

# Metering Feeders

Designs for continuous metering

# METERING SCREW FEEDERS

## Principle and Operation

Metering screw feeders are designed to continuously meter all types of material (see chart) at a constant volume to very high accuracies. The basic feeder consists of a specially designed, tapered product conditioning chamber within which is a slowly turning agitator (see following pages for freeflow and multi-agitator versions).

The agitator controller has a unique feature allowing it to rotate constantly or intermittently with an adjustable on/off period. This intermittent operation allows the effective feeding of delicate, friable products which might bridge unless gently and regularly activated. In continuous operation the agitator will de-aerate and densify fine powders, or alternatively keep free and fibrous materials loose.

For very free flowing materials a feeder can be provided without the agitator installed.

The densified material is directed into a variable speed metering screw which runs completely and evenly filled within its feed tube. The screw drive has electronic feed-back ensuring highly accurate speed holding under all load conditions. Thus the material is metered out of the machine at a regulated and constant volume of between  $\pm 1\%$  and  $\pm 2\%$ . Output capacities are 1.0kg/hr to 100,000kg/hr with screw sizes from 12mm dia to 250mm dia.

## Choice of Feeder

### Which type?

It is essential to choose the correct type of feeder to ensure efficient operation of your process. The selection of the correct type of feeder for any particular task from our extensive range is determined mainly by the type of material it is required to handle.

There are four basic models of feeder and the chart (right) will help you to select the most appropriate.

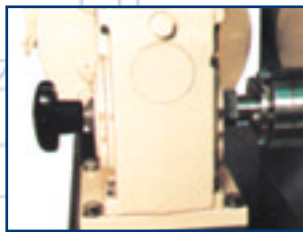
### Single screw or twin screw?

Both single screw and twin screws are equally efficient at metering a similar range of powders. The single screw is mechanically more simple – and therefore economic – and is used wherever practical.

The twin screw has several characteristics that are beneficial in some instances.

These are:

- (i) Non pulsing output – useful if feeding into processes where absolutely even feed is essential.
- (ii) Larger material inlet – reduces risk of bridging with awkward products.
- (iii) Self-cleaning of intermeshing screws – useful with sticky, cohesive products.



Characteristics	Typical Example	Powders	Pellets	Granules	Fibres	Flakes
Aerating	aerosil /cement	■				
Flushing/ fluidising	hydrated lime /talc	■ ■				
Free-flowing	semolina /pellets/rice	■ ■ ■ ■	■ ■	■ ■		
Poor-flowing	flavourings /iron oxide	■ ■			■ ■ ■ ■	■ ■
Cohesive	cocoa/plaster /TiO <sub>2</sub>	■			■	■
Sticky	cooked cereals /demerara sugar	■		■ ■	■	■
Bridging	fibreglass/peat /coconut	■ ■		■	■ ■	■
Damp	washed sand /ground clay	■ ■		■		
Compacting	dried egg yolk /diatomite	■			■	
Large particles	peanuts /aggregates			■		
Friable	raisins /agglomerates			■		■
Plasticising	wax/emulsifier	■ ■				

■ Single screw     ■ Freeflow  
■ Twin screw     ■ Multi-agitator

Outputs single	size	12	20	25	40	50	75	100	150	200	250	mm
	output	8.5	40	68	255	679	1698	5096	17838	56520	110460	
Outputs twin	size	20	25	40	50	70	90	110	130			mm
	output	70	170	280	1350	3058	8000	15344	21025			litres/hour

## SPECIAL FEATURES

### Removable front cover

The front cover is completely removable by means of hand knobs or over-centre toggle clips. This action exposes the complete interior of the machine, allowing very quick and easy cleaning by operators rather than maintenance staff.

### Safety switches and guards

All removable fronts and guards on Rospen feeders are protected by safety switches which meet UK Health and Safety and all European standards. This feature allows the feeders to be stripped for cleaning by operators rather than fitters.

### Removing the screw

The feed screw is instantly released by means of a rear mounted knob. This feature, combined with a unique quill shaft drive, means that the screw is removable without disturbing shaft seals. Thus the machine is ideally suited to industries that require regular product changes or rapid cleardown to avoid cross-contamination.

### Conditioning chamber with agitator

Within the conditioning chamber is a separately driven slowly turning agitator which de-aerates fine powders and brings them to a consistent density, or alternatively 'liven' fibrous products which tend to bridge. The agitator is capable of turning intermittently with an easily adjusted mark-space ratio, to avoid the overworking of sensitive powders or the breaking of friable granules. The agitator can be two-bladed or multi-bladed to suit the application and close-fit scraping models can be provided for the pharmaceutical industries.

