



Your Global Equipment and Processing Solution

# SOLUTIONS MADE SIMPLE

*Longstanding Trusted Source, Constant Innovation*

## Product Catalog

Experts in Coating &  
Granulation Technologies



FLUID BEDS | ROLL COMPACTION | HIGH SHEAR GRANULATORS  
COATING PANS | SPRAY DRYERS | MATERIAL HANDLING | PROCESS CONTROLS

# The FREUND-VECTOR Difference



FREUND-VECTOR is a global leader renowned for trust, value and quality.

## **Our Story**

Freund-Vector is a world-class coating and granulation equipment and service provider prepared to satisfy your processing requirements on a global scale. We provide the highest in equipment quality, system engineering, technical processing assistance, training, equipment servicing, and spare parts. With Freund-Vector, everything we supply comes with comprehensive lifetime support.

## **At Freund-Vector, We Listen and Propose Solutions**

Our clients have been the backbone of our work since 1972. While a lot has changed, one thing remains the same - "Our mission is to become your most trusted and valuable supplier." We constantly challenge ourselves to continually improve and innovate our products and services to meet the ever-changing needs of the marketplace.

**LET'S START WORKING TOGETHER TO ACCOMPLISH YOUR GOALS!**



*Your Global Equipment and Processing Solution*

675 44<sup>th</sup> St | Marion, IA 52302 | +1-319-377-8263

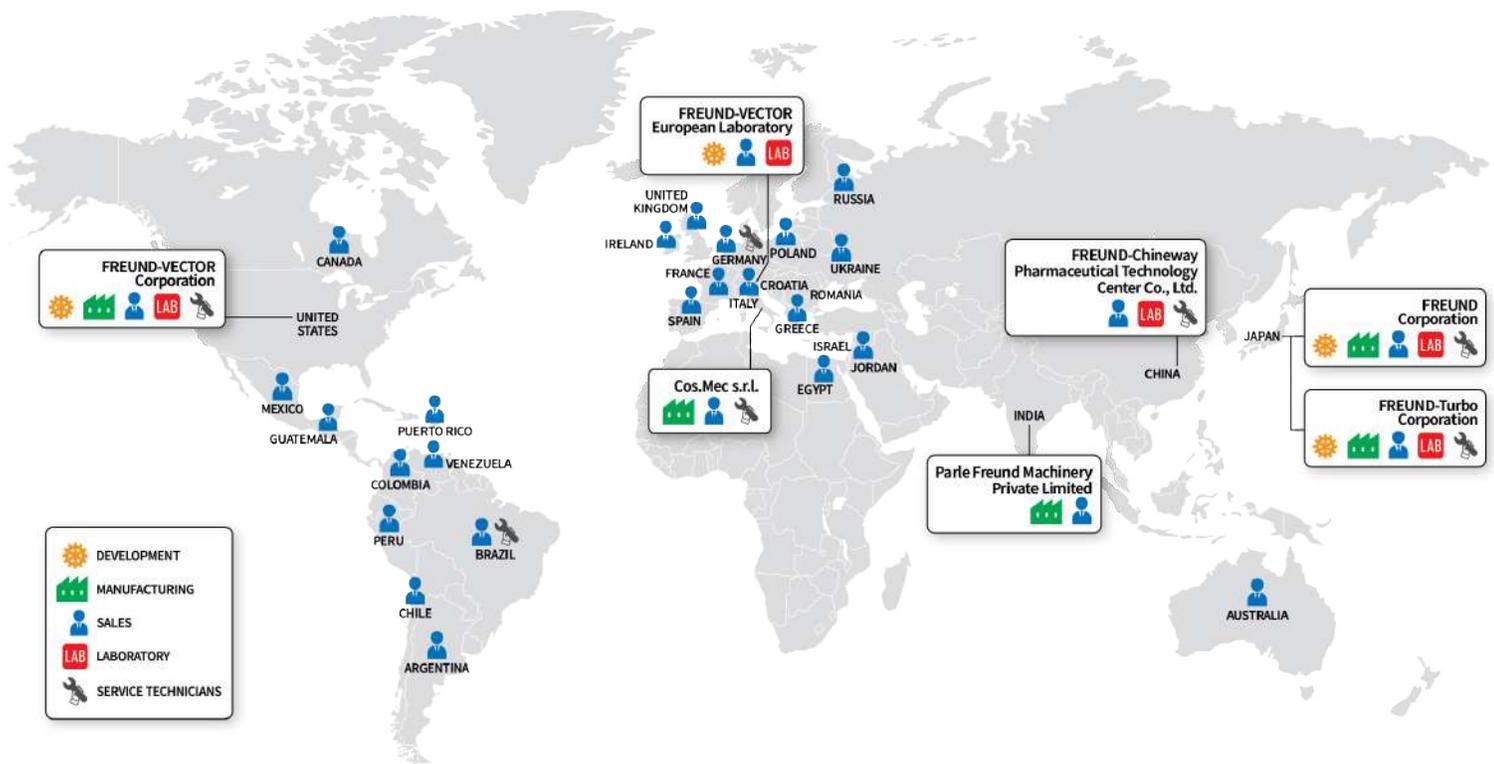
# Social Media

We use various channels to keep you informed with news, videos, photographs and new product information. To find out more visit:



@Freund-Vector

## FREUND Group Global Business Base



\*Agents can represent multiple territories

