Centrifugal pumps
FP, FM, FZ

Fristam
PUMPEN

Our philosophy is simply to su pply the best.

Perfection down to the last detail. The Fristam centrifugal pump FP.

This brief overview provides you with an insight into the current range of Fristam centrifugal pumps.

On the following pages you will find the most important performance features and specific applications for the FP, FM, FZ centrifugal pumps. See for yourself the versatile applications and the high quality of this range of Fristam pumps.

Three principles

Fristam was founded in 1868 and taken over in 1909 by the great grandfather of today's managing director Wolfgang Stamp. At that time, the North German company produced all types of machines for the dairy industry. The first Fristam stainless steel pump was manufactured in 1931 - from the very start in compliance with the individual requirements of our customers. Since then the success of Fristam has been based on three principles: quality, flexibility and innovation.

A leading manufacturer of stainless steel pumps

Over the generations, Fristam has established itself as a major manufacturer of high quality stainless steel pumps. 79 of the world's 100 leading companies in the food and drink industry already place their trust in Fristam pumps, which are produced in Germany, England, USA, Japan and India. Subsidiaries, together with specialised representatives, ensure that today hygienic pumps from Fristam are used all over the world - the standard for highest quality.

Hygienic pumps from Fristam ensure optimum pumping throughout the world.

Wolfgang Stamp, Managing Shareholder

Optimum solutions

For you and ourselves the focus is on one thing: your product. Fristam offers solutions which are perfectly adapted to your specific applications. In this way you are assured of having an optimised pumping system on which you can fully depend.

See for yourself!

Wolfgang Stamp,
Fristam Pumpen
F. Stamp KG (GmbH & Co),
Hamburg

A company with a long tradition: this was where the first Fristam stainless steel pumps were made back in 1931.

Fristam centrifugal pumps FP

Optimum pumping characteristics, top quality and exceptional economy – Fristam FP centrifugal pumps are the ideal solution for every application.

Pumping characteristics

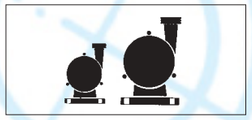
Minimal secondary flow:
Open impellers with narrow gaps between impellers and cover, combined with a flow-optimised pumping channel, ensure minimal secondary flow as well as guaranteeing gentle product handling - even at high volumetric flows.

Low NPSH values:
The low NPSH values of Fristam FP pumps make them suitable even for unfavourable intake conditions.

Viscosities up to 1,200 mPas:
Pumping products with viscosities of up to 1,200 mPas is no problem. What's more, the pumped fluids can contain air or other gases, and may be homogeneous or contain suspended solids.

No contamination:
Double-acting mechanical shaft seals permit operation under vacuum conditions as well as preventing contamination of the product and environmental pollution caused by leakage.

Sizes of FP



- 16 sizes
- discharge pressures up for system to 25 bar
- discharge pressures up to 15 bar
- flow rates up to 500 m^3/h

Type FPE, design B: without shroud, standing on motor foot and IEC standard motor B3/B5.

Quality

Robust design:
In conjunction with the strong cover fixing, the sturdy design of Fristam FP pumps ensures excellent operational reliability.

Problem-free operation:
Stainless-steel alloys and solid components with a minimum wall thickness of 6 mm meet operators' requirements and guarantee reliable operation.

Durable mechanical seals:
The extremely smooth running of Fristam FP pumps is another reason for their excellent reliability. It also means that the mechanical seals have an extremely long service life.

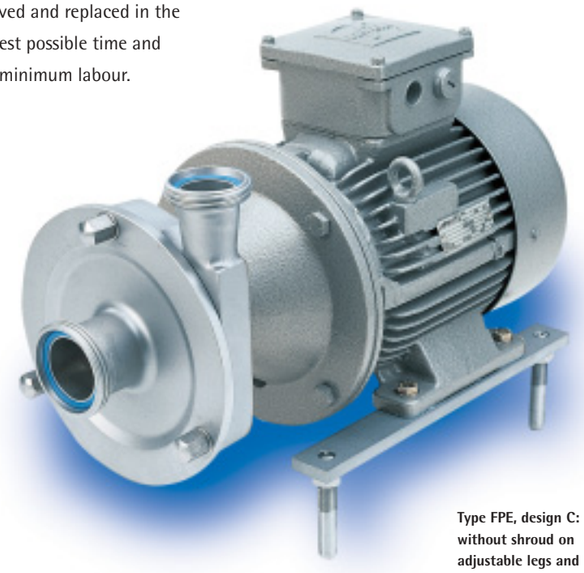
Optimum hygiene:
With their open impellers, Fristam FP pumps are ideal for hygienic applications. Furthermore, the FP and FPE pumps are fully compatible with CIP and can be sterilised.

Economy

Tailor-made solutions:
The incomparable range of different pump types means that there is an optimum compatibility with every operating point. The design options allow specific adaptation to different characteristics of products, processes and installations.

Straightforward maintenance:
Fristam FP pumps are simple to maintain. The pump interior is easily accessible, so that wearing parts can be removed and replaced in the shortest possible time and with minimum labour.

Type FP, design A: with stainless steel shroud on adjustable legs.

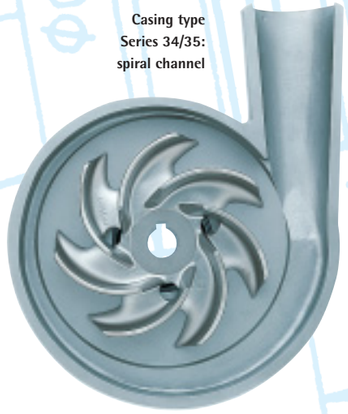


Type FPE, design C: without shroud on adjustable legs and IEC standard motor B3/B5.

