



GFD[®]Pilot

Pilot Plant Agitated Nutsche Filter Dryer



GFD 500 Series
Stainless Steel

GFD®Pilot

The GFD®Pilot is an Agitated Nutsche Filter Dryer (ANFD) that carries out solid-liquid separation processes at kilolab and pilot scale. It facilitates feasibility and proof of concept activities developed during smaller scale research and development stages. In spite of being a smaller, compact filter dryer, it provides the quality, reliability and efficiency of the full size PSL ANFD filter dryers.

PSL's unique GFD® technology was developed to overcome the well-known production challenges faced by manufacturers when using traditional production methods such as Büchner filtration and oven tray-drying.

It consists of an agitated vessel designed to work under vacuum and under pressure. The vessel can be made of Borosilicate 3.3 glass, 316L Stainless Steel or Alloy 22 and has a heated jacket for efficient drying. Solid-liquid separation is performed within the unique filtration basket, which can be removed to ease and maximise product recovery.

The GFD®Pilot technology is designed to be the logical scale-up ANFD from the GFD®Lab which is used in laboratory conditions. It assists in evaluation and development of the desired end product prior to scaling up to commercial production.

Features and Benefits

- **Combined Filtration and Drying**
A mobile and compact all-in-one solution
- **Maximum Product Recovery**
Unique, fully removable filtration basket
- **Flexible Modular Design**
Interchangeable vessels and material compatibility
- **Industry Compliance**
Solutions for hazardous areas and pressure directives
- **Containment-Ready**
GFD®FilterBox isolator solutions for different vessel types
- **Scale-up Capability**
Simple progression from pilot to full production scale



GFD® Pilot at a Glance

1 - Agitator System

- Height-adjustable system with manual operation
- Bidirectional motor (electrical or pneumatic) for smoothing and ploughing of filter cake
- 5-25 rpm with up to 68 N·m torque
- Aids uniform drying of filter cake

2 - Vessel

- Manufactured from Borosilicate 3.3 glass, 316L Stainless Steel or Alloy 22
- Integrated heating jacket aids quick and effective drying of the product
- Easy to clean
- High chemical and heat resistance
- Ergonomic vessel open/close and support via frame brackets
- Process nozzles: Drain/Filtrate, Vacuum, Pressurising/Inertion gas, Instrumentation, Sightglass (Metallic vessels only)
- Vacuum and Thermal Control packages available

3 - Filtration Basket

- Completely removable for maximum product recovery
- Available in Polypropylene, PTFE, 316L Stainless Steel and Alloy 22
- Various porosity options available (Typical example: 5, 10, 20µm)
- Interchangeable filtration media (Polypropylene and PTFE baskets only)
- Welded and Sintered mesh (316L SS and Alloy 22 baskets only)



Combined Filtration and Drying

Agitated Nutsche Filter Dryers separate solids from liquid in batch-oriented processing. The product of interest is usually the solid but in some cases the filtrate liquid or both, thus the need for versatile and flexible equipment that can adapt to achieve the desired outcome.

The GFD®Pilot is an all-in-one filter dryer designed for use at pilot plant production scale. It complies with Good Laboratory Practices (GLP) and is commonly used for pharmaceutical and fine chemical processing applications.

Developers and manufacturers can complete a wide range of processes in a single, standardised system:

- Slurry Filtration
- Product Washing
- Re-slurry
- Vacuum Drying
- Product Sampling
- Product Discharge



Vessel Specifications

Vessel MoC	Borosilicate 3.3 Glass	316L Stainless Steel / Alloy 22
Filtration Area	0.05m ²	
Filter Cake Volume (Min*/Max)	0.93 Litres / 5 Litres	
Filter Cake Depth (Min*/Max)	18mm / 100mm	
Vessel Volume	10 Litres	
Vessel Operating Temperature Range	0°C (32°F) to 150°C (302°F)	0°C (32°F) to 150°C (302°F)
Vessel Operating Pressure Range	Full Vacuum to 0.5 barG (7.25 psiG)	Full Vacuum to 3 barG (43.5 psiG)

*Recommended for optimum drying performance

Maximum Product Recovery

Maximising yield is crucial at pilot scale feasibility stages and/or small-scale production. The GFD®Pilot is designed with this in mind, given the importance of the final product.

