PIERRE GUERIN “Innovative Solutions in Mixing & Transfer”

Standardized or customized systems, PIERRE GUERIN has the ideal solution to meet your needs in mixing & transfer...

With more than 60 years of experience in the design, manufacturing and installation of process equipment and turn-key units, PIERRE GUERIN has acquired an extensive know-how of technologies and unit operations in the Food & Beverage and Life Sciences Industries.

Among these, mixing has particular importance as it often determines the quality of the final product.

To meet these requirements, PIERRE GUERIN offers an extended range of agitators which suits any type of mixing operation.

Our specialists in agitation (design and field engineers) will provide you with the required expertise to achieve your processing objectives and improve productivity.

At the heart of the range of PIERRE GUERIN components, the POLYMEL blenders are dedicated to the dissolution of powder into liquid which enhance the process performance and the working conditions of the operators.

Another key unit operation is the transfer of raw materials and end products. In this area, PIERRE GUERIN offers a complete range of sanitary centrifugal and positive displacement pumps.

All these components are designed to comply with the highest requirements of sanitary and hygienic design, according to the EHEDG FDA.
Summary

Agitation & Mixing...

OUR SERVICES

TURBOLAB 2500 series
the state of the art in laboratory agitators

HTPG4 agitators,
the reference for the mixing of fragile products

POLYMIX agitators, the economical solution
for homogeneous holding of low viscosity products

EOLE4, an innovative agitation
for yours viscous and fragile products

HTA HELI-TURBO Agitators, a unique combination
for your dispersion operations

TURBO AGITATORS “P”, the versatile agitator
for your mixing operations

PG-MAG, magnetic agitators
for mixing under aseptic conditions

Process Components...

POLYMEL, blending system for the Food & Beverage Industries,
Pharmaceutical & Cosmetic Industries

PCP, centrifugal pumps
for the Food & Beverage Industries

PCP, centrifugal pumps
for the Pharmaceutical Industries

PVP, rotary lobes pumps
for the transfer of fragile or viscous products
Agitation & Mixing...

For more than 20 years, PIERRE GUERIN has been designing and manufacturing a comprehensive range of agitators, either integrated within our vessels or sold as components.

In 1993, PIERRE GUERIN reinforced its know-how through the acquisition of the MORITZ Company, a world reference in the field of mixing. The take-over of the BIOLAFITTE Company in 1998 also brought additional experience in this field to PIERRE GUERIN, especially for fermentation and cell cultivation applications.

With a wide range of propellers: three blade impellers, helicoids, turbines, PIERRE GUERIN offers is able to propose a solution for any agitation application usually met in the Food & Beverage and Life Sciences industries;

- homogeneous holding
- dilution
- homogenization
- dissolution
- dispersion
- emulsion
- thermal transfer

With PIERRE GUERIN, you take benefit of the expertise and experience of a specialized and dedicated engineering team whose principle aim is to choose and size the best mixing solution at each stage of your process.

In addition to the capability for designing and manufacturing, we can also take the responsibility for the installation of the agitation systems through to vessel manufacturing and a complimentary range of service contracts.
As a major supplier of equipment and turn-key units to the Food & Beverage and Life Sciences industries, PIERRE GUERIN has been designing, manufacturing and installing agitator and mixing systems for over 20 years.

PIERRE GUERIN competencies in Agitation & Mixing

PIERRE GUERIN combines its technological expertise in vessel and agitation design to the knowledge of your processes and products.

This combination of knowledge allows us to determine the best solution to meet your mixing needs and to design it following best practice engineering.

The perfect characterization of our propeller range is the key for selecting the correct mixing device ideally suited and appropriately sized to your application.

Taking into account the process operating conditions and physical performance to be achieved, the optimal mixing solution will yield the following benefits:

- minimizing of product losses
- reduction of mixing time and improvement of quality
- efficiency down to the minimum working volumes
- minimise impacts of shear effect or aeration
- sanitary design

To achieve these objectives, our design office will handle:

- hydrodynamic calculations to ensure the selection of the appropriate propeller (single or twin movement) and correct sizing (propeller dimensions, rotation speed, installed power)
- the calculation of mechanical constraints to provide repeatability and robust continuous operation
- the choice of shaft seal design (‘V’ ring gasket, single mechanical seal, double mechanical seal with either liquid or gas lubrication, magnetic coupling..) to suit operating conditions and environmental constraints
- thermal transfer calculations to comply with your expected performances

Our Field Service team comprises of experienced technicians dedicated to the installation and the maintenance of the agitators. Our Process Engineers are also available to support you during the first production runs in order to optimize your process recipes and validate the performance of the equipment.

Our Services

Assistance, Support, Audit, Site Intervention

Ask PIERRE GUERIN for an audit of your process vessels

Your agitators might be obsolete, there are some concerns at site?