Pump range n = 2900 1/min

Casing type
Series 700:
ring channel

Casing type
Series 34/35:
spiral channel



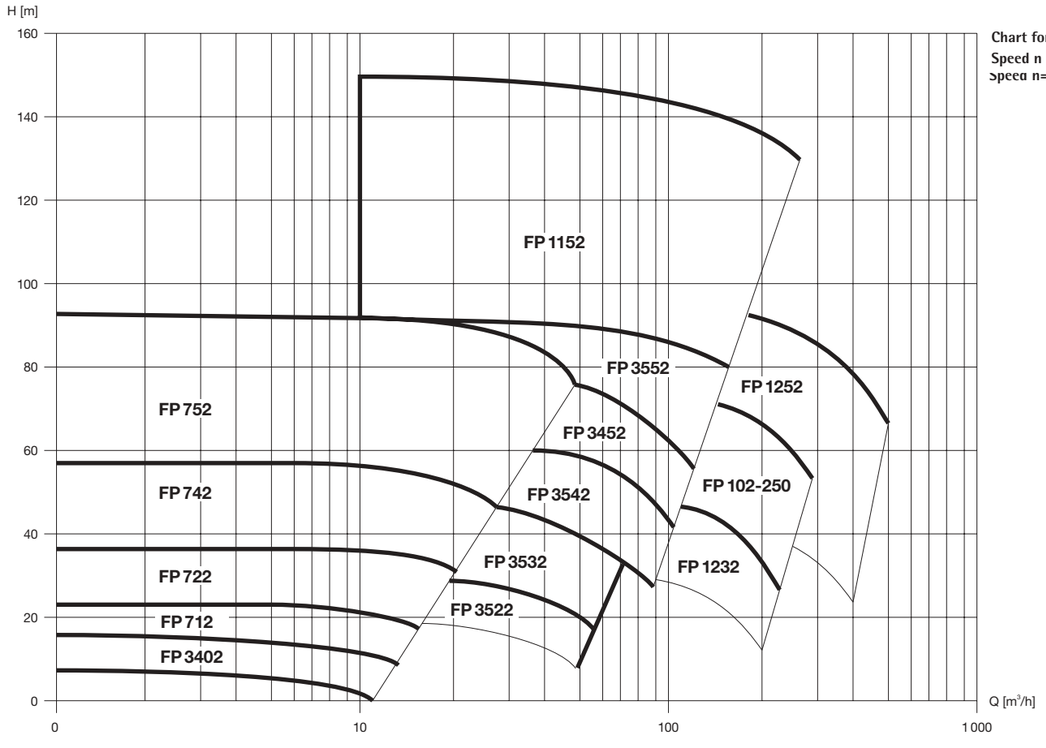


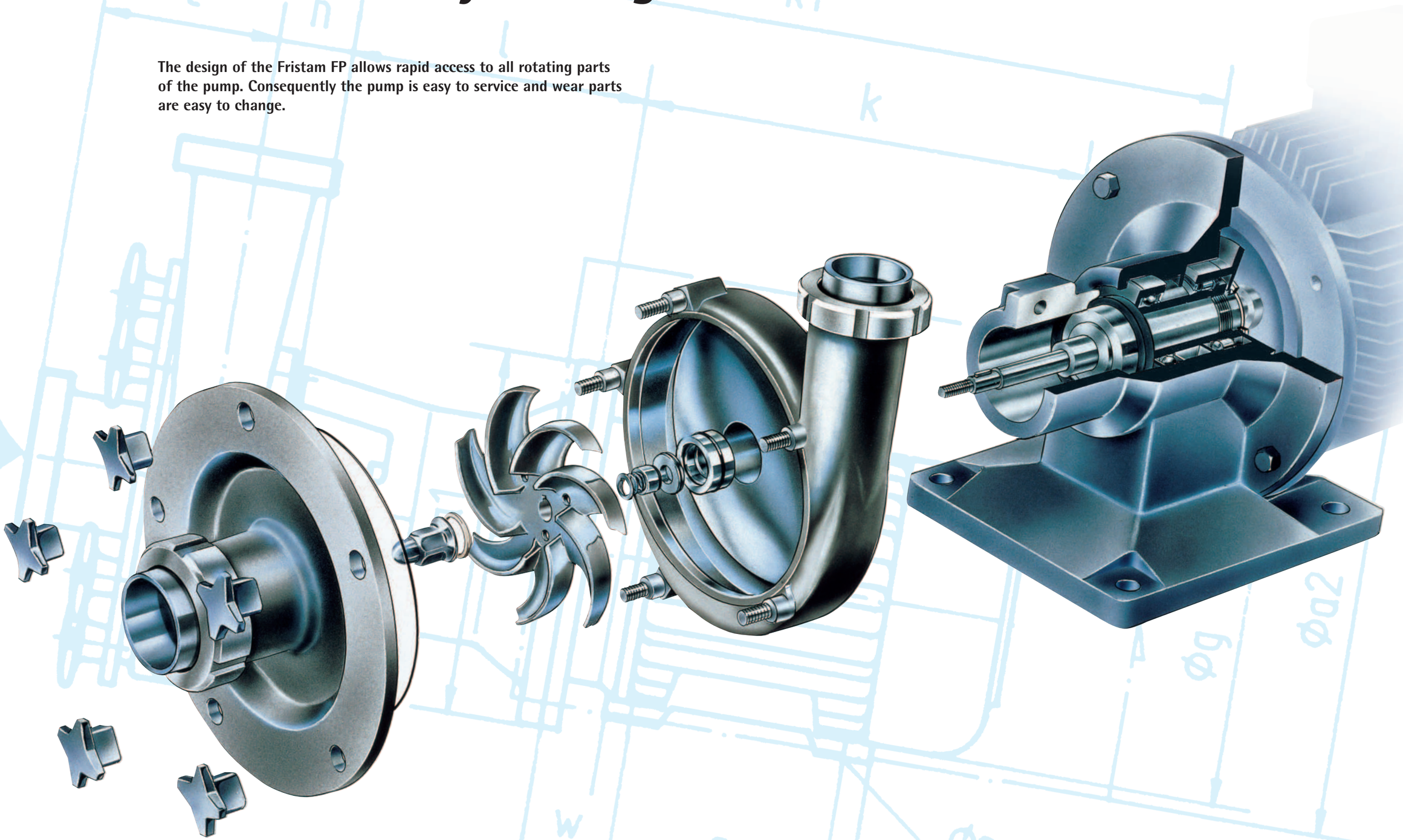
Chart for selecting FP sizes
Speed n = 2,900 1/min
Speed n=2,900 1/min

