
**Hydraulic fluid power — Mounting
dimensions for accessories for single
rod cylinders, 16 MPa (160 bar)
medium and 25 MPa (250 bar) series**

*Transmissions hydrauliques — Dimensions d'interchangeabilité des
accessoires pour vérins à simple tige, 16 MPa (160 bar) série moyenne
et 25 MPa (250 bar)*





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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 3, *Cylinders*.

This fourth edition cancels and replaces the third edition (ISO 8132:2014), which has been technically revised.

The main changes are as follows:

- The reference to ISO 3322 (withdrawn) has been replaced by ISO 2944 (Scope);
- [Figure 6](#) is for snap ring type (corrections have been made in the titles of [Figure 6](#) and [Table 6](#));
- [Figure 7](#) is for split pin type only (corrections have been made in the titles Title of [Figure 7](#) and [Table 7](#) and in [Clause 7](#) and Example 6);
- Keynotes ^a and ^b concerning tolerances in [Tables 6](#) and [7](#) have been modified.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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 fluid power cylinder. This is a device that converts power into linear mechanical force and motion. It consists of a movable element, i.e. a piston and piston rod, operating within a cylindrical bore.

Hydraulic fluid power — Mounting dimensions for accessories for single rod cylinders, 16 MPa (160 bar) medium and 25 MPa (250 bar) series

1 Scope

This document specifies the mounting dimensions required for the interchangeability of accessories for 16 MPa (160 bar) medium series cylinders in accordance with ISO 6020-1 and for 25 MPa (250 bar) series cylinders in accordance with ISO 6022. The accessories have been designed specifically for use with cylinders manufactured in accordance with ISO 6020-1 and ISO 6022, but this does not limit their application¹⁾.

This document covers the following accessories, identified in accordance with ISO 6099:

- AP2 — rod clevis, female thread (see [Figure 1](#) and [Table 1](#));
- AF3 — rod flange, circular (see [Figure 2](#) and [Table 2](#));
- AB4 — clevis bracket, straight (see [Figure 3](#) and [Table 3](#));
- AB3 — clevis bracket, in angle (see [Figure 4](#) and [Table 4](#));
- AT4 — trunnion bracket (see [Figure 5](#) and [Table 5](#));
- AA4-R — pivot pin, plain bearing (snap ring type) (see [Figure 6](#) and [Table 6](#));
- AA4-S — pivot pin, plain bearing (split pin type) (see [Figure 7](#) and [Table 7](#));
- AA6-R — pivot pin, spherical bearing (snap ring type) (see [Figure 6](#) and [Table 6](#));
- AA6-S — pivot pin, spherical bearing (split pin type) (see [Figure 7](#) and [Table 7](#));
- AP6 — rod eye spherical, female thread (see [Figure 8](#) and [Table 8](#));
- AP4 — rod eye plain, female thread (see [Figure 9](#) and [Table 9](#)).

These accessories are used on hydraulic cylinders for mechanically transmitting the cylinder force. The design of these accessories is based on the maximum forces resulting from the specified internal diameters of the cylinders and pressures according to ISO 3320 and ISO 2944.

This document applies only to the dimensional criteria of products manufactured in conformity with this document; it does not apply to their functional characteristics.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 286-2, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

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

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

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Mounting dimensions

The mounting dimensions for accessories are shown in [Figures 1](#) to [9](#) and are given in [Tables 1](#) to [9](#).

5 Tolerances

5.1 Tolerance values are given in [Figures 1](#) to [9](#).

5.2 Tolerances for other linear and angular dimensions shall be in accordance with the designation as described in ISO 2768-1.

6 Application instructions

6.1 Installation

6.1.1 Shaft for pivot pin, plain

A tolerance of f8 shall be used for plain bearing shafts in accordance with ISO 286-2.

6.1.2 Shaft for pivot pin, spherical bearing

A tolerance of m6 should be used for the shaft fitting the spherical plain bearing bore (see ISO 286-2). In exceptional cases (for example where there are difficulties in cylinder installation), a tolerance of f7 may be used. In this instance, a case-hardened shaft is recommended because movement occurs between the shaft and the bearing bore and lubrication is needed. Lubrication may be carried out through the shaft.

6.1.3 Tilting angle

The specified tilting angle of $\pm 4^\circ$ can still be obtained when the clevis inner faces about the side faces of the inner ring of the spherical plain bearing.

6.1.4 Rod clevis

The rod clevis, female thread (AP2), shall be screwed firmly against the piston rod shoulder before the two pieces are locked.

6.2 Lubrication

6.2.1 Sufficient lubrication for the satisfactory performance of these accessories shall be provided.

6.2.2 The method and frequency of such lubrication depend on the particular operating conditions.

6.2.3 For maintenance-free mating parts, no additional lubrication is required.

7 Designation

Accessories conforming to this document shall be designated by the mounting type identification, in accordance with ISO 6099, followed by “ISO 8132”, followed by a dash, followed by the type (size) from the relevant table.

