



Innovative Feeding and Material Handling Solutions
for the Pharmaceutical and Nutraceutical Industries

Innovative Material Handling Solutions

Single Source Solution

Coperion K-Tron can provide single source solutions for all your feeding and conveying needs in the pharmaceutical and nutraceutical industries.

The complete Coperion K-Tron line of pharmaceutical equipment is engineered to meet the rigid requirements of the industry, including strict adherence to cGMP guidelines and standards, as well as the use of FDA approved materials of construction.

Our Coperion K-Tron P-Series vacuum receivers and Coperion K-Tron pharmaceutical

design feeder line are easily disassembled. All units are specifically designed to meet the cleaning requirements of the end user, including options on complete wash-in-place and rinse-in-place cleaning.

Additional design options available include the ability to provide complete product containment during feeding and product transfer, isolation in glove boxes, and executions suitable for use in hazardous environments according to ATEX and NEC guidelines.

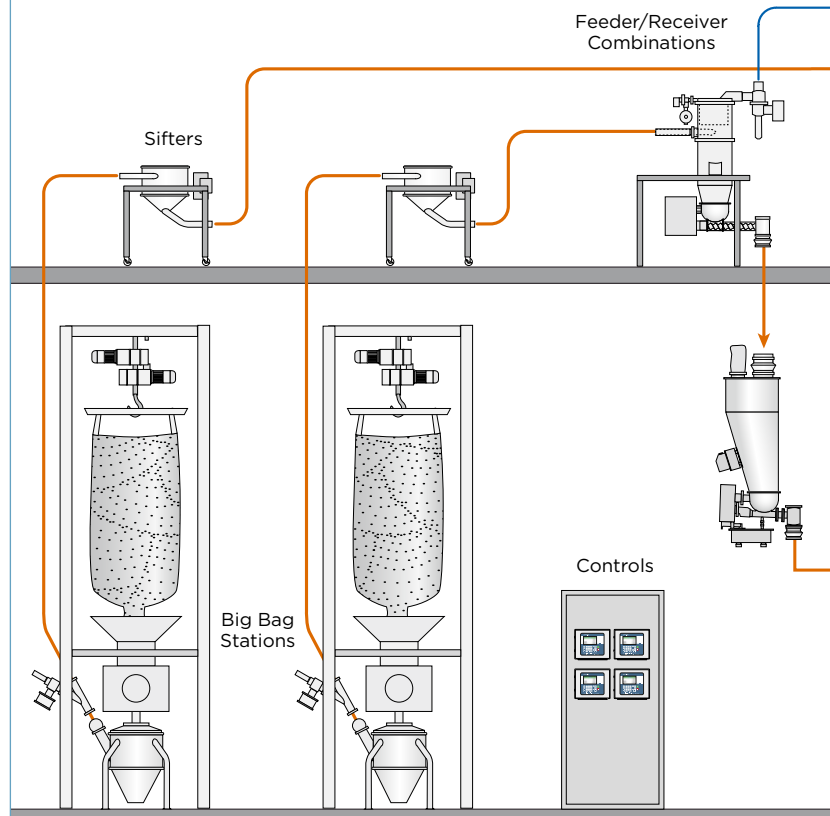


Pharma dispensary application

Systems Design and Integration

Coperion K-Tron's Systems Engineering Group specializes in supplying systems focused on material transfer and process ingredient feeding on a worldwide basis. Coperion K-Tron's experienced technical engineers are available to discuss your process requirements in detail and recommend specific design options to optimize your process, both in feed accuracy as well as process quality.

Coperion K-Tron offers complete solutions from material pickup to process



Validation

Coperion K-Tron can provide an extensive array of validation documentation including FRS, HRS, DQ, FAT and SAT protocols for both standalone feeders/conveyors and complete systems. Controls options are available to meet CFR 21 Part 11 compliance. Integration with a variety of communications platforms including Modbus, Allen Bradley, DeviceNet, Profibus, etc. are available.

Continuous Processing in the Pharmaceutical Industry

As the pharmaceutical industry undergoes a change in manufacturing from batch to continuous operations, Coperion K-Tron continues to be the supplier of choice for feeding and material handling equipment. Regardless of the exact continuous process utilized, the method of feed and refill to the process is critical in maintaining process and product quality/efficiency. Highly accurate Coperion K-Tron loss-in-weight feeders with clean and quick-reacting Coperion K-Tron receivers for automatic feeder refill are the perfect combination to ensure consistent continuous operations.

Continuous processes which are currently utilizing Coperion K-Tron equipment include: hot melt extrusion and extrusion granulation, wet granulation, drying, direct compression, blending/mixing, and coating.

Coperion K-Tron's systems engineering and design experts can provide complete material handling and feeding systems for all of the processes outlined above, with a focus on process and product quality and operator safety.