FP pump type	712	722	722	742	742	752	3402	3452	3522	3532	3542	3552	102	1152	1232	1252
Impeller dia. mm	130	145	162	165	205	250	110	250	145	175	205	250	250	320	185	260
Speed	0,75	1,5	2,2	3,0	4,0	11,0	0,75	15,0	3,0	5,5	11,0	18,5	37,0	75,0	18,5	90,0
	1,1	2,2	3,0	4,0	5,5	15,0	1,1	18,5	4,0	7,5	15,0	22,0	45,0	90,0	22,0	110,0
Motor [kW]	1,5	3,0		5,5	7,5	18,5		22,0	5,5	11,0	18,5	30,0	55,0	100,0	30,0	
								30,0				37,0				
												45,0				
Flow rate [l/h]	**Delivery head [m]**															
2 000	21,5	29,0	37,5		57,0		16,0									
4 000	21,0	28,5	37,0		57,0	92,5	15,5									
6 000	20,5	28,5	37,0		57,0	92,5	14,5									
8 000	20,0	28,5	37,0	40,0	56,5	92,5	13,0									
10 000	19,0	28,0	36,5	40,0	56,5	92,5	11,5	81,0	34,5	47,0						
15 000	16,0	27,0	35,0	39,0	54,5	92,0		81,0	34,0	47,0						
20 000		25,0	32,0	37,0	52,5	91,5		80,5	32,5	47,0	59,5	92,0	79,5			
25 000		21,0		34,0	50,0	91,0		80,5	31,0	46,5	59,5	92,0	79,5			
30 000				30,0	46,5	89,5		80,0	29,0	45,5	59,0	92,0	79,0			
35 000						87,5		79,5	28,0	45,0	59,0	92,0	79,0			
40 000						85,0		79,0	26,5	43,5	58,5	92,0	79,0			
45 000						81,0		78,5	24,5	42,5	58,5	91,0	79,0			
50 000								77,0	22,0	41,0	58,0	91,0	79,0	148,0	47,0	
60 000								75,0		37,0	56,5	90,0	79,0	147,5	46,5	
70 000								72,5		32,5	55,0	89,5	78,5	147,0	46,0	
80 000								70,0			52,5	89,0	78,5	146,5	45,5	
90 000								66,0			49,5	88,5	78,0	145,5	44,5	
100 000								61,5			45,0	87,0	77,5	145,0	43,5	94,5
125 000												84,0	76,0	144,0	41,5	94,0
150 000												79,0	74,0	140,5	38,0	92,5
200 000													67,5	133,0	29,5	91,0
250 000														123,0		87,5
300 000																85,0
400 000																76,0
500 000																63,0

- For liquids with a density of 1.0 kg/dm³ and a viscosity similar to water
- Tolerance ±5%

Maintenance-friendly FP design

The design of the Fristam FP allows rapid access to all rotating parts of the pump. Consequently the pump is easy to service and wear parts are easy to change.



Fristam FM Multistage Centrifugal Pumps

The reliable pump for high pressure applications.

Pump performance

High discharge pressures:

With discharge pressures of up to 16 bar and a system pressure capability of 60 bar (FM 3) Fristam FM pumps have been specially developed for operating under exceptional pressure conditions. The pressure is increased by several successive pump stages.

Applications:

The pumps are particularly suitable for use under difficult pressure conditions and in special process control systems such as feeding filters, heaters and fillers, circulation and pressure boosting in ultrafiltration and reverse osmosis systems.

Quality

Materials:

To ensure that the material is absolutely resistant even for highly aggressive products, Fristam FM centrifugal pumps are solely made of top-quality, corrosion resistant alloys such as Cr-Ni-Mo steel (stainless steel 316 L) or titanium.

Robust design:

Reliable operation and long service life of a Fristam FM pump are guaranteed by the robust design.

High-quality mechanical shaft seal:

The mechanical shaft seal is selected carefully to be suitable for the particular application. Both the rotating and stationary part materials and the corresponding elastomers used are thoroughly checked for compliance with all the specifications and standards required.

Optimum hygiene:

Fristam FM pumps are designed without any dead zones and are, of course, entirely suitable for CIP/SIP.

Economy

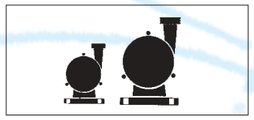
Tailor made solutions:

Fristam multistage centrifugal pumps are individually manufactured for the particular application. They achieve excellent levels of efficiency and have all the features to operate reliably in any production process.

Easy maintenance:

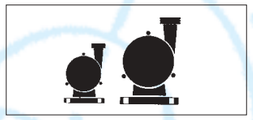
Fristam FM centrifugal pumps are designed to give direct access to the interior. Therefore allowing quick and easy replacement of wear parts.