EXAMPLE 1 A rod clevis, female thread of type 20 ($CK = 20$) conforming to ISO 8132 is designated by:

AP2 ISO 8132 - 20

EXAMPLE 2 A rod flange, circular of type 20 ($KK = M16 \times 1,5$) conforming to ISO 8132 is designated by:

AF3 ISO 8132 - 20

EXAMPLE 3 A clevis bracket, straight of type 20 ($CK = 20$), conforming to ISO 8132 is designated by:

AB4 ISO 8132 - 20

EXAMPLE 4 A clevis bracket, in angle of type 20 ($CK = 20$), conforming to ISO 8132 is designated by:

AB3 ISO 8132 - 20

EXAMPLE 5 A trunnion bracket of type 20 ($CR = 20$), conforming to ISO 8132 is designated by:

AT4 ISO 8132 - 20

EXAMPLE 6 A pivot pin, plain bearing (split pin type) of type 25 ($EK = 25$), conforming to ISO 8132 is designated by:

AA4-S ISO 8132 - 25

EXAMPLE 7 A rod eye spherical, female thread of type 20 ($CN = 20$), conforming to ISO 8132 is designated by:

AP6 ISO 8132 - 20

EXAMPLE 8 A rod eye plain, female thread of type 20 ($CK = 20$), conforming to ISO 8132 is designated by:

AP4 ISO 8132 - 20

8 Identification statement (reference to this document)

Use the following statement in test reports, catalogues, and sales literature when electing to comply with this document:

“Cylinder accessory mounting dimensions conform to ISO 8132, Hydraulic fluid power — Mounting dimensions for accessories for single rod cylinders, 16 MPa (160 bar) medium and 25 MPa (250 bar) series.”

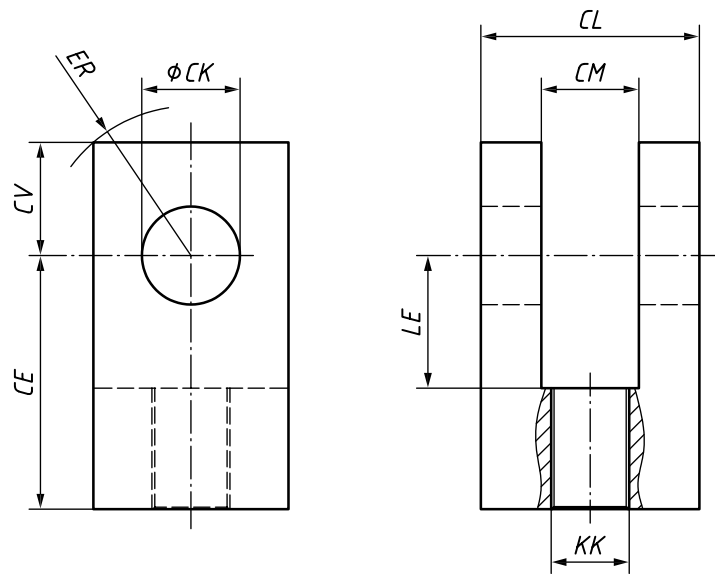


Figure 1 — AP2 — Rod clevis, female thread

Table 1 — Dimensions of AP2 — Rod clevis, female thread

Dimensions in millimetres

Type	Nominal force N	CK H9	CL h16	CM A13	CE js13	CV max.	KK 6H	LE min.	ER max.
12	8 000	12	28	12	38	16	M12 × 1,25	18	16
16	12 500	16	36	16	44	20	M14 × 1,5	22	20
20	20 000	20	45	20	52	25	M16 × 1,5	27	25
25	32 000	25	56	25	65	32	M20 × 1,5	34	32
32	50 000	32	70	32	80	40	M27 × 2	41	40
40	80 000	40	90	40	97	50	M33 × 2	51	50
50	125 000	50	110	50	120	63	M42 × 2	63	63
63	200 000	63	140	63	140	71	M48 × 2	75	71
70	250 000	70	150	70	160	80	M56 × 2	84	80
80	320 000	80	170	80	180	90	M64 × 3	94	90
90	400 000	90	190	90	195	100	M72 × 3	109	100
100	500 000	100	210	100	210	110	M80 × 3	114	110

