



Hydraulic Cylinders Type R4 - Big bore sizes

Conforms to ISO 6020-3: Nominal pressure of 160 bar and max 250 bar

Series R4 hydraulic cylinders are designed for heavy mill duty application and conforms to ISO 6020-3. It is completely interchangeable among manufacturers. It allows manufacturers of hydraulic equipments flexibility in the design of cylinders while it does not restrict technical development; however, it does provide basic guidelines.

Standard Specifications :

- Heavy duty construction
- Double Acting Design
- Bore Sizes: **250 mm to 400 mm**
- Rod Sizes: **140 mm to 220 mm**
- Strokes up to **5000 mm**
- **Two** seals options
- **Air Bleed** at both ends
- **Six** standard mounting styles
- **Adjustable** cushioning
- **Standard & SAE Flange** oil port options

Ordering Instructions :

R4 **P** - **250** / **140** / **0500** - **0** **K** **0** **S** **0** - **B1X1**

Cylinder Series:
R4 [ISO 6020-3]

Mounting Style: see section [1](#)

	REF. ISO
C - Fixed Clevis	MP1
G - Front Trunnion	MT1
L - Intermediate Trunnion	MT4*
N - Front Square Flange	MF5
P - Rear Square Flange	MF6
S - Fixed Eye with Spherical Bearing	MP5

Bore Size: From \varnothing 250 - 400 mm, see section [13](#)

Rod Size: From \varnothing 140 - 220 mm, see section [13](#)

Stroke: Up to 5000 mm, see section [6](#)

Oil Port Positions: see section [4](#)
B1;B2;B3 & B4 - Front Head Oil Port at Location 1;2;3 & 4
X1;X2;X3 & X4 - Rear Head Oil Port at Location 1;2;3 & 4

Oil Port options: see section [2](#) & [3](#)
0 - Standard [BSPP]
M - Front & Rear SAE Flange Oil Port

Sealing System:

S - Standard [NBR + PTFE + PU] [-20°C to 85°C]
V - Viton, For High Temp. [FKM + PTFE] [-20°C to 120°C]

Spacer: see section [7](#)

0 - None; **2** - 50 mm; **4** - 100 mm; **6** - 150 mm; **8** - 200 mm

Rod Treatment: see section [8](#)

K - Ground & hard chrome plated
T - Induction hardened, Ground & hard chrome plated

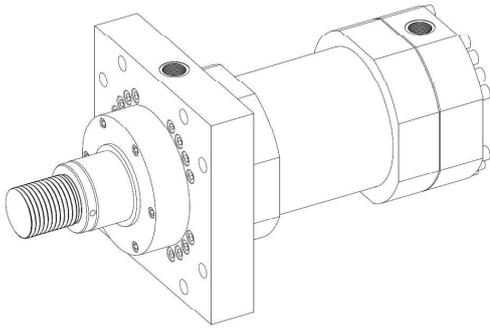
Cushioning: see section [5](#)

0 - None
Slow Adjustable
1 - Rear end
2 - Front end
3 - Both ends

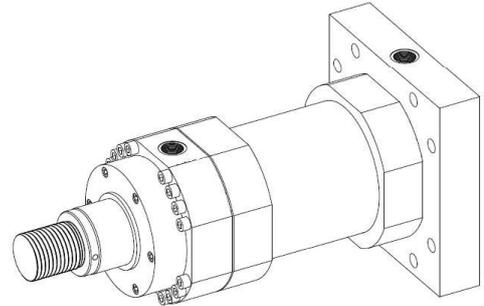
*NOTE: For style L [MT4], XV Dimension must be indicated in the order code, see section [9](#)

1 Mounting Style :

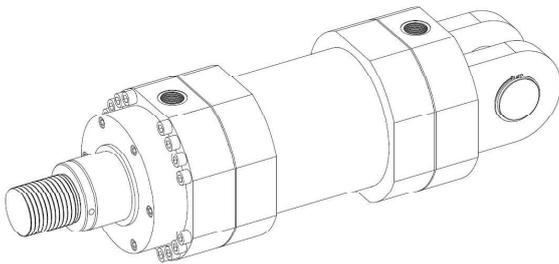
- 6 different standard styles of mounting as shown below
- Browse through subsequent pages for technical details and mounting dimensions
- Piston Rod End dimensions are given separately in section [13](#)



