

ICM, ICMB



Model ICM

The model ICM is a metallic magnetic drive chemical process pump made of stainless steel, Hastelloy, ductile cast iron and special metals. It has been engineered utilizing the collective expertise and pumping process

knowledge at Richter, Goulds and Vogel. Designed for normal and demanding chemical process applications, the ICM combines performance safety and reliability in a value added package.

The model ICM magnetic drive chemical process pump was developed based on input from leading chemical/pharmaceutical companies. Modern engineering methods from the field of CAE applications (computer aided engineering), e.g. FEM (finite element method) and CFD

(computational fluid dynamics) were used for this purpose. The ICM leverages years of process experience with our customers' and has been designed to meet customers' present and future expectations.

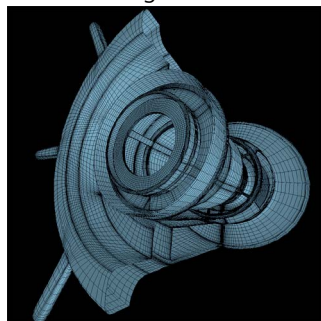
Design principles: Maximum Customer Value, Safety and Reliability

Special emphasis was paid to:

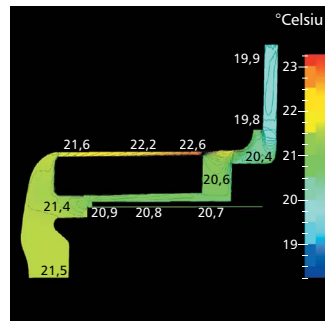
- Reducing customer Life Cycle Cost (LCC) by minimizing maintenance, operating and installation cost
- A comprehensive range of materials and accessories are offered to meet customer needs for a wide range of applications.
- Integrated

possibilities to connect safety and monitoring devices

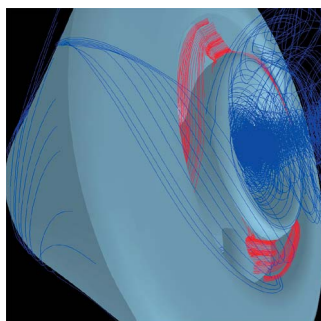
- Design standardization and simplification to provide for easy maintenance and to minimize spare parts inventory requirements.



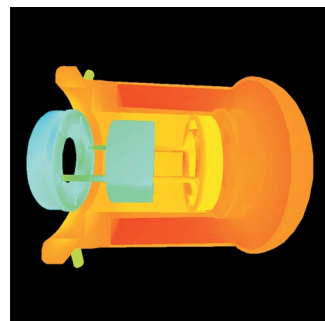
Networking of the body geometries of the ICM



Temperature profile in the can/magnetic drive area during medium conveyance



Flow patterns in the rear can area



Temperature profile in the can/plain bearing area during operation

Design

- Single-stage, magnetic drive centrifugal pump
- Dimensions and technical design in accordance with DIN EN 22858/ ISO 2858/ DIN ISO 5199, ISO 15783

- Standard frame-mounted design, alternatively close-coupled
- Sealless design eliminates the need for shaft sealing
- Flanges drilled to DIN/ISO, ANSI, BS, JS

Applications

- Corrosive, environmentally critical, dangerous, solids-containing, neutral and pure media

Markets

- Chemical, pharmaceutical and petrochemical industry, water treatment, pulp preparation, metal processing, general industry, nuclear power plants, food technology and waste disposal/recycling industries.

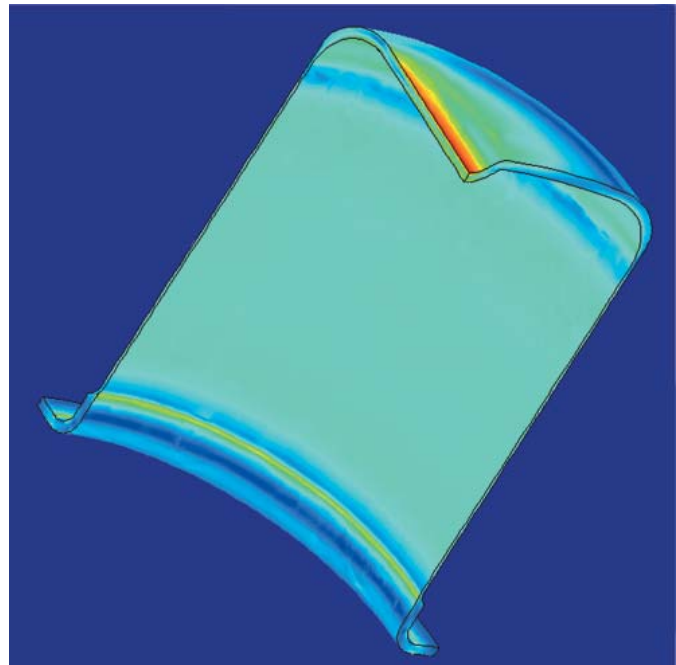


Illustration of the "von Mises stress concentrations" in the Hastelloy can: The pressure distribution is balanced, such that there are still enough safety reserves even in areas of maximum stress (red area).

