
**Hydraulic fluid power — Mounting
dimensions for single rod cylinders,
16 MPa (160 bar) series —**

**Part 2:
Compact series**

*Transmissions hydrauliques — Dimensions d'interchangeabilité des
vérins 16 MPa (160 bar) à simple tige —*

Partie 2: Série compacte



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6020-2 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 3, *Cylinders*.

This third edition of ISO 6020-2 cancels and replaces the second edition of ISO 6020-2 (ISO 6020-2:1991) and ISO 8138 (ISO 8138:1998), both of which have been technically revised.

ISO 6020 consists of the following parts, under the general title *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series*:

- *Part 1: Medium series*
- *Part 2: Compact series*
- *Part 3: Compact series with bores from 250 mm to 500 mm*

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit.

One component of such systems is the cylinder. This is a device that converts power into linear mechanical force and motion. It consists of a moveable element, i.e. a piston and piston rod, operating within a cylindrical bore.

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Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series —

Part 2: Compact series

1 Scope

This part of ISO 6020 establishes metric mounting dimensions for compact series cylinders, 16 MPa [160 bar ¹⁾], as required for interchangeability of commonly-used hydraulic cylinders.

NOTE 1 This part of ISO 6020 allows manufacturers of hydraulic equipment flexibility in the design of metric cylinders and does not restrict technical development; however, it does provide basic guidelines.

NOTE 2 The compact series dimensions are most applicable to square head cylinders.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1179-1 ²⁾, *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports*

ISO 3320, *Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series*

ISO 4395, *Fluid power systems and components — Cylinders — Piston rod thread dimensions and types*

ISO 5598 ³⁾, *Fluid power systems and components — Vocabulary*

ISO 6099, *Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types*

ISO 6149-1, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1: Ports with O-ring seal in truncated housing*

ISO 6162-1, *Hydraulic fluid power — Flange connectors with split or one-piece flange clamps and metric or inch screws — Part 1: Flange connectors for use at pressures of 3,5 MPa (35 bar) to 35 MPa (350 bar), DN 13 to DN 127*

1) 1 bar = 0,1 MPa = 10⁵ Pa; 1 MPa = 1 N/mm².

2) To be published. (Revision of ISO 1179:1981)

3) Under revision. (Revision of ISO 5598:1985)

ISO 6162-2, *Hydraulic fluid power — Flange connectors with split or one-piece flange clamps and metric or inch screws — Part 2: Flange connectors for use at pressures of 35 MPa (350 bar) to 40 MPa (400 bar), DN 13 to DN 51*

ISO 8133, *Hydraulic fluid power — Single rod cylinders, 16 MPa (160 bar) compact series — Mounting dimensions for accessories*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 apply.

4 Dimensions

4.1 Mounting dimensions for cylinders manufactured in accordance with this part of ISO 6020 shall be selected from Figures 1 through 13 and Tables 1 through 13.

4.2 Port and flange sizes and dimensions shall be selected from Table 14 and in the respective International Standards cited therein.

4.3 All the dimensions and methods of mounting in this part of ISO 6020 are identified by codes in conformance with ISO 6099.

5 Bore sizes

This part of ISO 6020 includes the following bore sizes, in millimetres, in accordance with ISO 3320:

25 — 32 — 40 — 50 — 63 — 80 — 100 — 125 — 160 — 200.

NOTE Mounting dimensions for compact hydraulic single rod cylinders with bores from 250 mm to 500 mm are specified in ISO 6020-3.

6 Stroke tolerances

6.1 The tolerance on strokes $\leq 1\,250$ mm shall be $^{+2}_0$ mm.

6.2 Tolerances on strokes $> 1\,250$ mm shall be in accordance with the manufacturer's specification or an agreement between the manufacturer and user.

7 Mounting types

This part of ISO 6020 includes the following mounting types, in accordance with ISO 6099:

- ME 5: Head, rectangular (see Figure 2 and Table 2)
- ME 6: Cap, rectangular (see Figure 3 and Table 3)
- MP 1: Cap, fixed clevis (see Figure 4 and Table 4)
- MP 3: Cap, fixed plain eye (see Figure 5 and Table 5)
- MP 5: Cap, fixed eye with spherical bearing (see Figure 6 and Table 6)
- MS 2: Side lugs (see Figure 7 and Table 7)
- MT 1: Head, integral trunnion (male) (see Figure 8 and Table 8)
- MT 2: Cap, integral trunnion (male) (see Figure 9 and Table 9)
- MT 4: Intermediate fixed or movable trunnion (male) (see Figure 10 and Table 10)
- MX 1: Both ends studs or tie rods extended (see Figure 11 and Table 11)
- MX 2: Cap studs or tie rods extended (see Figure 12 and Table 12)
- MX 3: Head studs or tie rods extended (see Figure 13 and Table 13)

8 Piston rod characteristics

8.1 This part of ISO 6020 covers piston rods that have shouldered male thread ends; see Figure 1 and Table 1 for basic dimensions.

