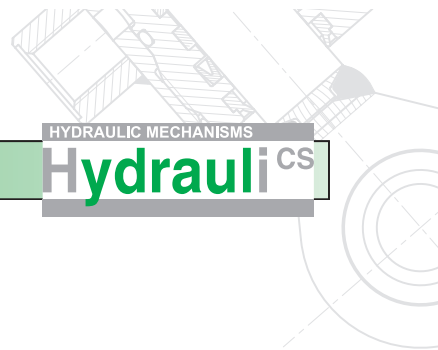


ZH-PL



Linear hydraulic motors of the ZH-PL series

TECHNICAL DESCRIPTION – PRODUCT FUNCTION

The ZH-PL 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-PL is composed of the tube of given dimension without the necessity of precision worked inner geometry. 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.

ZH-PL

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·s ⁻¹
The piston rod resistance value in the salt chamber pursuant to ISO 4540	- 120 hours

MARKING

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

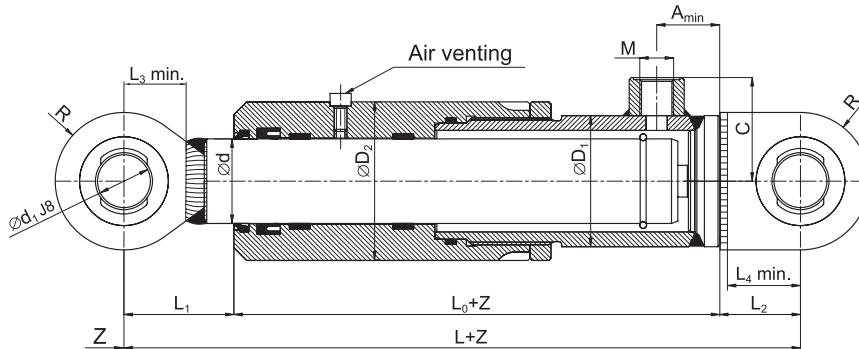
HYDRAULICS SEHRADICE
ZH-PL d x Z R / K /
MAX.OPERATING PRESSURE
SERIAL NUMBER

Part of the item delivery is the accompanying documentation containing

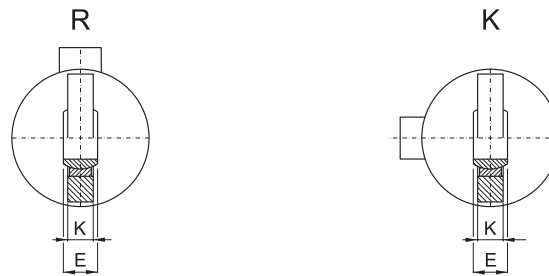
ITEM SAFEGUARD and
QUALITY CERTIFICATE /document details see page no. 97-98/.

ZH-PL Series

for P_{max} 25 MPa



Position of the screws joint to the swing plane



ZH-PL

$\varnothing d$	L	L_0	L_1	L_2	L_3 ± 1	L_4 ± 1	$\varnothing D_1$	$\varnothing D_2$	$\varnothing d_1$	E	K	R	M	A_{min}	C	Maximum recom. lift acc. to selected $\varnothing d$	Weight under given lift Z
32	185	105	45	35	32	31	50	65	20	16	14	27,5	12x1,5	25	43	730	3,30 + Z x0,01200
36	195	115	45	35	32	31	55	70	20	16	14	27,5	16x1,5	25	45,5	830	4,00 + Z x0,01400
40	220	130	52	38	33	33	60	75	25	20	18	32,5	16x1,5	30	48	917	5,90 + Z x0,02000
45	225	135	52	38	33	33	70	85	25	20	18	32,5	16x1,5	30	53	1040	7,10 + Z x0,02400
50	240	140	58	42	37	37	78	95	25	20	18	35	16x1,5	30	57	1160	9,40 + Z x0,02900
55	255	145	65	45	45	39	78	99	30	22	20	42,5	22x1,5	30	57	1280	11,20 + Z x0,03300
63	275	165	65	45	45	39	85	115	30	22	20	42,5	22x1,5	38	60,5	1480	16,20 + Z x0,04500
70	315	180	80	55	54	49	95	120	35	25	25	47,5	22x1,5	38	65,5	1640	19,40 + Z x0,04600
80	325	190	80	55	54	49	105	130	35	25	25	47,5	27x2	38	74,5	1890	23,60 + Z x0,06100

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.

