BS ISO 8133:2014

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of ISO 8133:2014. It supersedes BS ISO 8133:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/18/-/3, Cylinders.

A list of organizations represented on this committee can be obtained on request to its secretary.

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2014-11-15

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

Transmissions hydrauliques — Dimensions d'interchangeabilité des accessoires pour vérins, 16 MPa (160 bar) à simple tige, série compacte

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 131, *Fluid power systems*, Subcommittee SC 3, *Cylinders*.

This third edition cancels and replaces the second edition (ISO 8133:2006), which has been technically revised.

Introduction

In hydraulic fluid 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) compact series

1 Scope

This International Standard specifies the mounting dimensions required for interchangeability of accessories for 16 MPa [160 bar)] compact cylinders conforming to ISO 6020-2. The accessories have been designed specifically for use with cylinders manufactured in accordance with ISO 6020-2, but this does not limit their application.

Note 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

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

— AP6 — rod eye spherical, female thread (see Figure 1 and Table 1);

— AB5 — clevis bracket, spherical eye, in angle (see Figure 2 and Table 2);

— AA6-L — pivot pin, spherical bearing, locking plate (see Figure 3 and Table 3);

— AL6 — locking plate for pivot pin (see Figure 4 and Table 4);

— AP2 — rod clevis, female thread (see Figure 5 and Table 5);

— AP4 — rod eye plain, female thread (see Figure 6 and Table 6);

— AB2 — eye bracket (see Figure 7 and Table 7);

— AB4 — clevis bracket, straight (see Figure 8 and Table 8);

— AA4-S — pivot pin, plain (split pins) (see Figure 9 and Table 9);

— AA4-R — pivot pin, plain (rings) (see Figure 10 and Table 10);

— AT4 — trunnion bracket (see Figure 11 and Table 11).

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 3322.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

ISO 2768-2, *General tolerances — Part 2: Geometrical tolerances for features without individual tolerance indications*

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.

4 Mounting dimensions

The mounting dimensions for accessories are shown in Figures 1 to 11 and given in Tables 1 to 11.

5 Tolerances

5.1 Tolerances values are given in Figures 1 to 11.

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

5.3 Geometrical tolerances shall be in accordance with the designation as described in ISO 2768-2.

NOTE All figures in this International Standard indicate tolerance requirements using the ISO code "ISO 2768-mk", as described in ISO 2768-1 and ISO 2768-2.

6 Application instructions

6.1 Installation

6.1.1 A tolerance of f8 is recommended for plain bearing shafts (see ISO 286-2). A tolerance of h6 should be used for the shaft fitting the spherical plain bearing bore. In exceptional cases (for example where there are difficulties in cylinder installation), a tolerance of f7 can 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 can be carried out through the shaft.

6.1.2 The specified tilting angle of ±3° for the spherical bearing can still be obtained even after the clevis is in place next to the side faces of the spherical plain bearing's inner ring.

6.1.3 The rod clevis and the rod eye shall be screwed firmly against the piston rod shoulder before locking.

6.2 Life spherical bearing

6.2.1 The life of the spherical plain bearing is influenced by many factors, such as the specific load, angle of oscillation, type of lubricant, and frequency of lubrication.

6.2.2 The spherical plain bearings are designed to give an acceptable bearing life under normal operating conditions.

6.2.3 Where a constant unidirectional load is applied or other unusual operating conditions exist, consultation with the supplier is recommended.

6.3 Lubrication

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

6.3.2 The method and frequency of such lubrication depends on the particular operating conditions.

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

7 Designation

Accessories conforming to this International Standard shall be designated by the mounting type identification in accordance with ISO 6099, followed by "ISO 8133", followed by a dash, followed by the type (size) from the relevant table.

