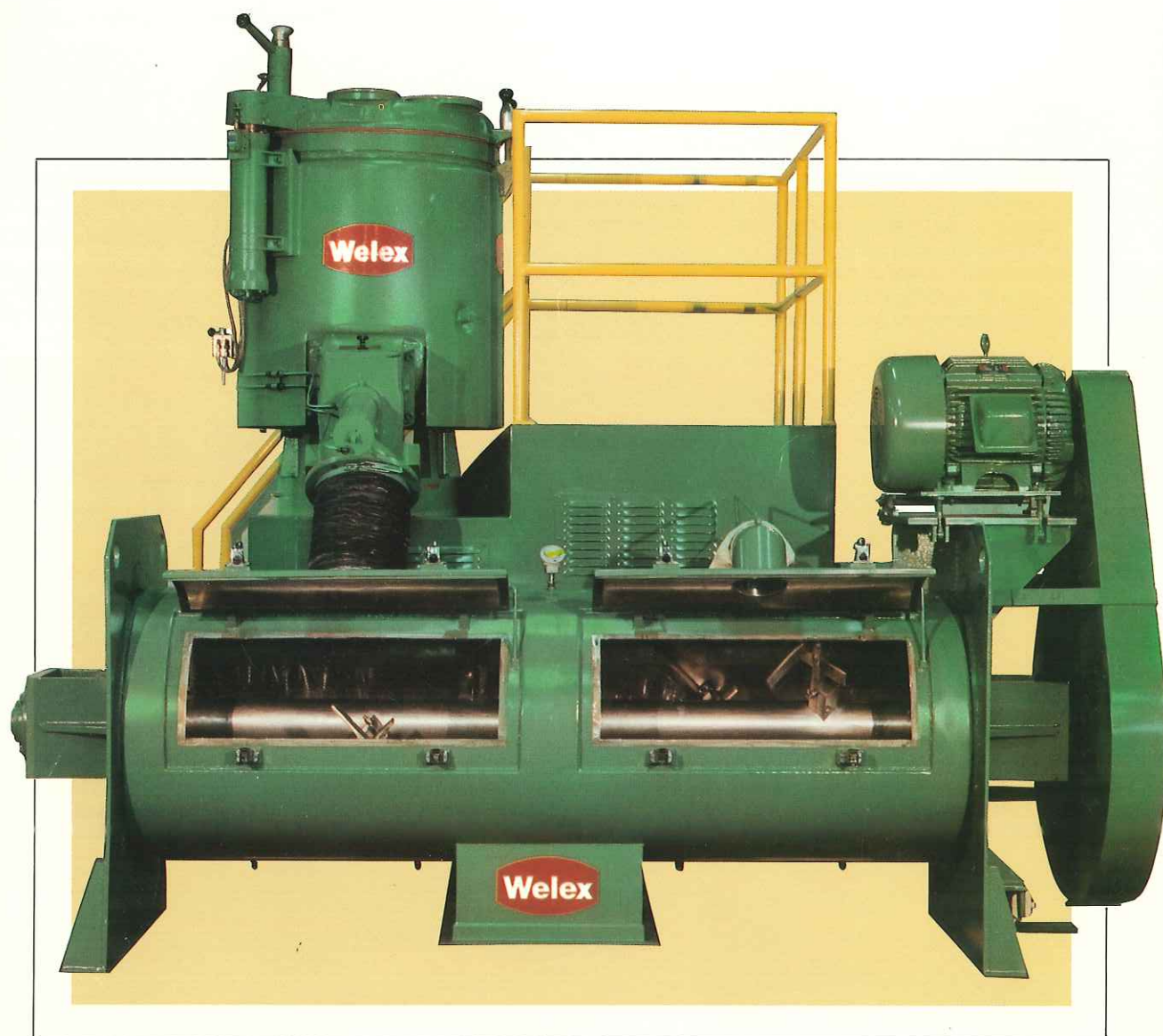




**High-intensity mixers, coolers,  
and automated mixer-cooler  
combinations**



## Welex high-intensity mixers, coolers, and automated mixer-cooler combinations.

**For mixing plastics, chemicals, foods, pharmaceuticals, and similar products better and faster.**

The Welex mixer was developed in Germany over 20 years ago. Today it is the largest selling high-intensity mixer in the world.

**High-intensity mixing** has been recognized as the best method of achieving complete and uniform dispersion when mixing solids with solids or liquids.

Welex mixers have wide acceptance in the rapidly growing plastics industry. They are now used by roughly 80% of the world's PVC producers. And most producers of powder coatings use Welex mixers for preparation of their pre-mix.

Other industries are also discovering the superiority of Welex mixers to traditional machines, including companies in pharmaceuticals, foods, ceramics, chemicals, paints, cosmetics, and metallurgy.

