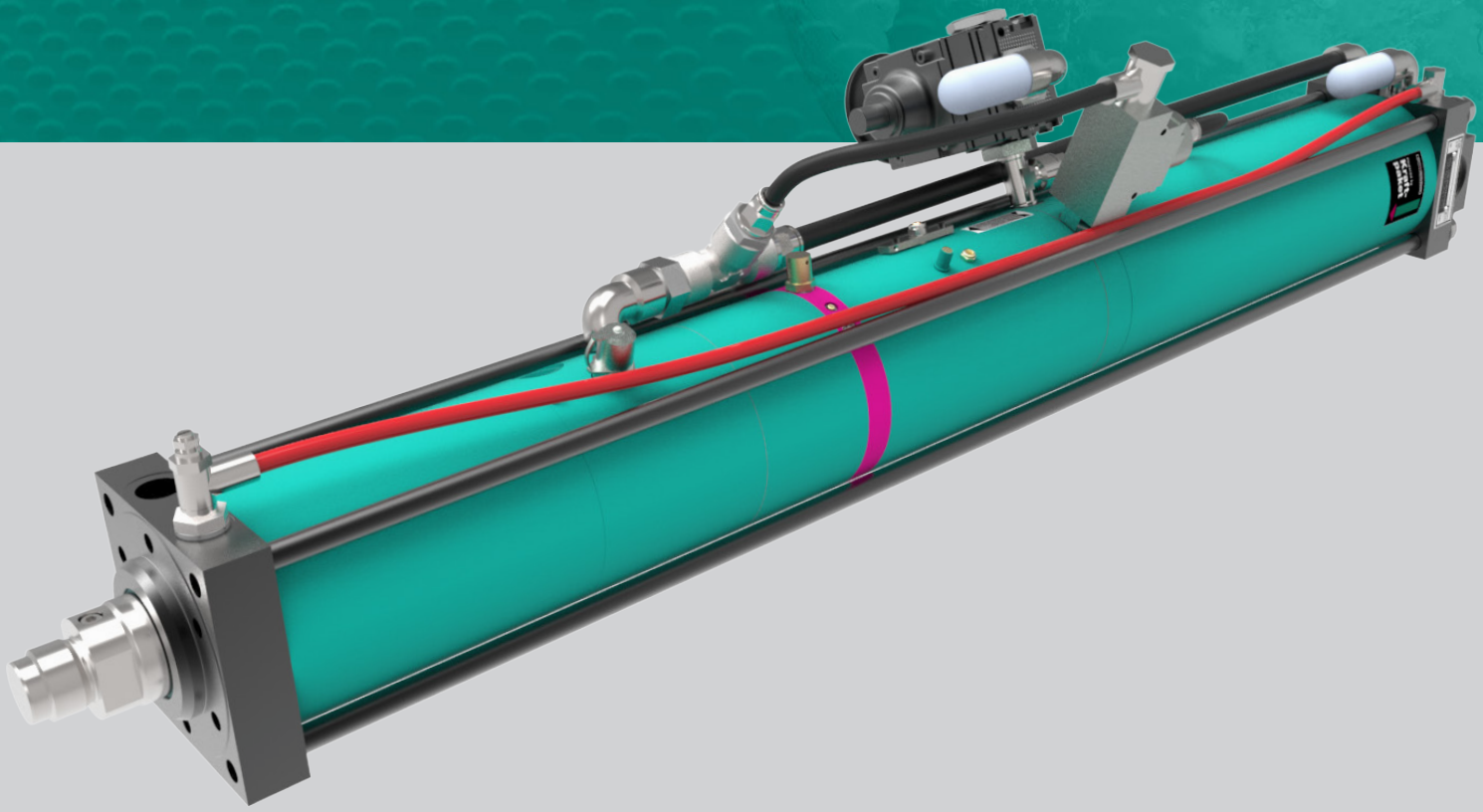
TOX® PRESSOTECHNIK

TOX®-Powerpackage

Pneumohydraulic drives
with press forces of 2 – 2000 kN



Optimum pressure for forces of 2 – 2000 kN

TOX®-Powerpackage – the pneumatic cylinder with integrated oil system and automatically activated power stroke. Our technology combines pneumatics and hydraulics to your advantage.

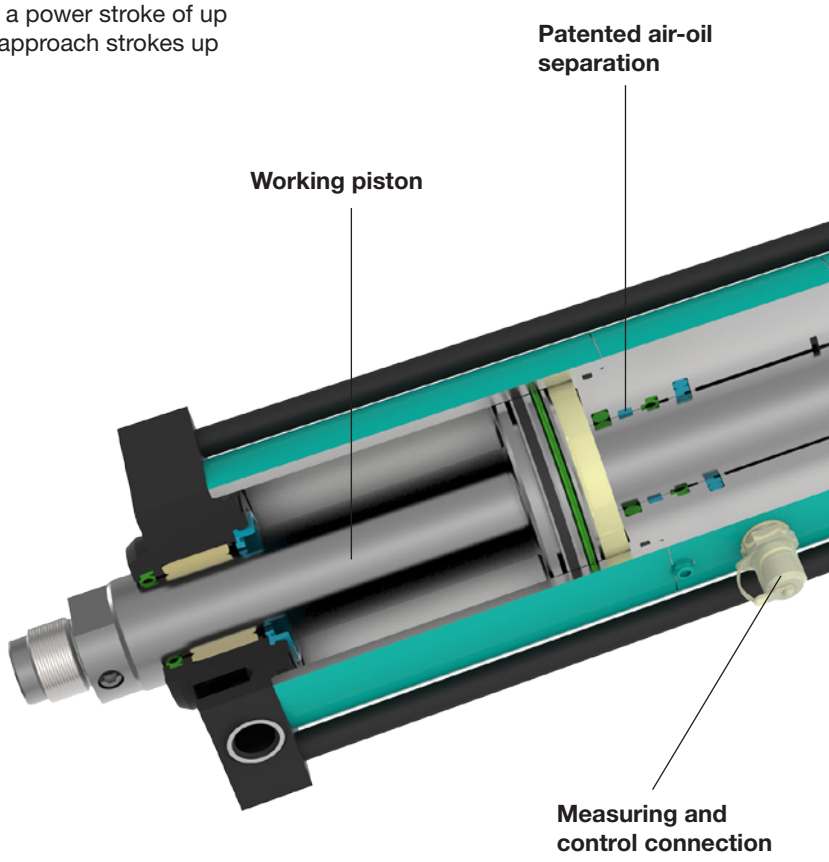
The TOX®-Powerpackage works purely pneumatically, but with integrated hydraulics. It is to be controlled like a normal, double acting pneumatic cylinder.

The simple design with few moving parts ensures high wear resistance and a long service life. The low impact forces of the fast approach protect the tools and reduce the noise level.

The low energy throughput in the unit causes a drastic increase of the speed for the smallest terminal and valve cross-sections. This saves cost and space also for the installation.

Unrivalled quality
The pneumohydraulic TOX®-Powerpackage impresses compared to mechanical drives, knee lever systems, hydraulic drive systems or large-volume pneumatic cylinders with its high power density, flexibility and simplicity.

Application:
Any applications requiring forces from 2 – 2000 kN and a power stroke of up to 80 mm, with approach strokes up to 400 mm.



