



hidravlični cilindri hydraulic cylinders

VRSTE/SERIES ME18 IN/AND ME18 Plu.



tehnični katalog
technical catalogue

MAPRO
HYDRAULIC MOVEMENT

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HIDRAVLIČNI CILINDER

Vrsta ME18

Nazivni tlak 18 MPa (180 bar)

- varjena izvedba
- enostransko delujoči z batom
- 6 pritrdilnih oblik
- premer bata od 40 mm do 160 mm
- premer batnice od 22 mm do 80 mm
- dolžina hoda do 6 m
- delovna hitrost od 0.5 m/s do 15 m/s
- delovna temperatura od -30° C do +80° C
- delovno sredstvo: mineralno hidravlično olje
- testiran v skladu z ISO 10100: 2001; Fluidna tehnika - Hidravlika - Valji - Prezemni preskusi
- tolerance vgradnih mer in hoda v skladu z ISO 6020 - 1: 2007; Fluidna tehnika - Hidravlika
- Vgradne mere valjev z enostransko batnico vrste 16 MPa (160 bar) - 1. del: Srednja vrsta
- možnosti izvedb tudi po željah kupca

HYDRAULIC CYLINDER

Series ME18

Nominal pressure 18 MPa (180 bar)

- welded version
- single acting with piston
- 6 fixation modalities
- piston diameter from 40 mm to 160 mm
- piston rod diameter from 22 mm to 80 mm
- stroke length up to 6 m
- operation speed from 0.5 m/s to 15 m/s
- working temperature range from -30° C to +80° C
- working fluid: mineral hydraulic oil
- tested in accordance to ISO 10100: 2001; Hydraulic fluid power - Cylinders - Acceptance tests
- tolerance of mounting dimensions and stroke in accordance with ISO 6020 - 1: 2007;
- Hydraulic fluid power - Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series - part 1: Medium series
- possible modifications according to Customer's order

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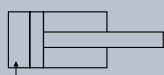
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Enostranski batni hidravlični cilindar

Enostranski batni hidravlični cilindar je izvršilna sestavina v hidravliki. Njena vstopna velikost je hidravlično olje pod tlakom, ki deluje na površino bata cilindra. S tem povzroča premočrtno gibanje bata in posledično batnice, ki je povezana z bremenom. Lastnost enostranskega batnega hidravličnega cilindra je ta, da lahko delovni gib opravlja le v eno smer - delovni gib, povratni gib pa omogoča breme, vzmet ali druga zunanja sila. Navadno je delovni gib iztegovanje cilindra, torej je cilindar potisni, lahko pa je delovni gib krčenje cilindra. Tak cilindar imenujemo vlečni cilindar. Ta katalog opisuje le potisne cilindre. Za vlečne cilindre je potrebno zahtevati povpraševanje.

Single acting piston hydraulic cylinder

Single acting piston hydraulic cylinder is executive component in hydraulics. Its input extent is represented by pressurized hydraulic fluid acting on cylinder piston surface area. This causes linear motion of the piston and consequently of piston rod, which is directly linked to the load. Characteristic of single acting piston hydraulic cylinder is that acting stroke (pushing force) is performed only in one direction, returning stroke is assured by the weight of the load, spring or third external force. Acting stroke is generally extension of the cylinder, suchlike cylinder is called pushing cylinder. On the other hand, acting stroke can be retraction of the cylinder, we call suchlike cylinder tractive cylinder. In this catalogue you will find descriptions for sole pushing cylinders. Please send inquiry for information about tracting cylinders.



Simbol enostranskega batnega hidravličnega cilindra./Feature: Single-acting piston hydraulic cylinder.

Enačbe za določitev hidravličnega cilindra

■ Enačba za določitev premera bata cilindra

Pri določevanju dimenzij enostranskega batnega hidravličnega cilindra moramo najprej poznati breme, ki ga bo cilindar premagoval. Če imamo poznano breme (potisno silo) in delovni tlak v sistemu, lahko izračunamo premer bata cilindra po enačbi 1.1. Dobljeno vrednost primerjamo s standardnimi premeri batov po katalogu. Izberemo prvo najbližjo večjo vrednost iz kataloga.

F	[N]	Želena potisna sila	Required pushing force
p	[bar]	Delovni tlak	Working pressure
D	[mm]	Premer bata	Piston diameter

Formulas to determine type of single-acting piston hydraulic cylinder

■ Formula to determine cylinder piston diameter

Prior to define dimensions of single-acting piston hydraulic cylinder one needs to know exact overcoming load parameters: when load (impetus) and working pressure within the system are known, it is possible to calculate cylinder piston diameter by means of equation 1.1. One then compares the obtained value to standard piston diameters from the catalogue and selects the first higher given value.

$$D = \sqrt{\frac{4 \times F}{0.1 \times p \times \pi}} \quad [1.1]$$

■ Enačba za določitev potrebnega pretoka hidravlične črpalke

Če imamo poznan željen čas delovnega hoda in premer bata, izračunamo potreben pretok hidravlične črpalke po enačbi 1.2.

t	[s]	Željen čas iztegovanja	Required time of extension
h	[mm]	Hod cilindra	Cylinder stroke
D	[mm]	Premer bata	Piston diameter
Q _d	[l/min]	Potreben pretok	Required fluid flow

■ Formula to determine required hydraulic pump fluid flow

When required time of working stroke is known, as well as piston diameter, it is possible to calculate needed hydraulic pump fluid flow according to equation 1.2.

$$Q_d = \frac{\pi \times D^2 \times h \times 60}{4 \times t \times 10^6} \quad [1.2]$$

■ Enačba za izračun iztislne črpalke

Ko smo izračunali potreben pretok črpalke, lahko po enačbi 1.3 izračunamo iztislino črpalke. Poznati moramo še število obratov pogonskega motorja ter volumetrični izkoristek črpalke.

Q _ε	[l/min]	Iztislina črpalke	Pump capacity (fluid pressed out)
Q	[l/min]	Pretok črpalke	Pump fluid flow
n _ε	[rpm]	Obrati pogonskega motorja	Propelling engine revolutions
η _ε	[%]	Volumetrični izkoristek črpalke	Volumetric pump capacity

■ Formula to calculate pump capacity (quantity of fluid pressed out)

Once we calculated the required hydraulic pump fluid flow, we can proceed, using the equation 1.3, to calculate the pump capacity (quantity of fluid pressed out). We furthermore need to know number of propelling motor revolutions (per minute) and volumetric productivity of the pump.

$$Q_{\epsilon} = \frac{Q \times 1000}{n_{\epsilon} \times \eta_{\epsilon}} \quad [1.3]$$

■ Enačba za izračun potrebne moči pogonskega motorja

Ko imamo izračunane vse vrednosti, lahko izračunamo še potrebno moč pogonskega motorja po enačbi 1.4. Poznati moramo tlak nastavitve varnostnega ventila (ustrezno višji od potrebnega delovnega tlaka), tok črpalke in pa skupni izkoristek črpalke.

P_{ϵ}	[Kw]	Moč pogonskega motorja	Propelling motor power
p_{ϵ}	[bar]	Tlak črpalke (nastavitev varnostnega ventila)	Pump pressure (safety valve adjustment)
Q_{ϵ}	[l/min]	Pretok črpalke	Pump fluid flow
η_s	-	Skupni izkoristek črpalke	Total pump rendition (productivity)

■ Formula to calculate required propelling engine power

Once we calculated all needed values we can now calculate required power of propelling motor by the use of equation 1.4. We need to know value of adjusted safety valve pressure (accordingly higher than required working pressure), pump fluid flow and total pump rendition.

$$P = \frac{p_{\epsilon} \times Q_{\epsilon}}{600 \times \eta_s} \quad [1.4]$$

Kontrola batnice na uklon

Določitev največjega dopustnega hoda enostranskega batnega cilindra

Pri cilindrih z daljšimi hodi je nujna kontrola na uklon.

■ Eulerjeva enačba za elastični uklon

F_k	[N]	Uklonska sila	Submittal force
F	[N]	Maksimalna sila cilindra	Maximum cylinder force
d	[mm]	Premer batnice	Piston rod diameter
E	[N/mm ²]	Modul elastičnosti za jeklo CK45 2.1×10^5 N/mm ²	Elasticity mode (for C45E steel 2.1×10^5 N/mm ²)
I_{min}	[mm ⁴]	Aksialni vztrajnostni moment batnice	Piston rod axial moment of inertia
l_0	[mm]	Prosta uklonska dolžina	Unforced submittal length
ν	-	Varnost (2÷10, navadno 3.5)	Safety (2÷10, usually 3.5)

Verification of piston rod against buckling

Defining maximum allowed cylinder stroke

In cylinders with longer strokes it is necessary to verify piston rod against buckling.

■ Euler's elastic buckling equation

$$F_k = \pi^2 \frac{E \times I_{min}}{l_0^2} \quad [1.5]$$

$$F_k = F \times \nu \quad [1.6]$$

$$I_{min} = \frac{\pi \times d^4}{64} \quad [1.7]$$

$$d = \sqrt[4]{\frac{64 \times l_0^2 \times F \times \nu}{\pi^3 \times E}} \quad [1.8]$$

l_0 za različne tipe pritrditev cilindrov:

l_0 for various modalities of cylinder fixation:

MA, MB:	$l_0 = l$	(l = razdalja med centroma ušes pri iztegnjenem cilindru)	(l = distance between both rod-end centers while cylinder extended)
MD:	$l_0 = l$	(l = razdalja med centrom tečaja in centrom ušesa pri iztegnjenem cilindru)	(l = distance between hinge center and rod-end center while cylinder extended)
ME, MF:	$l_0 = 0,7 \times l$	(l = razdalja od prirobnice do centra ušesa pri iztegnjenem cilindru)	(l = distance between cylinder bottom and rod-end center while cylinder extended)

Iz enačb 1.5, 1.6 in 1.7 izrazimo najmanjši dopustni premer batnice 1.8 pri določenem hodu.

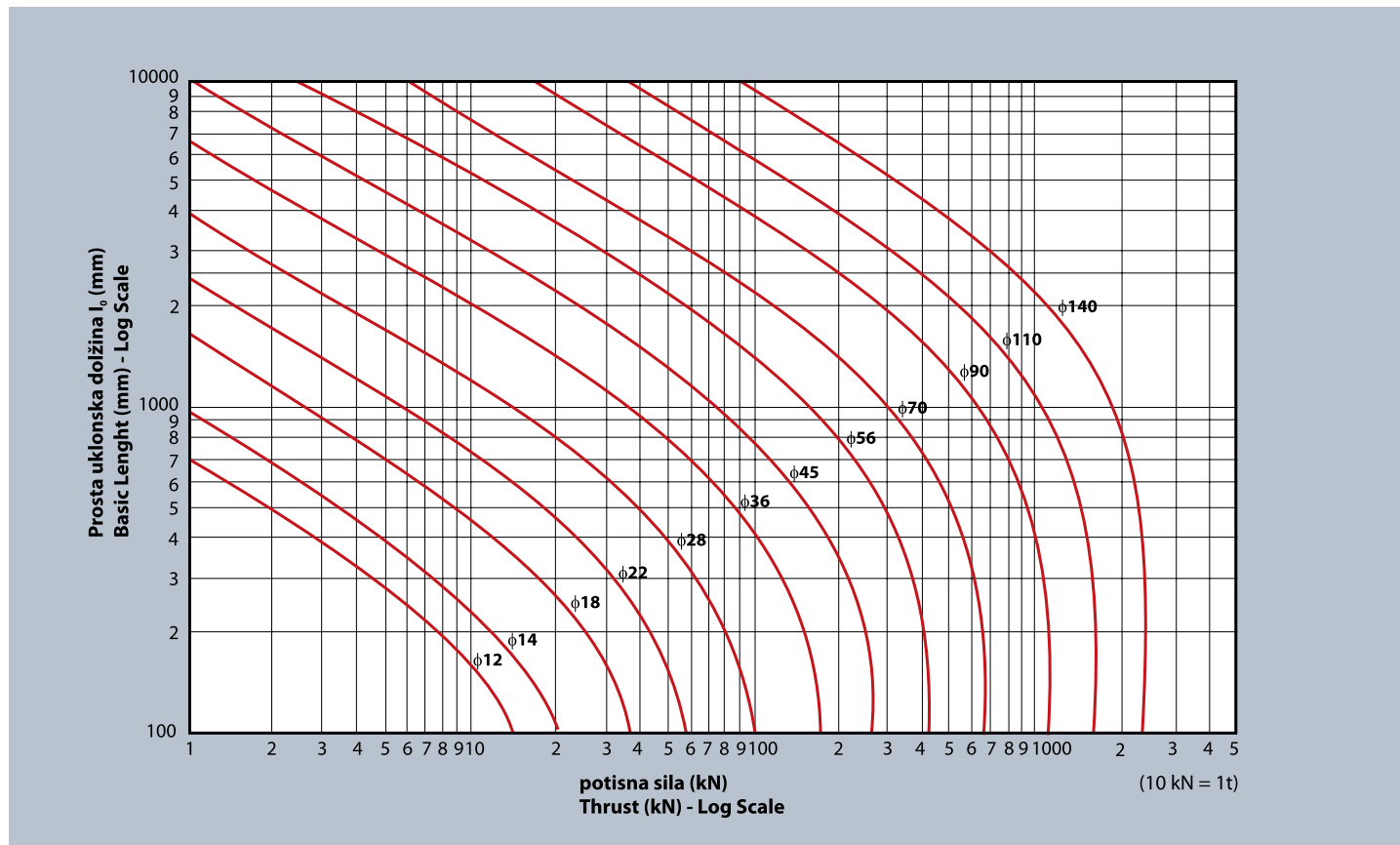
Izračunana vrednost premera batnice je zgolj orientacijska, zato je potrebno izbrati ustrezno večji premer batnice.

