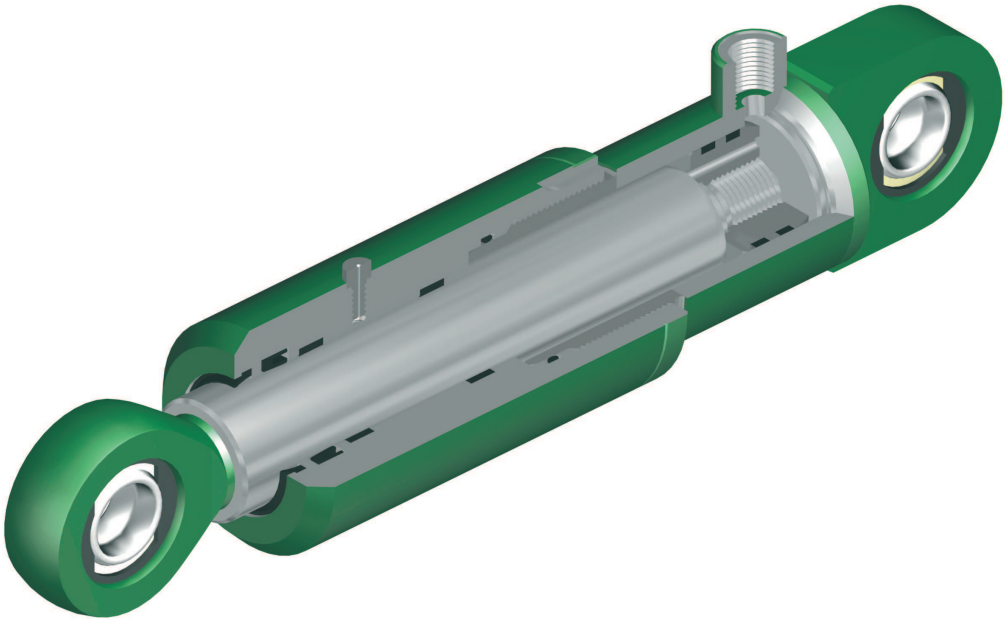


ZH-PL1

Linear hydraulic motors of the ZH-PL1 series

TECHNICAL DESCRIPTION – PRODUCT FUNCTION

The ZH-PL1 linear hydraulic motor is the element that converts the pressure energy to the mechanical energy – to the axial power of the piston rod in one direction – extension. The backward movement must be secured by external force. They have – by their construction – no special demands for service and maintenance. It is necessary to obey the service and technical conditions for perfect and secure functionality.
The ZH-PL1 is composed of the tube with precision worked inner diameter within the H8 allowance. On the tube there are welded the connection necks for inlet of the pressure oil with internal thread and the plug together with solid cylinder eye.
Both the cylinder eye and piston rod eye are equipped with the knuckle bearing as standard. The lid for piston rod guidance with the sealing elements and the air outlet of oil tank are screwed into the tube of cylinder cover. On the grinded – polished and chromed piston rod with the dimension tolerance f7 there is the connection eye welded from one side and the second end is equipped with the lift stop.

OPERATING CONDITIONS

The linear hydraulic motors of this kind do not require any special demands for service and maintenance.
the mounting of LHM must be done under conditions preventing the damage of function parts and which secure the protection of inner space against penetration of impurities

- properly provide the connection of LHM to the pressure source (danger of oil pressure decrease) and the mounting of LHM into the kinematic system of the given machine/device
- the work position of LHM is optional if not otherwise specified
- radial load of the piston rod by external force (or its radial force, caused by the LHM camber of own weight) or its rotations during working time are not allowed
- take care during the work to prevent the mechanical damages of the piston rod
- the hydraulic motor must not be loaded in the end positions by external force or by power of steady mass corresponding to 1,25 multiple of rated pressure
- when mounted into the machine's mechanical parts (or into some device) the possibility of swiveling of hydraulic cylinder body must be secured in transverse direction in the area of allowed swiveling of knuckle bearing
- LHM must not be exposed to any aggressive agents, aggressiveness of which would exceed the guaranteed resistance value for the motor piston rod used. The resistance value is specified in technical conditions.

