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Drying and Filtration Technology

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Centro Direzionale Colleoni
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Pressofiltro®

Agitated Nutsche Filter Filter Dryer





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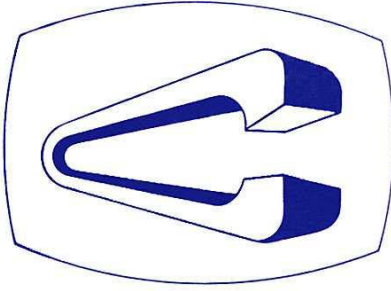
Pressofiltro® Agitated Nutsche Filter - Dryer



Pharmaceutical design Pressofiltro® Nutsche filter - dryers

- In compliance with **cGMP** and **FDA** guidelines, also available in **sterile** design.
- Double mechanical seals, externally interchangeable, dry running contacting or non contacting lift-off type seals as well as liquid lubricated seals.
- Calculation, design and manufacture in accordance with the **Pressure Equipment Directive (PED) 97/23/EC** and/or the **ASME** pressure vessel code, Section VIII, with **U-Stamp**.
- Removable filter bottom with conventional clamps or bayonet locking system.
- Easily interchangeable filter plates, secured from below the filter bottom.
- Welded multilayer filter versions, with flat, homogeneous, easy to clean and to inspect filter surfaces.
- Excellent cleanability using CIP systems, simple validation.
- Heated or unheated agitator, agitator with two or three arms, with simultaneous axial and radial agitator movements for efficient mixing and agitating as well as for the smoothing of the cake.
- Large heating area resulting in an outstanding heat transfer rate by heating the vessel walls, the vessel bottom as well as the agitator blades. Optional supplemental heating with **microwaves**.
- Good emptying characteristics due to narrow agitator to wall/bottom clearances and a unique agitator blade design.

TI 0024 E - 04/05



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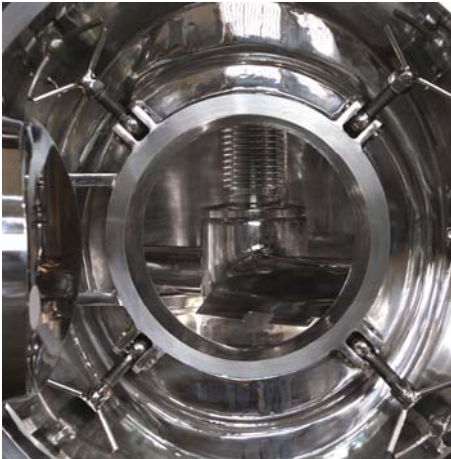
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Pressofiltro® Agitated Nutsche Filter - Dryer



Pressofiltro® PF nutsche filters or filter dryers are versatile units designed for multipurpose production facilities. To meet the demanding requirements for filters used in the manufacture of pharmaceutical ingredients, the filters are designed to meet stringent cGMP and FDA guidelines.

To allow for good cleanability using CIP systems and to permit optimal inspection after the cleaning process all product wetted surfaces are designed without dead areas, with smooth transitions of internals and without any bolted connections. For good access to the filter internals for cleaning and inspection purposes the filters are equipped with an openable filter base. The overall attention to design details allows for simplified validation of the units.



The agitator is supported from the top, with the agitator drive, the bearings and the shaft seal installed externally. Shaft sealing is with a double mechanical seal and a convoluted bellows. The agitator arms with specially designed bottom teeth smooth and press the cake when rotated counterclockwise, and mix and agitate the cake when rotated clockwise. Simultaneous rotational and vertical agitator motions result in a very efficient and even mixing of the entire product mass for mixing and drying. The agitator arms are S-shaped for improved product discharge.

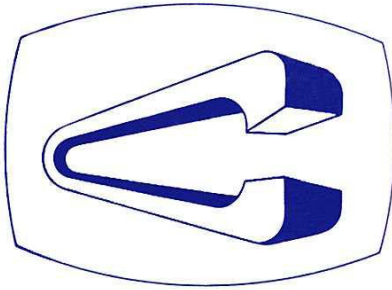
All product wetted surfaces are heated to obtain the largest possible heat exchange area for short drying times and a low attainable final humidity. Supplemental microwave heating is available to further reduce drying times.

The product is discharged through a hydraulically operated side discharge valve, with the valve plug contoured to match the curvature of the vessel internal wall. The solids discharge valve is a metal to metal seal design with the sealing surfaces arranged outside the product flow path, with interchangeable seal rings. This assures proper sealing even after multiple operations during a batched discharge.

