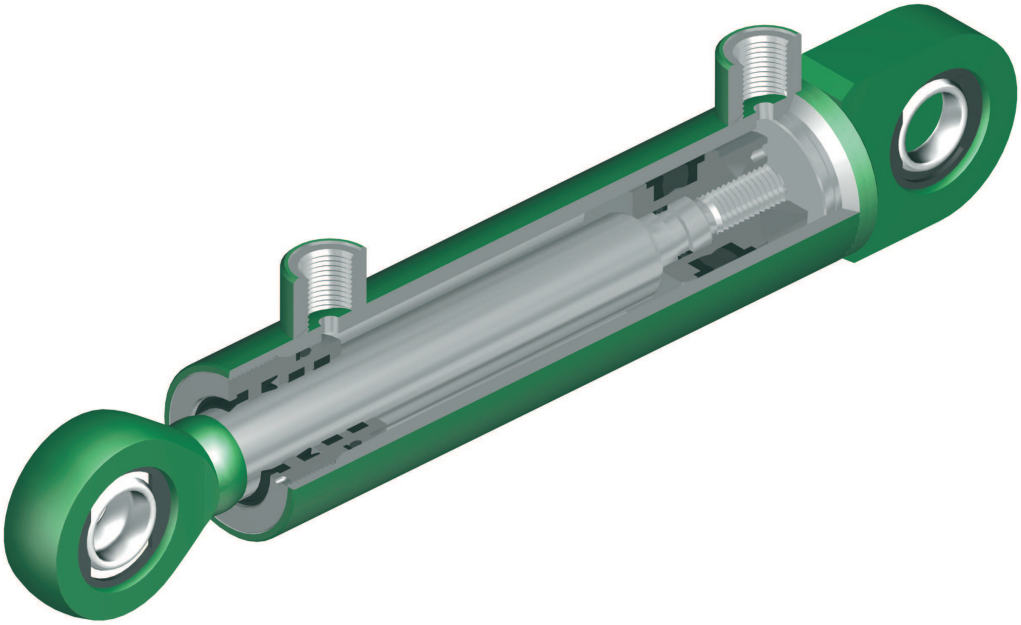
ZH2



Linear hydraulic motors of the ZH2 series

TECHNICAL DESCRIPTION – PRODUCT FUNCTION

The ZH2 linear hydraulic motor is the element that converts the pressure energy to the mechanical energy – to the axial power of the piston rod in both directions. 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 function of the motor.
The ZH2 hydraulic motor 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. The lid for piston rod guidance with the sealing elements is 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 piston.

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) 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

MARKING

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

HYDRAULICS SEHRADICE
ZH2 D/d x Z R / K /
MAX.OPERATING PRESSURE
SERIAL NUMBER

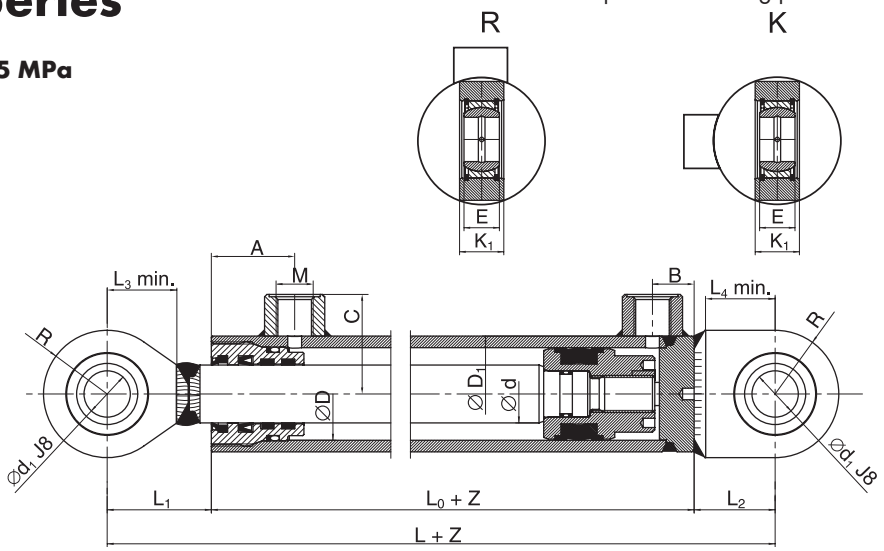
Part of the item delivery is the accompanying documentation containing

