



Model LWF-LC-V-30 with Rotary Feeder



Model LWF-LC-V-20 with Vibratory Feeder



Model LWF-SC-TS-8 with Twin Screw Feeder



Model LWF-15-V with Vibratory Feeder and hopper SPIRALATOR ™



Model LWF-LC-S-Batch Feeder/ Tote Unloader



Model LWF-SC-V-6 with Vibratory Feeder and hopper SPIRALATOR [™]



Model LWF-SG10-V-2 with Vibratory Feeder and Refill System



Model PF-LC-S-25 with Screw Feeder, Sanitary Design



Cascade Blender with Model LWF-SC-V-10 with Vibratory Feeder and Model MWF-OS Weigh Belt



Model PF-18L-V-20 with Screw Feeder



Model LWF-SG10-TS-2 with Twin Screw Feeder











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THAYER SCALE CONTINUOUS WEIGHING and FEEDING OF DRY BULK MATERIAILS

LOSS-IN-WEIGHT FEEDERS

10 100





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Thayer Scale Loss-In-Weight Feeders are designed to provide precision class accuracy and repeatability even in the harshest of industrial environments. They range in capacity from grams per minute to tons per hour.

These are the most versatile feeders in the industry. At the heart of each Loss-In-Weight Feeder is a THAYER scale that has been designed exclusively for the stringent requirements of Loss-In-Weight feeding.

Thayer Scale offers a powerful set of proprietary add-on accessories that are designed to defeat the problematic flow issues encountered by industry such as bridging, flushing, adhesion and cohesion. Comprehensive process solutions that can only come from a company with over fifty years experience.

TWO TYPES OF SCALES TO CHOOSE FROM:

"FMSS" CABLE SUSPENSION SYSTEM

and forgiving Force Measurement Weighing System available on pivots and knife edges and is not susceptible to vibration. Flexure today's market. It can take more physical abuse and can tolerate more suspension system transfers all loading forces to a single load foundation distortion/deflection than all other known designs.

System) design provides extremely high sensitivity. Feeder and weigh by the movement of the feed screw, agitator, etc. These factors can hopper "dead load" are mass-counterbalanced so that only material cause poor accuracy and poor calibration stability. Thaver's flexure weight (live load) is measured. This feature helps assure excellent system cancels all horizontal force vectors and also allows heavy control in "noisy" environments.

All of the articulate parts of the scale mechanism are supported from gross weight. "axially inextensible, but laterally yieldable" suspension elements (stainless steel pre-stressed aircraft cable), which are arranged to hang freely, thereby avoiding any appreciable spring or hysteresis effect, variation in mechanical advantage, or binding due to imperfect

Because of this unique mechanical property of the force transmission system, any laterally directed forces and shock on the scale or its supported feeder can not cause destructive shear and bending stresses to develop in the elements themselves or at the load cell junction. The system, being yieldable in the lateral direction, is therefore effectively and completely protected by using laterally placed "stops" in proximity of the weighed structure.

Weight loss measurement is done by either Thayer's LC-137 LVDT Load Cell or NTEP approved strain gauge load cell depending on application requiremen



More and more weigh feeders are being used in conjunction with statistical process control where performance records are routinely generated and delivered with the product as required by a customer's guality assurance program. Such a record should contain a "validation of scale calibration" step to be truly meaningful as a quality assurance tool. Thayer Scale's Automated Test Weight Lifter ("ATWL") provides

a means for automatically applying a known test load and going through a calibration sequence on computer or pushbutton command to check scale calibration. A "foolproof" self-checking software algorithm in the feeder control instrumentation prevents erroneous calibration.

The test weight calibration method has proven accurate and reliable over decades of in-plant use. Unlike material sampling, it is always clean, fast and safe and free from human error. Unlike electronic signal simulation, if mechanically tests the performance of critical electromechanical components under the full deflection range of the load cell

"FMSS" FLEXURE PLATE SYSTEM

The THAYER Cable Suspension System (patented) is the most rugged Flexure plate system eliminates all wearing parts, such as bearings, transducer, which accurately measures load regardless of load position. Most platform scales are not designed to be immune to side The exclusive Thayer Scale "FMSS" (Force Measurement Suspension loading and/or tortional loading caused by the plant environment and tare loads (weight of feeder and hopper) to be completely mass counterbalanced, permitting load cell sizing based on net rather than



- Accurately measures load regardless of load position.
- Immune to support structure deflections and process vibrations.
- Inherently self aligning to gravity.
- Nulls out heavy tare loads.
- 1.000% over load capacity.
- Scale may be suspended from above or supported below.
- Immune to shock or impact loads.