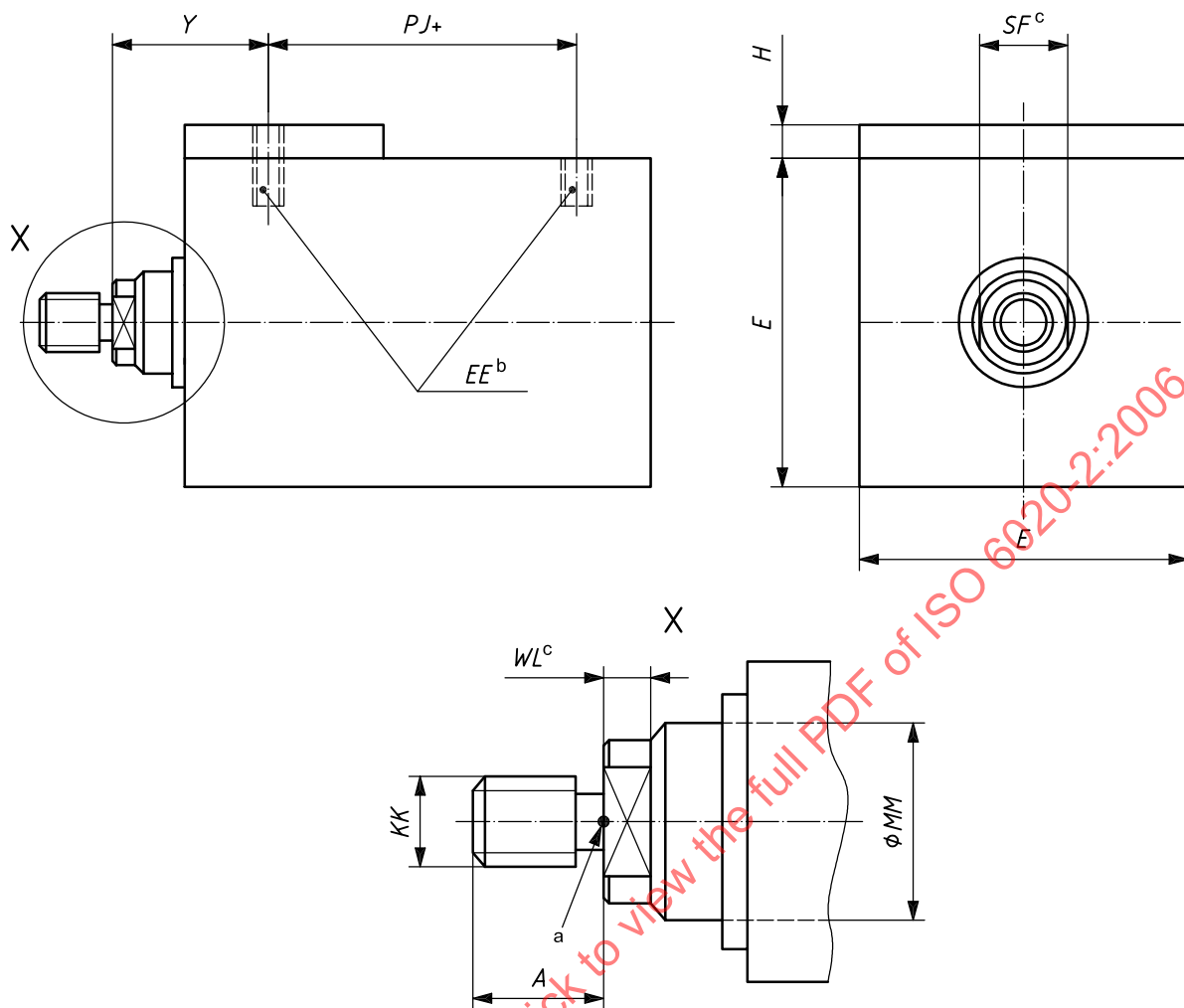
8.2 For rod end types, see ISO 4395.

8.3 For accessories, see ISO 8133.

9 Identification statement (reference to this part of ISO 6020)

It is strongly recommended to fabricators who elect to conform to this part of ISO 6020 to use the following statement in test reports, catalogues and sales literature:

"Interchangeable mounting dimensions selected in accordance with ISO 6020-2:2006, Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series — Part 2: Compact series."



- a Reference point.
- b See Table 14 for port options.
- c Dimensions SF and WL are controlled by ISO 4395.

Figure 1 — General dimensions

Table 1 — General dimensions

Dimensions in millimetres

Bore	Rod MM ^a	KK ^a 6g	A max.	H max.	E	Y ^b ± 2	PJ ^c ± 1,5
25	12	M10 × 1,25	14	5	40 ± 1,5	50	53
	18	M10 × 1,25 M14 × 1,5	14 18				
32	14	M12 × 1,25	16	5	45 ± 1,5	60	56
	22	M12 × 1,25 M16 × 1,5	16 22				
40	18	M14 × 1,5	18	—	63 ± 1,5	62	73
	28	M14 × 1,5 M20 × 1,5	18 28				
50	22	M16 × 1,5	22	—	75 ± 1,5	67	74
	36	M16 × 1,5 M27 × 2	22 36				
63	28	M20 × 1,5	28	—	90 ± 1,5	71	80
	45	M20 × 1,5 M33 × 2	28 45				
80	36	M27 × 2	36	—	115 ± 1,5	77	93
	56	M27 × 2 M42 × 2	36 56				
100	45	M33 × 2	45	—	130 ± 2	82	101
	70	M33 × 2 M48 × 2	45 63				
125	56	M42 × 2	56	—	165 ± 2	86	117
	90	M42 × 2 M64 × 3	56 85				
160	70	M48 × 2	63	—	205 ± 2	86	130
	110	M48 × 2 M80 × 3	63 95				
200	90	M64 × 3	85	—	245 ± 2	98	165
	140	M64 × 3 M100 × 3	85 112				

^a If other piston rod diameters or other piston rod threads are required, use those identified in ISO 3320 and ISO 4395.