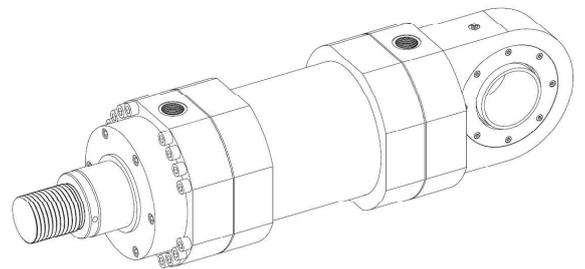
ISO MF5
Style N [Front Square Flange]



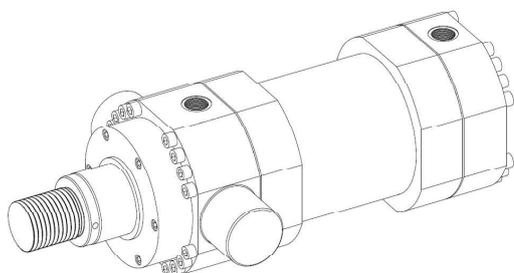
ISO MF6
Style P [Rear Square Flange]



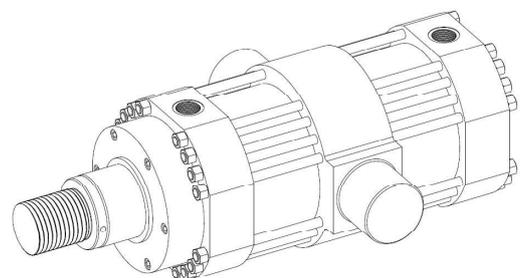
ISO MP1
Style C [Fixed Clevis]



ISO MP5
Style S [Fixed Eye with Spherical Bearing]



ISO MT1
Style G [Fixed Trunnion]



ISO MT4
Style L [Intermediate Trunnion]

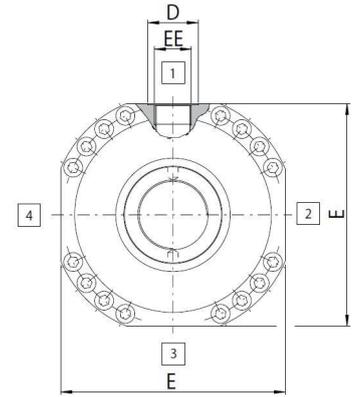
2 Size Of Oil Ports & Round Head Dimension [mm]:

Bore ϕ		250	320	400
Standard Oil Ports	D _{min}	58	58	69
	EE (BSPP)	G 1 ½	G 1 ½	G 2

• Oil ports EE are threaded according to GAS standard with counter bore dimension D.

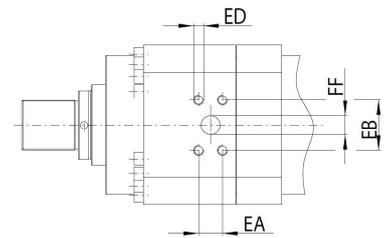
Bore ϕ		250	320	400
Front & Rear Head ϕ	E _{max}	320	400	500

• If not otherwise specified, E is the value of the front and rear round heads dimension for all the mounting styles.



3 SAE 6000 Flange Oil Port Dimensions (ISO 6162-2) [mm]:

Bore ϕ	DN	EA ± 0.25	EB ± 0.25	ED 6g	FF 0/-1.5
250	38	36.5	79.3	M16	38
320					
400	51	44.5	96.8	M20	51

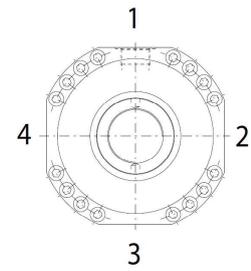


4 Position of Oil Ports:

- FRONT HEAD: B* = oil port position;
- REAR HEAD: X* = oil port position;
- *Selected position (1, 2, 3 or 4)

The oil ports and cushioning adjustments positions are available, respectively on sides 1 and 3 for all styles except E (see the figure at side): the style E has the cushioning adjustments on side 2.