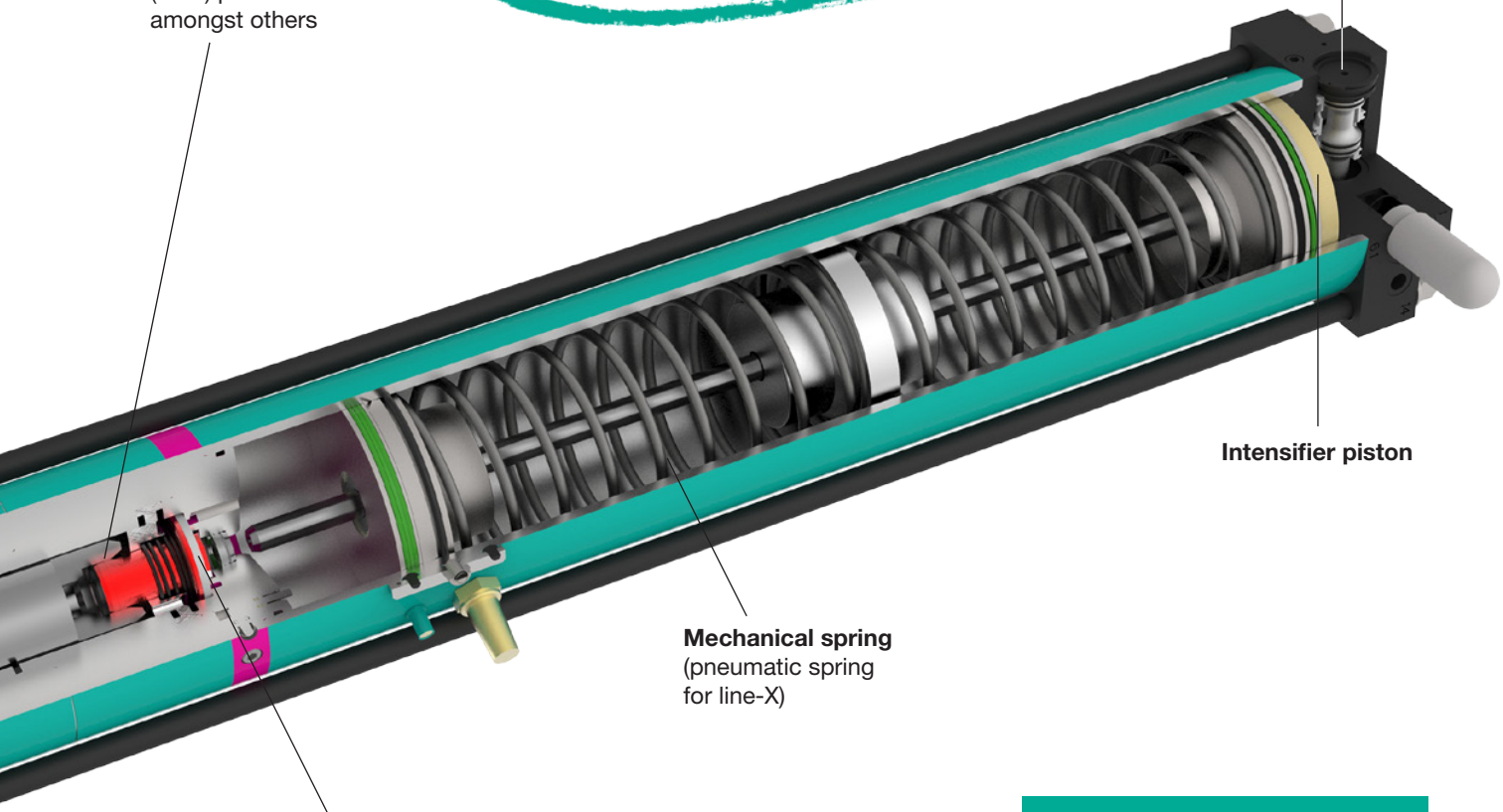
The special TOX® benefits

+ Reliable service worldwide
+ Comprehensive experience with different applications in different industries (automotive and supply industry, white goods industry, medical technology and many more)
+ TOX® PRESSOTECHNIK is your active partner – from planning to operation of the system
+ Support for commissioning and process optimization
+ Training at the customer's premises or at TOX® PRESSOTECHNIK
+ Remote service possible
+ Calibration and repair service

+ High stroke frequency
+ Long service life
+ Low energy consumption
+ Low noise level
+ Low maintenance costs

Hydraulic end position damping (ZHD) protects the tool amongst others

Power stroke valve



Intensifier piston

Mechanical spring (pneumatic spring for line-X)

Centrally patented power bypass (ZLB) prevents negative pressure in the oil system, which can occur during punching or during high stroke speeds (Standard for line-Q and line-X).

Power for daily use
The TOX®-Powerpackage is a complete drive system. With its various designs and comprehensive accessories it is universally applicable. In most cases it can be used without external tool guidance. It can also be installed in any position.

Ideal for powerful use in various technical applications


Clinching, joining TOX®-Sheet Metal Joining System


Installing, pressing in


Stamping in, pressing in (of functional elements)


Riveting, caulking, beading over


Punching, piercing


Coining, marking


Tightening, clamping, caulking


Pressing, compressing

The complete, pneumohydraulic drive family

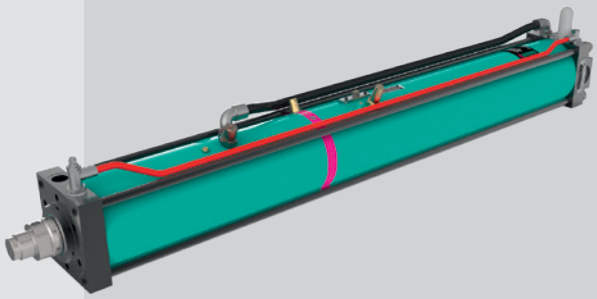
Design S (standard)

The preferential series line-Q

+ Collection of most common standard sizes
+ Shortest delivery times
+ Attractive price

Press forces: 10–300 kN
Total stroke: up to 200 mm
Power stroke: up to 52 mm
Air pressure: 2 - 6 bar

line Q



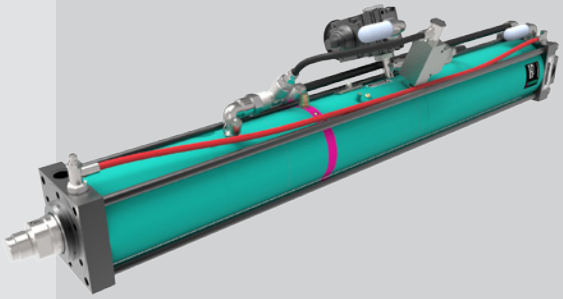
Type Q-S

The series line-X

+ Highest variability
+ 100% suitable for the application
+ Precisely controllable and adjustable
+ High stroke speeds

Press forces: 11–1727 kN
Total stroke: up to 400 mm
Power stroke: up to 69 mm
Air pressure: 2 - 6 bar

line X

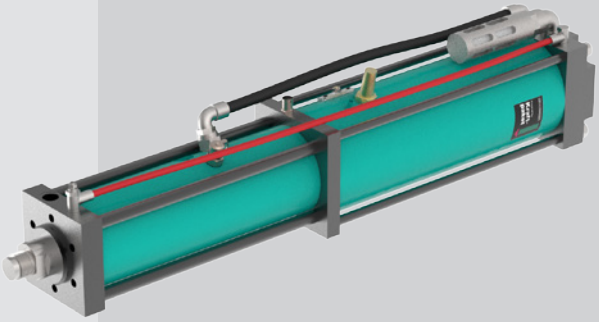


Type X-S

Special types

+ Leave nothing to be desired
+ Complete range of types
+ All accessories adaptable

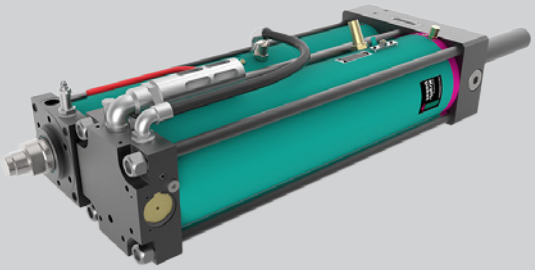
Press forces: 2–1740 kN
Total stroke: up to 400 mm
Power stroke: up to 80 mm
Air pressure: 2 - 10 bar



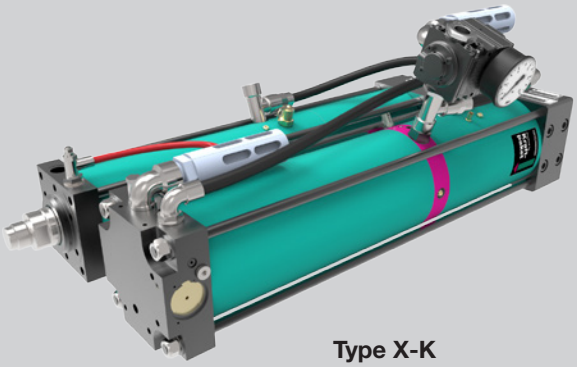
Type S

Design K (compact)

TOX®-Warranty:
10 million strokes
within
12 months!



Type Q-K

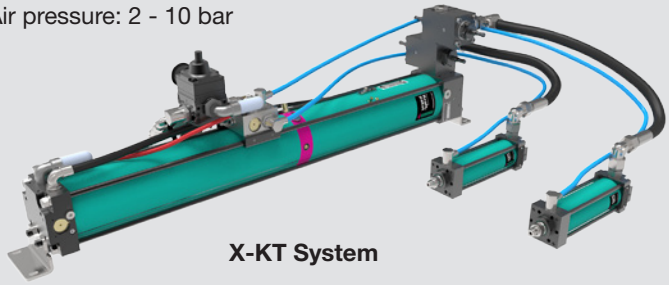


Type X-K

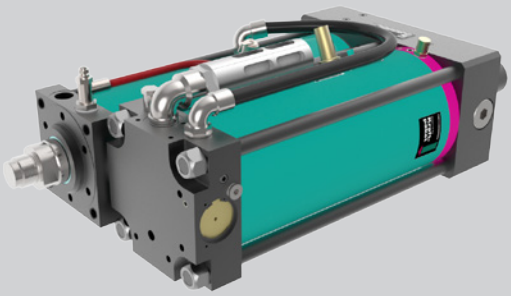
X-KT System

+ With separate intensifier for several working parts
+ For long power strokes
+ Working parts can be activated individually

Press forces: 2–2000 kN
Total stroke: up to 400 mm
Power stroke: up to 400 mm
Air pressure: 2 - 10 bar



