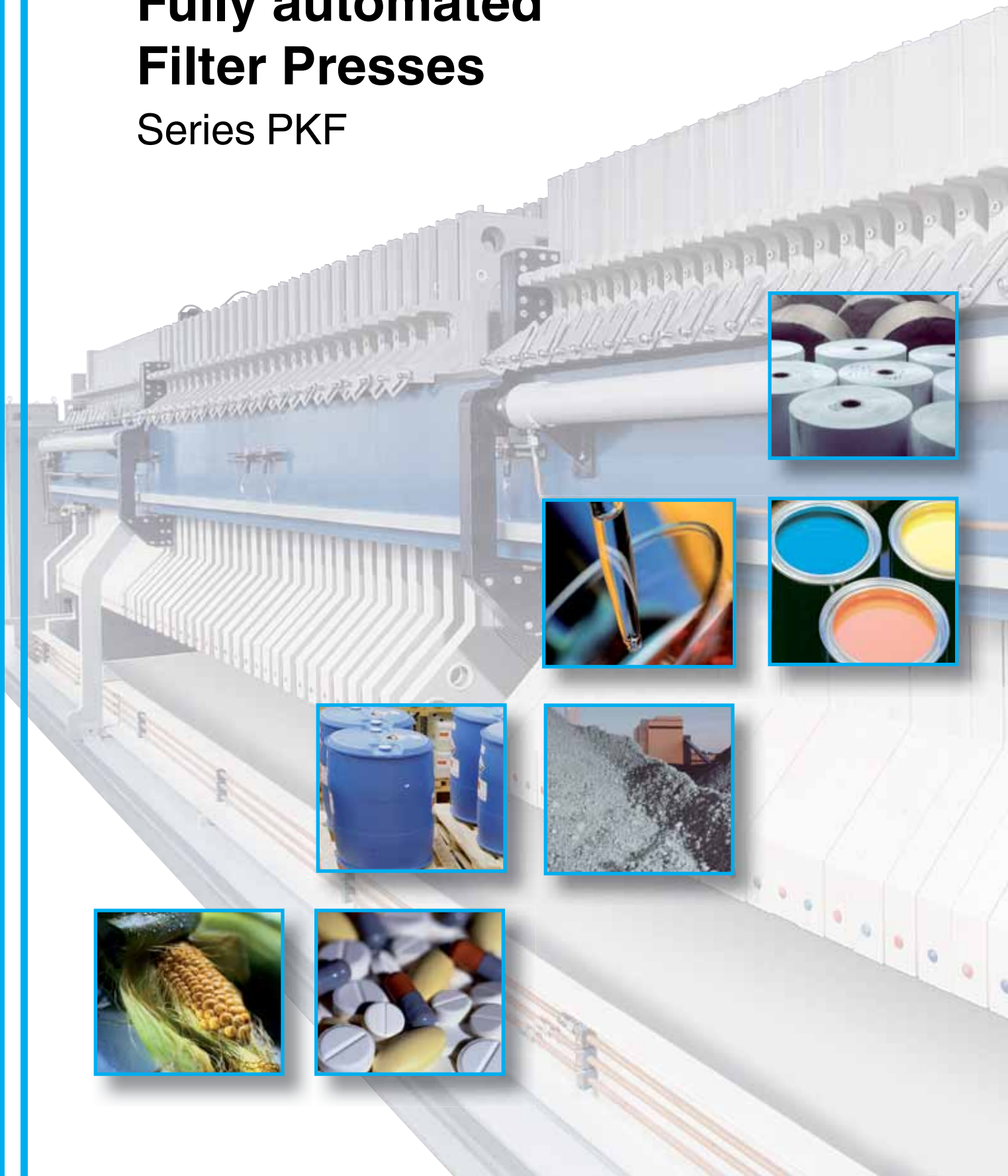
Putsch®

FILTRATION & SEPARATION TECHNOLOGY

Fully automated Filter Presses

Series PKF



Putsch®

FILTRATION & SEPARATION TECHNOLOGY

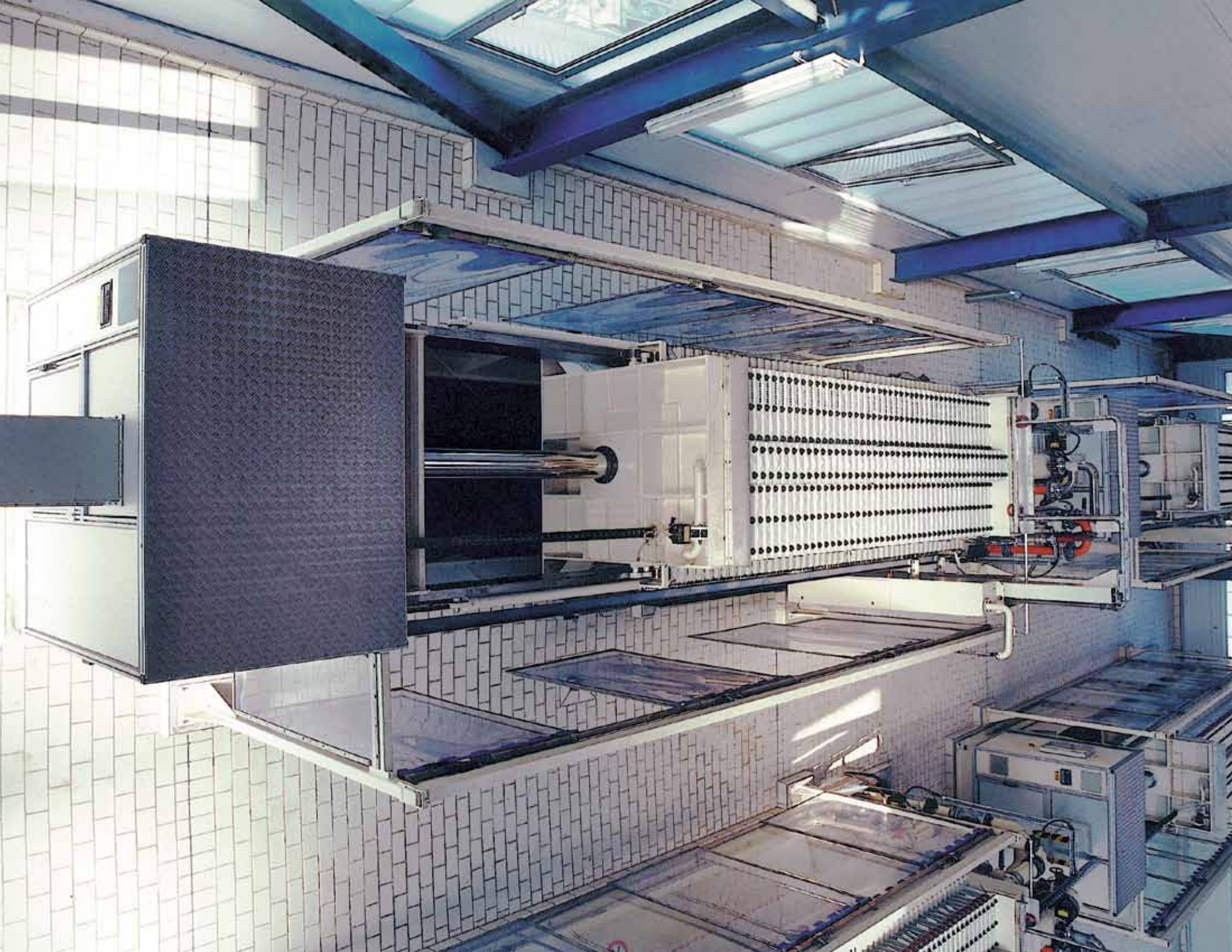
Putsch® Filtration & Separation Technology (FST) provides consulting, technical solutions, sales, manufacturing and services for the North American process industry. The technologies offered include Filter Presses, automated self cleaning filters and various devices for liquid / solid separation.

Putsch® FST is a part of Putsch® & Company, Inc., based in Asheville, NC. This facility provides services such as engineering, research, manufacturing, spare parts and customer support for the US, Canada and Mexico.

HISTORY

The Putsch® Group was founded in 1871 by Hermann Putsch and has become a diversified technology supplier for the process industry. Today, Putsch® products have expanded to offer complete turn-key systems for dependable process solutions. For example, Putsch® filter press systems have been among the standard equipment for the sugar & sweetener industry for decades. Over 1000 filter press systems have been successfully put into service worldwide.

Putsch® products are known world wide in the filtration and environmental technology industries, as well as in all glass and sugar factories for their quality and dependability. Far reaching diversification is the result of consistent company expansion and innovation.



Typical Applications

PIGMENTS & DYE MANUFACTURING

Many applications in this industry demand reliable service for 24 hours / 7 days a week operation. Corrosive environment, elevated temperatures and often volatile atmospheres demand suitable design. Putsch® Filter Press Systems are engineered to meet these requirements. Conventional devices such as Drum Filters and Centrifuges have been successfully replaced by Filter Presses.

