.

After conducting in house tests we can rent a mixer for on site trials if needed.

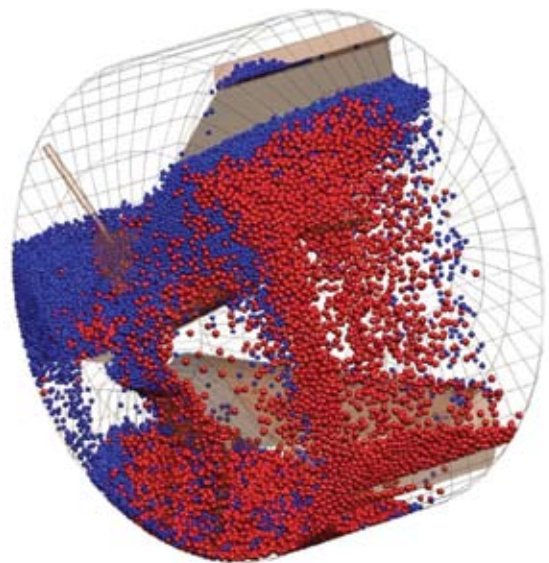
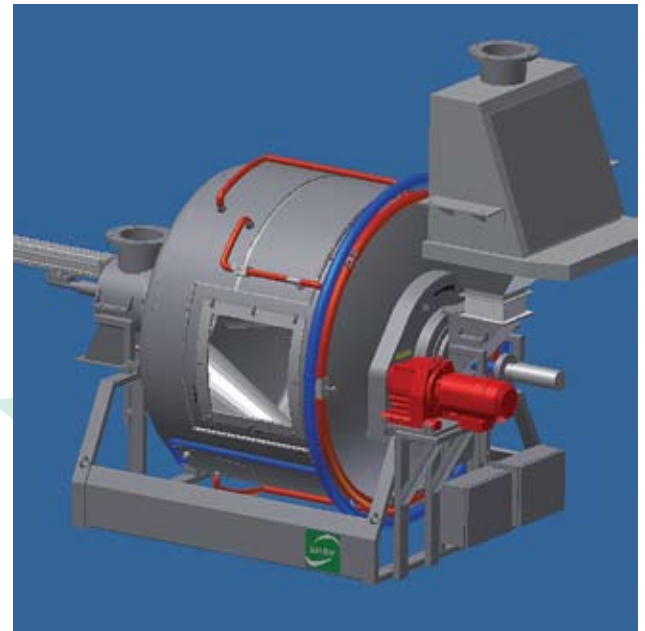
Service

Buying a Lindor mixer is buying quality. Quality in materials used, design, craftsmanship as well as in service.

We provide experienced on site personnel for start-up assistance and commissioning support, as well as for maintenance.

By far most spare parts needed are available globally within 24 - 48 hrs.

Our global agent network is available locally for support and advice.

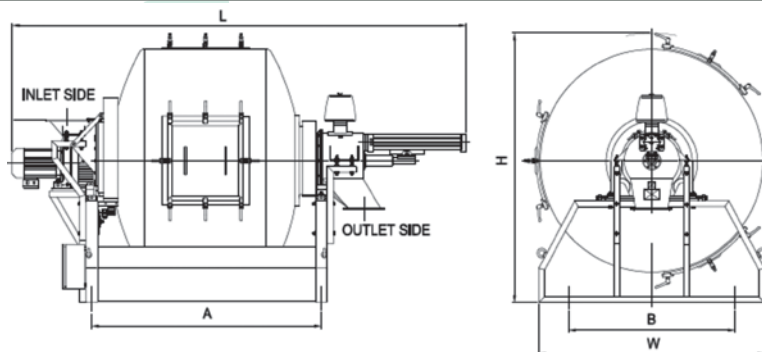




1a 2 Ph. liq. injector	2a Pharma mixer	3a L100 R&D mixer	4a Testing with L100	5a Steam jacket
1b Mirror polish	2b Control panel	3b QSR Inlet	4b KONTI outlet	5b Strength analysis
1c Injectors at inlet	2c Outlet L7000QSR	3c Gear driven	4c Ultrasonic inject.	5c Internals L25000
1d L7000 HC QSR	2d Fluidisation plate	3d Lindor®	4d L10 lab mixer	5d Lindor workshop
1e Looking glasses	2e L750QSR	3e Lindor building	4e L25000 mixer	5e L70 pilot mixer

Models

Size	Type	Net Product Volume (liter)	L (mm)	W (mm)	H (mm)	Typical Power (kW)
XS	L10	10	800	500	1.220	0.09
S	L70	70	1.100	930	1.270	0.37
	L100	100	1.500	900	1.270	0.37
	L200	200	1.580	1.100	1.480	0.37
M	L500	500	2.800	1.550	1.700	2.2
	L750	750	2.900	1.550	1.850	2.2
	L1000	1 000	3.200	1.550	1.850	2.2
	L1500	1 500	3.800	1.550	1.850	2.2
	L2000	2.000	4.300	1.550	1.850	4.0
	L2300	2 300	4.650	1.550	1.850	4.0
L	L3000	3.000	4.300	2.450	2.550	5.5
	L4000	4 000	4.750	2.450	2.550	7.5
	L5000	5 000	5.350	2.450	2.550	11
	L6000	6 000	5.450	2.650	2.850	2 X 7.5
	L7000	7.000	5.500	2.650	2.850	2 X 7.5
	L8000	8.000	6.000	2.650	2.850	2 X 11
XL	L14000	14.000	7.300	3.000	3.300	2 X 22
	L25000	25.000	8.500	3.800	3.900	2 X 30





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