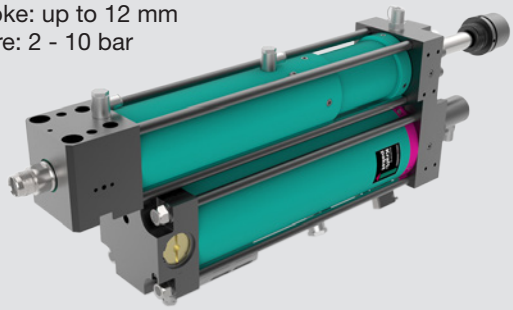
X-KT System



Type K

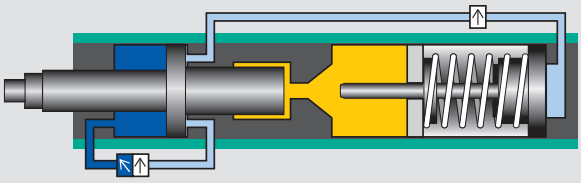
Type RP (marking cylinder)
Type P/VH (spot welding cylinder)
Type RZS/RZK/RZH (robot tongs cylinder)

Press forces: 2–80 kN
Total stroke: up to 200 mm
Power stroke: up to 12 mm
Air pressure: 2 - 10 bar

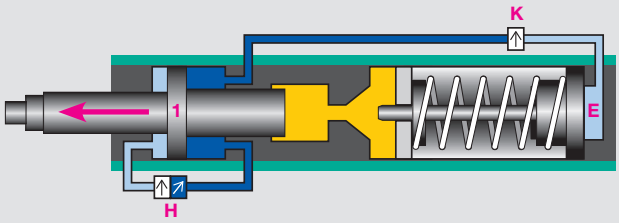


Functional principle

Original position

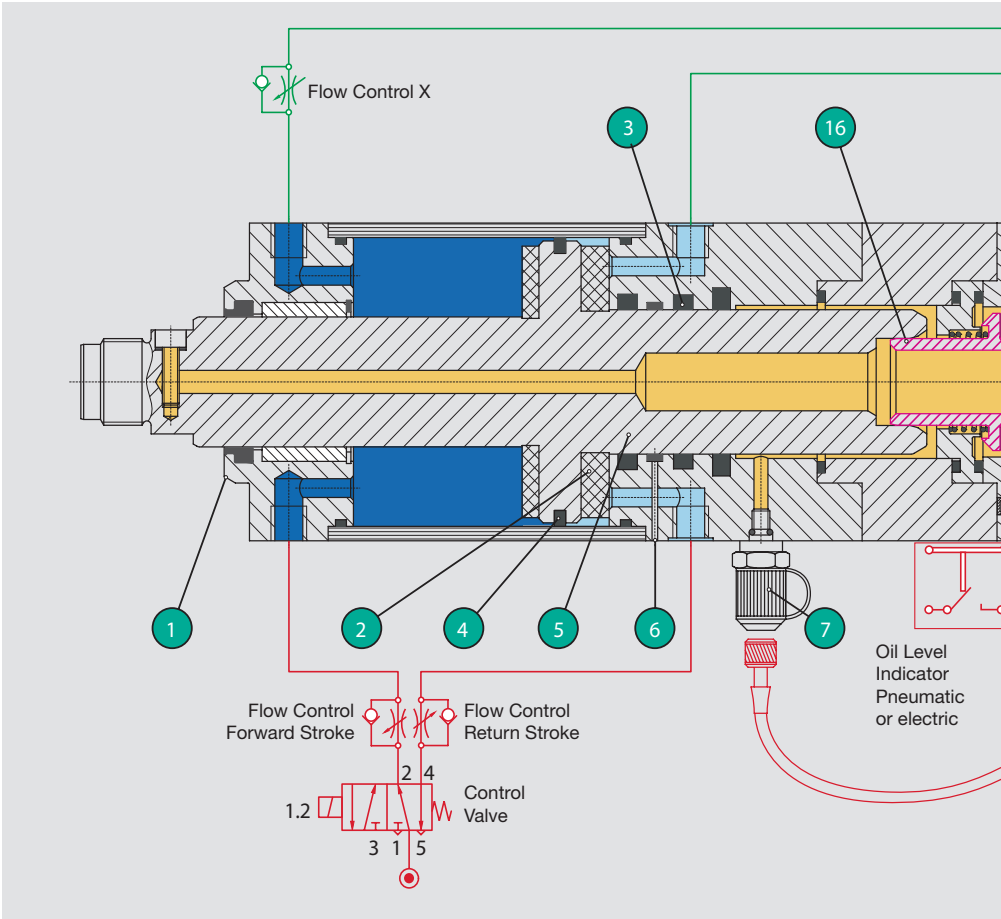


Fast approach



Air-operated **fast approach**: The main control valve (**H**) is switched. The working piston (**1**) extends in fast approach, until it meets resistance at any point. It stops and the power stroke valve (**K**) switches. Air now streams into the chamber (**E**).

Developed to the smallest detail
The TOX®-Powerpackage has been improved over many decades. But the ingeniously simple basic principle has always remained the same!



1. The TOX®-Powerpackage is attached by means of the **flange** with custom-fit collar and simple mounting option.

2. The end positions of the moveable pistons are equipped with durable **damping elements**: The key to smooth running at the highest stroke frequency.

3. All **sealing components** have been optimized in comprehensive long-term tests.

4. Special **seals** enable operation with oil-free air.

5. **Double supported working piston**
The TOX®-Powerpackage is powerful with high forces and at the same time smallest dimensions, only comparable with large hydraulic units and cylinders.

6. Absolute **separation of oil and air** with two seals and annular groove in-between vented to the atmosphere. These prevent the “mixing” of air into the oil.

7. **High-pressure measuring and control connection** for optional subsequent functions:
   - Press force control
   - Mains pressure monitoring
   - Manometer
   - Welding current connection with guaranteed press force

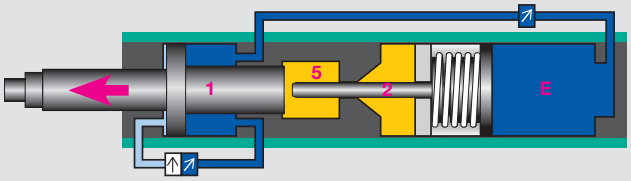
8. **Oil level indicator** (accessories) for pneumatic and electrical monitoring, also with remote control.

9. **Oil refilling nipple**

10. **Permanent pressure oil reservoir** for long-term refilling intervals.

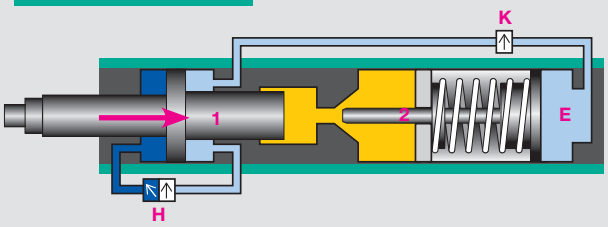
Operates like a pneumatic cylinder, with the power of a hydraulic cylinder!

Power stroke

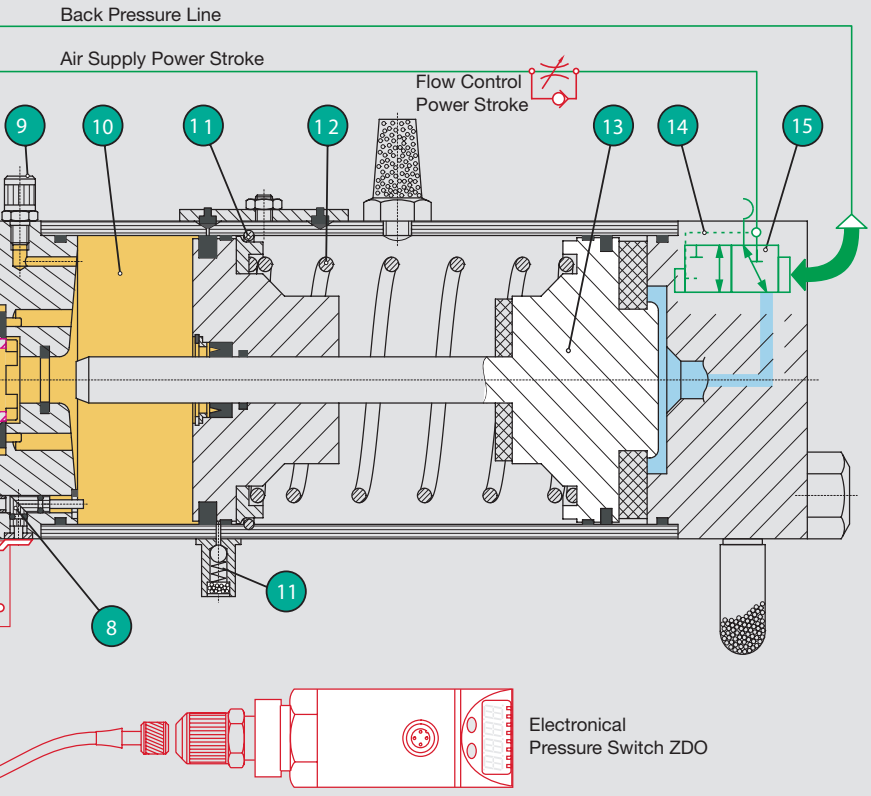


Pneumohydraulic **power stroke**: The intensifier piston (**2**) closes the high pressure chamber (**5**) and increases the oil pressure in the working area to up to 400 bar. This oil pressure acts on the rear of the working piston (**1**) and triggers the power stroke.