The Welex mixer employs a unique principle of intensive circulation—the material is not only driven upward, but downward as well. This forced circulation results in uniform high shear-

action throughout the charge. High-velocity agitator impact combined with interparticle friction insures breakdown of agglomerates and uniform distribution of even minute quantities of additives.

**Cycles shortened as much as 95%.** The mixing action of Welex triple impellers is so fast that operating cycles can be reduced as much as 95% of the time required by low-intensity mixers. In fact, the Welex mixer can be incorporated into a continuous process system, even though it is a batching device. And easily tied in with automatic material handling and batching equipment. Only a small surge capacity is needed at the mixer input and output.

**Smaller, more economical machines.** Short time cycles permit the use of a Welex mixer that is smaller and more economical than a low-intensity machine. The output of a Welex high-speed mixer in a given time span is as great or greater than the output of a much larger, slower, and more costly low-speed mixer.

**Heating and cooling.** The uniform frictional heat generated by the mixing

action can be used advantageously in many processes to promote absorption or drying. When heating is not desirable, the mixer jacket can be used to remove excessive heat, and cycles can usually be kept short enough to avoid problems.

If heating is necessary, and after-cooling required to prevent caking or degradation, Welex can furnish a separate, high-efficiency horizontal cooler designed for fast, even heat transfer and low maintenance.

**Components or complete systems—which for you?** Because of its efficiency, a Welex horizontal cooler can maintain the same short operating cycle as its companion mixer. Welex mixers and coolers, therefore, offer the user a high degree of flexibility. They can be supplied individually or as a fully-automated combination system.

**Easy double-batching for rigid PVC producers.** Welex mixer-cooler combinations are perfect for double-batching. Many rigid PVC producers have used the system to increase output by 100% without a proportional increase in capital equipment.



High-intensity mixers



High-efficiency coolers



Automated, high-intensity mixer-cooler systems



## The Welex impeller insures intensive, forced circulation.

The outstanding performance of the Welex mixer begins with its unique impeller. A rugged precision component, the Welex triple impeller has three levels of mixing blades that produce unique results:

**Forced circulation.** The impeller not only drives the mix upward and outward, it also forces it down in an intense vortex. The Welex impeller is especially suitable for materials that pass through a dough-like state. Cavitation is avoided because of the forced downdraft created by the impeller.

**Intensive mixing for uniform dispersion.** The mixing action is so intense that ingredients measured in a few parts per million are rapidly and uniformly dispersed throughout the batch. Agglomerates are completely pulverized and thoroughly mixed into the product. The fluidization of the particles insures that all components in the batch are completely exposed to one another.

**Long impeller life.** Because the Welex impeller has three sets of rugged blades that can produce the same energy input at a lower speed as im-

pellers with one or two sets of blades. This results in a five-to-ten-fold increase in impeller life. And to extend their life further, the blades can be rebuilt.

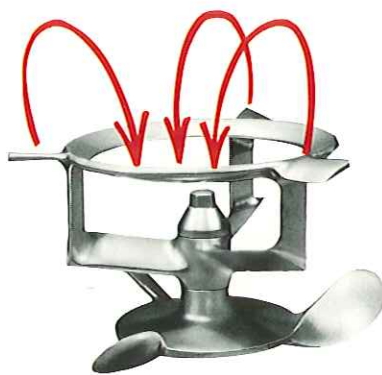


U.S. Patent No. 3,337,193



**The mixing begins here**

The lower blades of a Welex impeller resemble a ship's propeller. Wide and powerful, they scoop the batch from the bottom of the vessel and hurl it outward and upward toward the top of the chamber. The entire impeller assembly is made of stainless steel and is easily removed by unscrewing a single nut.



**Is accelerated here**

Three hard-surfaced airfoils give additional energy to the rising particles. The design of the blades and the shape of the vessel force the batch in upon itself in a continuous, uniform flow that falls into the center of the impeller. A baffle extending down from the lid helps deflect the flow inward.