^b The tolerance on dimension Y applies to strokes ≤ 1 250 mm. Tolerances on strokes > 1 250 mm can be in accordance with the manufacturer's specification or an agreement between the manufacturer and user (see 6.2).

^c The tolerance on dimension PJ shall be added to the tolerance on the stroke.

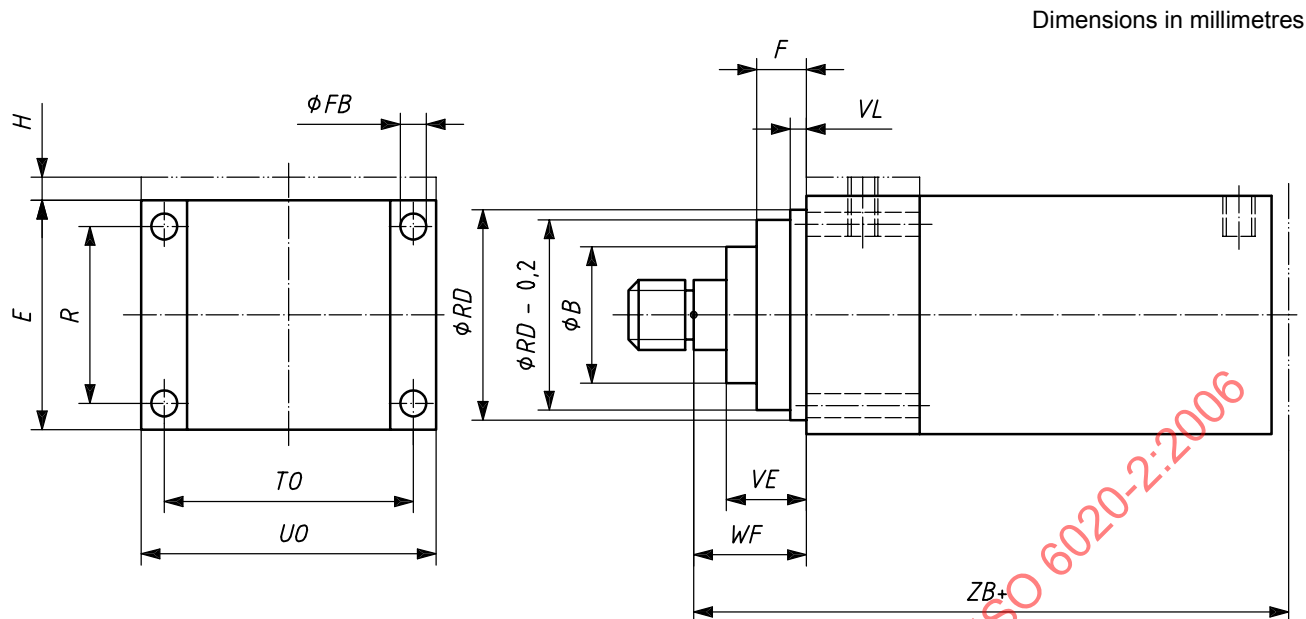


Figure 2 — ME 5 — Head, rectangular

Table 2 — Dimensions of head, rectangular

Dimensions in millimetres

Bore	Rod MM	RD f8	E	TO js13	FB ^a H13	R js13	WF ± 2	F max.	VE max.	VL min.	B max.	UO max.	ZB ^b max.	H max.
25	12	38	40 ± 1,5	51	5,5	27	25	10	16	3	24	65	121	5
	18	38									30			
32	14	42	45 ± 1,5	58	6,6	33	35	10	22	3	26	70	137	5
	22	42									34			
40	18	62	63 ± 1,5	87	11	41	35	10	22	3	30	110	166	—
	28	62									42			
50	22	74	75 ± 1,5	105	14	52	41	16	25	4	34	130	176	—
	36	74									50			
63	28	75	90 ± 1,5	117	14	65	48	16	29	4	42	145	185	—
	45	88									60			
80	36	82	115 ± 1,5	149	18	83	51	20	29	4	50	180	212	—
	56	105									72			
100	45	92	130 ± 2	162	18	97	57	22	32	5	60	200	225	—
	70	125									88			
125	56	105	165 ± 2	208	22	126	57	22	32	5	72	250	260	—
	90	150									108			
160	70	125	205 ± 2	253	26	155	57	25	32	5	88	300	279	—
	110	170									133			
200	90	150	245 ± 2	300	33	190	57	25	32	5	108	360	336	—
	140	210									163			