Return stroke



Return stroke: After switching of the main control valve (**H**), the power stroke valve (**K**) vents the chamber (**E**) automatically. The intensifier piston (**2**) is pressed back by spring force and the working piston (**1**) returns to the original position pneumatically.



Red: Optional accessoires

11 Patented **anti-overfill system** prevents the oil reservoir from overfilling. If too much oil is filled in, it can drain off through a check valve.

12 **Mechanical spring** has two functions:
- Reset of the intensifier piston
- Generation of pressure on the reservoir. This means the oil in the reservoir is under constant pressure without the TOX®-Powerpackage being connected pneumatically, ensuring operation in every installation position, e.g. on the industrial robot also.

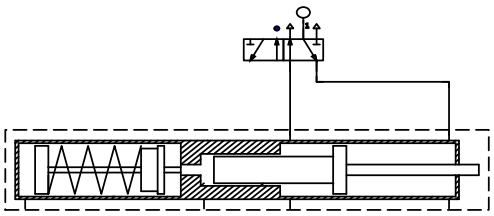
13 The **intensifier piston** generates the force during the power stroke. It is single-acting and is equipped with a spring reset, thus saving 85% of the energy of a double-acting cylinder in the power stroke.

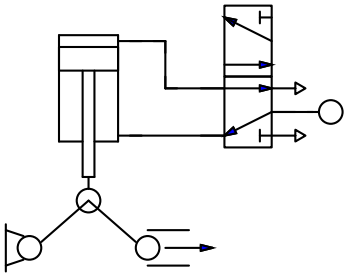
14 **Power stroke valve**
The automatic switch from fast approach to power stroke occurs when the working piston meets resistance at any point of the stroke. The valve is connected to the return stroke chamber and functions according to the dynamic pressure procedure. The changeover time is controlled with the control throttle X.

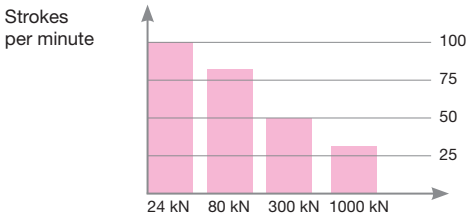
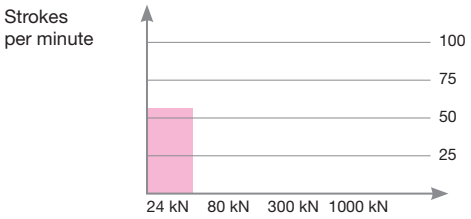
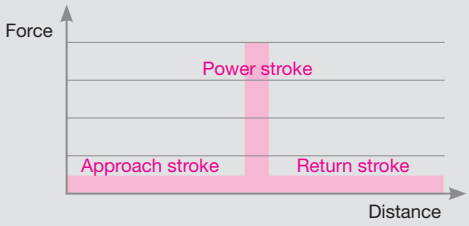
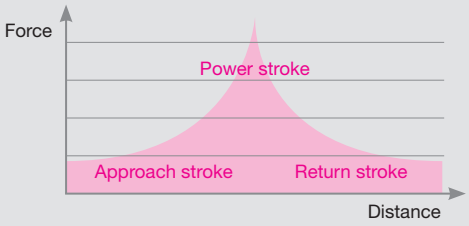
15 The complete **control** is either mounted or has been integrated into the flange for an even more compact design. The TOX®-Powerpackage is controlled like any double-acting pneumatic cylinder with a 4/2- or a 5/2-way directional valve.

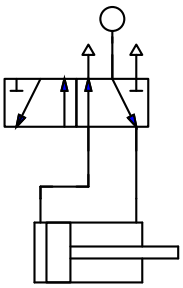
16 **End position damping**
The TOX®-Powerpackages line-Q and line-X as well as the special types S (from size S 4) are equipped with a patented, integrated, hydraulic end position damping. This guarantees optimum damping in the return stroke – especially in case of applications with high tool weight.

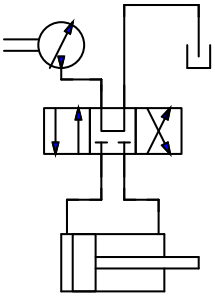
Comparison of drive systems

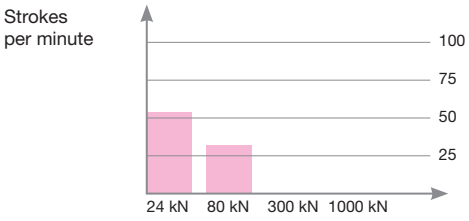
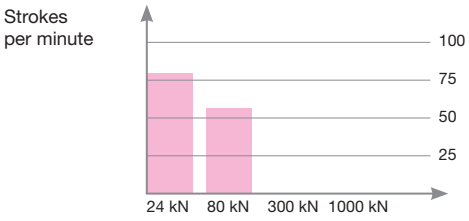
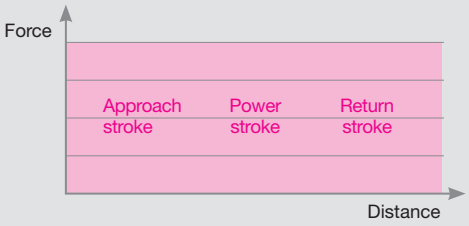
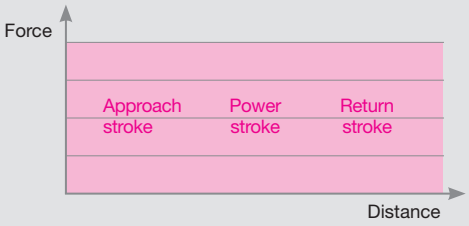




	Pneumohydraulic TOX®-Powerpackage	Toggle with pneumatic cylinder
Speed		
Force output		
Maintenance	+ Minimal wear + Easy to replace in case of repair + Seals last many millions of cycles + If “Lack of oil” is displayed, a small amount of oil needs to be refilled	+ Bearing wear and bearing play + Complex installation + Large valve cross sections and pneumatic connections + Work output and quality deteriorates in time.
Quality	+ Separate control of speed and force for each stroke + Low tool wear due to soft touchdown + Force control by means of oil pressure switch and manometer + Automatic power stroke connection + Workpiece tolerances are compensated + No setup work required for tool replacement or tool grinding + Working piston with double bearing for solid and precise guidance	+ Soft touchdown in case of properly configured tool with increase in force + The force increases progressively, cannot be controlled and is travel-dependent + Component differences have a large impact (excess power can destroy the component) + Complex configuration tasks are required + Separate guidance of the working knee lever is required
Flexibility	The drive systems are available in various stroke lengths. In special cases, the drive can operate power strokes repeatedly to achieve a longer total power stroke.	The stroke is constant, there are no options.
Environment	+ Can meet clean room conditions + Very low noise level + Low exhaust noise due to low air consumption.	+ Can meet clean room conditions only partially + Very low noise level + Low exhaust noise due to low air consumption.
Note	Large installation length for long power strokes. If this is required, select the divided version (TOX®-Powerpackage X-KT-System).	Ultimate power requires very largely dimensioned machine/press frame.





