

## Product Information

ZwickRoell single testing actuators: LH 100 / LH 250 / LH 500 / LH 1000

CTA: 203094 73853



LH actuator, overhead installation in a test frame



LH actuator with foot flange option

### Range of application

The testing actuators in the LH range feature servo-hydraulic linear drives, designed for maximum dynamic range and durability. As double-rod actuators they are suitable for dynamic and static tensile/compression alternating stress. They are used as single testing actuators, e.g. on a fixture platen for component testing, or as machine actuators in a test frame for materials testing.

### Function description

LH actuators are equipped with a servo valve and convert hydraulic energy into a mechanical linear motion. The servo valve and accumulator are flange-mounted directly on the actuator, giving a high dynamic range. Nominal operating pressure options are 280 or 210 bar. The chromed piston rod runs in zero-backlash hydrostatic bearings, the only type of bearing capable of absorbing significant transverse forces. As no friction-generating seals are used, sliding friction is absent from this bearing system under normal operating conditions and the system is therefore wear-free. This eliminates

the need for maintenance operations such as bearing replacement or re-chroming the piston rod. A further advantage is the absence of slip-stick effects or hysteresis in both quasi-static and cyclic tests.

In addition, a polymer coating is applied to both bearings and the piston skirt. Due to the sealless bearing design, the small amounts of bearing oil which escape must be suctioned by with a bearing-oil pump.

Cushioning at both ends ensures safe, reliable hydraulic braking of the piston from speeds up to a maximum of 2 m/s. The maximum permitted additional weight  $m_{zmax}$ , e.g. for specimen grips, can be calculated from the actuator nominal force  $F_n$  as follows:  $m_{zmax} [kg] \approx 0.8 \times F_n [kN]$ .

LH actuators can be used in any desired orientation; in testing machines they are usually upright or suspended; in test benches they may also be horizontal. The standard version of the actuators is as machine actuator. With the foot flange option they can be used as single testing actuators.

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To simplify fixture mounting, the piston rod is provided with a connecting flange, and also has a suitable extension to enable installation in a load frame.

An inductive displacement transducer (LVDT) is incorporated centrally in the actuator base for precise measurement of the piston position; linearity is 0.1% up to 100 mm and 0.25% for piston strokes greater than 100 mm.

#### Advantages and features

- axial actuator with hydrostatic bearings for virtually frictionless and maintenance-free operation
- hydraulic end-cushioning for safe, reliable braking of the piston
- valve blocks for 1 to 4 servo valves for optimum matching of hydraulic output to requirements
- integrated piston displacement measurement system, LVDT
- actuators can be used in any desired orientation: upright, overhead or horizontal
- flange adapter with centering spigot for simple, reliable attachment of load cell and fixture

#### Operation of hydrostatic bearing

Each bearing has four bearing pockets distributed around its circumference and fed at system pressure. The piston rod floats on an oil cushion and is automatically centered. Friction and wear are thus eliminated.

If a transverse force arises, the pressure in the corresponding bearing pocket falls, while that in the opposing pocket rises, re-centering the piston rod. In

the event of higher transverse forces, the bearing passes from a state of purely fluid friction into one of mixed friction, a hydrostatically unloaded sliding bearing. During this phase the actuator can be operated without any restriction. Bearing and piston skirt also have a polymer coating, giving the actuator emergency dry-running properties.

#### Transverse force loading

The permissible transverse force absorption depends on the size of the actuator, the piston position and any accessories etc. which may have been installed. The maximum permitted transverse force  $F_{Qmax}$  during continuous operation in a state of hydrostatically unloaded sliding friction is approximately  $F_{Qmax} \approx 0.3 \times F_n$ , with retracted piston rod and force application at the end of the piston rod. Top mounting is preferable in the event of high transverse forces.

