Quadro Ytron®

ADVANCED SINGLE-PASS FLUID MIXING

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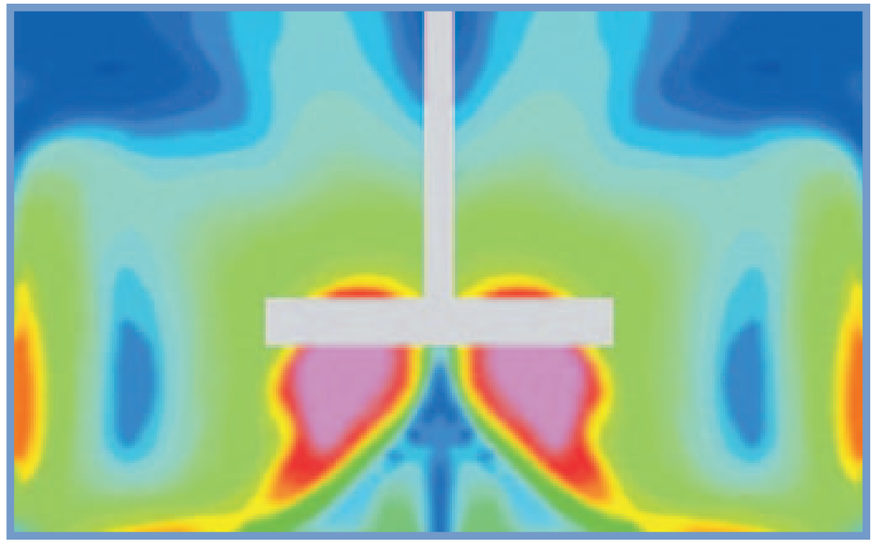
Shear Performance and Productivity in a Single Pass

Faster batch times. Higher capacities. Predictable, consistent quality. Easy to clean. These are the demands that are challenging process engineers in large-scale manufacturing today. However, traditional in-tank fluid mixing continues to impose limitations on productivity – causing bottlenecks that industry has reluctantly learned to live with, or work around by introducing costly additional processes.

Conventional Hit-and-Miss Mixing Technology



This in-tank velocity profile of a conventional mixer shows high velocity at the impeller, and low velocity throughout the bulk of the tank (blue and green areas). The result is random distribution of shear, which is impossible to control. Quadro Ytron® *single-pass technology delivers uniform shear to all material in a predictable, repeatable and scalable process.*

Conventional hit-and-miss

Traditional in-tank dispersion and emulsifying methods are, at best, hit-and-miss. Powders and immiscible liquids introduced into a vessel of liquid must find their way to the mixing impeller in order to be effectively sheared and dispersed. In theory, the vortexing created by a conventional impeller draws the powder down into the action zone. In reality, only a portion of the material introduced will reach the tooling for processing.

The result? Random, uncontrollable rates of shear. Some materials are continually recirculated back into the action zone – leading to over processing. Other components, most often in "dead zones" nearer the vessel walls and surface, remain virtually untouched. This incomplete dispersion not only promotes waste as materials "raft" on the tank surface or build-up on walls and baffles, it encourages the creation of "fish eye" lumps.

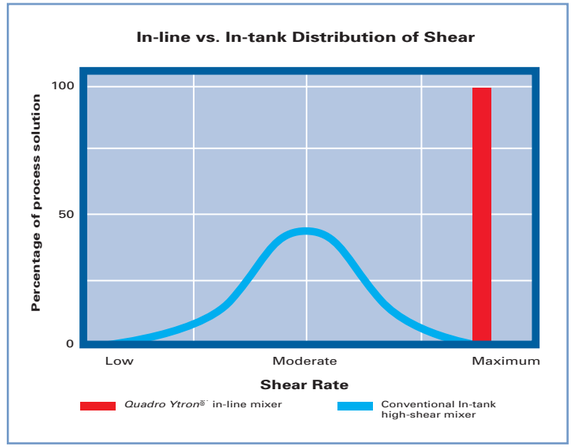
It's easy to see why even the most powerful mixer often has limited impact. To compound the situation, traditional vortex-flow induction introduces unwanted air into the batch mix, further compromising the desired results. And because these results are the product of so many randomly impacting processing variables, batch-to-batch quality and consistency becomes wholly unattainable. Processors have traditionally attempted to overcome these problems by extending processing times or using more costly, higher horsepower mixers. However, these approaches can damage heat- and/or shear-sensitive products.

The Quadro single-pass breakthrough

With the *Quadro Ytron*® line of mixers, dispersers and emulsifiers there's now a proven, viable alternative that removes these obstacles to greater efficiency. This unique in-line technology maximizes yields, creating high-quality dispersions and emulsions by applying the required shear to all the material in a quick, single pass. And its wide range of tooling can be specifically tailored to the difficulty of the application.

Quadro Ytron®'s breakthrough, single-pass process delivers high product quality that is not only predictable, repeatable and scalable, it can dramatically reduce batch times and energy consumption by as much as 75%.