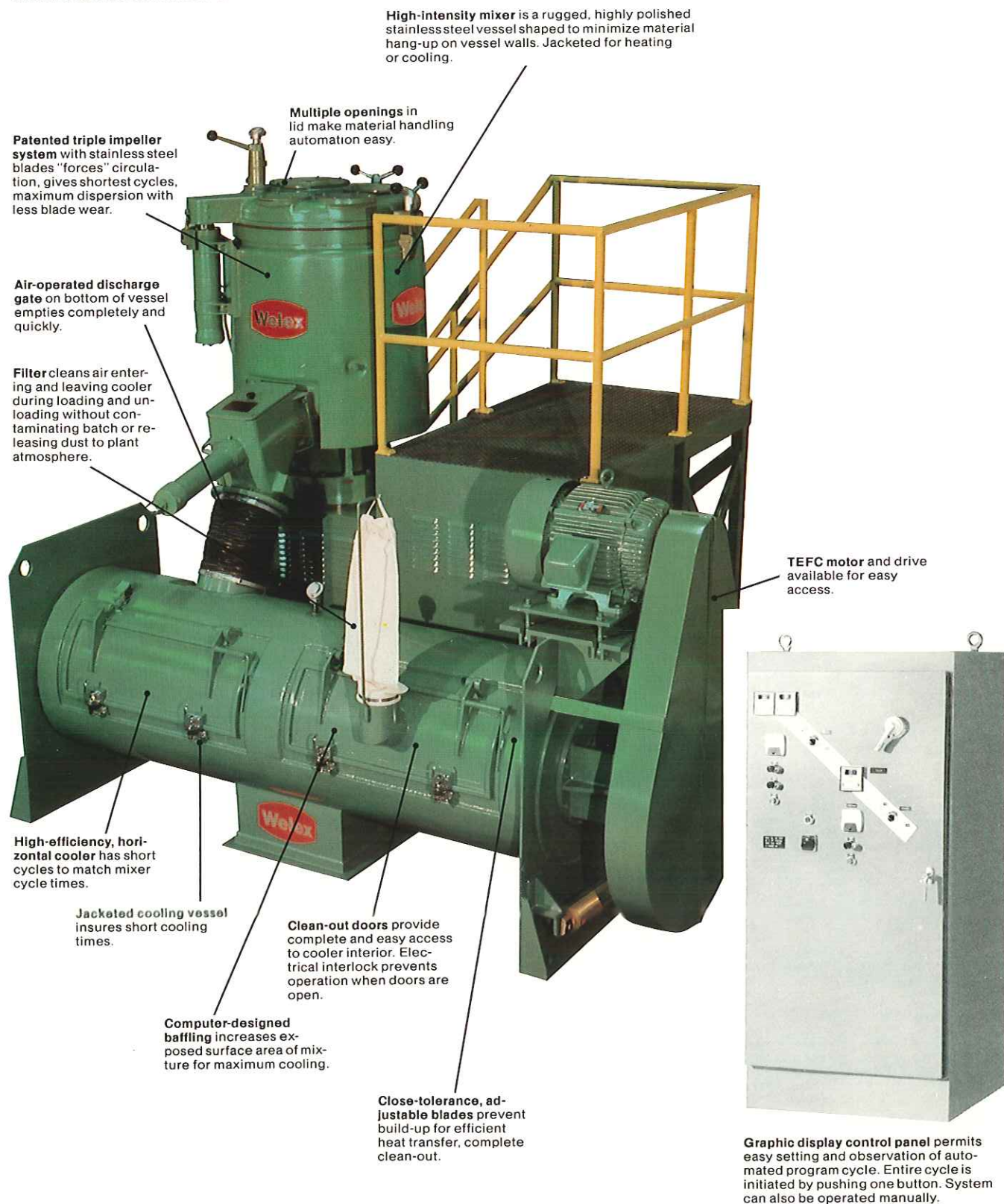


**And returned here, over and over**

The falling particles are guided downward by an aerodynamically shaped ring into the impeller's "pump"—three blades that energetically force the batch down against the central bottom plate of the impeller. There the particles are immediately captured by the first stage blades and hurled upward to begin the cycle anew.

## Welex high-intensity mixer-cooler combinations.

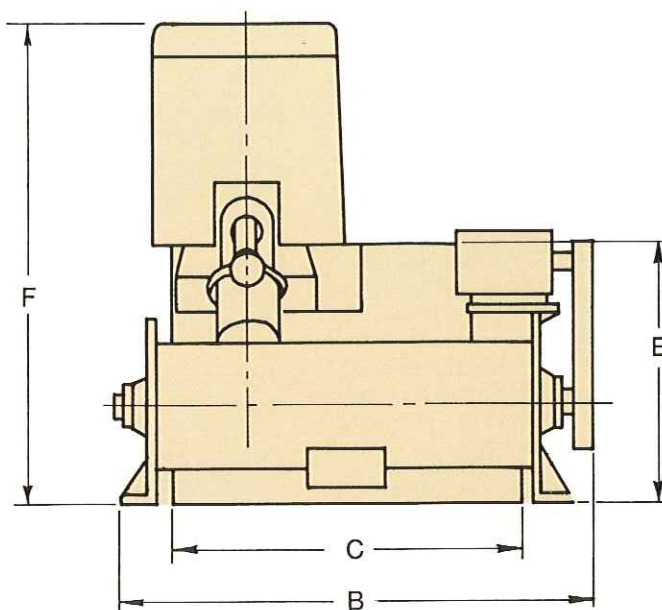
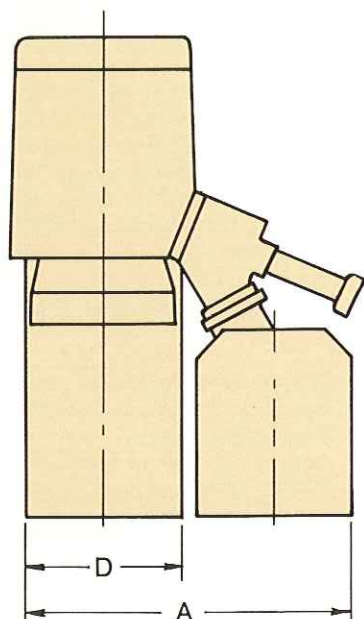
Fully-automated systems for high-speed mixing and cooling. Complete cycle automation insures uniformity and eliminates human error.