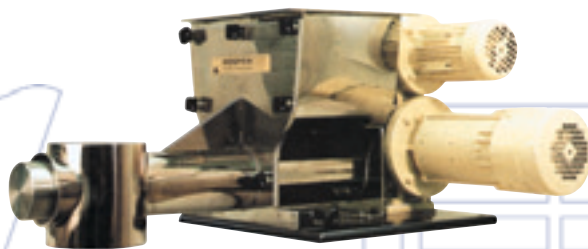
### Special seals

The drive shafts are protected from product egress by means of high quality, stainless steel housing, adjustable stuffing-box seals. Seal material is normally PTFE impregnated rope packing to suit the application. Gas-purge lantern-ring type seal housings can be provided as an alternative for pressurised systems as well as FDA approved lip seal options.

## SINGLE SCREW FEEDERS

The large inlet size of the standard single screw feeder eliminates material bridging. The tapered conditioning chamber with its special separately driven agitator, de-aerates fluidising powders, or will free and loosen cohesive material ensuring the screw runs completely and evenly filled. This machine is specifically designed to cope with any particulate material from very fine, to coarse or fibrous. The variable speed screw is available in sizes capable of handling 1.0kg/hr to 100,000kg/hr; turndown of 10:1 in output is normal. Moving parts have been kept to a minimum, resulting in low maintenance requirements and there are no drive chains or couplings.

Compact, the 50mm single screw machine is only 372mm high x 450mm square.



## TWIN SCREW FEEDERS

Designed to resolve three main problems associated with feeding of materials:

- Sticky materials which could block, plug or core within single screw machines are force-fed with two intermeshing co-rotating mutually self-cleaning screws so preventing coating and build-up.
- Powders that are easily fluidised and may tend to 'flush' through a single tube, are restrained and cannot flow so easily through the two intermeshing screws.
- Powders that are cohesive, sticky and greasy and thus tend to fall in congealed lumps from a single screw, are broken into smaller particles at the outlet of the twin screws thus giving a smoother feed characteristic.

The separately driven product agitator ensures that the densified material is directed evenly into both screws which run completely and evenly filled; they are designed to intermesh and can also be characterised to have different features.

Output rates are 1kg/hr to 25,000kg/hr depending on the diameter and profile of the screws.



## 'FREEFLOW' FEEDERS

Designed for economy and use with free flowing powders or granules, the tapered hopper ensures a smooth flow of material into the feed screw, which runs completely and evenly filled within its feed tube.

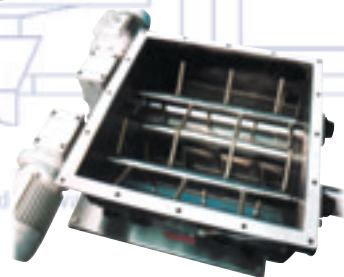
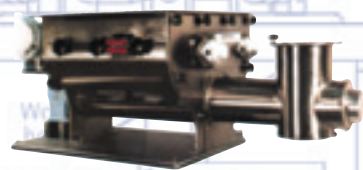
The screw drive controller has electronic feedback, ensuring highly accurate speed holding under all load conditions. Thus the material is metered out of the machine at a regulated and constant volume of between 1% and 2%.

The large inlet size avoids material bridging problems and output rates are 10kg/hr to 5,000kg/hr, depending on the screw size fitted.



## MULTI-AGITATOR FEEDERS

These feeders are designed with a very large inlet area of 0.5m square to allow the fitting of a large outlet hopper. They also incorporate two full-length independently driven twin shaft agitator product conditioners which continuously 'sweep' the large conditioning chamber. This very active 'live hopper outlet' feature allows this feeder to handle difficult products which may bridge, stick or rat hole (such as cooked cereals). The agitators can be wired to counter-rotate or co-rotate to suit the application and a speed inverter can be fitted to allow different conditioning rates. Output capacities are 200kg/hr to 20,000kg/hr with screw sizes from 75-150mm.



support can be extended to hand-tip platform  
Plan view

## TYPES OF FEED SCREW

Screws generally fall into two main genders:

**a) Open wire spiral screws**

Used for normal to free-flowing powders and granules, and for poor flowing products which are not cohesive or sticky. They can also be used for pellets and particles but this application would generally require a larger clearance between the screw and the tube.

**b) Welded core screws**

Used on more aerating, flushing, free-flowing powders, and generally when strength of screw is important ie: higher powers and longer screw requirements.

**Size of screw**

Screw diameters can range from 12mm to 250mm; it is simply the diameter and speed of the screw that determines the volumetric output rate.

**Speed of screw**

The metering feeder is usually supplied with a variable speed drive allowing a 10:1 normal (20:1 maximum) reduction in product throughput from maximum, by electronically varying the screw speed.