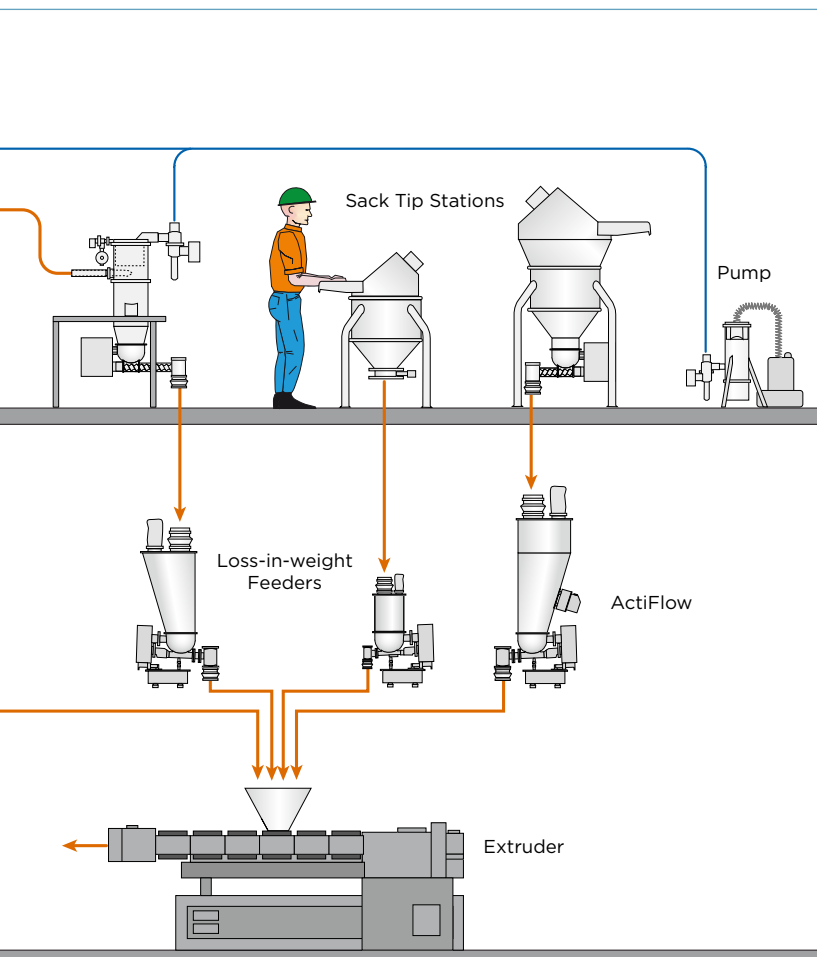
Feeding and Conveying in Tablet Press Operations

Coperion K-Tron's know-how in tablet press operations finds application in both the delivery of the tablet mixture to the press and the external lubrication of the press tools. Coperion K-Tron's dense phase pneumatic receivers are ideal for the transfer of the granulate mix directly into the press. The dense phase system is ideal for blends which have a tendency to segregate during material handling and transfer. The Coperion K-Tron lubricant feeder is used for accurate delivery of an atomized spray of lubricant powder directly into tablet press tooling. The external lubrication system can be provided for a number of tablet press designs. Installations

have proven that the atomized spray of the lubricant directly into the press can improve tablet hardness, significantly reduce the sticking and picking of the formulation to the tablet press tooling, and even reduce the overall lubricant consumption.



Coperion K-Tron Pharma Feeders are ideal for feeding even difficult powders



Sanitary Feeding Solutions

Pharma Feeder Design

Coperion K-Tron K3 Pharmaceutical Design screw feeders are available in volumetric and gravimetric loss-in-weight configurations.

Features include:

- › All stainless steel product contact surfaces with FDA approved elastomers
- › Material certification and surface finish confirmation on product contact surfaces
- › Integrated horizontal agitator to ensure optimal screw fill

- › Integral 2 degree pitch to allow for WIP drainage during cleaning
- › Interchangeable, modular, quick change design
- › Exclusive Coperion K-Tron Smart Force Transducer (SFT) digital weighing technology with true 1:8,000,000 in 20 ms resolution for optimal accuracy, critical in continuous applications
- › Surface finish on most contact surfaces Ra 0.8 µm or better



Pharma Feeder Models

Pharmaceutical Design Twin Screw Feeders

Twin screw feeders are ideal for handling difficult materials such as active pharmaceutical ingredients (APIs), excipients, lubricants and pharmaceutical granulations. Coperion K-Tron offers two sizes (QT20 and QT35) in either volumetric or gravimetric configurations.