Unless otherwise specified by customer, the standard oil port position remains as shown in figure at side, i.e. B1 & X1.



5 Cushioning:

Cushioning is recommended for applications where:

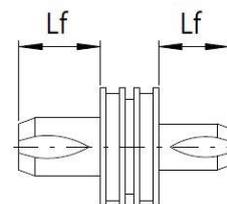
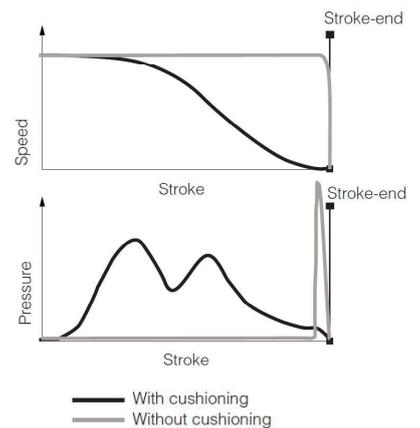
- The piston makes a full stroke with speed over than 0.05 m/s;
- It is necessary to reduce undesirable noise and mechanical shocks;
- Vertical application with heavy loads.

The stroke-end cushioning are hydraulic dampers specifically designed to dissipate the energy of the mass connected to the cylinder rod, by progressively increasing the pressure in the cushioning chamber and thus reducing the rod speed before the cylinder's mechanical stroke-end (see the graphics at side). The regulating screws are supplied fully screwed in (max cushioning effect).

In case of high masses and/or very high operating speeds it is recommended to back them off to optimize the cushioning effect. The adjustment screw has a special design to prevent unlocking and expulsion. The cushioning effect is highly ensured even in case of variation of the fluid viscosity.

Cushioning Length:

Lf is the total cushioning length. When the stroke-end cushioning are used as safety devices, to mechanically preserve the cylinder and the system, it is advisable to select the cylinder's stroke longer than the operating one by an amount equal to the cushioning length Lf; in this way the cushioning effect does not influence the movement during the operating stroke.



Bore ϕ		250	320	400
Rod ϕ		140	180	220
Cushioning Length [mm]	Lf Front	50	60	70
	Lf Rear	56	64	64

6 Stroke Selection:

Stroke has to be selected a few mm longer than the working stroke, to prevent to use the cylinder heads as mechanical stroke-end.

Minimum stroke [mm]: see table at side

Maximum stroke: 5000 mm

Stroke tolerances:

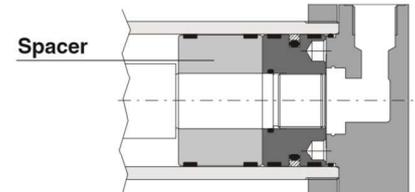
- 0 +2 mm for strokes up to 1250 mm
- 0 +5 mm for strokes from 1250 to 3150 mm
- 0 +8 mm for strokes over 3150 mm

Bore ϕ	250	320	400
Minimum Stroke	65	70	40

7 Spacer:

For strokes longer than 1000 mm, proper spacers have to be introduced in the cylinder's construction to increase the rod and piston guide and to protect them from overloads and premature wear. Spacers can be omitted for cylinders working in traction mode. The introduction of spacers increases the overall cylinder's dimensions: spacers' length has to be added to all stroke dependent dimensions.

Stroke [mm]	1001 to 1500	1501 to 2000	2001 to 2500	2501 to 5000
Spacer Code	2	4	6	8
Length [mm]	50	100	150	200



8 Rod Features & options:

The rods materials have high strength - EN8D / C45 & the rod surface is chrome plated: diameter tolerances f7, roughness Ra \leq 0.25 μ m.

Rod hardness can be improved selecting the options T :

K = Ground and hard chrome plated (for rods from 22 to 110mm)

T = Induction surface hardening, ground & hard chrome plated

- 56-60 HRC (613-697 HV) hardness

9 Note [Trunnion Mounting]:

XV - For cylinders with mounting style **L** the stroke must always exceed the minimum values reported in the table. The requested XV value must be included between **XV min** and **XV max** and it must be always indicated, with dimension in millimetres, together with the cylinder code. See the following example:

R4 L - 50 / 28 / 0500 - 0 K 0 S 0 - B1X1

XV = 200

10 Cylinder's Housing Features:

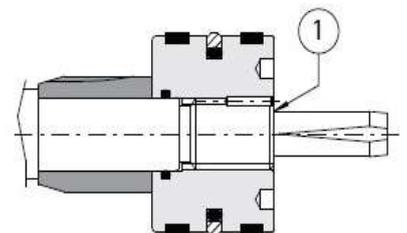
The cylinder's housings are made in "hot rolled steel"; the internal surfaces are lapped: diameter tolerance H8, roughness Ra \leq 0.25 μ m.

