



Planex System

Patented
Horizontal
Paddle
Vacuum Dryer



italvacuum

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A revolutionary vacuum drying philosophy.

Forget conventional dryers: this is a whole other planet. It is Planex System®, the ingenious innovation developed and manufactured by Italtvacuum, which brings in a true revolution in vacuum drying technology. A multi-patented machine which is conquering the most demanding operators from all around the world, by guaranteeing results that were unthinkable till now with conventional systems, both horizontal and vertical.

Planex System® is Italtvacuum's special horizontal vacuum paddle dryer with an **eccentric agitator featuring two independent movements**, allowing it simultaneously revolve around its own axis and rotate tangentially to the drying chamber.

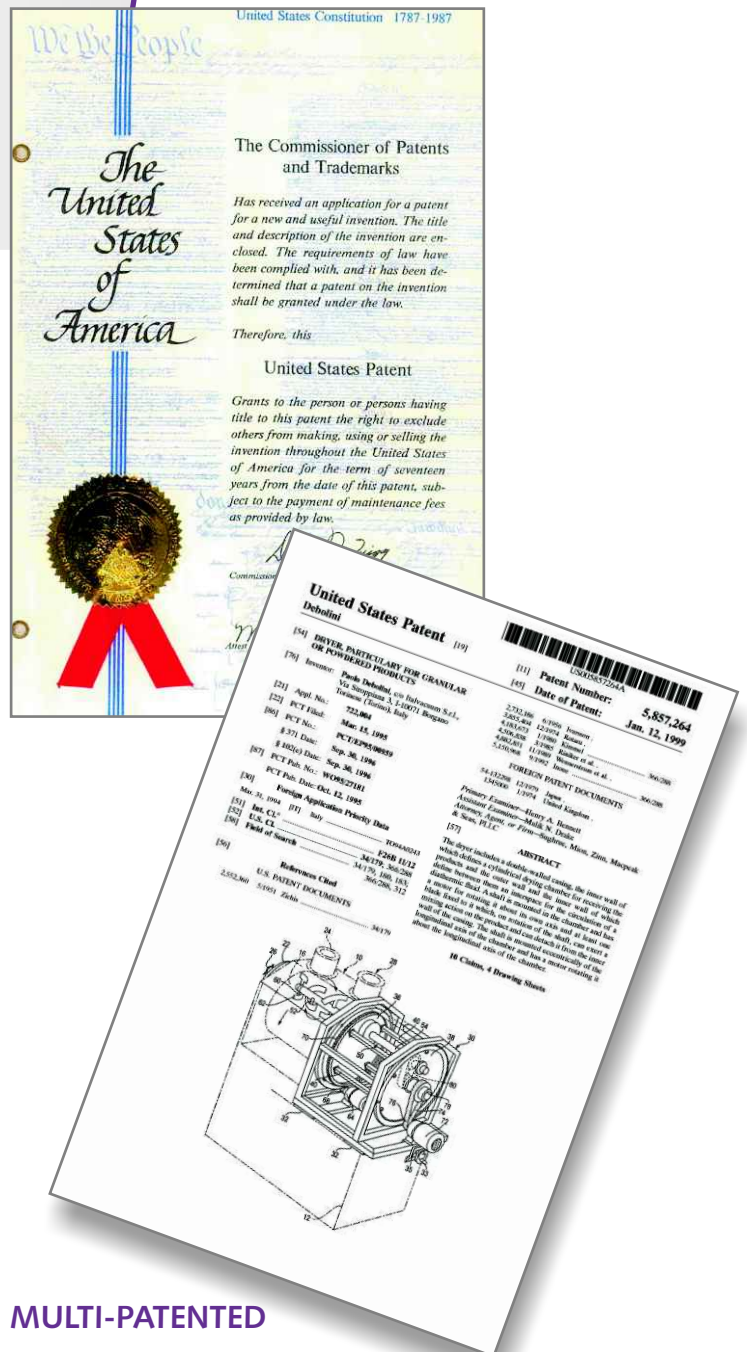
Designed to dry wet feed from filtration and centrifuging processes Planex System® is ideal for the production of **active pharmaceutical ingredients (API), fine chemicals and intermediates**.

The combined rotations of the agitator and its small size compared to the drying chamber diameter, ensures the perfect mixing of the entire batch, and allows consuming **at least three times less energy than conventional dryers** with a concentric agitator. This means a threefold reduction in mechanical and thermal stresses on the batch being dried (1). As a result, even the most delicate and temperature-sensitive products are treated with maximum care.