Easily accessible load cell can be accessed without removing the feeder.



Two Types Load Cells to Choose From THAYER LVDT Load Cell

The LVDT Load Cell was specifically developed as the ideal adjunct to THAYER'S "reverse-action" Force Measurement Suspension System. It is essentially a precision and extremely durable "tensionstyle" force transducer that is manufactured in a fine series of force ranges to produce scale capacities from 10 to 500 lbs depending on the application. The LVDT is the ideal load cell for "light loading" applications where mechanical tare loads represent as much as 10 to 40 times the net material load and provides unparalleled overload protection at 1000% of rated output.

THAYER Strain Gauge Load Cell

The Strain Gauge Load Cell is available in force ranges from 25 to 500 lbs with an overload protection of 300% of rated output.

	THAYER MODEL NO.		APPROX. FEED RATE RANGE		SCALE CA (POUN	SCALE CAPACITY (POUNDS)		WEIGH HOPPER EXTENSION CAPACITY		SCALE SUSPENSION	LOAD CELL	ATWL	TYPICAL MATERIALS HANDLED	
			MIN. MAX.		MIN. MAX.		LIQUID USABLE		DIA. (IN)	TYPE	TYPE	CAPABLE		
		MSF-15L-S	0.25	60	3	25	3	2.4	0.375 0.5 0.625 1.0	FLEXURE	SG LVDT	NO	CANDLE WAX, RICE POWDER, SALT, FLOUR, LITHIUM ION POWDER, GROUND BIOMASS, VITAMIN ADDITIVE, SEASONING	
	-	PFM-15L-S	20	1,250	10	200	1.0 3.0 5.52 7.5 9.75	0.8 2.4 4.42 6.0 7.8	1.0 1.5 2.0	FLEXURE	SG LVDT	NO	GRAPHITE POWDER, ZINC OXIDE, KAOLIN CLAY, GUAR GUM, PLASTIC ADDITIVE, QUICK LIME, PIGMENT, COPPER POWDER, RUBBER GRANULES, TSP, WHEY POWDER	
		PFM-18L-S	20	1,250	10	500	1.0 3.0 5.52 7.5 9.75	0.8 2.4 4.42 6.0 7.8	1.0 1.5 2.0	FLEXURE	SG LVDT	NO	TRONA ORE, MICROCELL E, POWDERED MILK ADDITIVE, CALCIUM CARBONATE, SALT, SPICE, ADDITIVE POWDERS, TIO2, STEARATE, BORAX	
		PF-18L-S	20	7,500	10	500	1.0 3.0 5.52 7.5 9.75	0.8 2.4 4.42 6.0 7.8	1.0 1.5 2.0 3.0 4.0 6.0	FLEXURE	SG LVDT	NO	COCOA POWDER, FLOUR, RICE, IMPACT MODIFIER, PP PELLETS, CRUMB RUBBER, SUGAR, ADVAWAX, CALCIUM STEARATE, ALMONDS, TOFFEE CHIPS	
		MSF-MC-S	0.50	900	5	250	1.0 3.0	1.8 3.6 5.4 7.2	0.375 0.5 0.625 1.0	CABLE	SG LVDT	YES	SPICES, SEASONING ADDITIVE, CANDLE WAX BEADS, CALCIUM CARBONATE, VITAMIN POWDER, GRAPHITE POWDER	
		PFM-SC-S	20	1,250	30	500	1.2 3.0 5.25 7.5 9.75	0.96 2.4	1.0 1.5 2.0	CABLE	SG LVDT	YES	CLAY, POLYETHYLENE PELLETS, LIMESTONE, PIGMENTS, IRON OXIDE, ZINC BORATE, ZINC OXIDE, OSB RESIN, QUICK LIME, STARCH, FLUORSPAR, ZEOLITE	
		PF-SC-S	20	7.500	30	500	3.375 4.5 6.75 9.0 10.0 11.25 15.0 5.73 9.83 11.83 13.83 15.83	2.7 3.6 5.4 7.2 8.0 9.0 12.0 4.58 7.86 9.46 11.06 12.66	1.0 1.5 2.0 3.0 4.0 6.0	CABLE	SG LVDT	YES	PULVERIZED LIMESTONE, AMMONIUM BICARBONATE, SODA ASH, EAF DUST, OAT FLAKES, PLASTIC RESIN, TALC, RUBBER, MICA, VITAMIN POWDER, BRAN, CALCIUM CARBONATE, ZINC OXIDE, PLASTIC STABILIZER, PULVERIZED COAL	
		PF-LC-S	100		250	2,200	$5.73 \\ 9.83 \\ 11.83 \\ 13.83 \\ 15.83 \\ 20.0 \\ 30.0 \\ 40.0 \\ 50.0 \\ 60.0 \\ 60.0 \\ 11.8 \\ 12.8$	4.58 7.86 9.46 11.06 12.66 16.0 24.0 32.0 40.0 48.0	3.0 4.0 6.0	CABLE	SG LVDT	YES	PLASTIC PELLETS, AGRICULTURAL CHEMICALS, CEMENT, GYPSUM, SNACK FOOD MIX, DOG FOOD PREMIX., COCOA POWDER TIO2, CHROMATE ORE, SODA ASH, CALCIUM OXIDE, TALC	