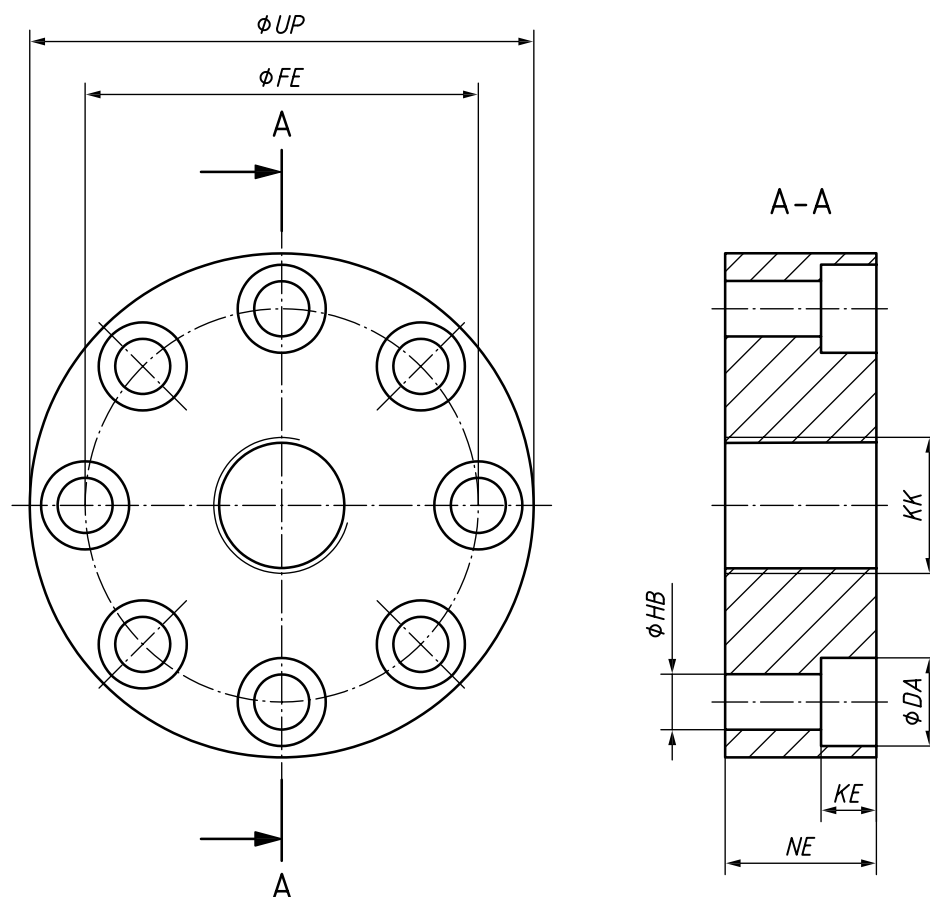


Figure 2 — AF3 — Rod flange, circular

Table 2 — Dimensions of AF3 — Rod flange, circular

Dimensions in millimetres

Type	Nominal force N	KK 6H	FE JS13	Number of holes	HB H13	NE JS13	UP max.	DA H13	KE +0,4 0
12	8 000	M12 × 1,25	40	4	6,6	17	56	11	6,8
16	12 500	M14 × 1,5	45	4	9	19	63	14,5	9
20	20 000	M16 × 1,5	54	6	9	23	72	14,5	9
25	32 000	M20 × 1,5	63	6	9	29	82	14,5	9
32	50 000	M27 × 2	78	6	11	37	100	17,5	11
40	80 000	M33 × 2	95	8	13,5	46	120	20	13
50	125 000	M42 × 2	120	8	17,5	57	150	26	17,5
63	200 000	M48 × 2	150	8	22	64	190	33	21,5
70	250 000	M56 × 2	165	8	24	77	212	36	23,5
80	320 000	M64 × 3	180	8	26	86	230	39	25,5
90	400 000	M72 × 3	195	10	29	89	250	43	28,5
100	500 000	M80 × 3	210	10	29	96	270	43	28,5