But there is more. Planex System®, thanks to its **agitator's ZeroFriction (R) planetary movement**, prevents the product from being rubbed against the drying chamber walls and thus heating up due to friction, a typical problem in conventional paddle systems.

In addition, the rotation of the paddles tangentially to the chamber walls, conveys the product into the small clearance between the agitator and the chamber surface, preventing lumps formation and guaranteeing an even more effective drying and a **controlled final particle size distribution**, which is impossible to achieve with conventional dryers.

Planex System® is **multi-product**, since it can be used with a wide range of products, both with crystalline and amorphous structure. In addition, thanks to the agitator movement controlled by the "Stop & Swing" program, it is also ideal for drying small batches.



MULTI-PATENTED

Planex System® is **versatile**, because it drastically reduces the downtime needed to rearrange the line, wash, clean and inspect the system before switching production processes. This is an important added-value, as it makes it fast and easy to pass from one production run to another.

Planex System® is **safe** for operators, the environment and the product, because it is designed and manufactured in compliance with European Union ATEX Directives and CE marking requirements, as well as with the increasingly stringent US FDA standards and cGMP Current Good Manufacturing Practice Regulations.

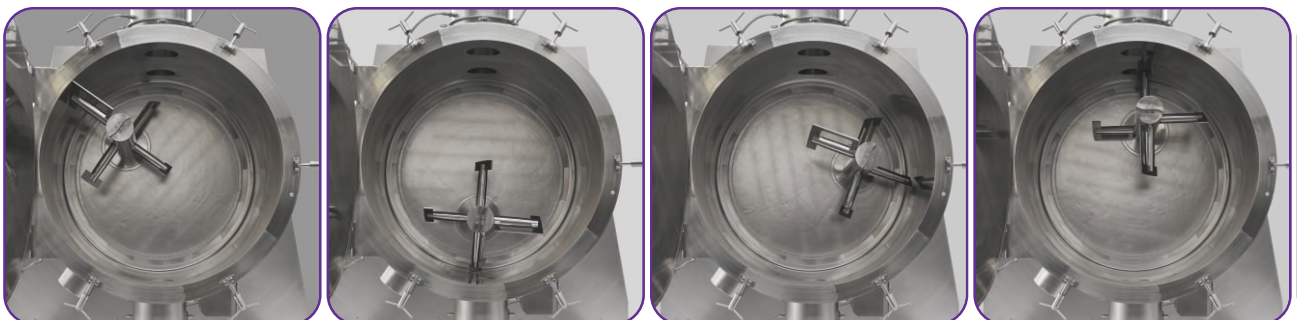
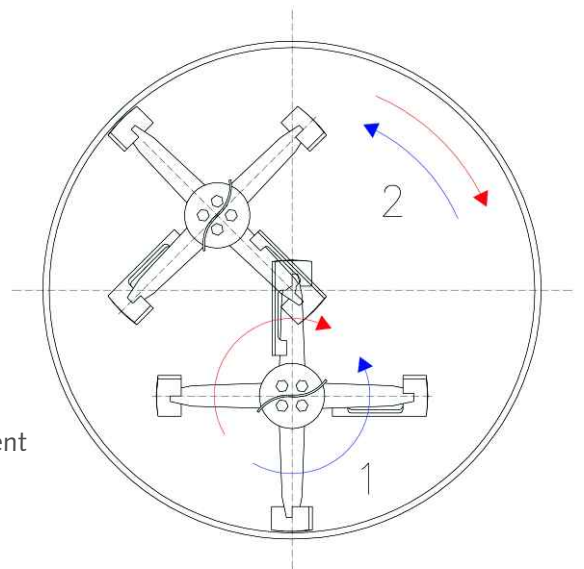
¹ Analysis by Politecnico di Torino's Department of Materials Science and Chemical Engineering

Advantages

All the quality of a one-of-a-kind multi-patented system

1. Energy consumption three times lower than in conventional dryers
2. Threefold reduction in mechanical and thermal stresses, to the benefit of product purity
3. Eccentric agitator with ZeroFriction® planetary movement:
 - No localized friction on the product
 - Possibility to process very delicate temperature-sensitive products
 - No product build up
 - Guaranteed final particle size
4. Ideal for processing also small batches, thanks to the automatic Stop & Swing program
5. Easy total discharge thanks to:
 - Minimum clearance between agitator paddles and fully machined drying chamber walls
 - Special automatic program
6. Faster drying times thanks to the combined rotations of the agitator, which increases the product surface exposed to evaporation
7. Very high final vacuum levels
8. Easy cleaning of interior and exterior, with practical access for inspection and swab testing
9. Simple agitator paddles dismantling and removal, without long machine downtimes
10. Full system automation guarantees batch-to-batch process repeatability.

