



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.

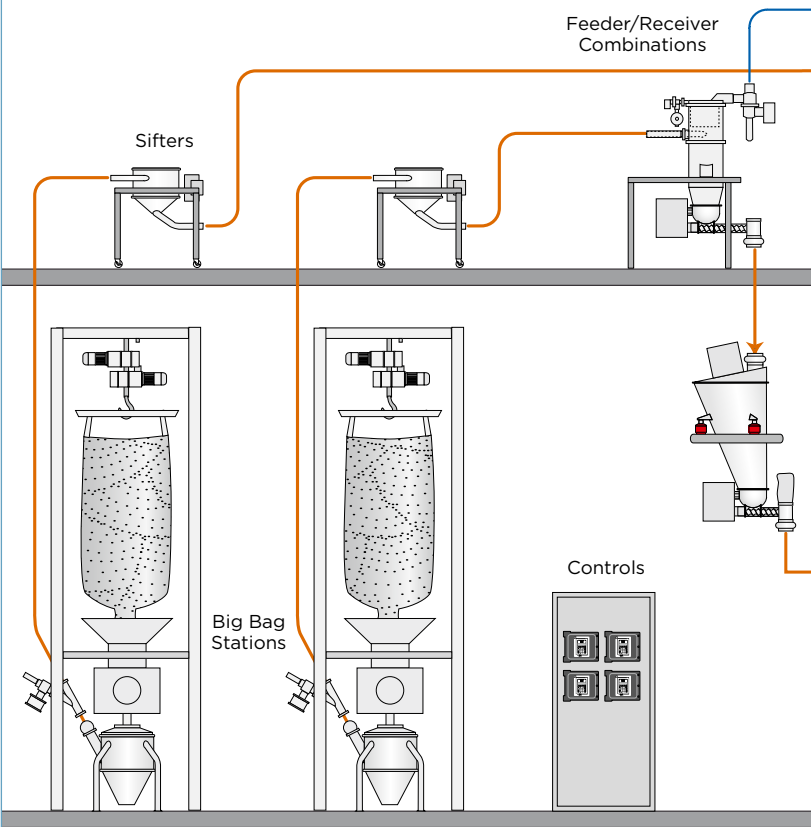


Pharma dispensary application

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.

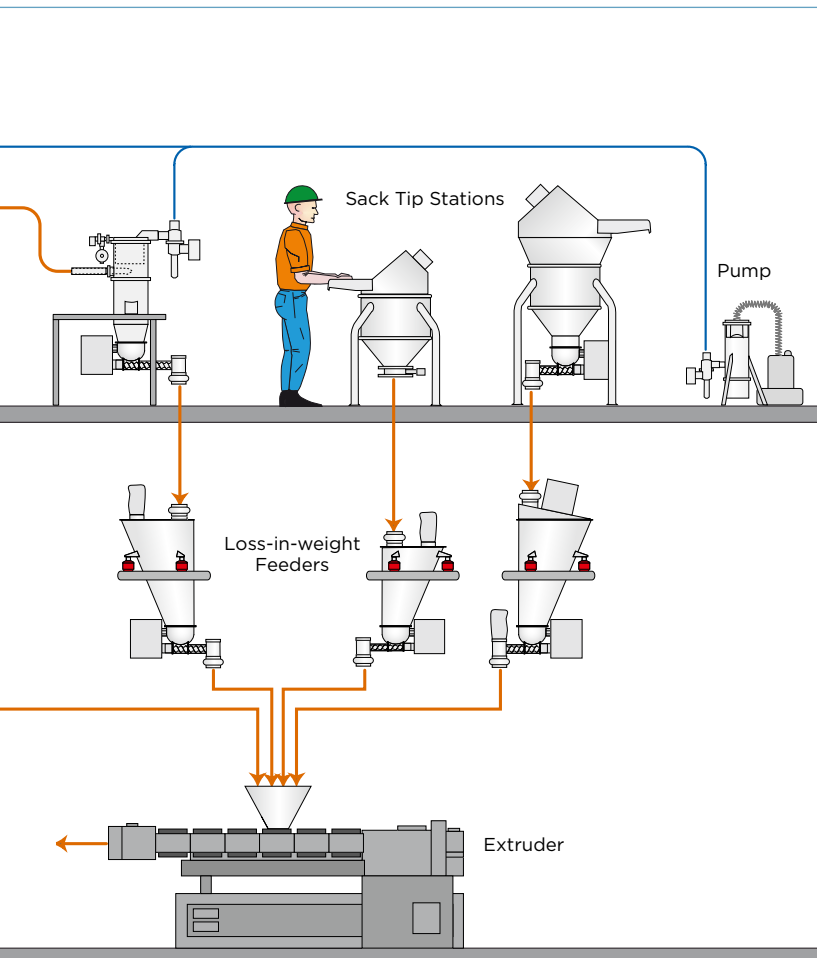
Coperion K-Tron's systems engineering and design experts can provide complete material handling and feeding systems for all of the processes outlined above, with a focus on process and product quality and operator safety.