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

ZH2 Series

for Pmax 25 MPa

Position of the screws joint to the swing plane



ØD	Ød	ØD1	Ød1	L	L0	L1	L2	L3 ± 1	L4 ± 1	M	A	B	C	E	K1	R	Maximum recom. lift acc. to selected Ød	Weight under given lift Z
32	18	42	20	175	95	45	35	30	30	12x1.5	36	18	39	16	20	27.5	170	1.80 + Z x 0.00656
32	20	42	20	175	95	45	35	30	30	12x1.5	36	18	39	16	20	27.5	230	1.80 + Z x 0.00703
40	22	50	20	185	105	45	35	30	30	16x1.5	36	18	43	16	20	27.5	220	2.05 + Z x 0.00853
40	25	50	20	185	105	45	35	30	30	16x1.5	36	18	43	16	20	27.5	310	2.05 + Z x 0.00940
45	25	55	25	190	102	50	38	33	33	16x1.5	41	18	45.5	20	25	32.5	260	2.50 + Z x 0.01000
45	28	55	25	190	102	50	38	33	33	16x1.5	41	18	45.5	20	25	32.5	350	3.15 + Z x 0.01100
50	25	62	25	205	117	50	38	33	33	16x1.5	43	21	49	20	25	32.5	220	3.50 + Z x 0.01214
50	28	62	25	205	117	50	38	33	33	16x1.5	43	21	49	20	25	32.5	300	3.50 + Z x 0.01312
55	28	70	25	215	116	57	42	37	36	16x1.5	45	20	53	20	25	35	260	4.18 + Z x 0.01640
55	32	70	25	215	116	57	42	37	36	16x1.5	45	20	53	20	25	35	370	4.60 + Z x 0.01787
60	32	75	25	225	126	57	42	37	36	16x1.5	48	25	55.5	20	25	35	330	5.50 + Z x 0.01880
60	36	75	25	225	126	57	42	37	36	16x1.5	48	25	55.5	20	25	35	440	5.55 + Z x 0.02047
63	36	78	30	240	130	65	45	44	39	16x1.5	50	27	57	22	28	42.5	410	6.50 + Z x 0.02103
63	40	78	30	240	130	65	45	44	39	16x1.5	50	27	57	22	28	42.5	530	7.00 + Z x 0.02290
65	36	80	30	240	130	65	45	44	39	22x1.5	53	24	58	22	28	42.5	390	7.00 + Z x 0.02140
65	40	80	30	240	130	65	45	44	39	22x1.5	53	24	58	22	28	42.5	510	7.00 + Z x 0.02327
70	40	85	30	260	150	65	45	44	39	22x1.5	54	33	60.5	22	28	42.5	460	8.90 + Z x 0.02420
70	45	85	30	260	150	65	45	44	39	22x1.5	54	33	60.5	22	28	42.5	610	8.95 + Z x 0.02680
75	40	90	35	280	150	75	55	53	48	22x1.5	57	30	63	25	30	47.5	410	10.30 + Z x 0.02512
75	45	90	35	280	150	75	55	53	48	22x1.5	57	30	63	25	30	47.5	550	10.50 + Z x 0.02774
80	45	95	35	290	155	80	55	53	48	22x1.5	59	33	65.5	25	30	47.5	510	11.70 + Z x 0.02866
80	50	95	35	290	155	80	55	53	48	22x1.5	59	33	65.5	25	30	47.5	660	11.80 + Z x 0.03160
90	50	105	40	310	165	85	60	57	53	22x1.5	64	35	70.5	28	35	52.5	560	15.20 + Z x 0.03344
90	55	105	40	310	165	85	60	57	53	22x1.5	64	35	70.5	28	35	52.5	710	15.60 + Z x 0.03668
100	55	120	45	340	180	95	65	67	57	27x2	73	38	82	32	38	60	610	21.80 + Z x 0.04578
100	63	120	45	340	180	95	65	67	57	27x2	73	38	82	32	38	60	850	22.10 + Z x 0.05160
110	63	130	50	360	185	105	70	70	62	27x2	78	38	87	35	40	62.5	750	26.00 + Z x 0.05406
110	70	130	50	360	185	105	70	70	62	27x2	78	38	87	35	40	62.5	960	26.24 + Z x 0.05980
125	63	155	60	470	260	120	90	78	75	33x2	100	60	99.5	44	50	80	580	52.75 + Z x 0.07700
125	70	155	60	470	260	120	90	78	75	33x2	100	60	99.5	44	50	80	770	53.44 + Z x 0.08300
140	70	170	70	500	270	130	100	85	85	33x2	100	70	107	49	55	90	650	67.25 + Z x 0.08800
140	80	170	70	500	270	130	100	85	85	33x2	100	70	107	49	55	90	920	68.32 + Z x 0.09600
160	80	190	80	550	290	150	110	100	90	42x2	105	80	120	55	60	100	750	94.10 + Z x 0.10400
160	90	190	80	550	290	150	110	100	90	42x2	105	80	120	55	60	100	1025	95.60 + Z x 0.11500
180	90	210	90	600	310	160	130	110	110	42x2	110	85	130	60	70	110	860	122.38 + Z x 0.12200
180	100	210	90	600	310	160	130	110	110	42x2	110	85	130	60	70	110	1130	123.68 + Z x 0.13400
200	100	245	100	640	330	170	140	120	120	42x2	120	90	147.5	70	75	120	960	169.30 + Z x 0.18500
200	110	245	100	640	330	170	140	120	120	42x2	120	90	147.5	70	75	120	1230	171.64 + Z x 0.19800