- 1: Axial movement
2: Planetary movement



ZeroFriction® planetary movement eccentric agitator

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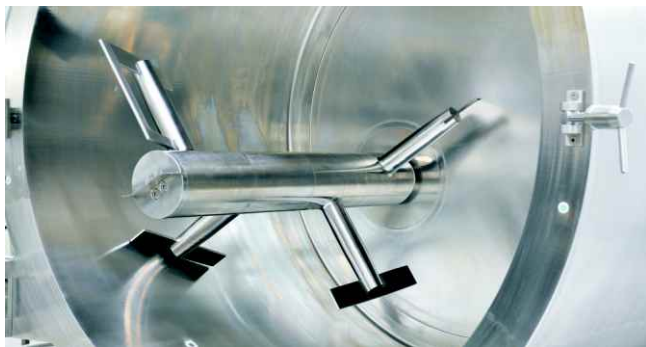
Features

For the parts in contact with the product Planex System® is built in stainless steel AISI 316L, but on request it is available in any other weldable metal (for instance ALLOY C-22 and AISI 904L).

The wall of the drying chamber, the back cover, the shaft of the agitator and the front door are heated through diathermic liquid circulation in order to avoid cold areas which could cause solvent condensation or product aggregation.

All the internal surfaces of the drying vessel are mirror polished or electropolished in order to optimise the endurance against corrosion, reduce the adherence and the friction on the product, increasing the flow behaviour of the powders and simplifying the cleaning operations.

The shaft of the agitator is complete with a **double mechanical seal system**, studied to guarantee the perfect vacuum tightness and the absolute purity of the dried batch, avoiding any risk of contamination of the product. The mechanical seal may be of conventional type with wet flushing or run dry with nitrogen immission.



Eccentric agitator profile



Paddles disassembling



SWAB TEST execution

Easiness of cleaning and inspection

The ease of the inner cleaning is granted by an **efficient C.I.P. system**, that allows a complete washing of all the parts in contact with the product.

The big front port makes the inspection simple and practical.

The **SWAB TEST** execution is facilitated by the profile of the eccentric agitator and the easy disassembly of its inner parts, unlike in the traditional systems, where the agitator, composed of a single structure, can only be removed with the aid of bulky equipment and long machine stops.

A special feature that makes Planex System® a unique dryer.

The exterior of Planex System® can also be easily cleaned. In fact the sealed external cladding (particle-free configuration cGMP) covers the insulation material, the electric wiring and the hydraulic piping.

Besides there is no support frame in the clean room, but only the drying chamber flanged to the wall.

In this way the external cleaning becomes very easy and effective, avoiding accumulation of the product in recessed areas.

These features, combined with the partitioning solution, allow **clean room installation**, achieving the pressurization and separation of the clean room from the machine room.