EXAMPLE 1 A rod eye spherical, female thread of type 20 (*CN* = 20) conforming to ISO 8133 is designated:

AP6 ISO 8133 - 20

EXAMPLE 2 A clevis bracket, spherical eye, in angle of type 20 (*CF* = 20) conforming to ISO 8133 is designated:

AB5 ISO 8133 - 20

EXAMPLE 3 A pivot pin, spherical bearing, locking plate of type 20 (*DK* = 20) conforming to ISO 8133 is designated:

AA6-L ISO 8133 - 20

EXAMPLE 4 A locking plate for pivot pin of type 20 (*DK* = 20) conforming to ISO 8133 is designated:

AL6 ISO 8133 - 20

EXAMPLE 5 A rod clevis, female thread of type 20 (*CK* = 20) conforming to ISO 8133 is designated:

AP2 ISO 8133 - 20

EXAMPLE 6 A rod eye plain, female thread of type 20 (*CK* = 20) conforming to ISO 8133 is designated:

AP4 ISO 8133 - 20

EXAMPLE 7 An eye bracket of type 20 (*CK* = 20) conforming to ISO 8133 is designated:

AB2 ISO 8133 - 20

EXAMPLE 8 A clevis bracket, straight of type 20 (*CK* = 20) conforming to ISO 8133 is designated:

AB4 ISO 8133 - 20

EXAMPLE 9 A pivot pin plain (plain split pins) of type 20 (*EK* = 20) conforming to ISO 8133 is designated:

AA4-S ISO 8133 - 20

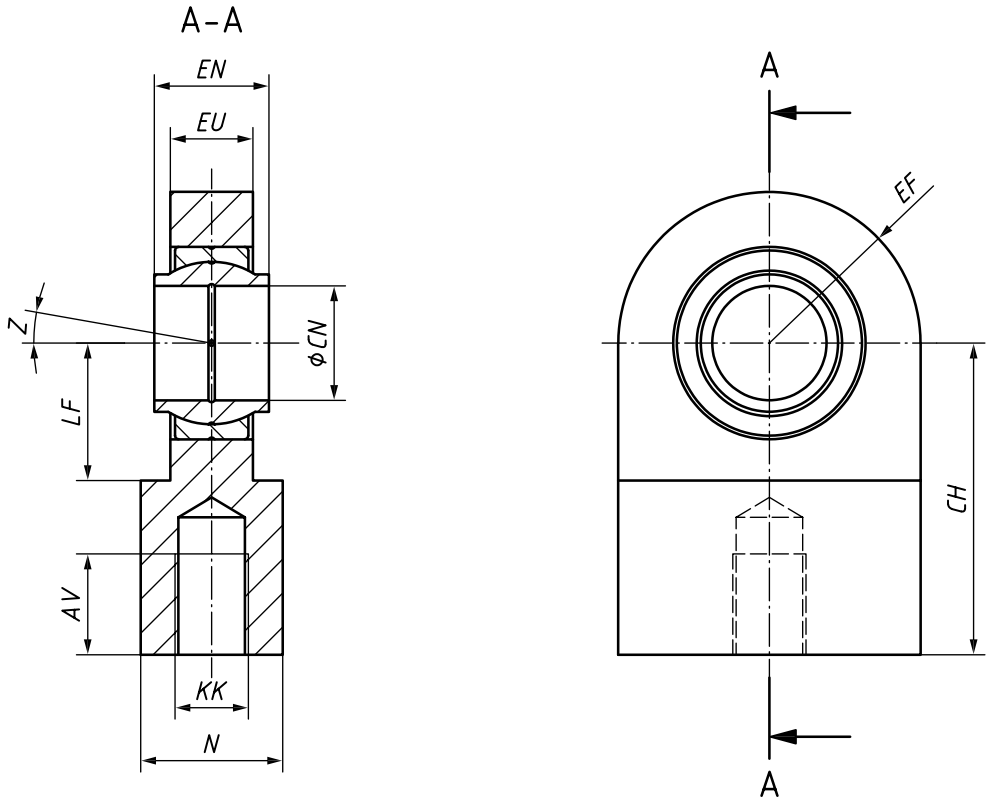
EXAMPLE 10 A trunnion bracket of type 20 (*CR* = 20) conforming to ISO 8133 is designated:

