

Application

Electronic Pressure Compensation (EPC) can be used to automatically detect changes in pressure within a feeder and adjust the weight signal accordingly. When it comes to handling air pressure issues in loss-in-weight feeders, especially for pressure issues in the feeder's material hopper, EPC offers distinct advantages over traditional mechanical pressure compensation systems such as:

- simple, cost-effective design
- fewer parts, easy to install and clean
- more effective and reliable
- maintenance free
- easy to retrofit on existing systems
- pressure data available electronically
- alarms on over-/under-pressure

Design

With EPC the KCM uses the data from a pressure sensor mounted in the hopper lid and/or discharge tube to adjust for changes to the weight signal caused by variations in pressure. Very small pressure changes inside the feeder material hopper cause weighing errors because the feeder hopper and discharge tube are not completely isolated vessels.

With the EPC compensation system, the KCM uses a sensor to measure the pressure and dynamically compensates the weight to eliminate the weighing error, using the entered value for the hopper lid or discharge opening(s). The EPC measures Gauge Pressure (relative to atmosphere). It will measure and correct for pressure fluctuations inside of a hopper in the range of ± 50 mBar. If the pressure is outside of this range an alarm will be generated.

EPC can be installed on the feeder hopper or the discharge or both. It is also possible to use EPC for the hopper while utilizing traditional mechanical pressure compensation on the discharge. However, EPC and mechanical pressure compensation cannot be used simultaneously on the same discharge.

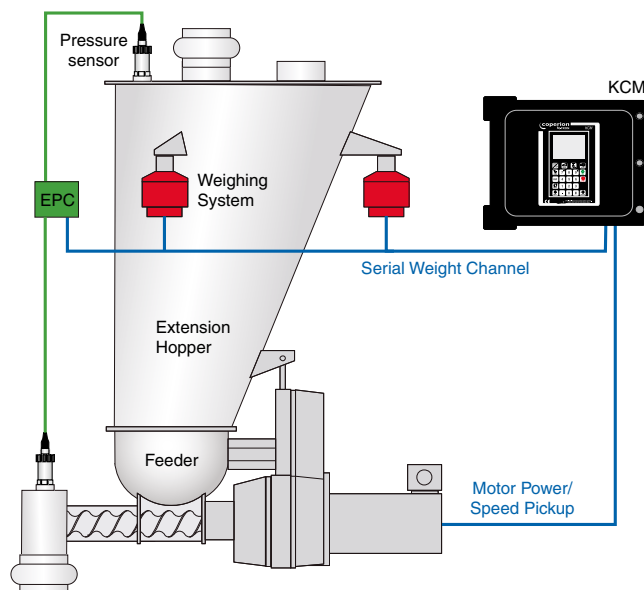
Why Pressure Compensation?

Pressure compensation is necessary for gravimetric feeders which are part of a closed system, where changes in pressure within the feeder hopper or discharge tube can cause an incorrect weight signal.

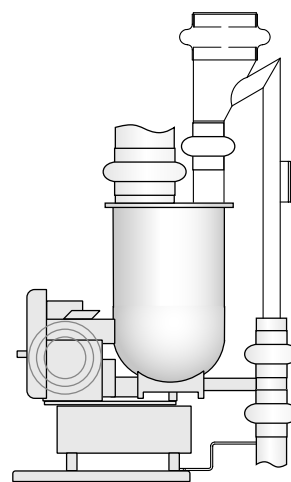
In a sealed pressure vessel the pressure forces balance perfectly in all directions and the measured weight is unaffected. However, the feeder hopper has an inlet in the lid for refills. Any positive air pressure in the hopper acts across the refill inlet area and pushes up on the fixed refill valve above. The flexible seal created by the bellows allows an equal force to push down on the hopper and results in an increase in the weight signal. The loss-in-weight controller would normally react to the added weight by erroneously increasing the feeder output creating a mass flow error.

Traditional mechanical pressure compensation on a hopper is quite complex and must be installed correctly – any deviations will adversely affect the result. In comparison, EPC is easy to install, self-optimizing and significantly less expensive.

Pressure changes at the feeder discharge, when sealed and connected to the downstream process with a bellows, also create a weight error which can be corrected with a separate pressure sensor connected to the same EPC junction box.



The diagram shows a block diagram of the EPC on both the hopper lid and the discharge. The EPC pressure sensor produces an analog value that is measured by the EPC circuit board. This EPC circuit board then is connected to the KCM on the serial weight channel, just like the SFT sensors.



Feeder with traditional mechanical pressure compensation on both hopper and discharge.

Traditional mechanical pressure compensation on a feeder outlet is often relatively simple and very effective and therefore often a good solution. However, even a relatively simple mechanical pressure compensation system requires on-going maintenance including periodically readjusting or replacing flexible bellows.