Alternatively the product can be discharged through an active or passive isolator (glove box). On smaller filter units the isolator permits contained sampling, product discharge and heel removal all in one system. For larger filters different heel break-up and heel removal devices are available.



TI 0122 E - 02/06



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Pressofiltro® Agitated Nutsche Filter Dryers

Standard Features for Pharmaceutical Version:

- Calculation, design and manufacture in accordance with PED 97/23/EC or/and ASME pressure vessel code, Section VIII with U-Stamp as well as in compliance with cGMP and FDA guidelines.
- EC type examination certificate 03ATEX0246X per the 94/9/EC directive or with electrical components UL approved for operation in a Class 1, Division 1 or 2, Groups C & D environment.
- Double mechanical seals, externally interchangeable, dry running contacting or non contacting lift-off type seals as well as liquid lubricated seals.
- Sample valve
- Hydraulic pre-piping to manifolds, pre-wiring to terminal boxes, all in Stainless Steel.
- CIP System.

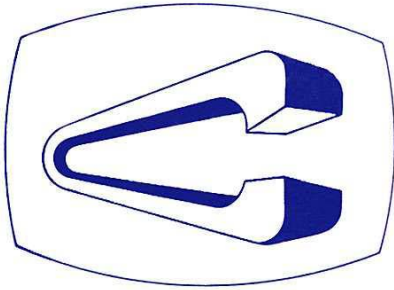
Options:

- Supplemental microwave heating to reduce time required for drying
- Aseptic versions, heel removal systems, contained discharge (Glove Box), DQ, IQ, OQ qualification
- PLC controls, autonomous or slaved to DCS, MCC

Technical Data: (pilot units)	PF 100	PF 200	PF 250	PF 350	PF 500S
Filter area:	0.20	0.32	0.38	0.50	0.60 m ²
Vessel internal diameter:	500	640	700	800	875 mm
Vessel cylindrical height:	550	720	750	800	850 mm
Usable slurry volume:	100	230	280	400	500 l
Cake volume:	32	80	115	150	180 l
Bottom opening stroke:	300	500	500	500	500 mm
Heated area, wetted:	0.31	0.57	0.74	0.85	0.94 m ²
Discharge valve ID:	150	200	200	200	200 mm
Agitator RPM:	5 - 50	7 - 74	7 - 70	6 - 60	5 - 52 RPM
Agitator drive:	4.0	4.0	5.5	5.5	7.5 kW
Agitator vertical stroke:	175	250	300	300	300 mm
Agitator up/down speed:	30	30	30	30	30 mm/min
Dust filter elements:	1	1	1	1	1 pcs.
Filter surface:	0.2	0.2	0.3	0.4	0.4 m ²
Nitrogen vessel volume:	6	6	6	6	6 l
Design pressure:	Vessel and jacket: Full vacuum / 4 barg				
Design temperature:	- 10 / + 151° C				
Finish:	Interior: mirror polish gr. 240 (Ra 0.38 µm) Exterior: satined gr. 180 (Ra 0.76 µm)				

Note: The technical data listed above are for the standard machine version. Machines with other pressure and temperature ratings and other specifications are available and can be quoted on request.

TI 0015 E - 06/08



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Standard Features for Pharmaceutical Version:

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- EC type examination certificate 03ATEX0246X per the 94/9/EC directive or with electrical components UL approved for operation in a Class 1, Division 1 or 2, Groups C & D environment.
- Double mechanical seals, externally interchangeable, dry running contacting or non contacting lift-off type seals as well as liquid lubricated seals.
- Sample valve.
- Hydraulic pre-piping to manifolds, pre-wiring to terminal boxes, all in Stainless Steel.
- CIP System.

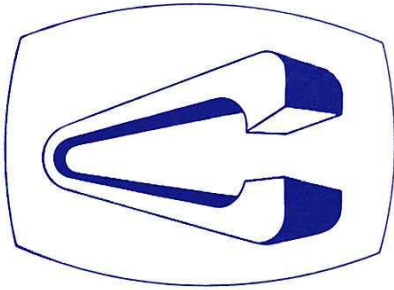
Options:

- Supplemental microwave heating to reduce time required for drying
- Aseptic versions, heel removal systems, contained discharge (Glove Box), DQ, IQ, OQ qualification
- PLC controls, autonomous or slaved to DCS, MCC