Typical applications are:
- Titan dioxide (TIO_2) (finishing / desalting and waste / neutralization)
- Caustic solutions
- Acids
- Coatings

FOOD & AGRICULTURE

Putsch® Filter Presses and Juice Purification Systems are the standard for applications in the sugar industry. The robust and high performance design as well as the high degree of automation make these filters the ideal choice for many applications in this market.

Typical applications are:
- Wine and Juices
- Beer
- Edible oils
- “Green Energies” (Bio-ethanol)
- Animal waste
- Sugar and sweetener processes

CHEMICAL/ PETROCHEMICAL

Putsch® Filter Press Systems provide large capacities with fully automatic operation for this industry. Corrosion and abrasion resistant materials and robust designs for continuous 24 hours / 7 days a week operation duty make our filtration systems the ideal choice for this market.

Typical applications are:
- Calcium carbonate ($CaCO_3$)
- Barium sulphate (Completion fluid)
- Silicates (product and waste)
- Polymers (Fibers)
- Brine solutions (Coolants recovery)

RECYCLING & ENVIRONMENT

For this industry, Putsch® can provide various Filter Press designs and assist in process development at our test laboratory.

Typical applications are:
- Stone processing (cutting, polishing and gravel washing applications)
- Plastic fibers (Carpet recycling)
- Power plants (Flue Gas Desulphurization, FGD)
- Industrial waste
- Chemical waste

PHARMACEUTICAL & BIOTECH

Demand for precisely controlled processes and clean environments can be met with Putsch® Filter Press Systems. Our proprietary program algorithms and machine enclosures meet this challenge.