^a Hole in accordance with ISO 273, medium series.^b The tolerances referred to apply to strokes ≤ 1250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

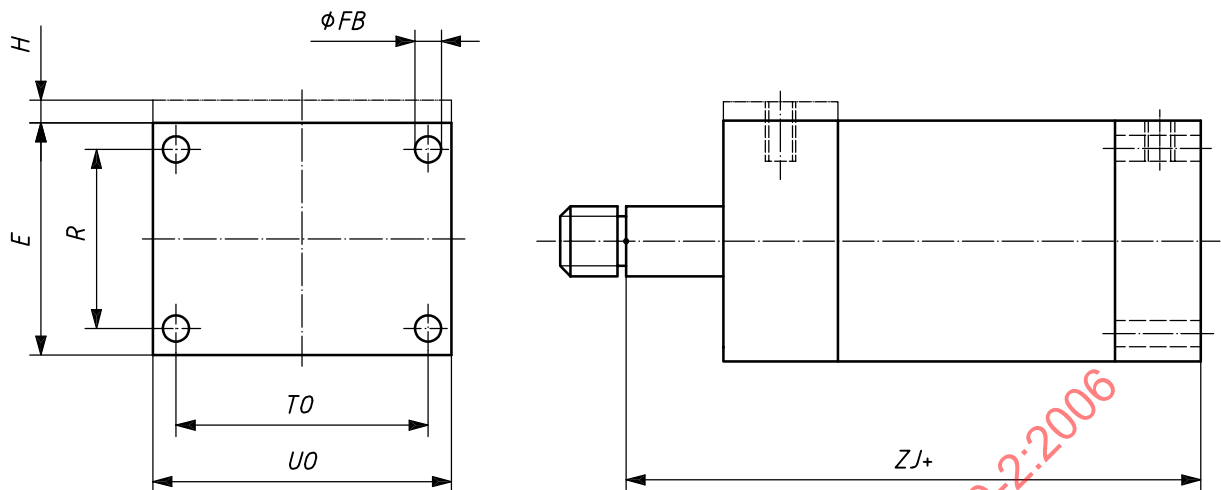


Figure 3 — ME 6 — Cap, rectangular

Table 3 — Dimensions of cap, rectangular

Dimensions in millimetres

Bore	Rod MM	E	TO js13	FB^a H13	R js13	ZJ^b ± 1	UO max.	H max.
25	12	$40 \pm 1,5$	51	5,5	27	114	65	5
	18							
32	14	$45 \pm 1,5$	58	6,6	33	128	70	5
	22							
40	18	$63 \pm 1,5$	87	11	41	153	110	—
	28							
50	22	$75 \pm 1,5$	105	14	52	159	130	—
	36							
63	28	$90 \pm 1,5$	117	14	65	168	145	—
	45							
80	36	$115 \pm 1,5$	149	18	83	190	180	—
	56							
100	45	130 ± 2	162	18	97	203	200	—
	70							
125	56	165 ± 2	208	22	126	232	250	—
	90							
160	70	205 ± 2	253	26	155	245	300	—
	110							
200	90	245 ± 2	300	33	190	299	360	—
	140							

^a Hole in accordance with ISO 273, medium series.^b The tolerance on dimension ZJ applies to strokes $\leq 1\,250$ mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