## Welex High-speed mixer-cooler combinations.

Fully automated systems to insure uniformity, eliminate human error, boost productivity.

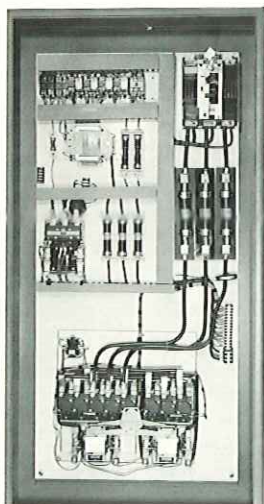


### Dimensional Block

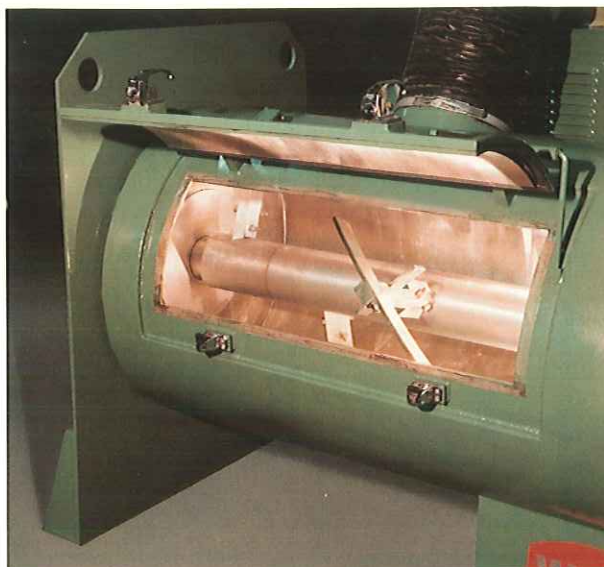
#### Specifications: Welex High Intensity Mixer-Coolers

Model	Double Batch Working Capacity (use half this for single batching.)		Motor Horsepower		Weight lbs.	Typical Rate * lbs./hrs.	A	B	C	D	E	F
	cu. ft.	liters	Mixer	Cooler								
200M/500 HC	10.0	320	50/25	10	8,000	900-1500	60	105	56	31	65	100
500M/1200 HC	26.0	800	100/50	20	11,000	2400-4000	80	135	75	38	70	150
1000M/2400 HC	52.0	1600	200/100	30	20,000	4800-8000	105	170	96	48	120	220
1500M/4200 HC	78.0	2600	400	50	26,000	9000-11,000	118	206	126	61	140	240

\*Single batching. Based on PVC dry blend. Rates depend on specific material and actual cycles.



**Prewired controls**—including adjustable timers, temperature controllers, and motor starters—are housed in free-standing panel. Dust-proof JIC panel requires only interconnecting wiring to machine terminals.



**Easy cleaning** is assured by large access doors on cooler.

## Welex high-intensity mixers. Short cycles, unmatched performance, for solids and solids-liquids mixing.

**Welex mixers** apply continuous high shear and impact action to any material that flows or can be fluidized. They are industrial-scale versions of the well-known kitchen blenders found in most homes and laboratories, but they work equally well on a wide range of solids and solids-liquids systems.

**High-energy inputs** up to 10 HP/cu. ft. combined with shear rates up to 25,000 reciprocal seconds and impact velocities of 150 ft./second are applied. The result is an intensity of mixing never before achieved in a mixer. High shear action is obtained throughout the batch, resulting in rapid breakdown of agglomerates and uniform dispersion of all ingredients. The smallest particle in the finished product is representative of the entire formula.

**High-speed mixing** in the Welex does in seconds or minutes what less intense mixers cannot do at all—or take hours to achieve. Consequently, smaller and more economical machines can be used. This also provides greater flexibility of operation in most mixing applications.

**Uniform frictional heating** throughout the batch promotes chemical reactions, drying, or absorption of liquids. Special vacuum-tight models are available when vacuum is needed to remove volatiles. Uniformity of heating prevents hot spots in the batch and rapidly brings it to any desired temperature level. When heating is not desired, the cycle can be shortened, or the temperature can be lowered jacket cooling.

