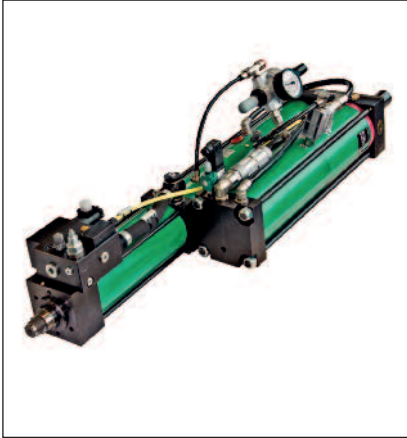


# TOX®-Powerpackage for optimal, even pressing and punching with reduced impact

Type ZED



## Reliable processes due to integrated, adjustable damping:

The integrated damping option allows for an **adjustable** constant speed of the working rod during the power stroke, independent of the working forces. Now, it is possible to almost fully compensate for the sudden acceleration of the working rod when the opposing force is removed.

## Advantages:

- + damping can be electrically initiated at any point of the stroke
- + damping is infinitely adjustable
- + almost constant speed of working rod
- + reduction of cutting impact when punching
- + smooth, monitored press-fit of pieceparts
- + option: speed control via proportional hydraulic valve
- + option: integrated travel measuring system type ZKW

Data  
sheet  
10.07

2012/04

## Press-fit:

Depending on the application, very strong chattering effects may be caused during the pressing cycle due to the so-called Stick-Slip effect. This effect induces strongly fluctuating progressions of Force/Travel making a reliable process control more difficult. And this chattering also generates undesirable pressing results and increased noises. With the damping function ZED, the acceleration of the working rod - due to a drop in counterforce - is almost completely compensated. The pressing operation is controlled at constant speed. The Force-Travel characteristics are precisely monitored and evaluated.

## Punching:

The break through effect at the end of a punching operation causes an abrupt drop of the counterforce. This results in an instantaneous high acceleration of the working rod. The **punching impact** causes a high mechanical stress, high noise levels and premature wear of the tools and the machine.

With the damping option ZED

- the speed of the working rod remains nearly constant
- shocks are prevented at the end position
- noise levels are noticeably reduced

## Soft-Touch-Function:

For the same adjustment of the flow regulator, the speed of the working rod is nearly the same for approach and power strokes. Therefore, the damping cylinder ZED provides for a soft touch on the work piece.

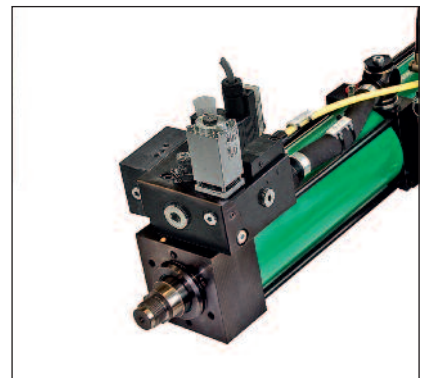
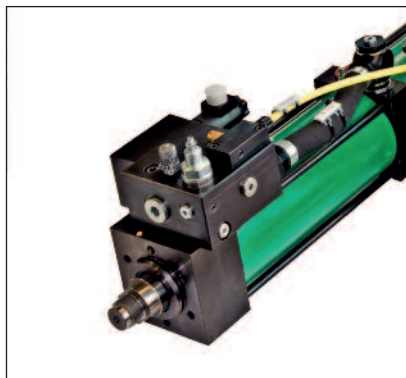
The TOX®-Powerpackage type ZED can be ordered either with a manually adjustable flow control valve or with a solenoid operated proportional flow control valve. Either valve can be mounted in the same control block.

## Manual flow control valve

The damping characteristics can be adjusted very precisely with the manual flow control valve. This function is recommended when the damping characteristics don't need to be changed very often.

## Solenoid operated proportional flow control valve

With the solenoid operated proportional flow control valve, the damping characteristics can be varied over the controls during the damping stroke, as well as within other strokes.



### Technical Data:

#### Manual flow control valve:

Reaction time and reaction distance when switching the damping during approach:

Reaction time

ZED 02/04/08 < 0.07 sec

ZED 15/30 < 0.14 sec

Reaction distance dependent on the approach speed

ZED 02/04/08 min. 6 mm to  
max. 34 mm

ZED 15/30 min. 6 mm to  
max. 38 mm

(high approach speeds result in increased reaction distance)

Switching repeatability during approach at max. speed:

ZED 02/04/08 < 4 mm

ZED 15/30 < 7 mm

Minimum speed adjustment for closed flow control valve during power stroke:

ZED 02/04/08 < 0.1 mm/s

ZED 15/30 < 0.18 mm/s

Minimum operating air pressure:  
3.0 bar

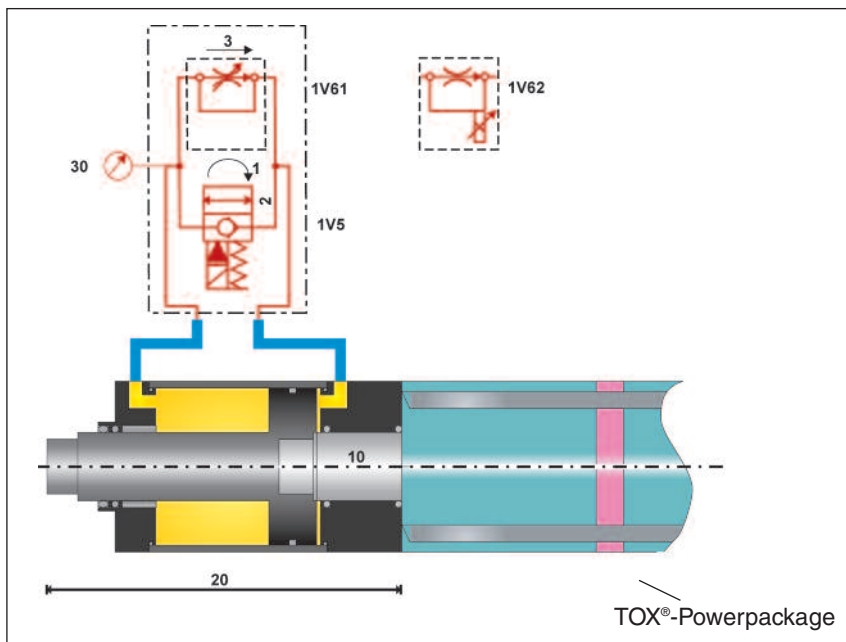
#### Solenoid operated proportional flow control valve:

Positional accuracy for damping in approach and power strokes  
< +/- 0.03 mm

In order to achieve this accuracy, the desired position must be approached slowly (e.g. over a speed ramp).

Minimum speed adjustment for closed flow control valve during power stroke:  
< 0.1 mm

Minimum operating air pressure:  
3.0 bar



#### Function:

A hydraulic damping cylinder is mounted on the working rod (10) of a standard TOX® pneumatic spring Powerpackage.

During the approach stroke, the oil flows, depending on the cylinder version either through a bi-directional manual flow control valve or an electrically operated proportional flow control valve from one side of the piston to the opposite side, thereby creating a constant, throttled volume stream and thus a dampened movement.

For a rapid fast approach stroke, the solenoid valve (1V5) can be switched electrically and the oil can flow without being throttled.

#### Controls:

The pneumatic activation of the approach stroke occurs in the same way as for a TOX®-Powerpackage with air spring. The power stroke activation is done electrically over a position sensor, as well as the switching on and off of the damping function (solenoid valve 1V5). A magnetic piston guarantees for the timely switch point. The sensors are to be ordered separately.

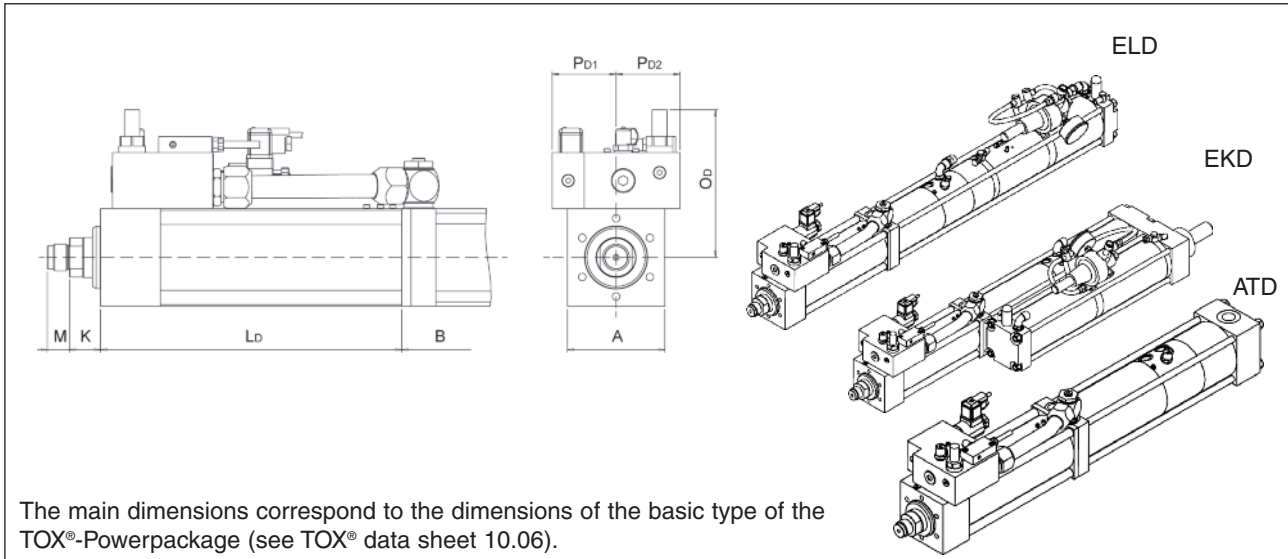
The damping effect can be adjusted either manually using flow control valve (1V61) or electrically using a solenoid operated proportional flow

control valve (1V62). As option, this can be monitored over a display (30).