In-line processing offers a host of additional advantages. Powder wastage, air entrainment and batch-to-batch cross-contamination are virtually eliminated. Clean-up is fast and easy. What's more, *Quadro Ytron*® technology is flexible enough that a single device can even process multiple applications feeding several batch tanks. No wonder single-pass processing is rapidly gaining momentum among leading processors. As pioneers in this revolution, Quadro offers the expertise, track record and advanced technology to meet the growing demand.



Quadro Ytron® *in-line technology applies maximum controllable rates of shear to process 100% of the product in a single pass.*

SOLUTION PROFILE

Meeting tight deliveries through faster, more consistent processing

"Not only did Quadro Ytron® *'s speed and versatility allow us to reduce our batch times from 72 to 8 hours, we were able to free up manufacturing space, plus reduce inventory and warehouse demands while still meeting tight 3-day deliveries."*

Quadro was approached by a large personal care product manufacturer producing private-label shampoos, creams and lotions for global distribution by health & beauty product retailers. Their conventional in-tank process was impeding productivity, and limiting batch quality and consistency. Delivery deadlines were potentially at risk. At the Quadro R&D Test Center, we audited their process, providing a solution that eliminated lumps, "fish eyes" and air entrainment, rapidly dispersing high-viscosity thickeners such as Carbopol®, HPMC and Keltrol® into water and alcohol during the liquid fill cycle. In addition, wax flakes are instantly dissolved at reduced temperatures, saving cooling time.

Powders are dumped from a mezzanine into the hopper of a ZC3 Powder Disperser, with a liquid feed from the water supply line and short discharge directly into the mixing vessel. A full-flow ball valve maintains the mass flow of powder through the hopper.

***Quadro Ytron*® Model ZC3**

QUADRO YTRON®

Thinking Outside the Box

In over 40 years of delivering the most efficient processing solutions for our customers worldwide, *Quadro Ytron®* technology has never allowed conventional thinking to get in the way. In fact, thinking outside the box is at the heart of our way of doing business. We continually develop innovative solutions that exceed expectations and break traditional assumptions about processing limitations.

A solution for every challenge

Our track record in high-efficiency, single-pass processing is unequaled across a broad range of industries and applications – from challenging materials for Personal Care and Cosmetics such as *Carbopol®* and pigments, to tough stabilizers in sauces, dressings and ice cream for the Food industry, to difficult-to-disperse powders for the Pharmaceutical and other industries.

Continuous innovation

To ensure each new generation of the *Quadro Ytron®* line raises the bar in productivity, we continually advance our understanding of the science of shear and dispersion through extensive R&D in our state-of-the-art, in-house Test Center. This, along with ongoing feedback from our customers about their changing processing challenges, has enabled us to engineer a line of liquid mixing technologies that delivers industry-leading performance, predictability, repeatability, ease of maintenance and long-term reliability.