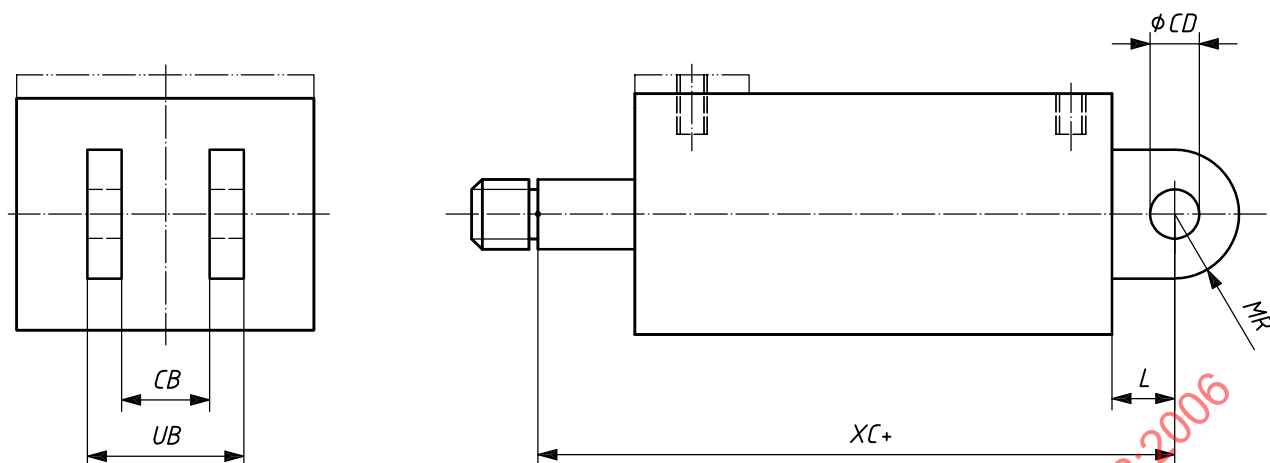


Figure 4 — MP 1 — Cap, fixed clevis

Table 4 — Dimensions of cap, fixed clevis

Dimensions in millimetres

Bore	Rod MM	CB A13	CD H9	MR max.	L min.	UB max.	XC ^a ± 1,5
25	12	12	10	12	13	25	127
	18						
32	14	16	12	17	19	34	147
	22						
40	18	20	14	17	19	42	172
	28						
50	22	30	20	29	32	62	191
	36						
63	28	30	20	29	32	62	200
	45						
80	36	40	28	34	39	83	229
	56						
100	45	50	36	50	54	103	257
	70						
125	56	60	45	53	57	123	289
	90						
160	70	70	56	59	63	143	308
	110						
200	90	80	70	78	82	163	381
	140						

^a The tolerance on dimension XC applies to strokes ≤ 1 250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

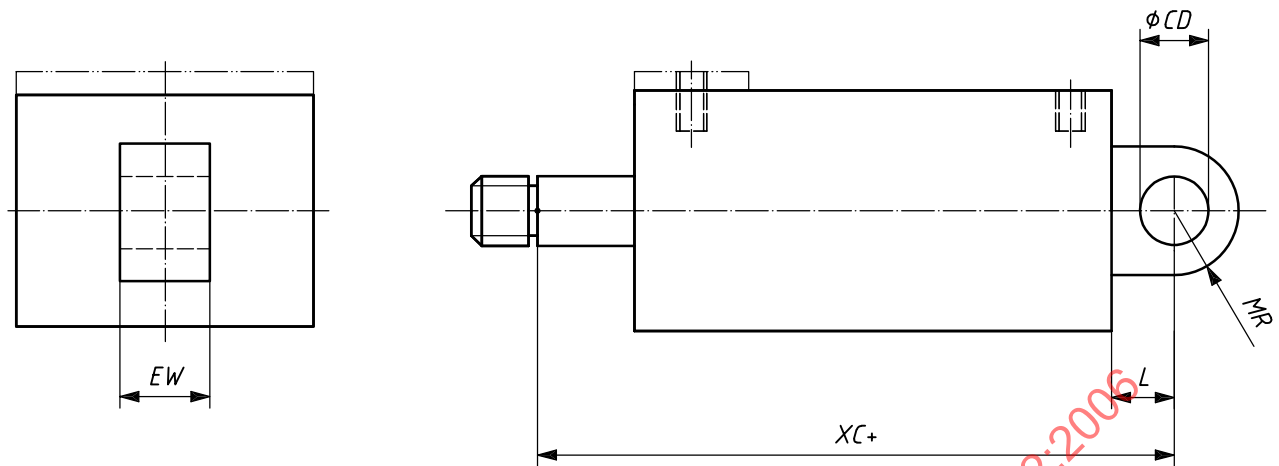


Figure 5 — MP 3 — Cap, fixed plain eye

Table 5 — Dimensions of cap, fixed plain eye

Dimensions in millimetres

Bore	Rod MM	EW	CD	MR	L	XC ^a
		h14	H9	max.	min.	± 1,5
25	12	12	10	12	13	127
	18					
32	14	16	12	17	19	147
	22					
40	18	20	14	17	19	172
	28					
50	22	30	20	29	32	191
	36					
63	28	30	20	29	32	200
	45					
80	36	40	28	34	39	229
	56					
100	45	50	36	50	54	257
	70					
125	56	60	45	53	57	289
	90					
160	70	70	56	59	63	308
	110					
200	90	80	70	78	82	381
	140					

^a The tolerance on dimension *XC* applies to strokes ≤ 1 250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

