Littleford

mixers and mixing systems



Littleford mixers and mixing systems

Mixing Technology

At Littleford Day, mixer design is based on a thorough knowledge and understanding of processing requirements within the industries we serve which include chemical, plastics, pharmaceutical, food, cosmetic, forest products, to name a few.

Littleford Day has designed and engineered an advanced line of mixers and mixing systems that combine degrees of speed, precision, efficiency and versatility not previously obtainable in a single mixing unit. Whether for batch or continuous material processing, Littleford equipment enables the user to have complete analytical control over the mixing operation, eliminating guesswork in preparing your products and formulations.

The key to success in Littleford mixers is the unique action created by the movement of the





Optional high-speed blending choppers, available on FM/FKM/KM Series mixers, enhance mixing action by controlling particle size and trace ingredient dispersion . . . usually without the need for additional process steps and equipment.

Littleford FKM Series Batch Mixers

FKM Series batch mixers are widely used throughout the process industries for product applications that include solids to solids, liquid to solids, and paste or pseudoplastic materials mixing applications.

Littleford offers these mixers in standard sizes from 11 cu. ft./300 liters to 883 cu. ft./25,000 liters.

FKM Mixer Construction

Littleford FKM Series mixers consist of a horizontal mixing cylinder, mixing elements mounted to horizontal main shaft, charging port located on top of mixer, contour access doors at the front of the mixer with electrical limit switches, discharge opening at the bottom of the mixer, mixer base, complete power and drive assembly, processing electrical controls designed to meet the customer's specific requirements.

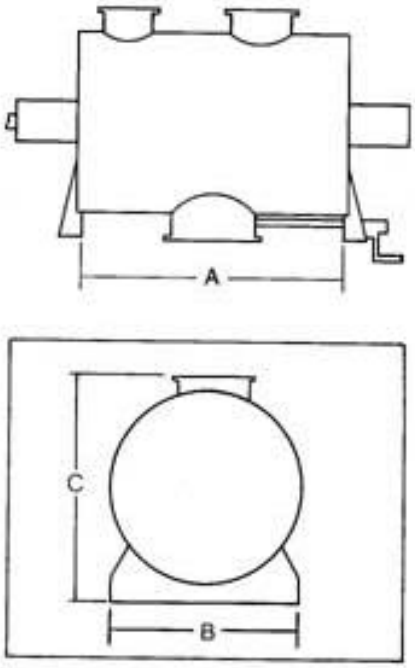
FKM Mixer Operation

The unique mixing action of the Littleford FKM Series mixer is accomplished by a horizontal shaft which revolves at a high rate of speed, rapidly projecting and hurling the mix materials away from the vessel wall into free space — filling the entire vessel. This mixing action causes the materials to crisscross in the direction of the vessel walls and inversely back again, providing a high volume rate of material transfer throughout the entire length

mixing elements that produce intense, but gentle intermingling of the materials of the mix in a mechanically fluidized bed. The mixing elements are arranged at intervals on the mixer shaft and their size, number, arrangement, geometric shape and peripheral speed are designed to force the product into appropriate components of axial and radial motion.

Fluidized Bed Mixing Action — *shown at 1/200 second exposure*





Standard Sizes of FKM Series Mixers

Model No.	TOTAL CAPACITY* Liters	Gallons	Cu. Ft.	APPROX. VESSEL DIMENSIONS A	B	C
FKM-300D	300	79	11	39"	28"	35"
FKM-600D	600	159	22	49"	34"	43"
FKM-1200D	1,200	317	42	98"	34"	43"
FKM-1200E	1,200	317	42	67"	42"	50"
FKM-2000D	2,000	530	71	117"	42"	51"
FKM-2000E	2,000	530	71	79"	50"	60"
FKM-3000D	3,000	792	106	117"	50"	60"
FKM-4200D	4,200	1,109	148	136"	54"	68"
FKM-6000D	6,000	1,584	212	117"	68"	80"
FKM-8000D	8,000	2,113	283	157"	68"	80"
FKM-10000D	10,000	2,642	353	198"	68"	80"
FKM-13500D	13,500	3,555	495	198"	79"	92"
FKM-15000D	15,000	3,960	530	198"	85"	96"
FKM-20000	20,000	5,284	706	198"	95"	107"
FKM-25000	25,000	6,605	883	234"	99"	110"

*Working capacity depends on the process and is normally between 50 and 70% of the total capacity.