Clean room installation

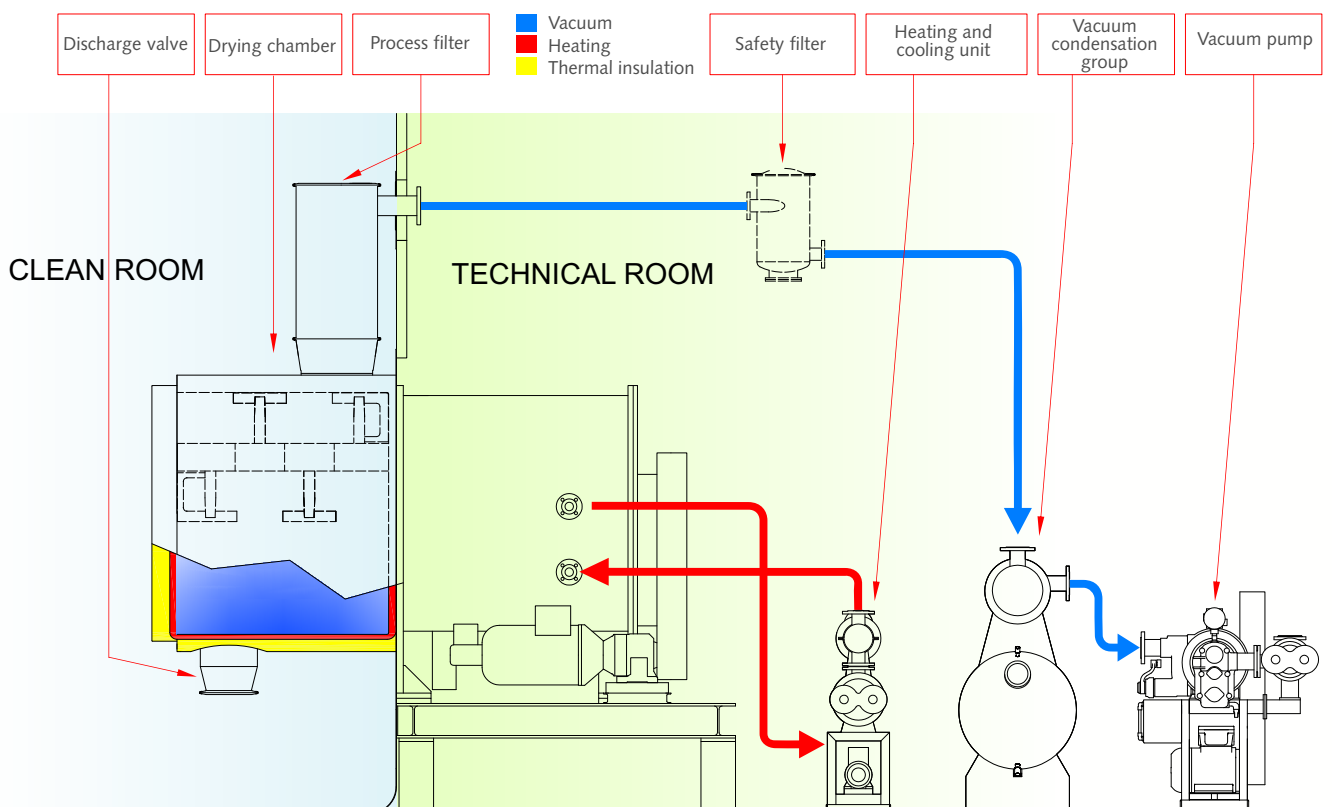
Turn-key systems

Italvacuum is the only manufacturer in the world that, in addition to the dryer itself, can design and build internally all the auxiliary units that complete the plant, properly sizing them to meet every process requirements, vacuum system included:

- **High vacuum group SAURUS 939**
- **Vacuum condensation group** for reduction of drying time and recovery of extracted solvents
- **Heated external safety cyclone filter**, designed to avoid pressure losses and condensation phenomena, for a complete protection of the vacuum line
- **Heating and cooling group** for system thermoregulation
- **Control panels with PLC** for complete plant management, provided with software that is certifiable according to CFR 21 – Part 11 regulations, and that guarantees reproducibility of the dried batches and communication with centralized supervision systems.



Control panel



Standard installation diagram of the Planex System[®] representing the different units realized by Italvacuum

Services

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From laboratory scale to industrial installation: the best way for an accurate choice of the industrial plant

Italvacuum, in its factory, has a wide range of pilot installations for performing drying trials on customer's products.

During the trials with the pilot installation it is possible to extract some product samples without breaking the vacuum and to vary at any time the process parameters in order to define the ideal drying path.

In this way the customer can make the best choice for the Italvacuum installation both in terms of dimensions and performance. On the other side the personnel of Italvacuum can obtain important information on the product to be dried, in order to adapt the industrial installation to the customer needs.

The tests are completed and formalized by drawing up a detailed report..



Italvacuum customer service: efficiency guaranteed to last

The start-up of the installation is just the beginning of our relation with the customer. This relation will last for years starting with an efficient policy of preventive maintenance with planned interventions. The maintenance plans are organized individually considering the customer's specific processes. This means a remarkable cost saving and more tranquillity.

At the same time, for the solution of any inconvenient or breakdown, Italvacuum is able to offer prompt and efficient technical assistance services both at the customer's site with the intervention of specialized personnel or from its site through on-line diagnostic, in case the customer's installation has a control system supplied by our company.

For an efficient management of the spare parts, Italvacuum has a computerized warehouse that allows the prompt and immediate delivery of original spare parts anywhere in the world.

Moreover, Italvacuum can fully overhaul its own used plants and regularly supports the customer in upgrading the delivered installations with new technical solutions – that have been developed in the meantime - as well as adapting the machines to the new ATEX regulations.