Typical applications are:
- Yeast
- Bio solids
- Seaweed
- Blood plasma
- Enzymes

PULP & PAPER

Although centrifuges are the preferred choice of dewatering equipment in this industry, Filter Press Systems have proven to provide superior results in regard to solid capture rate, final moisture content and salt removal (cake washing).

Typical applications are:
- Green liquor (Soda Recovery)
- Coatings waste treatment

MINING & MINERALS

The demand for large capacity Filter Presses for harsh environments make the Putsch® Filter Press Systems with their innovative cake discharge system an economic choice for this industry.

Typical applications are:
- Mineral concentrates
- Flotation slurries
- Coal
- Clays (Kaolin, Bentonite, Ceramics)

Putsch®

FILTRATION & SEPARATION TECHNOLOGY

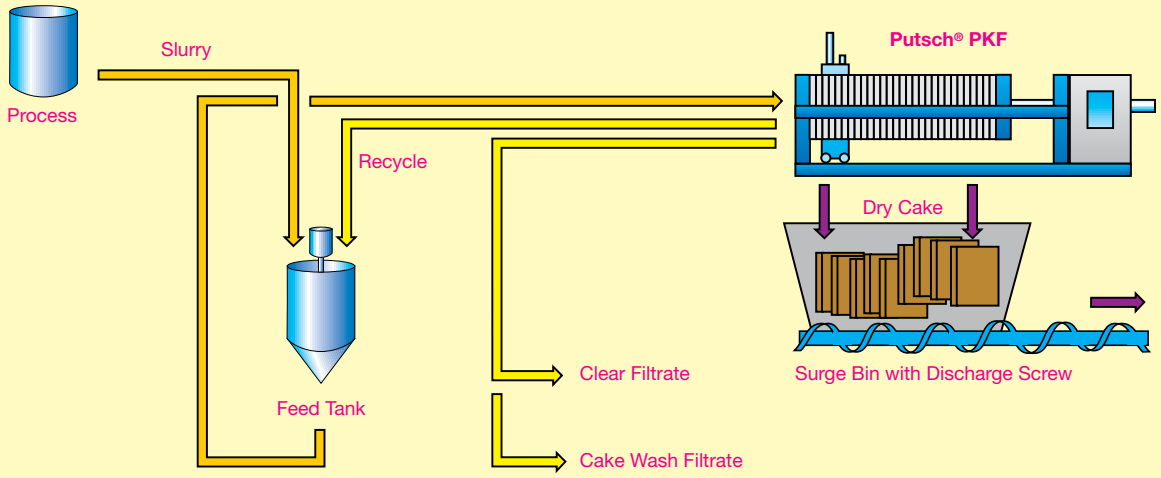
Putsch® Filter Press Systems have been selected for decades as the main choice of technology for the deliquifying of slurries and suspensions. Over 1000 Putsch® Membrane Filter Press Systems have been installed successfully worldwide.

Benefits of Putsch® Filtration Systems:

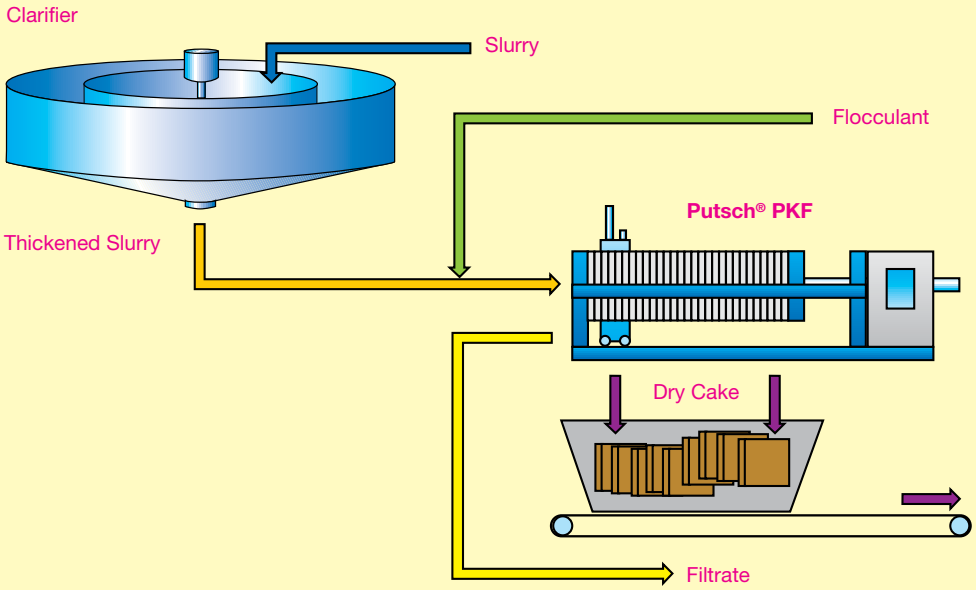
- US manufacturing and materials
- Responsive US service
- Fully automated operation
- Robust design with minimal maintenance requirements
- Custom designs and process developments specific to application
- Available selection of different filter plate styles
- Variety of filter media (filter cloth) optimized for the application
- Flexible cake volumes
- Effective cake wash
- Low cake wash water consumption
- Highest process rates due to short cycle times
- Highest cake solids
- Programmable feed controls for optimum filtration
- User friendly system controls
- In-house electrical design, programming and manufacturing
- Communications with centralised control systems (DCS)
- Low compressed air usage
- Low energy consumption
- Automated cloth washers
- Design and supply of peripheral components
- Engineering and supply of turnkey systems
- Professional filtration laboratory in the US and mobile test units for field studies

TYPICAL PROCESS SCHEMATICS

Direct Filtration with Cake Washing and Continuous Discharge



Pre-Thickening prior to Filtration with Conditioning



The successful operation of any solid/ liquid separation technology depends on a number of key factors. These factors include the understanding of process limitations, clearly defined application objectives, compatibility and integration of up and down stream process components, equipment maintenance and reliable service.