18 sizes with impeller Ø up to 315 mm

Flow rates

- up to 340 m³/h (1490 USgpm) at 2900 rpm
- up to 400 m³/h (1760 USgpm) at 3500 rpm

Heads

- up to 160 m (525ft) LC at 2900 rpm
- up to 210 m (685ft) LC at 3500 rpm

Temperature range

- -40/+180°C (-40/+360°F), optional as ICMP up to 280°C (530°F)

Pressures

- up to 16 bar (235 psi), optionally 25 bar (360 psi); sizes 65-40-315 and 80-50-315: 25 bar (360 psi) as standard

The sum of the technology and performance spectrum of the model ICM is extraordinary:

The ICM is capable of handling a wide range of applications in the chemical process industry! Sealless design eliminates the need for shaft sealing providing leak-free, environmentally friendly operation. The ICM contributes to the technical standardisation in process engineering thanks to its universal applications.

Pump housing

- Minimum corrosion allowance: 3 mm
- Standard 3/8" housing drain connection
- Replaceable housing wear ring (optional)
- Integrated connections for pressure and temperature monitors
- Jacketed housing for media heating or cooling on request

Impeller

- Precision-cast stainless steel, optionally Hastelloy and other materials
- Back vanes or balance holes reduce axial thrust
- Optional suction inducer:

- reduces the NPSHr by 35-50 %
- permits smaller pumps at higher speeds = lower costs
- is advantageous for media with gas content

Excellent pump hydraulics

The ICM utilizes the same hydraulic components offered on the mechanically sealed Vogel IC Series. Users benefit from reduced repair parts inventories due to this hydraulic design standardization.

Cartridge plain bearing

- Standard Pure Silicon Carbide SiC (SSiC), highly abrasion-resistant, with universal chemical resistance
- Cartridge design eliminates measurements and fitting for simplified maintenance
- Optional SAFEGLIDE® PLUS dry-running bearing system provide added safety during upset conditions
- High level of safety even in the event of plain bearing failure For details, see page 5

Inner magnet assembly

- Inner magnet assembly with encapsulated magnets
- Pump shaft and inner magnet assembly in one piece
- Integral axial vanes assure positive pressurized flushing flow to both lubricate and cool the plain bearings

Can

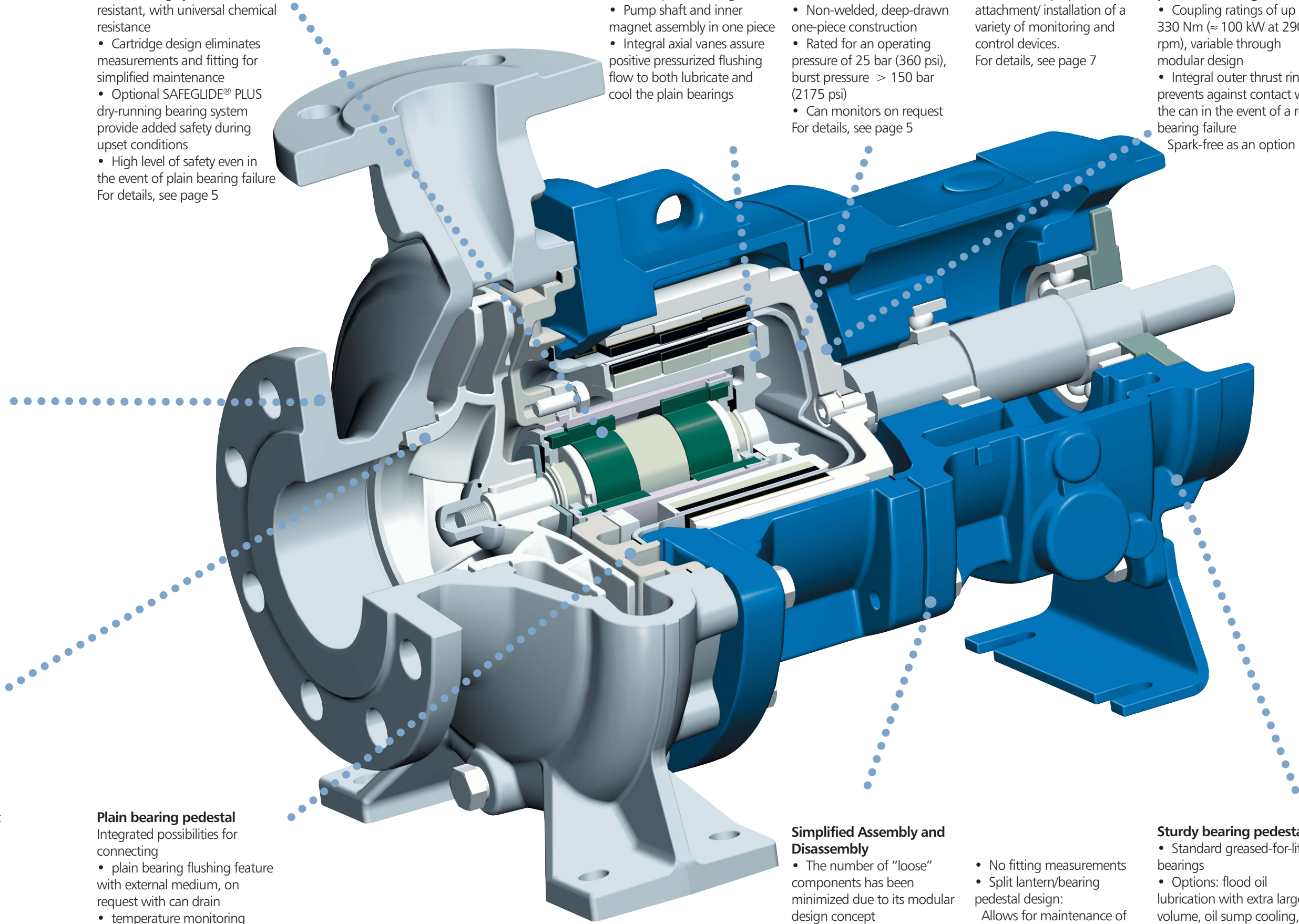
- Hastelloy C4 (2.4610) as standard
- Non-welded, deep-drawn one-piece construction
- Rated for an operating pressure of 25 bar (360 psi), burst pressure > 150 bar (2175 psi)
- Can monitors on request For details, see page 5