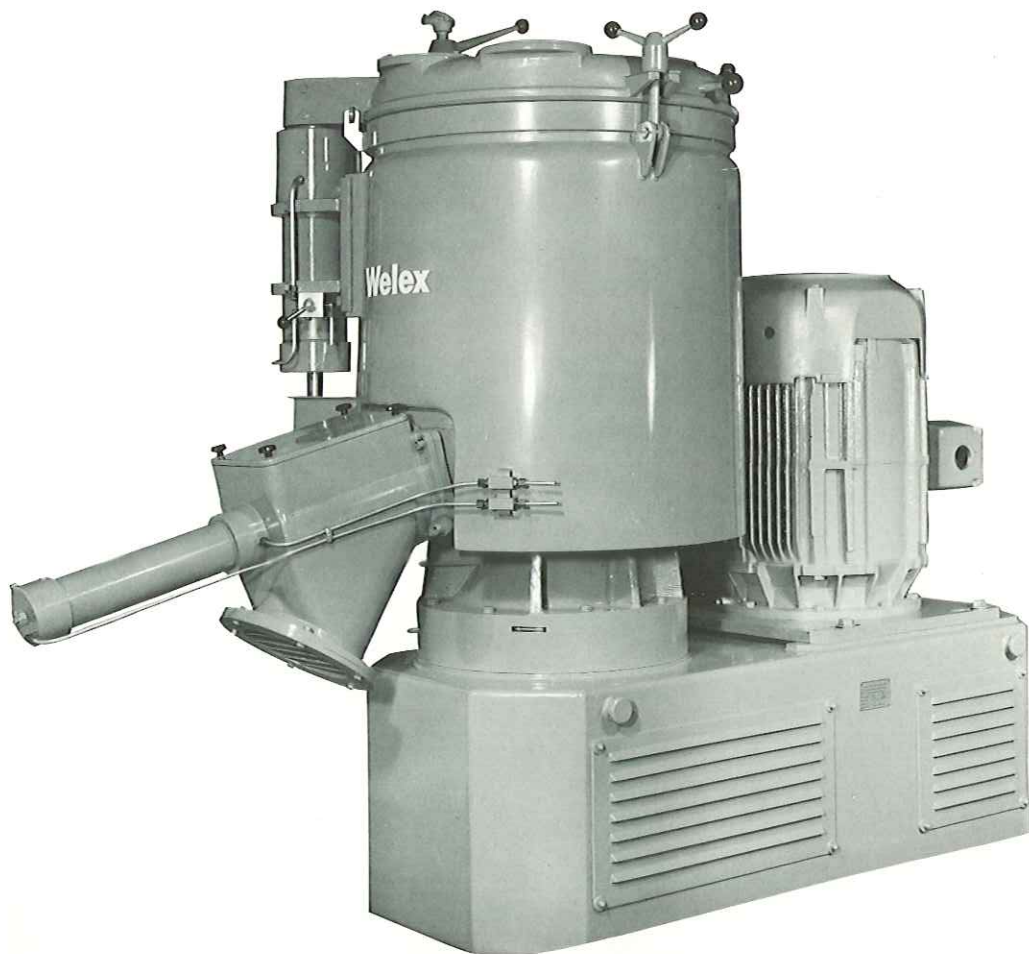
**Consistent mixtures** from batch to batch are obtained by reaching near-ultimate dispersion in every loading.

**Unsurpassed mixing efficiency** can be provided by automating cycles based on time or temperature. A wide variety of programs can be selected to suit individual requirements. Control circuit can include provision for integrating with automatic material handling systems.

**Clean operation** is assured by a hermetically-sealed vessel with special inert gaskets throughout. Inert atmospheres can be used economically when mixing sensitive materials.

**Easy cleaning** is assured by highly-polished stainless steel contacting surfaces and small surface-to-volume ratio. The impeller is readily removed by unscrewing the retaining nut. The pneumatically-operated lid swings completely free of the vessel for quick access. Thorough cleaning takes only a few minutes. Machine is suitable for washdown.

**Very low maintenance requirements** because, throughout, everything has been designed for long, troublefree operation. And to keep your mixer/cooler in operation, Welex carries a complete stock of spare parts for same day shipment from a major air terminal which is less than an hour's drive from our plant.





Full-diameter air-operated lid swings completely free of vessel for cleaning. Several large covered and gasketed charging ports are furnished. Aluminum lids are standard, stainless steel lids available on special order.

Deflector baffle can be adjusted to optimize material flow for different viscosity materials. Deflector incorporates high-sensitivity thermocouple to monitor batch temperature.

Highly-polished stainless steel vessel has inward sloping walls to minimize material hang-up. Vessel has 75 psig non-ASME rated jacket for temperature control. Closed vessel is completely dust-tight. Vacuum-tight construction available for drying and other special applications.