Technical Data: (medium sized units)	PF 500	PF 750	PF 1000S	PF 1000	PF 1500
Filter area:	0.70	0.85	1.00	1.26	1.50 m ²
Vessel internal diameter:	955	1050	1150	1270	1380 mm
Vessel cylindrical height:	900	900	900	900	1000 mm
Usable slurry volume:	640	770	930	1140	1500 l
Cake volume:	210	340	415	505	750 l
Bottom opening stroke:	500	600	600	600	600 mm
Heated area, wetted:	1.04	1.49	1.65	1.85	2.47 m ²
Discharge valve ID:	200	250	250	250	250 mm
Agitator RPM:	5 - 46	4 - 40	4 - 40	4 - 37	3 - 30 RPM
Agitator drive:	7.5	7.5	11.0	11.0	15.0 kW
Agitator vertical stroke:	300	400	400	400	500 mm
Agitator up/down speed:	30	30	30	30	30 mm/min
Dust filter elements:	1	1	1	1	2 pcs.
Filter surface:	0.4	0.4	0.4	0.4	0.8 m ²
Nitrogen vessel volume:	6	6	6	6	6 l
Design pressure:	Vessel and jacket: Full vacuum / 4 barg				
Design temperature:	- 10 / + 151° C				
Finish:	Interior: mirror polish gr. 240 (Ra 0.38 µm) Exterior: satined gr. 180 (Ra 0.76 µm)				

Note: The technical data listed above are for the standard machine version. Machines with other pressure and temperature ratings and other specifications are available and can be quoted on request.

TI 0016 E - 09/08



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Standard Features for Pharmaceutical Version:

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- EC type examination certificate 03ATEX0246X per the 94/9/EC directive or with electrical components UL approved for operation in a Class 1, Division 1 or 2, Groups C & D environment.
- Double mechanical seals, externally interchangeable, dry running contacting or non contacting lift-off type seals as well as liquid lubricated seals.
- Sample valve.
- Hydraulic pre-piping to manifolds, pre-wiring to terminal boxes, all in Stainless Steel.
- CIP System.

Options:

- Supplemental microwave heating to reduce time required for drying
- Aseptic versions, heel removal systems, contained discharge (Glove Box), DQ, IQ, OQ qualification
- PLC controls, autonomous or slaved to DCS, MCC

Technical Data: (large units)	PF 2000	PF 2500	PF 3000	PF 4000	PF 5000	PF 6000
Filter area:	2.0	2.5	3.0	4.0	5.0	6.0 m ²
Vessel internal diameter:	1600	1800	1960	2260	2535	2765 mm
Vessel cylindrical height:	1000	1000	1000	1000	1000	1000 mm
Usable slurry volume:	2000	2500	3000	4000	5000	6000 l
Cake volume:	1000	1250	1500	2000	2500	3000 l
Bottom opening stroke:	600	600	600	600	600	600 mm
Heated area, wetted:	2.92	3.34	3.68	4.35	5.00	5.54 m ²
Discharge valve ID:	350	350	350	350	350	350 mm
Agitator RPM:	3 - 30	3 - 25	3 - 25	2 - 21	2 - 18	2 - 17 RPM
Agitator drive:	18.5	18.5	22	22	30	30 kW
Agitator vertical stroke:	500	500	500	500	500	500 mm
Agitator up/down speed:	30	30	30	20	20	20 mm/min
Dust filter elements:	2	3	3	4	4	4 pcs.
Filter surface:	0.8	1.2	1.2	1.6	1.6	1.6 m ²
Nitrogen vessel volume:	6	12	12	12	12	12 l

Design pressure:

Vessel and jacket: Full vacuum / 4 barg

Design temperature:

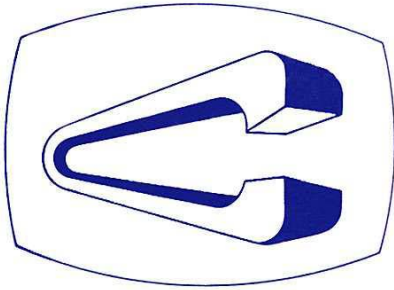
- 10 / + 151° C

Finish:

Interior: mirror polish gr. 240 (Ra 0.38 µm) Exterior: satined gr. 180 (Ra 0.76 µm)

Note: The technical data listed above are for the standard machine version. Machines with other pressure and temperature ratings and other specifications are available and can be quoted on request.

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Standard Features for Pharmaceutical Version:

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- EC type examination certificate 03ATEX0246X per the 94/9/EC directive or with electrical components UL approved for operation in a Class 1, Division 1 or 2, Groups C & D environment.
- Double mechanical seals, externally interchangeable, dry running contacting or non contacting lift-off type seals as well as liquid lubricated seals.
- Sample valve.
- Hydraulic pre-piping to manifolds, pre-wiring to terminal boxes, all in Stainless Steel.
- CIP System.