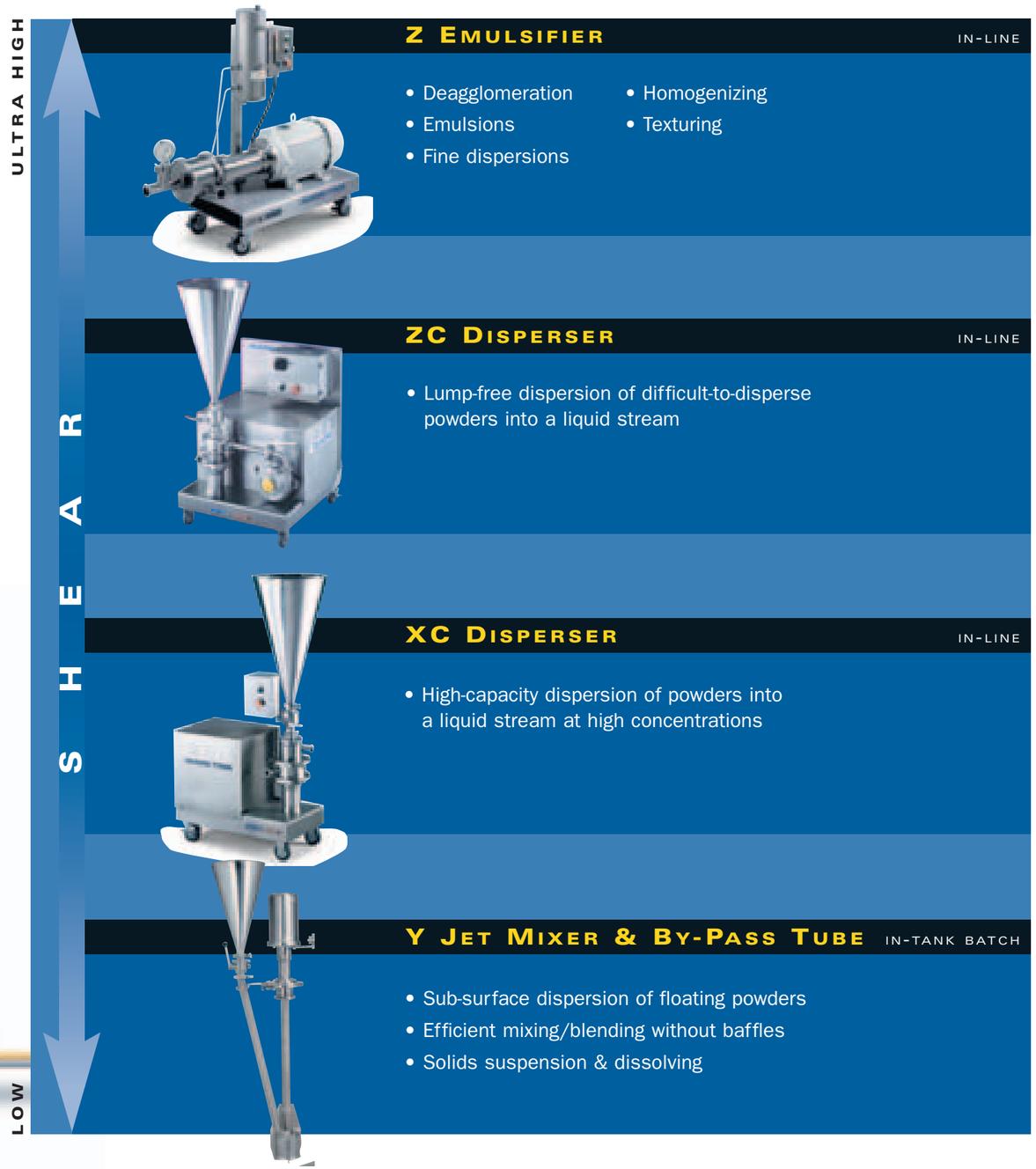
Performance across the line

Available in four scalable technologies capable of handling a broad range of capacities, *Quadro Ytron®* emulsifiers, dispersers and mixers can be custom engineered to deliver the exact amount of shear required by your application. And all our equipment is manufactured in stainless steel for full sanitary operation and easy cleanability.

And when it comes to achieving maximum up-time for your application, we don't think conventionally either. To meet your ongoing needs, Quadro offers a global sales, service and technical support network that spans six continents – so wherever you are, we are.

Integrating Quadro Ytron® *single-pass technology into your process can significantly boost quality and throughput.*

QUADRO YTRON® PERFORMANCE LINE



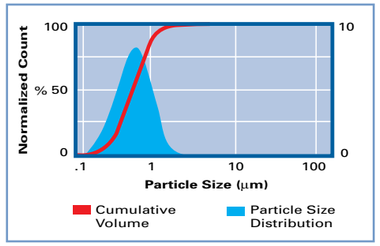
QUADRO YTRON®

Z Emulsifier

SINGLE-PASS EMULSION AND HOMOGENIZATION

ULTRA HIGH SHEAR

The *Quadro Ytron*® Z Emulsifier delivers unparalleled consistency and control of high-shear process applications such as immiscible phase emulsifying/homogenizing, wet grinding, deagglomeration and fine solids dispersing.



In a single pass, the Z Emulsifier achieves a very tight particle size distribution with 80% of the pigment less than 1 micron.

High differential velocities

Incorporating up to three sets of toothed rotor/stator heads, engineered to extremely fine radial tolerances, the Z Emulsifier processes product at high differential velocities, as many as 18 times in a single pass. The result is consistent, repeatable quality at capacities exceeding those of conventional multiple-pass technology, such as in-tank high-shear mixers, colloid mills and shear pumps.

Tooling flexibility

Rotors/stators for the Z Emulsifier come in a wide variety of slot widths which allow for a high degree of multi-processing flexibility. Through tooling selection and varying rotor tip speed the amount of shear can be precisely controlled.

Scalable throughput

Four sanitary-design models are available providing scalability from pilot plant capacities to >300 gpm (1,136 L/min). By maintaining the same tip speed while changing the tooling diameter, throughput can be scaled up or down without altering product characteristics, texture or particle size distribution.

INTEGRATED SOLUTIONS

Equipped with an infeed pump, this Z Emulsifier delivers outstanding quality and high throughput for the production of an oil/water emulsion liquid medication for a major pharmaceutical manufacturer.

Unique three-stage tooling

DYNAMIC PRINCIPLES

1. Product enters housing axially.
2. One or more liquid phases and suspended particles are pumped through 1, 2 or 3 sets of toothed rotors/stators.
3. Controlled, high-intensity shear is delivered equally to all fluid elements, regardless of product characteristics.
4. Shear rate is constant, dependent only on rotor/stator tooth selection and rotor tip speed.

