

## Cost-effectiveness

### Saves resources and saves money

The revolutionary design of the TORNADO® T2 pump head extends the lifetime and improves the performance of the rotors, the elastomer liners and the mechanical seals. By adopting a modular design approach it reduces the cost of wearing parts extending operating life and significantly reducing the life cycle costs (LCC).

## Process optimisation

### The quality of the components makes the difference

Torsional strength and deflection-resistant high-quality shaft material combined with sealed for life high load characteristic angular contact ball bearings ensure axial and radial shaft stability maintaining pump head rotor fits and clearances resulting in predictable process stability.

## COST-EFFECTIVENESS

## EASE OF SERVICE



## Environmental awareness

### Green is already our corporate colour

The weight of the TORNADO® T2 has been significantly reduced through the choice of materials and innovative component design. This also means the pump consumes less energy. The reduced power requirement, in parallel with increased pump performance, lowers power consumption and so preserves our environment in a sustainable way.

By eliminating the need for oil NETZSCH demonstrate their environmental awareness.

### Drive options

A range of drive options are available to suit specific application and process requirements. For more information see page 9.

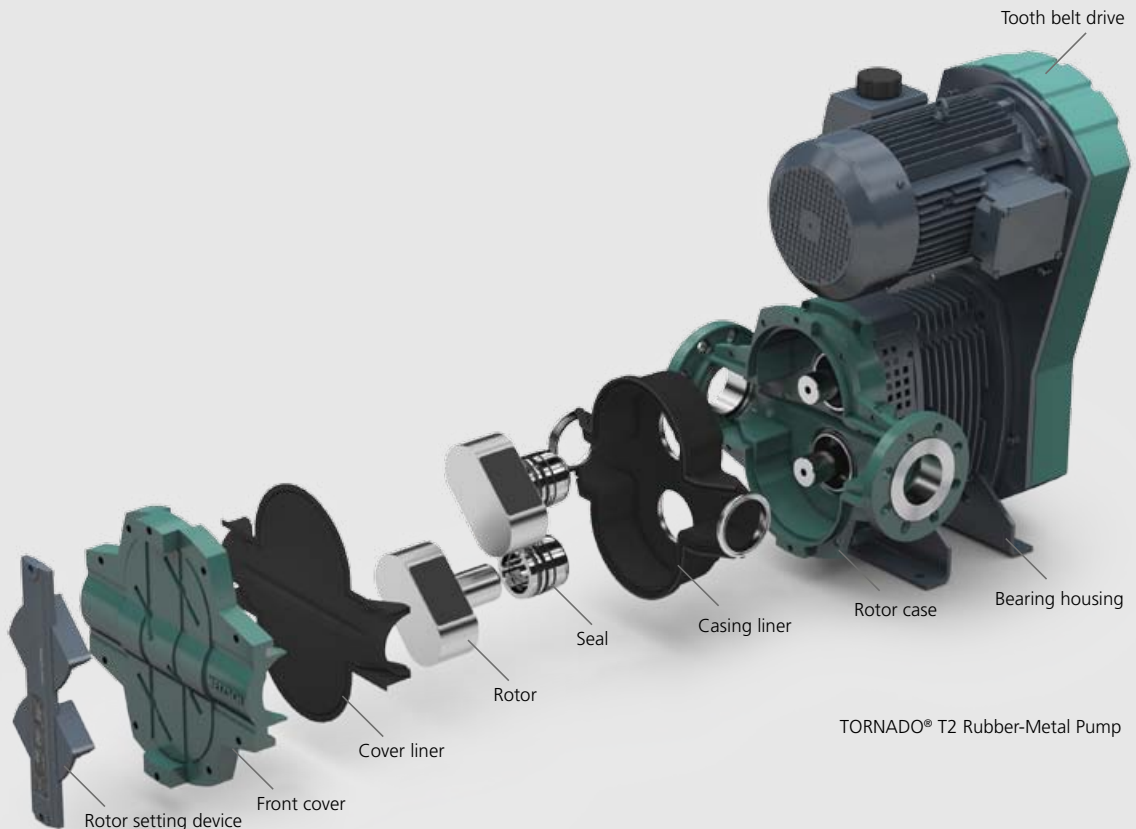
STABILITY

SAFETY

# Optimum choice of material – Your application is the decisive factor



Quickest assembly ever



TORNADO® T2 Rubber-Metal Pump

## Stability

### The best maintenance is no maintenance

Plastic deformation and heat generation is reduced by maintaining a uniform elastomeric wall thickness within the pump chamber. Material sections, bearing selection and seal positioning combine to minimize the adverse effects on dimensional changes to pump head geometry due to temperature changes.

