

Dry Chemical Feed Systems

Series 32-300 Volumetric Feeder

The Series 32-300 Screw Type Volumetric Feeders are designed for the demands of industrial-process applications. They meter dry and semi-dry powders and other free-flowing materials as well as pellets, flakes, chips, and other difficult materials with reliable accuracy and repeatability.

The heavy gauge steel construction stands up to the stress of long running, high-volume bulk operations. Operation and control are simple and direct. There are only five moving parts. Power from the vertically mounted DC motor is transmitted through a right-angle gear reducer to the feed-screw shaft. A potentiometer on the SCR control sets the feed rate. Automatic control from an mA signal is available as an option.

The compound feed screw comprises three screw elements welded to a heavy steel shaft. The interaction of the different-size-and-shape screw elements develops multi-level mixing of the process material. This produces a uniform material density and promotes complete filling of the feed-screw flights. Oversize sealed ball bearings support the one-piece, through-shaft at both ends. Interchangeable feed screws and discharge tubes, in six sizes, extend the versatile capabilities of these feeders. The standard 5-cubic foot hopper with steeply sloped sides is designed to promote an even flow of material to the feed screw.

Arrangements

Model 32-300ST

This basic arrangement handles most dry materials, including powder, pellets, and flakes. Feed screw is available in 1", 1-1/2", 2", 3", 4", and 6" sizes. Maximum feed rates range from 2.6 to 500 cubic feet per hour.

Model 32-300SP

This model is specifically designed for difficult-to-feed materials. The agitator and conditioner segments of the feed screw are larger and set out at a greater radius from the shaft to handle oversize and irregularly shaped particles. The area in the mixing trough has been increased to provide greater mechanical clearances. The discharge port is larger; there is no downspout to impede the flow. Standard metering screws are available in 3", 4", and 6" sizes. Maximum feed rates range from 50 to 500 cubic feet per hour.

Model 32-300SN

This sanitary version of the basic Series 32-300 Feeder is designed specifically for applications in the food and pharmaceutical industries. All surfaces in contact with the process material are 304 stainless steel and polished to a No. 4 finish. (316 stainless available on request.) Welds are ground smooth and polished to avoid product build-up. The exterior metal surfaces are covered with a white (food grade) epoxy paint. A TEFE rear seal and white neoprene (food grade) gasketing are standard. Hand-secured clamps and turn-nuts allow easy disassembly for cleaning. The TENV DC motor is suited for wash-down maintenance. Feed screw is available in 1", 1-1/2", 2", 3", 4", and 6" sizes. Maximum feed rates range from 2.6 to 500 cubic feet per hour.

Key Benefits

- *Heavy gauge construction*
- *Simple design*
- *Convenient controls and readouts*
- *Easy to maintain*
- *Smooth handling of difficult materials flows*



Features

Advanced Engineering Design

The compound feed screw operates on three levels to condition material and provide a smooth flow. The agitator segment, turning in an orbit outside the metering screw, releases air captured in the material. The deaerated material fills the spiral lights of the metering screw. The outermost, conditioner segment on the feed screw has a reverse pitch. The back-mixing effect prevents material jamming in the trough.



Versatile

Six screw sizes are available for capacities from 2.6 to 500 cubic feet per hour. The feeder can be controlled manually or by an mA signal. Basic feeder can process material at temperatures to 150° F: higher with optional TFE seal.

Reliable Performance

The simple, direct mechanical linkage has only five moving parts (drive, coupling, screw, and two bearings). Power from the vertically mounted DC motor is transmitted through a right-angle gear reducer. The feed screw is directly coupled to the gear reducer.

Structural Strength

Heavy gauge steel is used throughout. Feed-screw shaft is a single-piece through-shaft and is supported at both ends by sealed ball bearings. Agitator, conditioner, and metering screw segments are all welded to the shaft for strong unitized construction.

