WITTE PUMPS & TECHNOLOGY

MADE IN GERMANY

Gear pumps for the polymer industry

Contents

WITTE PUMPS & TECHNOLOGY GmbH is an international medium-sized machine designer and manufacturer based in Tornesch near Hamburg.

WITTE specialises in developing and manufacturing precision gear pumps. It has its own subsidiaries in the USA, China and Malaysia, as well as a number of agents representing it worldwide.

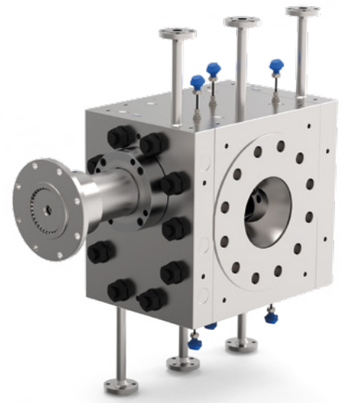
WITTE gear pumps for the polymer process

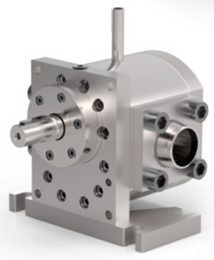
The petrochemical industry is one of the most important economic sectors. It is the foundation and engine for new and innovative products and materials. The manufacture of chemical base substances as raw materials for plastic products and chemical products calls for the highest standard of precision and care.

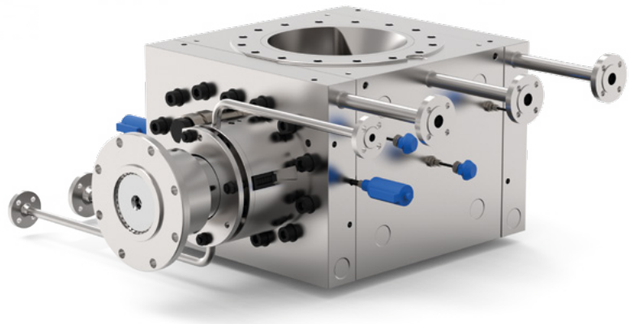
WITTE PUMPS & TECHNOLOGY GmbH has been a reliable technological partner to innovation drivers and giants in the chemical and plastics industries for years. We always aim to offer our customers the maximum degree of process reliability with our precision gear pumps and, in doing so, comprehensive quality controls take top priority.

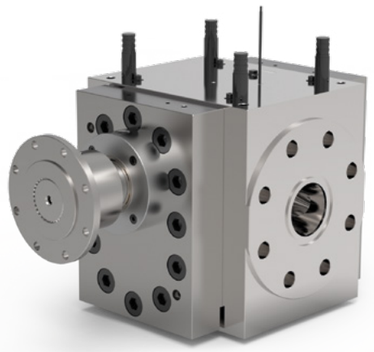
Usually a number of different pumps are needed in the manufacture of plastics and their raw materials. WITTE specialises in serving the entire process chain for the production of polymers with a wide range of pumps.

The advantage here is that customers can get all of their pumps from one place and these pumps are perfectly matched. The pumps in all series are individually adapted to the requirements and conditions of the plant and process in question. It is important to us that the highest safety standards are met and any risk to humans and nature is eliminated. We use an extensive network of material experts and manufacturers in the production of the components, allowing us to be able to offer pumps for even the most extreme conditions.

