NETZSCH

Proven Excellence.

Pumps for Wastewater Treatment Plants

Intelligent solutions for a clean environment

Pumps & Systems

Process sequence

OF A WASTEWATER TREATMENT PLANT

The process

We provide you NEMO® progressing cavity pumps, TORNADO® rotary lobe pumps, PERIPRO™ peristaltic pumps and N.Mac® twin shaft grinders in diverse designs and materials, designed according to the location of use in the wastewater plant. Low viscosity and also abrasive sludge is reliably conveyed using our pumps with flanged connections. Designs of the NEMO® hopper pumps are available with screw conveyors or also with our aBP-Module® to prevent bridging for media with a high dry material content, such as de-watered sludge.

Additional information

NEMO®
progressing cavity pump
Brochure NPA · 305

TORNADO® rotary lobe pump
Brochure NPA · 081

Grinding Systems
Brochure NPA · 040

PERIPRO™ peristaltic pumps
Brochure NPA · 800

The robust NEMO® progressing cavity pump:

NEMO® progressing cavity pumps are used in all sectors of the environment to convey almost all types of product continuously, smoothly, with low pulsation and metering in proportion to speed. (refer to p. 8)

Additional features:

- High suction capacity - up to 28 ft / 9 mWC
- Direction of rotation and flow can be reversed
- Can be installed in any position
- Quiet, low-noise running
- Temperatures from -4 °F to 390 °F / - 20 °C to + 200 °C
- Shear sensitive
- Solids handling
- Abrasion resistance

The compact TORNADO® rotary lobe pump:

Due to the compact construction, TORNADO® rotary lobe pumps are best for confined installation situations. Lobe pumps can work very well for high flow, high pressure applications and are also very suitable for product with larger solid substances.
(refer to p. 10)

The PERIPRO™ peristaltic pump:

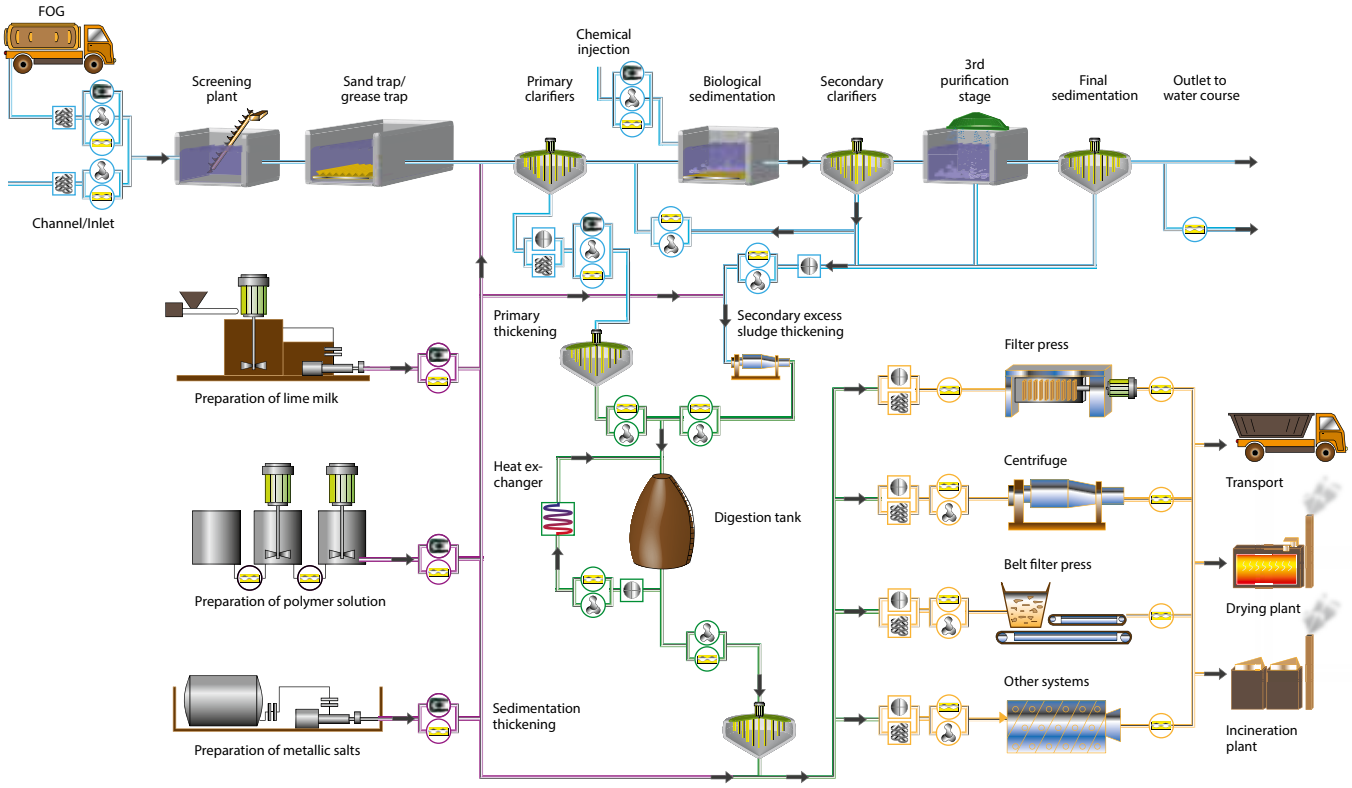
PERIPRO™ peristaltic pumps are best for metering applications and can handle abrasive fluids. Peristaltic pumps work very well for continuous work applications where the pump is run 24/7 due to the design and robustness of the equipment. Perfect for lime milk, sodium hypochlorite, active carbon, $FeCl_3$ and more. (refer to p. 9)