The products and people of Putsch® will supply you with the resources to meet your objectives. We provide application testing at either our laboratory or at your site, the selection and design of best suited components, the manufacturing and documentation of the selected products and reliable, professional after sales service for the duration of the operation.

Functional Description of the Putsch® PKF Series

1 Filling

The press is closed via the automatic, pressure controlled hydraulic. The slurry feed pump starts to fill the press according to an optimum rate and pressure curve tailored to the application.

2 Filtration

As the chambers are filled with slurry, a superior filtrate quality is obtained. This step is automatically controlled resulting in optimum filtration rates.

3 Pre- and Intermediate-Pressing

The filter feed pumps are turned off and the filter plate membranes compress the cake for optimum cake washing.

4 Cake Wash

Dissolved solids in the filter cake can be removed or washed using a variety of wash media depending on the application.

5 Final Pressing

The filter plate membranes resume compression of the filter cake at high pressures to obtain the highest possible cake solids and best cake release.

6 Air Drying

Additional moisture can be removed by forcing dry air through the filter cakes.

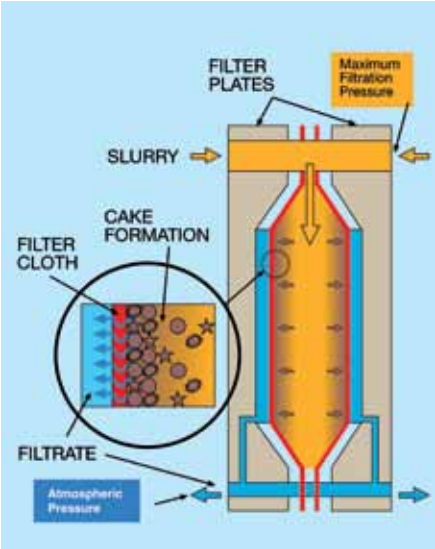
7 Cake Discharge

All the filter cakes are being discharged with the Putsch® block discharge system, reducing the process down time and providing the shortest possible filtration cycles.

8 Cloth Wash (optional)

All filter media (cloth) has a potential for blinding after repeated usage. The Putsch® automated cloth washer cleans the filter cloth and restores them to optimum performance.