Options:

- Supplemental microwave heating to reduce time required for drying
- Aseptic versions, heel removal systems, contained discharge (Glove Box), DQ, IQ, OQ qualification
- PLC controls, autonomous or slaved to DCS, MCC

Technical Data: (large units)	PF 7000	PF 8000	PF 9000	PF 10000	PF 12000	PF 14000
Filter area:	7.0	8.0	9.0	10.0	12.0	14.0 m ²
Vessel internal diameter:	3000	3190	3390	3570	3910	4330 mm
Vessel cylindrical height:	1000	1000	1000	1000	1000	1000 mm
Usable slurry volume:	7000	8000	9000	10000	12000	14000 l
Cake volume:	3500	4000	4500	5000	6000	7000 l
Bottom opening stroke:	600	600	600	600	600	600 mm
Heated area, wetted:	6.13	6.61	7.13	7.61	8.54	9.43 m ²
Discharge valve ID:	450	450	450	450	450	450 mm
Agitator RPM:	2 - 16	2 - 15	2 - 15	2 - 14	1 - 12	1 - 11 RPM
Agitator drive:	37	37	45	45	55	75 kW
Agitator vertical stroke:	500	500	500	500	500	500 mm
Agitator up/down speed:	15	15	10	10	10	10 mm/min
Dust filter elements:	5	5	6	7	9	10 pcs.
Filter surface:	2.0	2.0	2.4	2.8	3.6	4.0 m ²
Nitrogen vessel volume:	24	24	24	24	24	24 l

Design pressure: Vessel and jacket: Full vacuum / 4 barg
 Design temperature: - 10 / + 151° C
 Finish: Interior: mirror polish gr. 240 (Ra 0.38 µm) Exterior: satined gr. 180 (Ra 0.76 µm)

Note: The technical data listed above are for the standard machine version. Machines with other pressure and temperature ratings and other specifications are available and can be quoted on request.

TI 0190 E - 02/06



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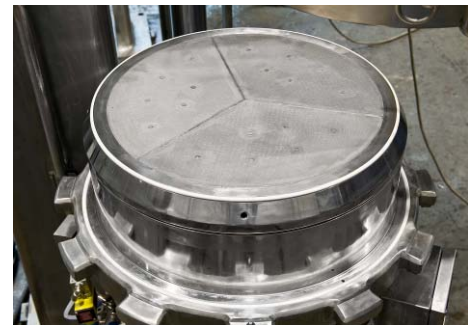
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Pressofiltro® PF 100 Filter Dryer Sterile



Pressofiltro® PF 100 filter dryer designed for a demanding aseptic application, complete with CIP and SIP systems, including sterilizable mechanical seal.

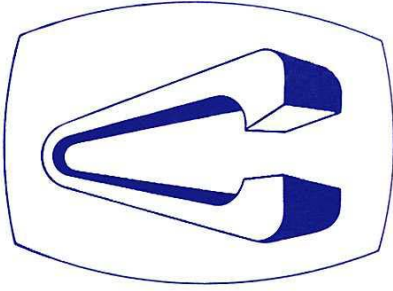
Other features include a multilayer filter plate, heel break-up system and Whirl Snake® turbine for total heel removal under aseptic conditions, the bayonet locking system for filter bottom and a vessel camera for remote process observation.

Upper right: Whirl Snake® heel discharge turbine installation

Centre right: Discharge valve with metal to metal seal, metal shaft bellows and CIP/SIP spray balls

Lower right: Filter plate in dead space free design, with multilayer filter mesh and heel break-up system

TI 0264 E - 09/08



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Pressofiltro® PF 200 Pilot Filter Dryer

Pressofiltro® PF 200 pilot filter dryers for pharmaceutical applications.

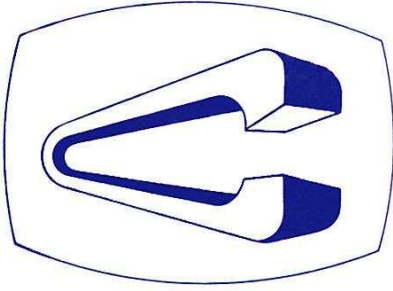
Right:

Filter dryer with all product wetted components in **Titanium Grade 7**, with active isolator for sampling, contamination free product discharge, heel removal and filter cloth disposal. With support structure for ergonomic operation of the isolator. The column mounted filter base provides excellent access to replace the filter cloth and for inspection. Filter bottom with peripheral groove for filter cloth fixation with PTFE rope.