Pump condition monitoring

- The ICM is prepared for the attachment/ installation of a variety of monitoring and control devices. For details, see page 7

Drive magnet assembly with high-performance permanent magnets

- Coupling ratings of up to 330 Nm (≈ 100 kW at 2900 rpm), variable through modular design
- Integral outer thrust ring prevents against contact with the can in the event of a roller bearing failure Spark-free as an option



Plain bearing pedestal

- Integrated possibilities for connecting
- plain bearing flushing feature with external medium, on request with can drain
 - temperature monitoring

Simplified Assembly and Disassembly

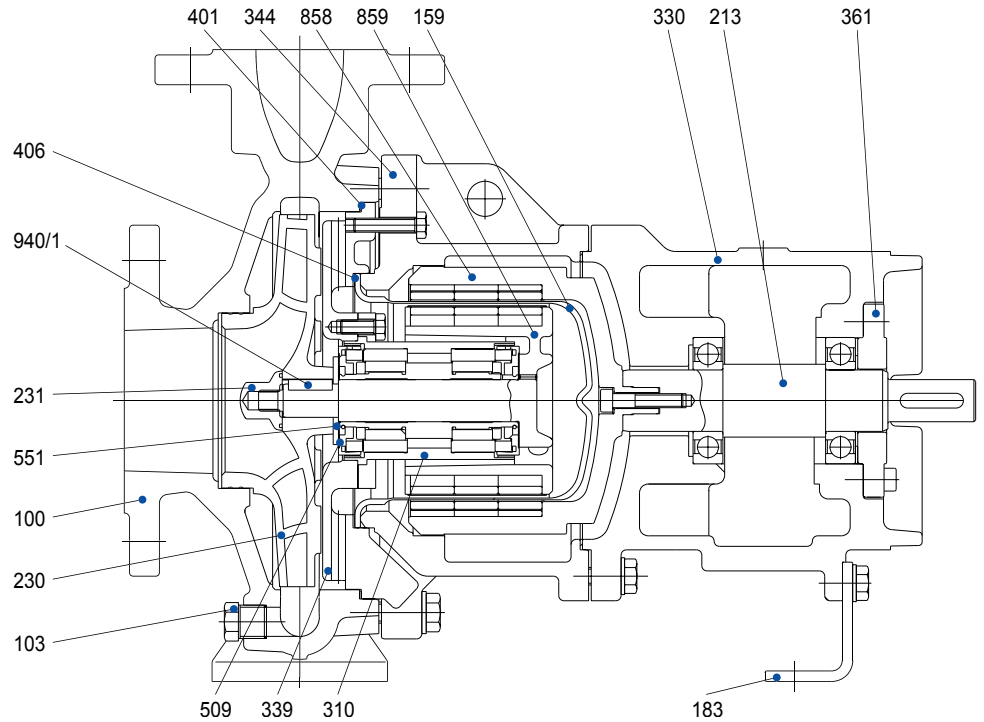
- The number of "loose" components has been minimized due to its modular design concept
- High component interchangeability within the frame size groups
- No special tools required

Sturdy bearing pedestal

- Standard greased-for-life bearings
- Options: flood oil lubrication with extra large oil volume, oil sump cooling, labyrinth oil seals

- No fitting measurements
- Split lantern/bearing pedestal design: Allows for maintenance of the drive side while keeping the liquid end assembled and pressurized ("back pull out design")

Parts list and materials



Item No.	Part designation	Stainless steel (VV)	Duplex (WW)	Ductile cast iron (NL)	Ductile cast iron/ stainl. steel	Hastelloy (CC)	Alloy 20 (AA)	Titanium (TT)
100	Housing	1.4408	1.4517	0.7043		Hastelloy	Details	Details
230	Impeller	1.4408	1.4517			Hastelloy	on request	on request
339	Plain bearing pedestal					Hastelloy		
310	Plain bearing cartridge	Duplex 1.4462/SSiC				Hastelloy		
859	Inner mag. ass./Magnets	Duplex 1.4517/NdFeB						
159	Can	Hastelloy C4 2.4610						
231	Impeller nut	Duplex 1.4517				Details on		
551	Distance washer	1.4571				request		
940/1	Key (impeller)	1.4571						
401	Housing gasket	Asbestos-free aramide fibre						
406	Can gasket	Asbestos-free aramide fibre						
509	Intermediate ring							
344	Lantern	0.7043						
858	Drive mag. ass./Magnets	0.6020/NdFeB						
330	Bearing pedestal	0.6025						
213	Drive shaft	1.4021						
361	Rear bearing cover	1.0601						
183	Support bracket	1.0037						
103	Housing drain plug	Stainless steel				Details on request		
	Screws, nuts etc.							