# Spare Parts

To ensure safe, reliable, and ideal operation of your equipment at all times, the use of original designed spare parts is necessary to the service life. We work with you before and after the sale to determine what critical spare parts your equipment needs and make sure they are always available for immediate delivery; or you can stock them, so they are ready at a moment's notice.



# ON-SITE PROCESS SOLUTIONS

Marion, Iowa | Villasanta, Italy

Freund-Vector Laboratories specialize in the design and development of granulated and coated products for the pharmaceutical, nutritional, confectionery, food, chemical, and other related industries.

The laboratories feature state-of-the-art processing equipment ranging from laboratory to pilot/production scale to perform feasibility studies and product development services.

## **Services Included:**

- ✓ Product and Process Evaluation
- ✓ Formulation Assistance
- ✓ Process Optimization
- ✓ Product and Process Development
- ✓ Process Scale-Up
- ✓ Technology Transfer
- ✓ Process Troubleshooting
- ✓ Contract Manufacturing
- ✓ Seminars/Training

## **Process Capabilities:**

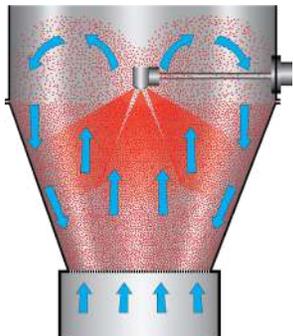
- ✓ Fluid Beds
- ✓ High Shear Mixers
- ✓ Roll Compaction
- ✓ Pan Coating
- ✓ Spray Drying



# FLO-COATER® TECHNOLOGIES

Maximum Processing Flexibility

## TOP SPRAY



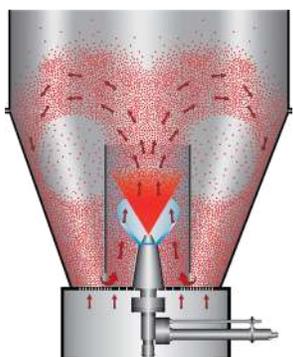
### Granulation/Agglomeration

- ✓ Uniform: Granules/Quality/  
Density/Porosity
- ✓ Homogeneous Mixing
- ✓ Improved Flowability
- ✓ Less Dense Granules
- ✓ Instantizing
- ✓ Improved Disintegration
- ✓ Reduction of Fines