Bottom left:

Filter dryer with conventional support legs, with bayonet locking system for filter bottom.





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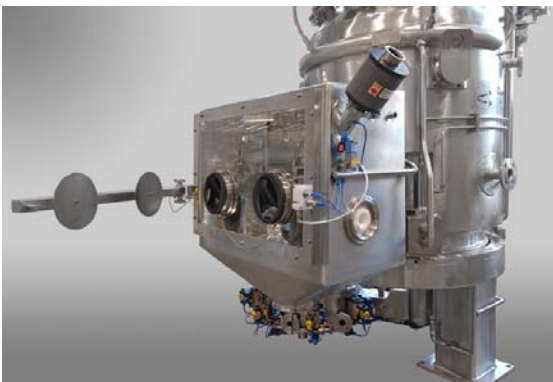
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Pressofiltro® PF 350 Pilot Filter Dryer

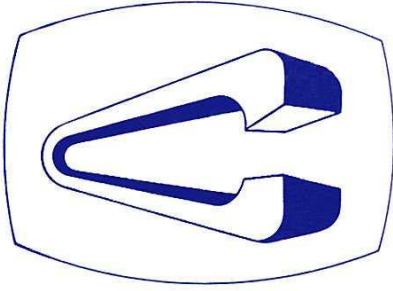


Pressofiltro® PF 350 filter dryer in single column design for a pharmaceutical application.

With passive isolator for sampling, dust containment during discharge and final heel removal. Filter bottom with heel break-up system, multilayer filter plate. With bayonet locking for filter bottom, pre-wiring to junction box with cables contained within SS halfpipe, tubes and metal braided hoses.

Left: Detail of isolator with safety barrier, sampling RTP and HEPA filter.

TI 0057 E - 06/05



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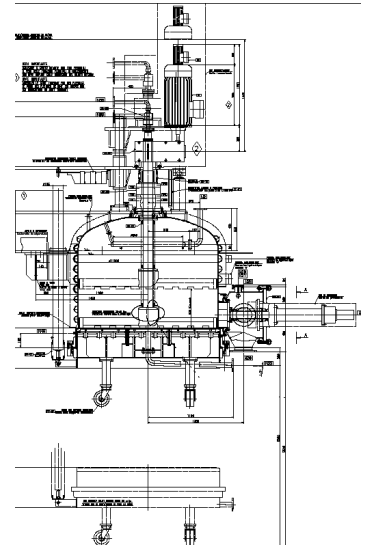
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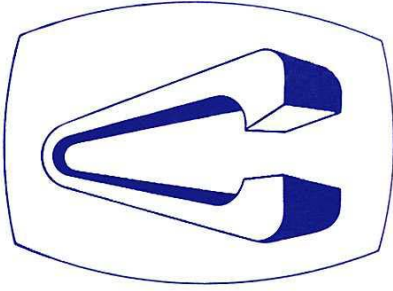
Pressofiltro® PF 2500 Filter Dryer



Pressofiltro® PF 2500 filter dryer for installation in a ceiling. The filter dryer is equipped with three lugs to secure the unit onto the ceiling, a welded collar around the top of the vessel allows for a clean separation of the filter dryer top in the upper room and the filter dryer vessel in the lower room. The filter bottom can be lowered by 1800 mm to the level of the floor for maintenance purposes.

The filter dryer is equipped with a multilayer filter plate, bayonet locking system for the filter bottom, discharge valve with spindle drive acuated by a hydraulic motor and an additional plug for heel removal diagonally across the discharge valve.

TI 0265 E - 09/08



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Pressofiltro® PF 2500 Filter Dryer



Type Pressofiltro® PF 2500 Filterdryer for a pharmaceutical application, with C-clamp locking for filter bottom, multilayer filter plate, solids discharge valve with valve seat cleaning system, pre-wiring to junction box with cables contained within SS halfpipe, tubes and metal braided hoses.

TI 0088 E - 06/03



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Pressofiltro® PF 4000 Filter Dryer



Type Pressofiltro® PF 4000 filter dryer(s) for a pharmaceutical application, with bayonet locking system for filter bottom, multilayer filter plate, plug-type sample valve, pre-wiring to junction box with cables contained within SS halfpipe, tubes and metal braided hoses.

TI 0070 E - 06/04



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Pressofiltro® PF 6000 Filter Dryer



Type Pressofiltro® PF 6000 filter dryer for a pharmaceutical application, with bayonet locking system for filter bottom, multilayer filter plate, plug-type sample valve, pre-wiring to junction box with cables contained within SS halfpipe, tubes and metal braided hoses.

TI 0217 E - 07/07