Options not shown:

236	Inducer	Duplex 1.4462			Hastelloy	Details on	Details on
502	Housing wear ring	1.4410	Duplex 1.4439	1.4410			request
642	Oil level sight glass	Plastic/glass					

Performance curves

The Model ICM comprises 18 sizes with impeller Ø up to 315 mm.

It is designed for flow rates of

- up to 340 m³/h (1490 USgpm) at 2900 rpm
- up to 400 m³/h (1760 USgpm) at 3500 rpm

and heads of

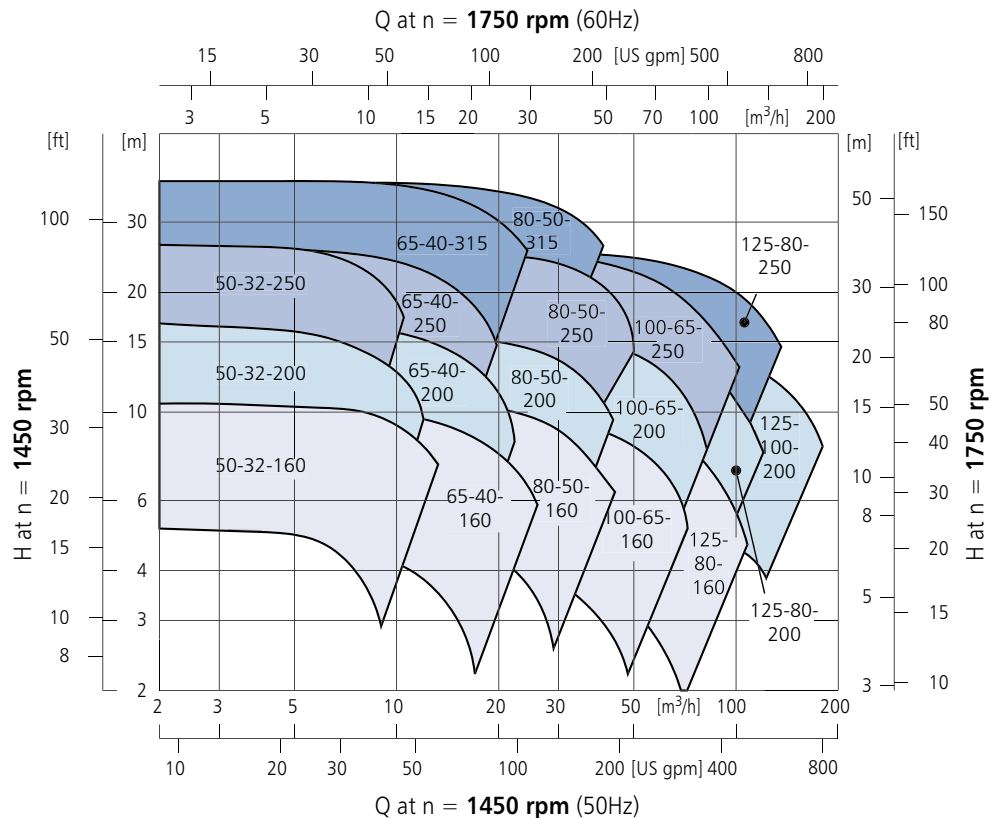
- up to 160 m (525ft) LC at 2900 rpm
- up to 210 m (685ft) LC at 3500 rpm

The sizes 50-32-160 to 80-50-160 as well as 50-32-200 to 80-50-200 are available in close-coupled design ICMB, too.

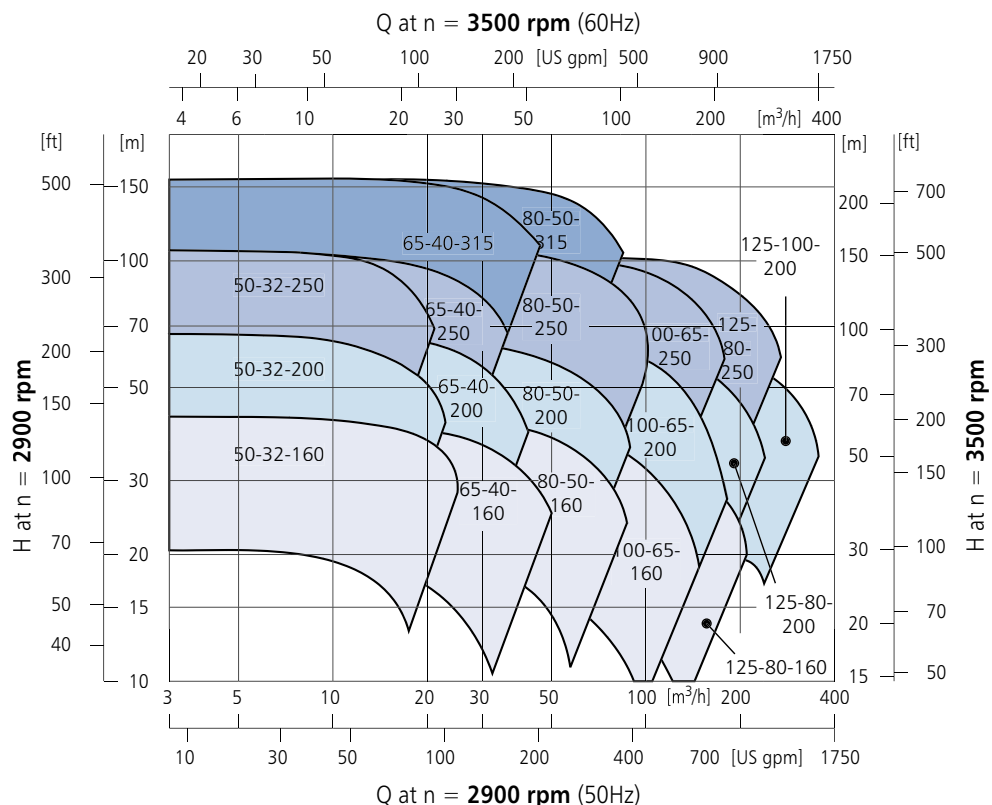
Flow rates and heads above the ICM spectrum can be covered up to 500 m³/h (2200 US gpm) by the mechanical seal pump series IC.