Following process completion, the product batch is collected with ease due to the design of the filtration basket which can be removed completely from the GFD® vessel.

The GFD® basket is suitable for multi-product applications as it facilitates quick and easy changeover of filtration meshes with various pore-sizes and materials such as Polypropylene, PTFE, 316L Stainless Steel and Alloy 22.



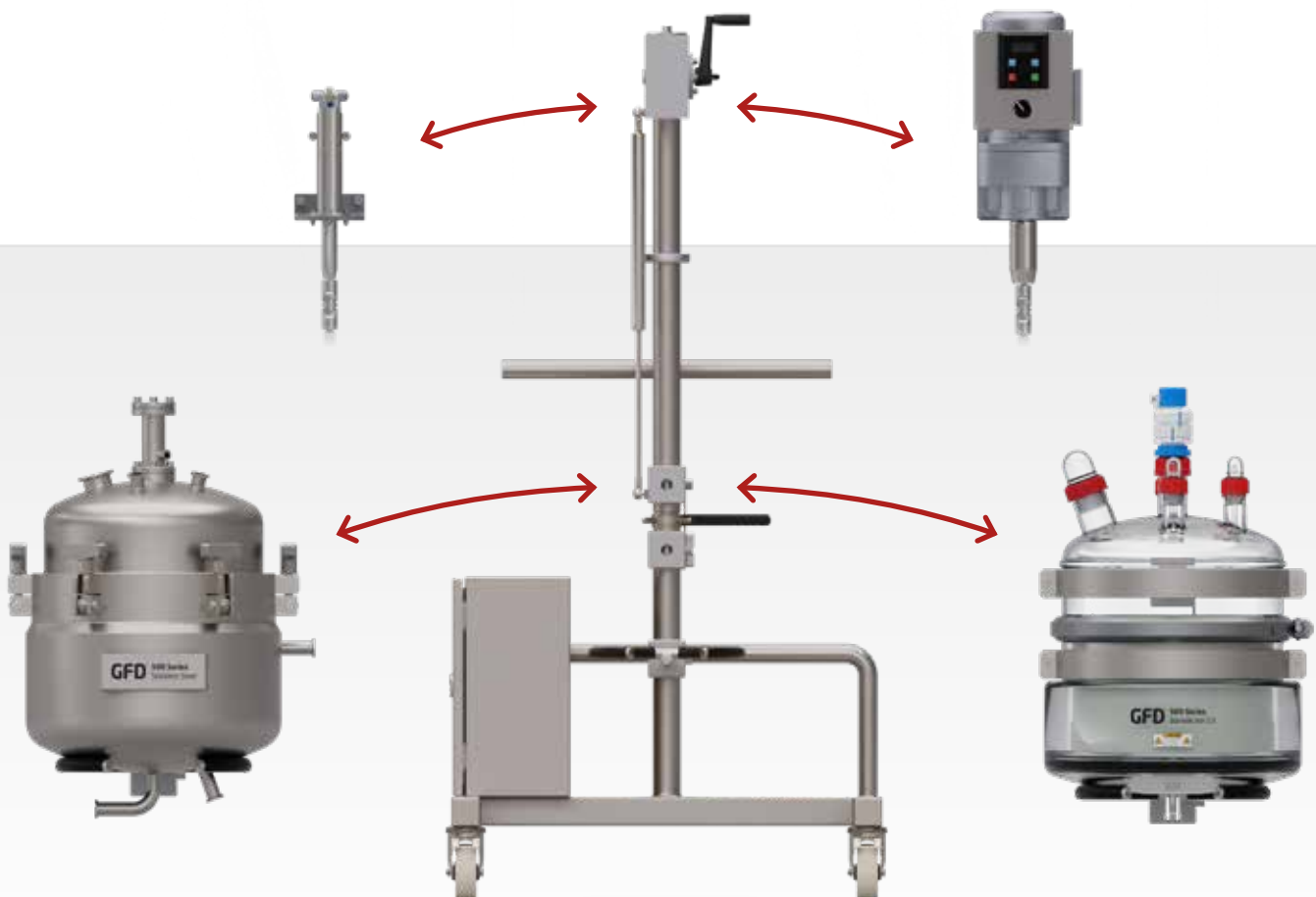
Basket Construction Materials	Polymer Basket Filtration Media	Metallic Basket Filtration Media	Basket Sealing Materials
Polypropylene	Polypropylene	316L Stainless Steel	EPDM
PTFE	PEEK	Alloy 22	Silicone
316L Stainless Steel	Polyester	-	FKM
Alloy 22	Nylon	-	FFKM