LOSS-IN-WEIGHT SCREW FEEDERS

• Patented "U-Trough" feed chamber with independently driven agitator assures precise, reliable delivery of material to the feed screw. • Eliminates material build-up, controls material aeration and delivers a steady and constant flow of material.

Trough is designed for fast, easy, and thorough clean out. Feeder completely disassembles in less than one minute. High guality, rugged, stainless steel construction assures years of reliable, trouble free operation.



The totally unique THAYER process screw has many innovative concepts. The most obvious of these is the hex shaped, eccentric cam locking, quick release screw drive shaft assembly. This allows for hassle free "no tools" screw

A more subtle but equally important concept is the shaft seal and how it is integrated into the process screw for ease of maintenance. With this shaft seal design the normal wear items (namely the seals) are mounted on and removed with the quick release process screw. They can then be easily cleaned, inspected or replaced without tools or additional disassembly

The process screw is designed so that the seals do not turn with the screw, rather the screw has a special adapter mounted on it which acts as a seal gland surface. This adapter rotates with the screw and runs on the inside diameter of the non-rotating seals.

In normal service the seals are the only wear items, however if abnormal screw damage has occurred, the process screw can be disassembled. This feature allows the drive shaft assembly to be removed from a damaged screw and reused on the replacement screw. Also the rotating adapter and drive key can be reused or replaced in the field with a minimum amount of down time.

Seal construction is carbon fiber (graphite) reinforced PTFE with a 302 stainless steel canted-coil energizing spring

The process screw has a round stub shaft which the adapter slides over prior to inserting into the mating hole in the screw drive shaft. This assembly along with the drive key is pinned together. This design allows for component replacement in the field. If required, the screw can be disassembled from the screw drive shaft assembly by driving the pin out. Once completed the drive shaft assembly and adapter can be withdrawn off the round stub portion of the

If the screw becomes jammed the spring pin will shear and protect the screw, reducer and drive motor.

LOSS-IN-WEIGHT VIBRATORY FEEDERS

THAYER MODEL No.		APPRO RATE F (lbs	X. FEED RANGE s/hr)	SC CAP (POL	ALE ACITY JNDS)	HOPPER CAPACITY (FT ³)	AVAILABLE TRAYS		SCALE			TYPICAL
		MIN.	MAX.	MIN.	MAX.	МАХ	WIDTH (INCHES)	LENGTH (INCHES)	SUSPENSION TYPE	LOAD CELL	ATWL CAPABLE	MATERIALS HANDLED
	LWF-SG-10V	0.1	20	3	25	0.5	1.75 4.0 5.0	12 20 20	FLEXURE	SG LVDT	NO	VITAMIN ADDITIVE, SEASONING, TALC POWDER, RESIN, PIGMENTS, GRASS SEEDS, SALT
	LWF-15L-V	10	750	10	200	3.0	4.0 5.0	20 20	FLEXURE	SG LVDT	NO	ZINC STEARATE, GRAPHITE POWDER, ZINC OXIDE, KAOLIN CLAY, CORN STARCH, CARBON BLACK, POLYPROPYLENE STRAND, PE POWDER, TOBACCO SEEDS
V	LWF-18L-V 10 3,000 10 500 6.0		6.0	4.0 5.0 7.0	20 20 21	FLEXURE	SG LVDT	NO	ADDITIVE POWDERS, CITRATE ACID, POWDERED METAL, FLOUR, TRISODIUM PHOSPHATE, IRGONOX, POLYETHYLENE POWDER, RICE			
	LWF-MC-V	10	3,000	10	500	3.0	4.0 5.0	20 20	FLEXURE	SG LVDT	YES	CALCIUM STEARATE, ALMONDS, CEREAL, SAND, PREMIX MASTERBATCH, CHOCOLATE CHUNKS, SCRAP FIBERGLASS, CHARCOAL, LLDPE
	LWF-SC-V	10	4,000	30	500	20	4.0 5.0 7.0	20 20 21	CABLE	SG LVDT	YES	SPICES, SEASONING, CALCIUM CARBONATE, CRUMB RUBBER, SODIUM BICARBONATE, IRON POWDER, PE RESIN, NYLON PELLETS
	LWF-LC-V	100	7,000	250	2,500	75	10 12 CUSTOM	CUSTOM	CABLE	SG LVDT	YES	LIMESTONE, RESIN, PIGMENTS, FREEZE DRIED STRAWBERRIES, FIBERGLASS, GRANULATED GYPSUM,OXIDE PELLETS,
	LWF-HC-V	CON FAC1	SULT FORY	400	4,000	CONSULT FACTORY CUSTOM	CUSTOM	CUSTOM	CABLE	SG LVDT	YES	GLASS CULLET, COKE BREEZE, ANTHRACITE COAL, PULVERIZED LIMESTONE, SODAASH, EAF DUST, OAT FLAKES, PLASTIC RESIN, TALC, RUBBER, PULVERIZED COAL