By means of equations 1.5, 1.6 and 1.7 define minimum admissible piston rod diameter 1.8 for given stroke.

Calculated value of piston rod diameter is merely an example, therefore an adequately larger diameter of piston rod needs to be selected.

Diagram za določanje velikosti batnice Piston Rod Selection Chart

Za enostavno kontrolo je priporočljivo uporabljati spodnji diagram (podatki v diagramu že vsebujejo faktor varnosti):
 For easy verification it is recommendable to observe the underneath diagram (given information include safety factor):



Tolerance vgradnih mer v odvisnosti od hoda za cilindre tipa **ME18**

Tolerances for mounting dimensions that are dependent on stroke for cylinders type **ME18**

Dimenzija/Dimension	ZJ ^a	ZP ^a	XO ^a	XV	WC	PJ ^a	Y
Hod/Stroke	Tolerance/Tolerances						
≤ 1250	± 1,5	± 1,5	± 1,5	± 2	± 2	± 1,5	± 2
> 1250 ≤ 3150	± 3	± 3	± 3	± 4	± 4	± 3	± 4
> 3150 ≤ 8000	± 5	± 5	± 5	± 8	± 8	± 5	± 8

^a - Dolžina vključuje hod. Tolerance hoda ne smejo biti dodane k tolerancam v tej tabeli.

^a - Length including stroke. Stroke tolerances shall not be added to the tolerances in this table.

Tolerance hoda

Tolerances on piston strokes

Hod/Stroke	Tolerance/Tolerances
≤ 1250	+ ₀ ²
> 1250 ≤ 3150	+ ₀ ⁵
> 3150 ≤ 8000	+ ₀ ⁸

Vse dimenzije so v milimetrih.

All dimensions are in millimetres.

Povzeto po standardu ISO 6020 - 1: 2007 - Fluidna tehnika - Hidravlika - Vgradne mere valjev z enostransko batnico vrste 16 MPa (160 bar) - 1. del: Srednja vrsta.
 Summarized ISO 6020 - 1: 2007 Standard - Hydraulic fluid power - Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series - part 1: Medium series.

ME18 - - / x E + - - -

Vrsta cilindra/Cylinder type

Oblike pritrditve/Mounting types

- MM - osnovna/basic
- MA - z zglobnim ležajem/with spherical bearing
- MB - z drsno pušo/with pivot lug
- MD - s tečajem/with pivot
- ME - s prirobnico spredaj/with flange front
- MF - s prirobnico zadaj/with flange rear

Premer bata/Piston

Premer batnice/Piston rod

Hod/Stroke

Pritrditev spredaj/Rod ends

0 - brez/0 - without

Poziciji priključkov/Attachments position

- spredaj (glava)/Front (head)
- zadaj (dno)/Rear (bottom)

Vrste tesnjenja/Sealing type

- P - klasično/Standard
- V - viton tesnila/Viton seals
- G - zmanjšano trenje (servokvaliteta)/Reduced friction ("Servo - quality")

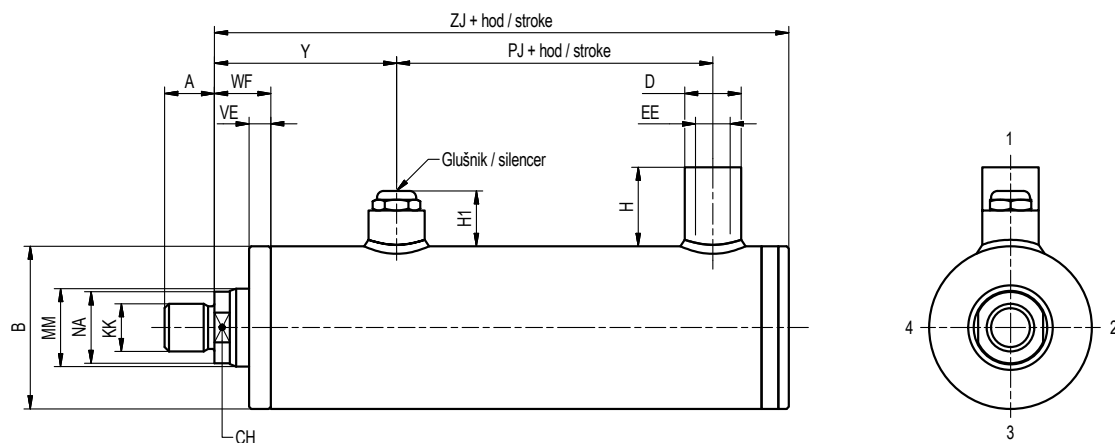
Dodatne zahteve/Additional requirements

Primer naročila/Order example

Enostransko delujoči batni hidravlični cilinder vrste ME18
Single acting piston hydraulic cylinder serie ME18

- | | |
|---|--|
| ■ Oblika pritrditve: MD - s tečajem | ■ Fixing type: MD - with pivot |
| ■ Premer bata: ϕ 100 mm | ■ Piston diameter: ϕ 100 mm |
| ■ Premer batnice: ϕ 50 mm | ■ Rod diameter: ϕ 50 mm |
| ■ Hod: 800 mm | ■ Stroke: 800 mm |
| ■ Pritrditev spredaj: MS50 U | ■ Rod end: MS50 U |
| ■ Poziciji priključkov:
- spredaj (glava) 1
- zadaj (dno) 3 | ■ Attachments position:
- Front (head) 1
- Rear (bottom) 3 |
| ■ Vrsta tesnjenja: V - viton | ■ Sealing type: V - viton |

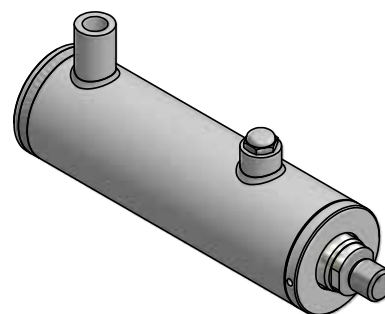
ME18 - MD - 100/50 x 800E + MS50U - 13 - V

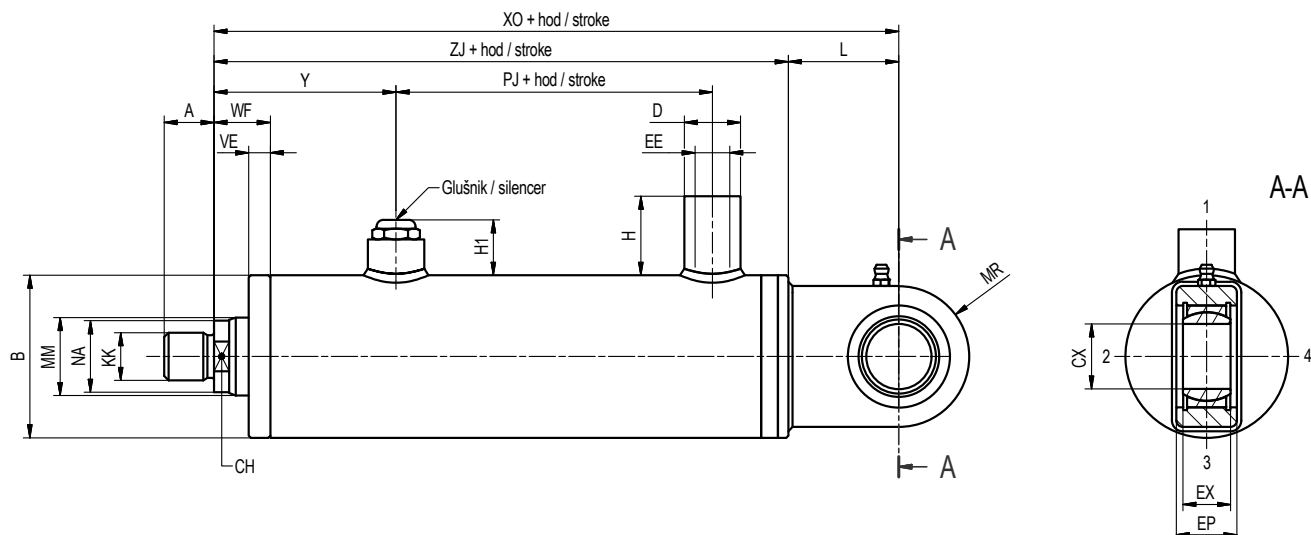


Vse dimenzije so v milimetrih./All dimensions are in millimetres.

Bat Piston Ø	MM Ø	A	B Ø	CH	D Ø	EE	KK	NA Ø	WF	VE	Y	PJ	ZJ	H1	H*
40	22/28	16	50	17	26	G 3/8	M 16×1.5	20	25	10	69	42	137	23	42
50	28/36	16	60	22	26	G 3/8	M 16×1.5	25	25	10	75	45	150	23	42
63	36/45	23	75	30	26	G 3/8	M 22×1.5	34	26	10	87	48	165	23	42
80	50	35	90	36	26	G 3/8	M 35×1.5	40	27	10	77	56	163	23	42
100	50/70	45	115	46	30	G 1/2	M 45×1.5	48/50	27	10	77	60	167	23	48
125	63/70	58	145	60	30	G 1/2	M 58×1.5	62/65	32	10	77	65	172	23	48
160	80	65	180	65	38	G 3/4	M 65×1.5	75	40	12	122	70	233	23	57

*V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.



