Specification
Servohydraulic – Actuator (Linear) WL 10 - 1000kN

Intended use

Servohydraulic - Linearactuators convert hydraulic energy - controlled by Servovalves - into mechanical energy. They are highly accurate and high dynamic-working, sensitive controlled servohydraulic – machine and equipment of the static and dynamic material and structural testing used. Here they come both as a single actuator on an adapter plate, as Built-in actuator testing machines, as well as complex, multi-axial Test systems used. In the present seal-free design with plastic-coated bearings under constant leakage extraction , they are in excellently suited, high power, while almost to transmit friction-free linear motion. They have therefore high Dynamics, free of stick-slip effects and can therefore by sensitive controllable forces or linear movements, the objects to be tested claim.

Features

The WL - actuators are double acting force generator in synchronization type, ie with equal piston areas in both cylinder chambers. The continuous Piston rod is guided by hydrostatic bearings completely free of play. A standard built-in transducer provides the necessary measured path of the piston position, for highly accurate positioning of the piston rod as well for position control in operation.
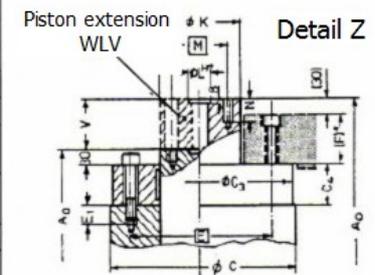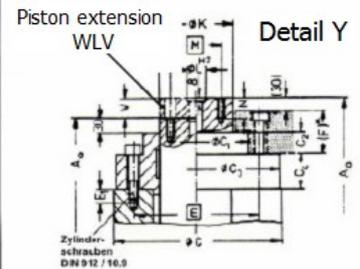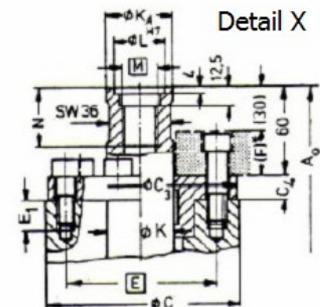
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Dimensions and weights
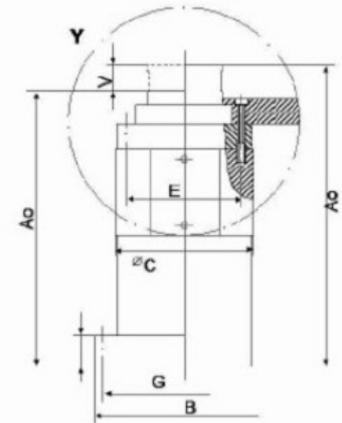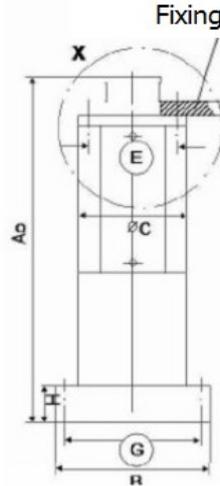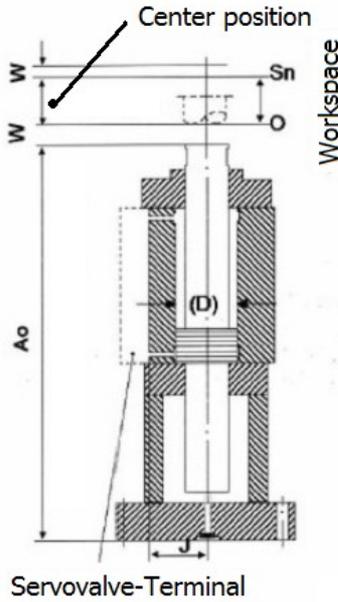
kN	10 bis 63	100 / 160	250 / 400	630		1000	
Sizes	WL 10-63	WL 100 160	WL 250 400	WL 630	WLm 630	WL 1000	WLm 1000
Measure Ao for Stroke Sn (mm) — 40	479	--	--	--		--	
100	539	605	605	705	750	705	750
250	829	905	905	1005	1050	1005	1050
400	--	1205	1205	1305	1350	1305	1350
B	205	275	370	470	--	550	--
C	126	224	315	370		440	
C1	--	125	190	236		300	
C2	--	28	39	50		50	
C3	125	205	280	360		430	
C4	15	54	60	79		82	
E	Ø 100	Ø 160	Ø 224	Ø 280		Ø 355	
	10 x M12	12 x M12	12 x M16	12 x M20		12 x M24	
E1	20	25	30	30		50	
G	Ø 180	Ø 250	Ø 335	Ø 425		Ø 500	
	10 x Ø 11	12 x Ø 14	12 x Ø 18	12 x Ø 22	--	12 x Ø 26	--
H	50	60	70	80	--	90	--
J	57	105	145,5	180		216	
(KA) K	(43) 45	80	125	160		200	
L	35	20	40	40		40	
M	M24	Ø 45	Ø 71	Ø 112		Ø 112	
		8 x M10	8 x M16	8 x M24		8 x M24	
N	50	25	30	45		45	
V	--	35	45	45	--	45	--
W	18	18	8	5		5	
KG WL.-40	35	--	--	--		--	
WL.-100	38	155	295	500		740	
WL.-250	65	240	435	730		1060	
WL.-400	--	300	560	960		1380	

Detail X

Piston extension WLV

Detail Y

Zylinderschrauben DIN 912 / 10.9

Piston extension WLV

Detail Z

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Description and identification