- current performance is no longer appropriate to your evolved processes
- maintenance cost have increased, spare parts have become hard to source
- you meet non compliance issues with current safety regulations...

PIERRE GUERIN provide you with

- 60 years of experience in the Food & Beverage and Life Sciences processes
- a dedicated team of mechanical engineers for equipment audit at site and selection of the best solution to meet your needs through the supply of a new agitator, or the upgrade of the existing one
- an extended range of propellers and sealing design
- experienced field service engineers for the installation, refurbishment, inspection, maintenance and commissioning
and testing tools in our laboratory or at your site

which allow the selection of the optimal practical solution:

- through trials performed at lab or pilot scale and scaling-up utilizing simulation principles of geometry, video, dynamic, chemical and thermal types
- through trials at scale 1:1 (depending on vessels available in our laboratory)

These tools are also available for the optimization of your processes or small scale productions which can be used for qualitative validation of new-products.

The address for the delivery of your raw materials or products for lab trials or rheological measurements:

PIERRE GUERIN SAS - 6, Rue Denis Papin - 79000 Niort

For lab trials the raw materials must be supplied in quantities allowing for the production of two batches of 2/3 l end-product.

For pilot scale trials the raw materials must be supplied in quantities allowing for the production of two batches of 100 l end-product.

These raw materials must be supplied complete with SOP’s, operating modes and recipes.

For rheological measurements, a quantity of 200 ml per product type is a convenient quantity.

Where are we active

Our primary area of activity is Europe …

but we also operate worldwide…
The TURBOLAB 2500 is the essential or represents the state of the art bench agitator for the development and the formulation of product samples at laboratory scale. The available range of impellers covers all commonly found mixing operations in the food and pharmaceutical process: heat transfer, suspension holding, homogenization, dissolving, dispersion, and emulsifying. These impellers are also available at industrial scale that allows for a predictable extrapolation.

The TURBOLAB 2500 is also suitable to viscous products due to its unique available power and speed.

**General Overview**

The TURBOLAB 2500 includes a quick lock coupling device combined to an electrical lifting device for easy use and changing of impellers.

**Technical Features**

- waterproof motor IP55, class FF
  - installed power: 0.55 kW
  - variable speed from 100 up to 4,500 rpm
- electrical lifting device - maximum height: 300 mm
- control cabinet comprising of:
  - emergency stop
  - led for power ON and mixing authorization
  - LCD Display of the agitation speed and temperature
  - ON/OFF agitation switch and speed controller
  - lifting device controller with safety contacts
- special frame profile ensuring perfect stability of the mixing device with dimensions suitable for the use of heating plate (2)
- beaker fixation device with locking system and safety contact allowing agitator start (3)
- temperature sensor (4)
- electrical Connections:
  - power supply: 230 V ± 15 Single phase: 50/60 Hz
  - cable, length 3 meters with 16 A connector
- weight: 40 Kg
- dimensions:
  - width: 450
  - depth: 450
  - height: 800
- noise level: 80dBA
- maximum dimensions allowed for the beaker:
  - volume ranging from 200 ml to 25 liters
  - maximum diameter: 340 mm
  - maximum height: 300 mm
- compliant to EEC directive 98/37/CE
Model HTPG4 Ø 100 propeller

- Features -
  - three blades impeller
  - axial flow
  - low turbulence action
  - low shearing action

- Applications -
  - homogenization of miscible liquids
  - suspension of solids
  - easy dissolving
  - heat transfers

Model Disc Turbine Ø 80

- Features -
  - high radial flow
  - high shearing action
  - high turbulence action

- Applications -
  - dissolving
  - dispersion
  - pasting
  - preparation of gels

Model L40 & L60 Turbines

- Features -
  - open disk turbine with stator ring
  - radial flow
  - high turbulence action
  - high shearing action

- Applications -
  - processing of products with high concentration of solids
  - cleaving
  - dissolving
  - chemical reaction

Model TR60 Turbine

- Features -
  - closed radial turbine with disks and toothed ring
  - high shearing action

- Fonctions -
  - emulsifying of liquids
  - dispersion of solids into liquids
HTPG4® agitators
The reference for the mixing of fragile products

A unique design: “the axial flow propeller “by excellence”

The design of the patented propeller HTPG4® originated from work focusing on two hydrodynamics mixing characteristics, essential when applied to any fragile fluid based products:
- to generate a minimum shearing effect
- to assure a maximum efficiency between circulation rates/power consumption, in order to optimize production periods and to minimize electrical consumption.

Improved blade designs and measurement of hydrodynamic impact with various sophisticated studies, in addition to numerical simulation, torquemeter and coloured tracer, generated the generation of PIERRE GUERIN Triple Impeller: HTPG4® (patented design).