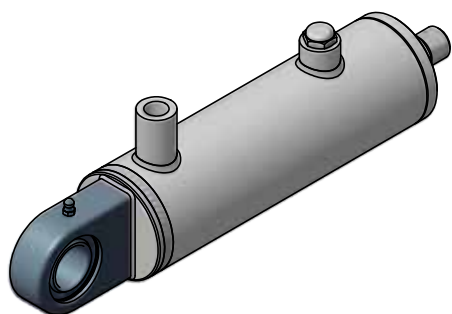


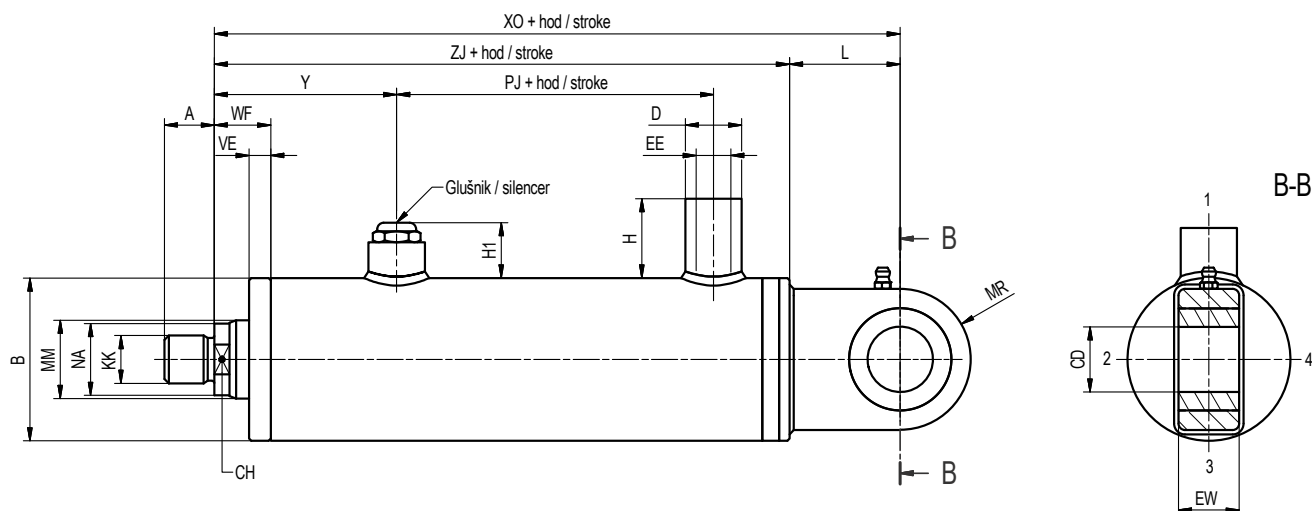
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Bat Piston Ø	XO	L	CX	EX	EP	MR
40	175	38	20	16	19	25
50	195	45	25	20	23	27.5
63	216	51	30	22	28	32.5
80	232	69	40	28	35	50
100	255	88	50	35	40	61.5
125	272	100	60	44	50	70
160	340	115	70	49	55	82



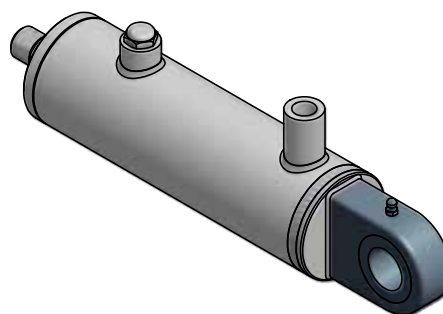


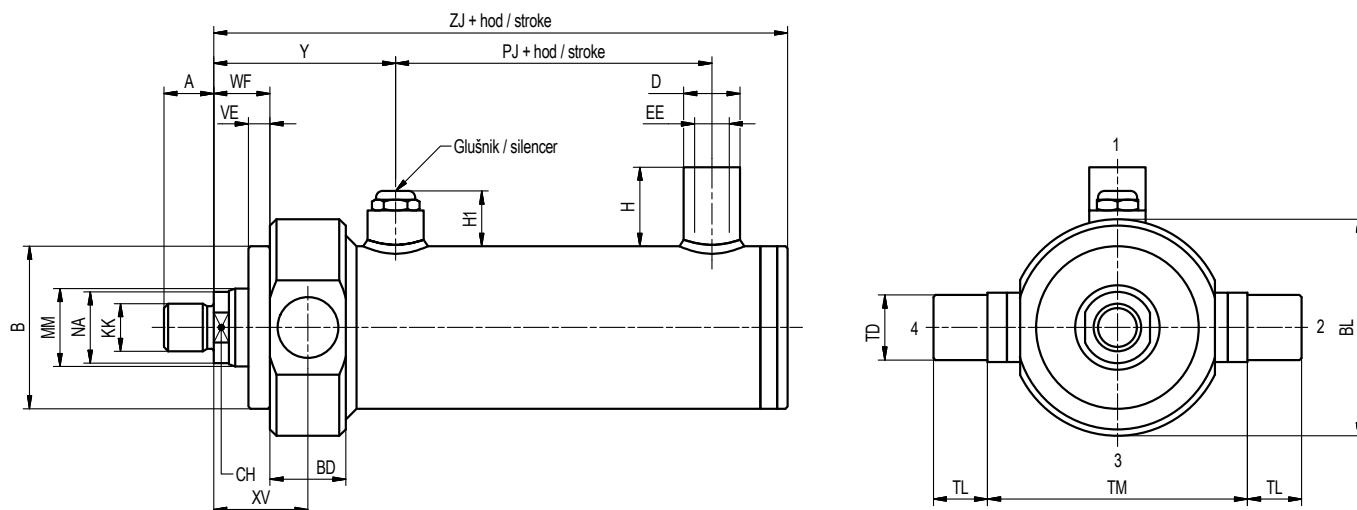
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Bat Piston Ø	MM Ø	A	B Ø	CH	D Ø	EE	KK	NA Ø	WF	VE	Y	PJ	ZJ	H1	H *
40	22/28	16	50	17	26	G 3/8	M 16×1.5	20	25	10	69	42	137	23	42
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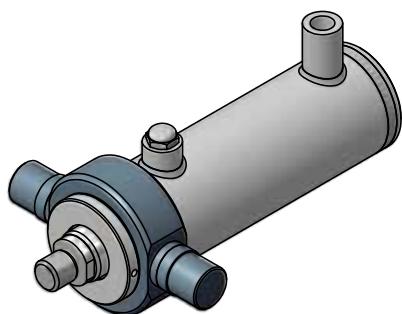


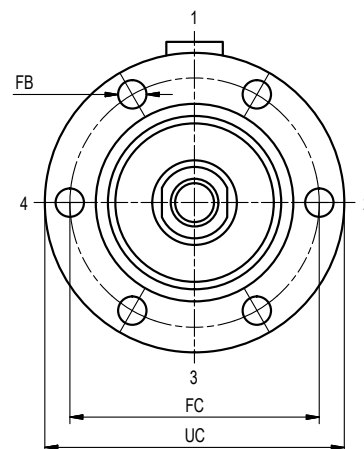
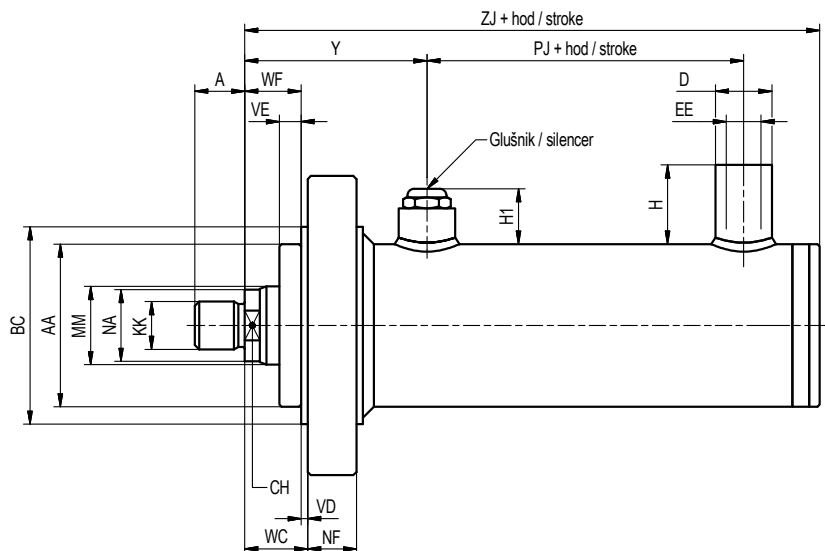
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*V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

Bat Piston Ø	XV	BD	TD Ø f8	TM	TL	BL
40	37.5	25	20	90	90	70
50	40	30	25	105	105	80
63	43.5	35	30	120	120	100
80	49.5	45	40	135	135	125
100	54.5	55	50	160	160	150
125	64.5	65	60	195	195	180
160	82.5	85	80	240	240	235



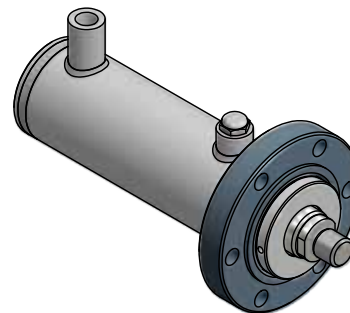


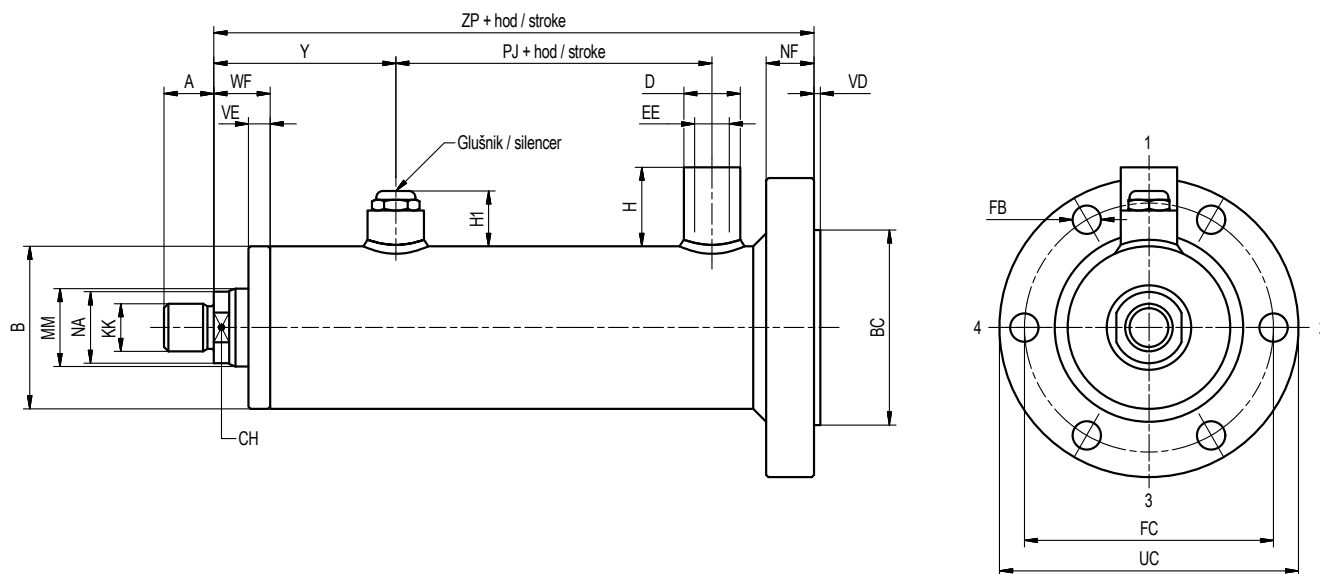
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63	36/45	23	30	26	G 3/8	M 22×1.5	34	26	10	87	48	165	23	42
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160	80	65	65	38	G 3/4	M 65×1.5	75	40	12	122	70	233	23	57

*V priključek je možno namestiti blokni ventil./Block valve can be mounted into the attachment.

Bat Piston Ø	WC	VD	NF	BC Ø e8	FC	UC	FB	AA
40	28	3	14	65	85	104	11	50
50	28	3	17	75	95	118	11	60
63	29	3	22	90	115	138	13	75
80	30	3	27	115	145	178	17	95
100	30	3	32	140	170	205	17	115
125	35	3	35	165	205	245	21	145
160	43	3	40	225	275	335	30	180



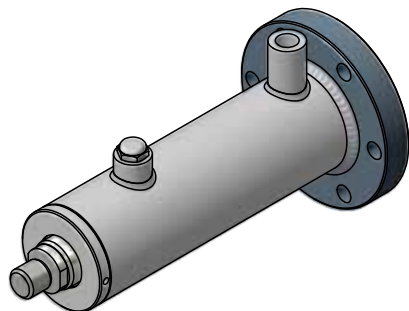


Vse dimenzije so v milimetrih./All dimensions are in millimetres.

Bat Piston Ø	MM Ø	A	B Ø	CH	D Ø	EE	KK	NA Ø	WF	VE	Y	PJ	ZP	H1	H *
40	22/28	16	50	17	26	G 3/8	M 16×1.5	20	25	10	69	42	142	23	42
50	28/36	16	60	22	26	G 3/8	M 16×1.5	25	25	10	75	45	158	23	42
63	36/45	23	75	30	26	G 3/8	M 22×1.5	34	26	10	87	48	177	23	42
80	50	35	90	36	26	G 3/8	M 35×1.5	40	27	10	77	56	178	23	42
100	50/70	45	115	46	30	G 1/2	M 45×1.5	48/50	27	10	77	60	184	23	48
125	63/70	58	145	60	30	G 1/2	M 58×1.5	62/65	32	10	77	65	187	23	48
160	80	65	180	65	38	G 3/4	M 65×1.5	75	40	12	122	70	240	23	57

*V priključek je možno namestiti blokni ventil./Block valve can be mounted into the attachment.