11 Fluid Requirements:

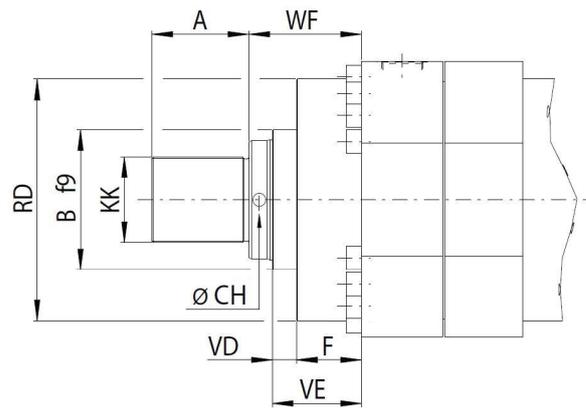
Cylinders and servo cylinders are suitable for operation with mineral oils with or without additives (**HH**, **HL**, **HLP**, **HLP-D**, **HM**, **HV**), fire resistant fluids (**HFA** oil in water emulsion, 90-95% water and 5-10% oil; **HFB** water in oil emulsion, 40% water; **HFC** water glycol, max 45% water) and synthetic fluids (**HFD-U** organic esters, **HFD-R** phosphate esters). The fluid must have a viscosity within 15 and 100 mm²/s, a temperature within 0 and 70°C and fluid contamination class ISO 20/18/15 according to ISO 4406 NAS1638 class 9.

12 Rod - Piston Coupling:

The rod and piston are mechanically coupled by a threaded connection in which the thread on the rod is at least equal to the external thread KK. The piston is screwed to the rod by a pre-fixed tightening torque in order to improve the fatigue resistance. The Grub screw **1** avoids the piston unscrewing.



13 Piston Rod End Data :

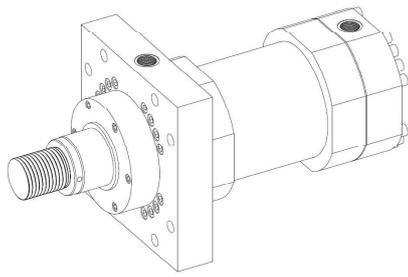


Rod End Dimensions :

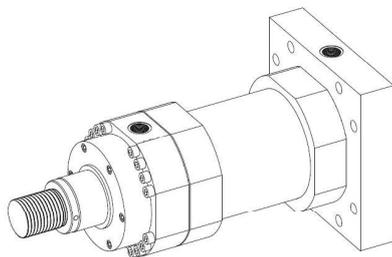
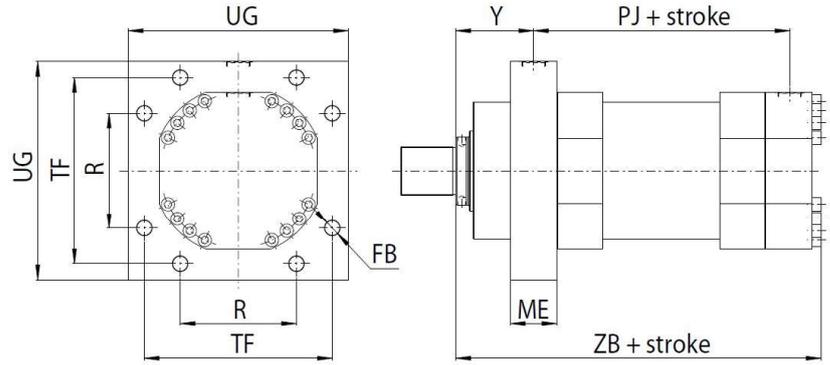
Bore ø	Rod ø	A	B f9	CH	F max	KK 6g	RD f8	VD	VE max	WF ±2
250	140	112	163	15	75	M100 X 3	280	8	83	110
320	180	125	205	15	75	M125 X 4	325	8	83	110
400	220	160	245	15	75	M160 X 4	380	8	83	110

All dimensions are in mm .