The return stroke can be activated over a position signal or a force signal at any time due to the integrated check valve independent of the switching position of the solenoid valve (1V5).

#### Caution:

For TOX®-Powerpackages with the damping option ZED, the oil pressure can not be used to measure the force and to switch the valve.



**Please note that the approach- and return force deviates from that for a standard series TOX®-Powerpackage!** Furthermore, the maximum approach and return speeds are reduced and the total stroke is reduced by 10 mm. A minimum 3 bar air pressure is required for approach and return strokes.

Type	Stroke * [mm]	Approach force [daN]	Return force [daN]	Average approach speed ** [mm/s]	Average return speed** [mm/s]	Average power stroke speed** [mm/s]	L <sub>D</sub> [mm]	O <sub>D</sub> [mm]	P <sub>D1</sub> [mm]	P <sub>D2</sub> [mm]	For TOX® pneumatic spring Powerpackage type
ZED 02	200 300	116	100	390	383	96	330 430	146 146	80 80	64 64	EL/EK/AT 02
ZED 04	200 300	156	132	345	299	58	335 435	154 154	80 80	64 64	EL/EK/AT 04
ZED 08	200 300	297	249	210	252	31	350 450	166 166	72 72	72 72	EL/EK/AT 08
ZED 15	200 300	465	328	296	241	56	359 459	198,5 198,5	84 84	84 84	EL/EK/AT 15
ZED 30	200 300	762	464	257	221	36	359 459	221 221	84 84	84 84	EL/EK/AT 30

Tolerance of ± 5% applies to all force and speed data

\*Due to the magnet used for stroke sensing, the total stroke is reduced by 10 mm.

\*\*all speed data valid without any opposing force and any tooling weight.

For TOX® pneumatic spring Powerpackages with total strokes different than those shown, the next size damping cylinder for the same capacity will be used, e.g. for a stroke of 100 mm, the cylinder with 200 mm stroke equal press force.

**Included with the TOX®-Powerpackage:**

- Stroke sensing ZHU (without sensors)
- Power bypass ZLB for EL 02, EK and AT units. Bypass with end position damping ZHD from EL 04 on.
- Positive stop with elastomeric damping FUD
- Additional HP connection for damping pressure monitoring

- External power stroke initiation including pneumatic valve (solenoid operated) and power stroke valve mounted on cylinder
- Includes all necessary electrical connectors (without cables)
- Flow control valve provides throttling

**Accessories and options:**

The TOX®-Powerpackage options are also available for these units (see TOX® data sheet 10.00).

**Order no:**

EK 002.100.12 – ZED



	<b>Electric 2-way valve</b>	<b>Manual 2-way flow control valve</b>	<b>Electric proportional 2-way flow control valve</b>	<b>Proportional plug amplifier, mounted directly to 1V62</b>
	1V5	1V61	1V62	1V62
<b>Ambient temperature</b>	Up to +50°C	Up to +50°C	Up to +50°C	
<b>Hydraulic temperature</b>	Up to +70°C	Up to +70°C	Up to +70°C	
<b>Mounting orientation</b>	Any	Any	Any	
<b>Function / operating mode</b>	Solenoid, direct operated, normally closed	Manual, mechanic key actuation via open end wrench and screwdriver Operating distance = 2.5 mm Operating range = 900° (2.5 turns) Adjusting accuracy <= 1%	Proportional solenoid push type	Proportional amplifier with clocked current regulator. The dither amplitude is variable. Min. and max. solenoid current separately adjustable. Integrated linear ramping. The input free/block allows for the block function. Stabilized output voltage provides an external set-point device.
<b>Electric parameters</b>	Standard nominal voltage UN = 24 VDC Nominal power = 26 W Current tolerance +/-10% dependent on nominal voltage Relative switch-on time 100% ED		Standard nominal voltage UN = 24 VDC Max. current IG = 680 mA Relative switch-on time 100% ED Repeatability <= 2% * Hysteresis <= 5% * * under optimum dither signal	Supply voltage UN = 24 VDC (Tolerance 22 – 36 VDC) Setpoint input 0 – +10 VDC Input resistance >= 100 kOhm Stabilized output voltage 10 VDC, max. load 2 mA Dither: Adjustable frequency 60 – 250 Hz Preset at 200 Hz No-load power 0,3 W Min. current Imin adjustable 30 – 400 mA Preset at 150 mA Max. current Imax adjustable Imin – 1200 mA Preset at 700 mA Ramp up/down are set by the trimming potentiometers Ramp time 0.25 – 6 sec
<b>Connection type</b>	Cable socket ISO 4400 / DIN 43650		Cable socket EN 17501-803 / ISO 4400	Power plug can be rotated 180°, with 1.5 m long cable
<b>Protection class</b>	IP 65 per EN 60529		IP 65	IP 65, mounted per DIN 40050