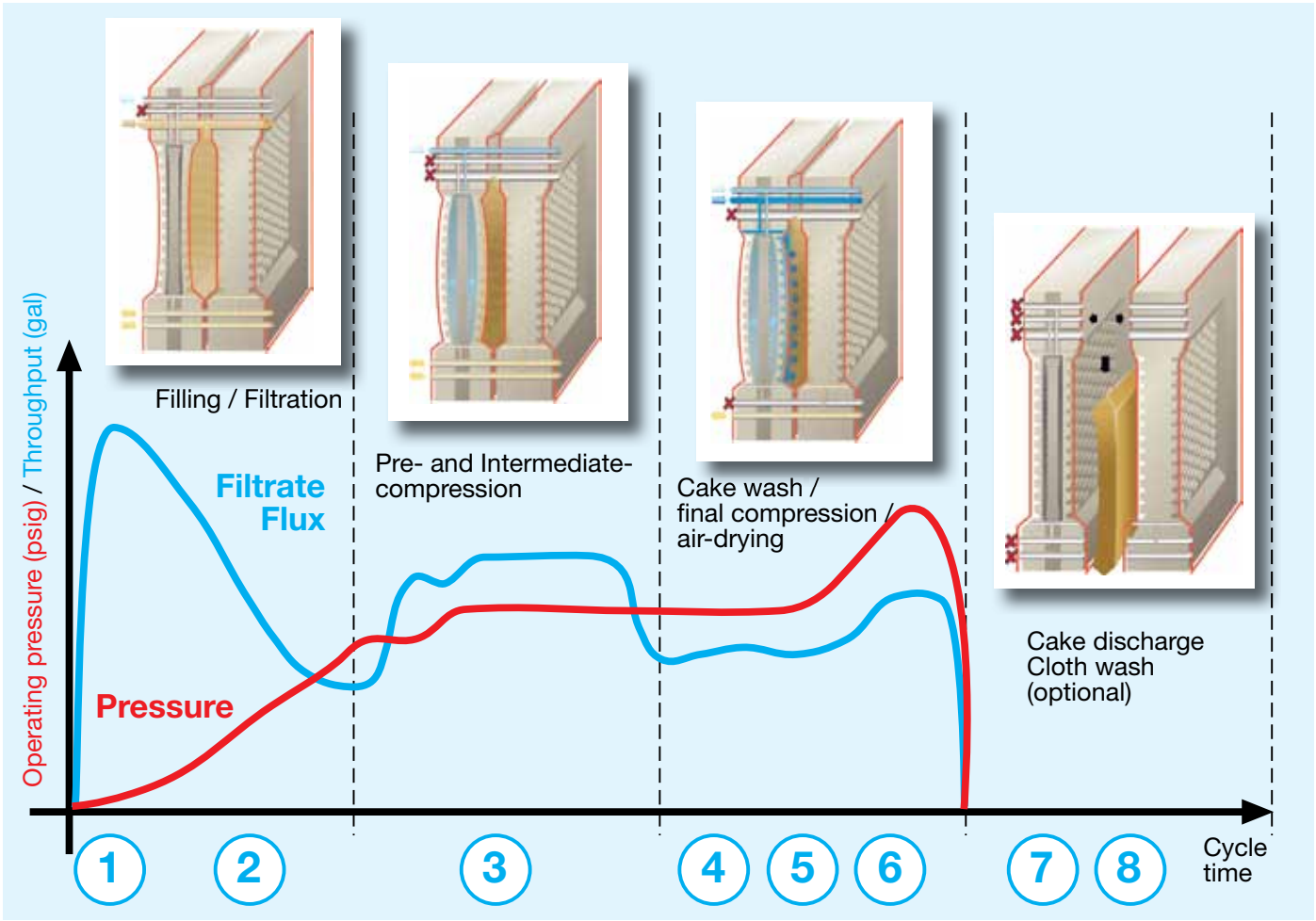
CAKE FILTRATION IN A FILTER PRESS



A slurry is pumped into a series of filtration chambers formed by the filter plates. The plates are lined with filter media (filter cloths) that is permeable to liquids only. All suspended solids in the slurry will accumulate on the media surface and begin to build a filter cake. Initially, the liquid from the slurry will pass through the filter cloth only. As the cake is formed, the liquid must pass through the cake as well. Thus, the filter cake becomes the filtration media. The liquid (filtrate) is discharged via a pipe manifold and is virtually solid-free. Due to the building cake resistance the filtration pressure increases.

The Putsch® Membrane Filter Press utilizes pumping pressure up to 100 psig. In a second step the slurry pump is turned off and flexible membranes (diaphragms), which are part of the filter plates, exert pressure (squeeze) up to 450 psig to the formed filter cake. A very dry cake with a residual moisture content of less than 10 % can be achieved. The fully automated controls of the Putsch® Membrane Filter Press allow the customization of all phases of filtration and compression (squeeze) in order to achieve optimum performance in regards to cake formation and cake washing (purging of dissolved solids in the filter cake).

At the end of the process cycle the filter plates are automatically separated and the filter cakes are discharged for further processing or disposal.



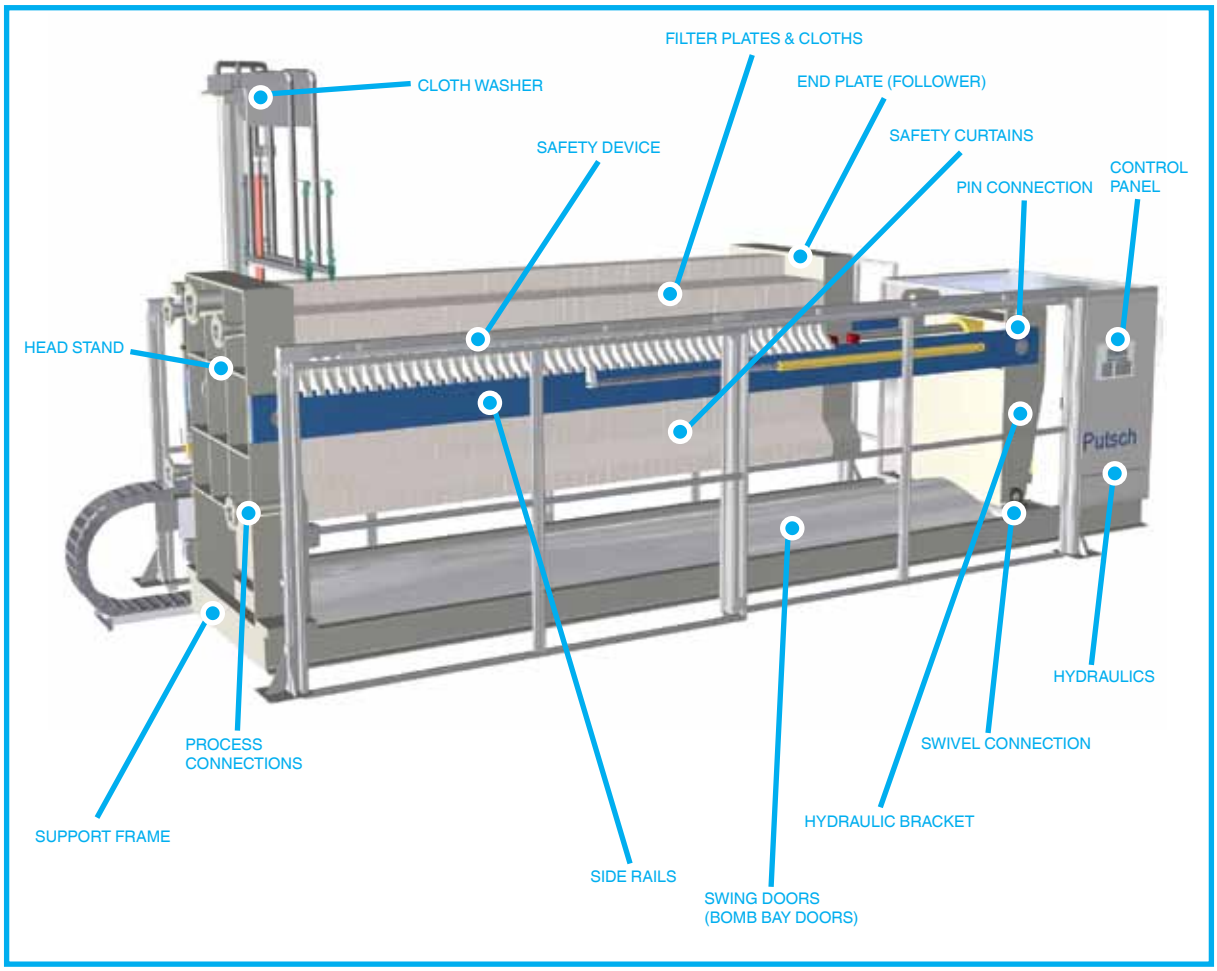
Design Features and individual Components