TYPICAL APPLICATIONS

COSMETIC/ PERSONAL CARE	FOOD & BEVERAGE	PHARMACEUTICAL	CHEMICAL
Perfumes	Yogurt	Antibiotics	Pitch/bitumen emulsions
Toothpastes	Salad dressings	Topical creams & gels	Fungicides & insecticides
Hair dyes	Mayonnaise	Ointments	Toners
Creams & lotions	Cheese sauce	Injectables	Pigments
Shampoos	Condiments	Suppositories	Laquers
Soaps	Creams	Nutritional drinks	Resins
	BBQ sauce	Oral suspensions	
	Spreads		

FEATURES

1. Sanitary design with clamped housing, easily dismantled for cleaning; CIP and SIP options available. Meets *3A*® standards.
2. All stainless steel construction.
3. Single and double mechanical seals provide for high-temperature, high-pressure performance.
4. Single-speed drive with variable speed options.
5. Stainless steel base with portable, locking castors.

SPECIFICATIONS

		MODEL Z0	Z1	Z3	Z5
POWER (Maximum)	HP	3	10	25	60
	kW	2.2	7.5	18.5	45.0
CAPACITY*	Gal/min	15	30	100	300
	L/min	60	115	380	1,150
RPM		10,000	6,000	3,600	1,800
ROTOR & STATOR SETS		1	1 to 3	1 to 3	1 to 3
OPERATING PRESSURE	psi	0 - 60	0 - 120	0 - 120	0 - 120
	bar	0 - 4	0 - 8	0 - 8	0 - 8
INLET & DISCHARGE FITTING	in	1	1.5	2	3
	mm	25	38	50	75

**Actual capacities will vary depending upon inlet pressure, tooling selection and product characteristics.*

QUADRO YTRON®

ZC Disperser

SINGLE-PASS DISPERSION OF EXTREMELY DIFFICULT-TO-WET POWDERS

HIGH SHEAR

The *Quadro Ytron*® ZC Powder Disperser is uniquely engineered to incorporate and disperse extremely difficult-to-wet powders into a liquid stream *in a single pass*.

Intense shearing

The advanced design of the ZC Disperser's rotor/stator and reactor head provides for intense shearing of powders prior to hydration, to produce homogeneous dispersions that are completely free of lumps and "fish eyes".

Dramatic powder and batch time savings

A near-perfect vacuum, created by the liquid seal between the rotor and stator, permits concentrations up to 25% by weight to be generated *in a single pass* with minimal air entrainment. Because the powder is completely hydrated, yield is maximized and wastage is reduced or eliminated, translating into powder savings of up to 30%, compared to processing with in-tank or other in-line high shear technologies. In addition, the over-processing common with conventional dispersing technologies is entirely eliminated, preserving the rheological properties of shear-sensitive products.

Batch time reductions as high as 75% can be realized with the *Quadro Ytron*® ZC Disperser technology. No dispersion aids such as pre-heating the water or the pre-dispersion of ingredients into non-aqueous solvents are required. Even with difficult products such as hydrocolloid gums, cellulose gums and carbomers you can expect complete dispersion *in a single pass*.

Sanitary design options

There are three sanitary-design models available, offering liquid throughputs up to 120 gpm (454 L/min). An optional vacuum delivery system is also available, for completely dust-free operation.

Close-tolerance rotor/ stator tooling

INTEGRATED SOLUTIONS

The Quadro Ytron® *PID Powder Inductor Disperser uses ZC technology to convey, incorporate and disperse difficult-to-wet powders with the push of a single button.*

DYNAMIC PRINCIPLES

1. ZC Disperser operation is based on a close-tolerance, high-shear, slotted rotor/stator design.
2. Rotor creates a liquid ring, generating a significant vacuum build in the reactor head.
3. This vacuum ensures that powders from the hopper above are drawn into the head where they are sheared into the liquid phase, before hydration takes place.

TYPICAL APPLICATIONS

COSMETIC/ PERSONAL CARE	FOOD & BEVERAGE	PHARMACEUTICAL	CHEMICAL
Lotions	Jams	Antacids	Airplane de-icer
Gels	Pet foods	Cough syrups	Detergents
Creams	Egg substitutes	Granulation solutions	Paint
Deodorants	Salad dressings	Tablet coatings	Drywall compound
Hair gels & sprays	Syrups	Vitamin dispersions	Oilfield products
Mouthwash	Condiments	Topical creams	
Shampoos	Gums	Ointments	
Hair conditioners	Stabilizers	Lotions	
Toothpastes		Gels	
Sunscreen			
Liquid makeup			

FEATURES

1. Steep-walled, mirror-polished hopper for superior powder flow.
2. Butterfly valve or optional full-port ball valve eliminates hindrances to powder flow.
3. Sanitary design with clamped housing, easily dismantled for inspection; most CIP designs meet *3A*® standards, USDA Dairy approved.
4. All stainless steel construction.

