Product Specifications

The Thermo Scientific Ramsey Granuflow DTR 131 and DTR 231 detect and monitor flow/no-flow conditions of bulk solids. Real-time flow data from the detectors allows you to monitor processes closely, leading to increased reliability, higher quality end product, reduced downtime and fewer hazards to jeopardize operators and equipment.

Thermo Scientific Ramsey Granuflow DTR 131 & DTR 231

Microwave-Based Flow Detectors

The Thermo Scientific Ramsey Granuflow DTR 131 and DTR 231 are low-cost, non-invasive, microwave-based instruments that detect and monitor flow/no-flow conditions of bulk solids on conveyor belts, in pipelines, ducts and air-slides, as well as at transfer points of chutes, conveyor belts and bucket elevators. Used for automation purposes, they efficiently optimize the use of machinery and energy by switching process equipment on or off as required. The Ramsey™ Granuflow DTR 131 and DTR 231 have no moving mechanical parts, which eliminates wear and makes the instruments maintenance-free and trouble-free.

Principle of Operation

The Ramsey Granuflow DTR 131 and DTR 231 utilize the Doppler Effect. They measure the difference between emitted and reflected microwave frequencies. Their electronics emit 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 things such as build-up in front of the antenna, do not affect flow/no-flow detection.

These detectors produce microwave energy at a level of 0.15 mW/cm^2 (measured at the antenna horn), which is a much lower level than the international safety standard of 10 mW/cm^2. They are certified to FCC-15F.

Detection Through Walls

Microwaves can penetrate non-conductive materials, such as plastic, glass and wood with negligible attenuation; therefore, the Ramsey Granuflow DTR 131 and DTR 231 are capable of looking into the process through thick walls. Non-conductive build-up on a wall of the container does not 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. If an application requires penetration of conductive material, a window can be installed to allow the unit to see into the process.

The adjacent table gives the values of wall thickness for various materials, which attenuate the intensity of the microwaves by half. Ramsey Granuflow DTR 131 and DTR 231 sensors can detect flowing conditions even when only a small percentage of their 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) or lower, depending on the application.

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

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

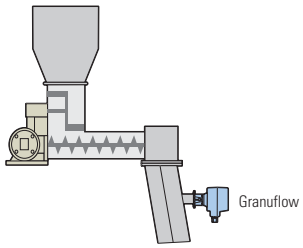
Pneumatic Conveyors and Injectors
Detects any major operational malfunction

Filters and Cyclones
Detects conditions beyond the equipment's design parameters

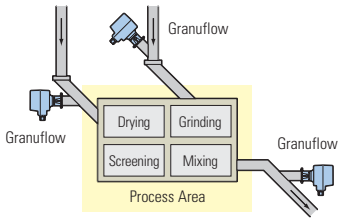
Conveyor Belts
Monitor presence or absence of material on a moving conveyor belt

Typical Equipment Applications

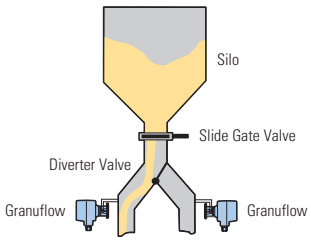
DTR Monitoring Volumetric Feeder



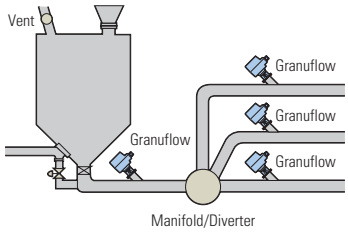
DTRs Monitoring Various Phases of a Process



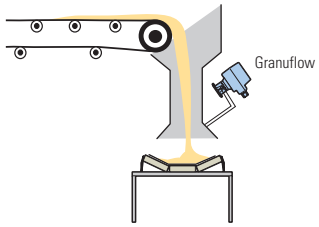
Two DTRs Monitoring Silo Discharge



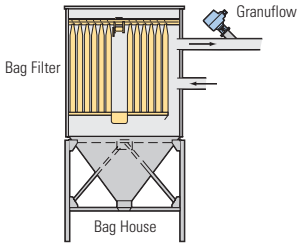
DTRs Monitoring Pneumatic Injection System