NOTE: All dimensions are nominal.

of the vessel. This blending action is the result of the special mixing element shape and speed within the enclosed vessel which transmits energy to the mass of material in the form of particle speed with a minimum impact and subsequent degradation, even with fragile materials.

The mechanically fluidized bed of particles is the basis of Littleford mixing efficiency and accuracy on a full range of materials including combinations with diverse specific gravities as well as other problems such as liquid incorporation and heat transfer.

The FKM Series mixer can be constructed with a variety of openings to facilitate the charging of materials, liquids and other processing aids. Easy access cleanout doors are located on the side of the mixer.

Liquid Addition Option — The Littleford FKM Series mixer is designed to allow for the incorporation of liquids into dry solids during the mix cycle.

Since the basic incorporation of ingredients is largely a function of the agitation rate of the mass, the mechanically fluidized bed action — particularly when combined with the Littleford integral high-speed blending choppers — changes problem applications into simple, normal daily production operations providing controlled agglomeration, quality finished products with a minimum of equipment and handling.

Liquids (or plastic materials) may be introduced with or without installed spray or atomization attachments depending upon the specific application, with the amount of liquid limited only by that quantity which the product will accept while remaining in a free-flowing physical state.

Littleford mixers and mixing systems

Excellent Heat Transfer

The unique mixing action of Littleford equipment described on the previous pages creates a mechanically fluidized bed of particles in constant motion, assuring absolute axial and radial mixing. This action, which exposes tremendous surface area of the mix, results in direct contact between particles, and provides associated momentum and heat transfer between particles, eliminating temperature gradients. As a consequence, heat transfer rates are at the highest obtainable level.

In applications where heat transfer is extremely critical, the jacketed Littleford mixer is one of the most efficient heat transfer vessels available.

Split-Seal Feature

The Littleford Split Seal Assembly meets the needs of the food and

KM-15000D



Littleford KM Series Continuous Mixers

KM Series continuous mixers are primarily used where high volume production is a prerequisite in the processing of dry products, and dry products with liquids in surface coating applications.

Standard sizes are 11 cu. ft./300 liters to 883 cu. ft. /25,000 liters.

KM Mixer Construction

In general, the construction of the KM Series continuous mixer is very similar to the Littleford FKM Series batch mixer. The horizontal cylinder and mixing element shaft move the product from the charging end to the discharge end in a minimum of retention time.

KM Mixer Operation

The Littleford KM Series continuous mixers are charged through a port mounted on the top side of the charging end of the mixer. Typical working level of the product is nominally 50% of total capacity. As in the case of the FKM Series batch mixers, the Littleford advanced mixing elements put the product into three-dimensional motion, resulting in a superior mix achieved during a short retention period. Discharge of product is through an adjustable weir valve at the opposite end of the mixer from where the product was charged. Access doors in the front of the mixer make cleaning and maintenance fast and simple operations.



KM-150D

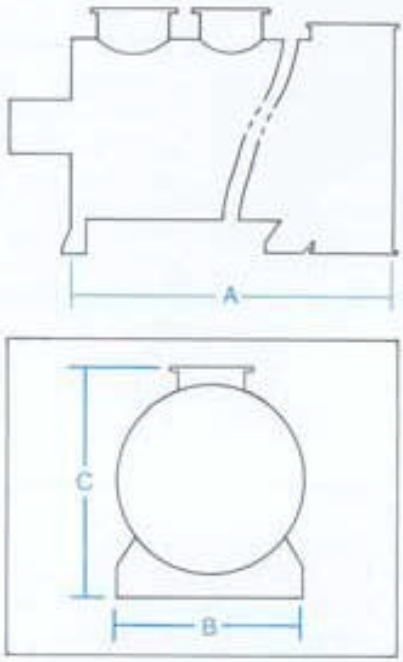
pharmaceutical process industries for an easily cleaned and maintained mixer shaft seal. It is designed to conform to the rigid requirements of the USDA, BISSC and 3-A codes.

The seal can be disassembled, cleaned and reassembled in minutes without the need for special tools, and without disturbing bearings or drive components. This seal can be adapted for vacuum operation if needed.

This packing seal system coupled with the outboard mounted bearings of the mixer virtually eliminate any possibility of cross contamination between the bearings and the mix.

Air Seal Feature

Littleford mixers may easily be fitted with air purge shaft seals for applications that require keeping the product away from the seal area.