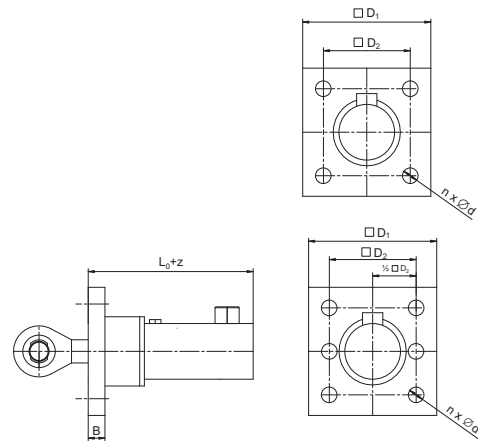
The weights are informative within scope of $\pm 5\%$ in kg.

Linear hydraulic motors

ZH-PL hydraulic motors gripping

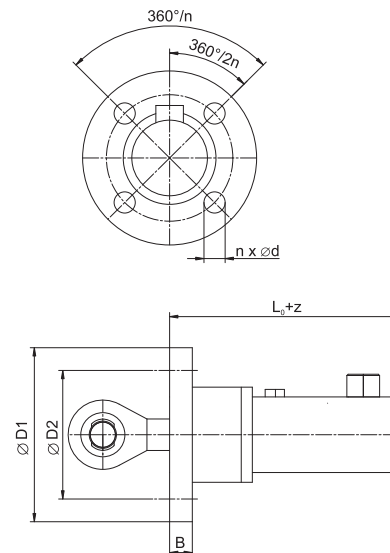
Gripping ZH-PL - A

Cylinder	D ₁	D ₂	B	∅d	n	L ₀
32	88	68	12	10.5	4	105
36	93	70	12	10.5	4	115
40	98	75	14	10.5	4	130
45	108	85	14	10.5	4	135
50	147	127	16	10.5	6	140
55	155	133	18	10.5	6	145
63	177	153	20	13	6	165
70	185	160	22	13	6	180
80	197	170	22	15	6	190



Gripping ZH-PL - B

Cylinder	D ₁	D ₂	B	∅d	n	L ₀
32	115	95	12	10.5	4	105
36	122	100	12	10.5	4	115
40	127	108	14	10.5	4	130
45	137	118	14	10.5	4	135
50	147	128	16	10.5	6	140
55	155	133	18	10.5	6	145
63	177	153	20	13	6	165
70	185	160	22	13	6	180
80	197	170	22	15	6	190

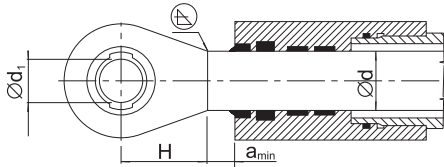


ZH-PL

Linear hydraulic motors

Piston rod end for hydraulic motors ZH-PL

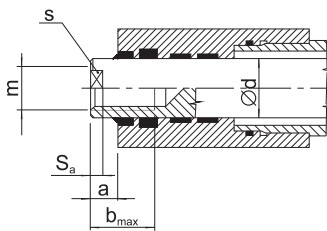
Variant: no. 2, 3 - we recommend to design according to lifting eyes (page 78÷93)