Bat Piston Ø	VD	NF	BC Ø e8	FC	UC	FB
40	3	14	65	85	104	11
50	3	17	75	95	118	11
63	3	22	90	115	135	13
80	3	27	115	145	178	17
100	3	32	140	170	205	17
125	3	35	165	205	245	21
160	3	40	225	275	335	30



hidravlični cilindri hydraulic cylinders

VRSTE/SERIES ME18 Plu.



MADRO
HYDRAULIC MOVEMENT



HIDRAVLIČNI CILINDER

Vrsta ME18 Plu.

Nazivni tlak 18 MPa (180 bar)

- varjena izvedba
- enostransko delujoči
- 6 pritrdilnih oblik
- premer batnice od 25 mm do 140 mm
- dolžina hoda do 6 m
- delovna hitrost od 0.5 m/s do 15 m/s
- delovna temperatura od -30° C do +80° C
- delovno sredstvo: mineralno hidravlično olje
- testiran v skladu z ISO 10100: 2001; Fluidna tehnika - Hidravlika - Valji - Prezemni preskusi
- tolerance vgradnih mer in hoda v skladu z ISO 6020 - 1: 2007; Fluidna tehnika - Hidravlika
- Vgradne mere valjev z enostransko batnico vrste 16 MPa (160 bar) - 1. del: Srednja vrsta
- možnosti izvedb tudi po željah kupca

HYDRAULIC CYLINDER

Series ME18 Plu.

Nominal pressure 18 MPa (180 bar)

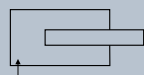
- welded version
- single acting
- 6 fixation modalities
- piston diameter from 25 mm to 140 mm
- stroke length up to 6 m
- operation speed from 0.5 m/s to 15 m/s
- working temperature range from -30° C to +80° C
- working fluid: mineral hydraulic oil
- tested in accordance to ISO 10100:2001; Hydraulic fluid power-Cylinders-Acceptance tests
- tolerance of mounting dimensions and stroke in accordance with ISO 6020 - 1: 2007;
- Hydraulic fluid power - Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series - part 1: Medium series
- possible modifications according to Customer's order

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Enostranski hidravlični cilindar

Enostranski hidravlični cilindar je izvršilna sestavina v hidravliki. Njena vstopna velikost je hidravlično olje pod tlakom, ki deluje le na površino batnice cilindra. S tem povzroča premočrtno gibanje batnice, ki je povezana z bremenom. Lastnost enostranskega hidravličnega cilindra je ta, da lahko delovni gib opravlja le v eno smer - delovni gib, povratni gib pa omogoča breme, vzmet ali druga zunanja sila.



Simbol enostranskega hidravličnega cilindra./Feature: Single-acting hydraulic cylinder.

Single acting hydraulic cylinder

Single acting hydraulic cylinder is executive component in hydraulics. Its input extent is represented by pressurized hydraulic oil acting solely on cylinder piston rod surface area. This causes linear motion of piston rod, which is directly linked to the load. Characteristic of single acting hydraulic cylinder type is that acting stroke (pushing force) is performed only in one direction, returning stroke is assured by weight of the load, spring of third external force.

Enačbe za določitev enostranskega hidravličnega cilindra

■ Enačba za določitev premera batnice cilindra

Pri določanju dimenzij enostranskega hidravličnega cilindra moramo najprej poznati breme, ki bo cilindar premagovalo.

Če imamo poznano breme (potisno silo) in delovni tlak v sistemu, lahko izračunamo premer batnice cilindra po enačbi 1.1. Dobljeno vrednost primerjamo s standardnimi premeri batnice po katalogu. Izberemo prvo najbližjo večjo vrednost iz kataloga.

F	[N]	Želena potisna sila	Required pushing force
p	[bar]	Delovni tlak	Working pressure
D	[mm]	Premer batnice	Piston rod diameter

Formulas to determine type of single-action hydraulic cylinder

■ Formula to determine cylinder piston rod diameter

Prior to define dimensions of hydraulic cylinder one needs to know exact overcoming load parameters: when load (impetus) and working pressure within the system are known, it is possible to calculate cylinder piston rod diameter by means of equation 1.1. One then compares the obtained value to standard piston rod diameters from the catalogue and selects the first higher given value.

$$D = \sqrt{\frac{4 \times F}{0.1 \times p \times \pi}} \quad [1.1]$$

■ Enačba za določitev potrebnega pretoka hidravlične črpalke

Če imamo poznan željen čas delovnega hoda in premer batnice, izračunamo potreben pretok hidravlične črpalke po enačbi 1.2.

t	[s]	Željen čas iztegovanja	Required time of extension/retraction
h	[mm]	Hod cilindra	Cylinder stroke
D	[mm]	Premer batnice	Piston rod diameter
Q _d	[l/min]	Potreben pretok	Required fluid flow during extension

■ Formula to determine required hydraulic pump fluid flow

When required time of working stroke is known, as well as piston rod diameter, it is possible to calculate needed hydraulic pump fluid flow according to equation 1.2.

$$Q_d = \frac{\pi \times D^2 \times h \times 60}{4 \times t \times 10^6} \quad [1.2]$$

■ Enačba za izračun iztisnine črpalke

Ko smo izračunali potreben pretok črpalke, lahko po enačbi 1.3 izračunamo iztisnino črpalke. Poznati moramo še število obratov pogonskega motorja ter volumetrični izkoristek črpalke.

Q _č	[s]	Iztisnina črpalke	Pump capacity (fluid pressed out)
Q	[l/min]	Pretok črpalke	Pump fluid flow
n _č	vrt/min	Obrati pogonskega motorja	Propelling engine revolutions
η _č	-	Volumetrični izkoristek črpalke	Volumetric pump capacity

■ Formula to calculate pump capacity (quantity of fluid pressed out)

Once we calculated the required hydraulic pump fluid flow, we can proceed, using the equation 1.3, to calculate the pump capacity (quantity of fluid pressed out). We furthermore need to know number of propelling motor revolutions (per minute) and volumetric productivity of the pump.

$$q_{\dot{c}} = \frac{Q \times 1000}{n_{\dot{c}} \times \eta_{\dot{c}}} \quad [1.3]$$

■ **Enačba za izračun potrebne moči pogonskega motorja**

Ko imamo izračunane vse vrednosti, lahko izračunamo še potrebno moč pogonskega motorja po enačbi 1.4. Poznati moramo tlak nastavitve varnostnega ventila (ustrezno višji od potrebnega delovnega tlaka), tok črpalke in pa skupni izkoristek črpalke.

P	[Kw]	Moč pogonskega motorja	Propelling motor power
p_c	[bar]	Tlak črpalke (nastavitev varnostnega ventila)	Pump pressure (safety valve adjustment)
Q_c	[l/min]	Pretok črpalke	Pump fluid flow
η_s	-	Skupni izkoristek črpalke	Total pump rendition (productivity)

■ **Formula to calculate required propelling engine power**

Once we calculated all needed values we can now calculate required power of propelling motor by the use of equation 1.4. We need to know value of adjusted safety valve pressure (accordingly higher than required working pressure), pump fluid flow and total pump rendition.

$$P = \frac{p_c \times Q_c}{600 \times \eta_s} \quad [1.4]$$

Kontrola batnice na uklon

Določitev največjega dopustnega hoda cilindra

Pri cilindrih z daljšimi hodi je nujna kontrola na uklon.

■ **Eulerjeva enačba za elastični uklon**

F_k	[N]	Uklonska sila	Submittal force
F	[N]	Maksimalna sila cilindra	Maximum cylinder force
d	[mm]	Premer batnice	Piston rod diameter
E	[N/mm ²]	Modul elastičnosti za jeklo CK45 2.1×10^5 N/mm ²	Elasticity mode (for C45E steel 2.1×10^5 N/mm ²)
I_{min}	[mm ⁴]	Aksialni vztrajnostni moment batnice	Piston rod axial moment of inertia
l_0	[mm]	Prosta uklonska dolžina	Unforced submittal length
ν	-	Varnost (2÷10, navadno 3.5)	Safety (2÷10, usually 3.5)

Verification of piston rod against buckling

Defining maximum allowed cylinder stroke

In cylinders with longer strokes it is necessary to verify piston rod against buckling.

■ **Euler's elastic buckling equation**

$$F_k = \pi^2 \frac{E \times I_{min}}{l_0^2} \quad [1.5]$$

$$F_k = F \times \nu \quad [1.6]$$

$$I_{min} = \frac{\pi \times d^4}{64} \quad [1.7]$$

$$d = \sqrt[4]{\frac{64 \times l_0^2 \times F \times \nu}{\pi^3 \times E}} \quad [1.8]$$

l_0 za različne tipe pritrditev cilindrov:

l_0 for various modalities of cylinder fixation:

MA, MB:	$l_0 = l$	(l = razdalja med centroma ušes pri iztegnjenem cilindru)	(l = distance between both rod-end centers while cylinder extended)
MD:	$l_0 = l$	(l = razdalja med centrom tečaja in centrom ušesa pri iztegnjenem cilindru)	(l = distance between hinge center and rod-end center while cylinder extended)
ME, MF:	$l_0 = 0,7 \times l$	(l = razdalja od prirobnice do centra ušesa pri iztegnjenem cilindru)	(l = distance between cylinder bottom and rod-end center while cylinder extended)

Iz enačb 1.5 , 1.6 in 1.7 izrazimo najmanjši dopustni premer batnice 1.8 pri določenem hodu.

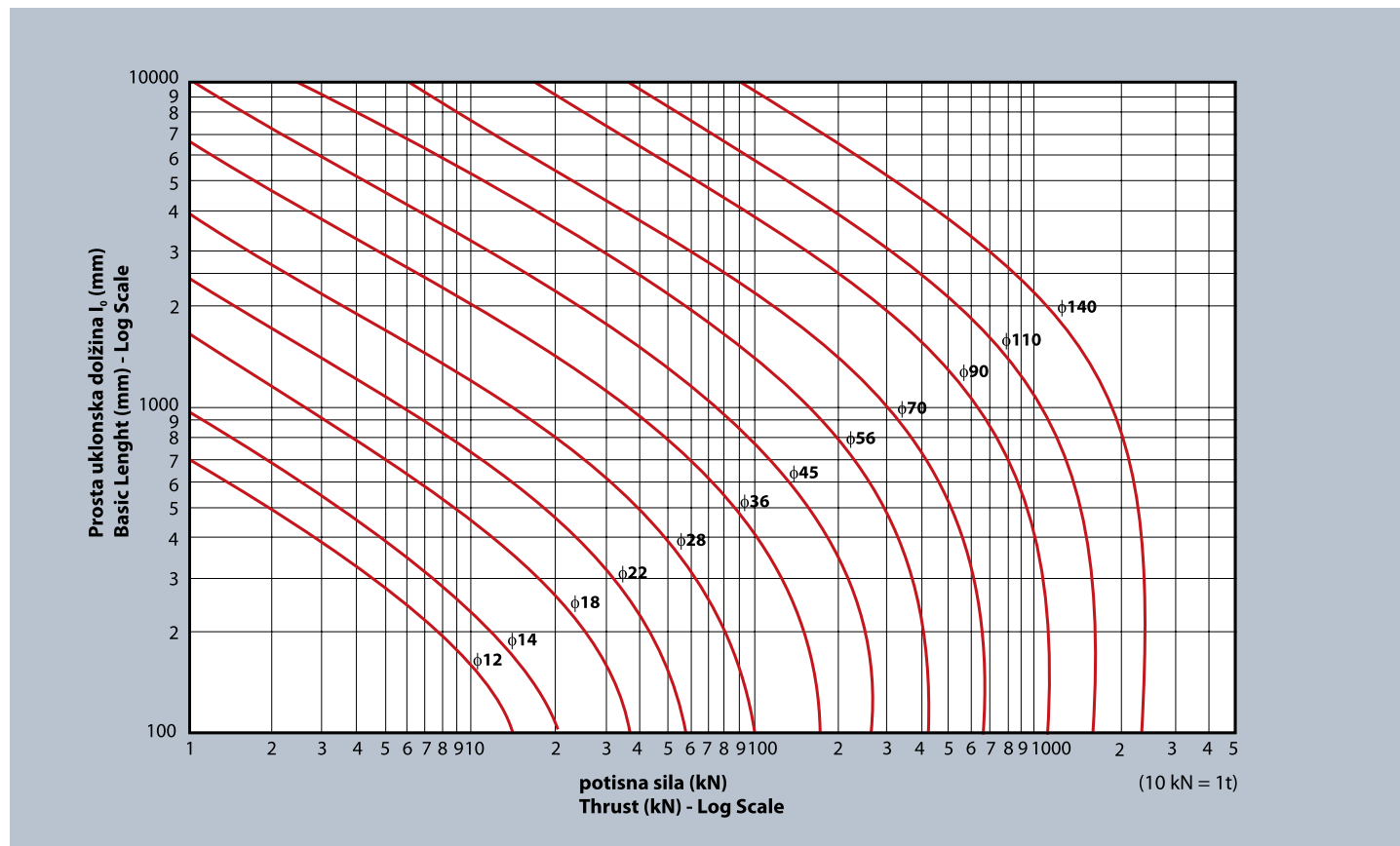
Izračunana vrednost premera batnice je zgolj orientacijska, zato je potrebno izbrati ustrezno večji premer batnice.