Simplified Control

Feeder controls are centralized in a NEMA 4 enclosure that can be mounted at the feeder or remote. Toggle switches set the operating mode. A potentiometer controls feed rate, and an optional analog meter provides readout of feed rate in percent of full scale.

Design and Operation

The Series 32-300 Volumetric Feeder is powered by an SCR-controlled DC motor. A gear reducer converts the high-speed motor-shaft rotation to a low speed, high-torque drive for the feed-screw shaft. Sealed ball bearings support the single-piece through-shaft at both ends. The agitator- conditioner compound feed screw is contoured to produce uniform material density. The agitator segment moves through the material outside the metering screw loosening and freeing the particles for maximum deaeration. This allows material to flow around the metering screw. As the material progresses toward the feed tube, it thoroughly fills the spiral lights of the metering screw. The reverse pitch of the conditioner segment develops a back-mix action that prevents material from piling up in the forward section of the trough. This eliminates dead pockets of material. The interaction of the large-diameter-outrigger segments conditions the material and avoids bridging. The standard hopper has a capacity of five cubic feet and steeply sloped sides for good material flow to the feed screw. A pneumatic-hopper vibrator is available for materials with poor flow characteristics. All controls are housed in a NEMA 4 enclosure that can be mounted on the feeder or remote. A potentiometer enables accurate pre- setting of the feed rate and excellent repeatability. An optional arrangement with an analog-speed-readout meter is available. Arrangements that accept a 1-5, 4-20, or 10-50 mA control signal have a second potentiometer for trimming the mA signal to the desired feed rate.

Control Arrangements

The basic manual SCR-control arrangement has a three- digit speed-adjust potentiometer for controlling the feed rate. Pushbuttons set the percent of maximum speed at which the motor is to operate. A toggle switch starts and stops the feeder. An arrangement with an analog-percent-readout meter is available. In the automatic arrangement, the feed rate is controlled by an mA input signal. A potentiometer trims the input signal to produce the desired speed rate. The speed-readout meter is standard with the automatic mA arrangement. This arrangement also has a speed-adjust potentiometer and can be operated in manual or remote mA mode. All SCR-control arrangements are available in optional versions which are Factory Manual approved as dust-ignition-proof* for Class II, Divisions 1 and 2, Groups E, F, and G, and Class III, Division 1 hazardous location. As defined by Article 500 National Electrical Code.

Hoppering

An optional hopper section with a 1.5-cubic-foot capacity can replace the basic hopper to provide interface with the line of hoppers and accessories. These include converging, loading, extension, and storage hoppers in square or cylindrical shapes, and in a variety of sizes. They are offered in a choice of floor-above-supported or feeder-supported configurations. Dust collectors are available in different sizes, floor-mounted or feeder-supported. Bag loaders come in 1-bag and 2-bag models. Other accessories include screens, covers, shut-off gates, flexible connections, and installation hardware. A plate adapts dust collectors and bag loaders to cylindrical hoppers of

various diameters (2, 3, or 4 ft.).

Applications

Continuous Feeding

Feeding of one or more bulk materials, by volume, at a controlled feed rate. Feed rate is set as a percent of full scale and can be controlled by a remote-process signal.

Continuous Proportioning

Feeding of two or more bulk materials, by volume, at controlled feed rates set in proportion to a specified master ingredient or control feeding by volume of two or more bulk materials in proportions set at the feeders for overall-formula requirements. Alternately, several feeder outputs can be controlled using a master set station which provides a common rate-signal. Each feeder will feed at a ratio pre-set at this station.

Batching

Controlled feeding of one or more bulk materials for repeat production of preset lot quantities. Feed rates are set at the feeders as a percent of full scale. Batch size can be determined by feeder-on time as preset on a timer or by a signal from a controller that automatically shuts off the feeders when a specified condition (weight, level, etc.) has been achieved.