Grinder for process reliability

The cutting plate macerator M-Ovas® and N.Mac® twin shaft grinder protect process equipment, pumps and other accessories which contribute to the process reliability of the overall plant. (refer to p. 11)

NETZSCH Accessories

- Protection devices
- Flushing/pressurized flushing devices
- Control units
- Transport devices
- Tools
- Dry run sensors
- Isolation gauge switches
- Flush systems
- Controls / VFDs
- Polymer injection rings
- Pressure relief valves
- Friction reduction systems
- Level transmitters
- Load cells



NEMO® progressing cavity pump

TORNADO® rotary lobe pumps

M-Ovas® cutting plate macerator

N.Mac® double shaft grinder

PERIPRO™ peristaltic pump

External view: NEMO® progressing cavity pump in a sewage plant with hopper and aBP-Module®

Internal view of the NEMO® progressing cavity pump: Attachment with aBP-Module® to prevent the bridging of sludge cake

TORNADO® rotary lobe pump conveys digested sludge in the sewage plant

Typical applications
IN THE WASTEWATER MARKET

Wastewater / Thin Sludge

During the initial steps of cleaning wastewater, liquid sludge occurs in large quantities as "waste". This is sludge with a dry matter content of approx. 1 % to 4 %. Depending on the origin, the ratio of the content of organic and inorganic substances can differ greatly. Pumps that can convey large quantities at low pressures, as well as feature a long service life, are normally required to convey low viscosity sludge. Both the NEMO® progressing cavity pump as well as the TORNADO® rotary lobe pump are used in these applications.

Scum / Dissolved Air Flotation (DAF)

During the separation process not all solids sink. Flotation sludge and sludge foam represent flotation fractions of sludge that collect on the surface in the secondary settlement tanks. This effect is not desired and results in the flotation sludge, appearing as an air-medium mixture, needing to be pumped away. Ideal for this is the NEMO® progressing cavity pump, which reliably and continuously conveys, even with a high ratio of gas in the medium. For restricted spaces, the TORNADO® rotary lobe pump can also be used.