The performance curves relate to a viscosity of 1 mm²/s.

Performance curves 1450/1750



Performance curves 2900/3500



Safety first: Pump control and monitoring

When a sealless pumps is specified the Number One user concern is safe and leakfree operation, especially when noxious, toxic, carcinogenic and other hazardous materials are conveyed.

The ICM has been designed such that most condition monitoring and speed control devices can be easily and economically installed and retrofitted. The following condition monitoring options are available:

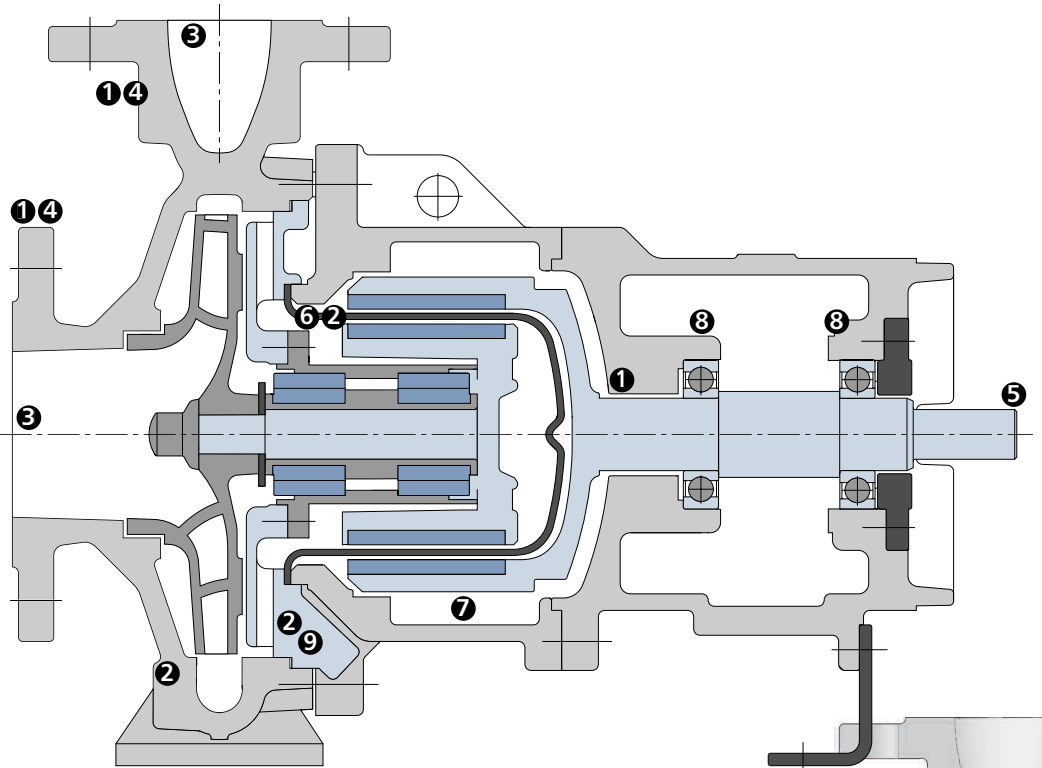
- ❶ Pump speed control (Hydrovar[®], PumpSmart[®] etc.)
- ❷ Temperature monitor
- ❸ Flow and filling level monitor
- ❹ Pressure monitor
- ❺ Motor load monitor
- ❻ Can temperature monitor
- ❼ Can leakage sensor in the lantern
- ❽ Rolling bearing monitor
- ❾ Connection for external flush supply

Customised solutions on request.

❶ Secondary sealing:

The space around the can be sealed against the rolling bearings by means of special shaft or labyrinth seals.

If the can is damaged, the drive side and atmosphere would be protected against the medium for a certain time. Therefore, in conjunction with one of the can monitors, this results in an effective preventive environmental protection in the case of critical media.