Large volume pneumatic cylinder	Complex hydraulic system	
		**Speed**
		**Force output**
+ Little wear + Very large design + Large valve cross sections G 1	+ Contamination of the system requires cleaning work + Complex installation of pipes, power unit and control + Oil and filter changes regularly required + Risk of oil leakage	**Maintenance**
+ Hard touchdown of the tool on the workpiece with full force + Force and speed of the forward and return stroke can be controlled, but not the power stroke + Force always present + Workpiece tolerances not important – thus no setup work	+ Touchdown of the tool on the workpiece with full force (can only be prevented at additional cost) + The speed of forward stroke and return stroke can be controlled + Force can be controlled by means of oil pressure switch or manometer + Force always present + Workpiece tolerances are compensated + Relatively poor guidance of the hydraulic cylinder piston	**Quality**
Power stroke present at any time and for any length.	Power stroke present at any time and for any length.	**Flexibility**
+ High energy consumption + Loud exhaust noise due to large air consumption	+ Oil disposal + Contamination + Permanent noise of the oil pump + Heating of the environment by the oil pump	**Environment**
Large installation dimension.	High energy consumption and high degree of contamination.	**Note**

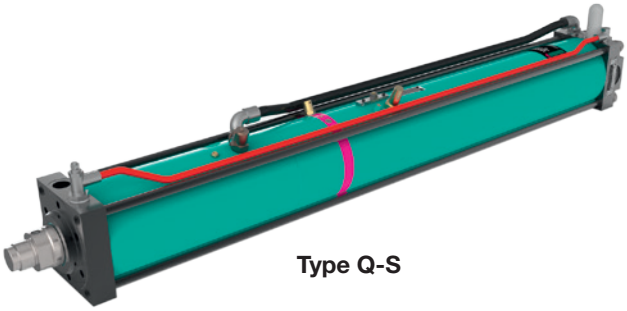
TOX®-Powerpackage line-Q

line Q

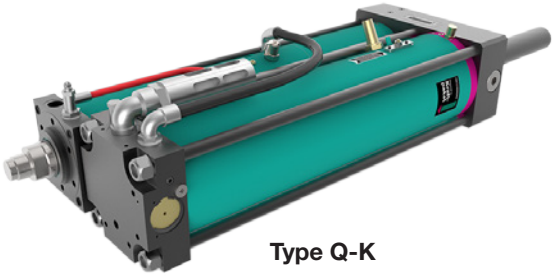
The line-Q drives provide all advantages of the TOX®-Powerpackages. They are available in two designs: as straight, slim type Q-S and as compact drive Q-K. This preferential series is available in most standard sizes and can thus be delivered quickly. Adding to this is an attractive pricing.

The series line-Q has a mechanical spring for initial tension of the reservoir piston and is equipped with hydraulic end position damping and power bypass as standard. Furthermore, this series is prepared for the stroke monitoring (ZHU).

Technical details:
+ Central power bypass ZLB
+ Hydraulic end position damping (ZHD)
+ Fixed stop with elastomer damping in the approach stroke FUD
+ Prepared for stroke monitoring ZHU and external linear position sensor ZHW



Type Q-S



Type Q-K

Advantages

+ Standard sizes always available
+ Short delivery times
+ Economical
+ Minimum air consumption
+ Medium maintenance interval

TOX®-Powerpackage line-X

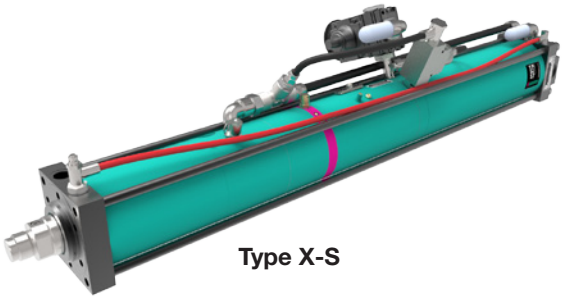
line X

The drives of the line-X series can be individually adapted to your requirements. They are equipped with the power bypass as standard, but a pneumatic spring is used instead of the mechanical spring for the return stroke.

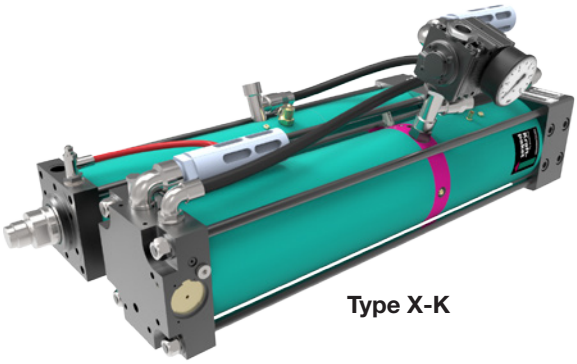
The line-X series is available in two design versions: As slim type X-S and as compact drive X-K.

Optional control versions like pressure regulator in the power stroke line, external power stroke connection or external power stroke release are possible.

Technical details:
+ Central power bypass ZLB
+ Hydraulic end position damping (ZHD)
+ Fixed stop with elastomer damping
+ Prepared for stroke monitoring ZHU and external linear position sensor ZHW
+ Type X-K with patented ring buffer version on the intensifier for significantly shortened installation length



Type X-S



Type X-K

The drives are equipped with pneumatic spring, fast stroke support and power stroke valve. Three pneumatic connections for the forward stroke, return stroke and pneumatic spring are required. This achieves increased approach strokes and maximum stroke speeds as well as extremely long maintenance intervals.

Advantages

+ Maximum diversity and equipment
+ Individually adaptable
+ Maximum speed
+ Long maintenance intervals

TOX®-Powerpackage X-KT-System
The pneumohydraulic aggregat with remote working cylinder

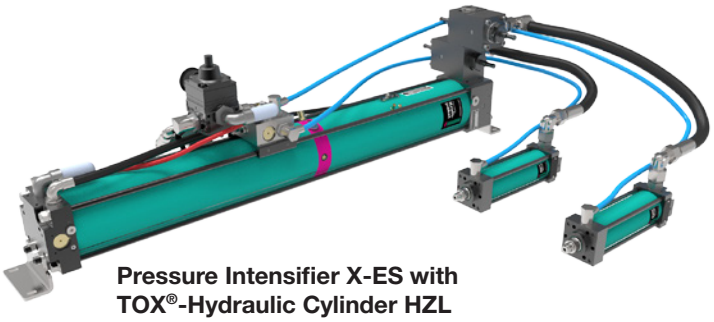
line X

The TOX®-X-KT-System consists of the pressure intensifier X-ES and one or more working cylinders. Depending on press force, installation dimensions and cycle time, it is tailored to customer requirements.

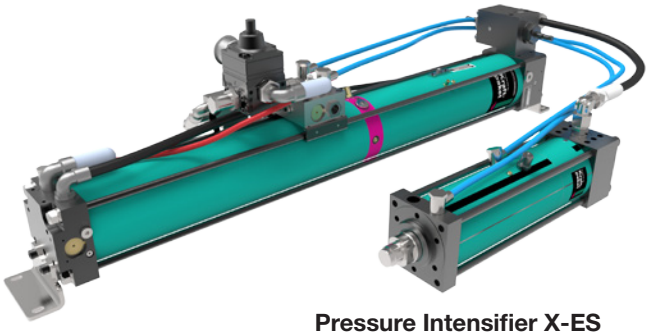
Either TOX®-Hydraulic Cylinders HZL or pneumatic TOX®-Working Parts X-AT are used.

Advantages of the HZL
+ Short designs
+ Working piston with simple bearing
+ Absolute air-oil separation
+ Fixed stop in approach stroke (elastomer cushioning optional)
+ Options: Stroke monitoring ZHU and linear position sensor ZKW
+ Cost-effective drive solution

Advantages of the X-AT
+ High approach and return stroke forces
+ Short cycle times
+ Fixed stop with elastomer damping in the approach stroke
+ Prepared for stroke monitoring ZHU and external linear position sensor ZHW
+ All sizes with bypass ZLB incl. hydraulic end position damping ZHD



Pressure Intensifier X-ES with TOX®-Hydraulic Cylinder HZL



Pressure Intensifier X-ES with TOX®-Working Part X-AT

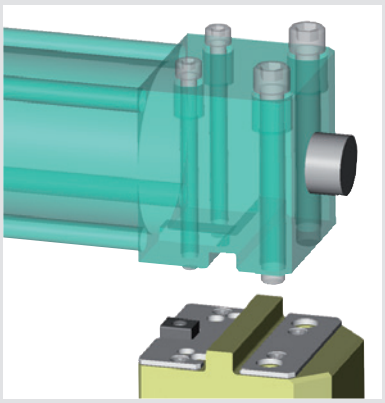
Advantages

+ Compact installation dimensions
+ Long power strokes
+ Simple control
+ Maximum diversity and equipment
+ Modular concept

Technical details:
+ Use up to 6 working parts per pressure intensifier
+ Optimum system separation by TOX®-Hydrosplit Coupling
+ Easy colour-guided pneumatic plug-in-system

TOX®-Powerpackage RZK, RZS, RZH specifically for robot tongs

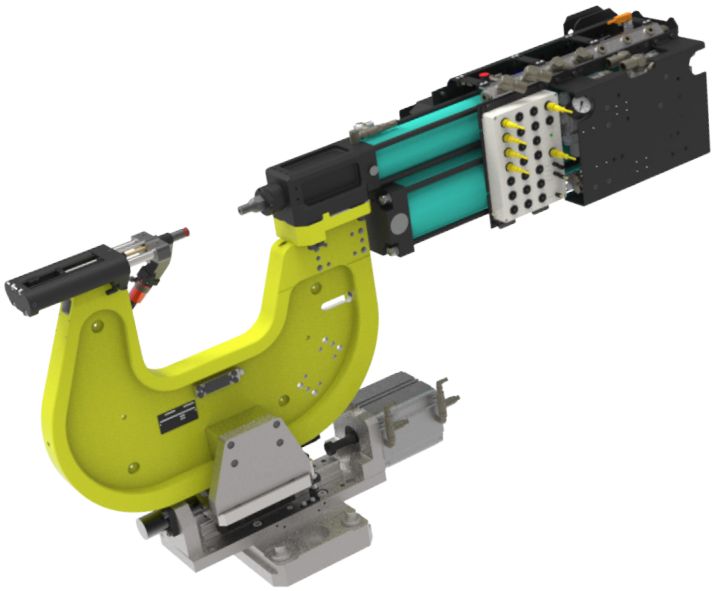
The TOX®-Powerpackages RZ are for applications on tongs. These drives can be precisely adjusted with a special flange and thus enable highest precision and production quality.