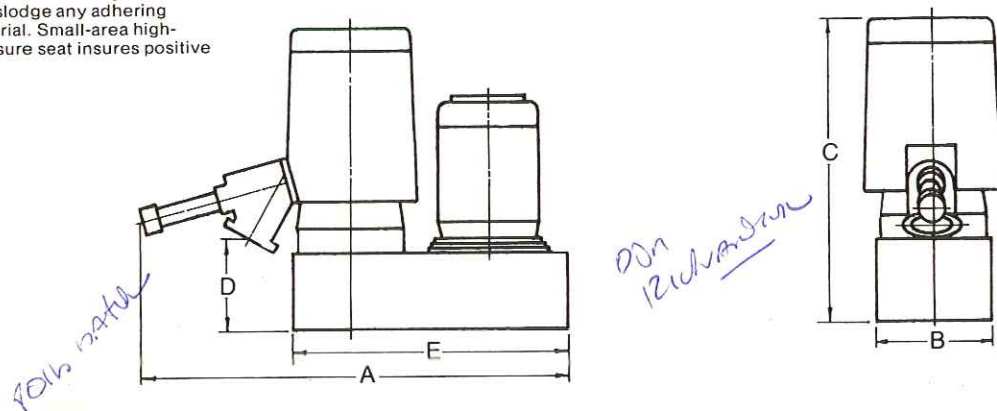
Heavy-duty TEFC motor provides flexibility in mixing operation, is made for long, trouble-free life. Motor is mounted on a sliding base that has a built-in provision for belt tensioning. May also be mounted below the base if space is a problem.

Three-stage, forced-circulation impeller insures positive high-intensity mixing throughout batch. Unique design drives material up and forces it down as well.

Rugged dual roller bearing assembly is completely isolated from mixer by two slingers and multiple seals to avoid contamination. Wide spacing of bearings insures long bearing life. Seals are accessible and easily changed.

Air-operated discharge has large diameter for complete and rapid emptying of mixer. Ram rotates during retraction to dislodge any adhering material. Small-area high-pressure seat insures positive seal.

Rigid base with mounting pads completely encloses and protects carefully-matched V-belt drive. Access is through quick-opening ports.



# Specifications: Welex High-Intensity Mixers

## Dimensions (inches)

Model	Working Capacity		Motor HP	Weight lbs.	Typical Rate* lbs./hr.	A	B	C	D	E
	cu.ft.	liters								
100 M	2.5	80	30/15	2500	450-750	87	29	60	20	56
200 M	5.0	160	50/25	3500	900-1500	92	29	64	20	56
300 M	8.0	240	60/30	4500	1350-2250	113	37	74	27	75
500 M	13.0	400	100/50	5500	2400-4000	116	37	91	27	75
1000 M	26.0	800	200/100	12,000	4800-8000	140	49	105	29	110
1500 M	39.0	1300	400	16,500	9000-11,000	171	61	140	49	126

\*Based on PVC dryblend. Rates depend on specific material and actual cycles.

## Welex high-efficiency coolers. Large-surface, compact units for rapid, uniform cooling.

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**Welex coolers** are extremely efficient heat exchangers. Though designed as companion coolers for Welex high-intensity mixers, they can also be separately used for thorough, rapid cooling of chemicals, plastics, foods, and other relatively dry mixtures.

**Many processes** discharge hot materials which must be cooled prior to storage or further handling. The Welex cooler is ideally suited to cope with such problems. The unit has an unusually large cooling surface—one square foot for each five pounds of charge. This is almost double the cooling area of other coolers of the same volume. All portions of the batch are kept in constant motion by the powerful low-speed impeller.





# Welex High Efficiency Horizontal Coolers.

Adjustable impeller blades with close tolerance, prevent build-up for efficient heat transfer, complete clean-out.

Large clean-out doors provide easy access to cooler interior. Dust-tight to ensure clean operation, avoid material loss.

Computer-designed baffling increases surface area of mixture for maximum cooling.

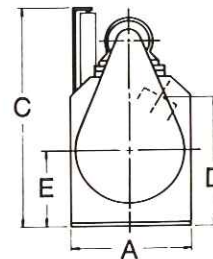
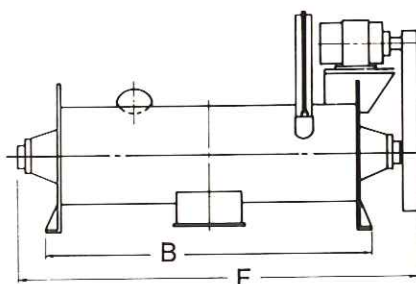
Sturdy base, totally enclosed, integrally mounted motor and drive.

Polished stainless steel walls minimize hang-up.

Bottom discharge chute for fast, complete discharge of cooled dry blend.



Outboard bearing design and air purge of packing gland permit easy maintenance and prevent leakage. The Seal can be changed in minutes by simply removing three cap screws on the gland, and sliding the packing off the shaft. A lantern ring, sandwiched between packing material, assures equal pressure to front and rear packing.