### Coatings

- ✓ Wax Matrix
- ✓ Uniform
- ✓ Active
- ✓ Hot Melt

## WURSTER



### Wurster Accelerator

- ✓ Increased Spray Rates
- ✓ Precision Product Movement
- ✓ Maximum Yields
- ✓ Minimal Agglomeration
- ✓ Reduced Coating Times
- ✓ Increased Batch Capacities

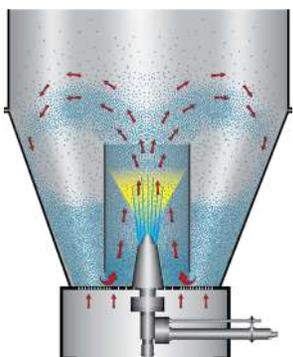
### Coatings

- ✓ Fine Particle
- ✓ Uniform/Active
- ✓ Controlled Release
- ✓ Hot Melt

### Single or Multiple Partitions

- ✓ Single Point Automated  
Partition Height Control
- ✓ In-process Removable Spray Gun

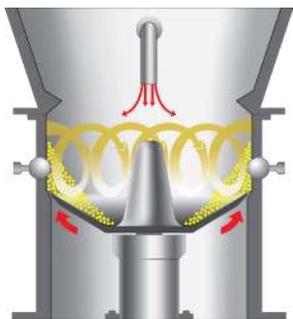
## WURSTER PRO



### Powder Coating

- ✓ Uniformity
- ✓ Minimized Agglomeration
- ✓ Repeatable Process
- ✓ Micronized API/Binder
- ✓ Micronized Dry Polymer
- ✓ Binder or Plasticizer
- ✓ Polymer Suspension/Glidant
- ✓ In-process Removable Spray Gun

## GRANUREX®



### Spherical Granulation

- ✓ High Density Granules
- ✓ Narrow Distribution
- ✓ 95-97% Active Content
- ✓ 95-99% Yields

### Coatings

- ✓ Polymer Solutions/Suspensions
- ✓ Uniform/Active/Polymer
- ✓ Reduced Processing Times

### Powder Layering

- ✓ Uniform
- ✓ Polymer
- ✓ Multi-Layered Multi-Particulates
- ✓ 1-90% Active Content
- ✓ 95-99% Yields

### Drying

- ✓ Process End Point
- ✓ No Secondary Drying



# VFC FLO-COATER®

## Laboratory Series Fluid Beds

With its standard drying, top spray and bottom spray capabilities, as well as the optional GRANUREX® rotor insert, the VFC-LAB FLO-COATER® series are the most versatile laboratory scale fluid bed systems available.

The unique design of the combination product container/Wurster processing insert and integrated solution pump eliminates the need for costly “add-ons”. The combination product container also allows for quick changeover and cleaning between processes.

Portable, flexible, efficient, and easy to operate, the VFC-LAB series is the perfect solution for your process development requirements.

MODELS	CONTAINER CAPACITY (L)	WURSTER CAPACITY (L)	GRANUREX CAPACITY (L)	PROCESS AIR VOLUME	SOLUTION DELIVERY RATE
VFC-LAB Micro	200mL - 1.2	40mL - 1.2	-	40 - 180 L/min	0.5 - 10 mL/min
VFC-LAB Mini	2.5	2.5	-	23 - 40 m <sup>3</sup> /hr	1.4 - 50 mL/min
VFC-LAB 1*	0.63 - 4	1.4 - 3.7	1.5	150 m <sup>3</sup> /hr	1.4 - 50 mL/min
VFC-LAB 3*	2 - 20	1.4 - 9	10	280 m <sup>3</sup> /hr	1.25 - 110 mL/min
VFC-LAB 3XL*	4 - 27	1.4 - 20.6	10	425 m <sup>3</sup> /hr	1.25 - 110 mL/min

\*Optional Product Containers Required for Reduced Processing

\*\*Optional Feature

### Features

- ✓ Flexible Configurations
- ✓ Removable Cartridge Filters
- ✓ Self-Contained System
- ✓ Color Touch Screen Controls
- ✓ COMPU™ Control System with 21 CFR Part 11\*\*
- ✓ Smart-Safe™ Containment\*\*
- ✓ EcoClean™ Systems\*\*



# VFC FLO-COATER®

## Production Series Fluid Beds

Our production systems are both simple and flexible. User-selected process components, filters, control systems and more. This modular approach ensures that qualification and validation procedures are kept to a minimum.

