



# Batch Mixers

# The Silverson Principle

**For over 75 years Silverson has specialised in the manufacture of quality high shear mixers for processing and manufacturing industries worldwide.**

With customers in over 150 countries, and serving industries as diverse as food, pharmaceuticals, cosmetics, luboils and petrochemicals, Silverson has become the world leader in the field of high shear mixing. Time after time, companies specify Silverson mixers as the “standard” equipment for their manufacturing process.

The key to this success is based on the professionalism and commitment Silverson shows to each of its customer’s needs. Whether supplying machines from its standard range of mixers or designing equipment specifically to meet an individual customer’s requirements, quality is guaranteed.

With a customer base that includes many of the world’s largest companies, Silverson is constantly at the forefront of new technologies. Developing and applying new high shear mixing techniques to meet these needs, Silverson has the experience, knowledge and commitment to both quality and service to solve today’s mixing needs and those of the future.

A truly international company, Silverson is represented by a network of associated companies, distributors and agents in over 50 countries, serving Europe, North America, Asia, Australasia, South America and Africa.



# Why Silverson?

## Speed

The exceptionally rapid Silverson mixing action substantially reduces process times compared with conventional agitators and mixers and can reduce mixing times by up to 90%.

## Versatility

The advantage of the Silverson approach to mixing is that any one machine can perform the duties that in the past may have required several different pieces of process equipment.

This unrivalled versatility allows any machine to perform the widest range of mixing applications:

- **Blending** - A homogeneous product is rapidly produced when blending liquids of similar or greatly varying viscosities, eliminating problems such as stratification.
- **Emulsifying and homogenising** - Emulsions (typically in the range of 0.5 to 5 microns) can be easily achieved.
- **Disintegration** - All Silverson rotor/stator mixers can disintegrate matter of animal, vegetable, mineral or synthetic origin in a single operation.
- **Particle size reduction** - Uniformly mill both solid and semi-solid materials into either solution or fine suspension.
- **Gelling and solubilising** - The high shear action of the Silverson rotor/stator can rapidly disperse gums, alginates, CMC, carbopols, etc., resulting in an agglomerate-free solution within minutes.

# How the Silverson Works

The advantages of Silverson's high shear rotor/stator mixer over simple conventional stirrers or agitators stem from the multistage mixing/shearing action as materials are drawn through the specially designed Silverson workhead - the heart of every machine.



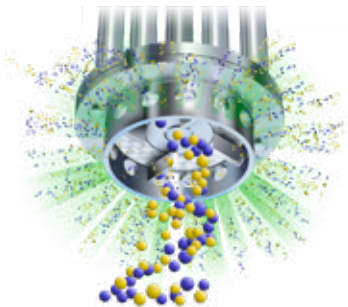
## Stage 1

The high-speed rotation of the rotor blades within the precision-machined mixing workhead exerts a powerful suction, drawing liquid and solid materials upwards from the bottom of the vessel and into the centre of the workhead.



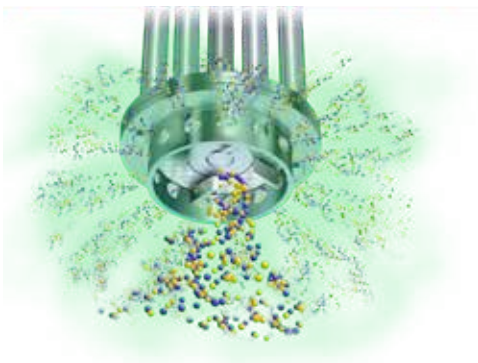
## Stage 2

Centrifugal force then drives the materials towards the periphery of the workhead where they are subjected to a milling action in the precision clearance between the ends of the rotor blades and the inner wall of the stator.



## Stage 3

This is followed by intense hydraulic shear as the materials are forced, at high velocity, out through the perforations in the stator and circulated into the main body of the mix.



## Stage 4

The materials expelled from the head are projected radially at high speed towards the sides of the mixing vessel. At the same time, fresh material is continually drawn into the workhead, maintaining the mixing cycle. The effect of the horizontal (radial) expulsion and suction into the head is to set up a circulation pattern that minimises aeration caused by disturbance of the liquid's surface.