The design and geometry of the rotors ensures a high level of durability. With the rotor fixing and drive outside of the pump chamber the rotors can have a completely flat continuous front and back face with no dead areas which eliminates the possibility

of fibrous material becoming trapped and compacted. The mechanical seal design and seal face position eliminates dead areas and allows constant circulation of the media around the faces which ensures that the risk of media entrapment and compaction is minimised.

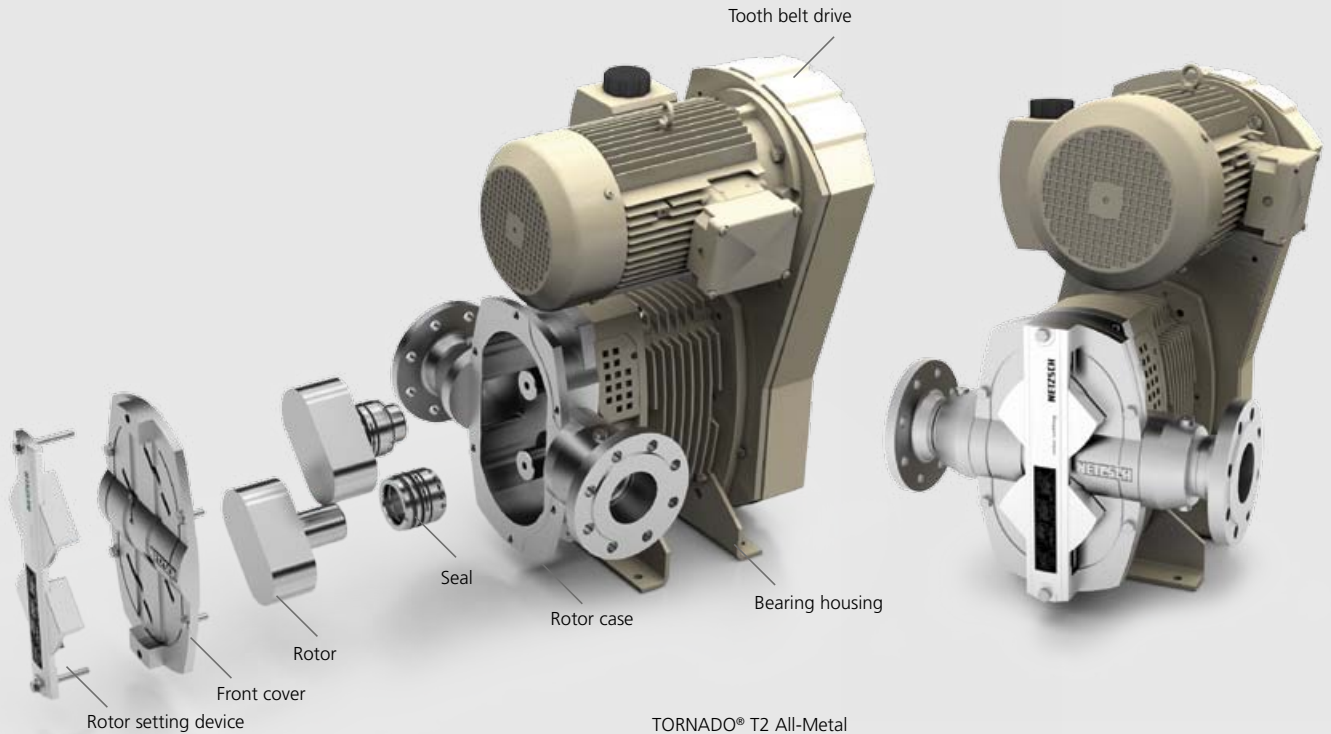
The TORNADO® T2 all metal pumps can be manufactured from metals offering higher levels of cleanliness, corrosion or abrasion resistance and can therefore be applied to applications demanding the characteristics of these materials, especially in the low sanitary hygienic or chemical market sectors.