WL (Q) (S) 16.250
- Stroke 250 mm
- Power 16 kN
- Special
- Cross Power reinforced
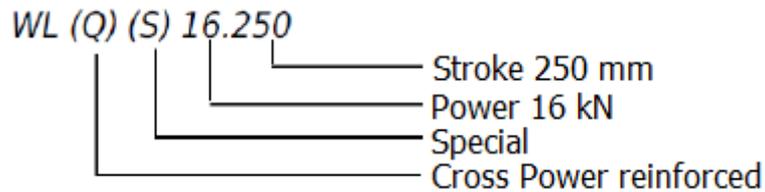
Load by cross power

A cross force FQ <FQ1 is recorded in the camps purely hydrostatic. The is the case in the usual application by testing the actuators with a relatively limited by the test object based on lateral reaction forces. In the field of liquid-solid boundary friction, the piston rod touches only places the actuator bearings. There is a hydrostatically balanced Slide bearing, up to transverse forces FQ2 = 3 + FQ1 without restriction in the well Continuous work. At higher load, the cross Emergency running properties of the plastic coating on the sliding surfaces in Claim made. The permissible limit for individual overload is Fqmax = 5 * FQ1. conditions may be even higher lateral forces Cylinder of a major construction phase with reduced piston area, ie, cylinders lateral forces reinforced version can be used.

Notes for actuator mounting

Actuators with 250 and 400mm stroke of all sizes 10-1000 kN should be possible to shear stress FQ> 0.3 Fn by "headgear" i.e. over the housing top and not with the actuator base to the Particleboard be fixed, which takes over all the reaction forces.

Allowable bending stress for eccentric longitudinal load applications

In the table below is the bending moment Mmax = F * e * s = Fn indicated that of the screw at the end of the piston rod can be transferred. To read is also the maximum Exzentrzität of capacity footnote in most peculiar vibration testing is often associated with off-center Force attack to be expected, because the focus of the specimen is not usually just above the actuator axis.

Power Fn (kN)	10 to 63	100/160	250/400	630	1000
Mma=F*e (kNm)	0,4	1,6	6,5	11,5	29
$eN = \dfrac{Mmax}{FN}$ (mm)	40 to 6,5	16 – 10	16 – 16	18	29

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Damping

The attenuation of the standard actuators is designed so that when Speeds up to vmax = 2.7 m / s of the flask with an additional mass mzmax (kg) = 8 * Fn (kN) is caught in the end positions.

Use versions

The actuators WL can be vertical, horizontal or pendulous, ie become most popular in position use in test benches and machines. When designing a Test equipment should the space requirement of the servo blocks WST and possibly Additional equipment, oil-carrying hoses and wires are not be forgotten.

Leakage extraction

The actuators WL are sealed gap and must name a Leakagepump can be operated.

Foot mounting

Actuators as standard can be set using the bolt pattern in their Bottom flange, dimension G on tension foundations, test frame, etc. tighten.

Head mounting

Through threaded holes in housing top, level E, all standard actuator directly to the table of vertical machines under the same Rated power (2-column design and 4-column designs) to angle brackets, Stretch walls e.g. be mounted. For the actuator WL 630 to WL 1000 (with Feet) for fixing a piston head extension pieces required. 10 - 400 kN, all as standard actuator engine actuator (head mounted) be used. For this they are having a piston rod extension and long terminal screws provided. From size 630 kN to 1000 kN, with actuator base, have the actuator piston rod and a longer are thus provided for the head mount.

Built between the ball joints

For this application, ball joints WK are available, the base flange and the piston rod can be secured. (See specification WK)

Equipped with servovalves

For each actuator, a servoblock WST as the carrier of actuator equipment such as servovalve SV, storage, oil ports. ect. In appropriate size available. Use Table B (page 6) can be Which estimate servo valves can be used.

Power, dynamic characteristics, performance

The nominal power Fn is achieved when an effective area of the AK hydraulic pressure of approximately 270bar attacks. In continuous operation, vibration or Fatigue tests, the actuators produce a "dynamic full load" Fdyn n = 0.8, i.e. 80% of capacity. This is the effective hydraulic Pressure about 215bar.

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Test frequency and servovalve assembly
Table A

*Is each of the randomly chosen vibration amplitude 2 * a = 1 mm a Indicative frequency FrE1 to the servovalve - actuator with various combinations scoring is. This depends solely on the maximum piston speed vmax, i.e. the size of the servo valve (Table B). Table A applies for actuator with 100 mm nominal stroke.*

vmax (m/s)	0,07	0,10	0,14	0,20	0,35	0,50	0,70	1,00	1,40	2,00
fref1 (Hz)	7,5	10	13	17	26	35	45	60	78	100

It should be noted, however, that the possible test frequency is always well control limits is subject to technical reasons.

Table B

Maximum piston speed Vmax (m / s) of standard actuators Servovalves of different sizes.

Servovalve / Nominal flow Qn at l/min	WL Actuator	Power Fn of the WL actuators at kN										
		10	16	25	40	63	100	160	250	400	630	1000
9,5	*	0,7	0,43	0,28	0,18	0,12	0,08	0,05				
19	*	1,35	0,85	0,55	0,35	0,23	0,15	0,09	0,05			
38	*		1,7	1,1	0,7	0,45	0,29	0,18	0,1	0,07		
63	*			1,8	1,15	0,72	0,5	0,3	0,18	0,12	0,08	0,05
125	*				2,2	1,4	0,8	0,55	0,35	0,22	0,15	0,09
160	**					1,75	1,15	0,7	0,45	0,3	0,19	0,11
250	**						1,8	1,1	0,75	0,45	0,3	0,17
400	**							1,7	1,15	0,7	0,45	0,27
630	**								1,8	1,1	0,7	0,42
1000	**										1,1	0,65
1600	**											1

*) Selection 2-stage servovalves on the basis of development results and practical experience.
**) 3-stage servovalves