Feed Rates:

0.13 dm³/h (0.005 ft³/h) to 2012 dm³/h (71.1 ft³/h)

Pharmaceutical Design Micro Screw Feeders

The family of microfeeders is specially designed for feeding free-flowing to difficult powders (e.g. lumpy, moist or bridge-building materials) at extremely low rates with extremely high accuracy and minimal residual material left in the feeder. Two sizes of twin screw feeders available.

Feed rates:

0.031 dm³/h (0.0011 ft³/h) to 33.11 dm³/h (1.17 ft³/h)

Pharmaceutical Design Vibratory Feeder

The innovative K3 Pharmaceutical Design V200 vibratory feeder is ideal for the gentle feeding of friable or irregularly shaped bulk materials at high accuracy. A hygienic silicone cover encloses the complete drive assembly.

Feed rates:

5 dm³/h (0.176 ft³/h) to 1600 dm³/h (56.5 ft³/h)



The new K3 Pharma Feeder Quick Change design makes decoupling of the feeding unit for changeover or cleaning quick and easy.

Pharma Feeder Applications

Typical applications of pharmaceutical design feeders include:

- › Feeding of mills and micronizers for both excipients and APIs
- › Pharma extruder feeders including hot melt and wet granulation extrusion
- › Single and multiple ingredient dispensing and batching, including reactor loading
- › Lubrication of tablet press tooling
- › Feeding of continuous pharmaceutical processes including mixing/blending, wet and dry granulators, coaters, and drying.

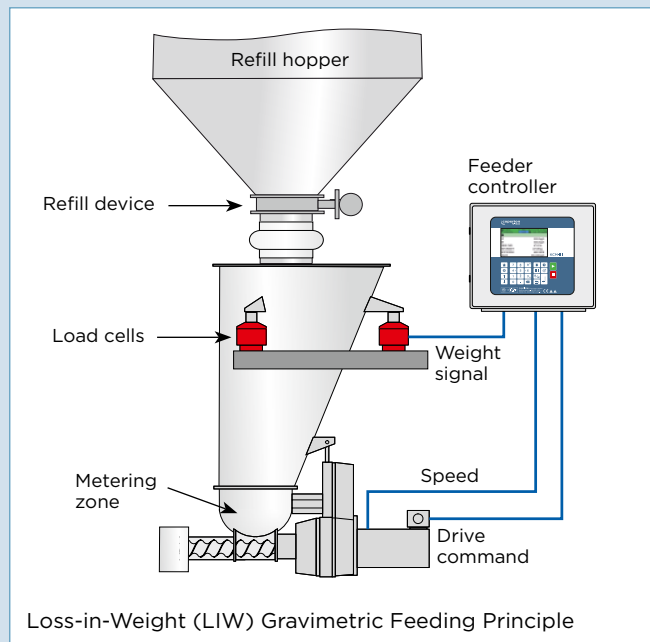
Pharmaceutical Design Liquid Loss-in-Weight Feeders

Coperion K-Tron's liquid loss-in-weight feeders provide accurate continuous volumetric or gravimetric flow control of liquids. Feed rates are dependent upon the configuration.



Specialized solutions are available for most applications.

Feeding Principles



Volumetric Feeding Principle

The bulk material is discharged from a hopper with a constant volume per unit of time by regulating the speed of the feeding device. The actual volume of material fed is determined through calibration. The feeding accuracy is dependent on the uniformity of the material flow characteristics and the bulk density.

Loss-in-Weight (LIW) Gravimetric Feeding Principle

The bulk material or liquid is discharged from a hopper with a constant weight per unit of time by weighing the hopper and regulating the speed of the feeding device depending on the rate of weight loss. The weighing control system compensates for non-uniform material flow characteristics and variations in bulk density; therefore providing a high degree of feeding accuracy.

When the hopper reaches a predetermined minimum weight level, the LIW control is briefly interrupted and the hopper is refilled. During the refill period, the controller regulates the speed of the feeding device based upon the historic weight and speed information that was accumulated during the previous weight loss cycle. The LIW feeding principle is most accurate when using a high resolution, fast responding, vibration immune weighing system such as Coperion K-Tron SFT platform scales or load cells combined with self-tuning controls such as the compact Coperion K-Tron Control Module (KCM).

Sanitary Pneumatic Conveying Solutions

Vacuum Sequencing Systems

The Coperion K-Tron P-Series are designed to convey delicate materials such as tablet granulations, active pharmaceutical ingredients (APIs), excipients, and even finished capsules and tablets.

Every pneumatic conveying solution is custom developed according to the process and application, based upon years of experience with many challenging materials. Since the characteristics of bulk materials are often difficult to define, system solutions are usually tested in the lab.

The P-Series systems designs are available for both dense and dilute phase vacuum

transfer for a wide variety of applications including capsule filler, tablet press, blender, and coater loading, feeder loading and refill, in line screening and sieving, and general ingredient conveying/transfer.