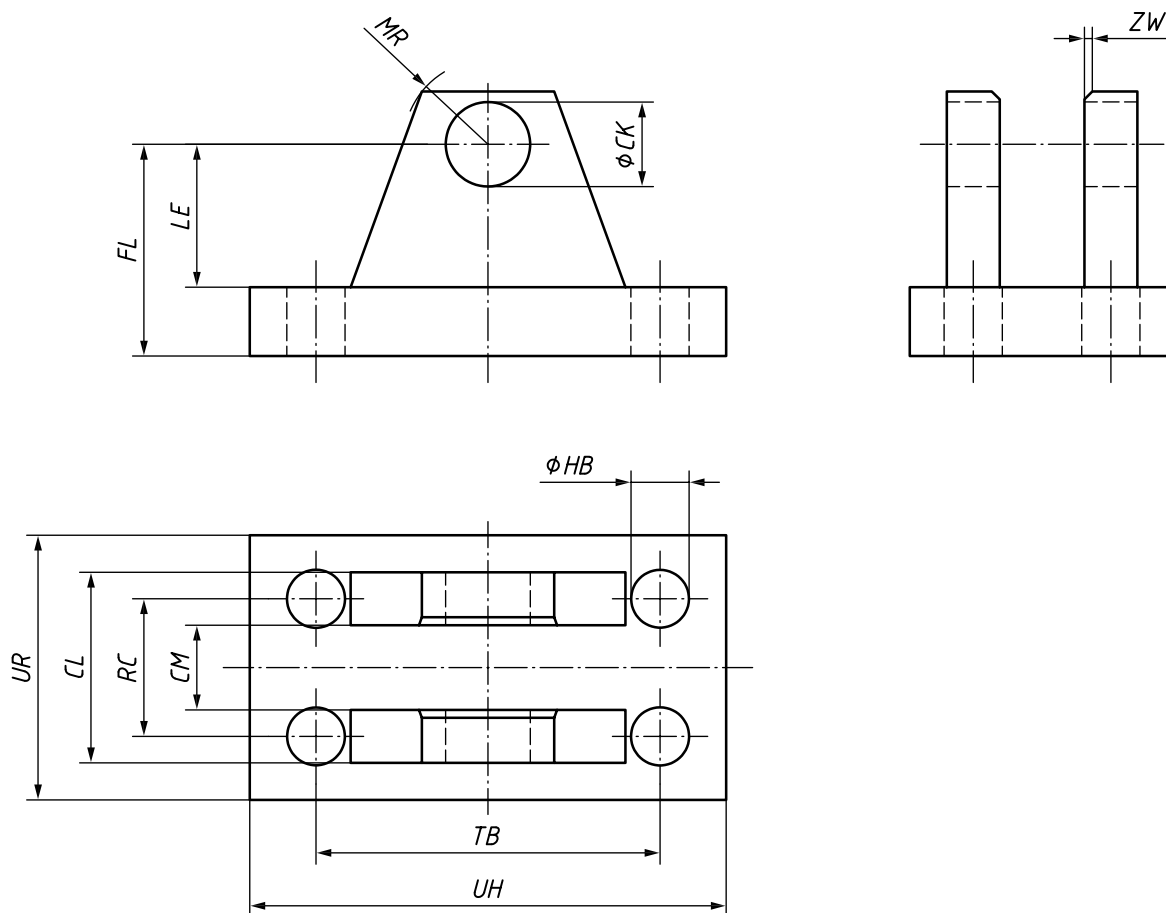


Figure 3 — AB4 — Clevis bracket, straight

Table 3 — Dimensions of AB4 — Clevis bracket, straight

Dimensions in millimetres

Type	Nominal force N	CK H9	CL h16	CM A13	ZW min.	FL JS12	HB H13	LE min.	MR max.	RC JS14	TB JS14	UR max.	UH max.
12	8 000	12	28	12	—	34	9	22	12	20	50	40	70
16	12 500	16	36	16	—	40	11	27	16	26	65	50	90
20	20 000	20	45	20	—	45	11	30	20	32	75	58	98
25	32 000	25	56	25	—	55	13,5	37	25	40	85	70	113
32	50 000	32	70	32	—	65	17,5	43	32	50	110	85	143
40	80 000	40	90	40	—	76	22	52	40	65	130	108	170
50	125 000	50	110	50	—	95	26	65	50	80	170	130	220
63	200 000	63	140	63	1 × 45°	112	33	75	63	100	210	160	270
70	250 000	70	150	70	2 × 45°	130	33	90	70	110	230	175	300
80	320 000	80	170	80	2 × 45°	140	39	95	80	125	250	210	320
90	400 000	90	190	90	2 × 45°	160	45	108	90	140	290	230	370
100	500 000	100	210	100	2 × 45°	180	45	120	100	160	315	260	400
110	635 000	110	240	110	2 × 45°	200	52	138	110	180	350	290	445
125	800 000	125	270	125	5 × 45°	230	52	170	125	200	385	320	470