**Length of screw**

It is normally preferable to keep a metering screw as short as practical to avoid compression of the product.

Screws can however be designed and provided to any length when the pitch will be expanded towards the outlet end to avoid product compression and high torque requirements.



## SPECIAL DESIGNS

**Food industry**

Unusual configuration of metering screw feeders mounted in opposite directions on a single base plate fed via a common bifurcated hopper.

**Snack foods industry**

Clip-on fronts can be offered as an alternative to hand-knobs. Using over-centre toggle clamps, dismantling and cleaning is made even easier. Ideal in situations where regular product changes are made such as flavourings application.

**Water industry**

Metering screw feeder with Rospen air-driven vibratory cone hopper discharger to ensure a smooth and regular flow of material to the variable speed screw.

**Chemical industry**

This feeder is flameproof to Zone I with a Rospen standard pneumatically operated shut-off valve which isolates powders from process vessel fumes.

**Pharmaceutical industry**

Gas-tight feeder with flameproof Zone I motors and gas-purged seals. Specially designed open-topped downspout allows cleaning with Makralon windows for visual check on product condition and flow-rate.

**Plastics industry**

Heavy duty model twin screw feeder with 130mm dia screws – the largest on the market. Robust construction, capable of high capacity throughput. The model illustrated was supplied for metering into an extruder.

# FLEXIBLE SCREW CONVEYORS

The Flexiscrew is suitable over a wide range of applications, for the most fine and dusty material or coarse powder and granulates. The only moving part in the transported product is the helix itself. This makes the Flexiscrew virtually maintenance-free. The unit is extremely easy to dis-assemble for cleaning purposes. It is therefore ideal for use where drugs or chemicals are conveyed in batches and the unit has to be kept clean to avoid contamination.

### Simple Installation

The Flexiscrew, flexible in all directions, can easily be slipped through small access spaces and around existing plant and equipment. Direction upwards and downwards doesn't matter.

The discharge end, the **Outfeed Unit**, can either be permanently fastened by flange and bolts to a receiving hopper, or if a more flexible arrangement is required, it can be suspended from a hinged bracket or an over head traverse unit etc.

The infeed end is usually equipped with the standard **Infeed Unit**, having a rectangular flanged opening faced upwards, to suit the flanged discharge opening (horizontal or inclined at 45°) at the bottom of the infeed hopper.

- Flexible
- High Capacity
- Rugged construction
- All contact parts of stainless steel and F.D.A. approved Ultra-High-Molecular-Weight-Polyethylene
- Easy to take apart for cleaning
- Used over a wide range of applications in chemical industries, food and pharmaceutical industry water-works and many other fields



Flexiscrew Feed to Mixing Station



## OPTIONAL EQUIPMENT

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**Infeed Hopper** at the infeed end of the Flexiscrew. Standard or according to specification. The discharge opening can be horizontal or inclined 45°. *Floor support can be extended*

**Multiple Discharge Unit.** Used in Multiple Delivery System.

**Transfer Box.** Used where two or more Flexiscrews must be connected in series transfer arrangement.

**Outlet Chute.** Std 45° or 90°. Other configuration or flanged outlets etc can be provided according to specification.

## CLIENT LIST

Cadbury  
Frito-lay  
Nestle  
Trebcor Bassett  
Spillers  
3M  
Sandvik  
McCains  
Heinz  
KP  
Zeneca  
British Sugar  
Imerys  
GlaxoSmithKline  
Weetabix  
BASF  
Halo Foods



## ROSPEN BENEFITS

Rospen's unrivalled industry experience combines with advanced design and system versatility to provide a range of benefits:-

**Hygiene** – Whatever the application, from pharmaceutical or food to quarry use, our machines are designed with easy strip-down features for hygienic cleaning.

**Maintenance** – Design ingenuity enables quick and easy access for maintenance and low down time.

**Precision** – All systems are designed to perform with precision accuracy under all operating conditions.

**Flexibility** – Standard design features ensure complete flexibility within existing manufacturing processes and enable options for expansion at a later date.

**Reliability** – All our systems are built to ensure long term reliability, maximum up-time and lowest on-going operational costs.

Application experience demonstrates that the combined benefits of our systems can repay the initial capital outlay within months.

## PRODUCT LIST

Metering Screw Feeders  
Loss in Weight Feeders  
Batch Weighers  
Weighbelt Feeders  
Weigh Screw Feeders  
Vacuum Conveyors  
Impact Plate Flowmeters  
Vibratory Tray Flowmeters  
Batch Weigh Flowmeters  
Flexible Screw Conveyors  
Granulation Mills  
Pulseronics Discharge Aids  
Lumpbreakers  
Mixers  
Big Bag Dischargers  
Sifters / Separators