



GFD[®]Lab

Laboratory Agitated Nutsche Filter Dryer



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GFDLab
PLUS
NUTSCHE FILTER DRYER

GFD®Lab

The GFD®Lab Agitated Nutsche Filter Dryer (ANFD) provides the reliability and performance of a production-scale filter dryer in a benchtop form. Optimised for laboratory applications, it performs solid-liquid separation processes and offers the same efficiency and benefits of the full size filter dryers PSL is renowned for.

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®Lab enables scientists, researchers and manufacturers to overcome the limitations of other filtration techniques. It provides the ideal solution for successful scale-up and scale-down activities and is being used in laboratories within research institutes, universities and companies from a wide range of industries, worldwide.

Features and Benefits

- **Combined Filtration and Drying**
An all-in-one solution, with upgrade options
- **Unrivalled Product Recovery**
Unique, removable filtration basket
- **Enhanced Modular Flexibility**
Interchangeable vessels and material compatibility
- **Batch reproducibility**
Automated control and recipe capability
- **Scale-up Capability**
Easy transition from lab to pilot scale



GFD®Lab at a Glance

1: Agitator System

- Height-adjustable system with manual or automated operation (GFD®Lab PLUS only)
- Bidirectional motor for smoothing and ploughing of filter cake
- 10-100 rpm with up to 5.1 N·m torque
- Aids uniform drying of filter cake
- Available in 316L Stainless Steel or Alloy 22

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
- Various nozzle connections for maximum process flexibility
- Integrated vacuum and drain nozzle allows for collection of filtrate/mother liquor
- 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
- Interchangeable filtration media and pore sizes (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®Lab is an all-in-one filter dryer designed to comply with Good Laboratory Practices (GLP) for regulated research and development activities. It allows process developers and manufacturers to complete a wide range of processes in one single system:

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



Vessel Specifications

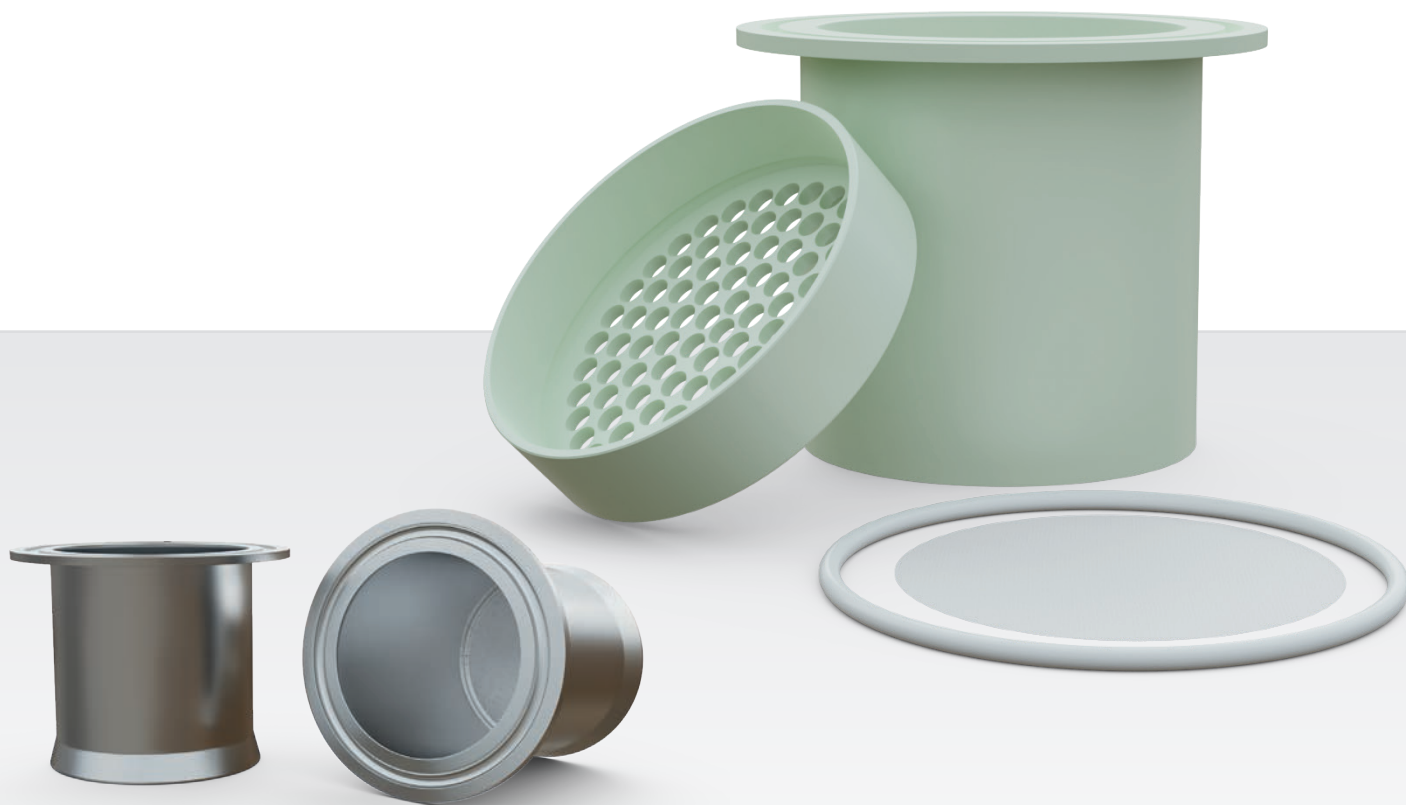
Vessel Size	010 Series	050 Series
Filtration Area	0.002m ²	0.01m ²
Filter Cake Volume (Min*/Max)	0.025 Litres / 0.1 Litres	0.18 Litres / 0.5 Litres
Filter Cake Depth (Min*/Max)	12.5mm / 50mm	18mm / 50mm
Vessel Volume	0.3 Litres	2 Litres
Vessel Operating Temperature Range	-25°C (-13°F) to 150°C (302°F)	
Glass Vessel Operating Pressure Range	Full Vacuum to 0.5 barg (7.25 psi)	
Metallic Vessel Operating Pressure Range	Full Vacuum to 4 barg (58 psi)	