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.

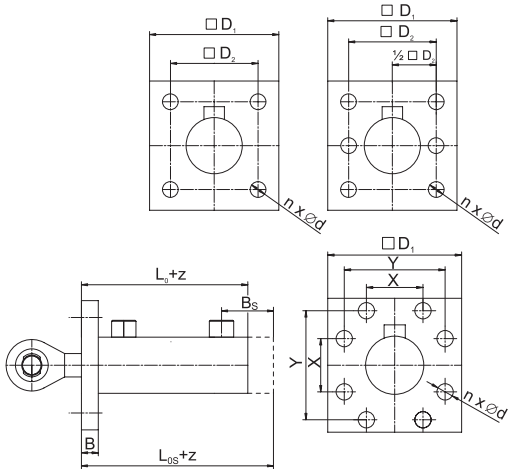
The weights are informative within scope of ± 5% in kg.

ZH2 Series hydraulic motors gripping

Gripping ZH2–A

ZH2-AS

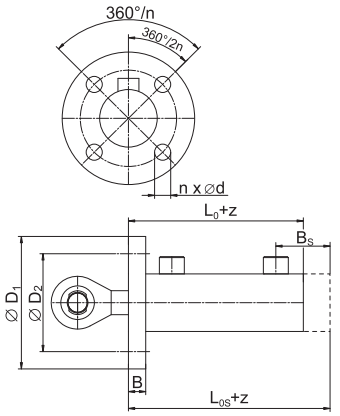
Cylinder	D_1	D_2	B	Ød	X	Y	n	L_0	L_{OS}	B_S
32	67	50	10	8.4			4	95	118	41
40	98	80	12	8.4			6	105	128	41
45	103	85	12	10.5			6	102	130	46
50	113	95	13	10.5			6	117	146	50
55	118	100	13	10.5			6	116	152	56
60	128	108	13	10.5			6	126	160	59
63	138	115	15	13			6	130	160	57
65	138	115	15	13			6	130	165	59
70	148	120	15	13			6	150	178	61
75	155	130	16	15			6	150	184	64
80	168	140	18	15			6	155	190	68
90	178	150	20	15			6	165	203	73
100	200	170	20	17			6	180	224	82
110	210	180	22	17			6	185	236	89
125	240		25	17	90	180	8	260	302	102
140	265		28	21	90	210	8	270	302	102
160	280		28	25	120	230	8	290	319	109
180	295		35	25	130	250	8	310	341	116
200	350		35	31	150	290	8	330	364	124



