Flow/No-Flow Detection for Grain and Milling Systems

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Agenda

• Why use flow detection sensors?
• How flow detection works
• Features of flow detection sensors
• Limitations of the sensor
• Models of flow detectors
• Where to use flow detection
• Installation tips
• Application examples
Why use Flow Detection Sensors?

• To determine whether material is flowing or not

• To be alerted when material “is” or “is not” flowing when starting, changing or stopping a process

• Prevent cross contamination of materials by guaranteeing material is flowing through the intended chute or spout

• Ensure that operations are running smoothly
Users of Flow Detect Devices

- Feed Mills
- Grain Storage
- Flour Milling
- Pet Food Manufacturers
- Grain Elevators
- Seed Companies

Many operations use multiple flow detection devices throughout their plants.
How Flow Detection Works

• Microwave technology uses the Doppler effect to detect presence or absence of material at a distance.

• It beams a microwave signal towards a desired target and listens for its reflection, then analyzes how the frequency of the returned signal has been altered by the object's motion.

• This variation gives direct and highly accurate detection of whether there is material in the path of the signal.
Features of Flow Detection Sensors

• Detect flow/no flow conditions
• For use in granules, pellets, meals, powders and all types of solids
• Low power microwave Doppler technology
• Detects material at distances up to 5 feet
• Has no contact with the material stream
• Process connection 1-1/4” NPT coupling
Single-Piece Flow Detection

• Single-piece design eliminates separate controller
• Sensing element, power, output connection and user adjustment control are contained in the enclosure
Specifications for FD2000

• Power Requirements: 2 Watts at 24 VDC +/-10%

• Detection Range: 5’

• Sensitivity Adjustment: High / low selection switch with potentiometer

• Relay Outputs: 250 VAC / 220 VDC / 2A (N.C. or N.O.)

• Output Delay Range: Switchable for 0.1 to 3.1 seconds for higher resolution OR 2.3 to 15.1 seconds for long delay

• 4 or 20 mA output with 22 mA fault
Specifications for FD2000

• Fault relay for Doppler sensor failure or excessive temperature
• Operating Temperature: -22°F to +140°F (-30°C to +60°C)
• Process Temperature: -40°F to +176°F (-40°C to +80°C)
• Enclosure: White Powder Coated Aluminum, NEMA 4X
• Mounting: 1-1/4” NPT
• Conduit Entry: 3/4” NPT
• Process Pressure: 80 PSI
Two-Piece Flow Detection

• Consists of two components including a remote sensor and control console
• Console is installed at convenient location to alert users to device status
• Setup potentiometer, power terminal and relays housed in remote box
Limitations of the Sensor

- Does not detect flow rate, just the presence or absence of flow
- Must have metallic plate on side opposite device, if mounted on a plastic chute
- Cannot be aimed at moving equipment, such as open belts, buckets or paddles
- Not intended for liquids
Where to use Flow Detection

• Gravity Chutes
• Feeders
• Pipelines
• Bucket Elevators
• Pneumatic Conveyors
• Distributors
• Cleaners
• Dryers
Mechanical Conveyors

- Ensure that conveyors are not running empty or have experienced mechanical damage. Run conveyors only when needed, reducing wear and energy costs.
Blending Systems

• Detect blockages and empty hoppers preventing variations in end products due to improper dosing or batching of ingredients.
Silo Discharge

- Detect no-flow conditions. Monitor the correct functioning of gates and valves to reduce material loss or accidental use of incorrect material.
Pneumatic Conveyors

• Monitor the addition of solid materials at multiple points to ensure proper end product characteristics. Detect malfunctions and blockages.
Pneumatic Conveyors

- Flour
- Sugar
- Starches
- Dusts
Gravity Feeders
Gravity Spouts
Distributors
Silo Unloading Conveyors
Feed Mill

Multiple spouts for ingredient silos
Unloading Pit Conveyor
Conveyor Feeding Bucket Elevator
Installation Tips

• Installs through a 1-1/4” NPT half coupling

• Always mount conduit openings facing down to prevent moisture from entering

• Mount at transitions, not at moving belts or conveyors

• Preferably mounted 20° to 30° off perpendicular to material flow

• Position so it does not interfere, or come into contact with, flow stream

Be sure not to mount Flow Detect where it can detect motion from a moving conveyor or elevator.
Do not point sensor toward moving buckets.
Good Mounting Practices

Material flows away from sensor. Non-contact with sensor.
Good Mounting Practices

Material flows away from sensor.
Thanks for your time!

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