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

All Coperion K-Tron feeders are available in volumetric and gravimetric loss-in-weight configurations.

Standard design 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
- Gas purging connections for all shaft seals

- Exclusive Coperion K-Tron Smart Force Transducer (SFT) digital weighing technology with true 1:4,000,000 in 80 ms resolution for optimal accuracy, critical in continuous applications
- Minimum surface finish on all contact surfaces of 0.8 micron Ra (25 micro inches Ra). Higher surface finishes optional.
- All seals, gaskets and O-rings are constructed of FDA approved materials.



KT35 Twin Screw Pharma Feeder on a D5 platform scale

Pharma Feeder Models

Pharmaceutical Design Single Screw Feeders

Single screw feeders are ideal for handling free-flowing materials such as granular excipients. Coperion K-Tron offers the KS60 in either volumetric or gravimetric configurations.

Feed Rates:

0.4 dm³/hr (0.014 ft³/hr) to 4600 dm³/hr (162 ft³/hr).



MT16 Twin Screw Microfeeder on an SFS 24kg platform scale

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 (KT20 and KT35) in either volumetric or gravimetric configurations.

Feed Rates:

0.12 dm³/hr (0.004 ft³/hr) to 2041 dm³/hr (72.1 ft³/hr).

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. Twin and single screw versions available.

Feed rates:

0.016 dm³/hr (0.0006 ft³/hr) to 33.11 dm³/hr (1.17 ft³/hr).

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.

Dismantling the Pharma Feeder in Six Easy Steps



Pharma Feeder Applications

Typical applications of pharmaceutical design feeders include:

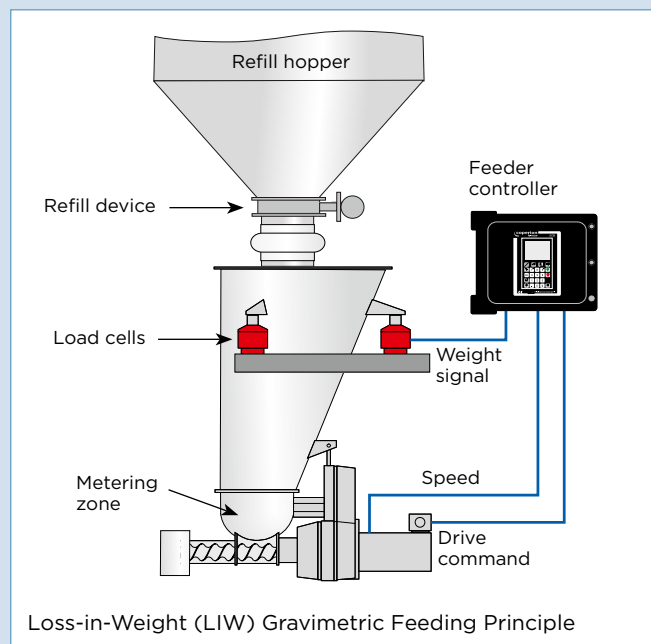
- Feeding of mills and micronizers for both excipients and APIs
- Pharma extruder feeders including hot melt and wet granulation extrusion
- Single and multiple ingredient dispensing and batching, including reactor loading
- Lubrication of tablet press tooling
- Feeding of continuous pharmaceutical processes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



A group of Coperion K-Tron Pharma Feeders feeding directly into an extruder inlet



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 FIBC's.

Coperion K-Tron P-Series design features include:

- › 316L stainless steel construction
- › Product contact surfaces polished to a minimum of 0.4 micron Ra
- › 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 dm³ [0.4 ft³] and conveys up to 600 kg/h [1320 lb/h].

The P10 with butterfly valve has a holding capacity of 7 dm³ [0.3 ft³] and conveys up to 400 kg/h [880 lb/h].

P30

The P30-150 with flap valve has a holding capacity of 28 dm³ [1 ft³] and conveys up to 1000 kg/h [2200 lb/h].