Flow efficiencies of HTPG4 blades are unique...

- the design assures a minimum shearing in order to maintain compatibility with fragile product structures (fat matter, proteins, cells cultures, etc...)
- the design induces an oriented flux, avoiding radial leaks and generating two distinct upward and downward flows. HTPG4® generates an optimal circulation rate optimizing productivity and time efficiency
- the flow resistance is very low, minimising power consumption and energy costs associated with the installation.

Comparison of efficiency between HTPG4® and traditional large blade impellers

<table>
<thead>
<tr>
<th>Number of anti-rotation blades</th>
<th>Improvement of HTPG4® compared to a traditional large blade impeller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>-13</td>
</tr>
</tbody>
</table>

Mixing applications

HTPG4® allows for the following mixing operations:
- homogeneous blending of liquid product
- mixing and re-suspension of solids/liquids
- dissolving of readily soluble powder easily in liquids
- heat transfer improvements

Examples of applications
- cell culture
- bacterial fermentation
- milk maturation and standardisation
- milk fermentation, curd breaking
- crystallisation
- fruit juices and flavoured water preparation
- sugar syrup preparation
- homogeneous preparation of ready cooked meals components
- processed eggs preparation
- blending oils
- brine preparation
- wines assembling & tartaric precipitation
Why choose the PIERRE GUERIN solution?

- because it is one of the most efficient commercially available impellers
- because of our understanding of process and products
- because of the well defined flow properties of HTPG4® for all tank designs

Control and knowledge of agitation principles in your field of application combined with the HTPG4® efficiency brings the solution to your mixing requirements.

Standard - HTPG4® agitators - Top head mounting

PIERRE GUERIN production methods allow the manufacturing of HTPG4® configurations with diameters of up to 2.4 meters and shaft lengths of up to 12 metres.

With 1, 2, 3 or even 4 impeller stages, we are able to make hydrodynamic calculations that will ensure you selected to the most appropriate dimensioning to your needs.

HTPG4® top mounted agitators are suitable for vessel capacities up to 120 m³.

Our agitation engineering office carries our mechanical strain calculations (torque and flexion), is able to recommend the ideal location and system assembly thus assuring equipment longevity.

Various mechanical mounting solutions are proposed depending on the running conditions, with flange or screwed couplings, seal with simple or double gaskets, with double thermo-elastic gaskets, or with single or double mechanical seal.

Standard - HTPG4® agitators - Tank wall and bottom mounting

Technical characteristics

- IP55 gearbox motor, 400 or 230/400 volts three-phase supply voltage, 50 Hz
- three-blade welded impellers from Ø 200 to Ø 1 000 mm
- all finishes available on request
- tank fixation by stainless steel flange with a leakage detection slot
- sealing by mechanical seal lubricated by the product

Selection guide for homogenous storage

<table>
<thead>
<tr>
<th>Code montage</th>
<th>Code Hélice (mm)</th>
<th>Puissance (kW)</th>
<th>Vitesse (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTPG4®</td>
<td>200</td>
<td>0.37</td>
<td>300</td>
</tr>
<tr>
<td>Top head</td>
<td>300</td>
<td>0.55</td>
<td>302</td>
</tr>
<tr>
<td>400 500</td>
<td>0.75</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>500 750</td>
<td>0.9</td>
<td>170</td>
<td></td>
</tr>
<tr>
<td>600 102 600</td>
<td>1.1</td>
<td>141</td>
<td></td>
</tr>
<tr>
<td>105 800</td>
<td>1.6</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>125 150 800</td>
<td>2.2</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>150 200 800</td>
<td>3</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>200 250 800</td>
<td>4</td>
<td>82</td>
<td></td>
</tr>
</tbody>
</table>

*Détermination à valider en fonction de l’application*
POLYMIX agitators, the economical solution for homogeneous holding of low viscosity products

Simplicity and reliability are the two main characteristics of the POLYMIX mixer. The agitator is fitted with 2 up to 8 stages of twin-blades impellers, depending on vessel geometry and volume. The POLYMIX mixer is suitable for homogeneous holding of low viscosity products and thermal transfer operations.

Main Benefits
- suitable for fragile products due to minimum shear constraint
- optimum circulation rate / power consumption ratios
- design and sizing avoiding air incorporation
- easy mounting on existing tank using bottom shaft guides that thus avoids reinforcing or changing the cover

Technical Features
Standard propellers ranging from Ø 400 up to Ø 600
- welded twin-blades impellers
- all product contact parts made from in stainless steel EN 1.4404 (316L) or 1.4307 (304L)
- finishes: welds are ground, polished to Ra ≤ 0.8 µm
- sealing by leak preventing cup
- IP 55 Geared motor
- voltage: 400 or 230/400 V, three-phased, 50 Hz
- vertical assembly with bottom shaft guide (in most cases)

Applications
- homogeneous holding of low viscosity (< 50 cps) products (liquids and liquids / solids)
- suitable for thermal transfer operations

Examples of process applications:
Storage of milk, cream, oil, eggs...