Sizes of FM 2



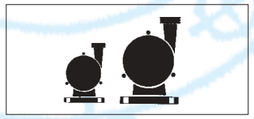
- 2 to 5 stages
- impeller dia. up to 160 mm
- for system pressures up to 20 bar
- discharge pressures up to 12 bar
- flow rates up to 35 m^3/h

Sizes of FM 3 / FMS 3

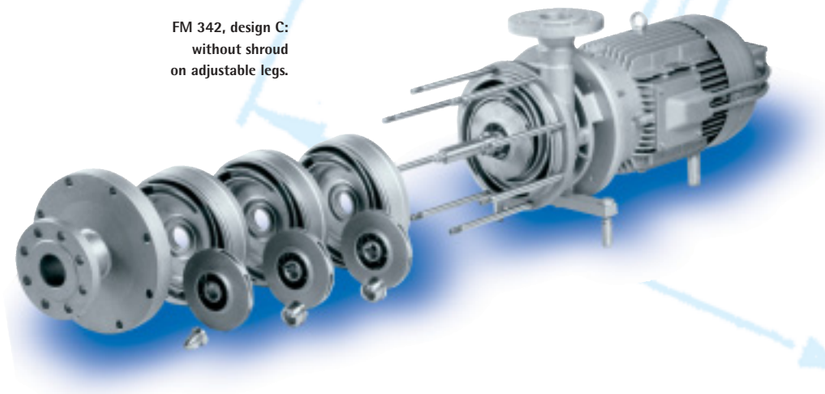


- 1 to 4 stages
- impeller dia. up to 175 mm
- for system pressures up to 60 bar
- discharge pressures up to 13 bar
- flow rates up to 80 m^3/h

Sizes of FM 4



- 2 to 4 stages
- impeller dia. up to 250 mm
- for system pressures up to 40 bar
- discharge pressures up to 28 bar
- flow rates up to 40 m^3/h



FM 342, design C: without shroud on adjustable legs.

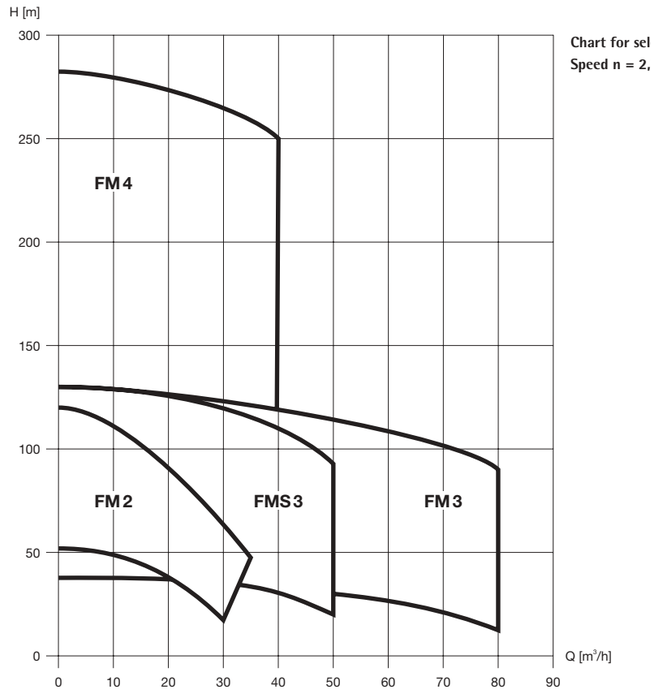


Chart for selecting FM sizes
Speed n = 2,900 1/min

FM pump type	FM 222	FM 232	FM 242	FM 252	FM 312	FM 322	FM 332	FM 342	FMS 312	FMS 322	FMS 332	FMS 342	FM 422	FM 432	FM 442
Impeller dia. mm	160				175				170				250		
Speed	4,0	7,5	7,5	11,0	7,5	11,0	15,0	18,5	4,0	7,5	7,5	11,0	22,0	37,0	55,0
	5,0	11,0	11,0	15,0	11,0	15,0	18,5	22,0	5,5	11,0	11,0	15,0	30,0	45,0	75,0
Motor [kW]	7,5		15,0	18,5		18,5	22,0	30,0			15,0	18,5	37,0	55,0	
						22,0	30,0	37,0							
							37,0	45,0							
Flow rate [l/h]	**Delivery head [m]**														
2 000	53,0	75,0	99,5	120,0	40,0	68,0	98,0	128,0	38,0	68,0	99,0	129,0	159,0	215,0	282,0
4 000	52,5	72,5	97,0	117,5	40,0	68,0	98,0	128,0	38,0	68,0	99,0	129,0	159,0	215,0	282,0
6 000	51,0	71,0	95,0	115,0	40,0	68,0	98,0	128,0	38,0	68,0	99,0	129,0	158,0	214,0	281,0
8 000	50,0	69,0	93,0	112,0	40,0	68,0	98,0	128,0	38,0	68,0	99,0	129,0	158,0	213,0	280,0
10 000	49,0	66,5	90,5	109,0	40,0	67,5	98,0	128,0	38,0	68,0	99,0	129,0	156,0	212,0	280,0
15 000	44,5	61,0	84,0	100,5	40,0	67,0	97,0	127,0	38,0	67,5	98,5	128,0	155,0	210,0	277,0
20 000	39,0	54,0	75,0	90,5	40,0	66,0	96,0	126,0	36,5	65,0	97,5	127,0	153,0	207,0	272,0
25 000	30,0	44,0	64,0	79,0	39,0	65,5	95,0	125,5	35,0	63,0	95,0	123,0	150,0	203,0	269,0
30 000	17,5	30,0	49,5	64,0	38,0	64,0	94,0	125,0	32,5	60,5	91,0	120,0	147,0	200,0	262,0
35 000				45,5	36,5	63,0	93,0	124,0	30,0	57,5	86,5	115,0	142,0	193,0	256,0
40 000					35,0	62,0	92,0	122,0	27,5	53,0	81,0	109,0	138,0	187,0	249,0
50 000					30,5	58,0	90,0	117,0	19,5	43,0	66,0	92,5			
60 000					26,0	53,0	84,0	110,0							
70 000					20,0	46,5	77,0	103,0							
80 000					14,0	40,0	67,0	91,0							

- For liquids with a density of 1.0 kg/dm^3 and a viscosity similar to water
- Tolerance ±5%

Fristam FZ Self-priming Centrifugal Pumps

The universal solution for high suction capability.