## Cost-effectiveness

### The first Rotary Lobe Pump with an elastomer liner reduces life cycle costs (LCC)

For the first time in a rotary lobe pump an elastomer liner is used for all media wetted surfaces of the pump chamber, which is both easy to replace in the event of servicing and significantly less expensive than replacing wear plates and housing parts.

By the correct and most appropriate choice of mating materials and the optimum sizing of the pump head interface geometry, especially with the rubber-metal pump, friction resulting in heat can be minimised. This results in both an energy saving and a longer life for consumable spare parts.



TORNADO® T2 All-Metal

## Ease of service

### “Full Service In Place” instead of “Maintenance In Place”

Servicing a rotary lobe pump has never been so easy and all without the need for any special tools. The rotors can be removed and replaced very easily and quickly because they are not bolted or keyed to the shafts within the pump head but fixed with quick-fit non media wetted taper lock assemblies positioned and accessed outside of the pump head. The geometry of the rotors means that they can be fitted and removed independently. There are no keys dictating a unique rotor position which results in faster, easier and cleaner rotor removal and replacement and for

rotor synchronisation a setting device is included as an integral part of the pump front cover. Benefitting from all these features the service time for the TORNADO® T2 has been reduced to significantly less than half the time required for servicing a conventional rotary lobe pump. The pre-set cartridge mechanical seals are fitted directly into the rotor and mounted on the shafts as one assembly. There are various cartridge mechanical seals available all of which fit into a common housing allowing for seal upgrades without modification.

## Process optimisation

### Maximum reliability through design, material and range of mechanical seals

The revolutionary NETZSCH PRS (Pulsation Reduction System) guarantees an almost pulsation-free discharge that is of benefit in many process applications. Even when used in conjunction with straight bi-lobe rotors, which ensures better solid handling capability and easier maintenance, the NETZSCH PRS provides an almost pulsation-free flow which outperforms the characteristics of complex multi-lobe helical rotors.

The pump chamber and mechanical seal design and position eliminates dead areas, where pump media can collect and compact, making cleaning easier, either manually or by CIP.

# Surprisingly simple – The patented synchronisation of the TORNADO® T2 with a tooth belt drive

## Functioning principle

The drive motor transmits power via a double-sided tooth belt which both drives and synchronises the pump shafts. If required, the drive can be used in conjunction with a frequency converter to achieve a specific flowrate or range of flowrates.



Drive and Synchronisation



Single tooth belt drive

## Stability

### A new application of tried and tested drive technology

An accident causing a complete write-off is inconceivable with this pump. We have replaced the timing gears which have to operate in a managed, maintained environment, with a robust and durable synchronising tooth belt drive. This gives smoothness of operation, load dampening, reduced energy loss and eliminates the need for oil. No more oil filling, draining,

changing, leakages, spillage or disposal reduces down time and increases operation time and provides a cleaner, safer working environment. The simple design of the timing tooth belt drive system reduces down-time for service; the result is that the pump is back on stream in less time, and with less components the pump is less prone to problems.

## Environmental awareness

### TORNADO® T2 – the environment friendly pump

By incorporating a tooth belt drive the pump does not use any oil. There is no chance of any environmental pollution due to spillage or leakage. Our customers benefit from low noise levels and reduced heat in the working area around the pump which corresponds with less energy loss.

## Versatile combination – flexible installation – consistent pumping capacity



Both single and double tooth belt drive arrangements are available providing a wide range of speed reduction ratios.



If required a shaft extension for direct in line coupling to electric motor or diesel engine drive is available.



Power take off (PTO) shaft extension for drive from truck or tractor; twin shaft extensions available where reversible operation is required.