The systems are uniquely engineered to meet your specific processing requirements, multi-processing capabilities and custom installations with all the ability to dry, granulate, coat, layer, spheronize and instantize.

MODELS	CONTAINER CAPACITY (L)	WURSTER CAPACITY (L)	GRANUREX CAPACITY (L)	PROCESS AIR VOLUME (m <sup>3</sup> /hr)
VFC-30/X	100 - 120	-	-	3,000
VFC-60/X	220 - 250	-	-	4,500
VFC-120/X	420 - 500	-	-	6,000
VFC-200/X	660 - 800	-	-	8,000
VFC-300/X	1,200 - 1,570	-	-	9,500
VFC-500/X	1,570 - 1,900	-	-	12,000
VFC-5M/X	6 - 27	12 - 22	10	750
VFC-15M/X	20 - 60	22 - 50	10	1,500
VFC-30M/X	45 - 120	22 - 165	10 - 50	3,000
VFC-60M/X	100 - 250	165 - 570	50 - 140	4,500
VFC-120M/X	220 - 500	260 - 570	140	6,000
VFC-200M/X	420 - 800	570 - 970	140 - 370	8,000
VFC-300M/X	660 - 1,570	970	370	9,500
VFC-500M/X	1,200 - 1,900	970	370	12,000

Optional Product Containers Required for Reduced Processing  
\*Optional Feature

### Features

- ✓ Optimized Geometries
- ✓ Non-Inflatable Seal Design
- ✓ Multiple Discharge Options
- ✓ Color Touch Screen Controls
- ✓ COMPU™ Control System with 21 CFR Part 11\*
- ✓ Smart-Safe™ Containment\*
- ✓ EcoClean™ Systems\*



Hot Melt Guns



# GRANUMEIST® (GMX/GMXB)

## Lab/Production Series High Shear Mixers

The GRANUMEIST® High Shear Mixer series are designed for efficient and homogeneous wet granulation of powders to form medium to high density granules with excellent flowability and compressibility characteristics.

Each series of mixers can work with aqueous and solvent processing. Both have optional jacketed bowls for product temperature control and both can be executed in 12-Bar pressure explosion proof configuration.

MODELS	BOWL CAPACITY (L)	MIXER SPEED (RPM)
GMX-LAB Micro	1, 4	30 - 1550
GMX-LAB Mini	4, 8	75 - 715
GMX-25	25	43 - 425
GMX-75	75	30 - 300
GMX Production	150 - 1,800	23 - 100
GMXB-LAB Micro	1, 2, 4, 6	455 - 1100
GMXB-LAB Mini	4, 6, 10	51 - 720
GMXB-Pilot	10, 25, 65	40 - 485
GMXB Production	100 - 3,000	7.5 - 75

\*Optional Feature

### Features

- ✓ Ideal for Granulation Suites
- ✓ Simple Scalability
- ✓ Unique Mixer Shaft Seal
- ✓ Fastest Charging/Discharge Rates
- ✓ In-Wall Installation Optional
- ✓ One-Pot Processing
- ✓ Color Touch Screen Controls
- ✓ COMPU™ Control System with 21 CFR Part 11\*
- ✓ Smart-Safe™ Containment\*
- ✓ EcoClean™ Systems\*



# GRANULATION SUITES

## Vertical or Horizontal Processing



Freund-Vector's horizontal granulation suites can be executed with both top & bottom drive systems and installed within single or adjacent processing rooms. The equipment layout is based on a through-the-wall design to minimize processing space and simplify cleaning the equipment.