TECHNICAL CONDITIONS

Work liquid	– hydraulic mineral oil (OH-HM 32, OH-HM 46, OH-HM 64)
Required filtration	– min. 40 μm, we recommend 25 μm
Temperature scope	– liquid -20°C ÷ +80°C
	– ambient -20°C ÷ +70°C
Climatic stability	– temperate climate WT
Rated pressure	– 20 MPa
Maximum pressure	– 25 MPa
Test pressure	– 32 MPa
Work speed	– maximum 0,5 $m \cdot s^{-1}$
The piston rod resistance value in the salt chamber pursuant to ISO 4540	– 120 hours

ZH-PL1

MARKING

Each hydraulic motor manufactured in our factory is marked with following data:

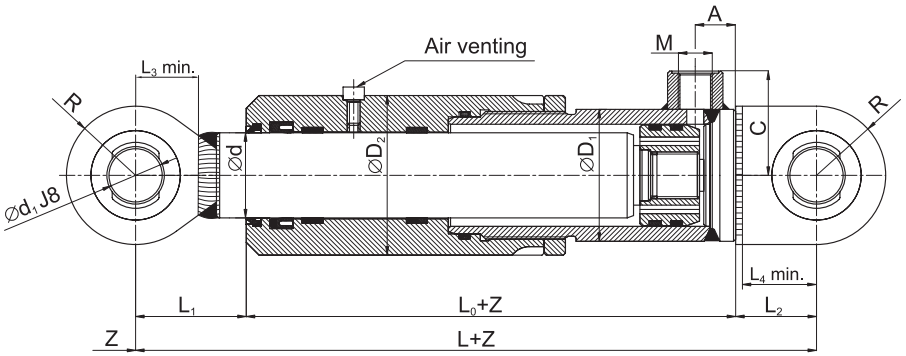
HYDRAULICS SEHRADICE
ZH-PL1 d x Z R / K /
MAX.OPERATING PRESSURE
SERIAL NUMBER

Part of the item delivery is the accompanying documentation containing

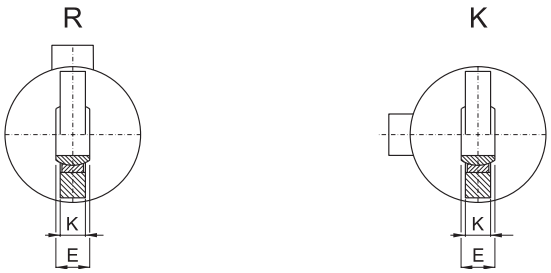
ITEM SAFEGUARD and
QUALITY CERTIFICATE /document details see page no. 97-98/.

ZH-PL1 Series

for P_{max} 25 MPa



Position of the screws joint to the swing plane



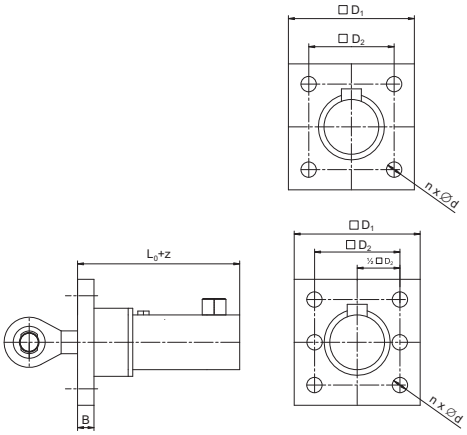
Ød	L	L_0	L_1	L_2	L_3 ± 1	L_4 ± 1	$ØD_1$	$ØD_2$	$Ød_1$	E	K	R	M	A	C	Maximum recom. lift acc. to selected Ød	Weight under given lift Z
28	170	90	45	35	32	31	42	57	20	16	14	27.5	12x1.5	19	39	1000	2.50 + Z x 0.01000
32	170	90	45	35	32	31	50	65	20	16	14	27.5	12x1.5	19	43	1100	3.10 + Z x 0.01200
36	170	90	45	35	32	31	50	65	20	16	14	27.5	16x1.5	19	43	1250	3.20 + Z x 0.01400
40	185	95	52	38	33	33	55	70	25	20	18	32.5	16x1.5	19	45.5	1400	4.20 + Z x 0.01600
45	190	100	52	38	33	33	62	77	25	20	18	32.5	16x1.5	20	49	1550	5.10 + Z x 0.02100
50	210	110	58	42	37	37	70	90	25	20	18	35	16x1.5	20	53	1700	7.40 + Z x 0.02700
55	225	115	65	45	45	39	78	98	30	22	20	42.5	22x1.5	25	57	1900	9.30 + Z x 0.03200
63	235	125	65	45	45	39	85	105	30	22	20	42.5	22x1.5	25	60.5	1900	10.90 + Z x 0.03900
70	265	130	80	55	54	49	90	110	35	25	25	47.5	22x1.5	30	63	1900	13.60 + Z x 0.04500