Lifting eye welded

variant 1

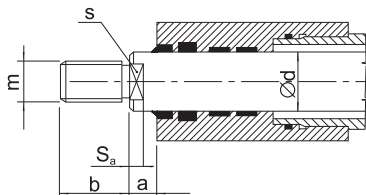
$\varnothing d$	32	36	40	45	50	55	63	70	80
a_{min}	15	15	15	15	20	20	20	25	25



internal thread

variant 2

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

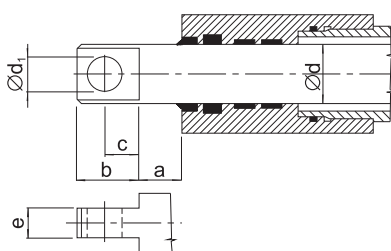


external thread

variant 3

$\varnothing d$	32	36	40	45	50	55	63	70	80
m	18x1.5 24x1.5	18x1.5 24x1.5 27x2	18x1.5 24x1.5 30x2	18x1.5 24x1.5 30x2	24x1.5 27x2 36x2	24x1.5 30x2 42x2	24x1.5 30x2 42x2	30x2 42x2 52x2	30x2 42x2 52x2
a	17	20	20	20	25	25	30	30	30
b_{max}	40	40	45	45	50	50	60	60	60
s	30	32	36	41	46	50	60	65	75
S_a	12	15	15	15	18	18	20	20	20

ZH-PL



neck hole

variant 4

$\varnothing d$	32	36	40	45	50	55	63	70	80
$\varnothing d_1$	17	20	22	26	28	30	40	50	52
a	10	10	12	12	15	15	18	18	18
b	50	60	70	80	95	100	120	135	145
c	31	36	43	50	59	64	80	85	90
e	24	26	28	32	34	38	40	46	56

The highlighted dimensions are default.



Ordering code

For standard linear hydraulic motors

ZH-PL Series

Acc. to the table on page 33

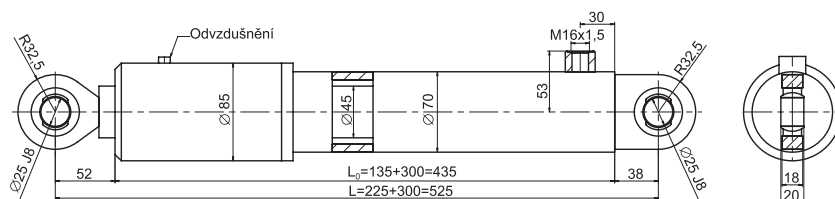
And for plungers ZH-PL using the construction module L_0 and another then standard piston rods ends and connection eyes ends.

	-	X	-	-															
							<p>Cylinder cover eye marking - (in case of not employing any eye from our catalogue fill in 0 to the code) - page 75÷90.</p> <p>Piston rod eye marking - (in case of not employing any eye from our catalogue fill in 0 to the code) - page 75÷90.</p> <p>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 35.</p> <p>The position of pressure inputs to welded-on eye on cylinder surface (valid only for ZH-PL) - according to herein stated drawings.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>R</p>  </div> <div style="text-align: center;"> <p>K</p>  </div> </div> <p>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.</p>												
<p>ZH-PL, ZH-PL - A, ZH-PL - B,</p>	<p>Piston rod diameter</p> <table border="1" style="margin: auto;"> <thead> <tr> <th>∅d</th> <th>L</th> <th>L_0</th> <th>L_1</th> </tr> </thead> <tbody> <tr> <td>32</td> <td>185</td> <td>105</td> <td>45</td> </tr> <tr> <td>36</td> <td>195</td> <td>115</td> <td>45</td> </tr> </tbody> </table>						∅d	L	L_0	L_1	32	185	105	45	36	195	115	45	
∅d	L	L_0	L_1																
32	185	105	45																
36	195	115	45																

ZH-PL

Example:

ZH-PL - 45x300-R



Customer's form

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

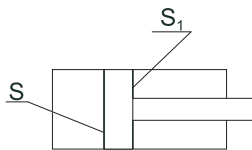
- damping at end positions - no - yes

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
 Pressure min. S MPa
 Operating pressure S_1 MPa
 Operating pressure S MPa
 Pressure max. S_1 MPa
 Pressure max. S MPa
 Pressure peak S_1 MPa
 Pressure peak S MPa