SPECIFICATIONS

		MODEL			
		ZC0	ZC1	ZC3	ZC5
POWER	HP kW	3 2.2	7 1/2 5.5	20 15.0	60 45
LIQUID CAPACITY	USGPM L/min	3 - 12 11 - 45	15 - 40 57 - 150	40 - 120 150 - 450	150 - 400 568 - 1500
POWDER CAPACITY*	lbs/min kg/min	30 14	60 27	120 55	1000 453
RPM		6,500	6,500	5,000	2,220
INLET FITTING SIZE	in mm	1 25	1.5 38	2 50	3 75
OUTLET FITTING SIZE	in mm	1 25	1.5 38	2 50	4 100
CIP CLEANABILITY		Yes 3A®	Yes 3A®	Yes 3A®	Yes 3A®

**Actual capacities will vary depending upon tooling selection and product characteristics.*

QUADRO YTRON®

XC Disperser

High-Capacity, Single-Pass Dispersion of Powders

MEDIUM SHEAR

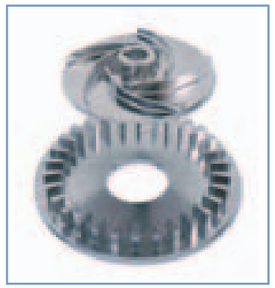
The *Quadro Ytron*® XC Powder Disperser is designed to incorporate and disperse large quantities of moderately difficult-to-wet powders into a liquid stream with minimal air entrainment.

High concentrations

Processing at ambient temperatures, the XC Disperser's dual-stage reactor generates a near-perfect vacuum that ensures the intensive wetting of powders while delivering high discharge capacity, to enable concentrations up to 40% by weight to be produced *in a single pass*.

Batch-to-batch repeatability

Not only does this innovative technology reduce dispersion times by up to 80%, but product characteristics are completely reproducible from batch-to-batch. And there's no plugging of screens, typical of other in-line blenders.



Impact design tooling

Shear design tooling

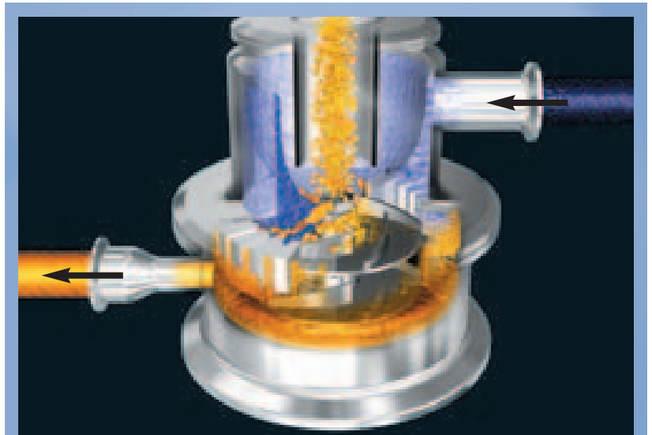
High throughput

Two portable, sanitary-design models of the XC Disperser are available, offering throughputs up to 200 gpm (760 L/min). Powder delivery options include feeding from hoppers, bag dump stations, bulk bags or super sacs and wanding from bags or our *Quadro Vac*® vacuum delivery system.

Integrated Solutions

This XC Disperser provides high concentrations with fast dispersion of protein hydrolysate for the Dairy industry.

Dynamic Principles



1. The XC Powder Disperser has a dual-stage reactor.
2. The first stage creates a strong vacuum to draw the powders into the reactor head.
3. Immediately after the powder comes in contact with the liquid, the premix is subjected to intense directional and velocity changes as it impacts the stationary baffles.
4. The lower stage tangentially discharges a smooth, lump-free, homogeneous product.

Typical Applications

FOOD & BEVERAGE	PHARMACEUTICAL	INDUSTRIAL
Milk powders	Nutrient replacement drinks	Paint
Whey powders	Antacids	TiO_2
Protein powders	Cough syrups	Oxides
Gums and stabilizers	Growth media	Pigments/stabilizers
Cocoa	Cell cultures	Coatings
Starches	Gelatin	Carbon dispersions
Maltodextrin	Pigment dispersions	Ink
Ice cream mix		Resins
Drink syrups/concentrates		Textile color
Infant formula		Cleaning solutions
Yogurt mixes		
Liquid beverages		

Features

1. Steep-walled hopper for superior powder flow.
2. Butterfly valve or optional full-port ball valve eliminates hindrances to powder flow.
3. Sanitary design with clamped housing, easily dismantled for cleaning; CIP design meets *3A*® standards, USDA Dairy approved.
4. All stainless steel construction.

Specifications

		MODEL XC1	MODEL XC3
POWER	HP kW	7 1/2 5.5	25 18.5
LIQUID CAPACITY	USGPM L/min	40 - 70 150 - 265	120 - 200 450 - 760
POWDER CAPACITY*	lbs/min kg/min	150 68	400 180
RPM		5,400	3,000
INLET FITTING SIZE	in mm	1.5 38	2 50
OUTLET FITTING SIZE	in mm	1.5 38	3 75
CIP CLEANABILITY		Yes	Yes

**Actual capacities will vary depending upon tooling selection and product characteristics.*

QUADRO YTRON®

Y Jet Mixer & By-Pass Tube

In-Tank Mixing System for Liquid Blending, Powder Incorporation and Dispersion

LOW BULK SHEAR

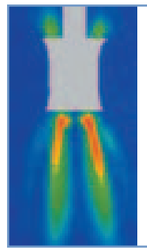
The *Quadro Ytron® Y Jet Mixer* uses a unique rotor/stator mixing head that creates a pure axial flow discharge jet to provide efficient in-tank mixing and blending. The wasteful radial flow and vortexing that are the downfall of conventional open-impeller design mixers are gone forever. Air entrainment is virtually eliminated – without the use of baffles.