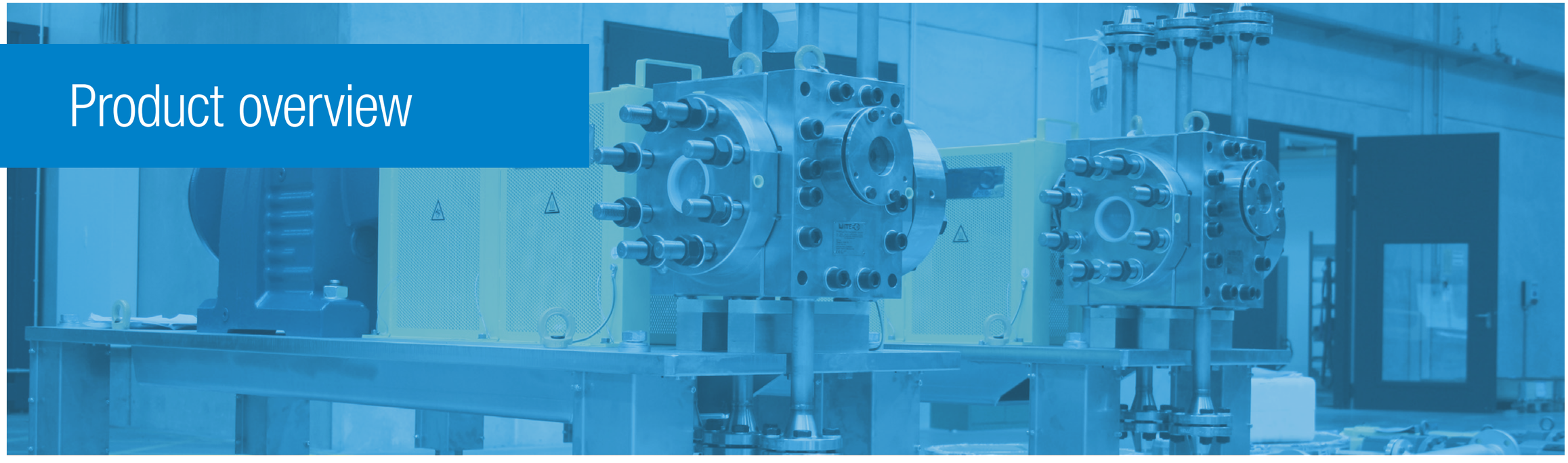








Product overview



The WITTE polymer pump range: the right pump for every processing stage. Available in standard designs or modified in accordance with customer requirements.

Plants and components are subject to extreme requirements in the production and processing of polymers. High temperatures and pressures are required for many processing stages. The quality of the product strongly depends on constant process parameters. Temperature fluctuations, shearing, pulsation or pressure changes negatively impact the quality of the melt.

That's why WITTE has developed a range of pumps that are precisely matched and can therefore be used in every required processing stage.

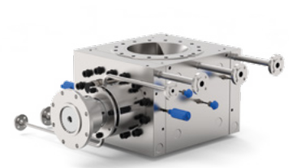
From the preparation and mixing of individual chemical components to the production of prepolymers and the final product, we offer the optimal pump solution.

WITTE gear pumps for the polymer process

Metering ChemCore® series

Chemical pumps for metering additives and for the production of monomers, oligomers and prepolymers.

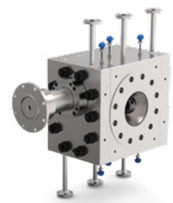
Pages 10–11



Discharge PolyCore® series

For discharge from melt reactors. Powerful discharge pumps with enormous output even from high vacuum conditions.

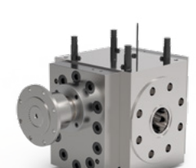
Pages 12–13



Pressure boost BoosterCore® series

Pumps for building up the required process pressure for further processing.

Pages 14–15



Extrusion ExtruCore® series

Extrusion pumps optimise the extrusion process and relieve the extruder. Product quality is kept consistently high.

