

Thermo Scientific Granuflow GTR 130

Flow/No-Flow Detector

The Thermo Scientific Granuflow GTR 130 is a low-cost, non-invasive, microwave-based instrument that detects and monitors flow/no-flow conditions of bulk solids in pipelines, ducts and air-slides, and at transfer points of chutes, conveyor belts and bucket elevators. The real-time flow information it generates allows you to monitor processes closely and leads to increased reliability, higher quality end product, reduced downtime and fewer hazards to jeopardize operators and equipment.



The Thermo Scientific Granuflow GTR 130 is a low-cost, non-invasive, microwave-based instrument that detects and monitors flow/no-flow conditions of bulk solids in pipelines, ducts and air-slides, and at transfer points of chutes, conveyor belts and bucket elevators. Used for automation purposes, it optimizes the efficient use of machinery and energy by switching process equipment on or off as required. The Granuflow GTR 130 has no moving mechanical parts, which eliminates wear and makes the instruments maintenance-free and trouble-free. It also features a unique snap-in/snap-out electronics module, which provides quick and easy service access without having to open your process. Flow control is commenced within minutes instead of hours.

Principle of Operation

The Granuflow GTR 130 utilizes the Doppler Effect. It measures the difference between emitted and reflected microwave frequencies. Its electronics emits a signal that is reflected by moving material. When the material is in motion, the returned signal is either higher or lower in frequency than the transmitted signal. No motion is present if the returned signal is the same frequency as the transmitted signal. Changes in the received microwave energy, due to such things as build-up in front of the antenna, do not affect flow/no flow detection.

Detection Through Walls

Microwaves can penetrate non-conductive materials, such as plastic, glass and wood with negligible attenuation; therefore, the Granuflow GTR 130 is capable of looking into the process through thick walls. Non-conductive build-up on a wall of the container doesn't affect the signal, allowing easy installation. External mounting lets the process remain closed. It also permits detection from the safe area outside of a hazardous process or high pressure-high temperature system.

The adjacent table gives the values of wall thickness for various materials, which attenuate the intensity of the microwaves by half. The Granuflow GTR 130 sensor can detect flowing conditions even when only a small percentage of its emitted microwave energy is available.

The Sensing Beam

A detector's microwave antenna emits and receives continuously. Its beam's narrow shape allows precise placement of the sensor, protecting the system against false readings caused by movement outside of the process. The beam can detect Doppler frequencies of 1.6 Hz up to 1.6 kHz, which corresponds to a solids velocity of 13 mm/sec to 9.75 m/sec (0.5 in/sec to 32 ft/sec) when material flow is perpendicular to the sensor (higher velocities require special mounting). The minimum detectable concentration is approximately 0.61 kg/m (0.125 lb/ft)*, depending on process conditions.

Wall Material	Wall Thickness
Glass (window, sight)	25 mm to 51 mm (1 in to 2 in)
Wood (dry chip board)	13 mm to 25 mm (0.5 in to 1 in)
Plastic (PVC, PE, PTFE)	<102 mm (4 in) negligible attenuation

Mounting

How the Granuflow GTR 130 is mounted depends on the particular features of the application. The sensor is normally threaded into a compatible internal half-connector; however, it can be flange-mounted as well. If the process material is conductive and tends to build up and impair the microwaves, a plug of PVC or PTFE should be placed into the standoff portion of the process to prevent material from entering it. Top hat Teflon plugs are available as an option.

Typical Equipment Applications

Volumetric Feeders

Detects operational malfunctions, such as blockages, empty hoppers or flushing

Silo Discharge

Detects operational malfunctions, such as bridging, rat-holing or loose slide gates

Mechanical Conveyors

Detects damaged conveyors and conveyors running empty

Dryers, Screeners, Classifiers, Mills, etc.

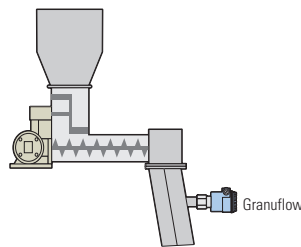
Detects proper material flow to and from the process

Pneumatic Conveyors and Injectors

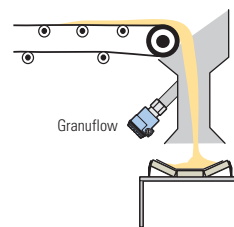
Detects any major operational malfunction