Piston rod lift according to the customer's wish.
Lifts higher than maximum recommended need to be controlled for the ultimate strength.
The articulated bearing is designed also for lubrication with the pin.
The weights are informative within scope of ± 5% in kg.

ZH-PL1 hydraulic motors gripping

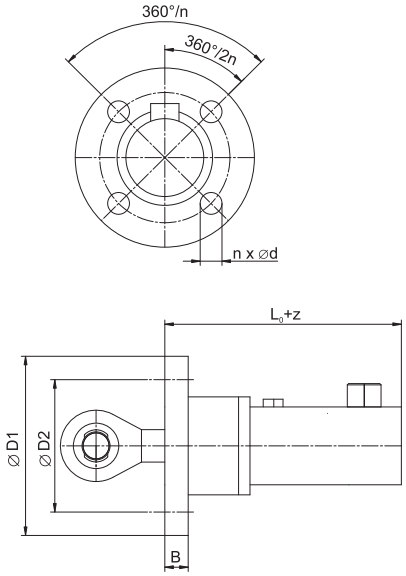
Gripping ZH-PL1 – A

Cylinder	D_1	D_2	B	∅d	n	L_0
28	78	60	12	10.5	4	90
32	88	68	12	10.5	4	90
36	88	68	12	10.5	4	90
40	93	70	14	10.5	4	95
45	98	77	14	10.5	4	100
50	147	125	16	10.5	6	110
55	155	133	18	10.5	6	115
63	167	143	20	13	6	125
70	175	150	22	13	6	130



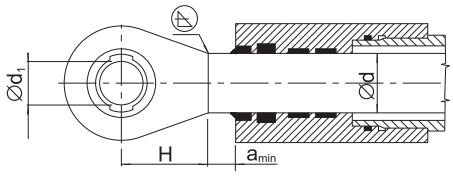
Gripping ZH-PL1 – B

Cylinder	D_1	D_2	B	∅d	n	L_0
28	108	88	12	10.5	4	90
32	115	95	12	10.5	4	90
36	115	95	12	10.5	4	90
40	122	103	14	10.5	4	95
45	128	109	14	10.5	4	100
50	147	125	16	10.5	6	110
55	155	133	18	10.5	6	115
63	167	143	20	13	6	125
70	175	150	22	13	6	130



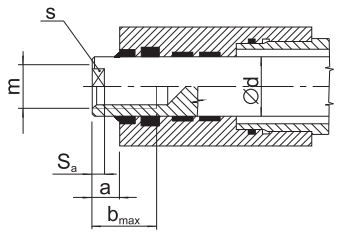
Piston rod end for hydraulic motors ZH-PL1

Variant: no. 2, 3 - we recommend to design according to lifting eyes (page 78÷93)