Utilizing a vacuum pump, product is easily transferred into the high shear mixer. After granulation, the fluid bed exhaust blower is used to efficiently transfer the wet granulation into the fluid bed dryer. After drying, an external vacuum source is used to transfer product into a dry mill and/or IBC.

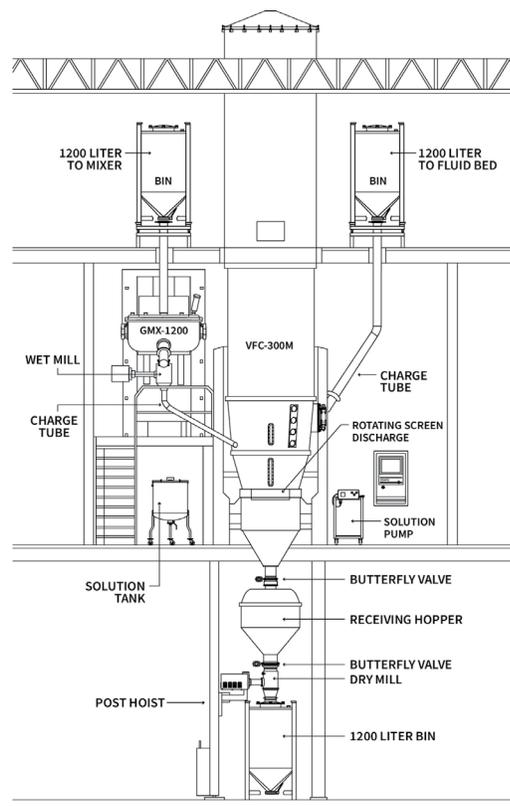


Freund-Vector's vertical granulation suites can be installed on several floors of a pharmaceutical facility. Gravity is utilized to provide a more efficient flow of product.

After the granulation process is complete, the high shear granulator/mixer relies on gravity and a wet mill to control the product flow into the fluid bed.

After the fluid bed drying process is complete, product is discharged using either Freund-Vector's patented lowering screen discharge method or via a rotating product screen. The dried product is discharged into an intermediate hopper where it waits to be dry-milled into the final IBC.

All granulation suites include Freund-Vector's COMPU™ automated control system which is designed to meet the strictest interpretation of 21 CFR, Part 11. The COMPU™ Automated Process Control System provides the highest level of pharmaceutical processes control.





# VHC HI-COATER®

## Lab/Production Series Tablet Coaters

The VHC HI-COATER® is used worldwide in the pharmaceutical, nutraceutical and industrial industries. With fully perforated drums, an industry leading spraying system and exchangeable baffles, products can be coated quickly and efficiently, making it a reliable workhorse for all kinds of coating requirements.

MODELS	PROCESSING RANGE (L)	SPRAY GUNS (QTY)	PROCESS AIR VOLUME (m3/hr)
LDCS-Micro	0.05 - 1	1	25 - 85
LDCS	0.05 - 8	1	17 - 170
LDCS-Plus	0.15 - 20	1	51 - 510
LDCS-Pilot	1.1 - 55	1-2	200 - 1,000
LDCS-Pro	2 - 150	1-3	255 - 1,700
VHC-Multi	11.5 - 1,070	4 - 8	850 - 11,900
VHC (FP)	20 - 1,800	4 - 12	2,124 - 11,900
VHC (IP)	90 - 1,500	4 - 12	1,480 - 8,155

\*Optional Feature



### Manifold Spray Bar

- ✓ Modular Design
- ✓ Internal Air/Solution Lines
- ✓ Unique Gasket Design
- ✓ Anti-Beading Spray Guns
- ✓ Simple Cleaning Process