Industry Applications

- Proportioning of virgin PVC pellets, color, resin, and regrind material into plastics extrusion processes
- Feeding bentonite and sand in foundry mold production
- Feeding crushed limestone into fluidized-bed-combustion processes
- Feeding of organic powders in pharmaceutical manufacturing
- Feeding of powered clay and pigments in the production of tile and brick
- Batching milk powder and salt in the production of cream cheese
- Feeding of spice premix in processed food production
- Feeding of diatomaceous earth as an oil filter aid in the cold-roll aluminum sheet rolling process

Short Description

This feeder is a Series 32-300 Screw-Type Volumetric Feeder with electric-variable-speed control. Full scale capacity is 2.6 to 500 cubic feet per hour depending on feed-screw size. Operating range is 20:1. The feeder consists of an SCR variable-speed drive in NEMA 4 enclosure; DC motor; right-angle speed-reducer gear box; a three-element compound feed screw; a 5-cubic foot hopper; a mixing trough and a discharge tube extension. A steel base supports the feeder and all components. SCR-control arrangements can be local manual, remote manual, start-stop, or automatic mA. Speed readout is available with start-stop and automatic arrangements. A three-digit pushbutton potentiometer adjusts motor speed. With the automatic mA arrangement, the feed rate is controlled by a 1-5, 4-20, or 10-50 mA DC process-control input. A panel-mounted potentiometer trims the signal to a percent of maximum to produce the speed-rate required. The walls of the hopper are steeply sloped, and a pneumatic vibrator is available. Feeder and hopper are heavy gauge steel construction. In the sanitary arrangement, surfaces in contact with the process material are 304 stainless steel (optional 316 ss is available) polished to a #4 finish: food-grade white neoprene gaskets and TFE rear seal are standard. Feed screws are available in 1", 1-1/2", 2", 3", 4", and 6" sizes for the standard and sanitary models, 3", 4", and 6" sizes for the model for difficult-to-feed materials. A 1.5-cubic-foot hopper is available for interfacing with standard hopping equipment.

Technical Data

Accuracy

With uniform free-flowing materials, accuracies of 1% to 2% of full scale can be achieved. It must be realized, however, that with material delivery controlled on a basis of volume, many factors apply: Material flowability, density at the feed screw, hopper size and shape are only a few of the factors which determine accuracy. Actual accuracy can be established only by running sample material tests.

Capacity

2.6; 7; 17; 50; 150; and 500 cubic feet per hour.

Maximum Temperature

Ambient, 120° F; process material, 150° F standard or 250° F with optional TFE seal.

Process-Control Output

1-5, 4-20, or 10-50 mA DC.

Input Impedance

Maximum is 100 ohms for 10-50 mA, 270 ohms for 4-20 mA and 1,000 ohms for 1-5 mA.

Motors

TENV, 3/4 hp, 1 hp, 1-1/2 hp. (An explosion-proof* UL

Listed motor and tachometer are available for use in Class I, Divisions 1 and 2, Group D and Class II, Divisions 1 and 2, Groups F and G hazardous locations.)

Electrical Requirements

3/4 hp motor, 120-volt, 50/60 Hz, single phase, 12 amps:

1 and 1-1/2 hp motors, 230-volt, 50/60 Hz, single phase, 8 amps

Control Arrangements

- Manual
- Remote manual
- Start-stop
- Automatic from mA process signal

Housing

SCR drive and controls are in a NEMA 4 housing, can be feeder-mounted or remote.

Options

Extended-length feed screws and discharge tubes, 316 stainless steel construction, a tachometer-generator with meter calibrated in percent of maximum for feed rate readout, 2-cubic-foot hoppers, pneumatic-vibrating hopper trough covers to interface with live-bottom bins. TFE seals for material temperatures to 250° F, UL Listed motors and tachometers, a 1.5 cubic-foot section to interface with hoppers in many sizes and variations as described on page 4.

Continuous Operating Range

20:1

Weight (Shipping Weight)

300 lb. to (400 lb.)

*As defined by Article 500 National Electrical Code.





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