Gripping ZH2–B

ZH2-BS

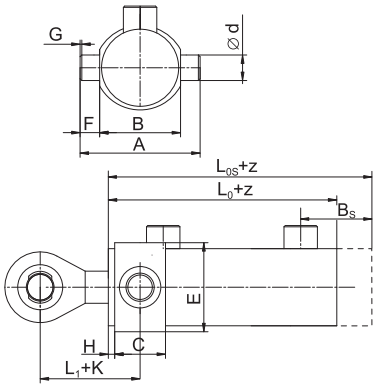
Cylinder	ØD_1	ØD_2	B	d	n	L_0	L_{OS}	B_S
32	88	70	10	8.4	4	95	118	41
40	98	80	12	8.4	6	105	128	41
45	103	85	12	8.4	6	102	130	46
50	113	95	13	10.5	6	117	146	50
55	118	100	13	10.5	6	116	152	56
60	128	108	13	10.5	6	126	160	59
63	138	115	15	13	6	130	160	57
65	138	115	15	13	6	130	165	59
70	148	120	15	13	6	150	178	61
75	155	130	16	13	6	150	184	64
80	168	140	18	15	6	155	190	68
90	178	150	20	15	6	165	203	73
100	198	170	20	17	6	180	224	82
110	208	180	22	17	6	185	236	89
125	237	205	25	17	8	260	302	102
140	267	230	28	21	8	270	302	102
160	305	260	28	25	8	290	319	109
180	330	285	35	25	8	310	341	116
200	380	330	35	31	8	330	364	124



Gripping ZH2–C

ZH2-CS

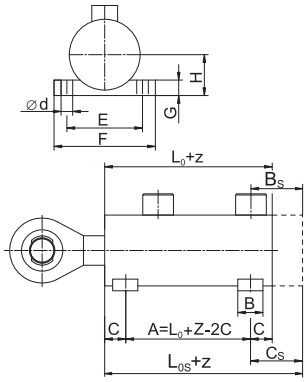
Cylinder	A	B h11	C	d f8	E	F	Gx45°	H	K	L_0	L_{OS}	B_S
32	90	55	28	20	53	17.5	1	5	19	95	118	41
40	105	65	28	20	65	20	1	5	19	105	128	41
45	110	70	33	25	70	20	1	5	22	102	130	46
50	120	80	33	25	80	20	1	5	22	117	146	50
55	135	90	35	25	90	22.5	1	5	23	116	152	56
60	140	95	35	25	95	22.5	1	7	25	126	160	59
63	150	100	40	30	100	25	1.5	7	27	130	160	57
65	155	105	40	30	100	25	1.5	7	27	130	165	59
70	160	110	40	30	105	25	1.5	7	27	150	178	61
75	180	120	45	35	115	30	1.5	7	30	150	184	64
80	185	125	45	35	115	30	1.5	8	31	155	190	68
90	205	135	50	40	135	35	1.5	8	33	165	203	73
100	220	150	55	45	150	35	1.5	10	38	180	224	82
110	240	160	60	50	160	40	1.5	10	40	185	236	89
125	295	195	80	60	195	50	2	10	50	260	302	102
140	335	215	90	70	215	60	2	15	60	270	302	102
160	380	240	100	80	240	70	2	18	68	290	319	109
180	420	260	110	90	260	80	2	20	75	310	341	116
200	480	300	120	100	300	90	2	25	85	330	364	124