#### Accessories

- Accumulator set for pressure and return oil for smoothing pulsation
- Servo valve in accordance with the demands on the dynamic performance of the actuator
- Bearing-oil pump for suctioning excess bearing oil
- Hose set for connection to hydraulic supply (various lengths)
- Load cell
- Version with foot flange

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### Technical data

Nominal force [kN]	Stroke [mm]	Valve block [l/min]	No. of servo valves	Piston rods Ø	Connection size <sup>1)</sup>	Item Number 280 bar	Item Number 210 bar
±100	50	65	1	80	Ø105, 12 x M10 and 12x Ø 11 Centering spigot Ø 70 H7	<b>925062</b>	<b>1011679</b>
±100	50	250	4 <sup>2)</sup>	80		<b>056358</b>	<b>1011680</b>
±100	100	65	1	80		<b>925060</b>	<b>924982</b>
±100	100	250	4 <sup>2)</sup>	80		<b>012726</b>	<b>091731</b>
±100	150	65	1	80		<b>083502</b>	<b>1011682</b>
±100	150	250	4 <sup>2)</sup>	80		<b>083527</b>	<b>1010768</b>
±100	250	65	1	80		<b>040580</b>	<b>1011684</b>
±100	250	250	4 <sup>2)</sup>	80		<b>042227</b>	<b>926710</b>
±100	400	65	1	80		<b>1010662</b>	<b>1011685</b>
±100	400	250	4 <sup>2)</sup>	80		<b>924817</b>	<b>1011687</b>
±250	100	65	1	125	Ø165, 12 x M16 and 12 x Ø 17.5 Centering spigot Ø 100 H7	<b>925173</b>	<b>1011690</b>
±250	100	250	4 <sup>2)</sup>	125		<b>924830</b>	<b>935972</b>
±250	150	65	1	125		<b>083528</b>	<b>1011692</b>
±250	150	250	4 <sup>2)</sup>	125		<b>083529</b>	<b>1011695</b>
±250	250	65	1	125		<b>082243</b>	<b>1011697</b>
±250	250	250	4 <sup>2)</sup>	125		<b>935334</b>	<b>926711</b>
±250	400	65	1	125		<b>1010666</b>	<b>1011698</b>
±250	400	250	4 <sup>2)</sup>	125		<b>935793</b>	<b>935820</b>
±500	100	65	1	160	Ø 240, 12 x M20 and 12 x Ø 17.5 Centering spigot Ø 100 H7	<b>1010668</b>	<b>1011699</b>
±500	100	250	4 <sup>2)</sup>	160		<b>924859</b>	<b>1011700</b>
±500	150	65	1	160		<b>083530</b>	<b>1011702</b>
±500	150	250	4 <sup>2)</sup>	160		<b>083531</b>	<b>1011703</b>
±500	250	65	1	160		<b>1010671</b>	<b>1011704</b>
±500	250	250	4 <sup>2)</sup>	160		<b>925073</b>	<b>1011707</b>
±500	400	65	1	160		<b>1010672</b>	<b>1011708</b>
±500	400	250	4 <sup>2)</sup>	160		<b>924986</b>	<b>1011710</b>
±1000	100	250	4 <sup>2)</sup>	200	Ø 280, 12 x M24 and 12 x Ø 26 Centering spigot Ø 100 H7	<b>935332</b>	<b>056703</b>
±1000	100	1000 <sup>3)</sup>	1	200		<b>1010674</b>	<b>1011716</b>
±1000	250	250	4 <sup>2)</sup>	200		<b>925092</b>	<b>925055</b>
±1000	250	1000 <sup>3)</sup>	1	200		<b>1010675</b>	<b>1011718</b>
±1000	400	250	4 <sup>2)</sup>	200		<b>3000088</b>	<b>1011714</b>
±1000	400	1000 <sup>3)</sup>	1	200		<b>1010676</b>	<b>1011719</b>

1) The piston rod is provided with a connecting flange

2) Requires valve block either for 2 valves (Item No. **924802**) or for 4 valves (Item No. **032955**)

3) Suitable for Moog 3-stage servo valve Type 792

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Actuators with a nominal force greater than 1000 kN are available on application.

### For the single testing actuator version:

Description	Item number
Version LH with flange 100 to 160 kN	<b>1052793</b>
Version LH with flange 250 kN	<b>1052794</b>
Version LH with flange 500 kN	<b>1052795</b>
Version LH with flange 1000 kN	<b>1052796</b>
Version LH with flange 2500 kN	<b>1052797</b>