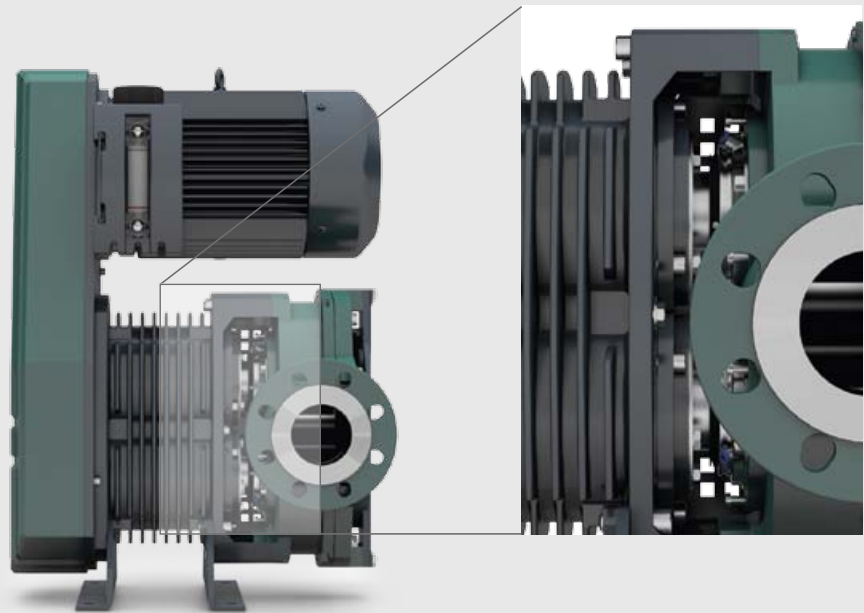
### Drive and design options

A range of drive and design options are available to suit specific application and process requirements. For more information see page 17.

# Optimum operation and process reliability and safety

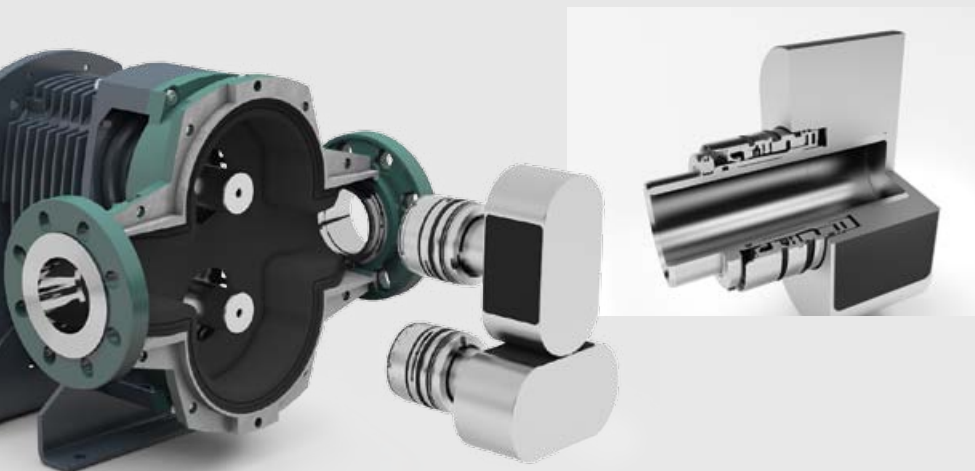
## From GSS<sup>1</sup> to BSS<sup>2</sup>

- No ingress of the media into the bearing housing in the event of seal failure
- Easy access to seal buffer/quench and barrier/flush connections
- Visual indicator of seal performance



<sup>1</sup> GSS = Gearbox Security System  
<sup>2</sup> BSS = Bearing Security System

## Design and position of mechanical seal: cartridge unit integral with rotor



- Uninterrupted and direct flow of media to and around seal faces
- Self draining, no dead areas
- No wear of shafts, the seal is mounted on an integrated rotor sleeve
- Easy assembly and disassembly

## Mechanical seal selection for TORNADO® T2

A pump is only as reliable as its seals. Therefore a range of seals and seal materials are available for the new TORNADO® T2. All seals are of a cartridge design and fit into a common

housing allowing for seal upgrades without modification. The seals are positioned with the seal faces directly in the flowpath through the pump chamber.