Uniform velocity profile

The *Y Jet Mixer*'s strong axial flow pattern produces a uniform velocity profile, throughout the vessel with no stratification or dead areas, improving heat transfer rates and reducing batch blending times by as much as 80%. The *Y Jet Mixer*'s flow characteristics are ideal for the suspension and re-suspension of high-settling-rate solids.

Rapid sub-surface dispersion

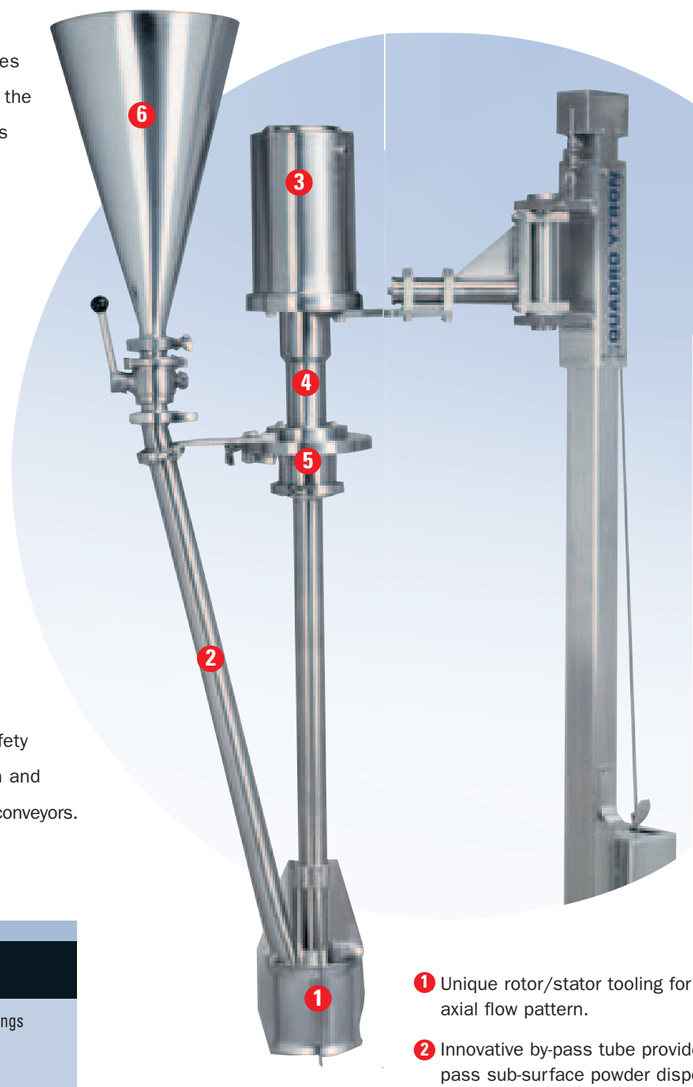
An innovative by-pass tube makes use of the strong negative pressures at the *Y Jet Mixer*'s rotor to draw powders and liquids directly into the rotor/stator head. The result is the immediate sub-surface dispersion of powders and viscous pastes into the liquid phase. Shear is applied to the product as it is discharged from the bypass for single-pass incorporation.

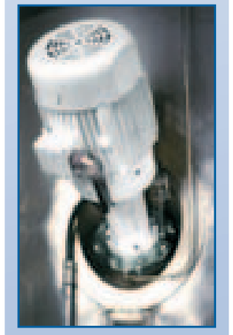


The computer model shows how the product is accelerated through the rotor/stator head while the bulk contents of the tank experience uniform velocity, without stratification or dead areas.

Dust-free powder handling

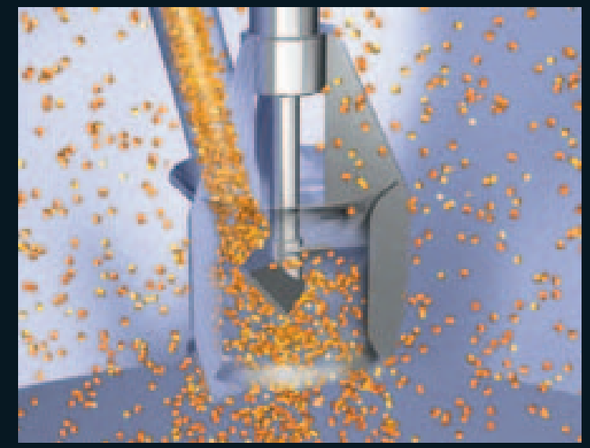
Depending upon the nature of the dry ingredients, a variety of dust-free powder handling methods, such as wanding from bags or totes, are available for delivering powders to the bypass tube. In addition to ensuring maximum mixing performance, dust-free handling reduces health and safety concerns, minimizes cross-contamination and eliminates the need for expensive material conveyors.