P-Series vacuum conveyors are designed with complete cleaning and ease of disassembly in mind. They are available as stand-alone units as well as integrated packages for the automated refill of Coperion K-Tron pharmaceutical design feeders. In addition, complete systems packages are also available for conveying pick up options from supersacks, drums, boxes, IBCs and FIBCs.

Coperion K-Tron P-Series design features include:

- › 316L stainless steel construction
- › Product contact surfaces polished to a minimum of Ra 0.4 μm
- › Pulsed filter cleaning assembly complete with pharma design PTFE laminated filter elements
- › Options for integrated retractable spray balls, modified swing heads for accessibility and automated lift assemblies.

P-Series Configurations

P10

The P10 with flap valve has a holding capacity of 10 dm^3 [0.4 ft^3] and conveys up to 600 kg/h [1320 lb/h].

The P10 with butterfly valve has a holding capacity of 7 dm^3 [0.3 ft^3] and conveys up to 400 kg/h [880 lb/h].

P30

The P30-150 with flap valve has a holding capacity of 28 dm^3 [1 ft^3] and conveys up to 1000 kg/h [2200 lb/h].

The P30-300 with flap valve has a holding capacity of 28 dm^3 [1 ft^3] and conveys up to 1800 kg/h [4000 lb/h].

The P30-150 with butterfly valve has a holding capacity of 27 dm^3 [0.9 ft^3] and conveys up to 1000 kg/h [2200 lb/h].

P100

The P100 with flap valve has a holding capacity of 96 dm^3 [3.4 ft^3] and conveys up to 4000 kg/hr [8800 lb/hr].

The P100 with butterfly valve has a holding capacity of 90 dm^3 [3.2 ft^3] and conveys up to 3600 kg/hr [7920 lb/hr].



All conveying rates are based on a distance of 15 m [50 ft] and bulk density of 0.5 kg/dm^3 [31 lb/ft^3]. Rates vary with material characteristics, conveying distance and plant layout.

P-Series as Refill Devices

The method of refilling a Loss-in-Weight feeder in a continuous process can be almost as critical as the right choice of feeder technology. Since the objective is to refill as quickly as possible, pneumatic receivers that operate in either dilute phase or dense phase (in the case of some pre-blended formulations) mode are often used as refill devices, particularly for continuous operations.

Integrated P-Series and LIW feeder for refill and dispensing applications



Specialty Designs for Specific Applications

Coperion K-Tron offers a number of specialty designs for pneumatic loaders and receivers, all dependent upon the requirements of the product and the process. Options are available for the conveying of potent or hazardous materials, including systems designs for the conveying of explosive materials. Modifications to the Coperion K-Tron P-Series design include the addition of retractable spray heads in the receiver body for cleaning and rinsing in place, as well as specialty swing out filter head designs to allow for easy access and removal of special filters.



P-Series as Pneumatic Loaders

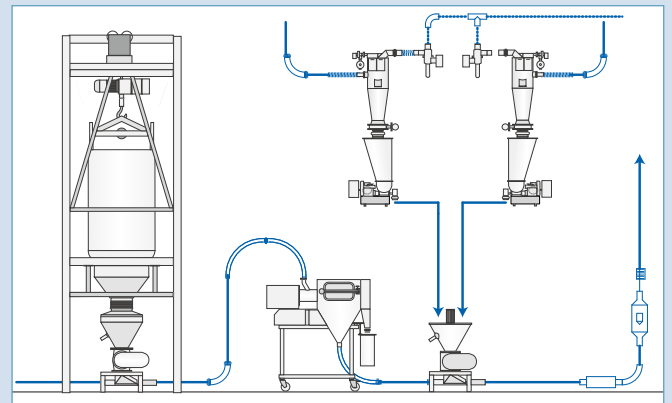
In addition to the use of P-Series pneumatic systems for feeder refill, the systems are also used for a wide variety of material handling operations in the pharmaceutical industry. Full containment options are available complete with split butterfly valves on the receiver discharge. A variety of material pickup designs are provided, dependent upon the source of the material to be transferred, product and process safety concerns, and required parameters for cleaning cycles.



P10 receiver in a tablet conveying application

Complete Systems Integration

The Coperion K-Tron material handling system design is available for a wide variety of process needs including pickup and delivery of potent compounds. These designs can include the integration of glove box or isolator technology at the powder pickup point, the addition of specialized docking stations with split butterfly valves for both product pickup and discharge from the vacuum receiver, the use of in-line sieving prior to delivery of the powder to the LIW feeder, and/or the use of specialized bag in/bag out secondary HEPA filtration prior to the vacuum source.



Smart Pharmaceutical Solutions



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