### Mechanical seal typically used for agricultural and environmental applications



Single

### Mechanical seal typically used for industrial and general process applications



Single



Single for buffer or quench



Double for barrier or flush

# The classic TORNADO® T1 with its proven quality

For more than a decade we have been supplying the classic design NETZSCH TORNADO® T1 rotary lobe pumps. Their extensive use in applications in the Environmental and Energy, Chemical, Pulp and Paper and Oil and Gas sectors for flow rates up to 1000 m<sup>3</sup>/h demonstrate their high performance. Pump size and specification are precisely tailored to suit the characteristics of the pumped media and the operating requirements. Three series with 12 models available provide for flow rates up to 1,000 m<sup>3</sup>/h at discharge pressures up to 6 bar for both intermittent and continuous operation. For higher discharge pressures customised solutions are available.

## Your benefits

- GSS<sup>1</sup> technology for long term reliability
- Maintenance without the need to disconnect the inlet and outlet pipework
- Easy and quick access to the lobes and shaft seals
- Tolerance of running dry
- Short delivery times – all manufacturing 'in-house', large stock of components

<sup>1</sup> Gearbox Security System



Series TORNADO® XLB

Series TORNADO® XB

Series TORNADO® MB

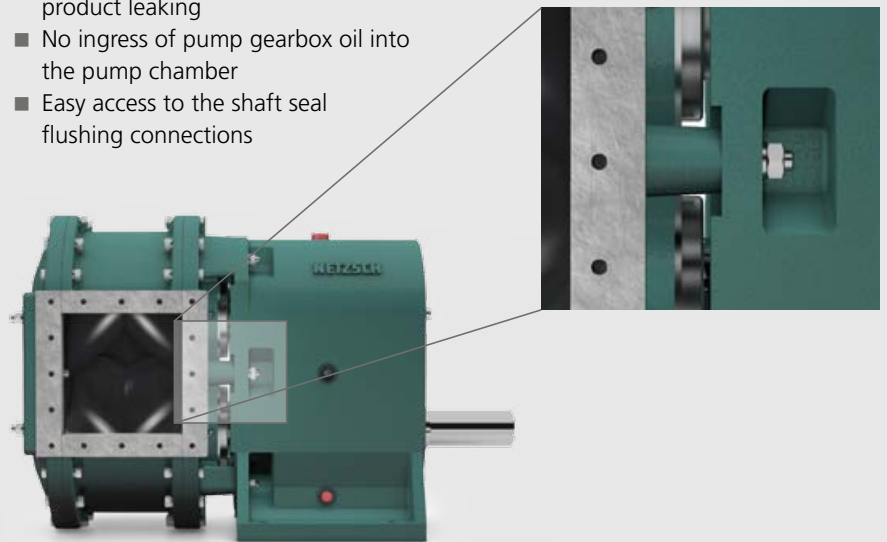


## NETZSCH GSS technology (GSS = Gearbox Security System) – Long-term reliability

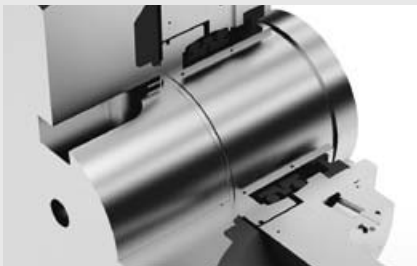
The classic TORNADO® T1 rotary lobe pump is of optimal design for each application based on the knowledge and experience gained by Netzsch over many decades of development, design, manufacture and supply of positive displacement pumps into all industries. This experience has founded the development of the NETZSCH GSS technology (Gearbox Security System), which significantly extends operational reliability by physically separating the pump chamber and gearbox.

### Your benefits

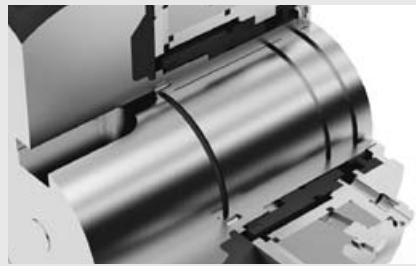
- Extended operational reliability
- No ingress of the pumped media into the pump gearbox in the event of a product leaking
- No ingress of pump gearbox oil into the pump chamber
- Easy access to the shaft seal flushing connections



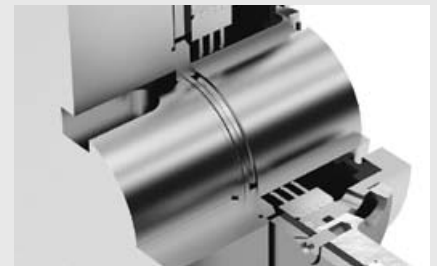
Seals are critical to satisfactory pump performance and the TORNADO® T1 is available with a range of highly engineered sealing solutions designed and selected to extend pump operating life.