FOG (Fats, Oil, Grease)

Some municipal plants have added the capability of receiving fats, oils and greases from local restaurants and food industries. They accept this FOG as additional organics to help with the digestion process and potentially to create biogas. These receiving stations normally have a grinder such as an N.Mac® twin shaft grinder with rock trap to aid in cleaning the received fluids and to help protect the process. A NEMO® progressing cavity pump, TORNADO® rotary lobe pump or the PERIPRO™ peristaltic pump can transfer these liquids as needed.

Primary Sludge / Secondary Sludge

Wastewater is gravity fed in to a large clarifiers where polymers or other flocculants are added to aid in the separation of solids (organics and inorganics) from the wastewater. These heavier solids will sink to the bottom creating a sludge. The plant may go through 2-3 cycles of clarification depending on the desired water cleanliness. These sludges are pumped with NEMO® progressing cavity pumps and/ or TORNADO® rotary lobe pumps or PERIPRO™ peristaltic pumps to the next process step of biological treatment.

RAS/WAS/TWAS

The biological process works to break down the organics so they can be processed more efficiently. This is known as activated sludge. This activated sludge can be pumped through a heat exchanger, thickened, and transferred to waste once is has completed the biological process. For all these process steps, NEMO® progressing cavity pumps and/or TORNADO® rotary lobe pumps work effectively to transfer or covey to the next stage of dewatering.

Thickened Sludge

In an initial step, the water ratio and, thus, the overall volume of the sludge is reduced by means of gravity or mechanical thickening. The objective is to attain a dry matter content of 4 % to 11 % in the medium. Thickened sludge is a flowable to viscous media that can also be pumped over long distances. High counter-pressures are overcome by using multiple stage NEMO® progressing cavity pumps. The space-saving TORNADO® rotary lobe pump is also frequently used for thickened sludge.

NEMO® FSIP® progressing cavity pumps

- Application: polymer pumps for wastewater treatment
- NEMO® Pump NM045 BY, 1 stage, L geometry
- Fluid: blended polymer
- Flow: 60 gpm / 14 m³/h
- Pressure: up to 25 psi / 1.5 bar
- Temperature ambient

NEMO® FSIP® Open Hopper progressing cavity pump

- Application: wastewater treatment
- NEMO® Pump NM105 BO, 1 stage, L geometry
- Fluid: 6% thickened sludge
- Flow: 180 gpm / 41 m³/h
- Pressure: up to 90 psi / 6 bar
- Temperature ambient

Typical applications
IN THE WASTEWATER MARKET

Polymers / Flocculant Agent

Flocculating agent is fed to the sludge before draining. It promotes formation of larger solid flakes in the sludge and, in this manner, contributes to improved de-watering. Normally, flocculating agent is metered as a polymer solution or dispersion. Its viscosity and the requirement to be able to accurately meter the quantity place requirements on pumps that the NEMO® progressing cavity pump can easily provide.

Water Treatment Chemicals

Lime milk is an inorganic suspension of lime hydrate and water. It can also be directly produced by quenching caustic lime with a surplus of water. Lime milk is used as an aid to filtration during the de-watering of sludge using filter presses. The structure and constitution of the calcium carbonate is dependent on the origin of the production process. It is a very abrasive medium. To attain high service life, NEMO® progressing cavity pumps are equipped with rotors and stators of high-quality material. Here, the non-wear NEMO® CERATEC® ceramic rotor, in combination with an extremely abrasion-resistant elastomer stator is ideal. (see page 9)

For sodium hypochlorite and $FeCl_3$, the PERIPRO™ is the perfect choice.

De-watered Sludge / Cake

During the de-watering of sludge, by adding flocculating agents in centrifuges, decanters, belt or chamber filter presses, solids content increases up to 35% depending upon the dewatering technology used. The resulting crumbly, compacted product cannot flow. Due to the characteristics of the medium, forced feeding into the pump is required. Additionally, bridging in the inlet area of the pump must be prevented. Fundamentally, NEMO® progressing cavity pumps with a rectangular inlet hopper that includes a feed and conveying screw can be used for these applications. A feature of this pump is the horizontally-positioned, patented conveying screw that ensures an optimum degree of filling of the delivery chamber. For sludge, that tends to bridge, the feed hopper of the NEMO® progressing cavity pump has an additional aBP-Module® or integrated bridge breaker.