*Recommended for optimum drying performance

Unrivalled Product Recovery

At PSL, we understand that maximising product recovery is extremely valuable in order to remain competitive in specific markets. The core features of the GFD®Lab were designed keeping this crucial requirement in mind.

Upon process completion, product batches can be collected easily by simply removing the filtration basket from the GFD®Lab vessel. Additionally, the unique GFD® basket was designed to allow quick and easy changeover of filtration meshes with various pore-sizes and materials (Polypropylene, PTFE, 316LSS, Alloy 22, etc.), hence facilitating multi-product applications.

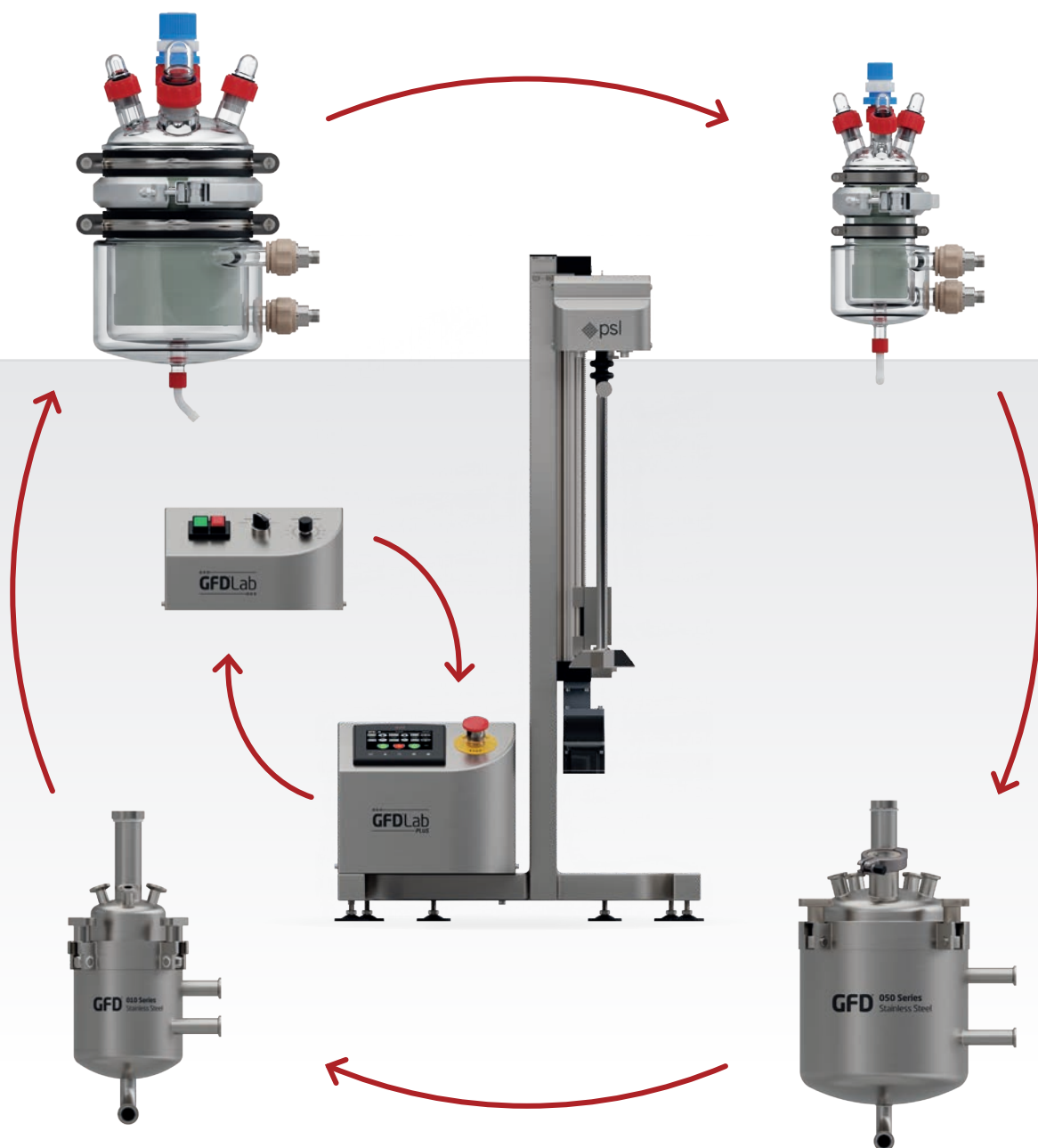


Basket Construction Materials	Polymer Basket Filtration Media	Metallic Basket Filtration Media	Basket Sealing Materials
Polypropylene	Polypropylene	316L Stainless Steel	EPDM
PTFE	PEEK	Alloy 22	Silicone
316L Stainless Steel	Polyester	-	FEP Encapsulated
Alloy 22	Nylon	-	FKM / FFKM

Enhanced Modular Flexibility

The GFD®Lab is an innovative agitated nutsche filter dryer with a modular design that enables end-users to interchange vessels sizes from the 010 and 050 series without the need to use a different base frame.

To further enhance production flexibility, the base frame of each GFD®Lab model is also compatible with all available vessel materials (i.e. Borosilicate 3.3 glass, 316L Stainless Steel, Alloy 22).



GFD® - The Choice is Yours

Due to its unique modular design, it is possible to upgrade the standard GFD®Lab into a GFD®Lab PLUS model by simply retrofitting a new base frame to the existing vessel. By opting for this upgrade, the additional features allow you to speed-up development activities by automating the controls of your GFD®Lab.



GFDLab



GFDLab PLUS

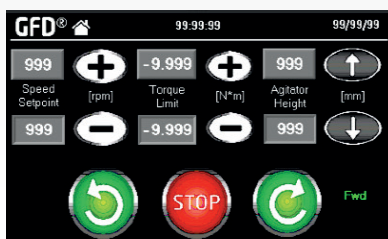
✓	Combined Filtration & Drying	✓
✓	Removable Filter Basket	✓
✓	316L SS or Alloy 22 Vessel	✓