Pages 16–17

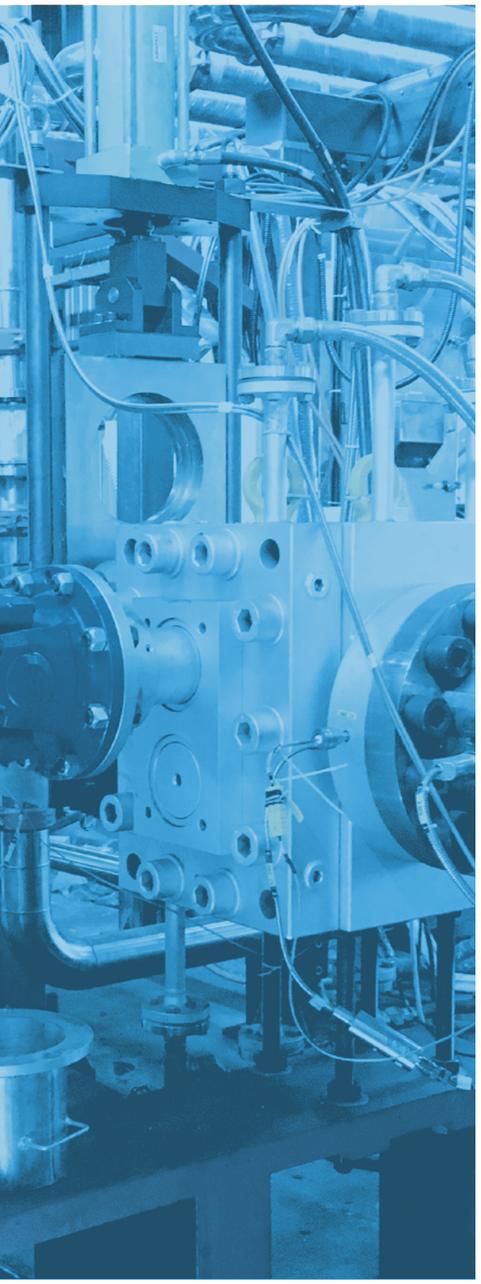
Applications

WITTE pumps can be used in a number of applications in the chemical and plastics industry. We've compiled a rough overview of the most common media that can be pumped with WITTE pumps here.

	CHEMICALS																			POLYMERS																		ELASTOMERS								
	Alcohols	Additives	Bases	Esters	Glycerine	Resins	Hardeners	Isocyanates	Monomers	Oils	Phenols	Acids	Biodiesel	Asphalt	Bitumen	Tar	Hot melt	Adhesives	Demineralised water	Waxes	PET	PBT	PA/Nylon 66®	PC	PS/HIPS	SAN/ABS	PP/PE	POM	Cellulose	Prepolymers	PVC	PMMA	HDPE/LDPE/LLDPE	PEEK	Polysulphone	Biopolymers (PLA, PBAT)	EPDM	CR	NBR	SBR	NR	FPM	BR	IIR
Chemical pumps ChemCore®	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•						•	•														
Extrusion pumps ExtruCore®																					•			•	•		•				•	•	•	•	•	•									
Booster pumps BoosterCore®																					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Discharge pumps PolyCore®																					•	•	•	•	•	•	•	•	•							•									

Processing stages

Using gear pumps in the production of polymers



The right pump at every point

WITTE offers the right pump solution for the entire process chain in the production of polymers. Different pump types are used depending on the requirement and the application. All pumps are tailored to the respective technical conditions of the processing stage in question. From small metering pumps for introducing additives in the production of raw melt and pumps for the production of prepolymers to discharge pumps for discharging the final polymer melt, WITTE is the one-stop shop for the entire process chain. WITTE also offers the required components for subsequent processing of granulates in the extrusion process.

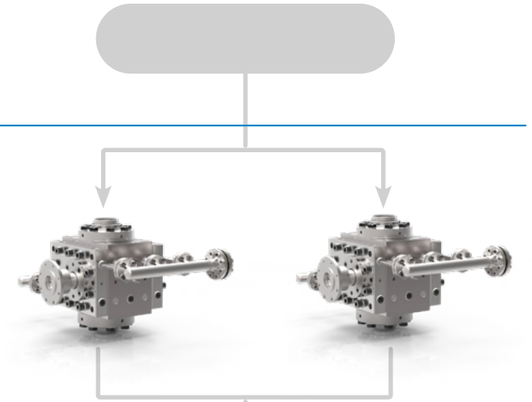
POLYMERS

Reactor with prepolymer melt

- Preliminary product for polymer production
  Discharge of prepolymer for further processing
- Prepolymers, monomers, oligomers

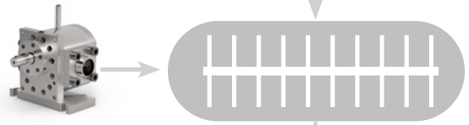
Discharge of prepolymer

- Prepolymer is transferred from the reactor through prepolymer pumps
- Seal: viscoseal with stuffing box



Metering of additives to mixer

- Metering of additives
- Mixing of melt

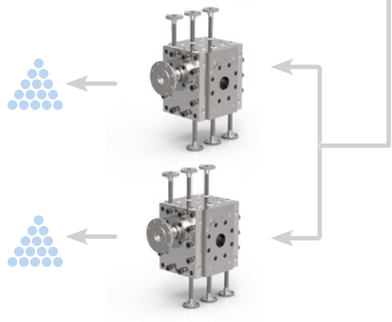


Discharge of polymer melt with PolyCore® pumps

- Polymer pumps used as discharge pumps
- Discharge from the melt reactor even under vacuum conditions