AT4 ISO 8133 - 20

8 Identification statement (reference to this International Standard)

It is strongly recommended to fabricators who elect to conform to this International Standard to use the following statement in test reports, catalogues, and sales literature when electing to comply with this International Standard:

"Cylinder accessory mounting dimensions conform to ISO 8133:2014, *Hydraulic fluid power — Mounting dimensions for accessories for single rod cylinders, 16 MPa (160 bar) compact series.*"



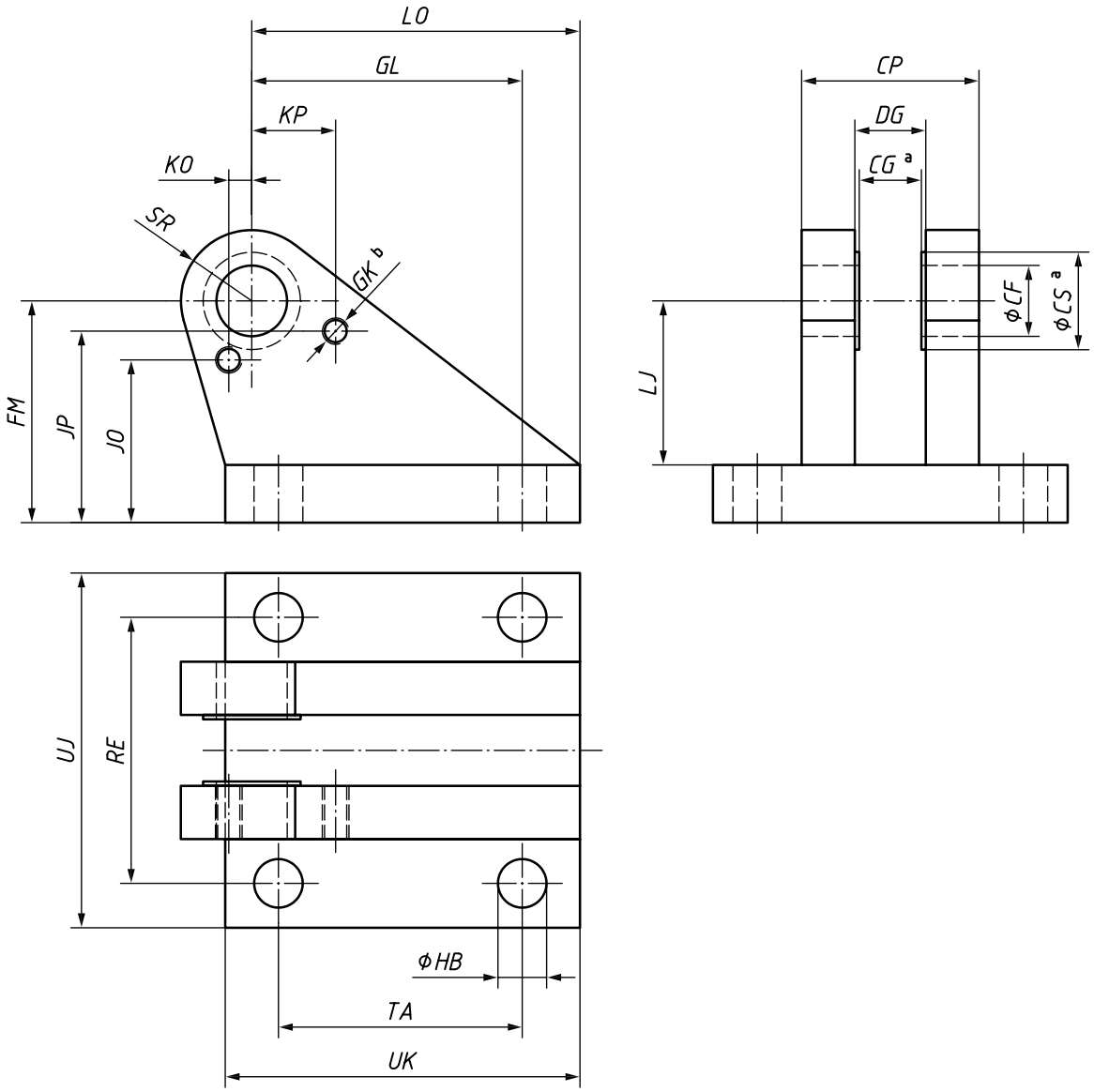
NOTE A suitable locking device shall be used.