THAYER SCALE Loss-In-Weight Vibratory Feeders Special Features and Benefits

Thayer Scale has spent many years developing the Loss-In-Weight Feeder and control system for use with vibratory feeders. Since virtually all of the controllers on the market were originally designed for use with a screw feeder, it should not be surprising to find that very few of them have the versatility to cope with the special requirements of the vibratory feeder type. Without (certain) special control features, the vibratory feeder can not be controlled effectively in a volumetric mode, nor can it be controlled gravimetrically over a wide operating range without making controller adjustments to suit its non-linear characteristics.

With complete absence of motors, bearings, seals and lubricating fluids, along with the un-contested pulse free delivery "smoothness" at maximum turn down, the vibratory feeder has powerful advantages over the screw feeder in a great number of applications.

Some important differences that need to be taken into account in controlling these two fundamentally different volumetric feed devices are:

1. The gain of a screw feeder is constant over its operating range. That is the increments of change in feed output for a given change in drive input is constant throughout its range. The "gain" of a vibratory feeder increases exponentially with its operating point. That is, the increment of change in feed output becomes larger for a given change in drive input as the operating point increases. The consequence of this is overall gain of the control loop is lower in the low operating ranges and higher in the high operating ranges. If something is not provided to compensate for this effect, the controller gain needs to be adjusted if the set point is changed any significant amount.

2. The "volumetric" delivery of a screw feeder stays relatively constant under a constant drive input (such as during hopper refill). Under conditions of a constant drive input, the "volumetric" delivery is relatively independent of material's bulk density. Variation in its "gravimetric" delivery under constant drive input is essentially determined by density changes of the material handled at the time.

3. The "volumetric" delivery of a vibratory feeder stays relatively constant providing the vibration amplitude is held consistent (frequency assumed constant @ 60 hz). However, for the vibration amplitude to hold constant, the drive input must be increased or decreased to offset the loading effect on the tray

4. A screw feeder can accept a refill with less material "heel" (the minimum quantity of material that is always maintained over the feeder inlet) than a vibratory feeder can, since the flights of a screw within the feed tube offers greater resistance to "flushing' than does an open channel tray.

5. The magnetic-drive of a vibratory feeder is capable of rapidly responding to changes in controller output signal. A gear-motor drive system for a screw feeder, and the screw itself, represents considerable angular "inertia" which simply can not be made to respond quickly to demand changes.

SPIRAL ATOR™

Enjoy the benefits of using a simple and reliable vibratory feeder on non-floodable materials that normally can

be reliably discharged through the small opening of a conical hopper. The benefits of using a vibratory feeder in place of a screw feeder include: higher turn-down, pulsation-free discharge, cleaning ability, and elimination of troublesome seals and bearings.

The SPIRALATOR[™] is a slowly rotating, nonagitating, conical wire-spiral within the hopper which counteracts the material's tendency to pack under its own weight by virtue of its "lifting" action throughout the stored material. The resulting reduction in consolidation pressures throughout the material mass assures that the stored material will not develop sufficient strength to form stable arches that can cause erratic flow or complete flow stoppage. The combination of the unique material conditioning system and a vibrating pan feeder assures that the material will be handled reliably and gently throughout the entire feeding range.