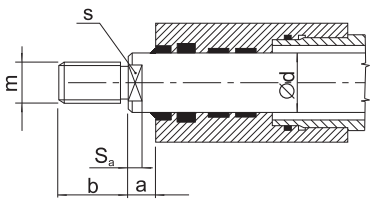
Lifting eye welded **variant 1**

Ød	28	32	36	40	45	50	55	63	70
a_{min}	12	15	15	15	15	20	20	20	25



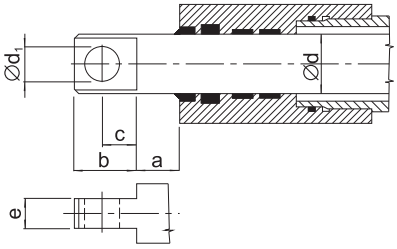
internal thread **variant 2**

Ød	28	32	36	40	45	50	55	63	70
m	**18x1.5**	**18x1.5**	**18x1.5**	**18x1.5**	**18x1.5**	**24x1.5**	**24x1.5**	**24x1.5**	**30x2**
	20x1.5	20x1.5	24x1.5	24x1.5	24x1.5	27x2	30x2	30x2	42x2
		24x1.5	27x2	27x2	30x2	36x2	42x2	42x2	52x2
a	17	17	20	20	20	25	25	30	30
b_{max}	56	60	70	70	70	80	90	90	100
s	24	28	30	36	38	41	46	55	60
				32	41	46	50	60	65
Sa	12	12	15	15	15	18	18	20	20



external thread **variant 3**

Ød	28	32	36	40	45	50	55	63	70
m	20x1.5	18x1.5	18x1.5	18x1.5	18x1.5	24x1.5	24x1.5	24x1.5	30x2
	22x1.5	**24x1.5**	24x1.5	24x1.5	24x1.5	27x2	30x2	30x2	42x2
			27x2	**30x2**	**30x2**	**36x2**	**42x2**	**42x2**	**52x2**
a	17	17	20	20	20	25	25	30	30
b_{max}	30	40	40	45	45	50	50	60	60
s	24	30	32	36	41	46	50	60	65
S_a	12	12	15	15	15	18	18	20	20



neck hole **variant 4**

Ød	28	32	36	40	45	50	55	63	70
$Ød_1$	16	17	20	22	26	28	30	40	50
a	10	10	10	12	12	15	15	18	18
b	48	50	60	70	80	95	100	120	135
c	29	31	36	43	50	59	64	80	85
e	20	24	26	28	32	34	38	40	46

The highlighted dimensions are default.

Ordering code

For standard plungers
ZH-PL1 Series
Acc. to the table on page 39

And for plungers ZH-PL1 using the construction module L_0 and another then standard piston rods ends and connection eyes ends.

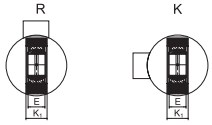
[ ] – [ ] x [ ] – [ ] – [ ] – [ ] / [ ]

Cylinder cover eye marking – (in case of not employing any eye from our catalogue fill in 0 to the code) –page 75÷90.

Piston rod eye marking – (in case of not employing any eye from our catalogue fill in 0 to the code) – page 75÷90.

Piston rod end – (for single solution without rod eye the highlighted dimensions are valid. In case of not employing any eye from our catalogue fill in 0 to the code) – page 41.

The position of pressure inputs to welded-on eye on cylinder surface (valid only for ZH-PL1) – according to herein stated drawings.



Lift – due to Your actual need – it is necessary to check the maximal possible lift because of the ultimate strength – the diagram of ultimate strength can be helpful according to Euler page 93.

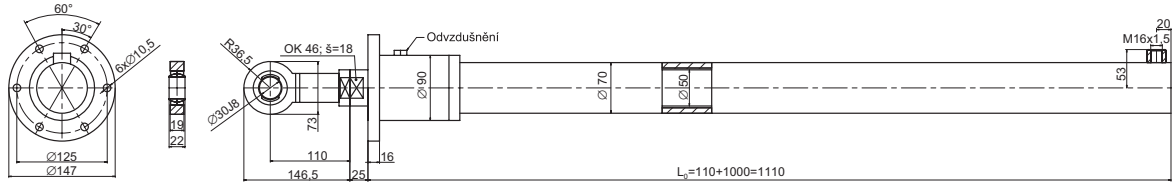
ZH-PL1,
ZH-PL1 – A,
ZH-PL1 – B,

Piston rod diameter

Ød	L	L_0	L_1
32	185	105	45
36	195	115	45

Example:

ZH-PL1–B–50x1000–3–EJ30–0



CUSTOMER'S FORM

Company ☐ ID ☐

Contact person ☐ tel/fax/e-mail ☐

Linear hydraulic motor: piston diameter / rod diameter / lift

Plunger – without guided piston ☐ – with piston rod pull-out end stop in cylinder ☐

– with guided piston ☐ – without end stop (with piston rod pull-out end stop on the construction) ☐

–piston rod return movement – mechanically – by external force ☐

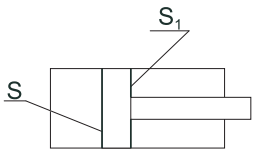
– by spring in the plunger ☐

Single acting linear hydraulic motor – it is exactly double acting linear hydraulic motor where the pressure oil is in one chamber only – the second one is filled with air.