Biogas/Biomass Feeding and Digestion

Most large municipal plants will harvest their digested gas and convert it into a biogas. Whether they burn it on site for steam, power, or even pump it back in to the natural gas pipeline. Municipal waste, as well as a wide range of raw organic materials, can be added to increase the output of gas; sources include waste from the food industry, from meat processing, supermarkets, hotels, etc. NETZSCH has grinders, cutting pumps, mixing pumps, and transfer progressing cavity pumps that are perfect for all areas of these processes.

Further information

NEMO CERATEC®
Brochure NPA · 347

The NEMO® FSIP® (Full Service-in-place) design

The FSIP® design enables a particularly service-friendly maintenance without disassembling the pump from the pipeline. With easier access to all rotating parts through cartridge joint and mechanical seals, the maintenance is reduced. The downtimes and the associated costs are reduced. In addition, the required installation space is reduced since the stator is removed laterally. The FSIP® design is offered in modification sets. You can also upgrade existing pumps with lower costs.

N.Mac® Twin Shaft Grinder and a NEMO® Progressing Cavity Pump in FSIP® design installed in wastewater treatment plant for primary sludge.

Additional information

NEMO FSIP®
Brochure NPA · 305 FSIP®

TORNADO® rotary lobe pumps for digested sludge recirculation

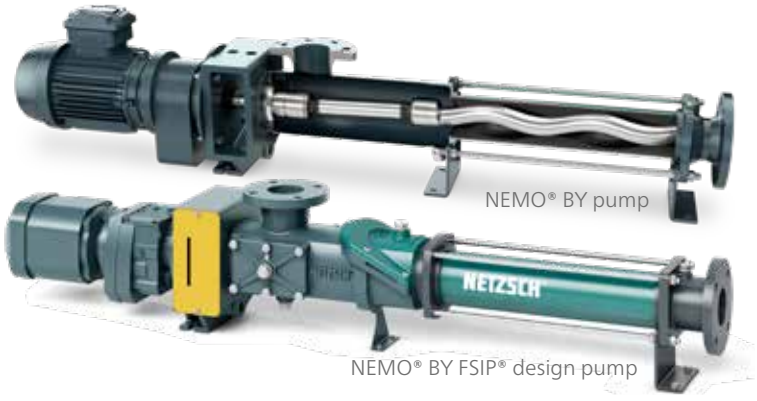
NEMO® Progressing Cavity Pumps
IN WASTEWATER TREATMENT

Large capacity and pressure range
- Capacities up to 4,400 gpm / up to 1,000 m^3/h
- Pressures 90 psi to 680 psi / 6 to 48 bar (standard) or up to 4,350 psi / 240 bar (high pressure)

NEMO® BY and BY FSIP® design

in block design with directly flanged drive

Compact design with directly flanged drive. It is distinguished by its low investment, operating and maintenance costs. Four rotor/stator geometries for optimum performance with every kind of application.



NEMO® BY pump

NEMO® BY FSIP® design pump

NEMO® BY Mini

block design

These pumps provide almost pulsation free dispensing with high repeatability and a metering accuracy of ± 1%. Four different (dimensionally identical) rotor/stator geometry sizes allow for easy adaptation of flow and pressure to meet your process requirements.

NEMO® BF option with aBP-Module®

in block design with directly flanged drive or with bearing housing and free shaft end

Housing with enlarged, rectangular feed hopper and with removable, cone-shaped compression chamber, coupling rod with patented, horizontally positioned conveying screw for optimum product feeding into the conveying elements.
Optional with aBP-Module® to prevent bridging.
Also available in FSIP® design.