Pump performance

High suction capability:

Both venting of suction pipes and pumping of gas containing products are possible due to the excellent suction capability at discharge pressures of up to 4.8 bar and system pressures of up to 15 bar. Short priming time prevents long dwell times of product residues.

Operating principle:

Self-priming Fristam FZ pumps operate on the side channel principle. Impellers with radial blades in conjunction with hydrodynamically optimised side channels transfer the energy to the product. Very narrow gaps between casing and impeller lead to produce excellent suction capability.

Quality

Materials:

Application-oriented stainless steel alloys guarantee ideal conditions for reliable operation.

Robust design:

The use of solid components ensures that Fristam FZ series centrifugal pumps have an extremely long service life.

High-quality mechanical shaft seal:

Both the rotating and stationary part materials and the corresponding elastomers used are thoroughly checked for suitability for the particular application and for compliance with the specifications and standards.

Optimum hygiene:

Fristam FZ pumps are designed so that there are no dead zones and are entirely suitable for CIP/SIP.

Economy

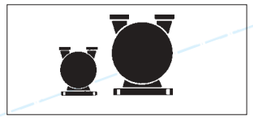
Tailor made solutions:

Fristam FZ centrifugal pumps are specifically manufactured to meet the customers needs. They achieve maximum levels of efficiency and can be used in many process systems.

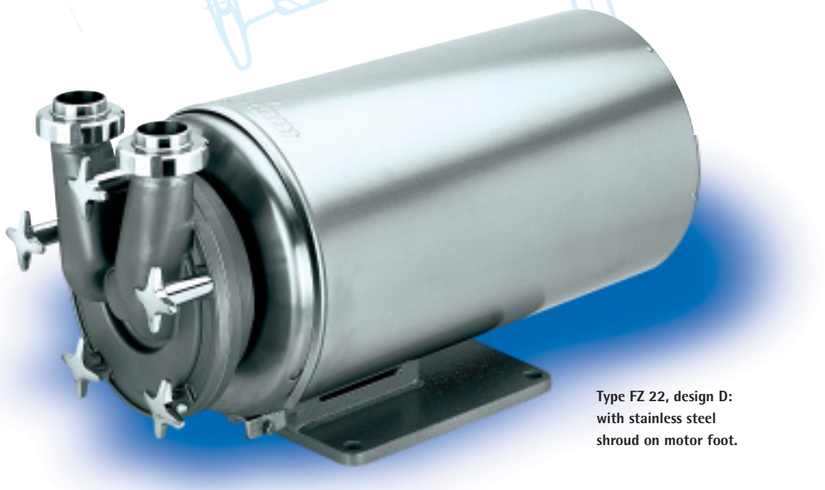
Easy maintenance:

Fristam FZ centrifugal pumps are designed to give direct access to the interior. Therefore allowing quick and easy replacement of wear parts.

Sizes of FZ



- 5 sizes
- for system pressures up to 15 bar
- discharge pressures up to 4.8 bar
- flow rates up to 55 m^3/h



Type FZ 22, design D: with stainless steel shroud on motor foot.