Standard Sizes of KM Series Mixers

Model No.	TOTAL CAPACITY* Liters	Gallons	Cu. Ft.	APPROX. VESSEL DIMENSIONS A	B	C
KM-300D	300	79	11	65"	24"	29"
KM-600D	600	159	21	92"	28"	35"
KM-1200D	1,200	317	42	114"	34"	42"
KM-2000D	2,000	530	71	134"	42"	50"
KM-3000D	3,000	792	106	137"	50"	59"
KM-4200D	4,200	1,109	148	159"	54"	66"
KM-6000D	6,000	1,584	212	177"	68"	80"
KM-8000D	8,000	2,113	283	140"	68"	80"
KM-10000D	10,000	2,642	353	224"	68"	80"
KM-13500D	13,500	3,555	495	224"	82"	91"
KM-15000D	15,000	3,960	530	224"	93"	96"
KM-20000D	20,000	5,284	706	224"	97"	105"
KM-25000D	25,000	6,605	883	260"	99"	109"

*Working capacity depends on the process and is normally between 50 and 70% of the total capacity.
NOTE: All dimensions are nominal.

Littleford FM Series Pilot Mixers

The Littleford FM Series pilot mixers, in sizes from 50 liters to 300 liters, are produced especially for testing, product formulation, new product development, laboratory and small scale production use.

The Littleford FM Series pilot mixers are extremely versatile and are utilized for enhanced processing and homogeneous mixing of dry materials (pulverized and granular), dry materials with liquids (surface coating), and liquids and pseudo-plastic products.

In addition to mixing applications, the Littleford Series FM pilot laboratory mixers are designed for vacuum drying, atmospheric drying and vacuum reactions.

The FM Series mixers/dryers are also generally equipped with the Littleford high speed impact choppers to enhance mixing/drying efficiency, dispersions, granulations and deagglomerations.

The FM Series mixers are constructed and operate on the same principle as the larger FKM Series batch mixers, making it reliable to scale up results to the larger production size units.

FM-130D



Model No.	TOTAL CAPACITY* Liters	Gallons	Cu. Ft.
FM-50	50	13	1.8
FM-130D	130	34	4.6
FM-300D	300	79	10.6

*Working capacity depends on the process and is normally between 50 and 70% of the total capacity.
NOTE: All dimensions are nominal.

Littleford mixers and mixing systems

Littleford Laboratory Mixers

Littleford offers four lab size mixers in 5, 20, 50 and 130 liter sizes, based on the mixing principles found in the FM/FKM/KM line of horizontal mixers. A 10 liter vertical bowl, high-intensity laboratory mixer, similar to the Littleford W Series high-intensity mixer, is available too.

All Littleford laboratory mixers are useful for determining scale-up information and/or for testing prototype materials prior to commitment of production runs. Additionally, the lab mixers can be used in conjunction with production units already installed in your plant for quality control purposes.



M-5



W-10

Model No.	TOTAL CAPACITY* Liters	Gallons	Cu. Ft.	APPROX. UNIT DIMENSIONS Length	Depth	Height
M-5	5	1.30	.18	32"	21"	24"
M-20	20	5.30	.71	38"	18"	30"
FM-50	50	13.00	1.80	52"	46"	66"
FM-130	130	34.00	4.60	62"	52"	102"
W-10	10	2.60	.35	28"	25"	44"

*Working capacity depends on the process and is normally between 50 and 70% of the total capacity.
NOTE: All dimensions are nominal.

Trial Demonstration Program

Your Littleford Day sales engineer can arrange for the rental of a trial demonstration mixer for testing in your own plant. Our Trial Demonstration Program offers potential customers in the process industry a unique opportunity to test a Littleford mixer in their own manufacturing environment. Various units (FM-130, DVT-130, FKM-1200 and KM-300) are available through this program for use in many applications and can be used to determine scale-up information for manufacturing capabilities of larger production units.

Through the Trial Demonstration Program, you are able to determine the processing advantages and efficiencies of the Littleford mixer without large commitments of research and development funds.

Littleford Day Testing Program

Littleford Day, Inc. maintains a modern, well-equipped Technical Center in Florence, Kentucky, for mixer evaluation and initial development by customers and prospects. We welcome you to "Put Us to the Test."

Technical Center equipment includes mixers, reactors, dryers, granulators, and compounders of various designs and sizes for batch and continuous processing and support equipment such as vacuum and compressed air systems. Also available are recirculating hot oil, recirculating hot and chilled water systems, as well as scales and instruments for product preparation, monitoring and initial evaluation.