By means of equations 1.5 , 1.6 and 1.7 define minimum admissible piston rod diameter 1.8 for given stroke.

Calculated value of piston rod diameter is merely an example, therefore anadequately larger diameter of piston rod needs to be selected.

Diagram za določanje velikosti batnice Piston Rod Selection Chart

Za enostavno kontrolo je priporočljivo uporabljati spodnji diagram (podatki v diagramu že vsebujejo faktor varnosti):
 For easy verification it is recommendable to observe the underneath diagram (given information include safety factor):



Tolerance vgradnih mer v odvisnosti od hoda za cilindre tipa **ME18 Plu**.

Tolerances for mounting dimensions that are dependent on stroke for cylinders type **ME18 Plu**.

Dimenzija/Dimension	ZJ ^a	ZP ^a	XO ^a	XV	WC	PJ ^a	Y
Hod/Stroke	Tolerance/Tolerances						
≤ 1250	± 1,5	± 1,5	± 1,5	± 2	± 2	± 1,5	± 2
> 1250 ≤ 3150	± 3	± 3	± 3	± 4	± 4	± 3	± 4
> 3150 ≤ 8000	± 5	± 5	± 5	± 8	± 8	± 5	± 8

^a - Dolžina vključuje hod. Tolerance hoda ne smejo biti dodane k tolerancam v tej tabeli.

^a - Length including stroke. Stroke tolerances shall not be added to the tolerances in this table.

Tolerance hoda

Tolerances on piston strokes

Hod/Stroke	Tolerance/Tolerances
≤ 1250	$\begin{matrix} +2 \\ 0 \end{matrix}$
> 1250 ≤ 3150	$\begin{matrix} +5 \\ 0 \end{matrix}$
> 3150 ≤ 8000	$\begin{matrix} +8 \\ 0 \end{matrix}$

Vse dimenzije so v milimetrih.

All dimensions are in millimetres.

Povzeto po standardu ISO 6020 - 1: 2007 - Fluidna tehnika - Hidravlika - Vgradne mere valjev z enostransko batnico vrste 16 MPa (160 bar) - 1. del: Srednja vrsta.
 Summarized ISO 6020 - 1: 2007 Standard - Hydraulic fluid power - Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series - part 1: Medium series.

ME18 - Plu x + - - -

Vrsta cilindra/Cylinder type

Oblike pritrditve/Mounting types

- MM - osnovna/basic
- MA - z zglobnim ležajem/with spherical bearing
- MB - z drsno pušo/with pivot lug
- MD - s tečajem/with pivot
- ME - s prirobnico spredaj/with flange front
- MF - s prirobnico zadaj/with flange rear

Premer batnice/Piston rod

Hod/Stroke

Pritrditev spredaj/Rod ends

0 - brez/0 - without

Poziciji priključkov/Attachments position

- spredaj (glava)/Front (head)
- zadaj (dno)/Rear (bottom)

Vrste tesnjenja/Sealing type

- P - klasično/Standard
- V - viton tesnila/Viton seals
- G - zmanjšano trenje (servokvaliteta)/Reduced friction ("Servo-quality")

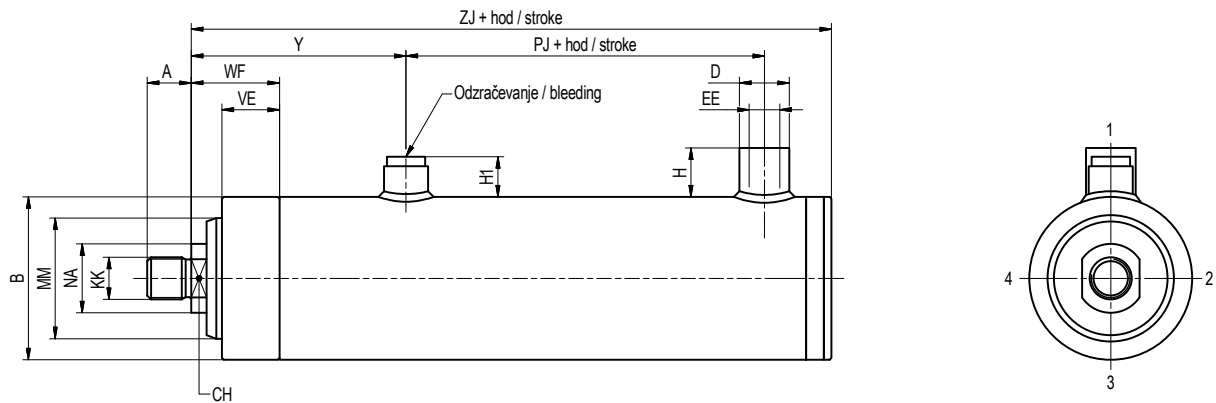
Dodatne zahteve/Additional requirements

Primer naročila/Order example

Enostransko delujoči hidravlični cilinder vrste **ME18 Plu**.
Single acting hydraulic cylinder serie **ME18 Plu**.

- | | |
|---|--|
| ■ Oblika pritrditve: ME - s prirobnico spredaj | ■ Fixing type: ME - with flange front |
| ■ Premer batnice: φ 63 mm | ■ Piston diameter: φ 63 mm |
| ■ Hod: 100 mm | ■ Rod diameter: 100 mm |
| ■ Pritrditev spredaj: brez | ■ Rod end: without |
| ■ Poziciji priključkov:
- spredaj (glava) 1
- zadaj (dno) 3 | ■ Attachments position:
- Front (head) 1
- Rear (bottom) 3 |
| ■ Vrsta tesnjenja: V - viton | ■ Sealing type: V - viton |

ME18 - ME Plu. 63 x 100 - 0 - 13 - V



Vse dimenzije so v milimetrih./All dimensions are in millimetres.

MM Ø	A	B Ø	CH	H *	H	H1 max	D Ø	EE	KK	NA	WF	VE	Y ± 5	PJ ** ± 5	ZJ **	V **
25	17	50	12	37	15	21	20	G 1/4	M 12x1.25	14	25	10	65	0	85	25
32	19	60	15	37	15	21	20	G 1/4	M 14x1.5	17	25	10	70	0	90	25
40	16	60	22	42	16	21	26	G 3/8	M 16x1.5	25	40	25	88	0	110	30
50	16	75	22	42	16	21	26	G 3/8	M 16x1.5	25	45	30	91	0	113	35
63	23	85	30	42	16	21	26	G 3/8	M 22x1.5	34	46	30	112	0	134	35
70	35	95	36	42	16	21	26	G 3/8	M 35x1.5	40	47	30	112	0	134	35
80	35	105	36	42	16	21	26	G 3/8	M 35x1.5	40	49	30	112	0	134	40
100	45	140	46	48	18	21	30	G 1/2	M 45x1.5	50	52	35	137	0	163	40
125	58	165	60	57	21	21	38	G 3/4	M 58x1.5	65	55	35	155	0	182	40
140	65	190	65	57	21	21	38	G 3/4	M 65x1.5	70	55	35	165	0	206	60

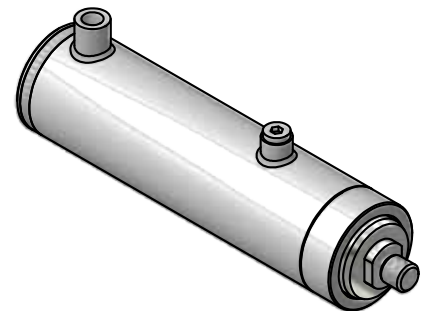
* V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

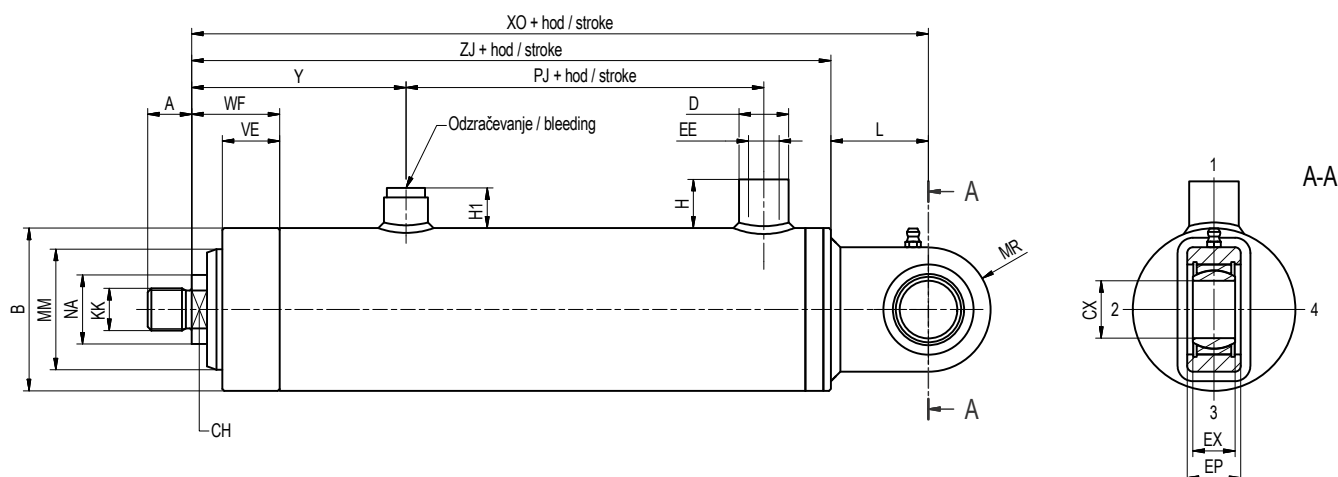
** Če je hod manjši od 50 mm, se vgradnji meri ZJ in PJ podaljšata za hod - 50mm.

** Pri hodu nad 500 mm se vgradni meri ZJ in PJ podaljšata za dolžino V, zaradi dodatnega vodenja batnice.

** In strokes shorter than 50 mm, mounting dimensions ZJ and PJ shall lengthen by the length of the stroke - 50mm.

** In strokes exceeding 500 mm, mounting dimensions ZJ and PJ shall lengthen by the length V, due to additional piston rod guidance.





Vse dimenzije so v milimetrih./All dimensions are in millimetres.