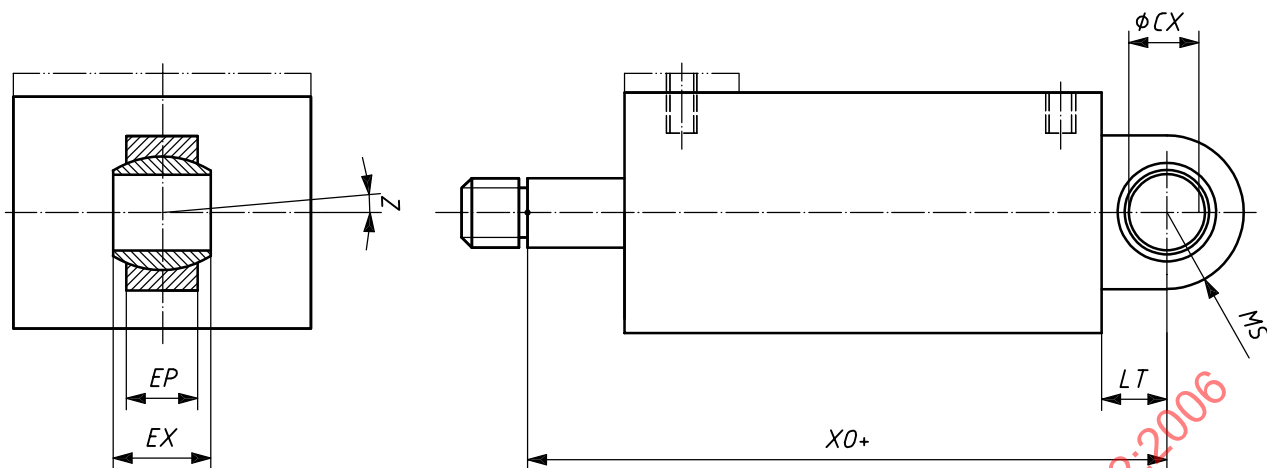


Figure 6 — MP 5 — Cap, fixed eye with spherical bearing

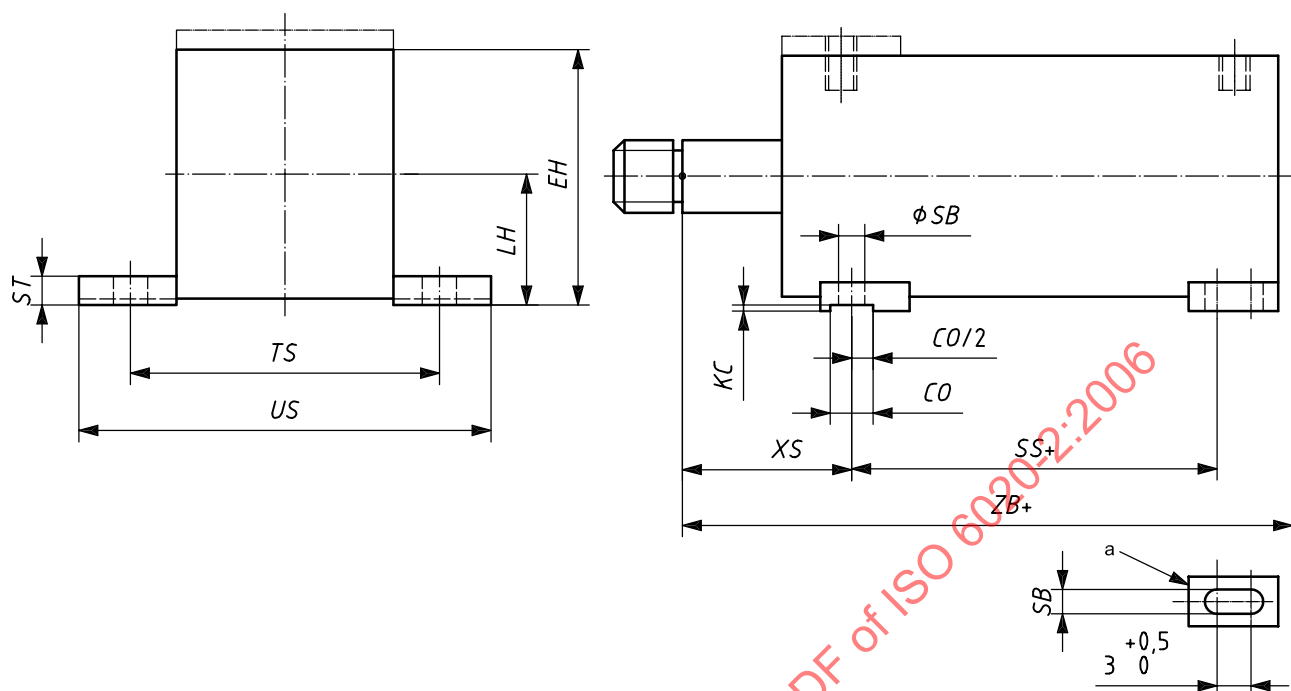
Table 6 — Dimensions on cap, fixed eye with spherical bearing

Dimensions in millimetres

Bore	Rod MM	EP	EX		CX		MS	LT	XO ^a	Tilting angle Z
		max.	nom.	tol.	nom.	tol.	max.	min.	± 1,5	min.
25	12	8	10	0	12	0	20	16	130	3°
	18			-0,12		-0,008				
32	14	11	14	0	16	0	22,5	20	148	
	22			-0,12		-0,008				
40	18	13	16	0	20	0	29	25	178	
	28			-0,12		-0,012				
50	22	17	20	0	25	0	33	31	190	
	36			-0,12		-0,012				
63	28	19	22	0	30	0	40	38	206	
	45			-0,12		-0,012				
80	36	23	28	0	40	0	50	48	238	
	56			-0,12		-0,012				
100	45	30	35	0	50	0	62	58	261	
	70			-0,12		-0,012				
125	56	38	44	0	60	0	80	72	304	
	90			-0,15		-0,015				
160	70	47	55	0	80	0	100	92	337	
	110			-0,15		-0,015				
200	90	57	70	0	100	0	120	116	415	
	140			-0,20		-0,020				

^a The tolerance on dimension XO applies to strokes ≤ 1250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

Dimensions in millimetres



a Two lugs.