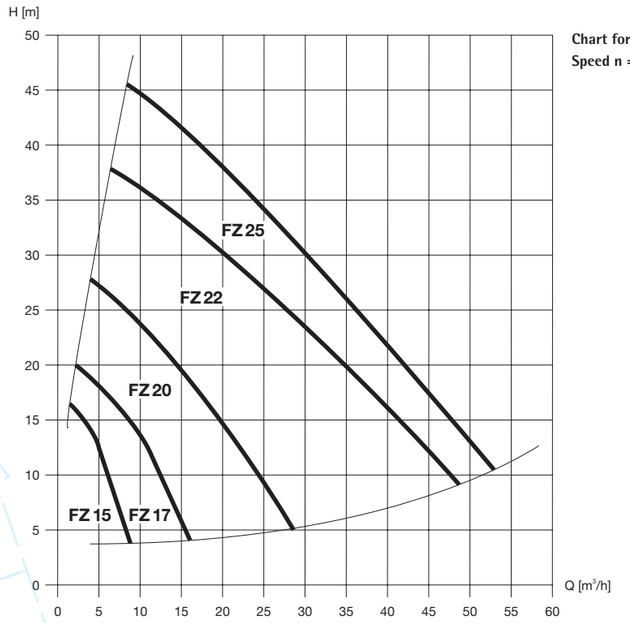


Chart for selecting FZ sizes
Speed n = 1450 1/min

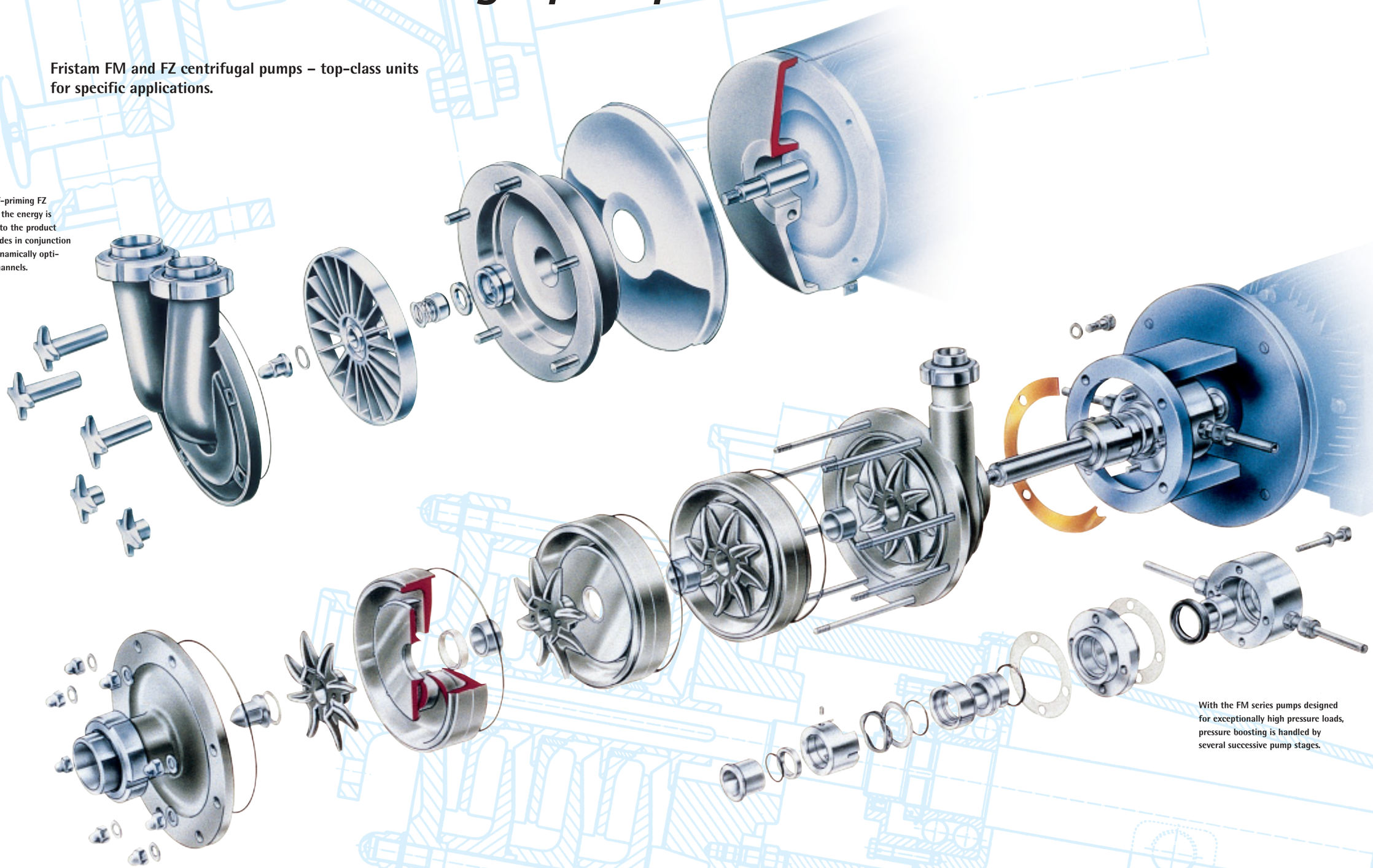
FZ pump type	15	17	20	22	25
Impeller dia. mm	1,1	2,2	5,5	11,0	15,0
Motor [kW]	0,75	1,5	4,0	7,5	11,0
			3,0		
Flow rate [l/h]	Delivery head [m]				
1	16,7				
2	16,2	20,1			
3	14,6	18,7	27,7		
4	12,8	17,8	27,0		
5	11,6	17,4	26,6		
6	9,7	16,8	26,2	37,7	
8	2,7	14,7	24,7	36,6	45,4
10		12,5	23,4	35,8	44,3
12		10,2	21,8	34,7	42,8
14		7,0	20,3	33,6	41,5
16		3,6	18,5	32,5	40,1
18			16,7	31,3	38,7
20			14,3	30,0	37,0
22			12,6	29,1	35,8
24			10,2	27,9	34,6
26			7,6	26,6	33,2
28			5,0	25,4	31,6
30				24,1	30,0
35				20,5	26,1
40				16,5	21,5
45				12,4	17,0
50				9,5	13,2

- For liquids with a density of 1.0 kg/dm^3 and a viscosity similar to water
- Tolerance ±5%

Well conceived down to the last d etail – Fristam FM and FZ centrifugal pum ps

Fristam FM and FZ centrifugal pumps – top-class units for specific applications.

With the self-priming FZ series pumps the energy is transformed to the product via radial blades in conjunction with hydrodynamically optimised side channels.



With the FM series pumps designed for exceptionally high pressure loads, pressure boosting is handled by several successive pump stages.

Fristam FP, FM, FZ design options

With a Fristam pump you are always sure of a customised solution because the individual components are tailored to the specific application in your company.

Materials

- Casing, cover, stage housing and impeller are cast or forged

- Materials
  Standard:
  - Cr-Ni-Mo steel 1.4404 ≈ ANSi 316L
  Options:
  - Titanium
  - Hastelloy C
  - Other precision-cast materials
  - Materials with less than 0.5 % delta ferrite

- Surfaces in contact with the product:
  - Shotblasted
  - Ground
  - Polished
  - Electropolished
  - Hardened or coated
  - Special surface finish requirements can be met

Drives

- Three-phase induction motors
  - Totally enclosed, IP 55
  Options:
  - Higher enclosure classes
  - Explosionproof
  - Flameproof
  - Suitable for frequency control
  - Special voltages and special frequencies
  - Hydraulic motors
  - Single-phase-motors

Impeller types:

- Open
- Semi-open
- Closed
- Impeller dia. 80 mm - 320 mm
- Different vane configurations

Types of connection:

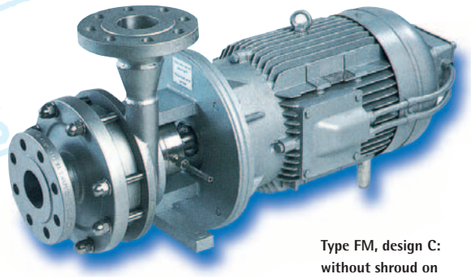
- Threads:
  - DIN 11851, DIN 11864
- Flanges:
  - DIN, ANSI, and others
- Clamps:
  - Tri-clamp, ISO-clamp

Special connections possible

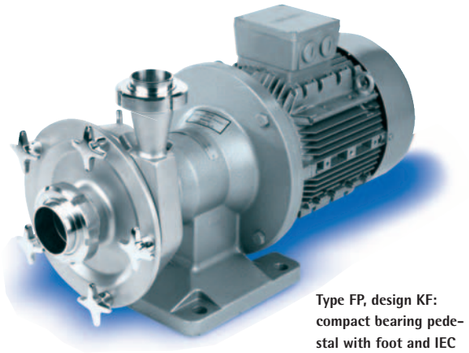
Special options

- Heating/cooling jacket
- High-pressure version for up to 50 bar system pressure
  Casing drainage
- Position of discharge connection, 360° variable
- Trolleys

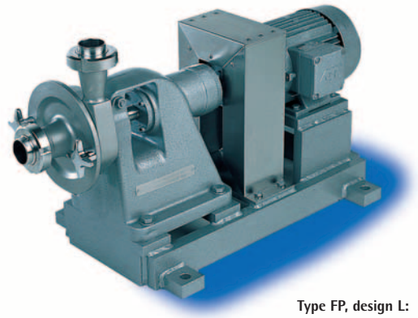
Further types



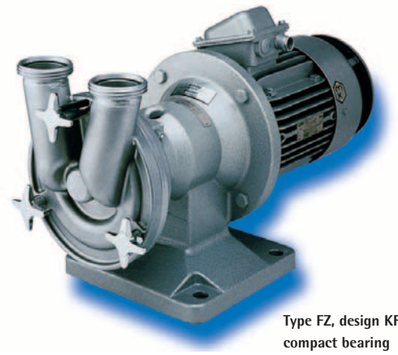
Type FM, design C: without shroud on adjustable legs:



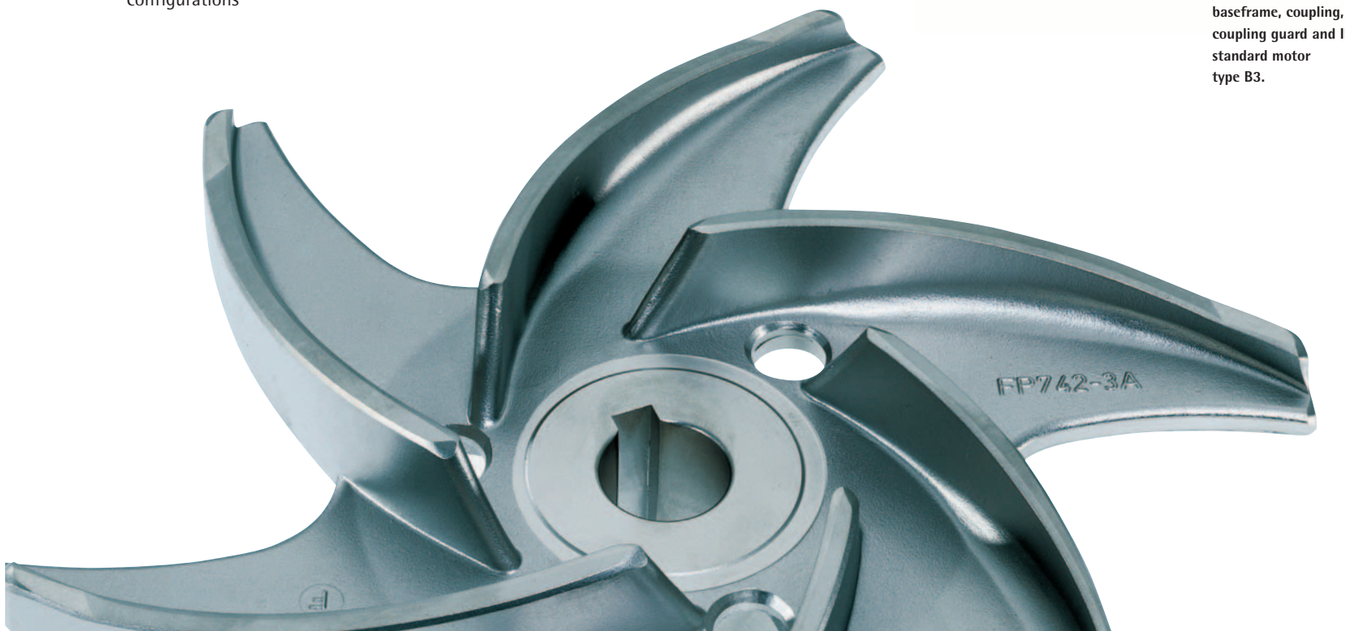
Type FP, design KF: compact bearing pedestal with foot and IEC standard motor type B5.



Type FP, design L: bearing pedestal with baseframe, coupling, coupling guard and IEC standard motor type B3.



Type FZ, design KF: compact bearing pedestal with foot and IEC standard motor B5.



- A, B, C, D block design with special motor
  - A: with stainless steel shroud and adjustable legs
  - B: without shroud, standing on motor foot
  - C: without shroud on adjustable legs
  - D: stainless steel shroud on motor foot
- KF: compact bearing pedestal with foot and IEC standard motor B5
- L: bearing pedestal with baseframe, coupling, coupling guard and IEC standard motor version B3
- FPE: Block design with IEC standard motor versions B3/B5, also available in A, B, C and D versions.