Increase of process pressure to produce end product

- Increase of process pressure and transfer of melt to downstream equipment
- Seal: vacuum viscoseal



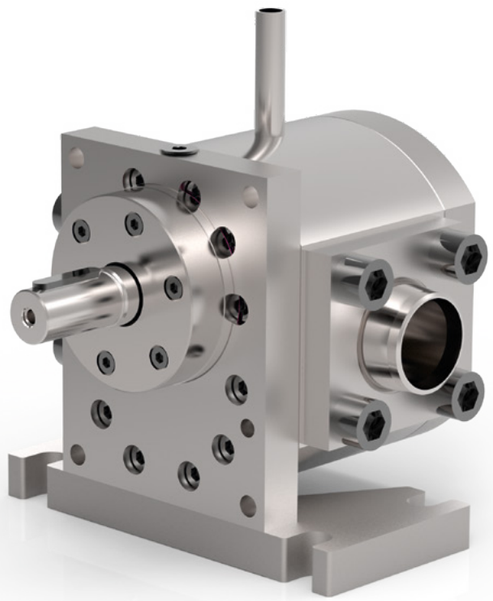
Metering

ChemCore®

The ChemCore® gear pump series was specially developed for the requirements of the polymer industry. The pumps are used to pump and transfer low-to-medium viscous media and are designed as classic metering pumps.

The versatile spectrum of use for these pumps ranges from organic and inorganic chemicals to the production of monomers, oligomers and prepolymers.

An extensive modular system provides optimal material pairings for corrosive or abrasive media.



CHEMICALS POLYMERS

Technical designs

HOUSING	Stainless steel · tantalum · titanium · Hastelloy® · ceramic
GEARS	1.4112, and also all other processable ceramic and metal materials, such as 1.4571, Ferralium®, Ferro-Titanit®, Hastelloy®, etc. · optionally available with coating · spur gearing
FRICTION BEARINGS	Carbon · NiAg (nickel silver) · silicon carbide · zirconia · tool steel · alum. bronze · optionally available with coating
SHAFT SEALS	Single internal, single external or double mechanical seal · stuffing box · magnetic coupling
HEATING	Steam · water · heat transfer oil · electric

Operating parameters

VISCOSITY	0.5 to 1,000,000 mPa s
TEMPERATURE	Up to 350°C · higher temperatures upon request
SUCTION PRESSURE	Vacuum to max. 15 bar, higher with magnetic drive
DISCHARGE/DIFFERENTIAL PRESSURE	Up to 120 bar *The values listed are maximum values and must not coincide under certain circumstances.*
PUMP SIZES	From 0.2 ccm/rev. to 24,000 ccm/rev.

Applications

ORGANIC AND INORGANIC CHEMICALS	Alcohols · additives · bases · esters · glycerine · resins · hardeners · isocyanates · monomers · oils · phenols · acids · biodiesel · bitumen · tar · hot melt · adhesives · waxes · etc.
POLYMERS	Cellulose · PA · prepolymers · etc.

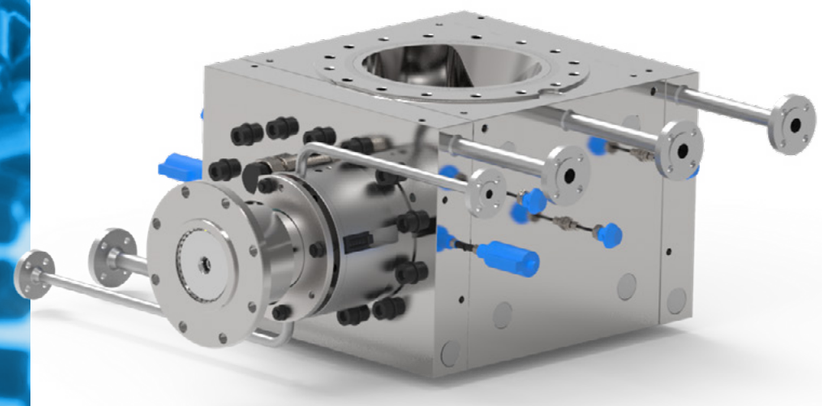
Discharge pumps

PolyCore® AT / PolyCore®

Reliable and robust pumps are especially needed in the polymerisation process for emptying reactors and containers. The pumps transfer the melt to downstream process steps. The highly viscous material must be pumped from a reactor that is under vacuum conditions.