Figure 7 — MS 2 — Side lugs

Table 7 — Dimensions of side lugs

Dimensions in millimetres

Bore	Rod mm	TS	SB ^a	LH	XS ^b	SS ^b	ZB	ST	US	CO ^c	KC ^c	EH	
		js13	H13	h10	± 2	± 1,25	max.	js13	max.	N9	min.	nom.	tol.
25	12	54	6,6	19	33	72	121	8,5	72	—	—	39	± 1,5
	18												
32	14	63	9	22	45	72	137	12,5	84	—	—	44,5	± 1,5
	22												
40	18	83	11	31	45	97	166	12,5	103	12	4	62,5	± 1,5
	28												
50	22	102	14	37	54	91	176	19	127	12	4,5	74,5	± 1,5
	36												
63	28	124	18	44	65	85	185	26	161	16	4,5	89	± 1,5
	45												
80	36	149	18	57	68	104	212	26	186	16	5	114,5	± 1,5
	56												
100	45	172	26	63	79	101	225	32	216	16	6	128	± 2
	70												
125	56	210	26	82	79	130	260	32	254	20	6	164,5	± 2
	90												
160	70	260	33	101	86	129	279	38	318	30	8	203,5	± 2
	110												
200	90	311	39	122	92	171	336	44	381	40	8	244,5	± 2
	140												

a Hole in accordance with ISO 273, medium series.

b The tolerances on dimensions XS and SS+ apply to strokes ≤ 1 250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

c Keyway is optional.

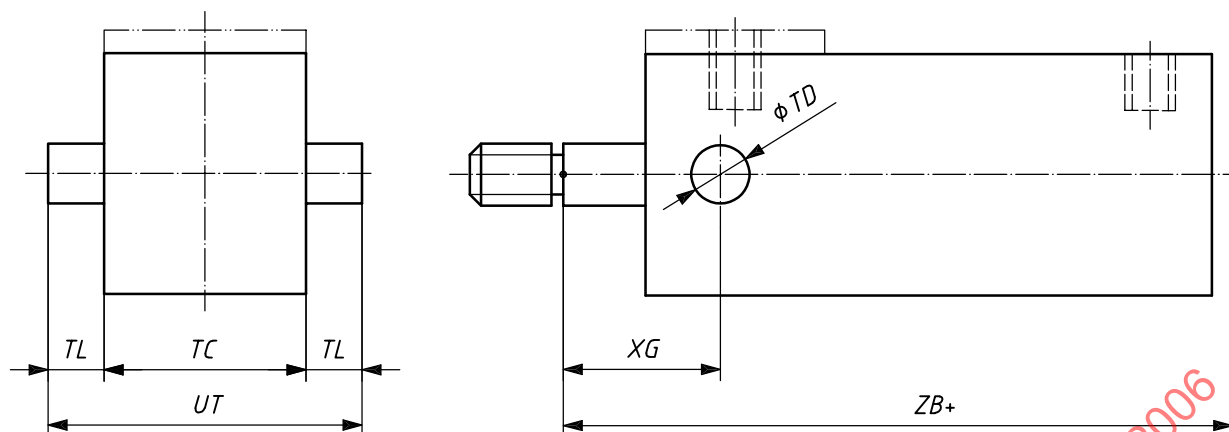


Figure 8 — MT 1 — Head, integral trunnion (male)

Table 8 — Dimensions of head, integral trunnion (male)

Dimensions in millimetres

Bore	Rod MM	TC h14	UT ref.	TD f8	TL js13	XG ^a ± 2	ZB max.
25	12	38	58	12	10	44	121
	18						
32	14	44	68	16	12	54	137
	22						
40	18	63	95	20	16	57	166
	28						
50	22	76	116	25	20	64	176
	36						
63	28	89	139	32	25	70	185
	45						
80	36	114	178	40	32	76	212
	56						
100	45	127	207	50	40	71	225
	70						
125	56	165	265	63	50	75	260
	90						
160	70	203	329	80	63	75	279
	110						
200	90	241	401	100	80	85	336
	140						

^a The tolerance on dimension XG applies to strokes ≤ 1250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

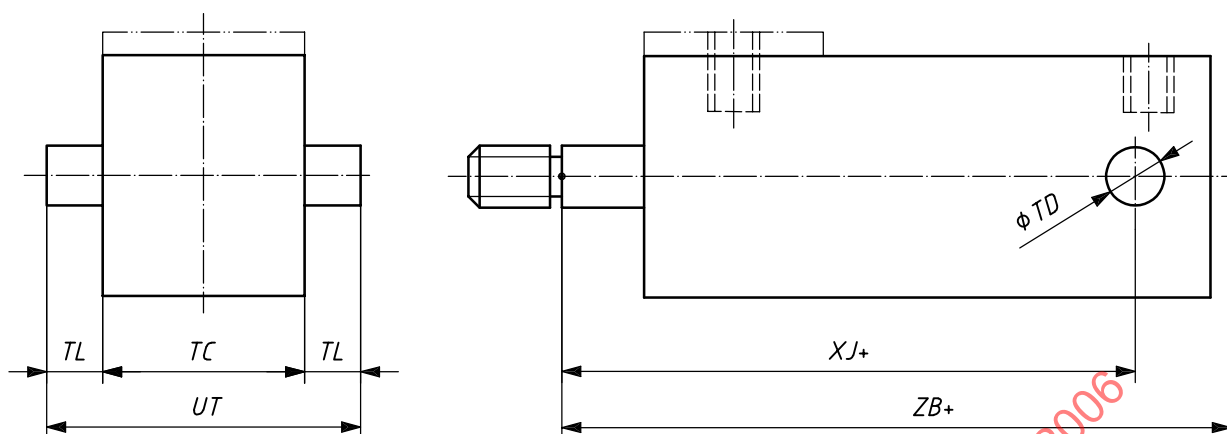


Figure 9 — MT 2 — Cap, integral trunnion (male)