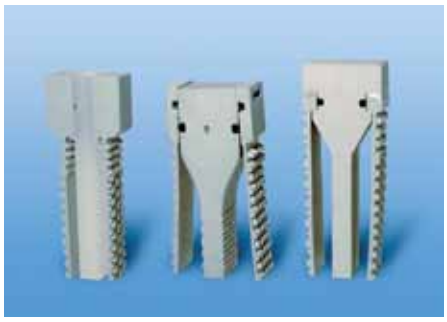
The press frame consists mainly of structural members such as head stand, hydraulic bracket, end plate (follower), and side rails. The structure is designed to support the entire weight of the filter plate stack and the cake. The system is manufactured to withstand the maximum operating pressure.

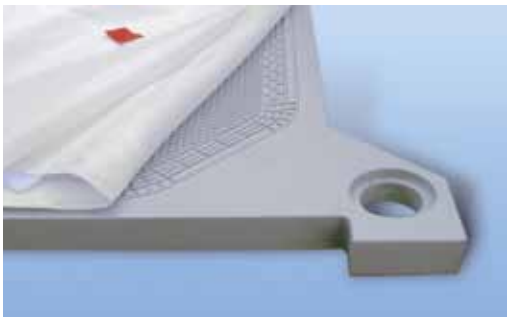
The Putsch® PKF series Membrane Filter Press Systems are manufactured for standard operating pressures of 116 psig and 232 psig with an option of 450 psig.

The unique side bar “Pin” and the swivel hydraulic bracket connections are superior to the typical “Hammer Head” design provided by other manufacturers. This feature distributes the enormous operating forces evenly, thus guaranteeing the reliable and safe operation of the filter.

All critical frame components, including the process connections, are available with special corrosion protection in materials suitable for the application. All Putsch® PKF series Membrane Filter Press Systems feature support frames for optimum foundation load distribution and assembled shipping.







Filter Plates

Putsch® PKF series Membrane Filter Presses are equipped with different styles of filter plates according to their application.

The plate sizes vary from 1200 mm x 1200 mm to 1500 mm x 2000 mm. The slurry feed inlets are optimized in their arrangement. Depending on the application, they can be located either on the top corner, the center, or the top of the filter plate.

The plates and membranes are manufactured from acid/leach resistant polypropylene. They can be used for filter pressures up to 232 psig and temperatures up to 203 °F. Special materials for higher temperatures up to 230 °F as well as for lower temperatures from 32 °F to 50 °F are available for continuous operations. Chamber depths in the standard version, available from 33 mm (1 $^{5}/_{16}$”) to 50 mm (2”), provide an optimum adaptability to the filtration tasks.

Another unique feature of the plates are the external filtrate channels (“ears”): the discharging filter cakes will not contaminate the area of the filtrate channels. Furthermore, the filter cake cannot disturb those areas of the frames where filter cloths and plates are compressed with high pressure. This protects the filter cloths and leads to prolonged lifetime.

Putsch® filter plates are available with block or exchangeable membranes. Exchangeable membrane plates are available in different variations. Putsch® is experienced in the selection of the perfect solution for your application.

Filter media (filter cloth)

A coarse under-cloth is mounted over the filter plates as a support fabric in accordance to the application. Over this, a finer filter cloth in various materials and permeabilites is placed for the filtration. Due to this combination, a faster drain of the filtrate is achived and a smaller filter area is needed. A variety of cloth attachments (cloth necks) are available to suit the application.

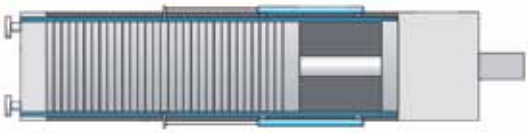
PLATE SHIFTING (CAKE DISCHARGE)

Putsch® Filter Presses are equipped with a patented, low maintenance plate transport system, which requires minimal space.

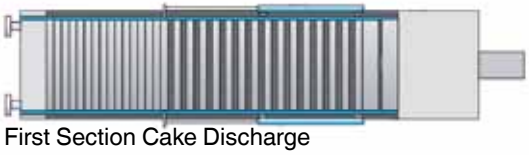
The plate package is opened in sections depending on the press size. Laterally mounted transport cylinders work together with the main cylinder to open and close sections of the plate package. Short opening and closing times enable very short cycles, thus reducing the down time greatly.