Discharge pumps in the PolyCore® series are precisely adapted to this task. The customer can choose between a standard design or a custom solution that meets requirements exactly. These pumps achieve the best efficiency thanks to optimised shaft and bearing geometries. Energy consumption is kept low so that operating costs are optimised.

The PolyCore® gear pump is available in different versions. Versions with conventional or shortened inlet funnels are just as possible as versions in the LowNPSH design. Pumps with shortened inlets guarantee fast transfer of the melt to the gears. All PolyCore® discharge pumps have inlet openings that are as large as possible and have optimised flow geometries in order to minimise pressure loss and therefore facilitate a minimal fill level via the pump, which means the shortest possible dwell times for the polymer.



POLYMERS

Technical designs

HOUSING	
	Stainless steel · alloyed steel optionally available with coating
GEARS	
	Nitrided steel · tool steel · optionally available with coating · helical gearing · herringbone gearing
FRICTION BEARINGS	
	Tool steel · NiAg (nickel silver) · alum. bronze · optionally available with coating
SHAFT SEALS	
	(Vacuum) viscoseal with buffered stuffing box · stuffing box · double mechanical seal, locked
HEATING	
	Heat transfer oil · steam

Operating parameters

VISCOSITY	
	Up to 40,000 Pas
TEMPERATURE	
	Up to 350°C
SUCTION PRESSURE	
	Vacuum to max. 15 bar
DISCHARGE/DIFFERENTIAL PRESSURE	
	Up to 250/320 bar *The values listed are maximum values and must not coincide under certain circumstances.*
PUMP SIZES	
	From 4.7 ccm/rev. to 44,400 ccm/rev.

Applications

POLYMER PROCESSING
PET · PBT · PA · PC · PS · SAN · ABS · HIPS · PP · PE · POM

AT design: advantages

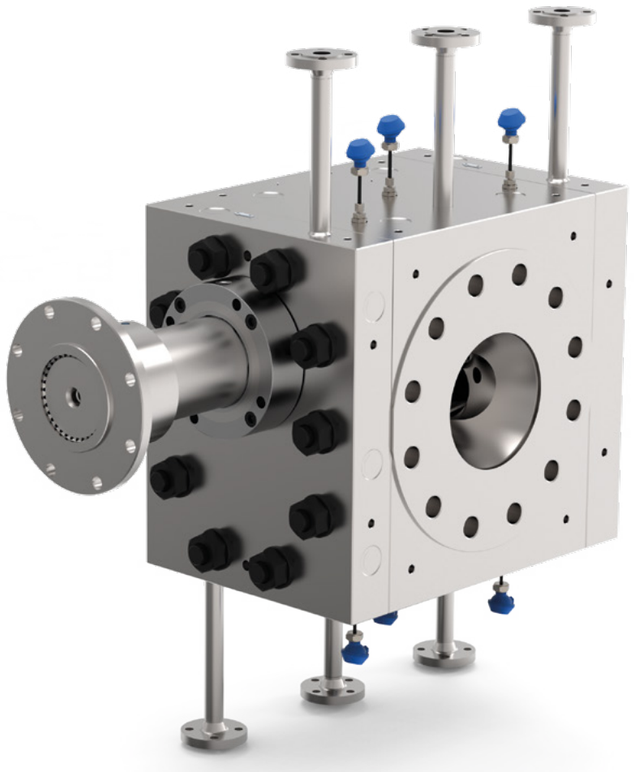
- Greater efficiency, resulting in
  - Less temperature transfer to the polymer
  - Energy saving = cost saving
  - Broader viscosity range possible
  - Broader volumetric flow range possible
- Lower bearing temperature, leading to lower strain on the polymer
- Parts in the BOOSTER and POLY series are interchangeable (same size)
- Optimised intake geometry (POLY), leading to minimal pressure loss and therefore minimal dwell times of the polymer in the reactor
- Three different flange types each (EN 1092-1 and ANSI B16.5)
- Three different pressure levels (200 bar, 250 bar, 320 bar)

Pressure boost

BoosterCore® AT / BoosterCore®

The BoosterCore® pumps provide the necessary process pressure. Tools, filters or pipes cause the pressure from upstream processing stages to reduce, meaning that it is generally no longer sufficient to reliably transfer highly viscous melt to downstream processes.