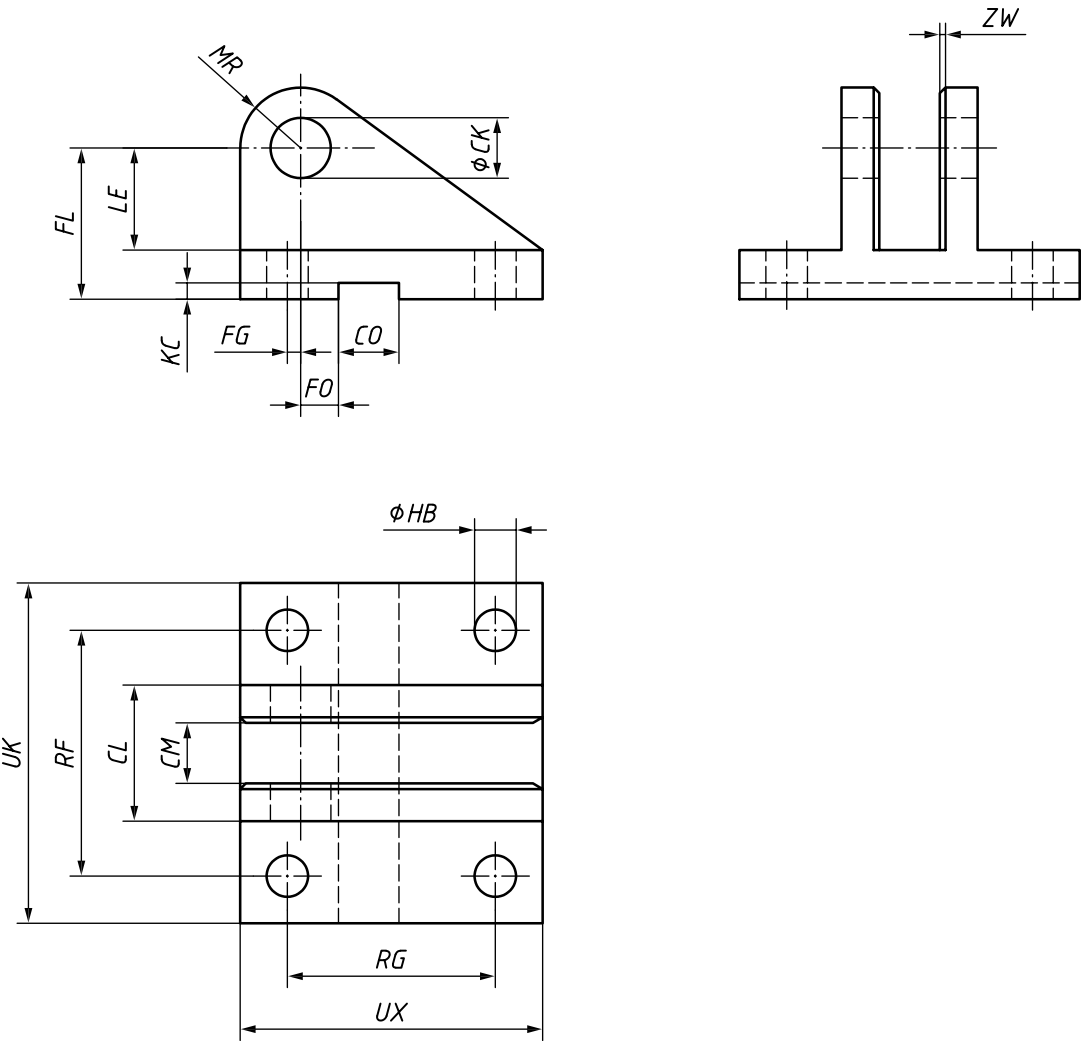


Figure 4 — AB3 — Clevis bracket, in angle

Table 4 — Dimensions of AB3 — Clevis bracket, in angle

Type	Nominal force N	CK H9	CL h16	CM A13	FL js13	ZW min.	HB H13	CO N9	LE min.	MR max.	RG js13	RF js13	UX max.	UK max.	FG JS14	KC +0,3 0	FO JS14
12	8 000	12	28	12	34	—	9	10	22	12	45	52	65	72	2	3,3	10
16	12 500	16	36	16	40	—	11	16	27	16	55	65	80	90	3,5	4,3	10
20	20 000	20	45	20	45	—	11	16	30	20	70	75	95	100	7,5	4,3	10
25	32 000	25	56	25	55	—	13,5	25	37	25	85	90	115	120	10	5,4	10
32	50 000	32	70	32	65	—	17,5	25	43	32	110	110	145	145	14,5	5,4	6
40	80 000	40	90	40	76	—	22	36	52	40	125	140	170	185	17,5	8,4	6
50	125 000	50	110	50	95	—	26	36	65	50	150	165	200	215	25	8,4	—
63	200 000	63	140	63	112	1 × 45°	33	50	75	63	170	210	230	270	33	11,4	—
70	250 000	70	150	70	130	2 × 45°	33	50	90	70	190	230	250	290	40	11,4	—
80	320 000	80	170	80	140	2 × 45°	39	50	95	80	210	250	280	320	45	11,4	—
90	400 000	90	190	90	160	2 × 45°	45	63	108	90	235	280	320	360	47,5	12,4	—
100	500 000	100	210	100	180	2 × 45°	52	63	120	100	250	315	345	405	52,5	12,4	—
110	635 000	110	240	110	200	2 × 45°	52	80	138	110	305	335	400	425	62,5	15,4	—
125	800 000	125	270	125	230	5 × 45°	52	80	170	125	350	365	450	455	75	15,4	—