## Specifications: Welex High Efficiency Horizontal Coolers

## Dimensions (Inches)

Model	Double Batch Working Capacity (use this half)		Cooling surface sq. ft.	Motor HP	Weight lbs.	Typical Rate* lbs./hr.	A	B	C	D	E	F
500 HC	10.0	320	31	10	4,000	900-1500	36	84	55	38	23	105
1200 HC	26.0	800	54	20	5,200	2400-4000	40	110	74	45	26	136
2400 HC	52.0	1600	90	30	7,900	4800-8000	45	144	79	52	30	169
4200 HC	78.0	2600	140	50	11,500	9000-11,000	54	176	91	61	35	202

\*Single batch PVC cooling.

## Welex laboratory mixers. Fully-instrumented, precisely scaled-down companions to Welex production mixers.

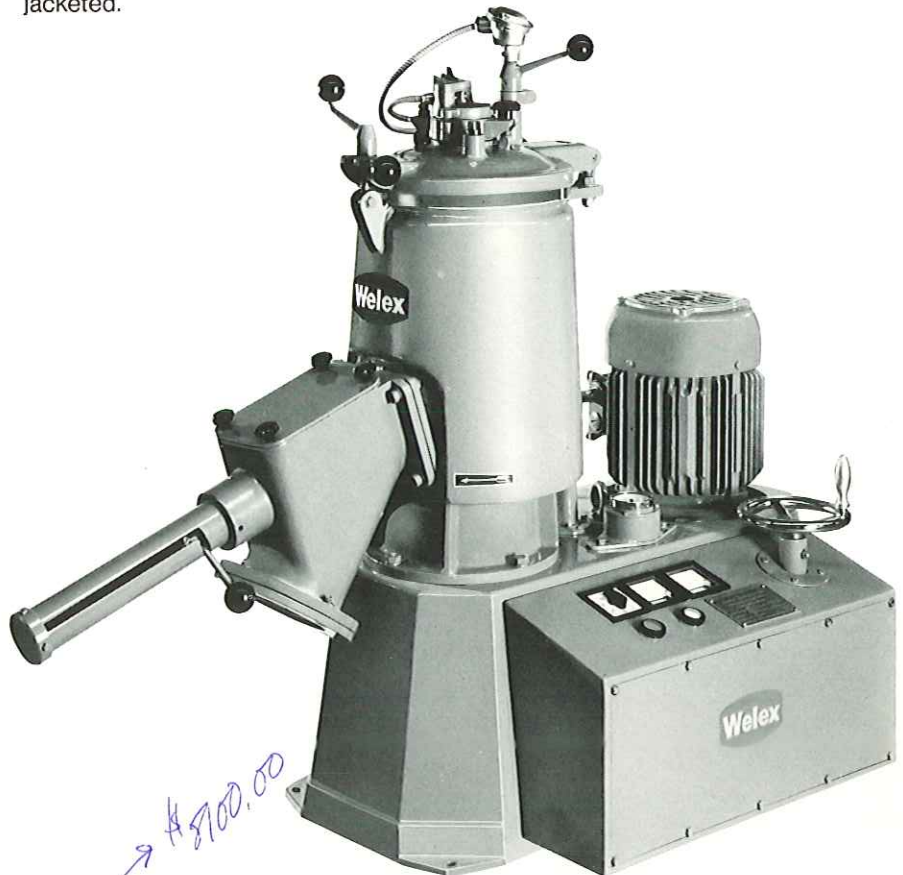
**Welex high-intensity laboratory mixers** offer the user a unique advantage—the ability to scale up precisely from laboratory or pilot plant batches to full-scale production.

**Forced-circulation action**, a feature in all Welex mixers, largely solves scale-up problems by eliminating the variable of batch pressure on the impeller. The downdraft impeller always forces the material into high-pressure contact with the lower impeller. Other high-intensity mixers without forced downdraft circulation depend on material height alone to produce this pressure. Since the material height above the impeller in a lab mixer is much less than in a production machine, the pressure will also be less, and the mixing action much poorer.

The **Welex lab mixer impeller**, like its production counterpart, *pulls* the material down. The mixing action, therefore, is as intense and thorough as in larger Welex machines. Welex laboratory models feature powerful, infinitely variable, variable-speed drives. Precision instrumentation furnished with the mixer includes tachometer, motor-load indicator, stock-temperature indicator, and automatic cycle timers.

**All controls** together with the motor starter are pre-wired and built into a console which is mounted on the mixer. Installation is simply a matter of plugging into a suitable power supply. An illuminated sight glass in the mixer cover is an additional feature that permits close observation of the mixing progress. Like their production counterparts, all Welex lab mixers are jacketed.