The BoosterCore® series guarantees the reliable flow of product and builds up the necessary pressure for further processing. Hydraulically heated, even temperature-sensitive fluids are reliably pumped.



POLYMERS RUBBER

Technical designs

HOUSING
Heat-resistant carbon steel · stainless steel 1.4313 · optionally available with coating
GEARS
Tool steel · nitrided steel · optionally available with coating · helical gearing · herringbone gearing (for lowest possible pulsation)
FRICTION BEARINGS
Tool steel · NiAg (nickel silver) · alum. bronze · optionally available with coating
SEALS
Viscoseal · stuffing box · (vacuum viscoseal)
HEATING
Steam · water · heat transfer oil

Operating parameters

VISCOSITY
Up to 40,000 Pas
TEMPERATURE
Up to 400°C · higher temperatures upon request
SUCTION PRESSURE
Up to max. 120 bar
DIFFERENTIAL PRESSURE
Up to max. 250/320 bar *The values listed are maximum values and must not coincide under certain circumstances.*
PUMP SIZES – CLASSIC DESIGN
From 4.7 ccm/rev. to 21,500 ccm/rev.

Applications

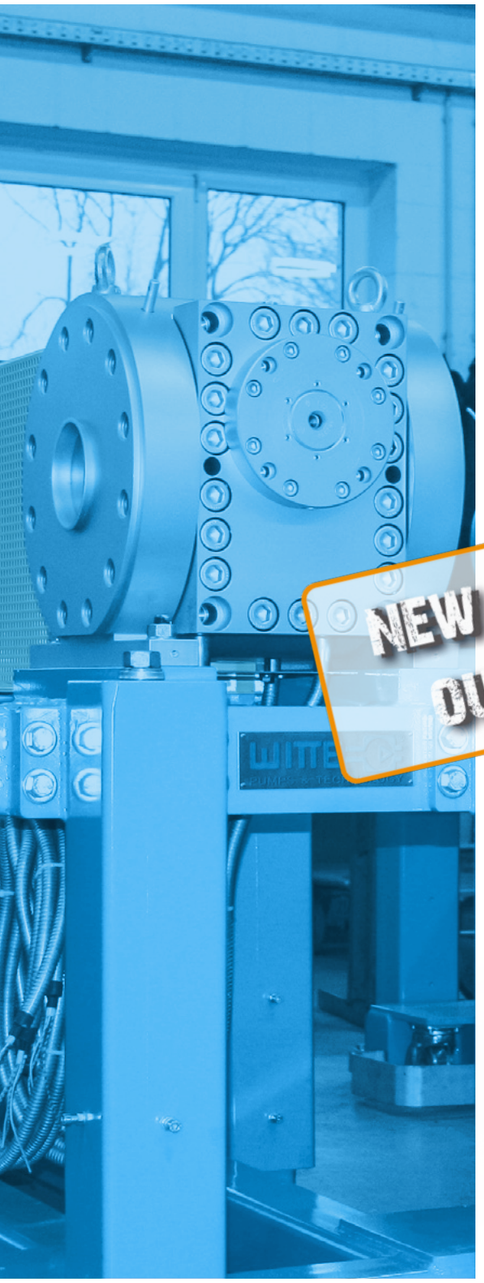
POLYMERS
PET · PBT · PA · PC · PS · SAN · ABS · HIPS · PP · PE · POM · biopolymers · elastomers