Typical applications for this side-entry model include storage silos, tall tanks, horizontal vessels and low-liquid-level mixing.

DYNAMIC PRINCIPLES



1. The *Y Jet Mixer* incorporates a specially designed rotor/stator mixing head to create a pure axial flow pattern.
2. An axial flow impeller within a unique, finned stator eliminates radial flow to deliver a strong axial discharge.
3. By means of a by-pass tube, product is delivered directly to the head for single-pass processing.
4. The *Y Jet Mixer* is mounted near the tank wall to ensure strong top-to-bottom roll that results in a uniform velocity profile of the tank contents, without vortexing or air entrainment.

TYPICAL APPLICATIONS

COSMETIC/ PERSONAL CARE	FOOD & BEVERAGE		PHARMACEUTICAL		CHEMICAL
Shampoos/ conditioners	Pectins	Juice and beverage concentrates	Pigments	Polyethylene glycol	Automotive coatings
Make-up bases	Skim milk powder	Lactose	HEC	Medicated syrups	Pigments
Lotions	Fruit blending	Ice cream mix	CMC	Antibiotics	Bentonite clay
Creams	Gum acacia	Stabilizers	HPMC	Antacids	*Cab-o-Sil*® (fumed silica)
Toothpastes	Starches	Tomato paste	HPC	Tablet coatings	Resins
Pigments	Guar	Pasta sauce	Vitamins and minerals		Calcium carbonate
	Gelatin	Ketchup	Bentonite clay *Cab-o-Sil*® (fumed silica)		Diatomaceous earth
	Sugar solutions	Salad dressings			Polyvinyl alcohols
	Cocoa	Syrups	Sodium alginate		Paper coatings
	Citric acids	Yogurt mixes	Starches		Paint
	Powdered egg				Ink
	Cinnamon				Carbon black

FEATURES

1. Unique rotor/stator tooling for strong axial flow pattern.
2. Innovative by-pass tube provides single-pass sub-surface powder dispersion directly into rotor/stator.
3. Fixed-speed motors with variable-speed and air motor options available.
4. Simple, direct-driven spindle provides long bearing life and easy maintenance.
5. Seal options include V-ring, double Varilip™, single and double mechanical seals.
6. Stainless steel construction.

SPECIFICATIONS

		MODEL				
		Y0	Y2	Y3	Y4	Y5
POWER (Maximum)	HP kW	1/3 0.25	3 2.2	10 7.5	30 22.4	75 56.0
LIQUID BLENDING/ SOLIDS SUSPENSION (Batch size)	Gal Liters	75 285	600 2,280	6,000 22,800	20,000 76,000	60,000 228,000
POWDER INCORPORATION (Batch size)	Gal Liters	25 100	300 1,140	1,000 3,800	4,000 15,200	N/A
POWDER FEED RATE	lbs/min kg/min	2 1	50 23	150 68	200 90	N/A

**Actual volumes and capacities will vary depending upon product characteristics.*

Integrated Solutions, Custom Engi neered for Your Processing Demands

At Quadro, we love challenges. After delivering industry-leading performance in thousands of applications – from the simple to the most complex– we've seen some of the toughest processing challenges. In fact, we like nothing more than a customer with a seemingly impossible problem to solve.

Meeting the requirements of the toughest applications requires more than experience. It requires engineering depth. When you partner with Quadro, you work hand-in-hand with some of the most knowledgeable engineers in the business, processing experts who understand how to apply the unique advantages of *Quadro Ytron®* technology to maximize your process.

At the Quadro R&D Test Center, we work with a vast array of applications, developing advanced solutions for leading processors worldwide.

Application-specific solutions

First, we look at your process train, to see how we can optimize your application. Then, in our state-of-the-art R&D Test Center, we verify your process using various configurations of Quadro technology, providing product samples and video-taped results, to achieve the performance your specifications demand. In most cases, the performance and quality improvements to our customer's existing process are dramatic.

Available in USDA Dairy approved, CIP and SIP designs meeting *3A®* standards, *Quadro Ytron®* products are available in accordance with many international standards including UL, CSA and Halal certifications, and comply with OSHA, FDA, CE, cGMP, ATEX and 21CFR11 guidelines and directives.

Up and downstream integration

From stand-alone, in-line emulsifiers to integrated process skid systems incorporating automatic powder feed, liquid flow control and product transfer, each solution can be custom configured for easy integration with your process train. And to ensure successful integration into your plant environment, we offer on-site demos, lab testing, monthly rentals and extended proof-of-performance programs.

Another thing to consider. With distribution, service and support in virtually every industrialized region of the world, we can meet your needs no matter where you're doing business. Just one more reason why global leaders choose Quadro as their processing partner.