Options
- sealing by double ring or other
- variable Frequency Drive

<table>
<thead>
<tr>
<th>Liner Height</th>
<th>Quantity of twin-blades impeller</th>
<th>Motor Power</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>2 impellers Ø 600</td>
<td>0.37 kW</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>2 impellers Ø 600</td>
<td>0.37 kW</td>
<td>70 t/mn</td>
</tr>
<tr>
<td>3000</td>
<td>2 impellers Ø 600 + 1 impellers Ø 400</td>
<td>0.75 kW</td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>2 impellers Ø 600 + 2 impellers Ø 400</td>
<td>0.75 kW</td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td>2 impellers Ø 600 + 3 impellers Ø 400</td>
<td>0.75 kW</td>
<td></td>
</tr>
<tr>
<td>6000</td>
<td>2 impellers Ø 600 + 4 impellers Ø 400</td>
<td>0.75 kW</td>
<td></td>
</tr>
<tr>
<td>7000</td>
<td>2 impellers Ø 600 + 5 impellers Ø 400</td>
<td>0.75 kW</td>
<td></td>
</tr>
<tr>
<td>8000</td>
<td>2 impellers Ø 600 + 6 impellers Ø 400</td>
<td>0.75 kW</td>
<td></td>
</tr>
</tbody>
</table>
EOLE4, an innovative agitator for your viscous and fragile products

“the gentle mixing“ from PIERRE GUERIN“

The homogenisation of some viscous products requires an important flow rate. For this type of application, a traditional agitation system, utilizing a pumping impeller at high rotation speed, generates shear forces which can damage the product structure.

In such case EOLE4 is the solution you are looking for...

Made with several stages of the PIERRE GUERIN patented HTPG4 impeller and with opposing mounted blades, Eole4 brings a drastic reduction of the undesired shear effects.

The HTPG4 impellers ensure the axial pumping of the product from the top to the bottom in the centre of the vessel whereas the blades ensure the pumping in the reverse direction and along the vessel wall.

The complementary action of two types of propellers allows for decreasing significantly the rotation speed compared to a traditional agitator, thus preserving the product integrity while ensuring an optimal mixing in the vessel as a whole.

A number of baffles, fitted at the bottom part of the shaft provides additional benefits by improving:
- thermal transfer
- recirculation of the product
- homogeneous holding when emptying the vessel

EOLE4 also exists in coaxial version for two independent movements with adjustable speed per propeller. That simplifies optimization of the mixing performance.

Should the recipe require dispersion or emulsion operations, the vessel could be equipped with an additional bottom mounted agitator fitted with a high speed turbine.

Main benefits
- due to minimum shear effects, Eole4 preserves product integrity
- the low speed limits the vortex and risk of air incorporation, and thus the oxidation of the product
- because of the high recirculation flow rate, Eole4 optimizes the mixing time
- the hydrodynamics of the HTPG4 impellers ensures a maximum ratio: circulation flow rate / consumed power (meaning less electrical consumption)
- the efficiency of the mixing limits the product loss (for example during the cutting of coagulum)

Applications
EOLE4 can be used for the typical following operations:
- homogeneous holding of fragile liquids, pastry products
- coagulum cutting

While improving thermal transfer and renewal of the wall layer limit

Examples of applications
- cell culture
- coagulum cutting of mixed yogurts
- chocolate mixing
- food preparation
- milk desserts
- fourrages, nappages
- preparation of fruit jams
HTA HELI-TURBO Agitators, a unique combination for your dispersion operations

An inventive design:
“Provided by the unique combination of the PIERRE GUERIN propeller and the SC Saw disc turbine”

Generalities about dispersion operations

Two essential and complementary hydrodynamic parameters are to be considered for the operations of dispersions:
- **Tip speed** that directly relates to the shearing rate imposed on the powder to be dispersed by the impeller. This speed varies between 7 and 20 m/s depending on the application...
- **Circulation rate** that determines agitator capability to increase the number of particle passes through the disperser.

Amongst others factors, this circulation rate is linked to the viscosity of the product mix.

In actual industrial processes, two main classes of impeller devices: the turbines and the propellers, cover the majority of mixing operations. Turbines provide radial flux and shearing actions while propellers generate axial flux and pumping actions.

The turbines, in particular the disc type, are the typical impellers used for dispersion operations but this configuration only provides a limited circulation flow while consuming high power.