### Features

- ✓ Film, Solvent & Sugar Coating
- ✓ 10-100% Capacity
- ✓ "Elongated" Pans
- ✓ Minitab Pans
- ✓ Zone Coating System
- ✓ Color Touch Screen Controls
- ✓ COMPU™ Control System with 21 CFR Part 11\*
- ✓ Smart-Safe™ Containment\*
- ✓ EcoClean™ Systems\*



Standard Pan



Elongated Pan



# TFC ROLL COMPACTION

## Lab/Production Series

The TFC Roll Compaction systems are a continuous, directly compressible, dry granulation system to improve material flow characteristics and increase material density. A vertical product flow system uses a single tapered feed screw to deliver the material to the fully contained compaction zone of the cantilevered rolls, increasing product yields and minimizing product fines.

MODELS	PROCESSING RANGE (kg/hr)	ROLL SPEED (RPM)	MAXIMUM ROLL FORCE (KN)
TFC-LAB Micro*	5g - 1	1 - 4	13.2
TFC-220	1 - 30	2 - 17	50.4
TFC-520	5 - 130	3 - 25.5	136
TFC-1230	100 - 400	2 - 17	284.7
TF-1540**	200 - 700	2 - 17	374

\*Smallest Roll Compactor on the Market

\*\*Non-Cantilevered Design

\*\*\*Optional Feature

### Features

- ✓ Single Tapered Vertical Screw
- ✓ Constant Force Design
- ✓ Gap Measurement & Optional Control
- ✓ Unique Roll Seal Design
- ✓ Color Touch Screen Controls
- ✓ COMPU™ Control System with 21 CFR Part 11\*\*\*
- ✓ Smart-Safe™ Containment\*\*\*
- ✓ EcoClean™ Systems\*\*\*



### Rasping Star Mill: The New Standard

- ✓ Throughputs up to 700kg/h
- ✓ Variable Speed
- ✓ Uniform Milling
- ✓ Tight Particle Size Distribution
- ✓ Sieve Plate Types:
  - Rasping
  - Flat Perforated





# VSD SPRAY DRYERS

## Lab/Production Series

Our VSD series is focused on providing you with small molecule process development & formulation solutions that will allow you to move through each phase with flexibility and speed.

The systems are built to overcome limitations found in other spray dryers. Equipped with modular components and accessories that allow you to easily configure the equipment to best suit your intended process, you can now discover faster and more reliable pathways to scale up and time to market.

MODELS	WATER EVAPORATION (kg/hr)	DRYING GAS VOLUME (kg/hr)
VSD-LAB Micro	0.5	12
VSD-200	1	25
VSD-800	4	120
VSD-800+	6	180
VSD-1200	15	400
VSD-1600	25	800
VSD-2200	50	1,250

Solvent Capacities: Contact Us  
\*Optional Feature

### Features

- ✓ Aqueous/Solvent Ready
- ✓ Drying Chamber Extensions
- ✓ Cyclone Configurations
- ✓ Multiple Nozzle Types
- ✓ Color Touch Screen Controls
- ✓ COMPU™ Control System with 21 CFR Part 11\*
- ✓ Smart-Safe™ Containment\*
- ✓ EcoClean™ Systems\*