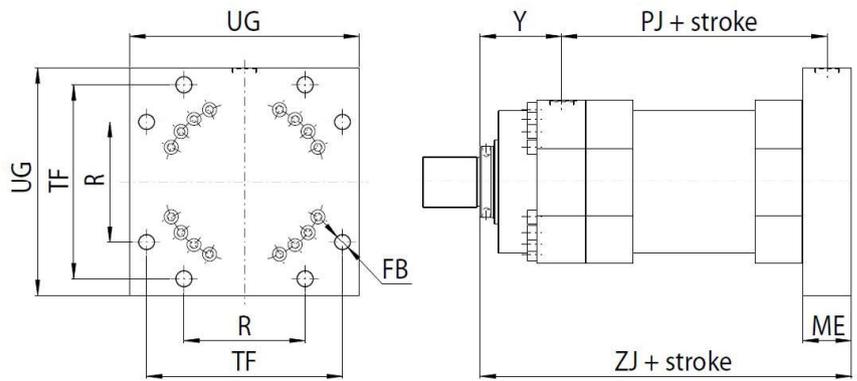
14 Square Flange Mountings :



Style N
ISO MF5
Front Square Flange



Style P
ISO MF6
Rear Square Flange



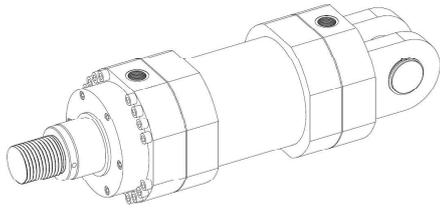
Installation Dimensions - MF5 & MF6

Bore Ø	Rod Ø	FB	ME ref	R js13	TF	UG max	Y	+Stroke		
								PJ	ZJ	ZB max
250	140	30	94	235	380	445	157	218	420	460
320	180	36	114	283	472	549	167	252	475	520
400	220	45	140	340	588	683	180	320	580	625

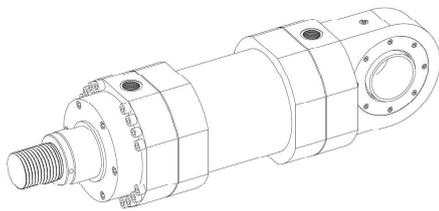
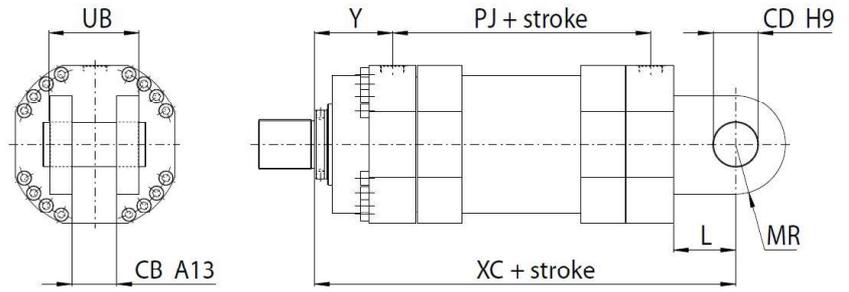
All dimensions are in mm .

NOTE: For Rod End Dimensions refer to the section [13](#)

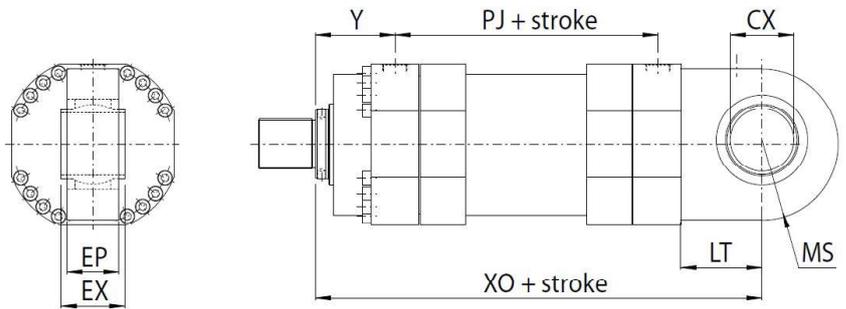
15 Pivot Mountings :



