

Accurate Feeding of Dry Bulk Materials

Thermo

ELECTRON CORPORATION



Loss-In-Weight & Volumetric Feeders

Thermo Ramsey's Volumetric and Loss-In-Weight Feeders

... maintain quality and weighing accuracy, reduce material waste and improve blend consistency for increased profits.

Introduction

The accurate feeding of a dry bulk material is often critical to maintaining product quality. A feeder that weighs accurately and reliably can reduce material waste, improve blend consistency, and increase profits. Thermo Ramsey's Loss-In-Weight and Volumetric feeding systems accurately control the flow of powders, pellets, flakes and granules to critical processes. Volumetric feeding accuracies of $\pm 1-2\%$ are characteristic, depending on the material and application. Thermo Ramsey incorporates the standard, low capacity and sanitary versions of our volumetric feeders into a complete gravimetric feeding system, providing higher accuracies (typical $\pm 0.25\%$ to 1%) and more reliable process control over volumetric feeding systems.

Thermo Ramsey Standard Modular Volumetric Feeder

Volumetric feeders are utilized in bulk material feeding applications when the feed rate and total weight measurements are not necessary and accuracy requirements of $\pm 1-2\%$ are permissible. Volumetric adjustments are accomplished through the use of an open loop variable speed control, which can be operated either locally or remotely. Thermo Ramsey works closely with customers to ensure that each system meets their expectations for performance and reliability, whether the application is handling pellets, flakes, powders or fibers.

Standard Modular Volumetric Feeder

Thermo Ramsey's standard modular volumetric feeder is available in six sizes and provides accurate feeding up to 600 ft^3 per hour. The unit's design affords the ability of handling a broad range of bulk solid materials with various characteristics and may be equipped with an integral, free-flowing hopper, as shown, or an optional dust containment trough cover for use directly beneath a bulk material storage bin.

The modular design of the volumetric feeder permits selection of the most economical design required for a specific application with the unparalleled ability to upgrade the design as materials and characteristics change. Various customer options may be added to allow the unit to adapt to a broad range of feeding applications and materials:

- A standard feeder with static hopper, trough and feed screw for free-flowing materials.
- An agitator conditioner feeder with a secondary trough conditioning screw for semi-flowing materials.
- A vibrated feeder using controlled vibration for non-free-flowing materials.

Note: See size chart and specifications on back cover.

Thermo Ramsey Low Capacity Volumetric Feeder

Thermo Ramsey's Low Capacity Volumetric Feeder is available in five sizes with $1/4"$ to $3/4"$ diameter screws that provide accurate feeding at rates less than 1 ft^3 per hour. The unit's design addresses the issues associated with accurate, low-volume feeding, such as bridging, material build-up and stagnation. Its simple design, rugged construction and compact size make it readily adaptable to existing process lines.

Note: See size chart and specifications on back cover.

Thermo Ramsey Sanitary Volumetric Feeder

Both the Standard and Low Capacity models are available in sanitary construction for use in USDA, FDA and other controlled applications requiring quick disassembly, cleaning and re-assembly between uses. Utilizing quick release, hand-operated clamps and nuts, the units can be cleaned promptly.

Specifications:

Materials of Construction: Contact surfaces- 304 stainless steel (316 stainless steel, optional). Non-contact surfaces- mild steel. White, food grade painted exterior surfaces. Gasket material- white Nordel (food grade).

Sanitary Construction: All internal welds are continuous and ground smooth; internal surfaces polished to #4 finish. External stainless steel surfaces glass are bead blasted to a uniform finish. Quick release handles for quick disassembly for cleaning contact surfaces. Self cleaning trough.

Specifications on the sizes, drives, feed tube & screw, optional features and overall dimensions are the same as the standard and low capacity versions.

Conditioning screw only available when self-cleaning trough is not used.

Standard Loss-In-Weight Feeder



Thermo Ramsey Loss-In-Weight Feeder

Theory of Operation

The Continuous Loss-In-Weight principle involves weighing the entire feeding system (hopper, feeder, and bulk material) by means of a static-type scale system, and controlling the discharge feed rate of the bulk material by means of a variable speed motor.

Material is discharged from the system, via screw or vibratory tube or tray, with the measured "loss in weight" per unit time (dv/dt) compared to the desired (set) feed rate. The difference between the actual (measured) rate and the desired (set) rate produce a corrective action by the feed rate controller (Micro-Tech 2104), which automatically adjusts the feeder speed, thus maintaining accurate feed rates with no process lag.

When the measured weight in the hopper reaches the hopper low (refill) level, the controller affixes the feed system into volumetric control. The hopper is then quickly recharged (manually or automatically), and the Loss-In-Weight control action repeats.