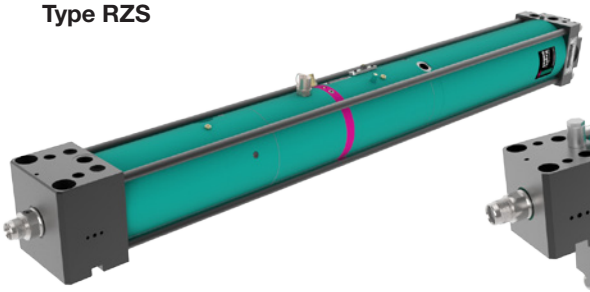
Precise flange connection
The drive can be precisely aligned in both directions vertically to the stroke direction with custom-fit grooves on the TOX®-Powerpackage type RZ. The height and position of the drive can be adjusted with shims and the sliding block on the mounting surface.

Advantages

+ Simple and accurate adjustment of tongs due to special flange
+ Short cycle times
+ Maximum maintenance intervals

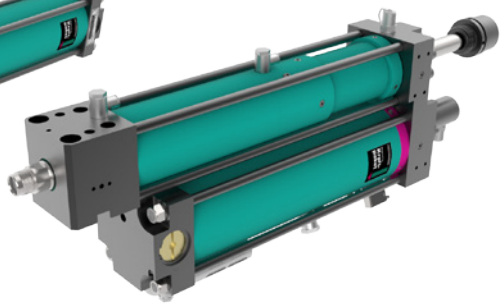


Type RZS



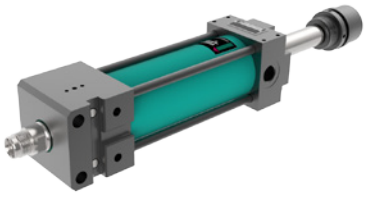
Powerpackage type RZS
+ Long design
+ With pneumatic spring
+ High stroke rates and short cycle times
+ Cost-effective

Type RZK



Powerpackage type RZK
+ Compact design
+ With pneumatic spring
+ High stroke rates and short cycle times
+ Stroke lengths standardized for TOX®-TZ Tongs
+ Integrated total stroke adjustment

Type RZHL / RZHO



Powerpackage type RZHL / RZHO
+ Compact
+ Working cylinder for combination with pressure intensifier X-ES
+ With special flange for TOX®-TZ Tongs
+ High stroke rates and short cycle times

Special types S, K, T and RP

The TOX®-Powerpackage – completely individually. These versions leave nothing to be desired – almost everything can be achieved.

Series S can be equipped with a power stroke adjustment, series K with a total stroke adjustment.

With the power stroke adjustment, the length of the power stroke can be set independent of the length of the total stroke. Application example: Coining of numbers with always the same coining depth at different workpiece heights.

With the total stroke adjustment the total stroke can be continuously set. This is ideal for any forming and joining applications e.g. use of tools without end stop.

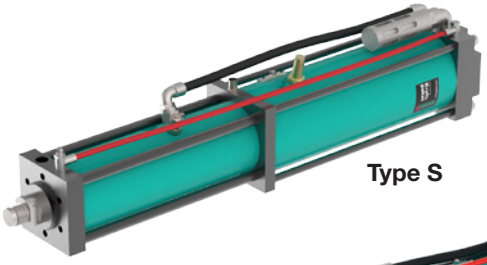
For all designs, the mounting flange and air connection can also be supplied assembled in mixed up order. Starting with both designs, special versions are possible, e. g. Z-shape or customer-specific assemblies.

Technical details:
+ Individual stroke lengths, press forces and dimensions possible
+ Optionally with pneumatic or mechanical spring
+ Available as 6 bar and 10 bar drives
+ All accessories available

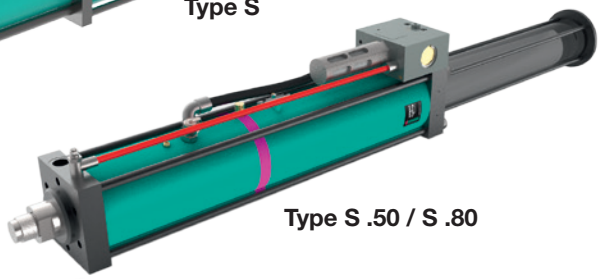
Special applications usually require individual solutions. Whether it has to be extremely fast or powerful or with stamping tool – the TOX®-Powerpackage is so adaptable that almost anything is possible.

Advantages

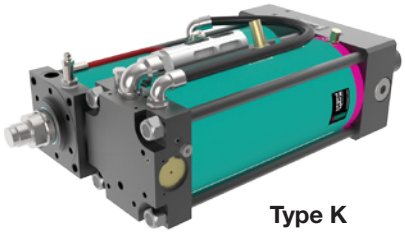
+ Only power stroke
+ With pneumatic spring
+ Also available as 10 bar version



Type S



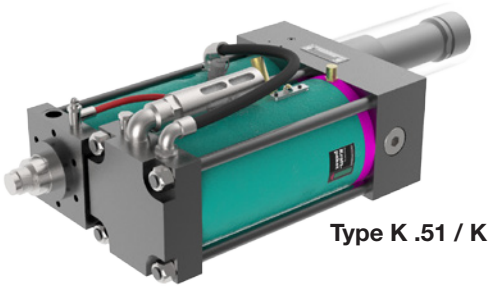
Type S .50 / S .80



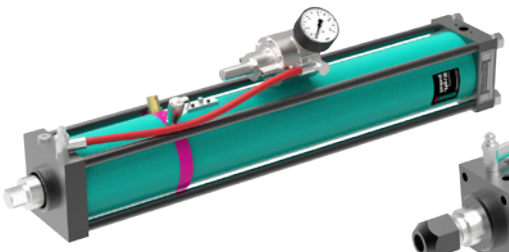
Type K

Advantages

+ Maximum diversity and equipment
+ All parameters freely determinable
+ Special designs possible

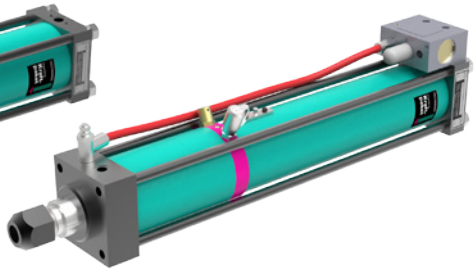


Type K .51 / K .81



Type T
High-speed turbo cylinder

+ Only power strokes
+ Thus up to 550 strokes/min
+ With pneumatic spring and integrated power bypass
+ Constant press force
+ Compressed air: up to 10 bar



Type RP
For the coining and labelling of workpieces.

+ With anti-rotation device
+ With clamping chuck for tool holding fixture
+ Setting of coining depth
+ With pneumatic spring
+ Compressed air: up to 10 bar

Stroke controls and damping

Stroke controls

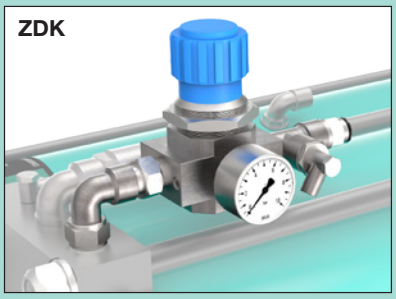
There are various ways to adapt the stroke of a TOX®-Powerpackage to individual requirements. We provide the following control units.

The **pressure regulator of the power stroke line ZDK** enables individual adaptation of the press force by means of a manual pressure valve. The pressure valve can also be installed further away (e.g. in the switch cabinet).

The **external power stroke activation ZKHZ** enables the activation of the power stroke valve by means of an electrically actuated valve. This is recommended for travel-dependent power stroke connection, usage with upwards piston rod and high tool weight, or for application-related interrupted fast approach stroke.

With the power stroke deactivation ZKHD, the power stroke can be deactivated through an electrical signal (e.g. during setup mode).

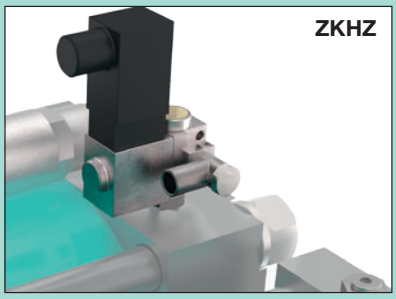
ZDK



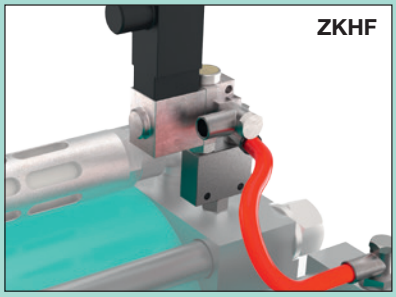
With the **external power stroke release ZKHF** it is possible to additionally release the activation of the power stroke valve by means of dynamic pressure control with an electrical signal.