Style D
ISO MP3
Rear Fixed Eye



Style S
ISO MP5
Rear Fixed Eye with Spherical Bearing



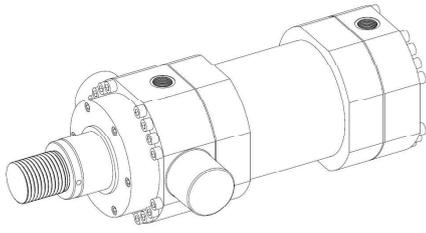
Installation Dimensions - MP3 & MP5

Bore ∅	Rod ∅	CB A13	CD H9	CX H7	EP	EX	L min	LT min	MR max	MS max	UB	Y	+Stroke		
													PJ	XC	XO
250	140	90	90	125	102	125	125	160	100	160	180	157	218	545	580
320	180	110	110	160	130	160	152	200	120	200	220	167	252	627	675
400	220	140	140	200	162	200	195	250	160	250	280	180	320	775	830

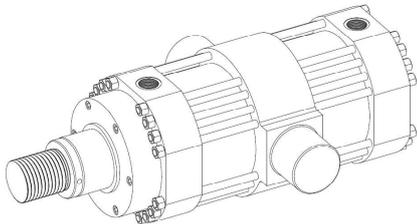
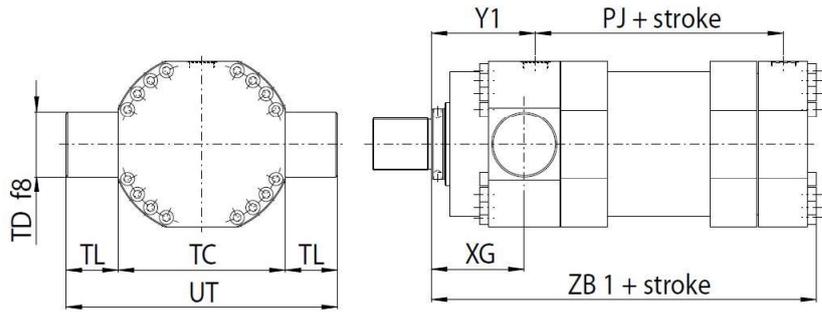
All dimensions are in mm .

NOTE: For Rod End Dimensions refer to the section [13](#)

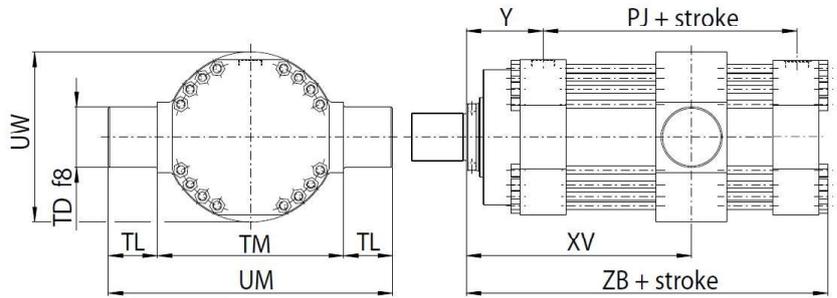
16 Trunnion Mountings :



Style G
ISO MT1
Front Trunnion



Style L
ISO MT4
Intermediate Trunnion



Installation Dimensions - MT1 & MT4

Bore ∅	Rod ∅	TC h14	TD f8	TL js13	TM h14	UM ref	UT ref	UW max	Y1	Y	XG	Min. Stroke	XV min	+Stroke			
														XV max	PJ	ZB1 max	ZB max
250	140	320	125	100	380	580	520	480	199	157	178	20	275	255	218	505	460
320	180	400	160	125	485	735	650	600	223	167	195	35	312	273	252	580	520
400	220	500	200	160	605	925	820	750	260	180	215	26	358	332	320	685	625

All dimensions are in mm .

NOTE: For Rod End Dimensions refer to the section 13