MM Ø	A	B Ø	CH	H *	H	H1 max	D Ø	EE	KK	NA	WF	VE	Y ± 5	PJ ** ± 5	ZJ **	V **
25	17	50	12	37	15	21	20	G 1/4	M 12x1.25	14	25	10	65	0	85	25
32	19	60	15	37	15	21	20	G 1/4	M 14x1.5	17	25	10	70	0	90	25
40	16	60	22	42	16	21	26	G 3/8	M 16x1.5	25	40	25	88	0	110	30
50	16	75	22	42	16	21	26	G 3/8	M 16x1.5	25	45	30	91	0	113	35
63	23	85	30	42	16	21	26	G 3/8	M 22x1.5	34	46	30	112	0	134	35
70	35	95	36	42	16	21	26	G 3/8	M 35x1.5	40	47	30	112	0	134	35
80	35	105	36	42	16	21	26	G 3/8	M 35x1.5	40	49	30	112	0	134	40
100	45	140	46	48	18	21	30	G 1/2	M 45x1.5	50	52	35	137	0	163	40
125	58	165	60	57	21	21	38	G 3/4	M 58x1.5	65	55	35	155	0	182	40
140	65	190	65	57	21	21	38	G 3/4	M 65x1.5	70	55	35	165	0	206	60

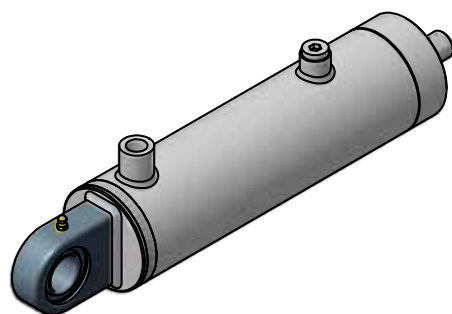
* V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

** Če je hod manjši od 50 mm, se vgradnji meri XO, ZJ in PJ podaljšata za hod - 50mm.

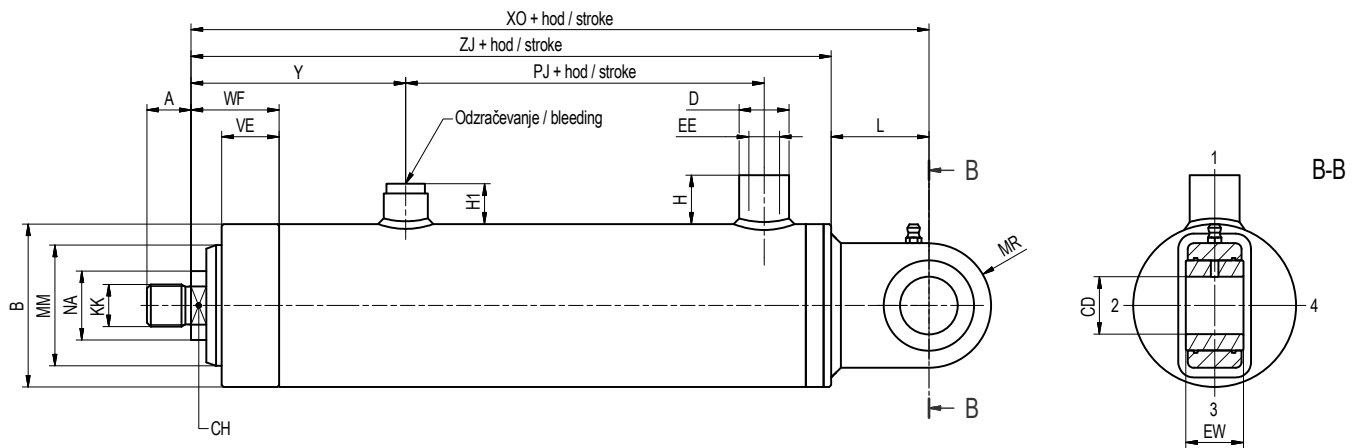
** Pri hodu nad 500 mm se vgradnji meri XO, ZJ in PJ podaljšata za dolžino V, zaradi dodatnega vodenja batnice.

** In strokes shorter than 50 mm, mounting dimensions XO, ZJ and PJ shall lengthen by the length of the stroke - 50mm.

** In strokes exceeding 500 mm, mounting dimensions XO, ZJ and PJ shall lengthen by the length V, due to additional piston rod guidance.



MM Ø	XO	L	CX Ø	EX	EP	MR
25	101	16	12	12	10	16
32	110	20	16	16	14	20
40	148	38	20	16	19	25
50	158	45	25	20	23	27.5
63	185	51	30	22	28	32.5
70	185	51	30	22	28	32.5
80	203	69	40	28	35	50
100	251	88	50	35	40	61.5
125	282	100	60	44	50	70
140	321	115	70	49	55	82



Vse dimenzije so v milimetrih./All dimensions are in millimetres.

MM Ø	A	B Ø	CH	H *	H	H1 max	D Ø	EE	KK	NA	WF	VE	Y ± 5	PJ ** ± 5	ZJ **	V **
25	17	50	12	37	15	21	20	G 1/4	M 12x1.25	14	25	10	65	0	85	25
32	19	60	15	37	15	21	20	G 1/4	M 14x1.5	17	25	10	70	0	90	25
40	16	60	22	42	16	21	26	G 3/8	M 16x1.5	25	40	25	88	0	110	30
50	16	75	22	42	16	21	26	G 3/8	M 16x1.5	25	45	30	91	0	113	35
63	23	85	30	42	16	21	26	G 3/8	M 22x1.5	34	46	30	112	0	134	35
70	35	95	36	42	16	21	26	G 3/8	M 35x1.5	40	47	30	112	0	134	35
80	35	105	36	42	16	21	26	G 3/8	M 35x1.5	40	49	30	112	0	134	40
100	45	140	46	48	18	21	30	G 1/2	M 45x1.5	50	52	35	137	0	163	40
125	58	165	60	57	21	21	38	G 3/4	M 58x1.5	65	55	35	155	0	182	40
140	65	190	65	57	21	21	38	G 3/4	M 65x1.5	70	55	35	165	0	206	60

* V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

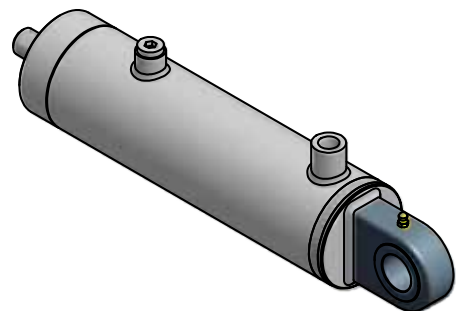
** Če je hod manjši od 50 mm, se vgradnji meri XO, ZJ in PJ podaljšata za hod - 50mm.

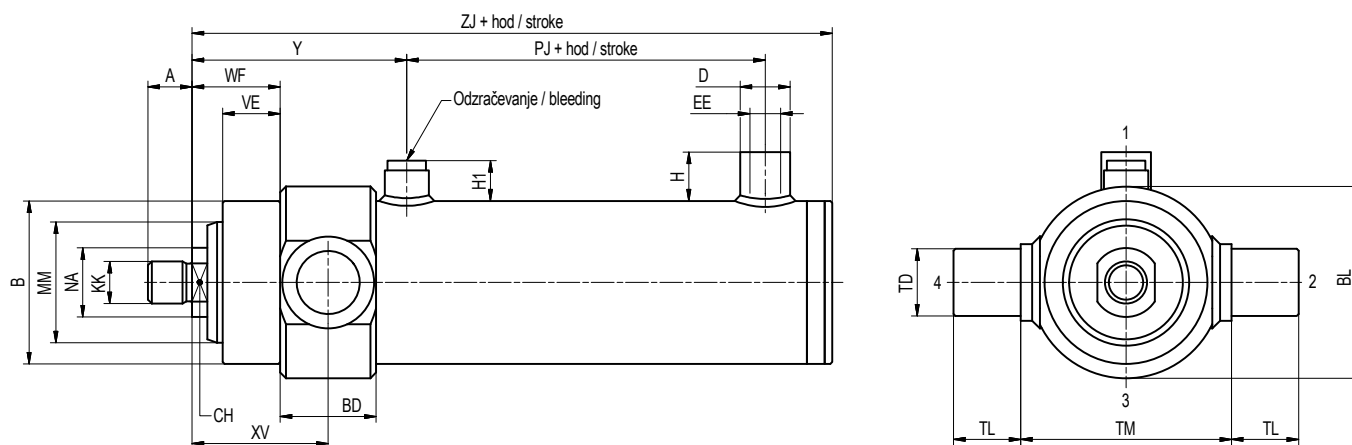
** Pri hodu nad 500 mm se vgradni meri XO, ZJ in PJ podaljšata za dolžino V, zaradi dodatnega vodenja batnice.

** In strokes shorter than 50 mm, mounting dimensions XO, ZJ and PJ shall lengthen by the length of the stroke - 50mm.

** In strokes exceeding 500 mm, mounting dimensions XO, ZJ and PJ shall lengthen by the length V, due to additional piston rod guidance.

MM Ø	XO	L	CD Ø	EW	MR
25	101	16	12	12	16
32	110	20	16	16	20
40	148	38	20	20	25
50	158	45	25	25	27.5
63	185	51	30	30	32.5
70	185	51	30	30	32.5
80	203	69	40	40	50
100	251	88	50	50	61.5
125	282	100	60	60	70
140	321	115	70	70	82





Vse dimenzije so v milimetrih./All dimensions are in millimetres.

MM Ø	A	B Ø	CH	H *	H	H1 max	D Ø	EE	KK	NA	WF	VE	Y ± 5	PJ ** ± 5	ZJ **	V **
25	17	50	12	37	15	21	20	G 1/4	M 12x1.25	14	25	10	65	0	85	25
32	19	60	15	37	15	21	20	G 1/4	M 14x1.5	17	25	10	70	0	90	25
40	16	60	22	42	16	21	26	G 3/8	M 16x1.5	25	40	25	88	0	110	30
50	16	75	22	42	16	21	26	G 3/8	M 16x1.5	25	45	30	91	0	113	35
63	23	85	30	42	16	21	26	G 3/8	M 22x1.5	34	46	30	112	0	134	35
70	35	95	36	42	16	21	26	G 3/8	M 35x1.5	40	47	30	112	0	134	35
80	35	105	36	42	16	21	26	G 3/8	M 35x1.5	40	49	30	112	0	134	40
100	45	140	46	48	18	21	30	G 1/2	M 45x1.5	50	52	35	137	0	163	40
125	58	180	60	57	21	21	38	G 3/4	M 58x1.5	65	55	35	155	0	182	40
140	65	190	65	57	21	21	38	G 3/4	M 65x1.5	70	55	35	165	0	206	60

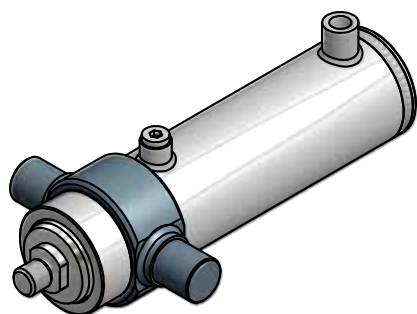
* V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

** Če je hod manjši od 50 mm, se vgradnji meri ZJ in PJ podaljšata za hod - 50mm.

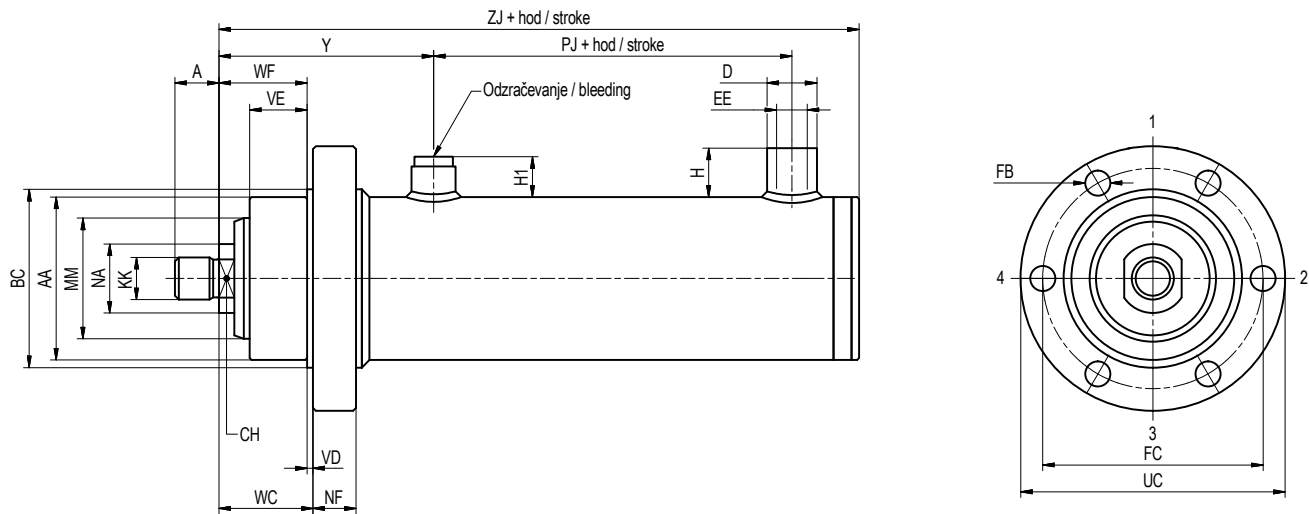
** Pri hodu nad 500 mm se vgradni meri ZJ in PJ podaljšata za dolžino V, zaradi dodatnega vodenja batnice.