The HTA range is unique in the market...

With the Heli-Turbo Agitator PIERRE GUERIN has differentiated itself taking the dual action approach of the highly effective pumping action of its patented HTPG4™ impeller with the SC saw disc turbine to achieve exceptional dispersion results.

Characteristics and advantages of this design

**Pumping effect**

HTPG4 impeller generates a vortex assuring an optimum feeding of powder to the SC saw disc turbine dynamic region.

It is possible to control the extent of the vortex using a frequency inverter.

**Dispersion effect (tank bottom)**

HTPG4 propeller also enables fast powder wetting thus increasing dispersion rates through the saw disc turbine. Under these hydrodynamics conditions, the SC saw disc turbine works at its optimum cutting efficiency, either in a turbulent or laminar flow.
Combined flow dynamics
The dual function design has the advantage of maintaining homogeneous product but with relatively low rotation speed thus avoiding possible breakage of three-dimensional mix structures.

Users benefits
- HTA agitator efficiently blends powder into liquid without generation of lumps thus reducing losses of raw materials
- the high powder wetting rate gives an assurance of fast dispersion meaning optimum productivity
- power input required for dispersion is minimized.

Main technical features
- gearbox motor with IP55 protection, voltage 400 or 230/400 three phase, 50 Hz
- HTPG4 propellers Ø 60 to 300 mm / saw disc turbines Ø 80 to 400mm
- wide choice of material finishing according to User requirements
- tank mounting via a stainless steel flange provided with leakage detector device
- sealing: lip seal or lubricated mechanical seal

Applications
- dispersions of products such as Xanthan gum, Guar gum, Carob, Pectin, Carrageenans, Starch
- applications: milk desserts, mustard, puree, tomato sauces...

Dispersion of texturizing agent in a raspberry puree
Turbo-Agitator “P”, the versatile agitator for your mixing operations

The perfect balance between shearing and pumping effects...

The turbo-agitators “P” generate two complementary hydrodynamic effects: pumping and shearing.

This range of agitators is thus perfectly adapted to homogenizing operations, dispersion of powders, emulsions of pastry products and liquids.

Technical Features

- standard rotation speed: 750 - 1500 rpm
- viscosity up to 15 000 cpo depending on the mixing operation to be achieved and products to be mixed
- mounting: by flange
- finishing:
  - food application: Ra 0.8 µ
  - cosmetic and pharmaceutical applications: Ra 0.6 or 0.4 µ with electro-polishing on request
- propeller: double turbine with radial flow.

How it works

The agitator is made of a double turbine (rotor / stator type) fitted with a crenellated crown which generates a radial flow. The shearing effect is achieved through the circulation of the liquid into the rotor / stator air-gap.

The spherical design of the turbine with 2 wide-opening carters also allows the rotor for an optimal pumping of the total product volume.
Applications

The turbo-agitators P allow for the following mixing operations:

- mixing of liquid
- mixing of pastry products
- homogenization
- dispersions of powders into liquids for volumes ranging from 40 to 10 000 litre
- emulsions
- thermal transfer

Examples of applications

- mixing and homogeneous holding of sugar syrups
- emulsion egg and butter for pancake batter
- emulsion for vinaigrette
- dispersion and emulsions shampoos and personal care products

Technical Features

<table>
<thead>
<tr>
<th>Designation of the Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Ø Nominal flange (1)</td>
</tr>
<tr>
<td>Ø Ext mm</td>
</tr>
<tr>
<td>Ø Hole mm</td>
</tr>
<tr>
<td>Number of holes Ø mm</td>
</tr>
<tr>
<td>Length mm (2)</td>
</tr>
<tr>
<td>Ø Sphere mm (3)</td>
</tr>
<tr>
<td>Motor Power kW</td>
</tr>
<tr>
<td>Speed rpm</td>
</tr>
<tr>
<td>Weight kg</td>
</tr>
<tr>
<td>Water flow rate l/mn</td>
</tr>
</tbody>
</table>

19...
**PG-MAG®**, magnetic agitators

for mixing under aseptic conditions

Relating our know-how of sanitized process to our background expertise in agitation via the MORITZ division, PIERRE GUERIN provides the **PG-MAG™** range, a new generation of bottom mounted shaft agitators with magnetic coupling, for your process applications. This system is particularly adapted to pharmaceutical and food industries formulation and storage tanks, and for applications requiring strict asepsis, and efficient agitation with cleaning in place.