Gripping ZH2–D

ZH2-DS

Cylinder	B	C	Ød	E	F	G	H	L_0	L_{OS}	C_S	B_S
32	20	15	10.5	65	88	10	27	95	118	38	41
40	24	20	10.5	75	100	12	31	105	128	43	41
45	24	20	13	80	105	12	35	102	130	48	46
50	24	20	13	88	110	14	38	117	146	49	50
55	26	20	13	98	123	16	43	116	152	56	56
60	30	25	15	107	135	16	47	126	160	59	59
63	30	25	15	110	138	18	50	130	160	55	57
65	30	25	15	110	138	18	50	130	165	60	59
70	34	27	17	118	150	20	55	150	178	55	61
75	34	27	17	125	158	20	55	150	184	61	64
80	40	30	21	140	180	24	60	155	190	65	68
90	40	30	21	150	190	24	65	165	203	68	73
100	48	34	25	170	215	26	75	180	224	78	82
110	48	34	25	180	230	26	80	185	236	85	89



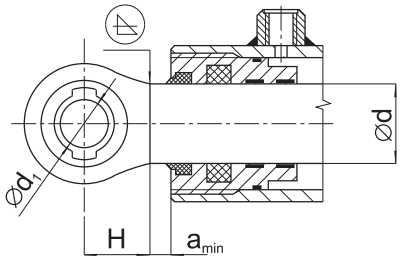
Dimensions L0S, BS and CS apply to the LHM design with a screwed plug.

Variants of piston rod end

Connection eye welded **version 1**

Ød	18	20	22	25	28	32	36	40	45	50	55	63	70	80	90	100	110
a_{min}	10	10	10	12	12	15	15	15	15	20	20	20	25	30	30	30	30

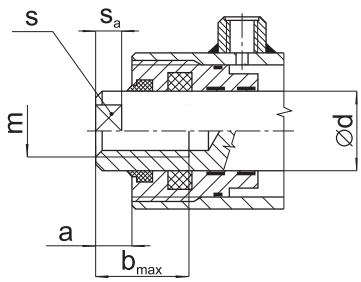
Ød1. H - choose according to connection eye offer sheet (page 75÷90)



ZH1

internal thread **version 2**

Ød	20	22	25	28	32	36	40	45	50	55	63	70	80	90	100	110
m	14x1.5	16x1.5	18x1.5 20x1.5	20x1.5	24x1.5	24x1.5 27x2	27x2	27x2 30x2	30x2 36x2	36x2 42x2	42x2	42x2 52x2	60x2	68x2	75x2	75x2
a	12	12	15	17	17	20	20	20	25	25	30	30	35	40	45	45
b_{max}	40	40	56	56	60	70	70	70	80	90	90	100	100	110	110	110
s	18	19	22	24	28	30	36 32	38 41	41 46	46 50	55 60	60 65	70	80	90	100
S_a	8	8	10	12	12	15	15	15	18	18	20	20	25	30	35	35

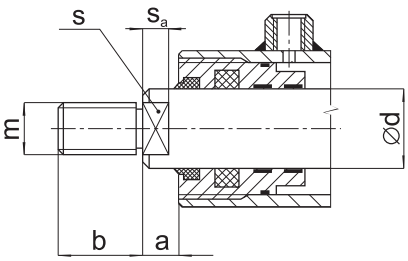


ZH2

ZH2T

external thread **version 3**

Ød	18	20	22	25	28	32	36	40	45	50	55	63	70	80	90	100	110
m	16x1.5	16x1.5 18x1.5	16x1.5 18x1.5	18x1.5 20x1.5	20x1.5 22x1.5	24x1.5	24x1.5 27x2	27x2 30x2	27x2 30x2	30x2 36x2	36x2 42x2	42x2	42x2 52x2	60x2	68x2	75x2	75x2
a	12	12	12	15	17	17	20	20	20	25	25	30	30	35	40	40	45
b	20	20 30	20 30	30	30 34	34 40	40	40 45	40 45	45 50	50	60	60	70	70	70	70
s	16	18	19	22	24	30	32	36	41	46	50	60	65	70	80	90	100
S_a	8	8	8	10	12	12	15	15	15	18	18	20	20	25	30	35	35