Wiring Details

Figure 1: General Purpose Version

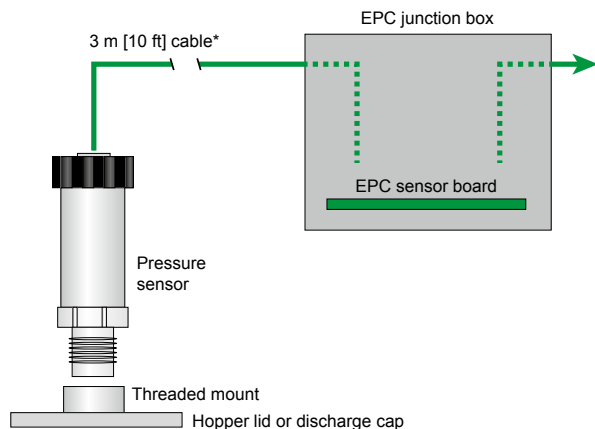


Figure 2: Version for Zones 2 or 22

ATEX 3G, 3D, NEC Class I & II Div 2

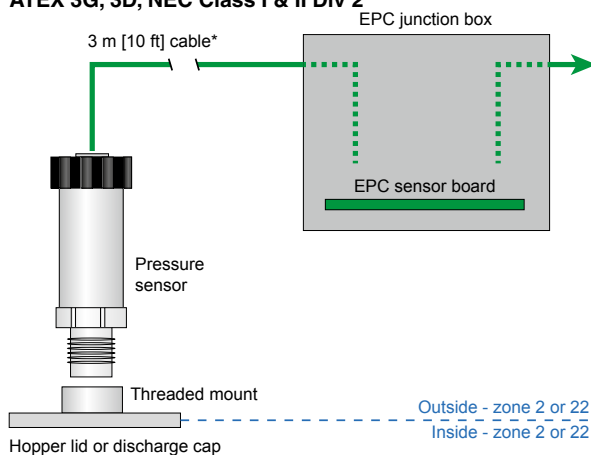
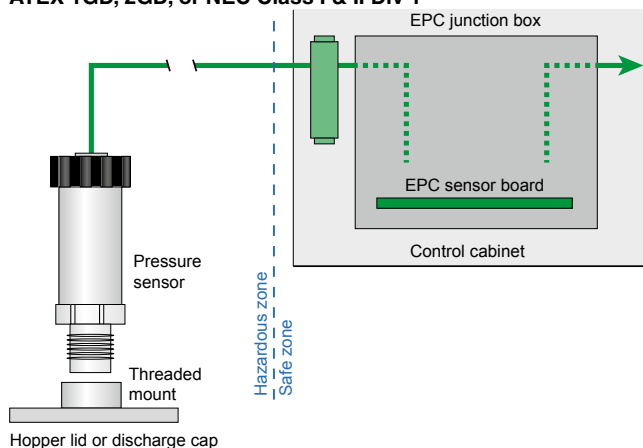


Figure 3: Zones 0, 1, 20, or 21

ATEX 1GD, 2GD, or NEC Class I & II Div 1



Technical Data

EPC Circuit Board

- Safety: Complies with IEC61010-1 and UL61010-1
- Certifications: CE
- J-Box available for:
 - General purpose
 - Atex 3D
 - NEC Class 2 / Division 2
- Operating temperature: -10 to 60°C [14 to 140°F]
- Storage temperature: -25 to 80°C [-13 to 176 °F]
- Electrical supply voltage: 12 VDC (uses KCM SFT power wires)
- Max. power consumption: 50 mA
- Coperion K-Tron software compatibility: EPC is compatible only with KCM (s/w ≥ 2.6)

EPC Pressure Sensor

- Pressure sensor range: ±50 mBar
- Factory calibrated
- Operating temperature: -20 to 80°C [-4 to 176 °F]
- Material of construction - material contact - wetted parts: 316L stainless steel
- CE compliant
- Ingress protection:
 - Angular DIN connector IP65
 - Permanent wired: IP68
 - Field Case: IP67
- Mechanical process connection: G½B EN 837
- Tightening torque: 60 Nm
- 3 m [10 ft] cable

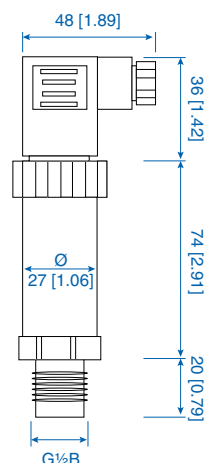
Options

Pressure Sensor Options

- Longer cables
- Intrinsically safe pressure sensor approvals: ATEX, FM, CSA, and GOST-R Listings
- Hygienic process connection for food or pharma applications
- Flush pressure diaphragm for food or pharma applications
(The standard pressure sensor has a 12 mm bore and a recessed pressure diaphragm to avoid dust build-up.)

Dimensions mm[in]

shown with angular DIN connector



* Standard cables are 3 m (10 ft). Maximum cable length without junction box is 10 m (33 ft).