### Main Benefits
- the **PG-MAG™** agitation system ensures perfect sealing (absence of mechanical seal and lubrication systems) and elimination of contamination risk
- design and construction of this equipment meets quality requirements of CGMP and EHEGD: cleaning and sanitation in place capability, self draining, no dead zone, surface finish $Ra \leq 0.8 \mu m$ with with electro polished mixing head (option: $Ra \leq 0.4 \mu m$ with electro polished, bell), material traceability for all contact parts
- the design of the mixing provides a maximal flow rate for low operating speeds, that will achieve homogenous mixing with minimal shear effects
- the range is composed of only 3 models for volumes from 20 liters to 20 000 liters requiring stocking of a minimal number of spare parts
- systems are delivered with complete documentation, supporting validation requirements

### Technical Features

#### Material
- stainless steel EN 1.4404 - 316L for all contact parts
  - option: EN 1.4435
- bearing ring in silicon carbide
  - option: Peek
- magnet in Samarium Cobalt
- gasket in EPDM - Other on request
- material certificate 3.1

#### Finishing
- finishing of all wetted parts: $Ra \leq 0.8 \mu m$
  - option: $Ra \leq 0.4 \mu m$ electropolished

#### Other Available Options
- bell assembly on removable flange
- bell housing exteension for insulated tank bottoms
- speed sensor
- motor with integrated frequency inverter
- control Box
- magnetic retaining device for sterilization in autoclave
- dismounting tool (PG-MAG-1B & 10B)

<table>
<thead>
<tr>
<th>Tank volume (l)</th>
<th>20-200</th>
<th>200-2 000</th>
<th>2 000-20 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (kW)</td>
<td>0.37</td>
<td>0.55</td>
<td>3.0</td>
</tr>
<tr>
<td>Speed (rpm)</td>
<td>80-496</td>
<td>80-496</td>
<td>80-496</td>
</tr>
</tbody>
</table>

*Information suitable for liquids having approximatively viscosity and density such water*
Magnetic Driving Agitator PG-MAG™

Selection Guide

<table>
<thead>
<tr>
<th>Code</th>
<th>Tank Nominal Volume (l) (indicative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG-MAG-1B</td>
<td>20-200</td>
</tr>
<tr>
<td>PG-MAG-10B</td>
<td>200-2 000</td>
</tr>
<tr>
<td>PG-MAG-50B</td>
<td>2 000-20 000</td>
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</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>1.4404</td>
</tr>
<tr>
<td>35</td>
<td>1.4435</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Roughness</th>
</tr>
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<tbody>
<tr>
<td>S8</td>
<td>Ra ≤ 0.8 µm</td>
</tr>
<tr>
<td>S4</td>
<td>Ra ≤ 0.4 µm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Assembling</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS</td>
<td>Bell housing weld pad</td>
</tr>
<tr>
<td>BD</td>
<td>Bell housing on removable flange</td>
</tr>
</tbody>
</table>

Available Options

- 01 Speed sensor
- 02 Motor with integrated frequency inverter
- 03 Bell housing extension
- 04 PEEK material bearing ring in lieu of Silicon
- 05 Electro polishing of all wetted parts Ra≤0.4 µm

Available Accessories

- A01 Magnetic retaining device for sterilization by steam autoclaving (PG-MAG-1B & 10B only)
- A02 Dismounting tool (PG-MAG-1B & 10B only)
- A03 Leak proof bell housing control tool (recommended if AS assembling)
- A04 Supply of bell vessel weld flange (if BD assembling)

3D View - Weight and Dimensions

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>10</th>
<th>15</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (mm)</td>
<td>288 x 276 x 156</td>
<td>327 x 335 x 185</td>
<td>586 x 463 x 268</td>
</tr>
</tbody>
</table>

Example of agitator coding: PG-MAG-50B-04-S4-AS/04-02
Example of accessories coding: PG-MAG-50B/A01/A03

Note your selection here

Top
- EPDM gasket
Agitation blade
Bell housing
Driving unit
This questionnaire lists the major information needed by our technical services to determine the most adequate mixing solution to fit your application.

Be sure it will be very confidential

(Please fill in one questionnaire per equipment)

1 - General Information

<table>
<thead>
<tr>
<th>Your ref.</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company</th>
<th>Person in charge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phone</th>
<th>Fax</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 - Mixing objectives

2.1 - Mixing operations to be achieved

<table>
<thead>
<tr>
<th>Type of mixing</th>
<th>Mixing operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid - Solid</td>
<td>Dissolution</td>
</tr>
<tr>
<td>Liquid - Gas</td>
<td>Dilution</td>
</tr>
<tr>
<td>Liquid - Liquid</td>
<td>Suspension</td>
</tr>
<tr>
<td>Non-miscible</td>
<td>Heat exchange</td>
</tr>
<tr>
<td>Miscible</td>
<td>Homogenous storage</td>
</tr>
<tr>
<td></td>
<td>Dispersion</td>
</tr>
<tr>
<td></td>
<td>Emulsion</td>
</tr>
<tr>
<td></td>
<td>Oxygen transfer</td>
</tr>
</tbody>
</table>