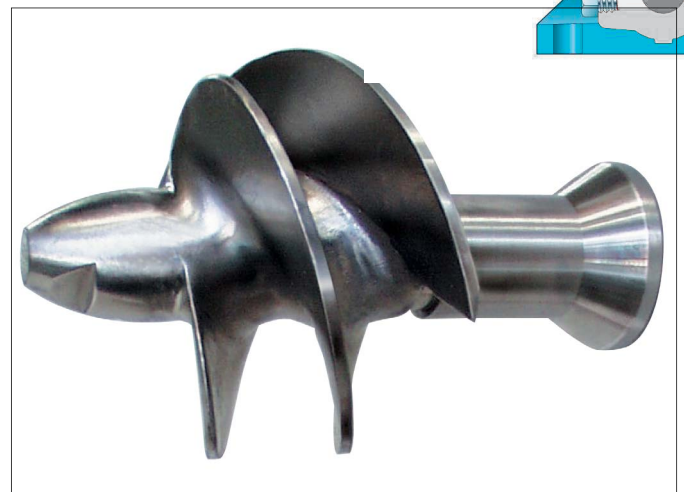
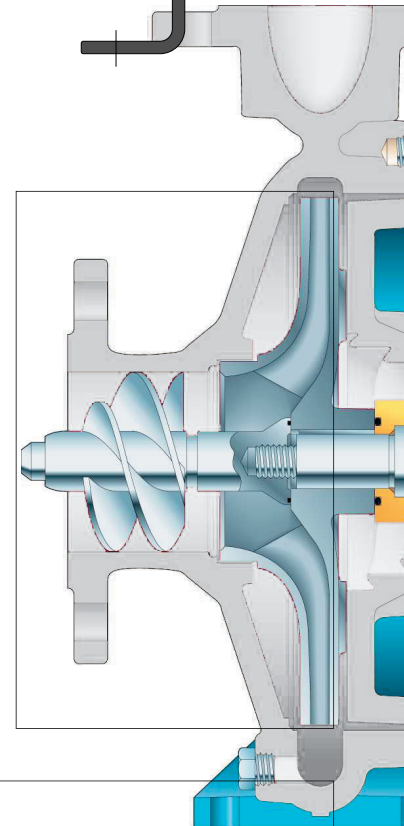
Inducer

As an option all ICM pumps can be fitted with a suction inducer.

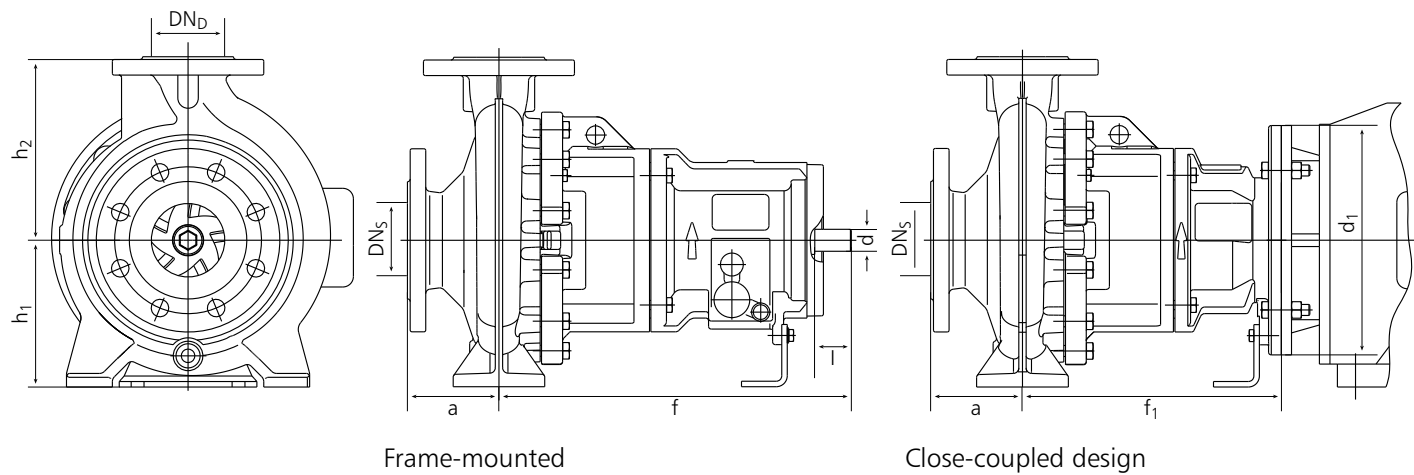
The inducer

- reduces the NPSHr by 35-50 %
- permits smaller pumps at higher speeds for lower installation costs
- is advantageous for media with entrained gas, high vapor pressures or specific heats

ITT's inducer technology has been proven in practice for over thirty years.



Pump dimensions for frame-mounted and close-coupled designs



All dimensions in mm

Pump size	Flanges		Pump				Shaft end		Weight approx. kg (without drive)
	DN_S	DN_D	a	f	h_1	h_2	d	l	
50-32-160	50	32	80	385	132	160	24	50	57
50-32-200	50	32	80	385	160	180	24	50	67
50-32-250	50	32	100	500	180	225	32	80	109
65-40-160	65	40	80	385	132	160	24	50	58
65-40-200	65	40	100	385	160	180	24	50	72
65-40-250	65	40	100	500	180	225	32	80	111
65-40-315	65	40	125	500	200	250	32	80	150
80-50-160	80	50	100	385	160	180	24	50	62
80-50-200	80	50	100	385	160	200	24	50	73
80-50-250	80	50	125	500	180	225	32	80	113
80-50-315	80	50	125	500	225	280	32	80	155
100-65-160	100	65	100	500	160	200	32	80	95
100-65-200	100	65	100	500	180	225	32	80	101
100-65-250	100	65	125	500	200	250	32	80	127
125-80-160	125	80	125	500	180	225	32	80	107
125-80-200	125	80	125	500	180	250	32	80	114
125-80-250	125	80	125	500	225	280	32	80	143
125-100-200	125	100	125	500	200	280	32	80	121