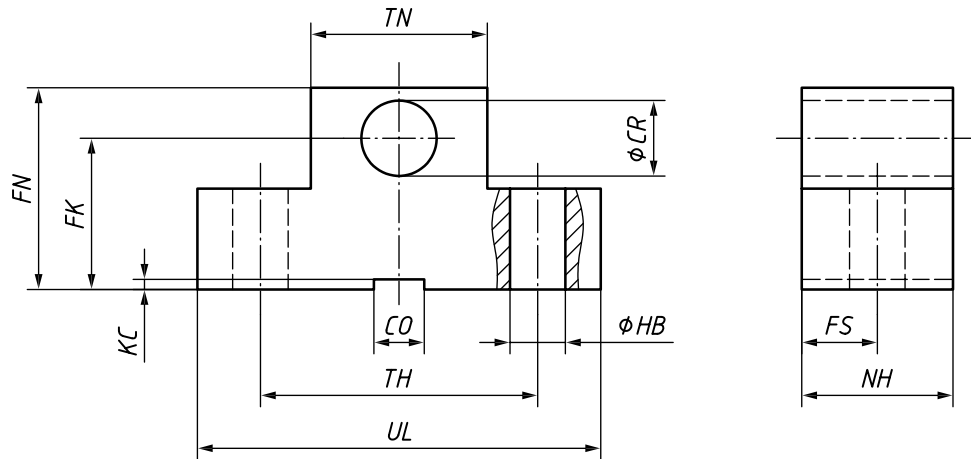


Figure 5 — AT4 - Trunnion bracket

Table 5 — Dimensions of AT4 - Trunnion bracket

Dimensions in millimetres

Type	Nominal force N	CR H7	FK JS12	FN max.	HB H13	NH max.	TH js13	TN max.	UL max.	CO N9	KC +0,3 0	FS js13
12	8 000	12	34	50	9	17	40	24	63	10	3,3	8
16	12 500	16	40	60	11	21	50	31	80	16	4,3	10
20	20 000	20	45	70	11	21	60	41	90	16	4,3	10
25	32 000	25	55	80	13,5	26	80	56	110	25	5,4	12
32	50 000	32	65	100	17,5	33	110	70	150	25	5,4	15
40	80 000	40	76	120	22	41	125	88	170	36	8,4	16
50	125 000	50	95	140	26	51	160	105	210	36	8,4	20
63	200 000	63	112	180	33	61	200	130	265	50	11,4	25
80	320 000	80	140	220	39	81	250	170	325	50	11,4	31
90	385 000	90	160	250	45	91	265	190	345	63	12,4	40
100	500 000	100	180	280	52	102	295	215	385	63	12,4	45
110	630 000	110	200	310	52	112	320	240	410	80	15,4	50
125	785 000	125	220	345	62	132	385	270	570	80	15,4	56

NOTE These dimensions are valid for operation at 16 MPa (160 bar) of cylinders with bores of 25 mm up to and including 250 mm; they are also valid for operation at 25 MPa (250 bar) of cylinders with bores of 50 mm up to and including 200 mm.

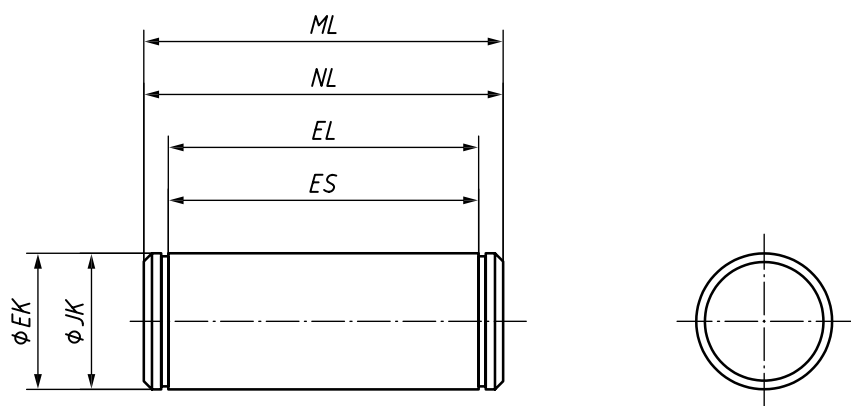


Figure 6 — AA4-R — Pivot pin, plain bearing (snap ring type) or AA6-R — Pivot pin, spherical bearing (snap ring type)

Table 6 — Dimensions of AA4-R — Pivot pin, plain bearing (snap ring type) or AA6-R —Pivot pin, spherical bearing (snap ring type)

Dimensions in millimetres

Type	Nominal force N	NL ML max.	ES EL H16	JK ^a m6 EK ^b f8
12	8 000	49	29	12
16	12 500	57	37	16
20	20 000	72	46	20
25	32 000	84	57	25
32	50 000	105	72	32
40	80 000	133	92	40
50	125 000	165	112	50
63	200 000	185	142	63
70	250 000	205	152	70
80	320 000	225	172	80

^a For tolerances for *CN* in spherical bearing, see [Table 8](#).
^b For tolerances for *CK* in plain bearing, see [Table 9](#).
NOTE The symbols “*ML*”, “*EL*” and “*EK*” are for plain bearings. The symbols “*NL*”, “*ES*” and “*JK*” are for spherical bearings.