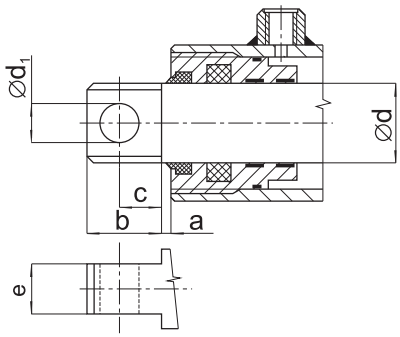


ZH2RT

neck hole **version 4**

Ød	18	20	22	25	28	32	36	40	45	50	55	63	70
d_1	10	12	12	14	15	17	20	22	26	28	30	40	50
a	6	6	8	8	8	10	10	12	12	15	15	18	18
b	25	30	35	40	45	50	60	70	80	95	100	120	135
c	15	18	22	25	29	31	36	43	50	59	64	80	85
e	13	15	16	18	20	24	26	28	32	34	38	40	46

The highlighted dimensions are default.



Ordering code

For standard linear hydraulic motors
ZH1, ZH1 – A až ZH2RT – D Series
Acc. to the table on page 15, 19, 23, 27.

And for linear hydraulic motors using the construction module L_0 and another then standard piston rods ends and connection eyes ends.

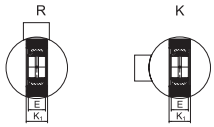
[ ] – [ ] / [ ] x [ ] – [ ] – [ ] – [ ] – [ ]

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 29.

The position of pressure inputs to welded-on eye on cylinder surface (valid only for ZH1, ZH2, ZH2T, ZH2RT) – 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.

ZH1, ZH1-A, ZH1-AS
ZH1-B, ZH1-BS
ZH1-C, ZH1-CS
ZH1-D, ZH1-DS
ZH2, ZH2-A, ZH2-AS
ZH2-B, ZH2-BS
ZH2-C, ZH2-CS
ZH2-D, ZH2-DS
ZH2T, ZH2T-A, ZH2T-AS
ZH2T-B, ZH2T-BS
ZH2T-C, ZH2T-CS
ZH2T-D, ZH2T-DS
ZH2RT, ZH2RT-A, ZH2RT-AS
ZH2RT-B, ZH2RT-BS
ZH2RT-C, ZH2RT-CS
ZH2RT-D, ZH2RT-DS

Piston rod diameter

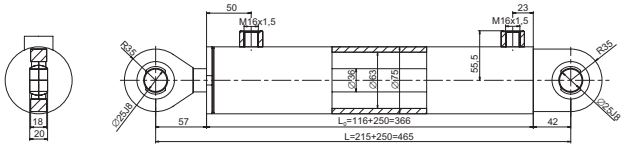
ØD	Ød	ØD$_1$	Ød$_1$	L
25	14	35	12	142
25	12	351	12	142

Rated diameter of cylinder

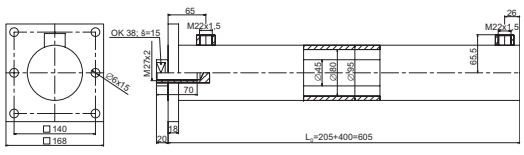
ØD	Ød	ØD$_1$	Ød$_1$	L
25	14	35	12	142
25	12	351	12	142

Example:

ZH1 – 63/36 x 250 – R



ZH2T –A–80/45x400–2–0–0



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 ☐

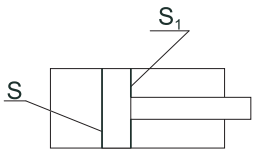
– by spring in the plunger ☐

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 ☐

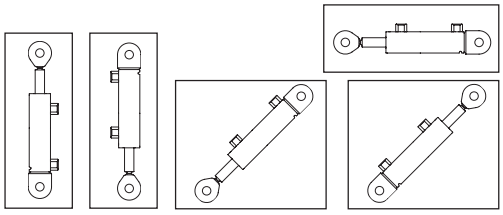
regulation on piston rod pull-out – S_1 ☐

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.