AT design: advantages

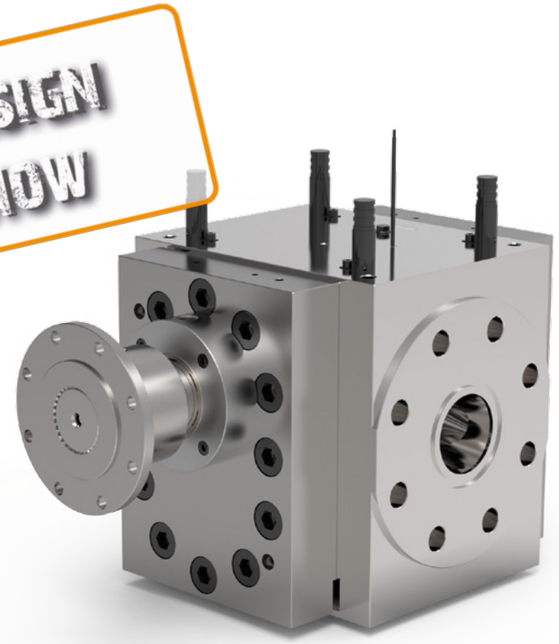
- Greater efficiency, resulting in
  - Less temperature transfer to the polymer
  - Energy saving = cost saving
  - Broader viscosity range possible
  - Greater volumetric flow range possible
- Lower bearing temperature, leading to lower strain on the polymer
- Increased protection against shaft breakage due to overload thanks to innovative design
- Standardisation of components, meaning easier storage and improved availability

Extrusion

ExtruCore®



Using gear pumps in extrusion brings enormous benefits in terms of the quality of the process and of the end product. By relieving the extruder, maintenance intervals can be extended and downtime minimised. Reduced backflow means increased output. The product is produced with consistent quality, minimising rejections. Pumping fluctuations and pulsation in the product flow are things of the past: they're reliably absorbed by the extrusion pump. The pump also ensures constant pressure ratios and gentle transfer of the melt. The exact volumetric transfer of the pump even means that gravimetric metering can be eliminated.



POLYMERS

Technical designs

HOUSING	
	Heat-resistant carbon steel · stainless steel optionally available with coating
GEARS	
	Tool steel · nitrided steel · special steel · optionally available with coating · helical gearing · herringbone gearing (for very low pulsation during pumping)
FRICTION BEARINGS	
	Tool steel · NiAg (nickel silver) · alum. bronze · special materials · optionally available with coating
SHAFT SEALS	
	Viscoseal · stuffing box
HEATING	
	Electric · optionally available with cover heating

Operating parameters

VISCOSITY	
	Up to 40,000 Pas
TEMPERATURE	
	Up to 400°C
SUCTION PRESSURE	
	Up to max. 120 bar
DIFFERENTIAL PRESSURE	
	250/320 bar *The values listed are maximum values and must not coincide under certain circumstances.*
PUMP SIZES	
	From 2.78 ccm/rev. to 12,000 ccm/rev. Intermediate sizes with more narrow gears for higher differential pressures are possible, e.g. 140/90 (690 ccm/rev.)

Applications

POLYMERS
PS · PET · PVC · PC · PMMA · HDPE · LDPE · LLDPE · PP · PEEK · polysulphone
FOOD
Liquorice · chewing gum

AT design: advantages

- Lower bearing temperature, leading to lower strain on the polymer
- Wider viscosity range, also optimally suitable for highly structurally viscous media
- Reduced heat input due to improved efficiency
- Lower shear
- Increase in product quality
- Higher possible flow rate
- Even higher reliability

Quality management

Quality plays a crucial role at WITTE and runs through every area of the company. It is reflected not only on our company's products but also in its processes and in the work itself. That's why WITTE PUMPS & TECHNOLOGY GmbH is certified under the current DIN ISO 9001 standard. Regular internal and external audits ensure continuous improvement. The principles of modern business operations are assured by a code of conduct.

Certificates:

- DIN EN ISO 9001
- AEO
- EAC
- TA Luft

Working with and pumping chemicals and critical media calls for maximum care. All of the core components of our pumps are therefore tested in modern 3D and optical measurement processes for dimensional stability, clearance classes and quality criteria. Compliance with our quality standards is the most important consideration when it comes to our gear pumps.

Methods and processes are under constant audit and improvement, which is also reflected in our DIN ISO 9001 certification. We inspect not only ourselves but also all of our partners and suppliers to ensure that quality standards are met.

In addition to technical solutions for process requirements, WITTE also sees maximum safety for humans and the environment as a top priority.
It is for this reason that we are so strict about observing and implementing directives and standards for risk avoidance.

WITTE®
PUMPS & TECHNOLOGY

WITTE WORLDWIDE

All of our sales partners can be
found at **www.witte-pumps.com**

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