** In strokes shorter than 50 mm, mounting dimensions ZJ and PJ shall lengthen by the length of the stroke - 50mm.

** In strokes exceeding 500 mm, mounting dimensions ZJ and PJ shall lengthen by the length V, due to additional piston rod guidance.



MM Ø	XV	BD	TD Ø f8	TM	TL	BL
25	37.5	25	20	90	16	70
32	40	30	25	105	20	80
40	55	30	25	105	20	80
50	62.5	35	30	120	25	100
63	63.5	35	30	120	25	110
70	69.5	45	40	135	32	125
80	71.5	45	40	135	32	135
100	84.5	65	60	195	50	180
125	97.5	85	80	240	60	235
140	97.5	85	80	240	60	235



Vse dimenzije so v milimetrih./All dimensions are in millimetres.

MM Ø	A	CH	H *	H	H1 max	D Ø	EE	KK	NA	WF	VE	Y ± 5	PJ ** ± 5	ZJ **	V **
25	17	12	37	15	21	20	G 1/4	M 12x1.25	14	25	10	65	0	85	25
32	19	15	37	15	21	20	G 1/4	M 14x1.5	17	25	10	70	0	90	25
40	16	22	42	16	21	26	G 3/8	M 16x1.5	25	40	25	88	0	110	30
50	16	22	42	16	21	26	G 3/8	M 16x1.5	25	45	30	91	0	113	35
63	23	30	42	16	21	26	G 3/8	M 22x1.5	34	46	30	112	0	134	35
70	35	36	42	16	21	26	G 3/8	M 35x1.5	40	47	30	112	0	134	35
80	35	36	42	16	21	26	G 3/8	M 35x1.5	40	49	30	112	0	134	40
100	45	46	48	18	21	30	G 1/2	M 45x1.5	50	52	35	137	0	163	40
125	58	60	57	21	21	38	G 3/4	M 58x1.5	65	55	35	155	0	182	40
140	65	65	57	21	21	38	G 3/4	M 65x1.5	70	55	35	165	0	206	60

* V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

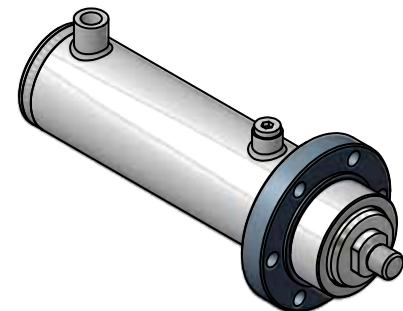
** Če je hod manjši od 50 mm, se vgradnji meri ZJ in PJ podaljšata za hod - 50mm.

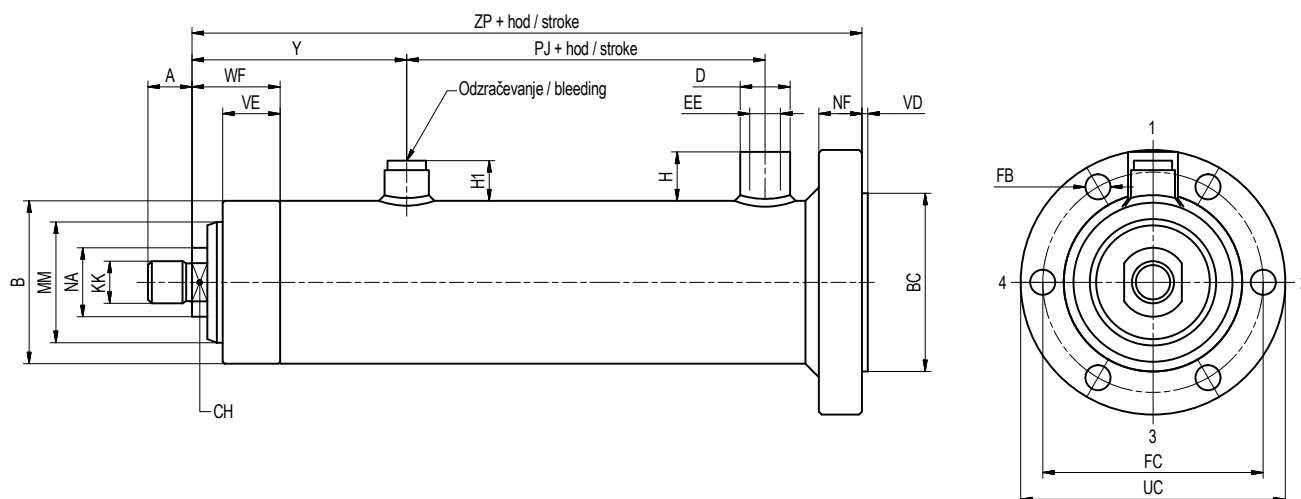
** Pri hodu nad 500 mm se vgradnji meri ZJ in PJ podaljšata za dolžino V, zaradi dodatnega vodenja batnice.

** In strokes shorter than 50 mm, mounting dimensions ZJ and PJ shall lengthen by the length of the stroke - 50mm.

** In strokes exceeding 500 mm, mounting dimensions ZJ and PJ shall lengthen by the length V, due to additional piston rod guidance.

MM Ø	WC	VD	NF	BC Ø e8	FC	UC	FB	AA
25	28	3	14	65	85	104	11	50
32	28	3	17	75	95	118	11	60
40	43	3	17	75	95	118	11	60
50	48	3	22	90	115	138	13	75
63	49	3	25	100	125	158	13	85
70	50	3	27	115	145	178	17	95
80	52	3	27	125	155	188	17	105
100	55	3	35	165	205	245	21	140
125	58	3	40	225	275	335	30	180
140	58	3	40	225	275	335	30	190





Vse dimenzije so v milimetrih./All dimensions are in millimetres.

MM Ø	A	B Ø	CH	H *	H	H1 max	D Ø	EE	KK	NA	WF	VE	Y ± 5	PJ ** ± 5	V **
25	17	50	12	37	15	21	20	G 1/4	M 12x1.25	14	25	10	65	0	25
32	19	60	15	37	15	21	20	G 1/4	M 14x1.5	17	25	10	70	0	25
40	16	60	22	42	16	21	26	G 3/8	M 16x1.5	25	40	25	88	0	30
50	16	75	22	42	16	21	26	G 3/8	M 16x1.5	25	45	30	91	0	35
63	23	85	30	42	16	21	26	G 3/8	M 22x1.5	34	46	30	112	0	35
70	35	95	36	42	16	21	26	G 3/8	M 35x1.5	40	47	30	112	0	35
80	35	105	36	42	16	21	26	G 3/8	M 35x1.5	40	49	30	112	0	40
100	45	140	46	48	18	21	30	G 1/2	M 45x1.5	50	52	35	137	0	40
125	58	180	60	57	21	21	38	G 3/4	M 58x1.5	65	55	35	155	0	40
140	65	190	65	57	21	21	38	G 3/4	M 65x1.5	70	55	35	165	0	60

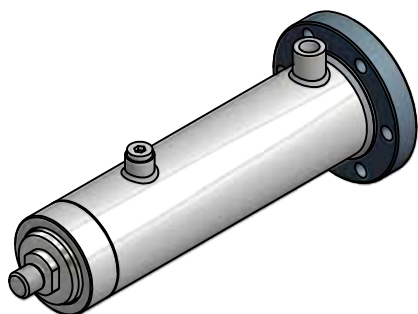
* V priključek je možno namestiti blokirni ventil./Block valve can be mounted into the attachment.

** Če je hod manjši od 50 mm, se vgradnji meri ZP in PJ podaljšata za hod - 50mm.

** Pri hodu nad 500 mm se vgradni meri ZP in PJ podaljšata za dolžino V, zaradi dodatnega vodenja batnice.

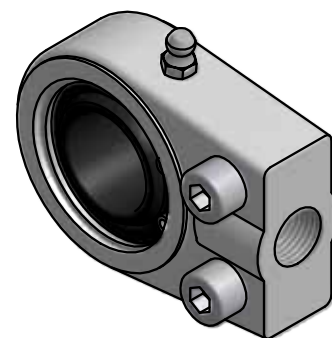
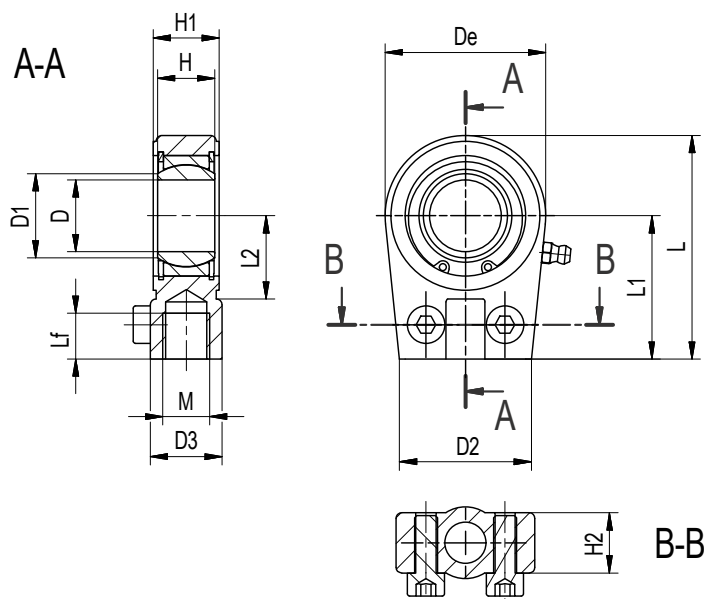
** In strokes shorter than 50 mm, mounting dimensions ZP and PJ shall lengthen by the length of the stroke - 50mm.

** In strokes exceeding 500 mm, mounting dimensions ZP and PJ shall lengthen by the length V, due to additional piston rod guidance.

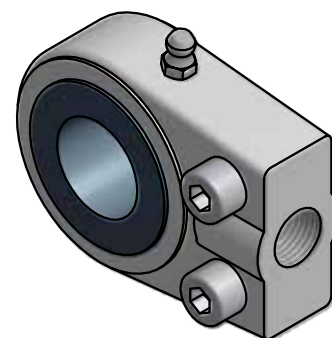
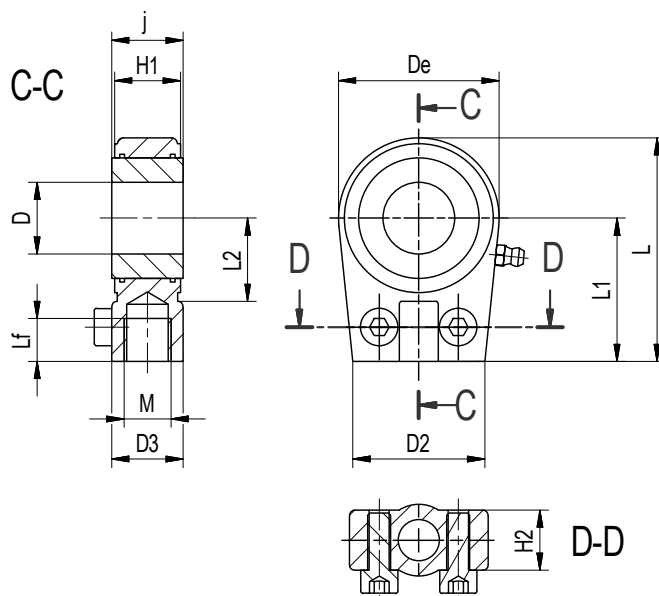


MM Ø	ZP **	VD	NF	BC Ø e8	FC	UC	FB
25	90	3	14	65	85	104	11
32	98	3	17	75	95	118	11
40	118	3	17	75	95	118	11
50	125	3	22	90	115	138	13
63	149	3	25	100	125	158	13
70	149	3	27	115	145	178	17
80	149	3	27	125	155	188	17
100	186	3	35	165	205	245	21
125	209	3	40	225	275	335	30
140	221	3	40	225	275	335	30