Piston rod pull-out speed m/s

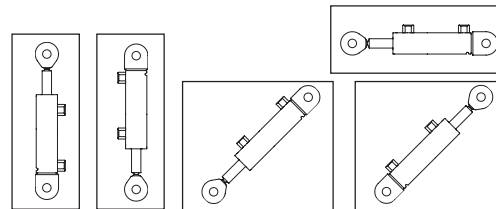
Piston rod pull-in speed m/s

Oil temperature °C

Ambient temperature °C

Working medium

Working position of the hydraulic motor



Operating conditions

Type of device

Function of the hydraulic motor

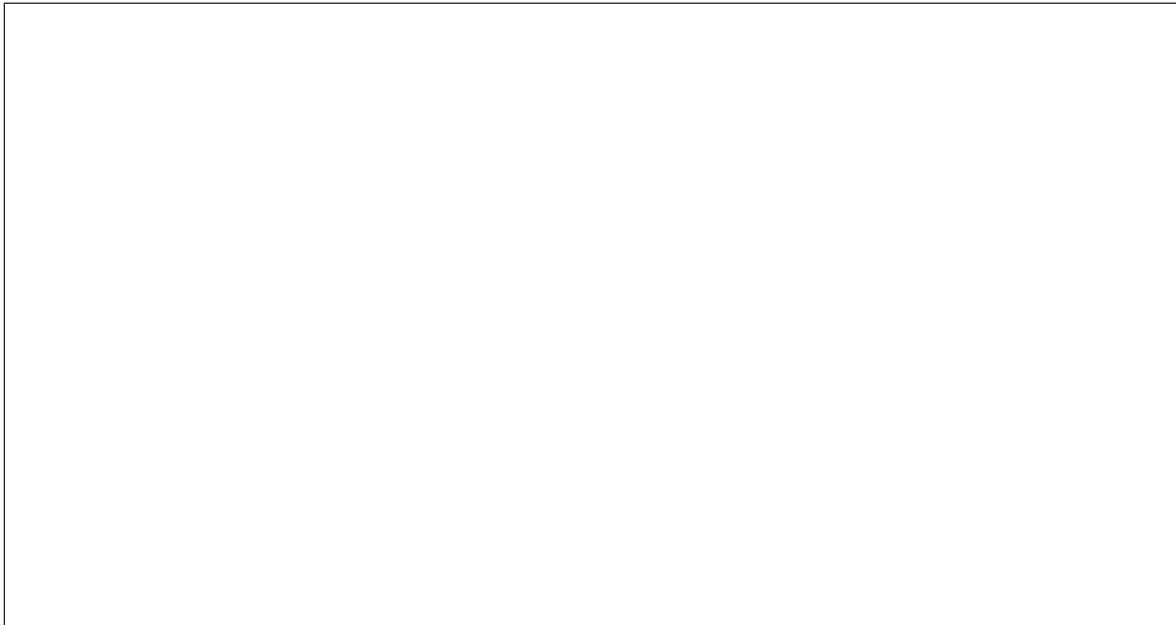
Work intensity (cycles/hour, min, sec, ...)

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-drawn 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 stand 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

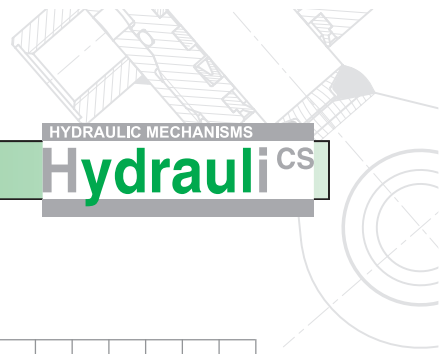
GUARANTEE

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.



Notes

A large, empty grid of small squares, intended for writing notes or calculations. The grid consists of 30 columns and 40 rows.