Table 9 — Dimensions of cap, integral trunnion (male)

Dimensions in millimetres

Bore	Rod MM	TC h14	UT ref	TD f8	XJ ^a ± 1,5	TL js13	ZB max.
25	12	38	58	12	101	10	121
	18						
32	14	44	68	16	115	12	137
	22						
40	18	63	95	20	134	16	166
	28						
50	22	76	116	25	140	20	176
	36						
63	28	89	139	32	149	25	185
	45						
80	36	114	178	40	168	32	212
	56						
100	45	127	207	50	187	40	225
	70						
125	56	165	265	63	209	50	260
	90						
160	70	203	329	80	230	63	279
	110						
200	90	241	401	100	276	80	336
	140						

^a The tolerance on dimension XJ applies to strokes ≤ 1250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

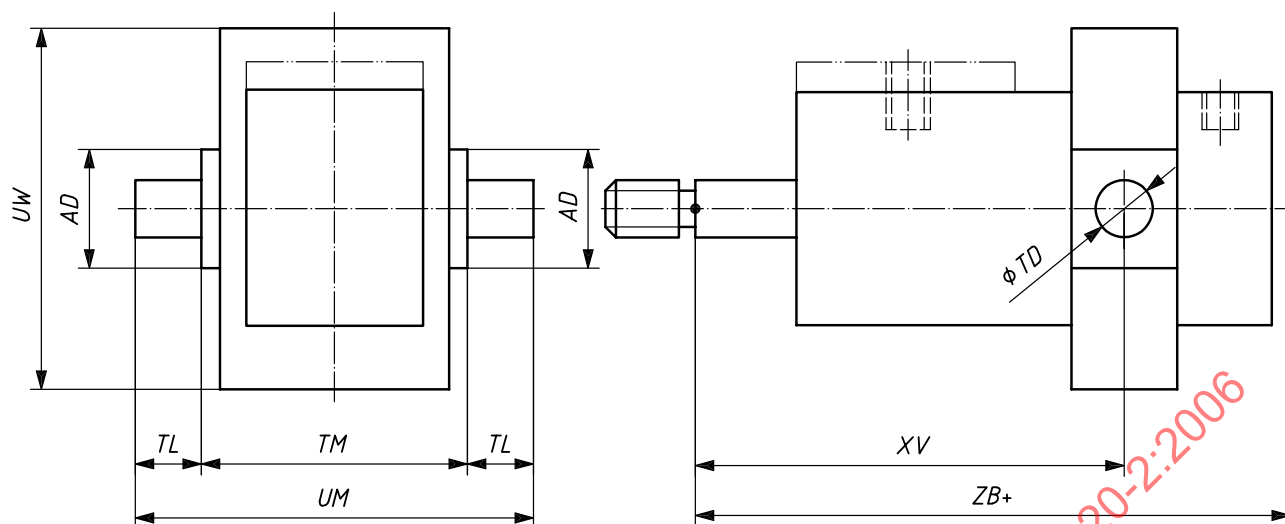


Figure 10 — MT 4 — Intermediate fixed or movable trunnion (male)

Table 10 — Dimensions of intermediate fixed or movable trunnion (male)

Dimensions in millimetres

Bore	Rod MM	AD	UW	TM	UM	TD	TL	XV ^{a, b} ± 2		ZB	Stroke ^b
		min.	max.	h14	ref.	f8	is13	min.	max.	max.	min.
25	12	20	63	48	68	12	10	82	72	121	10
	18								+ stroke		
32	14	25	75	55	79	16	12	96	82	137	14
	22								+ stroke		
40	18	30	92	76	108	20	16	107	88	166	19
	28								+ stroke		
50	22	40	112	89	129	25	20	117	90	176	27
	36								+ stroke		
63	28	40	126	100	150	32	25	132	91	185	41
	45								+ stroke		
80	36	50	160	127	191	40	32	147	99	212	48
	56								+ stroke		
100	45	60	180	140	220	50	40	158	107	225	51
	70								+ stroke		
125	56	73	215	178	278	63	50	180	109	260	71
	90								+ stroke		
160	70	90	260	215	341	80	63	198	104	279	94
	110								+ stroke		
200	90	110	355	279	439	100	80	226	130	336	96
	140								+ stroke		

^a The tolerance on dimension XV applies to strokes ≤ 1 250 mm. For longer strokes, tolerances can be in accordance with the manufacturer's standard or by agreement between the manufacturer and user.

^b For the maximum and minimum values of XV to be valid, the cylinder shall have a minimum stroke, as listed in this table.