The filter plates are connected through interlocking linking plates. Therefore, the distance between the plates, in reference to each other, stays always the same and parallel.

Specially constructed plate handles ensure low wear gliding of the filter plates on the side rails.



Closed Plate Stack



First Section Cake Discharge

Second Section Cake Discharge

HYDRAULIC SYSTEMS

A high performance hydraulic unit drives the plate transport cylinders, the cylinders on the swing doors (bomb bay doors) and the main cylinder.

The hydraulic unit can be enclosed with an optional housing to protect it from dirty environments. The large service doors provide easy access for inspection and maintenance. This feature reduces the service frequency and provides easier maintenance and trouble shooting.

AUTOMATIC CLOTH WASHER

For best performance, most Putsch® Membrane Filter Press Systems are equipped with the optional automatic cloth washer. Frequent cleaning with the automatic cloth washer prolongs the lifespan and performance of the filter cloth. A manual cleaning process is inferior to the automatic cloth washer and can result in frequent, costly cloth replacements.

The automatic filter cloth washer travels on a rail along the side of the filter press frame. The washer arm cleans the cloth of both sides with high pressure cleaning liquid at a special “peel-off” angle.

SWING DOORS (BOMB BAY DOORS)

The cloth wash liquid is collected on the closed swing doors (bomb bay doors) and drains into discharge channels.

The closed swing doors protect the discharged filter cake and optional cake transport system from the cleaning liquid.

SAFETY DEVICES

The protective curtains, which are located on both sides of the press, allow a visual inspection of the press function. To increase the safety standard even further, the curtains are equipped with safety switches and / or light curtains.

SYSTEM CONTROLS

The entire process cycle is controlled automatically via PLC systems and can also be monitored from a main factory control center.

The locally mounted control panel allows the operator to interact with the basic operating steps and to provide maintenance or to facilitate trouble shooting (manual operation).

An intelligent filtration control as well as the compression (squeeze), cake wash, air-drying and cake discharge functions are integrated into the proprietary program. Peripheral equipment and instrumentation can be included by our process engineers and programmers as part of the entire control system.

Additional Equipment and Accessories

The Putsch® Group manufactures a variety of equipment designed to complement complete process systems. Additionally, we can supply third-party components (buy-outs) to be able to deliver a full package. As a benefit, our clients receive a fully integrated system.

· Instrumentation and programming

· Centralised control system (DCS) programming: for new and existing systems

· Filter Housings and Cartridges

· Candle Filters

· Thickeners / Decanters

· Screw Conveyors

· Belt Conveyors

· Sludge Conditioning Systems

· Feed Pump Systems

· Support Structures

Putsch® FILTER HOUSINGS & CARTRIDGES (for fine filtration)

Putsch® TWO STAGE FILTRATION SYSTEM with candle filters for the first step and filter presses for mud treatment

Putsch® SIBOMAT FILTRATION SYSTEM (automated self cleaning screen filter)

PROCESS TANKS

CAKE CONVEYING SYSTEMS

PUMPING SYSTEMS

Putsch® Professional Services

- Studies
- Pilot Tests
- Process Optimisation
- Planning
- Engineering
- Manufacturing
- Delivery
- Installation
- Start-up Assistance
- Service
- Spare Parts

Putsch® FST offers extensive studies and pilot tests to show how Putsch® products can be integrated into your factory and what results to expect.

Our process engineers can help optimise the existing process and prepare the integration of new equipment. We offer the complete range of support for all Putsch® products and peripheral components.

Before delivery, our engineering division can support you or provide turnkey planning. We are also experienced in providing engineering for highly specialized modules like an automatic pre-coating system.

Our experience and know-how in these areas guarantee the success of your new Putsch® installation. Program monitoring and online updates, as well as maintenance contracts and onsite service are an important part of our customer support.

Modernising and updating existing Putsch® installations completes the full range of our service.