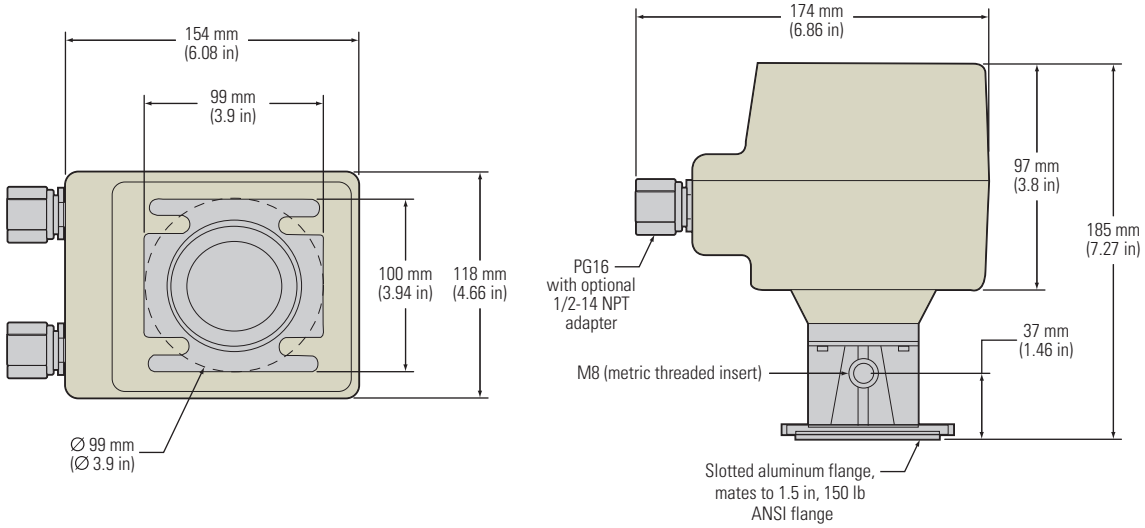
DTR Monitoring Transfer Point on Conveyor System



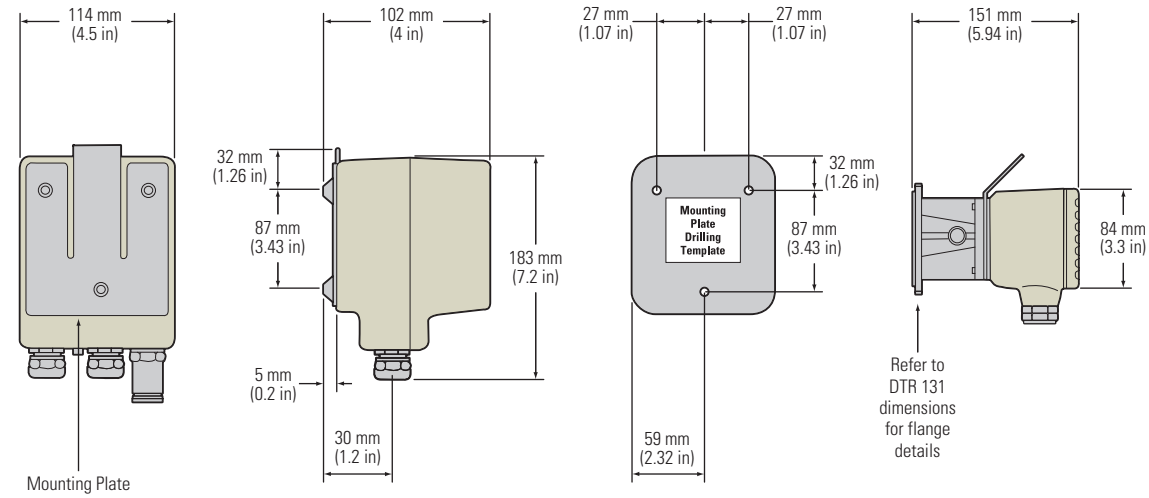
DTR Monitoring Air Flow from Bag Filter



Ramsey Granuflow DTR 131 Flow/No-Flow Detector Dimensions



Ramsey Granuflow DTR 231 Flow/No-Flow Detector Dimensions



Typical Industry Applications

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

Thermo Scientific Ramsey Granuflow DTR 131 and DTR 231

General Specifications	
Housing	Cast aluminum
Protection	DTR 131: NEMA-4 (IP65) DTR 231: NEMA-4 (IP54)
Ambient Temperature	-40°C to +60°C (-40°F to +140°F)
Maximum Temperature at Sensor Horn Surface	+80°C (+175°F)
Weight	DTR 131: Approximately 2 kg (4.5 lb) DTR 231: Transducer: approximately 0.8 kg (1.8 lb); Transmitter: approximately 1.9 kg (4.2 lb)
Maximum Operating Pressure	15 PSI (1 bar)
Power Supply Options	115 VAC or 230 VAC, 50/60 Hz, jumper selectable, optional 24VDC
Power Supply Tolerance	15% - 10%
Operating Frequency (microwaves)	24.124 GHz
Detection Range	0 m - 1.5 m (0 ft - 5 ft) depending on application
Relay Output/Contact Rating	Max. 250 V; Max. 4 A; Max. 500 VA (AC); Max. 100 W (DC), 1 SPDT
Switching Delay	On or Off delay (selectable); Switching delay adjustable between one and ten seconds
Transducer Mounting	Special slotted aluminum flange mates with standard 1.5-in 150-lb ANSI flange, or trunnion mount
Approvals/Certification	Dust-ignition-proof Class II, Div. 1, Groups E-G, for outdoor locations; Certified to FCC-15F; Model DTR 131 cCSAus approved for non-hazardous areas
Options	HF-permeable window with flange to maximum pressure of 230 PSI; Maximum temperature of +288°C (+550°F); Mounting bracket with window or standalone; Pipe standoff with mounting flange (45° or 90°)
Manufacturing Quality	ISO-9001 Certified

Note: For vessel wall temperatures exceeding +60°C (+140°F), contact factory for planning instructions.

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