Double acting linear hydraulic motor ☐

Double acting linear hydraulic motor – with continuous piston rod ☐

– damping at end positions – no ☐ – yes ☐



without regulation ☐

regulation of both positions ☐

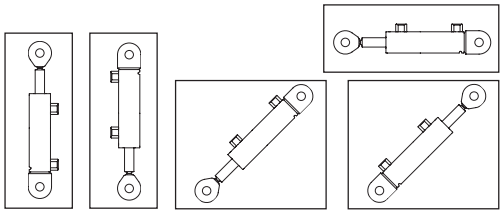
regulation on piston rod pull-out – S_1 ☐

regulation on piston rod pull-in – S ☐

Operating parameters

Pressure min. S_1		MPa	Piston rod pull-out speed		m/s
Pressure min. S		MPa	Piston rod pull-in speed		m/s
Operating pressure S_1		MPa	Oil temperature		°C
Operating pressure S		MPa	Ambient temperature		°C
Pressure max. S_1		MPa	Working medium		
Pressure max. S		MPa			
Pressure peak S_1		MPa			
Pressure peak S		MPa			

Working position of the hydraulic motor



Operating conditions

Type of device ☐

Function of the hydraulic motor ☐

Work intensity ☐ (cycles/hour, min, sec, ...)

Provoz occasional | one-working | two-working | three-working | continual

Operating environment

Weather conditions ☐ Dust ☐ Clear ☐ Water ☐ chem. corrosive ☐ Other ☐

Hydraulic motor drawing

Technical parameters of used materials

Commonly used types

CYLINDER COVER

- the tube welded and calibrated within the inner diameter allowance H9 - Rm = 570 MPa - DIN 2393
- the tube cold-drawed and rolled or honed within the inner diameter allowance H8 - Rm = 570 MPa - DIN 2391

BAR

- 20MnV6 - bar with a chrome layer 20-30 µm - Rm = 500 MPa
- 42CrMo4V - bar with a chrome layer 20-30 µm - Rm = 900 MPa
- HIPERCHOM 200 - material 20MnV6 - bar with a chrome layer c. 50 µm - Rm = 500 MPa - resistance in soil chamber 200 hours to defined damage
- NiCr 350 - material 20MnV6 - common bar with a chrome and nickel layers - Rm = 500 MPa - resistance in soil chamber 350 hours to defined damage
- Ck 45 or C50 - surface-hardened bar with a chrome layer 20-30 µm - Rm = 500 MPa
- 42CrMo4V - IH - surface-hardened bar with a chrome layer 20-30 µm - Rm = 900 MPa
- stainless steel rod with hardened chrome surface finish 20-30 µm

HYDRAULIC MOTORS TESTS

Each LHM manufactured in Hydraulics company is tested before delivery to the customer via final inspection. It is separated to several levels:

- visual check
- check of construction and integration dimensions
- leak test (done on test stend using the pressure mineral oil HM32)

Inspection methodology is based on: ČSN 11 9008
ČSN 11 9372
ČSN 11 9373, resp. ISO 10 100

SURFACE FINISH

In common order the surface adjustment is the final operation. As a standard it is done by painting with base synthetic colour S 2035 hue 0840 / red-brown/.
There are many ways of the surface adjustment:

- with other colour with other hue
- galvanization – zinc deposition
  – nickel plating
- with nitride
- without surface adjustment – pure metal

GUARANTEE

Our products - linear hydraulic motors - are subject to warranty under the commercial code. During the warranty period, the manufacturer shall, free of charge, without any undue delays remedy all functional defects, which shall be duly claimed and which were not due to incorrect usage of the product or failure to adhere to technical conditions.
The warranty period is 12 months from the date of sale.
We must also keep an eye on the life cycle of the LHM. It is determined according to ČSN 11 9372 to minimum of 10^6 cycles (lifts) for hydraulic motor lift to 500 mm, or 1000 km of course under given parameters.
In some cases it is possible to determine different warranty conditions.