Classic single acting seal

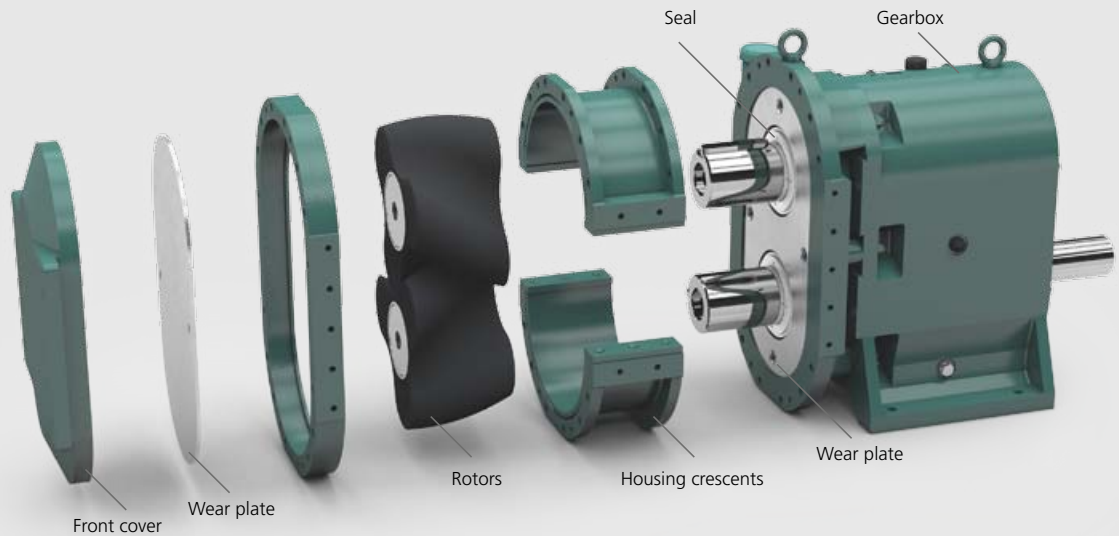


Single for buffer or quench for industrial applications



Special seal for demanding applications

# The design of the classic TORNADO® T1



## Front Cover

Rotors, cover seal and product seals can be accessed for inspection, service or replacement by simply removing the front cover. Disassembly of the inlet and outlet pipework and pump housing is not necessary.

## Wear Plates

Abrasion and chemically resistant, replaceable wear plates are fitted both sides of the rotors.

## Rotors

Straight sided or helical rotors are selected to suit individual application requirements. Rotors are available as bi-lobe, tri-lobe or four-lobe and a wide range of materials is available.

## Housing Crescents

Modular construction allows for the crescents to be simply replaced should wear occur. Pump life time can be further extended with the option of replaceable crescent liners.

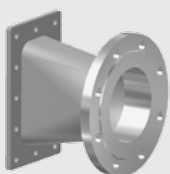
## Seals

Wide range of product seals and materials are available, which are selected to suit individual application requirements. Seal arrangements include easy access connections for seal quench or flush.

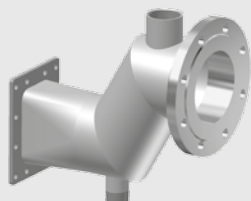
## Gearbox

The patented gearbox design includes NETZSCH GSS-Technology separating the pump head from the gear box which eliminates cross contamination between the pump media and gear box lubricant.

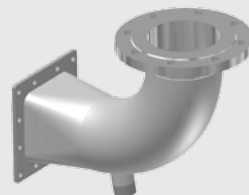
**Pump inlet and outlet adaptors for connection to installation pipework are available in various designs**



Straight adaptor



S-shaped adaptor



Elbow (90° upwards) adaptor

## Connection options

Adaptors designed to suit specific installations available on request