# Interchangeable Heads and Screens

A comprehensive range of workheads and screens is available for all Silverson rotor/stator mixers. These easily interchangeable workheads offer great versatility by allowing any machine to be adapted to perform a wide range of mixing operations including emulsifying, homogenising, disintegrating, dissolving, dispersing, blending, particle size reduction and de-agglomerating. Changing from one head or screen to another is quick and simple.



## General Purpose Disintegrating Head

This is the most versatile of all the heads, giving an exceptionally vigorous mixing action. Ideal for general mixing applications, its uses also include the disintegration of solids and the preparation of gels and thickeners, suspensions, solutions and slurries.



## Slotted Disintegrating Head

For the disintegration of fibrous materials such as animal and vegetable tissue, as well as the disintegration and solubilisation of “elastic” materials such as rubbers and polymers.



## Square Hole High Shear Screen™

Provides exceptionally high shear rates ideal for the rapid size reduction of soluble and insoluble granular solids. It is also suitable for the preparation of emulsions and fine colloidal suspensions.



## Standard Emulsor Head and Emulsor Screen

Suitable for liquid/liquid preparations and especially useful for all emulsions. Emulsor screens are available in fine and medium perforations.

# Batch Mixers

Silverson offers a complete range of multipurpose batch mixers able to perform the widest variety of applications - mixing, emulsifying, homogenising, disintegrating and dissolving - with an efficiency and flexibility unmatched by other machines.

## Medium Range Models BX to GX

Any machine in this range from the 0.75kW BX to the 15kW GX25 can be used on a mobile hydraulic floor stand (local safety regulations permitting). This option greatly increases the flexibility of these mixers, allowing them to be moved from vessel to vessel and to be raised and lowered during operation, if required, in order to give the optimum mixing position at varying stages of the process.

Speed-Performance  
Versatility-Reliability





# Large Range Models 700X to MX

Silverson is the world leader in the specialised design and manufacture of large scale rotor/stator mixers with a capacity of up to 30,000 litres. All these machines are individually built to order and constructed specifically to suit each customer's requirements.

The large scale mixers possess all the qualities and flexibility of Silverson's medium range models and include a number of additional and unique features.

Each mixer is designed and built to the highest possible engineering standards. From the specially balanced motors to the fitting of precision ground shafts which are finish turned in-house to ensure critical vibration free running, no aspect of manufacture escapes our rigorous inspection.

These machines are designed to be maintained and serviced in-situ wherever possible. Quick release shaft couplings, split two-part downthrust propellers and hard-surfaced sacrificial shaft journal sleeves are just a few of the features designed to keep maintenance and downtime to a minimum.

In every case, Silverson's technical staff will ensure that the customer's needs are precisely catered for.



# Duplex Disintegrator Dissolver

The Duplex was specifically developed for the disintegration and solubilisation of solid rubbers and polymers for the lube and adhesive industries, but its success has now seen its introduction into all fields of mixing, whether chemical, pharmaceutical or food.

The Duplex differs from the standard multipurpose batch mixers in having two workheads facing in opposite directions; the upper head pulls materials down from the surface of the mix, while the lower head draws material up from the base of the vessel.

The combined use of two workheads makes the Duplex ideal for applications where light or buoyant material (powders, rubbers and polymers, etc.) needs to be drawn down from the surface of a mix and rapidly dispersed. Because of the added movement afforded by the two workheads, the Duplex is also ideal for use on high viscosity materials.

## Typical Applications

- Rapid solution of rubbers and polymers into lubricating oils, solvents and bitumen for the production of lubeoils, adhesives and bituminous compounds
- Disintegration and dissolving of solid resin for the production of varnish
- Vegetable and meat purée/slurries
- Recovery of waste confectionery



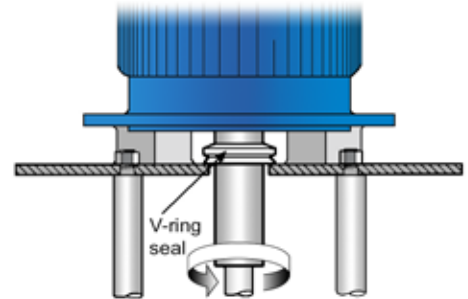


# Sealing

Unless otherwise stated all machines are designed for operation in unsealed vessels at atmospheric pressure. Where sealing is required machines can be supplied with the appropriate shaft sealing and mounting flange as an optional extra.