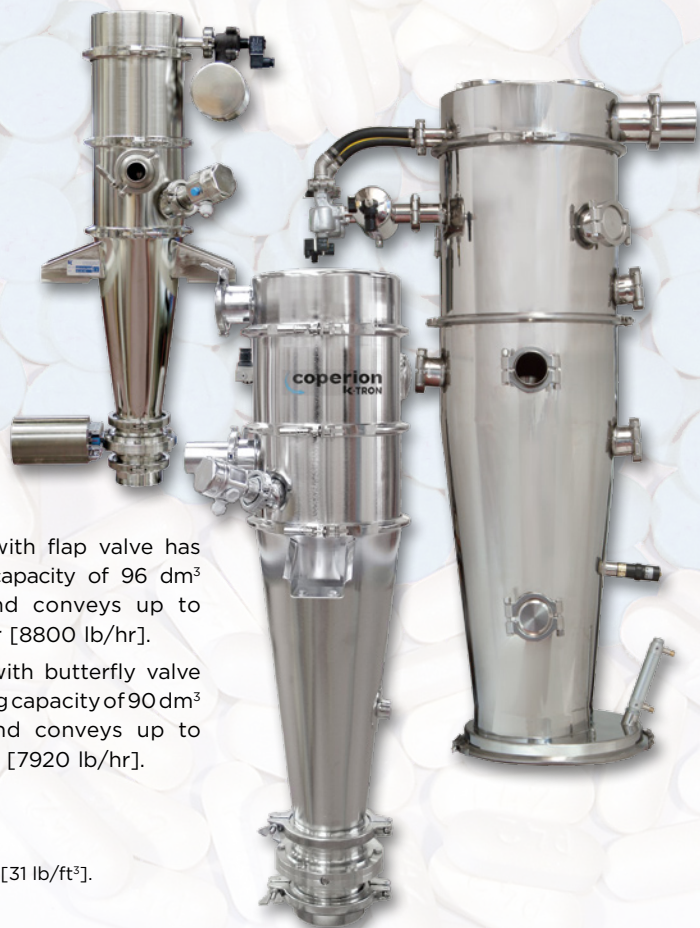
The P30-300 with flap valve has a holding capacity of 28 dm³ [1 ft³] and conveys up to 1800 kg/h [4000 lb/h].

The P30-150 with butterfly valve has a holding capacity of 27 dm³ [0.9 ft³] and conveys up to 1000 kg/h [2200 lb/h].

P100

The P100 with flap valve has a holding capacity of 96 dm³ [3.4 ft³] and conveys up to 4000 kg/hr [8800 lb/hr].

The P100 with butterfly valve has a holding capacity of 90 dm³ [3.2 ft³] 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/dm³ [31 lb/ft³]. 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.



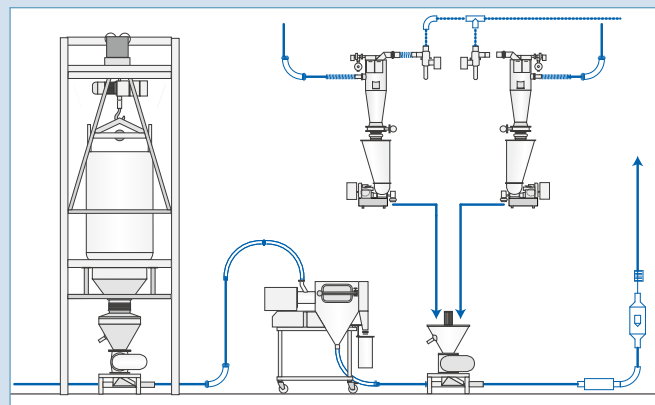
P-Series as Pneumatic Loaders

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.



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



www.coperion.com

>Manufacturing, Sales and Engineering:

>Sales and Engineering:

Coperion K-Tron Pitman, Inc.
590 Woodbury-Glassboro Rd
Sewell, NJ 08080 USA
Tel +1 856 589 0500
Fax +1 856 589 8113

Coperion K-Tron Salina, Inc.
606 North Front St.
Salina, KS 67401 USA
Tel +1 785 825 1611
Fax +1 785 825 8759

Coperion K-Tron (Switzerland) LLC
Lenzhardweg 43/45
CH-5702 Niederlenz
Tel +41 62 885 71 71
Fax +41 62 885 71 80

info@coperion.com

Asia Pacific
Coperion K-Tron Asia Pte Ltd
8 Jurong Town Hall Road
#28-01/02/03 The JTC Summit
Singapore 609434
Tel +65 6418 8200
Fax +65 6418 8203

British Isles
Coperion K-Tron Great Britain Ltd.
4 Acorn Business Park
Heaton Lane
Stockport SK4 1AS
United Kingdom
Tel +44 161 209 4810
Fax +44 161 474 0292

China
Coperion K-Tron (Shanghai) Co. Ltd.
Building A2-A3
No. 6000 Shen Zhuan Gong Road
Songjiang district
CN-201619 Shanghai
Tel +86 21 6375 7925
Fax +86 21 6375 7930

France
Coperion K-Tron France S.à.r.l.
56, boulevard de Courcerin
FR-77183 Croissy-Beaubourg
Tel +33 1 64 80 16 00
Fax +33 1 64 80 15 99

Germany
Coperion K-Tron Deutschland GmbH
Heinrich-Krumm-Strasse 6
DE-63073 Offenbach (Main)
Tel +49 69 8300 8990
Fax +49 69 8300 9498



coperion
K-TRON