The Stroke frequency optimization ZHO is an optional additional assembly for improving the cycle time (time gained approx. 20%) and replaces the existing power stroke valve with one of the next size.

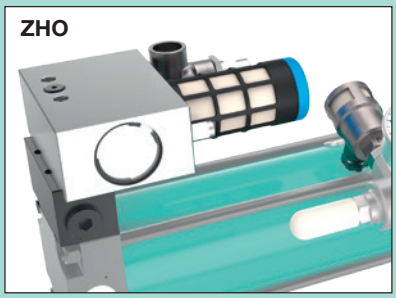
ZKHZ



ZKHF

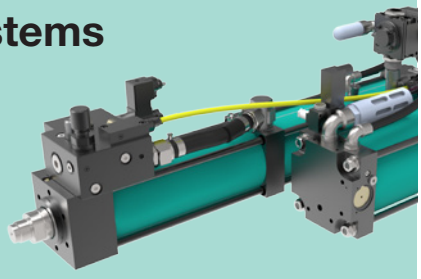


ZHO

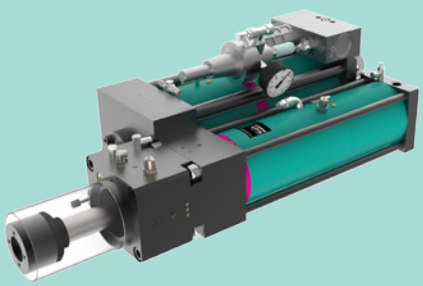


Stroke damping systems

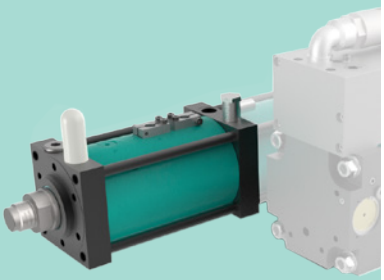
With the **stroke damping ZED**, the speed of the working piston can be controlled across the entire stroke. This is useful for pressing applications to avoid the stick-slip-effect. The damping ensures a gentle approach to the workpiece, good pressing results, noise reduction, and avoids high mechanical stresses.



The **cutting impact damping ZSD** dampens the working piston when the counterforce ceases, like for example during punching applications. As purely mechanical damping it can also be used as stroke damping with limitations.



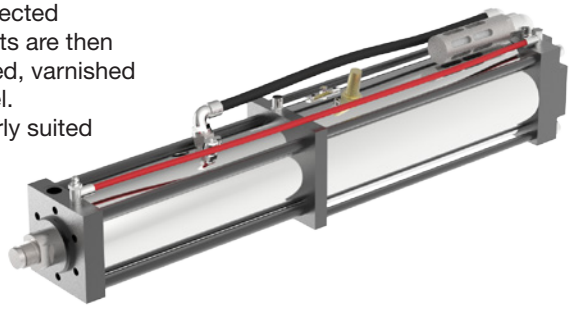
Safety rod catcher “Safety Lock” ZSL
Takes effect in case of pressure loss and prevents the working piston from lowering and extending. It works with mechanical clamping jaws and can only be released again through application of pressure. The safety rod catcher is certified by the professional association.



Special versions

Version for usage in the food industry (ZLM)
All TOX®-Powerpackages can be filled with food grade oil and grease (both USDA-H11 approved). These units are suited to usage in the food, pharmaceutical and cosmetics industry, where contact with the lubricant cannot be avoided technically.

Rust-protected versions (ZRO)
If desired, the TOX®-Powerpackages are available as rust-protected version. All individual parts are then chrome-plated, galvanized, varnished or made of stainless steel.
These units are particularly suited to usage in the food and packaging industry.



Regulated powerstroke ZKPr

Precise control
This TOX®-Powerpackage enables precise processes due to its perfect regulation of the power stroke.

The regulated powerstroke control servo can be used for the following types of powerpackages (up to a maximum pressforce of 150 kN):

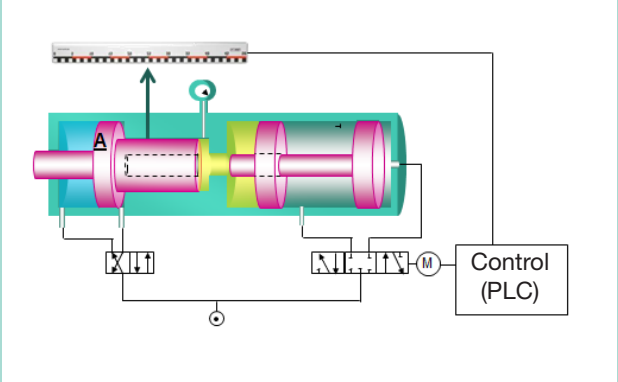
- Series line-X
- Special types S, K and RZ with integrated airspring

Only for applications which have a counterforce:
- Assembling
- Joining
- Insertion of functional elements
- Coining
- Marking
- Riveting
- Caulking
- Beading over
- Bending
- Pressing

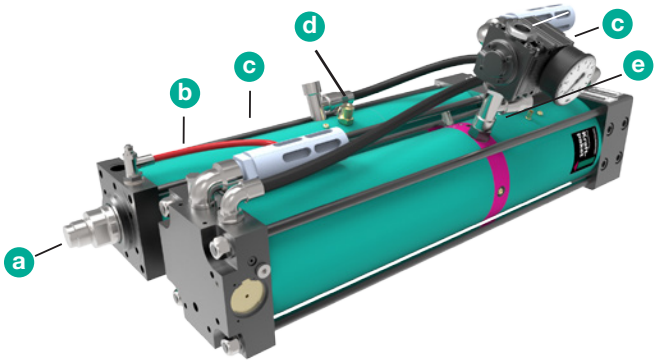
Advantages

+ New control on proven mechanics
+ Powerstroke control via servo valve
+ Adjustable speed, travel and distance course for the powerstroke
+ Adjustable stop on absolute or relative position
+ Reduced air consumption
+ Robust control behavior thanks to hydraulic reduction
+ Protected against overload with software
+ Simple and inexpensive control
+ Retrofittable

Functional principle of the control
The fast approach stroke is controlled with a 5/2-way valve. The power stroke is controlled by means of an intensifier piston and only occurs once the working piston was extended during fast stroke.
For connecting the power stroke, the intensifier piston is controlled with a 5/3-way servo valve like a double acting pneumatic cylinder, independent of the working piston.



Accessories



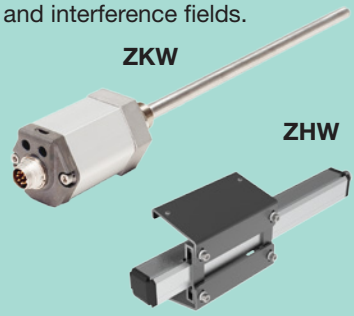
Mounting points for exemplary accessories:

- a Press force sensor ZPS
- b Stroke monitoring for forward and return stroke ZHU
- c Analog position sensor ZHW and ZKW
- d Electronic pressure switch ZDO
- e Oil level monitoring ZU

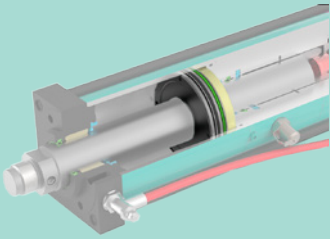
Electronic pressure switch ZDO
Detects the oil pressure in the high-pressure section as system pressure and indicates this as a 4-digit LED display. Two output signals are created according to the set switching function.

Press force sensor ZPS
The press force sensor is screwed onto the working piston and measures press forces in pulling and pressure direction. The sensor is protected against dust and dirt. The compact and robust ZPS has a high measuring accuracy.

Travel measuring system ZHW/ ZKW
The distance transducer indicates the absolute actual position of the TOX®-Powerpackage piston. The measuring system operates contactless and is thus wear-free, insensitive against contamination and interference fields.



End position monitoring ZHU
All TOX®-Powerpackages of type line-Q have a special tube and a magnetic disc as signal transmitter for the piston position. With this a **TDC/BDC request or optional stroke monitoring** can be performed.