In a Batch Loss-In-Weight System, the design is similar to a Continuous Loss-In-Weight System. However, the accuracy of the final weight at the end of the feed (batch) cycle is typically more critical than the actual feed rate control.

The Micro-Tech 2104 Controller accomplishes this by providing a high feed rate signal to the variable speed drive for quick filling and then switching to a low feed rate control signal for precise, fine control at the end of the batch.

Advantages of Loss-In-Weight Feeding

- Handles hot, floodable and difficult materials.
- Unaffected by dust and material accumulation.
- Well-suited for low feed rate applications.

Sanitary Volumetric Feeder



- Entire system is weighed. No errors from belt tensioning or tracking.
- No transportation lag time exists, which ensures precision second-to-second accuracy.
- Feed accuracy can always be checked during normal operation without the need for sampling.

Micro-Tech 2104 Loss-In-Weight Feeder Controller

Thermo Ramsey's Micro-Tech 2000 Electronics

The Micro-Tech 2104 Loss-In-Weight Controller is specifically designed for continuous or batch Loss-In-Weight or Gain-In-Weight applications. The Micro-Tech 2104 provides easy operation and calibration with large easy-to-read displays, straight forward, tactile-touch keyboards and software that prompts you step-by-step through the proper set-up and operational procedures.

The Micro-Tech 2104 is capable of operating two independent Loss-In-Weight systems, thus providing a cost savings. It is also available in a UL approved version.

Thermo Ramsey offers a full line of microprocessor-based electronics for many types of weighing applications. The Micro-Tech 2104 Loss-In-Weight Feeder Controller is one model in a family of electronics that offers the customer the security of a common operator platform. This benefit provides the operator the confidence and knowledge of interfacing with a variety of weighing equipment electronics, because all of Thermo Ramsey's electronics operate with the same format.

Micro-Tech 2104 Advantages

- Common Operator Interface for set-up and calibration reduces operator training.
- Digital electronics provide accurate, drift-free performance.
- Auto-Zero automatically computes and installs a new zero.
- Auto-Span automatically computes and installs a new span based on electronic calibration, static weights or material load.
- Numerous programmable features let the user customize the electronics to fit their individual needs.
- Communication and field bus capabilities include Allen-Bradley Remote I/O (Blue Hose), Siemens Profibus-DP, Device Net, Allen Bradley DFI, Modbus and Siemens 3964.
- Multi-level password protection provides varying levels of security for operator access.
- LED's provide visual indication of control status: Remote control, Automatic control, Alarm, Batch, and Ready.
- Refill capabilities include automatically adjusting the volumetric constants according to the net weight. Therefore, if the density of the material is significantly different between a high level hopper and a low level hopper, affecting the flow rate, the controller will automatically adjust the output at the end of the refill cycle.
- Batch capabilities allow the user to control flow rate and required quantity, and switch to a lower rate set point for a fine batching end.



Micro-Tech 2104 Field Mount



Micro-Tech 2104 Panel Mount

Service

When you invest in Thermo Ramsey, you're not only buying our products, you're buying our commitment to service. Our pledge is to work with you, the customer, to continuously apply new technology and offer real solutions to your specific needs.

We will work with you to answer your application requirement and service questions, to service your equipment, and to support and assist you every step of the way. No matter what your location, no matter what your need, you can count on Thermo Ramsey's service.

Our service and fast parts turnaround time are just two of the things that set Thermo Ramsey apart.

Thermo Ramsey Volumetric Feeder

Standard Sizes 1" to 6"

Maximum Feed Rate				
Dimensions in INCHES (MM)		(NOTE: TYPICAL TURNDOWN IS 20:1)		
SCREW DIA.	A	B	FT ³ /HR	M ³ /HR
1 (25)	1-1/2 (38)	8-1/4 (210)	2.8	0.1
1-1/2 (38)	2 (51)	8-1/4 (210)	8.8	0.2
2 (51)	2-1/2 (63)	8-1/4 (210)	23.0	0.6
3 (76)	3-1/2 (89)	14 (356)	74.0	2.0
4 (102)	4-1/2 (114)	14 (356)	200.0	6.0
6 (152)	6-5/8 (168)	18 (457)	600.0	17.0

To determine LBS/HR feed rate multiply the FT³/HR x lbs/FT³ (bulk density).

STANDARD VOLUMETRIC FEEDER SPECIFICATIONS

Sizes (inches): 1, 1-1/2, 2, 3, 4 and 6

Materials of Construction: Contact surfaces available in carbon steel, 304 stainless steel and 316 stainless steel. Non-contact surfaces: carbon steel, painted exterior surfaces.