—	Automated Agitator Raise & Lower	✓
—	Digital Display & Touch Screen	✓
—	Real-time Value & Graph Display	✓
—	Process Sequence Design	✓
—	Process Recipe Optimisation	✓
—	Process Data Recording & Exporting	✓

Batch Reproducibility at the Touch of a Button

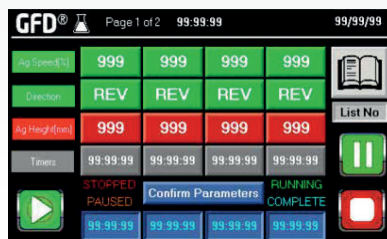
The GFD®Lab PLUS allows users to build bespoke process sequences and optimise process recipes to suit particular process applications. Pre-designed recipes can be initiated with your preferred process parameters (e.g. pressure/vacuum, agitator speed/torque, temperature, duration), thus maximising batch-after-batch reproduction while minimising human error.

Speeding up lab-scale R&D activity

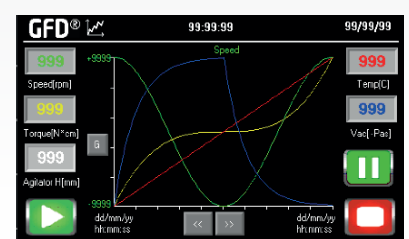
- 4" colour HMI Touch Screen digital display
- Quick navigation with an enhanced user-interface
- Real-time process graph display
- Capability to design process sequences
- Opportunity to record and export process data



Home Screen



Process Sequence Creation



Real-time Process Values

Predictive Scale-up

The GFD®Lab is perfectly suited to complete scale-up and scale-down studies 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.

GFD[®]Pilot

Pilot Plant Filter Dryer

- 0.050m² Filtration area (500 Series)
- Compact Mobile Frame mounted for use in various locations
- Same unique Filtration Basket, mesh material and porosity options as the GFD®Lab
- Metallic Vessels certified for various pressure directives: PED, ASME "U-Stamp", SELO
- Versions suitable for use in Hazardous Area (ATEX/NFPA)



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.

w: **powdersystems.com**

e: **info@powdersystems.com**

t: **+44 (0) 151 448 7700**



株式会社 奈良機械製作所

〒143-0002 東京都大田区城南島2-5-7
TEL (03) 3790-8011 FAX (03) 3790-8055

<https://www.nara-m.co.jp>

事業所 / 奈良機械販売株式会社 〒532-0011 大阪市淀川区西中島3-23-15-606
TEL (06) 6307-2371 FAX (06) 6307-2370



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