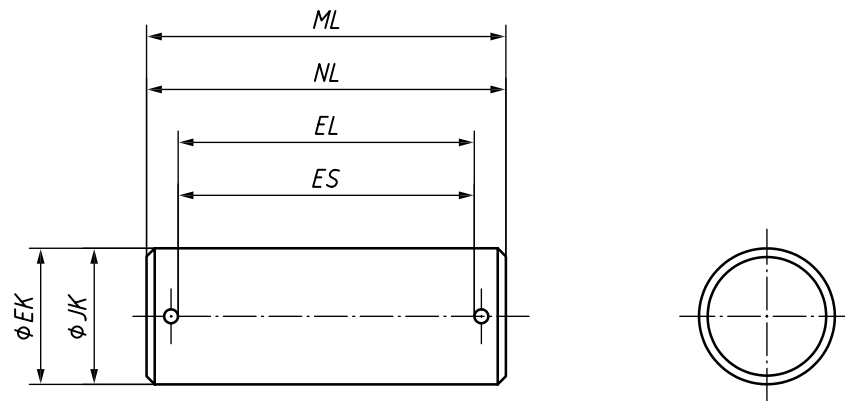


Figure 7 — AA4-S — Pivot pin, plain bearing (split pin type) or AA6-S — Pivot pin, spherical bearing (split pin type)

Table 7 — Dimensions of AA4-S — Pivot pin, plain bearing (split pin type) or AA6-S — Pivot pin, spherical bearing (split pin type)

Dimensions in millimetres

Type	Nominal force N	NL ML max.	ES EL H16	JK ^a m6 EK ^b f8
12	8 000	49	29	12
16	12 500	57	37	16
20	20 000	72	46	20
25	32 000	84	57	25
32	50 000	105	72	32
40	80 000	133	92	40
50	125 000	165	112	50
63	200 000	185	142	63
70	250 000	205	152	70
80	320 000	225	172	80

^a For tolerances for *CN* in spherical bearing, see [Table 8](#).

^b For tolerances for *CK* in plain bearing, see [Table 9](#).

NOTE The symbols “*ML*”, “*EL*” and “*EK*” are for plain bearings. The symbols “*NL*”, “*ES*” and “*JK*” are for spherical bearings.