Flexible Modular Design

The compact, mobile GFD®Pilot filter dryer provides production flexibility due to its modular design.

As with the GFD®Lab range, the base frame is compatible with all relevant vessel materials (Borosilicate 3.3 Glass, 316L Stainless Steel and Alloy 22), offering a simple, fit-for-purpose solution. The motor options – electrical or pneumatic depending on the environment of use – are also compatible with the frame drive mount.

The frame has been designed as compact as possible to allow integration within fume cupboards and walk-in laminar flow booths when required. It is also mobile to facilitate the use of the GFD®Pilot with different process/product streams within the facility.



Frame Dimensions (H x W x D)

1680 x 784 x 650 mm

Hazardous Area Compliant

When scaling up to the operational volumes available with the GFD®Pilot, the use of organic solvents in chemical and pharmaceutical processes often means hazardous area considerations must be taken into account.

To overcome this, PSL offers alternative agitator drives suitable for such environments with appropriate certification, for example ATEX and NFPA.

Additionally, the use of pneumatic motor drives ensures the design is kept compact.



Pressure Directives

When higher operating pressures are required, metallic versions of the GFD®Pilot are available.

These are designed and manufactured in accordance with the Pressure Directives of the place of installation. PSL can deliver U-Stamp, PED and SELO certification, as required.



Vessel Operating Pressure (Min/Max)

Full Vacuum / 3 barG (43.5 psiG)

Containment-Ready

As one of the early pioneers of containment technology, PSL developed the unique GFD®FilterBox isolator range to accommodate all the types of vessel used with the GFD®Pilot.

By opting for a GFD®FilterBox operators are safe-guarded from the most toxic/potent compounds and the product is protected from production environments.

PSL can also provide integration packages with/for third-party containment providers. Please contact PSL for further details.



Predictive Scalability

The GFD®Pilot is perfectly suited as the intermediate step between laboratory studies and commercial manufacturing as it helps maintain key objectives such as product quality, product yield and batch consistency, along with the key production parameters of filtration time, washing time and drying time etc.

The GFD® product range is designed to streamline scale-up development from early R&D activities and GLP batches up to Pilot Plant production. For Commercial-Scale production, PSL also offer a range of cGMP compliant Agitated Nutsche Filter Dryers.



Laboratory Nutsche Filter Dryer

- 0.002m² and 0.01m² Filtration area (010 Series and 050 Series)
- Benchtop Frame compatible with both sizes and vessel material options.
- Same unique Filtration Basket, mesh material and porosity options as the GFD®Pilot
- Various Product Contact Material options for process versatility.
- Advanced User interface with the GFD®Lab PLUS providing automation capability, data recording and recipe creation.



ANFD

Commercial Filter Dryers

- 0.05m² up to 1.00m² Filtration area
- Full cGMP design: Double Mechanical Seal, Agitator Bellows, Integral Dust Filter, CIP Ring, etc.
- Filtration Mesh versatility with cloth or metallic sintered mesh use within a single design.
- Fully compliant for Hazardous Area (ATEX/NFPA)
- Contained product off-loading options available for operator protection on API/HPAPI Applications
- Full Automation Capability available to industry standards (GAMP5, 21 CFR Part 11, etc.)



Taking your process further, together.

For over 30 years, Powder Systems Limited (PSL) has been at the forefront of designing and engineering advanced technology to support process development. We are a globally recognised, award-winning business with expertise in pharmaceutical and chemical processing.

Our focus is to help clients and partners address challenging manufacturing processes by providing fit-for-purpose solutions from our wide range of Microsphere Processing, Filtration and Drying ranges.

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