VSD-200 Discovery Module





# MATERIAL HANDLING

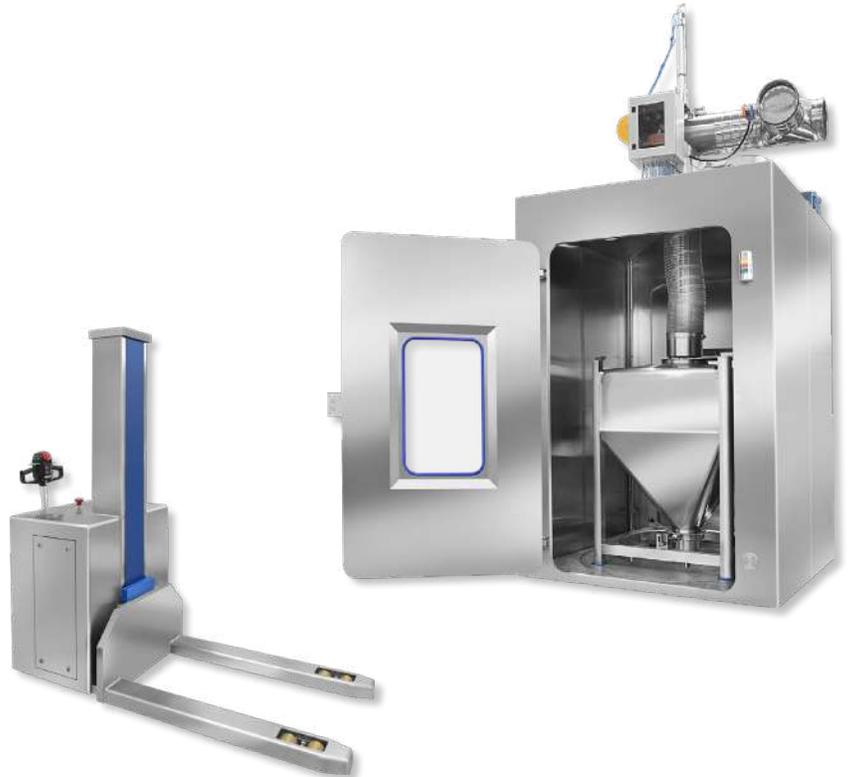
## Lab/Production Series

Freund-Vector offers a complete range of powder and tablet handling solutions for the pharmaceutical, nutraceutical, food, and many other industries around the globe. Applying our experience and technical expertise, we work together with our customers to deliver first-class personalized, single source solutions for projects of all ranges and complexity.

### CATEGORIES

Bins/IBC's	1 - 2,500 L
Laboratory Bin Blender	1 - 15 L
Pilot Bin Blender	1 - 50 L
Production Bin Blenders	50 - 2,500 L
IBC Washing Systems	1,000 - 1,200 mm
Column Lifts & Inverters	200 - 1,500 kg
Mobile Lifts	50 - 1,500 kg
Mills	50 - 1,600 kg/hr
Vibrating Sifters/Seperators	200 - 800 kg/hr
Solution Tanks	25 - 600 L
Drums	1 - 450 L
V Blenders	5 - 4,000 L
Double Cone Blenders	5 - 4,000 L

*\*Standard Sizes and Capacities Shown,  
Contact us for Custom Sizes*



# PAT PROCESSING EXPERTS

## A Process-Centric Approach

Process Analytical Technology (PAT) is a system for designing, analyzing, and controlling pharmaceutical manufacturing processes through measurements of critical quality and performance attributes of raw and processed materials to ensure final product quality. The idea of which is to become more efficient while reducing over-processing, enhancing efficiency, reducing waste, and getting products to the market faster.

### WHY SHOULD YOU WORK WITH FREUND-VECTOR FOR PAT?

We offer a wide arrange of real-time information on powders, pellets, granules, tablets, solids, slurries, liquids.

- ✓ Process Parameters
- ✓ Moisture & Drying Analysis
- ✓ In-Process Material Behavior
- ✓ Coating Thickness
- ✓ Particle Size
- ✓ Particle Size Distribution
- ✓ End Point Detection
- ✓ Blending Uniformity
- ✓ And More!



MicroNIR PAT-U

Our process scientists specialize in supporting the implementation of PAT for processing. We take a step-by-step approach by employing PAT in simple cases to produce noticeable gains. Once the benefits and understanding that PAT creates are transparent, you will be ready to start the establishment of bigger PAT projects.