Typical Equipment Applications

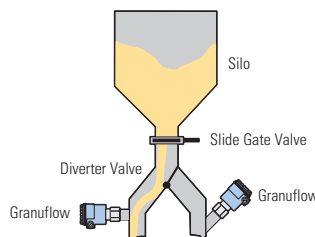
GTR Monitoring Volumetric Feeder



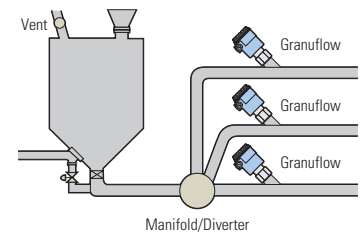
GTR Monitoring Transfer Point on Conveyor System



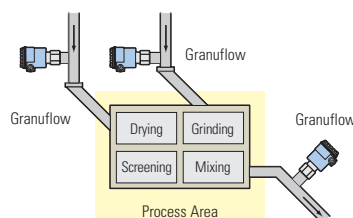
Two GTRs Monitoring Silo Discharge



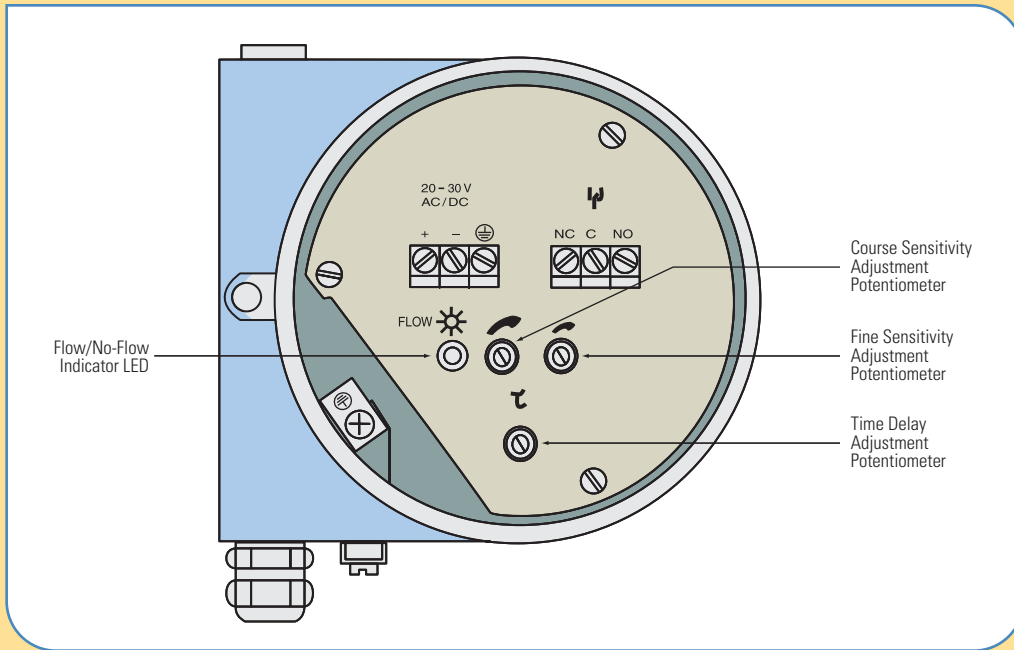
GTRs Monitoring Pneumatic Injection System



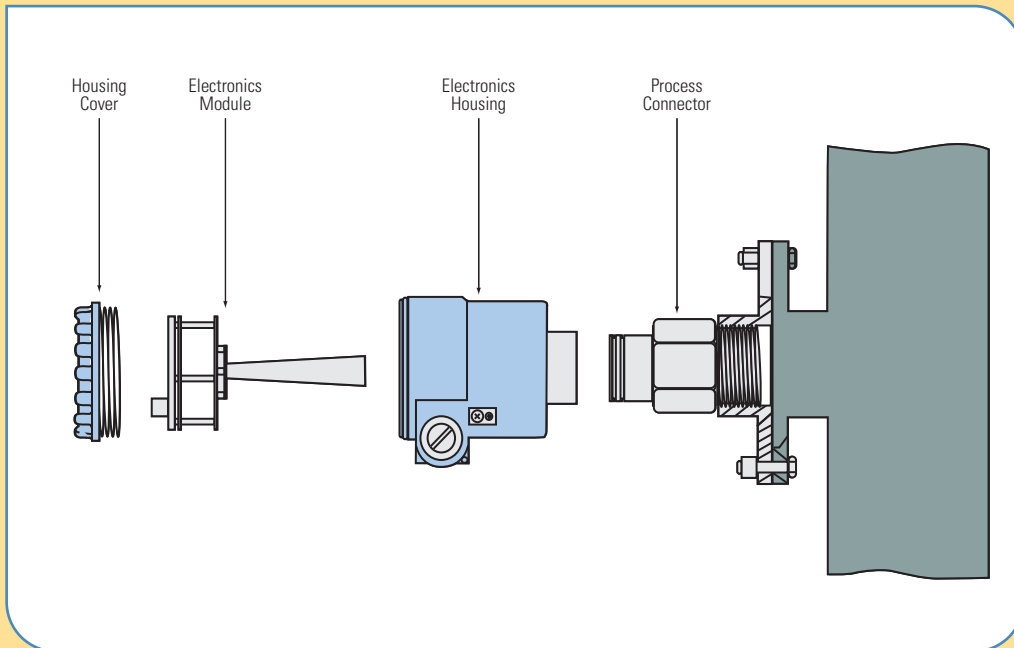
GTRs Monitoring Various Phases of a Process