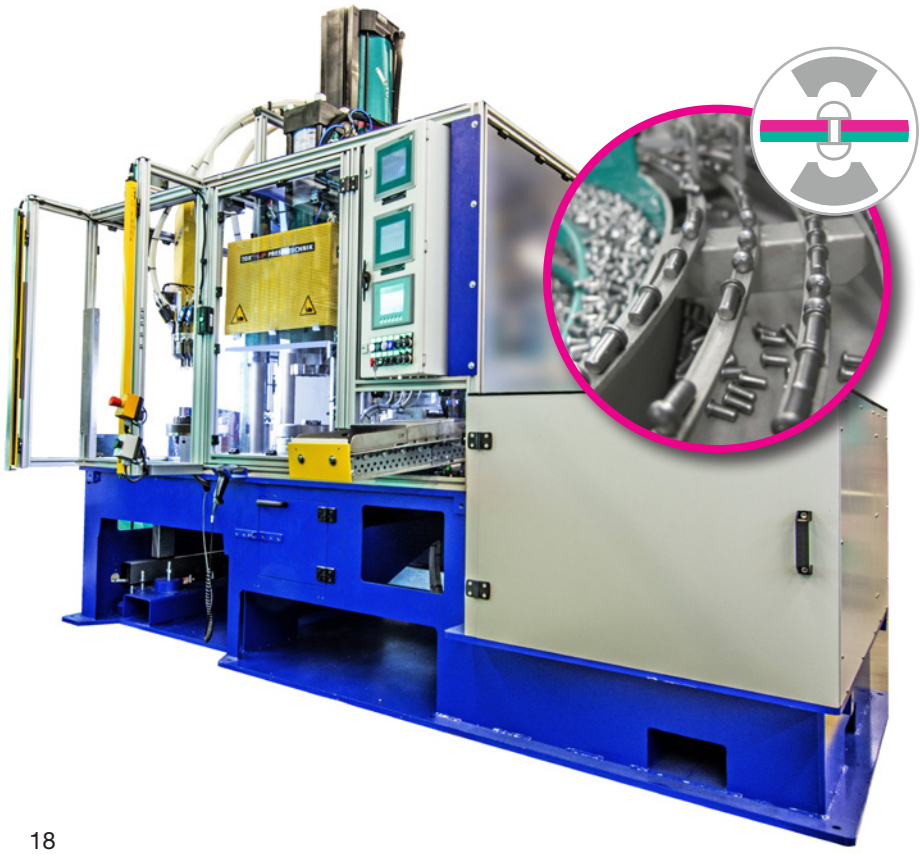
Coupling ZWK
Connects the TOX®-Powerpackage (press) and tool as flexible coupling. This means that the TOX®-Powerpackage cannot be affected by lateral forces. Including anti-rotation device. It is screwed onto the TOX®-Powerpackage piston rod. Available from 60 – 320 mm.

Oil pump ZP guarantees the optimum maintenance concept and long operating intervals. For simple filling of the oil volume of the TOX®-Powerpackage without the formation of bubbles. Transparent container and filler hose for oil level monitoring.

Possible applications

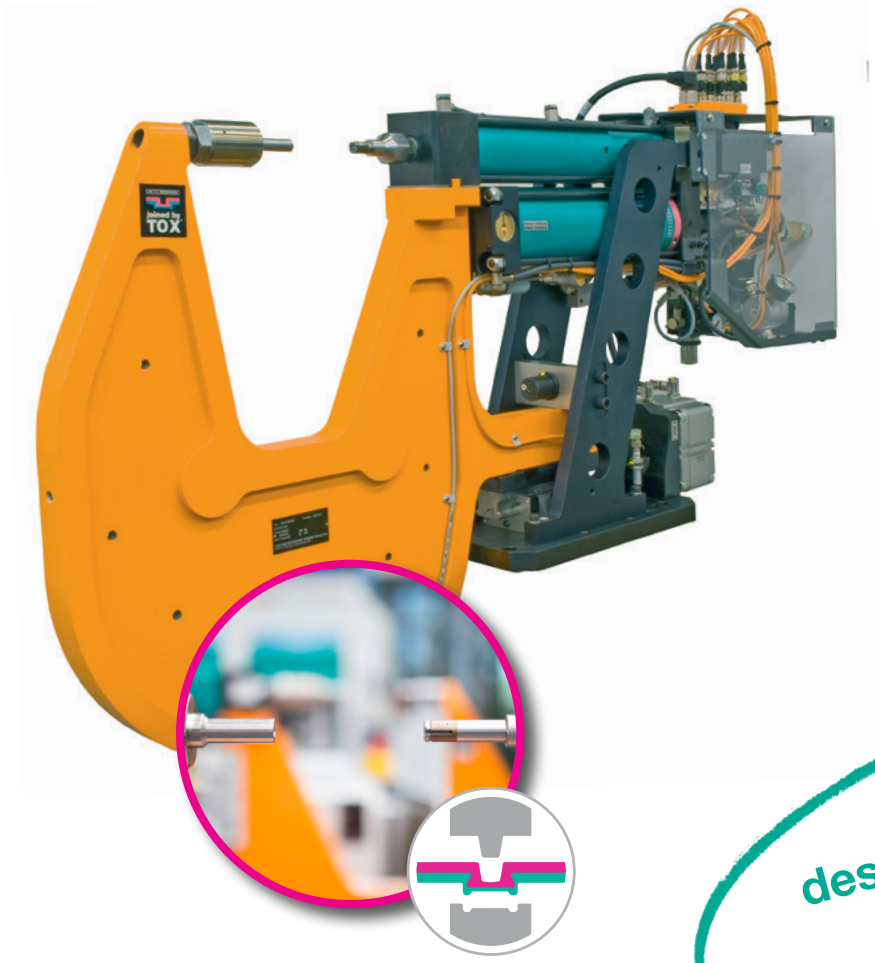
Presses

TOX®-Presses: The functional design of our series based on the modular principle enables simple and economic adaptation to your individual specifications. Naturally, we also realize highly individual solutions.



Special machines

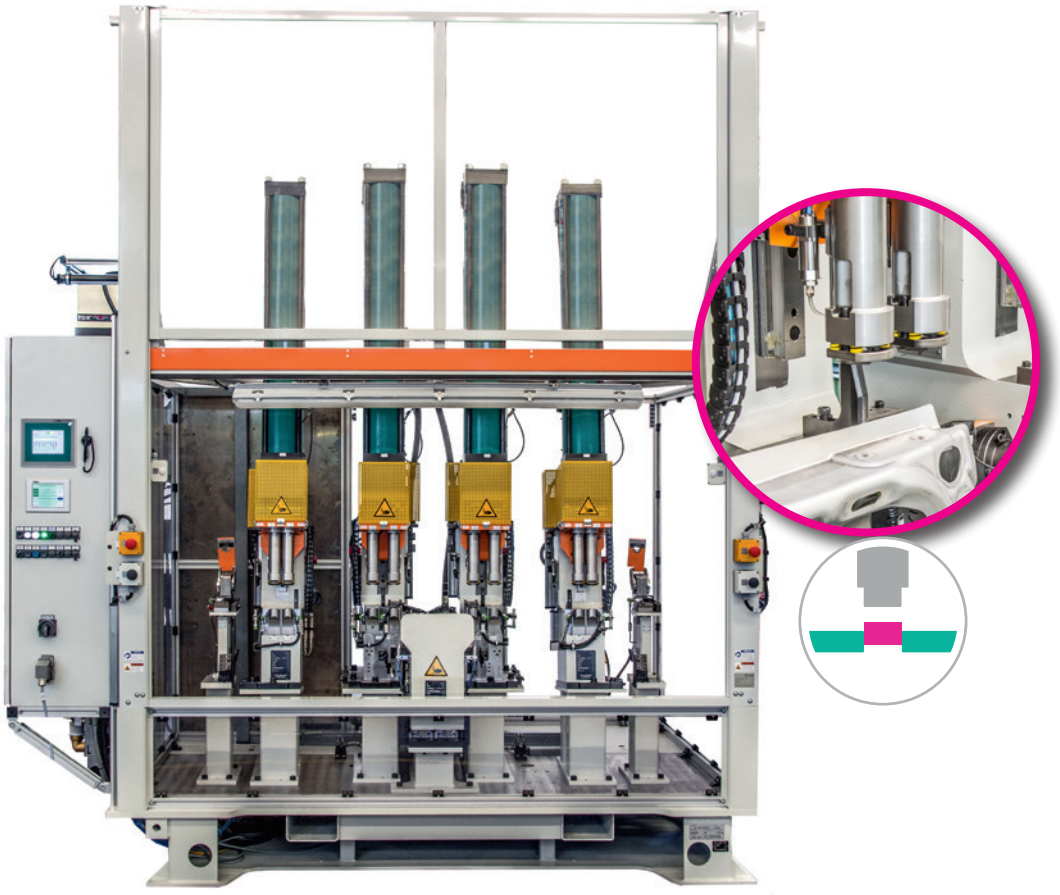
TOX®-Powerpackages are also used in many special machines: for pressing in elements, punching, joining of sheet metal with the TOX®-Clinching Technology, rivet technology or assembly.
The drives meet all requirements here: They are powerful, economical, low in maintenance, and depending on planning do not need hydraulics or a complicated control.



Tongs

TOX®-Robot Tongs and TOX®-Machine Tongs leave you with freedom for your workpiece. The tongs are delivered completely ready for connection. The TOX®-Powerpackages used here are equipped with TDC damping as standard. This means that extremely high cycle frequencies with optimum protection of the attachment parts can be realized.

We plan, design and build your complete production plant!



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