The Quadro Ytron® *CDS Continuous Dispersion System offers automatic in-line control of liquid and powder feeds, maintaining exact concentrations for direct downstream packaging or further processing and eliminating the need for batch tanks.*

This ZC1 Dispersion System performs a two-step process to manufacture a cosmetic product. The first step in this liquid foundation manufacturing system disperses pigments and thickeners into an aqueous phase. The second step creates a water/ silicone emulsion, in a single pass.

SOLUTION PROFILE

Dramatically higher productivity, without facility expansion

"With Quadro Ytron® we've been able to substantially increase production, without having to expand our facility. In addition to reducing overall batch times by 75%, the increase in viscosity we achieved has allowed us to re-formulate and use less powder – saving time and money."

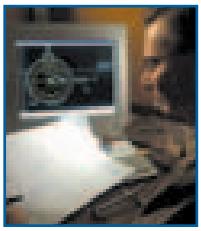
A leading North American developer of innovative professional dentistry products brought us their challenge. They needed to rapidly and uniformly disperse *Carbopol®* and 40% carbamide peroxide into a low pH glycerine solution, without over-processing. After analyzing the problem, Quadro engineered a solution that not only met their requirements, but optimized batch-to-batch consistency, reduced air entrainment and eliminated the need for filtering undispersed powders.

A ZC1 In-line Disperser is skid mounted with a dual PD pump arrangement and Quadro Vac® *powder transfer system for full control over addition rates and viscosity. Pre-set operating points on inlet and discharge pumps facilitate addition of individual ingredients. An automated powder valve with level sensors in the hopper controls powder addition on/off.*

Quadro Ytron®
Model ZC1Q

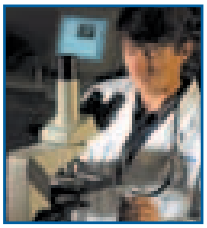
Quadro Process Productivity Solutions

For more than 30 years, Quadro has made an unparalleled commitment to delivering the highest production efficiencies, product quality and consistency to market leaders in the Pharmaceutical, Food, Fine Chemical, Personal Care and Cosmetics industries worldwide.

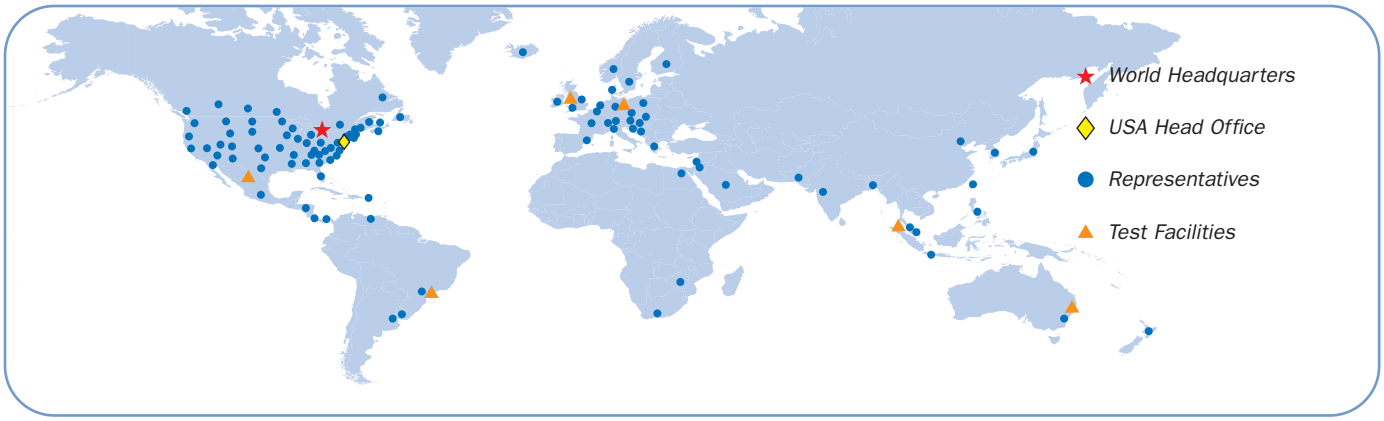


With the engineering experience gained from developing reliable application-specific solutions for major processors in more than 80 countries, our knowledge of size reduction and dispersion is unmatched. In fact, meeting the evolving needs of our customers drives the development of some of the industry's most advanced processing technologies and systems – such as the *Quadro® Comil®*, *Quadro Ytron®* in-line mixers, dispersers and emulsifiers and *Quadro Vac®* vacuum transfer systems.

Since 1976, Quadro has led the industry in research & development. Through the Quadro R&D Test Center we work directly with our customers, to run real-world tests of their processes on the latest Quadro equipment. The result has been technical breakthroughs that have changed the way many of our customers process, and led to new global processing industry standards.



As the world's leading supplier of size reduction technology – with a vast global network of agents, distributors, OEMs and partners – Quadro provides a level of service and technical support that is unequaled in the industry. Our passion for technology is exceeded only by our dedication to meeting the needs of our customers.



SIZE REDUCTION • FLUID MIXING • PNEUMATIC TRANSFER

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