MS_U

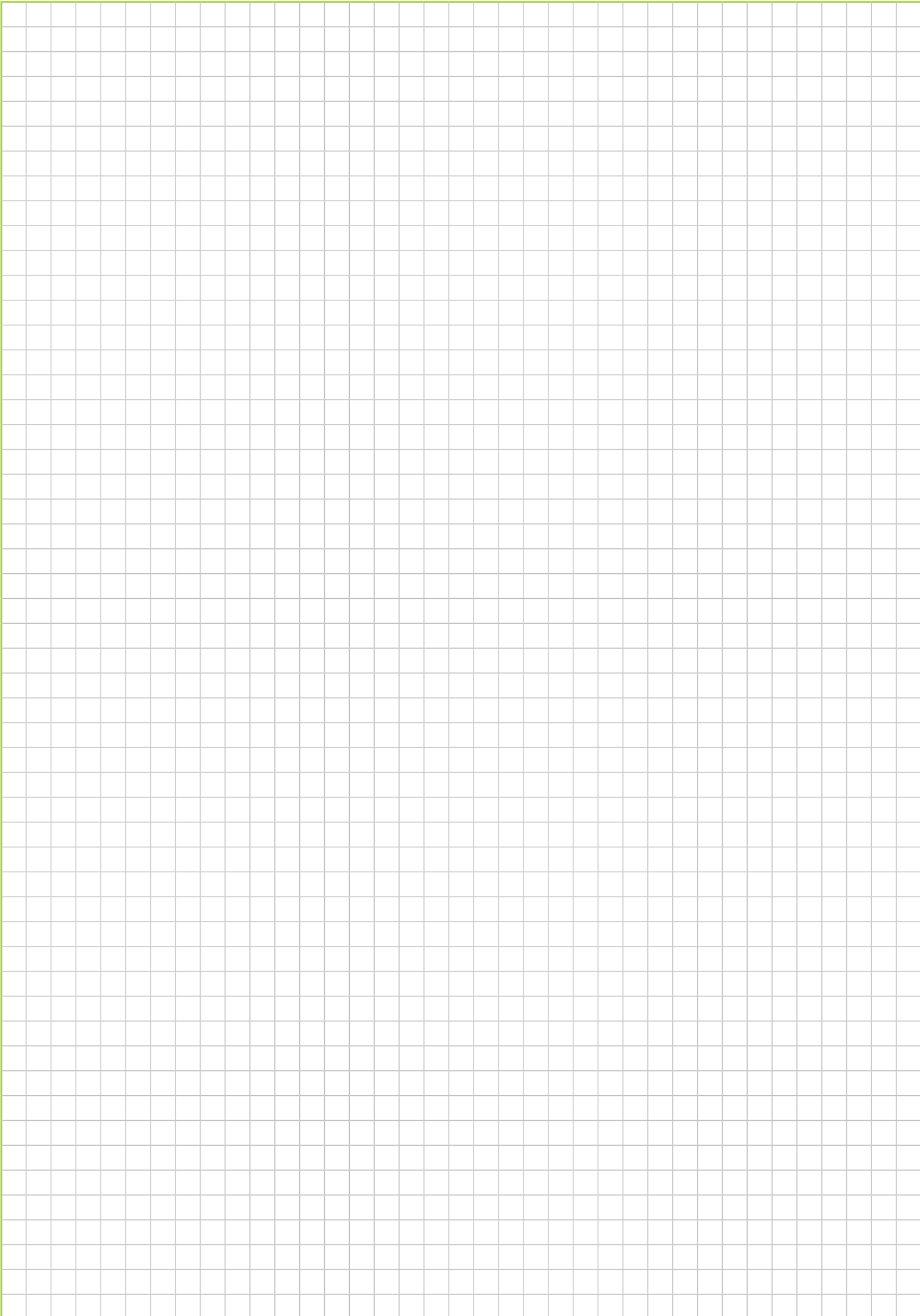


MS_P



Vse dimenzije so v milimetrih./All dimensions are in millimetres.

Oznaka Types	Bat Piston Ø	M	D Ø	L	L2	Lf	L1	De	D2	D3	H1	H2	j	H	D1 Ø
MS 12U-LO MS 12P	25	M 12x1.25	12	54	14	17	38	32	32	16.5	10.6	15	12	12	15.5
MS 16U-LO MS 16P	32	M 14x1.5	16	64	20	19	44	40	40	21	13	15	16	16	20
MS 20U MS 20P	40	M 16x1.5	20	80	25	17	50	56	46	25	19	17	20	16	24.1
MS 25U MS 25P	50	M 16x1.5	25	80	28	17	50	56	46	25	23	21	25	20	29.3
MS 30U MS 30P	63/ 70	M 22x1.5	30	94	30	23	60	64	50	32	28	26	30	22	34.2
MS 40U MS 40P	80/ 90	M 35x1.5	40	135	45	36	85	94	76	49	35	33	40	28	45
MS 50U MS 50P	100/110	M 45x1.5	50	168	55	46	105	116	90	61	40	37	50	35	56
MS 60U MS 60P	125	M 58x1.5	60	200	65	59	130	130	120	75	50	46	60	44	66.8
MS 70U MS 70P	140	M 65x1.5	70	232	75	66	150	155	130	86	55	51	70	49	77.8
MS 80U MS 80P	160/180	M 80x2	80	265	80	81	170	177	160	102	60	55	80	55	89.4
MS 100U MS 100P	200	M110x2	100	360	105	111	235	230	200	138	70	65	100	70	109.5
MS 110U MS 110P	250	M120x3	110	407.5	115	125	265	265	220	152	80	75	110	70	121.2



Vgradnja

1. Skladiščenje pred vgradnjo

Hidravlični cilindri naj bodo skladiščeni v pokritem, suhem prostoru brez industrijskih par ali kislih snovi in pri konstantni temperaturi, ki ni manjša od 5° C.

Kadar je skladiščna doba daljša od 6 mesecev, je potrebno hidravlični cilinder priklopiti na hidravlični sistem in ga vsakih 6 mesecev vsaj 5-krat premakniti iz začetnega v končni položaj.

2. Priprava za vgradnjo

Priključne cevi in ostale priključne elemente je potrebno pred priključitvijo na hidravlični cilinder znotraj očistiti in izprati.

Glede na velikost cilindra in način pritrditve v sistem je potrebno zagotoviti zadostno oporo in ustrezne pritrdilne elemente.

Vse notranje dele hidravličnega cilindra je potrebno ohranjati čiste, zato naj se zaščitne čepe odstrani šele pred priklopom cevovodov.

3. Vgradnja v sistem

Položaj vgradnje hidravličnega cilindra je poljuben, omogoča naj le ustrezen dostop za kasnejše vzdrževanje.

Hidravlični cilinder je lahko le delovni element, ki je vgrajen tako, da na batnico in ohišje (cevi) v mirovanju ne deluje nobena zunanja obremenitev. Pri obratovanju pa sme obremenitev delovati le v aksialni smeri, saj lahko radialne in tangencialne obremenitve povzročijo uničenje vodilnih elementov, tekalnih površin, tesnil in ostalih delov cilindra.

Cevovodi naj bodo kratki in speljani čim bolj ravno brez nepotrebnih kotnih priključkov in krivin, ki povzročajo padec tlaka.

Priklop cevovodov naj opravi usposobljen strokovnjak s področja hidravlike.

Pri dvostransko delujočih hidravličnih cilindrih mora biti omogočen prosti povratni tok hidravličnega medija iz hidravličnega cilindra nazaj v sistem.

Uporaba

1. Zagon

Pred zagonom hidravličnega sistema v maksimalnih delovnih pogojih je potrebno vse dele sistema dobro izprati. Za ta namen je potrebno priključke hidravličnega cilindra premostiti s fleksibilnimi cevimi zvezami. Po pranju je potrebno elemente filtriranja skrbno očistiti ali po potrebi zamenjati z novimi. Hidravlični cilinder je potrebno z odzračevalnimi vijaki ali z odvijanjem priključkov temeljito odzračiti.

Ko olje v sistemu doseže svojo delovno temperaturo, je potrebno preveriti, če vsi spoji in priključki popolnoma tesnijo. Po potrebi naj se še dodatno privijejo.

2. Obratovanje

Pri dvostransko delujočih cilindrih tlak na strani batnice (glava) ne sme preseči delovnega tlaka. Zaradi razmerja med površino bata in batnice je na strani bata (dno) dovoljeno obratovati le takrat, ko ni nevarnosti pojava zastojnih tlakov v hidravličnem cilindru.

3. Neustrezni delovni pogoji

Delovni medij mora ustrezati predpisanim zahtevam.

Delovni tlak in temperatura ne smeta presegati predpisanih vrednosti.

Vzdrževanje

Vsi hidravlični deli so mazani z delovnim medijem, zato posebno vzdrževanje ni potrebno.

V rednih časovnih intervalih je potrebno preverjati puščanje medija. V primeru večje netesnosti je potrebno zamenjati tesnila ali pa vrniti hidravlični cilinder v naše podjetje na kontrolo in menjavo tesnil.

V rednih časovnih intervalih je potrebno opraviti mazanje ležajev in puš.

Pri naročilu nadomestnih delov je potrebno definirati tip hidravličnega cilindra.

Vgradnjo hidravličnih cilindrov, zagon in kasnejše vzdrževanje naj opravljajo ustrezno kvalificirane osebe. Upoštevati je potrebno dana navodila in vzdrževati čistočo sistema, da bo doseženo brezhibno delovanje in dolga življenjska doba.

Mounting

1. Storage prior to mounting

Hydraulic cylinders need to be stored in covered dry premises with no industrial vapours or acid substances, at a constant minimum ambient temperature of 5° C.

Should the storage period exceed 6 months, hydraulic cylinder need to be connected to hydraulic circuit, 5 complete cycles from initial to maximum extended position need to be perform every 6 months.

2. Preparing cylinder for mounting

Before connecting to hydraulic cylinder connection hoses and other connection elements shall be cleaned and washed from inside.

With regard to cylinder dimensions and modality of fixation into the circuit sufficient support and adequate fixing elements need to be assured.

As all internal parts of hydraulic cylinder need to be kept clean, it is recommended to remove protective taps just before connection of piping.

3. Assembling into the system

Mounting position of hydraulic cylinder is arbitrary according to user's requirements, but it shall allow adequate access to maintenance personnel.

Hydraulic cylinder as a working appliance shall be installed in a manner to prevent any external charge acting onto piston rod and cylinder barrel (body) while not in function. During operation load may act exclusively in axial direction, as radial and tangential charges might lead to damage of rod gland, rolling surfaces, seals, bearings and other parts of the cylinder.

Piping should be as short and as straight as possible without needless angle junctions and curves, as they might result in pressure decrease.

Piping connection shall be performed only by qualified hydraulics technician.

In double-acting hydraulic cylinders return hydraulic oil flow from the cylinder back into the circuit shall be enabled.

Use

1. Activation

All parts of hydraulic system need to be well washed prior to activation of the system in maximum working conditions. Connectors to hydraulic cylinder shall be surmounted by flexible piping for this purpose. Once washed, filtering elements need to be thoroughly cleaned or replaced if required.

Hydraulic cylinder needs to be thoroughly vented by the use of air vent screws or simply unscrewing the connectors.

Once hydraulic oil inside the circuit attains its working temperature it is necessary to check seals to prevent oil from leaking. If necessary they should be screwed additionally.

2. Operation

In double-acting cylinders piston rod side (head) pressure should not exceed working pressure. Due to surface area ratio between piston and piston rod, operation on piston (bottom) side is allowed only when there is no risk of standstill pressure inside the hydraulic cylinder.

3. Poor operation conditions

Hydraulic fluid needs to meet all prerequisite requirements.

Working pressure and temperature may not exceed prescribed values.

Maintenance

As greasing of all hydraulic components is assured by hydraulic fluid, particular maintenance is not required.

Eventual oil leakage shall be checked in regular maintenance intervals. In case when major leakage is observed, seals should be replaced or have cylinder controlled and seals replaced by manufacturer.

Greasing of bearings and ear style bearings shall be performed in regular maintenance intervals.

When ordering spare parts please refer to your type of hydraulic cylinder.

Mounting, activation and maintenance of hydraulic cylinders shall be performed exclusively by qualified personnel. Instructions need to be thoroughly observed and hydraulic system kept clean to assure impeccable operation and longer operational life.



MAPRO



MAPRO d.o.o.
Industrijska ulica 12
4226 Žiri - Slovenia
European Union
T +386 4 510 50 90
F +386 4 510 50 91
E info@mapro.si
I www.mapro.eu