Wiring Connectors and Calibration Components



Snap-In/Snap-Out Electronics Module Design



Typical Industry Applications

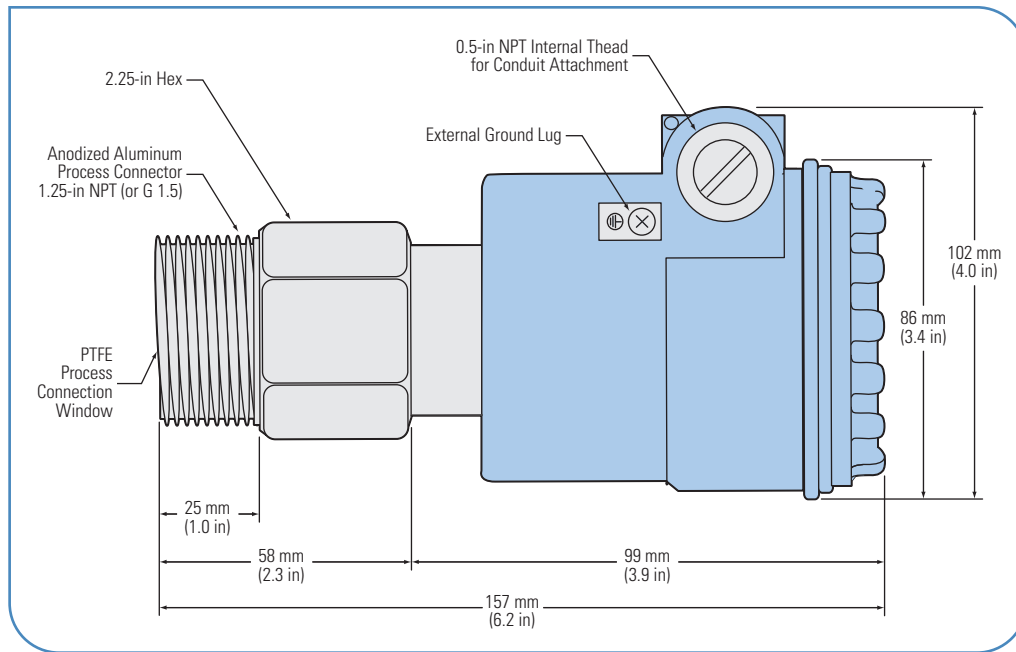
- Construction Materials
 - Cement (limestone, clinker, dolomite)
 - Gypsum
 - Woodchips
- Chemical Additives
 - Fertilizer
 - Powders
 - Paint
 - Plastic Pellets
 - Silica
- Food Products
 - Coffee
 - Tea
 - Snack Foods
 - Seasonings
 - Grains
 - Animal Feed
- Energy Products
 - Pulverized Coal
 - Fly Ash
 - Coke

Granulflow GTR 130 Flow/No-Flow Detector

General Specifications

Housing	Aluminum with epoxy coating; Single compartment
Protection	NEMA 4
Ambient Temperature of Housing	-20°C to +60°C (-5°F to +140°F)
Maximum Temperature at Sensor Horn Surface	+80°C (175°F)
Weight	Approximately 1 kg (2.2 lb)
Maximum Operating Pressure	15 PSI (1 bar)
Power Supply	20–30 VAC/DC; +15%, -10%
Operating Frequency (microwaves)	24.125 GHz
Detection Range	0 m to 1.5 m (0 ft to 5 ft) depending on application
Relay Output - Contact Rating	Max. 250 V, Max. 4 A, Max. 500 VA
Time Delay	Adjustable between 0 and 10 seconds
Mounting Connection	1.25-in NPT or G 1.5-in anodized aluminum
Process Connection Window	PTFE
Conduit Connection	0.5-in NPT internal; Optional PG 16, G 0.5 in or M 20 x 1.5 cable gland

Granulflow GTR 130 Dimensions



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