We are confident that you will find the data compiled during the test program to be valuable and useful in assessing Littleford processing equipment for your application. We look forward to assisting you during the test program.



Other Littleford Processing Equipment

Outside of the basic batch and continuous mixers described on the preceding pages, Littleford Day designs, engineers and manufactures a number of more specialized pieces of processing equipment for various industries. Here, briefly described, are these Littleford products.

W Series High-Intensity Mixer — used in applications requiring high shear and high-intensity mixing action such as color concentrate blending, plasticized PVC, and pipe and siding applications. Standard capacities: 7.4 cu. ft./200 liters, 21 cu. ft./600 liters, 42 cu. ft./1,200 liters, 51 cu. ft./1,500 liters, 74 cu. ft./2,000 liters, and 86 cu. ft./2,400 liters.

MGT Series Vertical Mixer/ Granulator — provides the pharmaceutical, cosmetic and food industries with a precision mixer/granulator that is easily cleaned. Standard capacities: 2.5 cu. ft./70 liters to 42 cu. ft./1,200 liters.

DVT Series Polyphase Processor — is a sophisticated chemical processor providing multi-processing capabilities in a single pressure vessel. Standard capacities: up to 883 cu. ft./25,000 liters.

Littleford Vacuum Dryer — results in uniformly dried, lump-free products of exceptional quality in economical drying times. This vessel promotes drying at much lower temperatures than conventional atmospheric dryers. Standard capacities: 5 cu. ft./130 liters to 883 cu. ft./25,000 liters.

EK Series Particleboard Blenders — result in glue savings through more efficient resin-to-wood dispersion, without sacrificing quality.

W Series High-Intensity PVC Compounder and **K Series Matched Cooler** — combine for the efficient compounding and cooling of rigid PVC, flexible PVC and other materials. Standard capacities: 1,000 to 20,000 lbs. per hr.

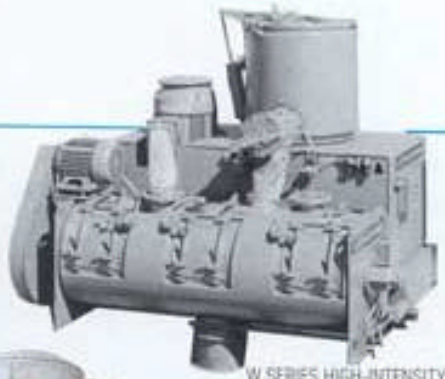
LCC Littleford PVC Compounding Center — is an integrated, prefabricated system for the continuous, high-volume production of dry PVC compound. Standard capacities: 1,000 to 24,000 lbs. per hr.



W SERIES HIGH-INTENSITY MIXER



DVT SERIES POLYPHASE PROCESSOR



W SERIES HIGH-INTENSITY PVC COMPOUNDER AND K SERIES MATCHED COOLER



LITTLEFORD VACUUM DRYER



MGT SERIES VERTICAL MIXER/GRANULATOR



EK SERIES PARTICLEBOARD BLENDERS



LCC LITTLEFORD PVC COMPOUNDING CENTER

Littleford Processing Equipment

Depicted on this page are just a few of the Littleford mixers, dryers and reactors that are providing cost effective solutions to the processing industry's most demanding applications.

2000 Liter FKM Series Batch Mixer

For solids mixing, liquid addition, granulation, viscous liquids and paste mixing, etc. Applications include ceramic and metallic powders, brake linings, adhesives, food, pharmaceuticals, just to name a few. Photo below shows independently driven chopper motors to provide increased sheer and energy input to enhance the process.



4200 Liter DVT Polyphase Processor

Specially designed for pressure and vacuum applications such as Kolbe-Schmitt reactions, biopolymer modification, vacuum drying and solvent recovery to name a few. Photo below also shows a 100 cubic foot Littleford Pulse Back Filter attached to the top of the mixer/dryer.



1200 Liter KM Series Continous Mixer

For use in environmental industries. This unit is specially designed with load cell mounting to automate the processing system ensuring product quality and increased production. Photo below also shows a large condensate chamber and load cell mounting of the 1200 liter Littleford Ploughshare Mixer.



13,500 Liter KM Series Continuous Mixer

The KM continuous mixers are used in applications which need homogeneous continuous throughput such as iron ore, chemicals, detergents, foods, etc.



Littleford Day

Where Processing Ideas Become Reality

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