Mechanical shaft seal options FP, FM, FZ

Fristam FP 712 K
with thermosiphon
system

Mechanical shaft seals

- Standard:
  - single and double-acting

- Options:
  - DIN 24960
  - with internal circulation from pump discharge connection
  - with external sealing/ flushing liquid
  - pressureless (quench)
  - pressurised (back to back)
  - with/without pressure balancing
  - unidirectional/ bi-directional
  - auxiliary systems, e.g. pipes, fittings and pressure gauge, funnels, thermosiphon tank for sterile operation etc. are possible

- Internal seal faces:
  - Carbon
    - dry-running performance
    - high temperature resistance
  - Tungsten carbide
    - extreme hardness and wear resistance
  - Ceramic
    - high wear resistance
    - high chemical resistance
  - Special stainless steel
    - good chemical resistance
  - Silicon carbide
    - exceptionally high chemical resistance
    - good thermal conductivity

- Secondary seal materials:
  - Perbunan (NBR)
    - up to +100°C
    - resistant to water, steam, mineral and vegetable fats and oils, alcohol, saline solutions
  - EPDM
    - up to +150°C
    - good thermal properties
    - suitable for use with alcoholic solutions, dilute acids and concentrated acids
  - Silicon-caoutchouc
    - up to + 100° C
    - high thermal resistance
  - Viton (fluorocarbon)
    - up to +180°C
    - good thermal resistance
    - resistant to water, steam, mineral and vegetable fats and oils, alcohol, acids and alkaline solutions, saline solutions
  - PTFE / Kalrez
    - up to +200°C
    - optimum chemical and thermal resistance against all aggressive liquids
    - elasticity provided by the use of Viton rubber or EPDM material
  - and other materials

Standard seal
(back-to-back
with flow thread)

Double-acting
mechanical shaft seal

The best pump for the best pro duct.

Fristam stainless-steel pumps are used by leading companies in the food and drink industry throughout the world as well as many companies in the pharmaceutical and chemical industries. Fristam pumps are also the best solution for pumping your products:

Applications

Dairy products
Raw milk, whey, cream, skimmed milk, milk concentrate, whey concentrate, set milk

Foods
Animal and vegetable oils and fats, vinegar, sauces, flavourings, brine, meat broth, tomato juice, vegetable juice, mayonaise, whole egg

Sugar/confectionery
Liquid sugar, molasses, starch solutions

Brewing
Mash, yeast, beer, hot and cold wort, low-alcohol, non-alcoholic and waste beer, CIP solutions

Alcoholic beverages
Liqueur, wine, champagne, distiller's wash, spirits, alcoholic solutions

Non-alcoholic beverages
Syrup, concentrates, fruit juice, mineral water, mixed drinks containing CO_2, concentrates with fruit pulp

Chemicals
Photographic emulsions, acids, alkaline solutions, waste water containing crystals, slightly contaminated liquids, chemically polluted industrial waste water, cleaning agents, adhesives

Pharmaceuticals
Pure water, infusion solutions, lotions, plant extracts, perfumes

Biotechnology
Cell suspensions, nutritive solutions, enzymes, toxic solutions, alcoholic solutions

Paper/cellulose
Glues, starch solutions, resin solutions, kaolin solutions

Systems and processes

The innovative and efficient Fristam centrifugal pumps can be used in a whole series of technical processes thanks to the wide choice of available versions. Here are some of the process applications which the Fristam FP, FM and FZ range of pumps covers:

Extraction unit

Feeding filters, heaters and fillers.

Supply, circulation and pressure boosting in ultrafiltration systems for water treatment, dealcoholization, separation of liquids containing harmful substances and recovery of product residues.

Feeding evaporation and ultra-heat treatment systems.

Acceleration and pressure build-up in carbonising, mixing, metering and cleaning systems.

Residue emptying of product pipes, cleaning in place return in CIP systems

Drum emptying, container emptying

Sampling in breweries

Filling and emptying of tank trucks

Water treatment

Concentration

Distillation

Dealcoholisation

Reverse osmosis

Filtration

Extraction

Carbonisation

Heating/Pressure boosting

Fermentation

Emulsification

Homogenising

Dialysis

Filling

Degassing

Transfer

Cleaning systems/CIP

In-line mixing

Emptying

Sampling

Fristam sampling pump FZP 10 A.

Mobile CIP unit

FP und FZ pumps for food prozessing.

Worldwide Contacts

Germany
Fristam Pumpen
F. Stamp KG (GmbH & Co)
Postfach 80 08 80
21008 Hamburg
Tel.: (0) 40/7 25 56-0
Fax: (0) 40/7 25 56-166
eMail:info@fristam.com

The address of our
branches are listed under:
http://www.fristam.com

Australia
Fristam Australia Pty. Ltd.
Bayswater, VIC

Austria
Fristam Pumpen GmbH
Vienna

Belgium
Luxembourg
Fristam N.V.
Aartselaar (B)

France
Pompes Fristam S.A.
Noisy-le-Sec

Great Britain
Fristam Pumps (UK) Ltd.
Hailsham

India
Fristam Pumps (I) Pvt. Ltd.
Pune

Italy
Fristam Italia Srl.
Borgo Ticino (NO)

Japan
Stamp Pumps of Japan Ltd.
Tokyo

Netherlands
Fristam B.V.
De Meern

New Zealand
Fristam Pumps Ltd.
Cambridge

Poland
Fristam Polska Sp. z o.o.
Warsaw

Russian Federation
Fristam Pumpen R.A.
Moscow

Scandinavia
Fristam Pumper A/S
Saeby

South East Asia
Fristam Pumpen A.R.
Singapore

Switzerland
Fristam Pumpen AG
Gossau

Ukraine
Fristam Kiev Ltd.
Kiev

USA/Canada
Mexico
South America
Fristam Pumps, Inc.
Middleton (USA)

Fristam
PUMPEN