2.2 - Physical characteristics of the final product

<table>
<thead>
<tr>
<th>Nature</th>
<th>Quantity</th>
<th>Viscosity mPa.s (Cp) at °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific gravity</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 - Rheological behavior of the final product

<table>
<thead>
<tr>
<th>Newtonian</th>
<th>Pseudo-plastic</th>
<th>Rheopecte</th>
<th>Thixotropic</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes ☐ no ☐</td>
<td>yes ☐ no ☐</td>
<td>yes ☐ no ☐</td>
<td>yes ☐ no ☐</td>
</tr>
</tbody>
</table>

3.1 - Characteristics of liquid ingredients (please indicate units)

<table>
<thead>
<tr>
<th>Liquid 1</th>
<th>Liquid 2</th>
<th>Liquid 3</th>
<th>Liquid 4</th>
<th>Liquid 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>Density</td>
<td>Viscosity</td>
<td>Volume</td>
<td>Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Percentage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Specific Heat</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Conductivity</td>
</tr>
</tbody>
</table>

3.2 - Characteristics of solids ingredients (please indicate units)

<table>
<thead>
<tr>
<th>Solid 1</th>
<th>Solid 2</th>
<th>Solid 3</th>
<th>Solid 4</th>
<th>Solid 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>Apparent Density</td>
<td>Solid Size</td>
<td>Concentration</td>
<td>Percentage</td>
</tr>
</tbody>
</table>
3.3 - Characteristics of gas ingredients (please indicate units)

<table>
<thead>
<tr>
<th>Nature</th>
<th>Pressure</th>
<th>Flow</th>
<th>Percentage</th>
</tr>
</thead>
</table>

4 - Operating mode and recipe -

Please provide hereafter any useful information related to your operating procedures and recipes (mixing time, initial volume, way of introduction of ingredients and flow rates, etc...)

5 - Main vessel features - (Where possible, please attach the drawing of the vessel)

- Location: Inside, Outside
- Design: Horizontal, Vertical
- Cover type: Flat, Dished, Conical
- Frame type: Skirt, Legs, Concrete
- Insulated tank: yes, no
- Insulation thickness
- Minimum working volume:
- Internal Ø, External Ø, Liner height, Outlet height
- Maximum operating pressure, Maximum operating vacuum
- Maximum operating temperature
- Is the vessel fitted with baffles? yes, no
- Quantity, Width

6 - Material and finish of the product contact parts -

- Material:
- Finition:

7 - Conditions of use and others requirements

7.1 - Agitator location

- Top mounting, Wall mounting, Bottom mounting

7.2 - Flange dimensions

- Internal Ø,
- External Ø

7.3 - Type of seal

- V’Ring Gasket, Single Mechanical Seal, Double mechanical seal with steam lubrication, Double mechanical seal with liquid lubrication, Magnetic coupling

7.4 - Others

- Should the mixer have to work during draining yes, no
- Maximum overall height available
- Variable speed required: yes, no
- Available voltage: 220V - 380V, Other

Additional requirement:
This equipment is ideal for any process that requires the incorporation of large quantities of powder into liquids.

Due to their versatile performance, the POLYMEL product family provides a solution for a wide range of mixing operations including dissolution, homogeneous holding and pre-dispersion.

Simple to use, ergonomic and cleanable-in-place, they can easily be incorporated into a production process line.

The POLYMEL program comprises of 3 models providing powder incorporation flow rates of up to 9 500 Kg/h.

A wide range of options are available: mounting on mobile frame, hopper for working under pressure, special device for the continuous dosing of powders...

Actually, more than 3 000 Polymels are in use worldwide...
As the French leader of industrial equipment for food, biopharmaceutical and cosmetic industries, PIERRE GUERIN is recognized for its know-how in the manufacture of automated complete equipment lines and for the quality of its products. Among the range of agitation and mixing systems, PIERRE GUERIN offers the POLYMEL®, an efficient powder/liquid mixing device.

Operational description

The POLYMEL comprises of a mixing chamber incorporating a centrifugal pump casing, an impeller and a horizontally mounted hopper.

The liquid enters tangentially in the diffuser pipe, through the mixing chamber by following the direction of impeller rotation, which causes a rapid acceleration in the speed.

A vortex forms in the impeller’s eye causes a pressure drop thus causes a sucking-up of powder from the hopper.

Turbulences created by impeller result in the homogeneity of final product.

Depending on the application, final product is directly transferred (continuous process) or recycled in a buffer vessel (the recycling improves the mixing operation due to successive passes via the POLYMEL).