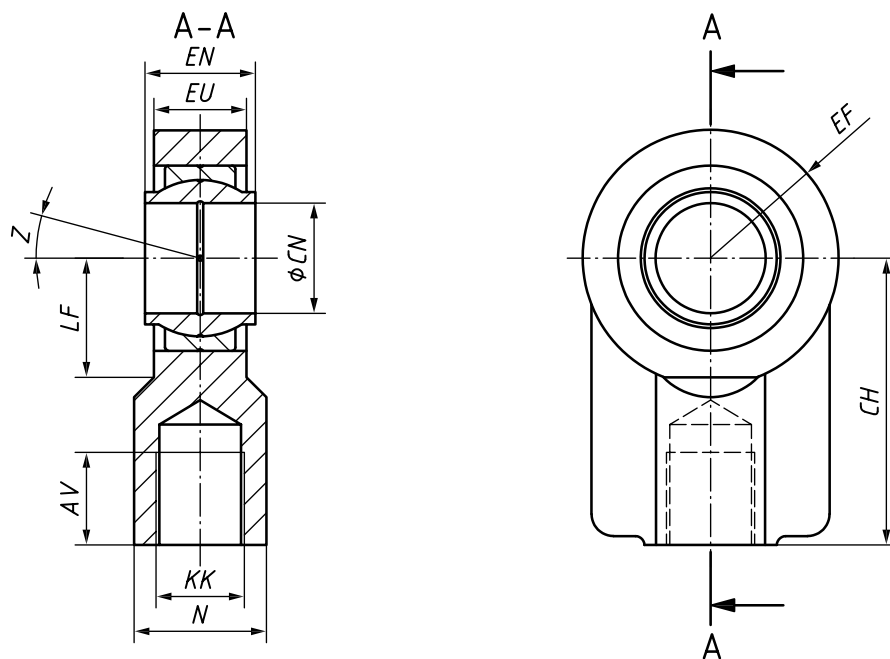


Figure 8 — AP6 — Rod eye spherical, female thread

Table 8 — Dimensions of AP6 — Rod eye spherical, female thread

Dimensions in millimetres

Type	Nominal force N	N max.	KK 6H	CN		EN		EF max.	CH js13	AV min.	LF min.	EU max.	Til- ting angle Z min
				nom.	tol. µm	nom.	tol. µm						
12	8 000	19	M12 × 1,25	12	+18 0	12	0	16,5	38	17	14	11	4°
16	12 500	22	M14 × 1,5	16		16	-180	20,5	44	19	18	14	
20	20 000	28	M16 × 1,5	20	+21 0	20	0	25	52	23	22	17,5	
25	32 000	31	M20 × 1,5	25		25	-210	32	65	29	27	22	
32	50 000	38	M27 × 2	32	+25 0	32	0 -250	40	80	37	32	28	
40	80 000	47	M33 × 2	40		40		50	97	46	41	34	
50	125 000	58	M42 × 2	50		50		63	120	57	50	42	
63	200 000	70	M48 × 2	63	+30 0	63	0	72,5	140	64	62	53,5	
80	320 000	91	M64 × 3	80		80	-300	92	180	86	78	68	
100	500 000	110	M72 × 3	100	+35 0	100	0 -350	114	210	91	98	85,5	
			M80 × 3							96			
125	800 000	135	M90 × 3	125	+40 0	125	0 -400	160	260	107	120	105	
			M100 × 3							113			
160	1 250 000	165	M125 × 4	160		160		200	310	126	150	133	
200	2 000 000	215	M160 × 4	200	+46 0	200	0	250	390	161	195	165	
250	3 200 000	300	M200 × 4	250		250	-460	320	530	205	265	200	
320	5 000 000	360	M250 × 6	320	+57 0	320	0 -570	375	640	260	325	265	
NOTE	For spherical bearings see ISO 12240-1, type W.												

NOTE For spherical bearings see ISO 12240-1, type W.

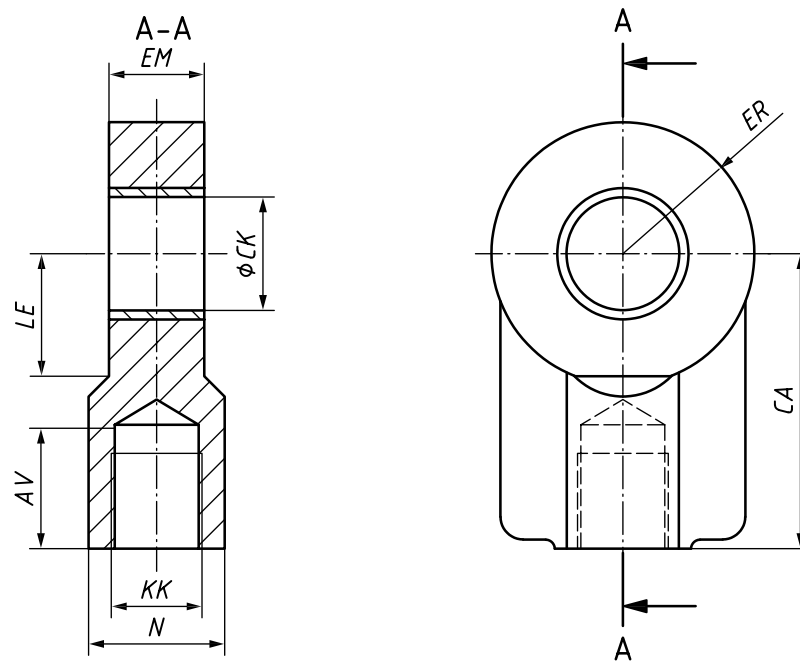


Figure 9 — AP4 — Rod eye plain, female thread

Table 9 — Dimensions of AP4 — Rod eye plain, female thread

Dimensions in millimetres

Type	Nominal force N	KK 6H	CK H9	EM h12	ER max.	CA JS13	AV min.	LE min.	N max.
12	8 000	M12 × 1,25	12	12	16,5	38	17	14	19
16	12 500	M14 × 1,5	16	16	20,5	44	19	18	22
20	20 000	M16 × 1,5	20	20	25	52	23	22	28
25	32 000	M20 × 1,5	25	25	32	65	29	27	31
32	50 000	M27 × 2	32	32	40	80	37	32	38
40	80 000	M33 × 2	40	40	50	97	46	41	47
50	125 000	M42 × 2	50	50	63	120	57	50	58
63	200 000	M48 × 2	63	63	72,5	140	64	62	70
80	320 000	M64 × 3	80	80	92	180	86	78	91
100	500 000	M72 × 3	100	100	114	210	91	98	110
		M80 × 3					96		
125	800 000	M90 × 3	125	125	160	260	107	120	135
		M100 × 3					113		
160	1 250 000	M125 × 4	160	160	200	310	126	150	165
200	2 000 000	M160 × 4	200	200	250	390	161	195	215
250	3 200 000	M200 × 4	250	250	320	530	205	265	300
320	5 000 000	M250 × 6	320	320	375	640	260	325	360

Bibliography

- [1] ISO 2944, *Fluid power systems and components — Nominal pressures*
- [2] ISO 3320, *Fluid power systems and components — Cylinder bores and piston rod diameters and area ratios — Metric series*
- [3] ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*
- [4] ISO 6020-1, *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series — Part 1: Medium series*
- [5] ISO 6022, *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 25 MPa (250 bar) series*
- [6] ISO 12240-1, *Spherical plain bearings — Part 1: Radial spherical plain bearings*