PERIPRO™ Peristaltic Pumps
IN WASTEWATER TREATMENT

Capacity and pressure range
- Flow rates up to 75 gpm / up to 17 m^3/h
- Supports pressures up to 145 psi / 10 bar

PERIPRO™

Your benefits

- High resistance to abrasion during the transfer of sludges and slurries and in the metering of highly abrasive products such as lime milk and activated carbon
- Suction capacity of up to 13.5 psi (9.5 mWc) and optimal flow rate control for sampling applications
- Ease of maintenance and operation for continuous work applications (24 h/7 days) because of the design and robustness of the equipment
- Low shear pumping for metering of polymers and flocculants
- Maximum process efficiency
- Chemical version with materials that are resistant to highly concentrated acids
- Pumping of gaseous products without problems for indefinite periods

Sludges, slurries and products with a high solids content or that are very abrasive such as lime milk can be pumped with the PERIPRO™ pump. Its robustness is achieved with the use of very strong materials, integrated bearings, large-size rollers and a system of reliable and very secure connections that prevent the appearance of leaks during its operation.

Typical applications in water treatment
- Pumping or conveying of sludges and slurries
- Metering of
  - activated carbon
  - lime milk
  - sodium hypochlorite
  - ferric chloride ($FeCl_3$)
  - polymers
  - flocculants
- Sampling

Technical notes: the hopper dimensions can be adjusted to suit the specific application.

BEST CHOICE

for every application

TORNADO® rotary lobe pumps – powerful, robust, compact

TORNADO® self-priming, valveless positive displacement pumps for high-performance and optimally tailored to individual requirements. They are used for continuous and smooth conveyance of almost all media, as well as for metering in proportion to speed.

Large capacity and pressure range

- Capacities up to 4,400 gpm / 1,000 m^3/h
- Pressures up to 125 psi / 8 bar

Broad range of applications

The pumps are primarily used with media that have the following features:

- With and without solids
- Low to high viscosity
- Thixotropic and dilatant
- Shear sensitive
- Abrasive
- Non-lubricating and lubricating

Additional information

TORNADO®
Brochure NPA · 081

FSIP®

Full Service-in-Place holds also true for our grinders

Grinding systems, so that each media is pumpable

Powerful grinding systems are used to protect your plant and pump units contained therein. They ensure that impurities are separated or ground suitable for pumping. Thus, the risk of blocking and/or clogging in the pump systems is reliably prevented.

M-Ovas®
cutting plate macerator

During the treatment of wastewater, the impurities in the medium are directed through the specially shaped housing and gathered and cut by the rotating blades. This unit can be used for sludge with a throughput rate of up to max. 1,340 gpm / 70 m^3/h and a dry matter content of up to 12% and is characterized by its ease of maintenance.

N.Mac®
twin shaft grinder

Capable of fragmenting large and solid particles, the N.Mac® Twin Shaft Grinder is the ideal equipment to suit different applications such as wastewater treatment, biomass substrate handling, food and fruit scraps. Its various housing designs in channel and inline version allow installation into effluent channels or flange assembly to prevent pipe clogging and to protect downstream equipment, such as pumps.

M-Ovas® cutting plate macerator

N.Mac® twin shaft grinder

Additional information

Grinding Systems
Brochure NPA · 040

The NETZSCH Group is a mid-sized, family-owned German company engaging in the manufacture of machinery and instrumentation with worldwide production, sales, and service branches.

The three Business Units – Analyzing & Testing, Grinding & Dispersing and Pumps & Systems – provide tailored solutions for highest-level needs. Over 4,000 employees at 210 sales and production centers in 36 countries across the globe guarantee that expert service is never far from our customers.

The NETZSCH Business Unit Pumps & Systems offers with NEMO® progressing cavity pumps, TORNADO® rotary lobe pumps, NOTOS® screw pumps, PERIPRO™ peristaltic pumps macerators/grinders, metering technology and equipment custom built and challenging solutions for different applications globally.

Proven Excellence.

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