The **unusually wide speed range** allows speeds slow enough to furnish after-cooling in the mixer when desired, and eliminates the need for a separate cooler. All contacting surfaces are stainless steel, and ease of cleaning is a paramount feature of the design. The two smaller mixers can be used on laboratory benches or carts. The largest model is best mounted on a small floor pedestal.



**Specifications: Welex High-Intensity Laboratory Mixers**

Model	Working Capacity		Motor	Speed Range	Weight
	cu. ft.	liters	HP	RPM	lbs.
8M	0.2	6	4	600/3600	375
20M	0.5	15	5½	600/2500	485
35M	1.0	25	15	600/2000	900

**Dimensions (inches)**

Length	Width	Height
45	18	34
50	22	46
64	25	50



## Typical applications for Welex high-intensity mixers.

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### Solids

**Dispersion** of colors and additives in powders, beads, or crystalline materials. 1-3 minute cycles.

**PVC dryblending** with thorough, uniform dispersion of stabilizers, lubricants, and pigments. Product is suitable for direct extrusion, molding, or fluid-bed coating. 3-6 minute cycles.

**Molding materials** are thoroughly mixed with fillers, catalysts, and pigments. 2-3 minute cycles.

**Batch blending** of granular or pelletized materials. 1-2 minute cycles.

**Densification** of frangible, spongy materials. Can be accompanied by dispersion of additives. 1-3 minute cycles.

**Powder metallurgical** compound blending and dispersion with intimate mixing of all ingredients. 1-3 minute cycles.

**Pharmaceutical** compound mixing and dispersion with assured uniformity of the smallest particles. 1-3 minute cycles.

**Food preparation** of cake mixes, pudding powders etc., with complete homogeneity. 1-3 minute cycles.

**Ceramic powder** mixes of all kinds. Special, hard-surfaced vessels and impeller can be provided. 1-5 minute cycles.

**Chemical and fertilizer** mixes with intimate blending of all ingredients. 1-2 minute cycles.

**Wood products** such as particle board and wood flour compositions with binders can be mixed with more efficient use of resins. 1-2 minute cycles. Special continuous models available.

**Color concentrate** preparations in a wide range of solid media. 1-3 minute cycles.

**Cosmetic** mixtures such as powders are finely mixed and dispersed to near ultimate color development. 2-5 minute cycles.

**Powder coatings and premixing** achieves complete pre-dispersion of pigments with the resin vehicle for maximum color development and uniformity. 2-5 minute cycles.

### Solids—Liquids

**PVC dryblending** with completely homogeneous absorption of plasticizer in resin and uniform dispersion of stabilizers, pigments, and lubricants on each resin particle. 3-6 minute cycles.

**Pigment dispersion** in oils or plasticizers eliminates need for paint milling in many cases. 1-5 minute cycles.

**Ceramic slips and frits** can be prepared with complete homogeneity and thorough color dispersion. 2-5 minute cycles.

**Food products** such as baby food, mayonnaise, and other highly dispersed, emulsified, and homogenized products. 1-5 minute cycles.

**Plastisols** with complete dispersion of resin, pigments, fillers, and other ingredients. Can be performed under vacuum for simultaneous de-aeration. 2-4 minute cycles.

**Color concentrate** preparations in a wide range of using dry color and wetting agent without prior paint milling. 1-4 minute cycles.

**Paint mixing** at high solids level for efficient use of pigments and bases with precisely reproducible shades. 2-5 minute cycles.

**Chemical reactions** can be performed with unusual ease in the high-intensity medium provided by Welex mixers. Continuous intimate contact of all ingredients is assured for rapid and homogeneous reactions. Jacketing can be used for precise temperature control.

**Cosmetic** mixtures such as creams and emulsions can be advantageously mixed for better uniformity. 2-5 minute cycles.

**Vacuum drying** completely removes moisture or residual volatiles from powders as the mixing action generates frictional heat and increases the mixtures' surface area. 2 minute to 1 hour cycles.

Welex is backed by a nationwide sales and service organization to help you at any time. Our customers are supported by a very large inventory of spare parts that cover every conceivable emergency. Parts shipment can be made on the day the order is received to insure uninterrupted profitable operation for our customers.

The Welex plant and technical service laboratory are located in Blue Bell, Pa. near Philadelphia. Our laboratory is well-equipped to solve a wide variety of mixing problems, and our competent staff is at your disposal.

Because of the rapid growth of high-intensity mixing technology, many companies are unaware of the opportunity they might have to improve products, processes, and profits. Welex units have reduced some mixing operations literally from hours to minutes, while turning out a superior product.

If you have a mixing problem, one of our specialists will be happy to call on you at your convenience to discuss it and to suggest an economical solution. The Welex laboratory also offers a product testing service to demonstrate the speed and effectiveness of a Welex high-intensity mixer with your sample material. If you wish to avail yourself of this service, please call or write to arrange for a demonstration.



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