Advantages

- simple and robust system with the guarantee of a rapid and homogeneous mixing
- installation in a fabrication line without any significant modifications
- simple connection using flexible tubing
- compact, reliable (few moving parts) low maintenance cost
- easily dismountable and cleanable-in-place

User Benefits

- economy of manpower and reduction of product losses
- improvement of User working conditions
- improvement to final product quality: no lumps, greater product homogeneity

Technical Features

- 3 models with a capacity of up to 9500 kg/h sucked powder
- 60° conical hopper, 50 liters capacity (for models 20 & 50)
- diffuser pipe with tangential liquid inlet
- casing design mixing chamber
- open impeller with inverted blades
- turbine driving with pulley and notched belt (model 50 & 150)
- simple Carbon/Silicon Carbide mechanical seal and leak proof static seal
- 230/400V, class F with shaft protection
- clamp or SMS connections
- in accordance with Europeans standards

Material

- all product-contact parts are made of stainless steel 1.4404 (316 L)
- EPDM gaskets

Finish

- internal: Ra ≤ 0.8 µm
- external: satin
Documentation
- manual of instruction and maintenance with CE certificate of conformity

Material Certificates
- EN 10028/7 3.1 material certificates: casing and back plate, impeller, diffuser, and inlet adapter
- FDA certificates for mechanical parts and gaskets
- roughness surface finish certificates of all product-contact parts

Options
- alternative mechanical seal materials: silicon carbide/silicon carbide for abrasive products
  (others on request)
- powder inlet fitted with pneumatic butterfly valve
- Viton gaskets
- ATEX version (zone 2 class 2)
- trolley mounted
- skid mounted version with preparation tank and dosing device for liquid and powder

Applications in the Food & Beverage Industries
- reconstitution of milk derived products
- standardization and enrichment of milk
- preparation of infantile and gelified milk
- coating products for pet foods
- dissolution of sugar (solutions up to 67° Brix)
- incorporation of stabilizers
- preparation of batter
- fabrication of brine
- preparation of food sauces
- incorporation of salt into oil
- reconstitution of egg white

Applications in the Pharmaceutical & Cosmetic Industries
- dissolution of active pharmaceutical components
- mixing of base components for personal care products
- dissolution of detergent pellets

Sizes - Weighs - Flows rates

<table>
<thead>
<tr>
<th>Model of POLYMEL</th>
<th>A (B)</th>
<th>Frame Width</th>
<th>Net Weight (kg)</th>
<th>MAXIMUM flow rate (according to apparent density) (kg/h)</th>
<th>Liquid Flow (l/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>600</td>
<td>1240</td>
<td>355</td>
<td>1 350</td>
<td>13 500</td>
</tr>
<tr>
<td>50</td>
<td>970</td>
<td>1280</td>
<td>400</td>
<td>2 700</td>
<td>27 000</td>
</tr>
<tr>
<td>150</td>
<td>860</td>
<td>760</td>
<td>400</td>
<td>9 500</td>
<td>34 000</td>
</tr>
</tbody>
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More Information
- availability less than 6 weeks for standard models
- rental equipment available for trials
This questionnaire lists the major information needed by our technical services to determine the most adequate mixing solution to fit your application. Be sure it will be very confidential. 

**Please fill in one questionnaire per equipment**

## 1 - General information -

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## 2 - Information related to the products -

### 2.1 - Characteristics of liquid ingredients *(please indicate units)*

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<td>Volume</td>
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<tr>
<td>Temperature</td>
<td>Percentage per product</td>
<td>Specific Heat</td>
<td>Conductivity</td>
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### 2.2 - Characteristics of solids ingredients *(please indicate units)*

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<tbody>
<tr>
<td>Nature</td>
<td>Apparent density</td>
<td>Solid size</td>
<td>Concentration</td>
</tr>
<tr>
<td>Quantity</td>
<td>Flow rate</td>
<td>Abrasive <em>(yes / no)</em></td>
<td>Hygroscopic <em>(yes / no)</em></td>
</tr>
<tr>
<td>Percentage per product</td>
<td>Solid 1</td>
<td>Solid 2</td>
<td>Solid 3</td>
</tr>
</tbody>
</table>

## 3 - Physical characteristics of the final product -

- Nature .................................................. Quantity ........................................ Viscosity ........ mPa.s (Cp) at ........ °C 
- Specific gravity ..........................................................

## 4 - Operating mode and recipe -

- Expected mixing time ..........................................................
- Suction pressure .......................................................... Discharge pressure ..........................................................

Please provide hereafter any additional useful information related to your operating procedures and recipes: ..........................................................

## 5 - Complementary information

- Specific electrical protection required: yes ☐ no ☐
- Specific gasket material compatibility: yes ☐ no ☐
- Precise your demand: ..........................................................