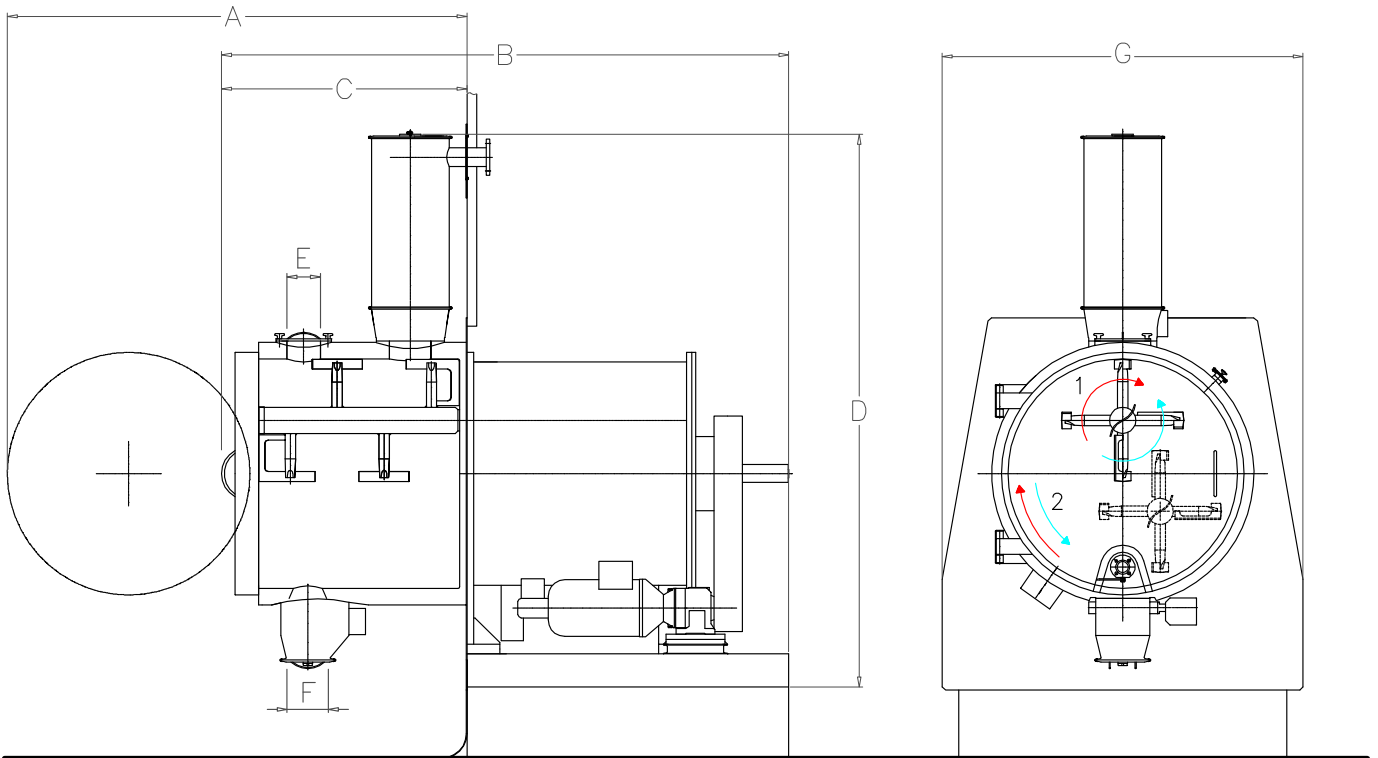
Integrated quality - Italvacuum has implemented a Quality Management System with **ISO 9001** certification covering from design to production of every single component, from end product sale to plant installation and technical assistance. In addition, acknowledging the importance of the welding process in the qualitative result and the reliability of the end product, ITALVACUUM has considered to certify its own processes and personnel complying to **ISO 3834-2** norms.

Dimensions

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Versatile and flexible

The patented Planex System® features **outstanding loading flexibility**. The system is available with total volumes ranging from 150 to 3,200 liters. Maximum loading capacity depends on the product to be processed, and can vary from 15% to 80% of the chamber volume. The system can meet all the production needs of the pharmaceutical and chemical industries, as it is capable of processing small amounts of product, thanks to the automatic Stop & Swing program, as well as large batches.



PLANEX System		PX 150	PX 300	PX 800	PX 1200	PX 1800	PX 2400	PX 3200
Total Volume	(l)	150	300	800	1200	1800	2400	3200
A	(mm)	1400	1800	2300	2500	2850	3140	3460
B	(mm)	2100	2700	2900	3200	3460	3700	4200
C	(mm)	780	960	1200	1350	1500	1670	1800
D	(mm)	1700	2100	2700	2900	3120	3440	4000
E	(mm)	125	150	150	200	200	250	250
F	(mm)	200	200	200	250	250	300	300
G	(mm)	1200	1500	1700	1950	2200	2360	2550

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