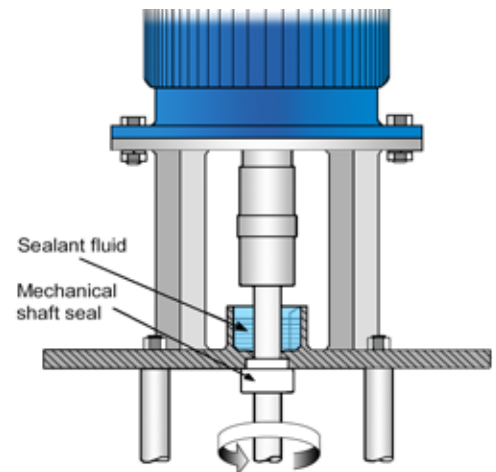
## V-Ring Shaft Seal

This is the simplest form of shaft sealing and is designed to prevent the possible ingress of material from outside the vessel. It is also used to minimise vapour loss from the vessel and prevent liquid escaping if a spray ball is used.



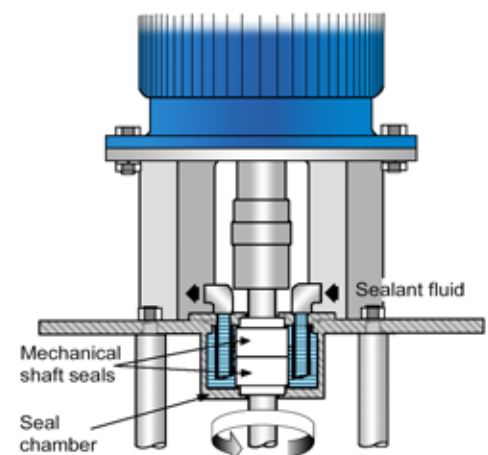
## Single Mechanical Shaft Sealing

If the vessel needs to be fully sealed, mechanical shaft sealing is necessary. The mixer shaft is sealed where it passes through the mounting flange by a single mechanical shaft seal. This seal is surrounded by a quench cup which must be filled at all times during operation with a compatible non-flammable fluid to cool and lubricate the seal. This type of arrangement is suitable for operation at atmospheric pressure or vacuum only.



## Double Mechanical Shaft Sealing

Where there is positive pressure in the vessel, double mechanical shaft seals will be required. The seals are mounted in a chamber that must be flushed with a compatible non-flammable fluid at a pressure not less than 1 atmosphere (15 psi) in excess of the pressure in the vessel. This type of arrangement is suitable for operation under positive pressure, atmospheric pressure and vacuum. Sealant flushing systems can be supplied as an optional extra. Gas lubricated non-contacting double mechanical shaft seals are also available.



# Technical Specifications

## Materials of Construction

	Medium Range	Large Range	Duplex
Wetted Parts: 316L Stainless	●	●	○
Wetted Parts: Special Materials	○	○	
Bush Material: Bronze Alloy	●	●	●
Bush Material: PTFE	●	●	●



General Purpose Disintegrating Head

## Motor

TEFC	●	●	●
Other - Stainless, Flameproof/ATEX	○	○	○



Slotted Disintegrating Head

## Mounting

Mobile Hydraulic Floor Stand	●		up to GDD
Vessel Mounting	●	●	●



Square Hole High Shear Screen™

## Sealing

V Ring	○	○	○
Single Mechanical	○	○	○
Double Mechanical	○	○	○
Special Sealing Arrangements	○	○	



Standard Emulsor Head and Emulsor Screen

## Advanced Features

Ultra-Hygienic Specification	○	up to KX	
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● Standard ○ Optional

# Mobile Floor Stands

A comprehensive range of mobile hydraulic floor stands is available for small to medium scale batch mixers. These enable a machine to be moved from vessel to vessel and to be raised and lowered during operation, if required, in order to give the optimum mixing position at varying stages of the process. The use of a suitable stand greatly increases the flexibility and versatility of the machine.



## Construction

Manually operated hydraulic rams are standard. Pneumatically and electrically powered units are available as an optional extra. Unless otherwise specified, all stands are constructed in mild steel and finished in a durable polyester epoxy paint finish. Stands are also available constructed in Grade 304 stainless steel.

## Yoke Mounting

Yoke mounting jib arms are available for applications where a low ceiling height or high vessel rim height prevents a standard floor stand from being used. They also restrict the movement of the mixer in the vessel.

## Floor/Wall Mounted Stands

Where a mobile stand is not required, fixed position floor/wall mounted stands are available.

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Patent Pending.