Drive: Sizes 1, 1-1/2 and 2 inches - DC-SCR controlled, 1/2 hp, TENV motor enclosure, supply 120v, 1 phase, 60 Hz, NEMA-12 controls enclosure.

Sizes 3 and 4 inches - DC-SCR controlled, 3/4 hp, TENV motor enclosure, supply 230v, 1 phase, 60 Hz, NEMA-12 controls enclosure.

Size 6 inches - DC-SCR controlled, 1 hp, TENV motor enclosure, supply 230v, 1 phase, 60 Hz, NEMA-12 controls enclosure.

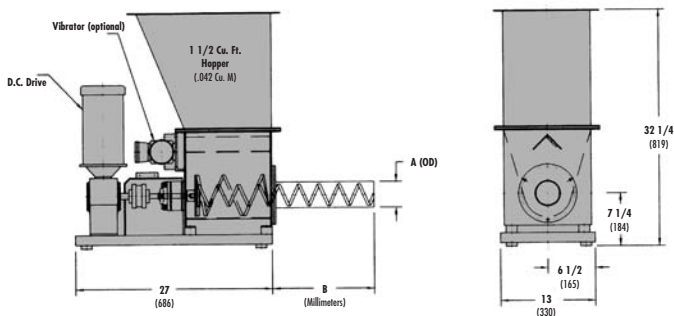
Feed Tube and Screw: Straight, horizontal/end discharge - downspout, vertical discharge with or without end bearing, optional. Wire screw or flighted screw.

Supply Hopper: Hoppers available as an extension of the feed trough, 1-1 1/2 ft³ through 15 ft³.

Optional Features/Equipment:

- Vibrator on feed trough.
- Conditioning screw in feed trough (4" conditioning screw for 1" and 2" sizes; 6" conditioning screw for 3" and 4" sizes).
- Hopper cover with inlet opening and vent.

Overall Dimensions: See diagram.



Thermo Ramsey Low Capacity Volumetric Feeder

Standard Sizes 1/4" to 3/4"

Maximum Feed Rate			
Dimensions in INCHES (MM)		(NOTE: TYPICAL TURNDOWN IS 20:1)	
SCREW DIA.	A	FT ³ /HR	M ³ /HR
1/4 (6)	3/8 (10)	.037	.001
3/8 (10)	5/8 (16)	.10	.003
1/2 (13)	3/4 (19)	.24	.007
5/8 (16)	7/8 (22)	.52	.01
3/4 (19)	1.050 (26)	1.0	.03

To determine LBS/HR feed rate multiply the FT³/HR x lbs/FT³ (bulk density).

LOW CAPACITY VOLUMETRIC FEEDER SPECIFICATIONS

Sizes (inches): 1/4, 3/8, 1/2, 5/8, and 3/4

Materials of Construction: Contact surfaces available in carbon steel, 304 stainless steel and 316 stainless steel. Non-contact surfaces: carbon steel, painted exterior surfaces.

Drive: DC-SCR controlled, 1/3 hp, TENV motor enclosure, supply 120 volt, 1 phase, 60 hertz, NEMA-12 controls enclosure.

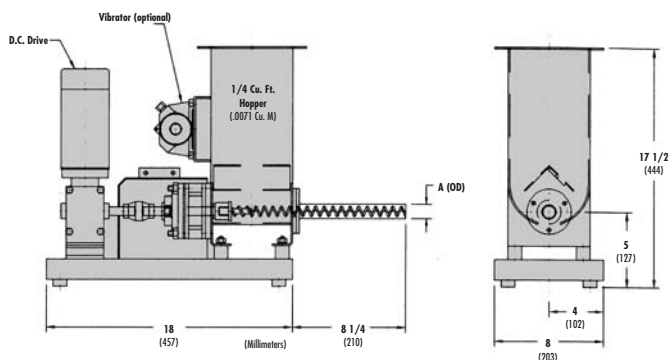
Feed Tube and Screw: Straight, horizontal/end discharge - downspout, vertical discharge with or without end bearing, optional. Wire screw.

Supply Hopper: Integral with feed trough. Volume 3/4ft³ (nominal).

Optional Features/Equipment:

- Vibrator on hopper/feed trough.
- Hopper cover with inlet opening and vent.

Overall Dimensions: See diagram.



Thermo

ELECTRON CORPORATION

501 90th Avenue N.W.

Minneapolis, MN 55433

TEL: (763) 783-2500 • FAX: (763) 783-2525

http://www.thermo.com

Thermo Companies in:

Australia	Italy	South Africa
Canada	Mexico	The Netherlands
Germany	Spain	United Kingdom



Certificate No. CERT-88174-2001-AQ-HOU-RA/RAB