NIR Filter Photometer



NIR Full Spectrum Analyzer



Inline Particle Probe

# ADDITIONAL TECHNOLOGIES

## Containment and Cleaning



### All Systems are Available in Containment Designs

- ✓ 1µg/m3 Containment: No Isolator  
(Confirmed by EHS Sample Testing)
- ✓ <1µg/m3 Containment: With Isolator
- ✓ 10 ng/m3 Containment
- ✓ Contained Infeed, Sampling and Outfeed
- ✓ Split Butterfly Valves

### Material Handling Options

- ✓ Drum Loading (Lift/Vacuum)
- ✓ IBC Loading (Lift/Vacuum/Through Floor)
- ✓ Bag/Bottle Infeed/Outfeed Systems
- ✓ Vacuum Discharging
- ✓ In-Line Sieving/Milling

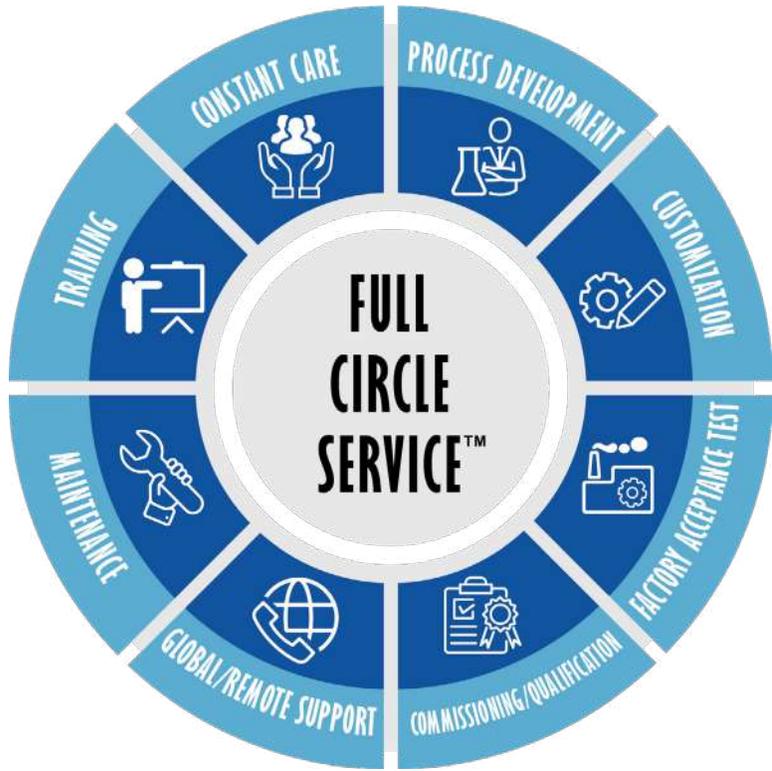
### Custom Solutions for Your Specific Needs

- ✓ Each System can be Customized for your Specific Requirements



### WIP/CIP System Options

- ✓ Basic WIP System
- ✓ Advanced EcoClean™ (CIP) System
  - Complete Cleaning and Drying in as Little as One Hour
- ✓ High Pressure/Low Volume Skid
  - Low Water Consumption
  - Less Waste Water Generated
- ✓ Electric or Steam Water Heater
- ✓ Chemical Injection System
- ✓ Conductivity Measurement/Control
- ✓ Rinse Conductivity Measurement



Full Circle Service™ represents our endless dedication to provide the best customer service in the industry. Each project has unique requirements, and we tailor our equipment and services to your specific need, with one goal in mind – ensuring we are providing the best processing solutions.



## GET IN TOUCH

FREUND-VECTOR CORPORATION | Marion, IA | TEL: +1-319-377-8263

FREUND-VECTOR EUROPEAN LABORATORY | Villasanta, Italy | TEL: +39-039-2050331

FREUND CORPORATION | Tokyo, Japan | TEL: +81-3-6890-0750



*Your Global Equipment and Processing Solution*