Motor-dependent pump dimensions for close-coupled version			
Pump size	Motor size	f_1	d_1
50-32-160	80	275.5	200
	90	275.5	200
65-40-160	100	275.5	250
80-50-160	112	275.5	250
50-32-200	132	295.5	300
65-40-200	160	325.5	350
	180	325.5	350
	200	325.5	400

Material comparison table			
Cast materials	ICM standard	Equivalent standards DIN	Equivalent standards ASTM
Cast iron	EN-GJL-250 (JL1040)	0.6025	A48, Class 35 B
Duct. cast iron	EN-GJS-400-18-LT (JS1025)	0.7043	A536, grade60-40-18
Stainless steel	1.4408	1.4408	A743, CF-8M
Duplex	1.4517	1.4517	A744 CD4-MCu
Alloy 20	1.4536	1.4536	A743 CN-7M
Hastelloy C	V2.4811	2.4811	A494 N-12MV
Hastelloy B	V2.4810	2.4810	A494CX 2MV
Titanium	3.7031	3.7031	B367 Grade 2

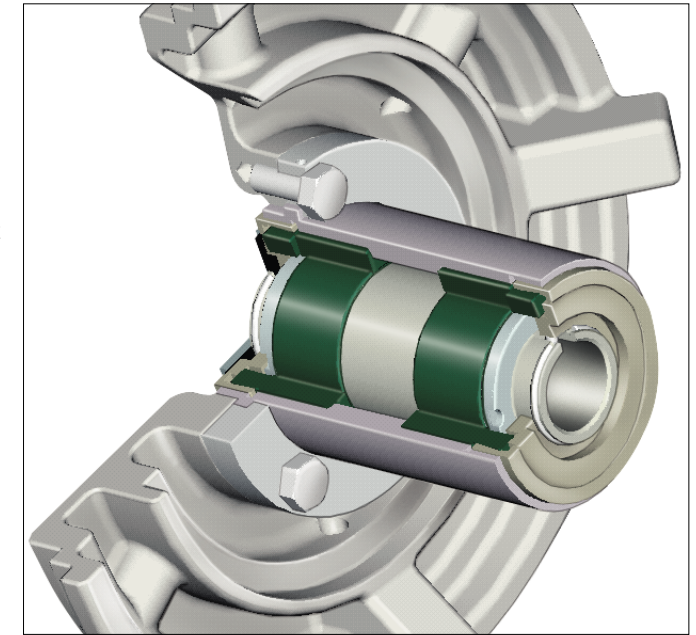
Cartridge plain bearings

Plain bearings must run reliably. If, however, pump maintenance is required, it must be performed correctly and often as quickly as possible. The cartridge plain bearing system of the ICM is designed accordingly:

- Fast and simple installation and replacement of the plain bearings, no need for installation settings.
- Cartridge design can be rebuilt/refurbished with individual components to minimize spare parts and repair costs.
- Radial and thrust plain bearings made of highly

abrasion-resistant pure silicon carbide (SSiC) with universal chemical resistance

- In case of a plain bearing failure the encapsulated cartridge design both will act to contain possible silicon carbide (SSiC) fragments and to prevent the inner magnet assembly from contacting the can.
- Optionally the SAFEGLIDE® PLUS bearing system can be supplied to provide an optimized dry-running capability. SAFEGLIDE® PLUS has proven its worth in thousands of operating chemical process pumps.



Separating cans

The can is the most important sealing element against the atmosphere. This component was thus carefully examined the development phase:

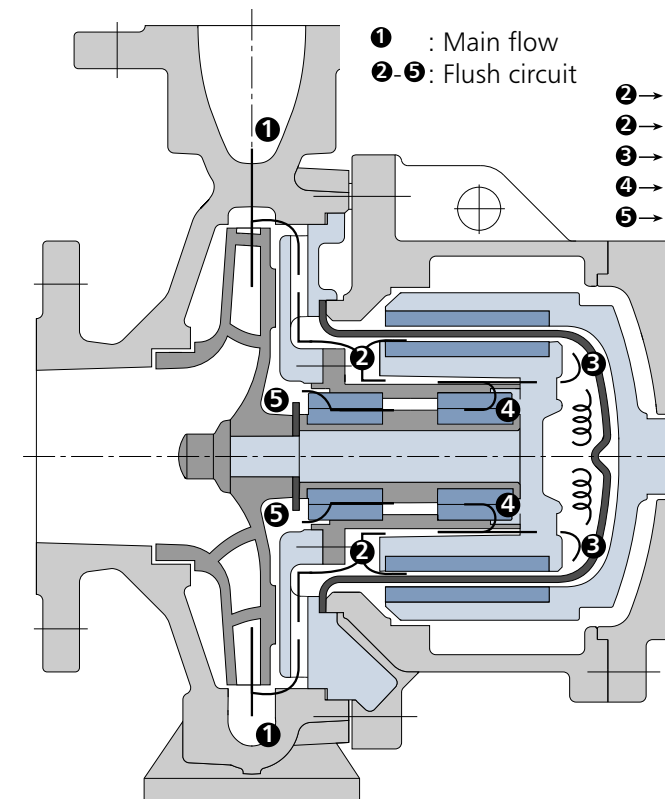
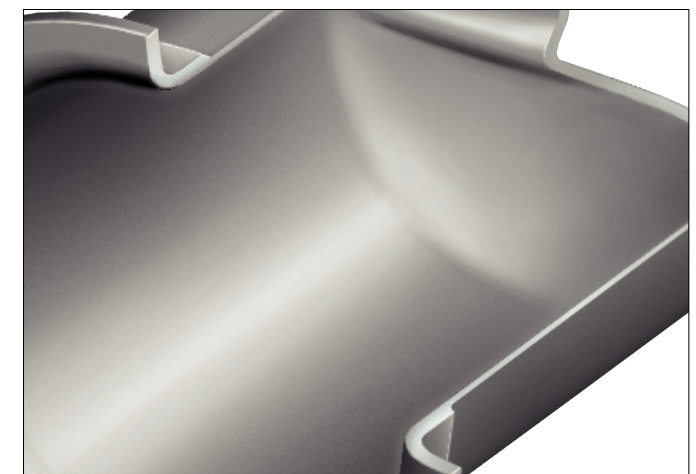
The pressure and flow conditions inside the can were illustrated, simulated and analysed using a computer. The can is therefore optimally designed.