PILOT FILTER SYSTEMS

Putsch® FST FILTRATION LABORATORY

MANUFACTURING

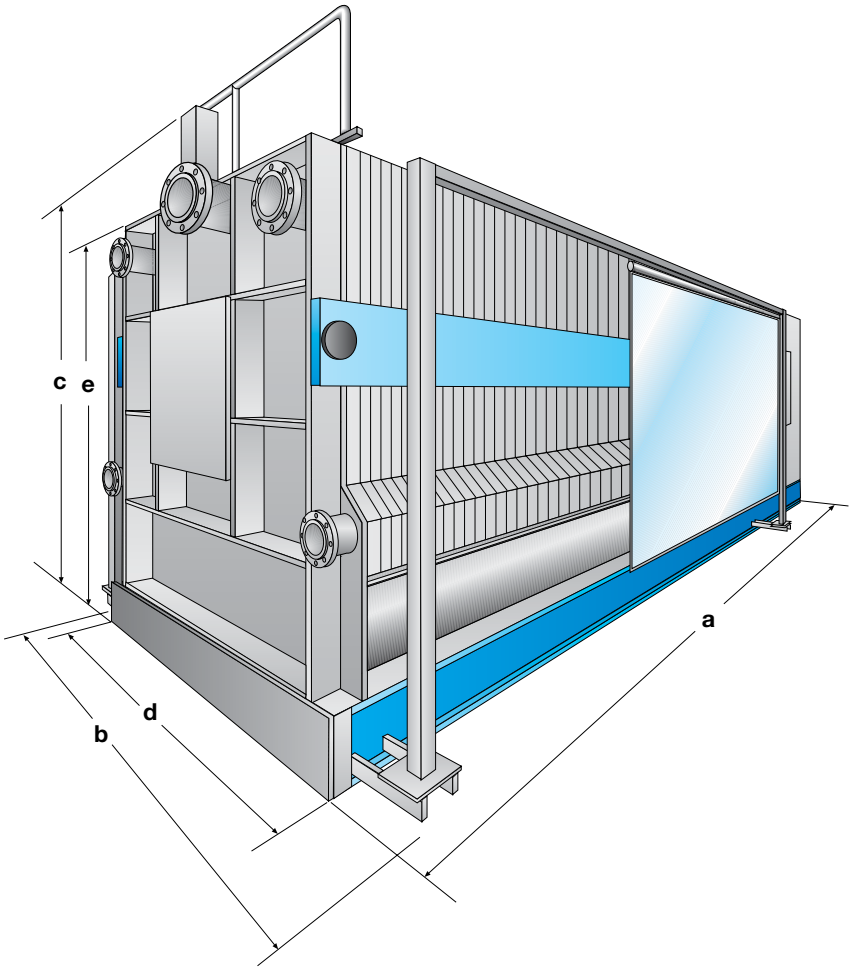
ASSEMBLED DELIVERY

SYSTEM OPTIMISATION

ENGINEERING, FIELD ASSISTANCE, SERVICE & PARTS

Technical Data for the Putsch® PKF NG Series

Model / Type		PKF 100-12	PKF 140-13	PKF 200-13	PKF 250-13
Filter plate sizes	inch mm	48 x 48 1200 x 1200	51 x 51 1300 x 1300	51 x 51 1300 x 1300	51 x 51 1300 x 1300
Chamber depth	inch mm	1 3/4 45	2 50	2 50	2 50
Filter area min. / max.	ft^2 m^2	732 / 931 68 / 87	1141 / 1378 106 / 128	1615 / 1916 150 / 178	1851 / 2217 172 / 206
Press volume min. / max.	gal l	385 / 487 1456 / 1845	649 / 786 2458 / 2976	923 / 1094 3494 / 4141	1060 / 1265 4011 / 4788
Number of chambers min. / max.		30 / 38	38 / 46	54 / 64	62 / 74
Chamber depth	inch mm	1 5/16 33	1 5/16 33	1 5/16 33	1 5/16 33
Filter area min. / max.	ft^2 m^2	883 / 1023 82 / 95	1259 / 1496 117 / 139	1733 / 2153 161 / 200	2271 / 2637 211 / 245
Press volume min. / max.	gal l	342 / 398 1293 / 1508	474 / 564 1794 / 2135	655 / 812 2477 / 3074	857 / 993 3245 / 3758
Number of chambers min. / max.		36 / 42	42 / 50	58 / 72	76 / 88
Operating pressure	psi bar	116 or 232 8 or 16	116 or 232 8 or 16	116 or 232 8 or 16	116 or 232 8 or 16
Dimensions (inch / m)	a = b = c = d = e =	296 / 7.5 106 / 2.7 134 / 3.4 67 / 1.7 99 / 2.5	362 / 9.2 115 / 2.9 146 / 3.7 79 / 2.0 114 / 2.9	473 / 12.0 115 / 2.9 146 / 3.7 79 / 2.0 138 / 3.5	496 / 12.6 115 / 2.9 146 / 3.7 79 / 2.0 138 / 3.5
Max. weight empty, approximately	lbs kg	37000 16800	48100 21800	69500 31500	73400 33300
Max operating weight, approximately	lbs kg	45200 20500	60600 27500	82000 37200	87100 39500
Electrical power requirements	H P (US) kVA	20 15	20 15	33.5 25	33.5 25
Pressure of the cleaning unit	psi bar	580 40	580 40	580 40	580 40



PKF 330-15	PKF 450-15	PKF 1000-15/20
59 x 59 1500 x 1500	59 x 59 1500 x 1500	59 x 79 1500 x 2000
2 50	2 50	2 50
2317 / 3186 252 / 296	3897 / 3993 326 / 371	9074 / 9709 843 / 903
1546 / 1819 5851 / 6884	2000 / 2273 7572 / 8605	5453 / 5833 20640 / 22080
68 / 80	88 / 100	172 / 184
1 1/4 32	1 1/4 32	1 1/4 32
3111 / 3509 289 / 326	3649 / 4790 339 / 445	10021 / 10646 931 / 989
1145 / 1292 4335 / 4891	1556 / 1762 5891 / 6670	3514 / 3736 13300 / 114140
78 / 88	106 / 120	190 / 202
116 or 232 8 or 16	116 or 232 8 or 16	116 or 232 8 or 16
536 / 13.6 126 / 3.2 170 / 4.3 87 / 2.2 185 / 4.7	622 / 15.8 126 / 3.2 170 / 4.3 87 / 2.2 185 / 4.7	1292 / 23.8 126 / 3.2 221 / 5.6 87 / 2.2 178 / 4.5
125700 57000	149900 68000	238100 108000
140900 63900	169300 76800	301600 136800
40 30	40 30	54 40
up to 1450 up to 100	up to 1450 up to 100	up to 1450 up to 100

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Fontaine & Co., Aachen

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