Key Features of the THAYER Loss-In-Weight Controller That Addresses "Vibratory Feeder" Control Issues

"OCMP" (Controller Output Compensation). This is a vibratory feeder gain compensation control block that can be programmed into the control loop between the controller output stage and the drive input stage. It represents a "characteristic" equation that permits a single controller gain setup to operate over a wide range (typically 50:1 but can go as high as 100:1) with most vibratory feeders.

"EFT" Excitation Tracking. A transducer physically nounted to the vibratory tray is used in conjunction with specialized circuitry to control and monitor the amplitude of the vibratory tray. During gravimetric control cycles, amplitude readings and weight readings are combined in time adjustable averaging registers for purposes of continually updating a density" register. Thus, when a volumetric feed cycle is called for during refill, the transducer signal and the density factor are combined to provide a dynamic weight-rate signal in the control loop in place of the normal scale-derived value. Thus "closed loop" control is never discontinued, and the feeder is always responsive to changing set points. Should head pressure on the vibrating tray begin to load down its amplitude, the controller automatically responds immediately with a compensatory output change.

his parameter, which has a direct effect on the system's front-end damping, and thus its "measurement dead time". establishes a limit on how high the controller gain can be set without experiencing bothersome control oscillation. The combination of less front-end damping along with the higher degree of responsiveness of a magnetic drive unit (over a motor drive) reduces the overall loop time-constant dramatically making the vibratory Loss-In-Weight Feeder an excellent choice where process demand changes may occur abruptly.

NODAL MEMBRANE VIBRATORY TRAY INSERT

This patented feeder meters material on an elastic membrane feed trav that responds uniquely to the action of the magnetic vibratory drive. A transverse multiple node standing wave is produced in the membrane that serves to discourage any adherence of material to its surface. The cross-sectional shape of the membrane is made up of multiple distinct curves which alternate between convexity and concavity so as to produce corresponding tensile and compressive surface strains in the elastomer. It is amplified and reversible surface "straining" (stretching and compressing) that creates the self- shedding action. The feeder is frequently supplied in combination with the Spiralator[™] agitator for sluggish powders.



GRAVIMETRIC MODE

In the gravimetric mode THAYER'S controller samples the signal from the load cell up to 16 times a second measuring the rate at which you are losing weight from the hopper/scale. The controller then adjusts the screw speed to maintain the desired flow rate (setpoint). During the gravimetric mode of operation the controller monitors the material flow rate, motor speed input from the tachometer and the length of time set in the Density Sample Time program parameter to continuously calculate the gravimetric constant. The gravimetric constant is used to maintain a constant flow rate during the volumetric mode of operation.

VOLUMETRIC MODE

In the volumetric mode the controller will adjust the motor speed signal to the discharge screw motor to maintain a constant motor speed based on the tachometer signal. The desired motor speed during volumetric is based on the gravimetric constant and the current setpoint

The LWF will automatically go into the refill mode while running in the gravimetric mode when the hopper level reaches the Start Refill Point program parameter. In the refill mode the controller is running in volumetric mode with the refill output turned on. The controller will stay in the refill mode until the hopper weight reaches the Stop Refill Point program parameter or if the time set in the Abort Fill time program parameter has elapsed, typically 40 seconds. After the refill mode the controller will automatically go into the settle mode, volumetric mode with the refill output turned off. The controller will stay in the settle mode until the length of time in the Fill Settle program parameter has elapsed, typically 10 seconds. The fill settle time is the length of time it will take to completely stop the material flow into the LWF hopper, allow all of the material to fall and allow the scale to settle from the impact of material coming into the hopper. After the Settle mode the controller will automatically go back to the gravimetric mode.

EFILL SYSTEM

The refill system should deliver at least 50% of the Loss-In-Weight Feeders hopper loading in less than 20 seconds. If you are using a valve it must be fast acting and the material flow from the supply hopper into the Loss-In-Weight hopper must be free flowing. If you are using an auger, rotary valve or other delivery device it must be fast acting and properly sized. The refill valve or device must be located near the inlet (within 3 ft.) to allow for prompt cutoff of material flow when the system has been satisfied. The refill system must also provide a positive shutoff of material flow when closed or stopped and isolate the Loss-In-Weight hopper from any pressure differential that may be present in the supply hopper system.

LOSS-IN-WEIGHT ALGORITHYN

_____ SENSED WEIGHT

ACTUAL FEED RATE AROUND SET POIN

Weight at Refill Completion 🔴

Weight at Refill Request