- Hastelloy C4 (2.4610) as standard, deep-drawn non-welded design for reliable corrosion resistance

- Vortex breaking bead at the bottom of the can prevents against erosion of the can
- Burst pressure > 150 bar (> 2,175 psi)

Large clearances (1.5 mm!) between the can and the inner magnet assembly allow for greater reliability in solid laden services or with higher viscous media

- A double can arrangement is available on request where secondary containment is required



Flush circuit in the plain bearing system and can chamber

A reliable flush circuit is important for heat dissipation, lubrication of the plain bearings and solids handling without clogging. The heat produced in the metallic can by eddy currents must be controlled to prevent against flashing because dry-running/inadequate lubrication and overheating are the most important causes of sealless pump downtimes and failures.

Coupling years of ITT's sealless pump experience and using modern CFD (computational fluid dynamics) methods, an effective and reliable flush circuit has been designed during the development stages of the ICM. The flush

circuit is enhanced by special design features in the inner magnet assembly, can and plain bearing cartridge to guarantee reliable pumping even under the most demanding applications. Rigorous testing has been completed to confirm its reliability.

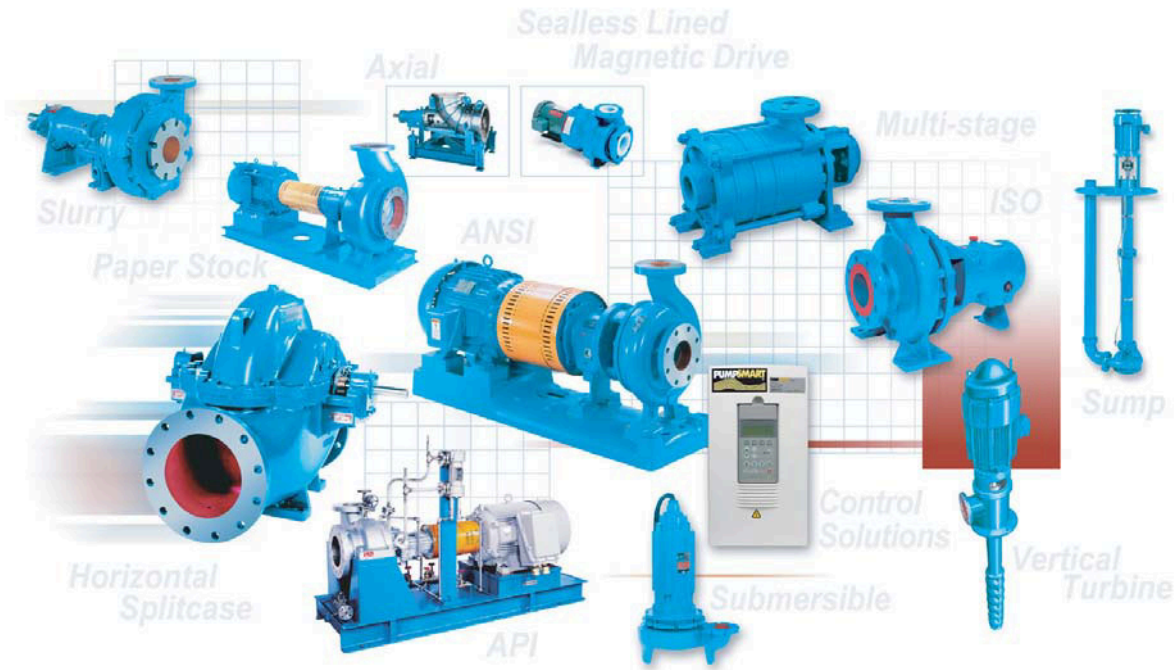
Solids Handling Capability:

Based on extensive testing the ICM has shown to be capable of pumping liquids which contain highly abrasive powders without any breakdowns or detectable signs of wear. Admissible solids contents need to be checked case by case.

Metallic and lined process pumps

We offer one of the broadest ranges of process pumps available on the market. Pumps for severe corrosives, abrasives or contaminated media, for high temperatures

or hazardous liquids, for media with fibrous solids, for low or high flow rates. No matter what you need, we'll find you the optimum, reliable solution.



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