Figure 1 — AP6 — Rod eye spherical, female thread

Table 1 — Dimensions of AP6 — Rod eye spherical, female thread

Dimensions in millimetres

Type	**Nominal force** N	*N* max.	*KK* 6H	*CN* nom.	*CN* tol. µm	*EN* nom.	*EN* tol. µm	*EF* max.	*CH* js13	*AV* min.	*LF* min.	*EU* max.	**Tilting angle** *Z* min.
12	8 000	19	M10 × 1,25	12	0 −8	10	0 −50	18	42	15	16	8,5	3°
16	12 500	22	M12 × 1,25	16		14		23	48	17	20	11,5	
20	20 000	28	M14 × 1,5	20	0 −10	16		28	58	19	25	13,5	
25	32 000	31	M16 × 1,5	25		20		33	68	23	30	18	
30	50 000	37	M20 × 1,5	30		22		41	85	29	35	20	
40	80 000	47	M27 × 2	40	0 −12	28		51	105	37	45	24	
50	125 000	57	M33 × 2	50		35		61	130	46	58	31	
60	200 000	69	M42 × 2	60	0 −15	44	0 −150	80	150	57	68	39	
80	320 000	91	M48 × 2	80		55		102,5	185	64	92	48	
100	500 000	110	M64 × 3	100	0 −20	70	0 −200	120	240	86	116	57	



a Separate spacers are permitted to maintain *CG* and *CS* dimensions.

b Tapped holes are required only when using a pivot pin with a locking plate.

Figure 2 — AB5 — Clevis bracket, spherical eye, in angle

Table 2 — Dimensions for AB5 — Clevis bracket, spherical eye, in angle

Dimensions in millimetres

Type	**Nominal force** N	*CF* K7	*CP* h14	*CG* +0,3 +0,1	*CS* min.	*DV*[a] min.	*DG* +2 0	*FM* js13	*GK*	*HB* H13	*GL* JS13	*JO* ± 0,2	*JP* ± 0,2	*KO* ± 0,2	*KP* ± 0,2	*LJ* min.	*LO* max.	*RE* js13	*SR* max.	*TA* js13	*UJ* max.	*UK* max.
12	8 000	12	30	10	16	9	12	40	M6	9	46	29,1	33,2	3,9	11,6	29	56	55	12	40	75	60
16	12 500	16	40	14	22	12	16	50	M6	11	61	36,7	43,2	5,2	18,9	38	74	70	16	55	95	80
20	20 000	20	50	16	25	12	19	55	M6	14	64	38,3	44,7	8,5	15,6	40	80	85	20	58	120	90
25	32 000	25	60	20	30	12	24	65	M6	16	78	48,5	48,5	11	14	49	98	100	25	70	140	110
30	50 000	30	70	22	35	12	26	85	M6	18	97	66	66	15	15	63	120	115	30	90	160	135
40	80 000	40	80	28	47	16	32	100	M8	22	123	77	77	21	21	73	148	135	40	120	190	170
50	125 000	50	100	35	58	16	41	125	M8	30	155	95,5	95,5	22,5	22,5	92	190	170	50	145	240	215
60	200 000	60	120	44	68	20	50	150	M10	39	187	116,5	116,5	27,5	27,5	110	225	200	60	185	270	260
80	320 000	80	160	55	90	20	65	190	M10	45	255	146	146	30	30	142	295	240	80	260	320	340
100	500 000	100	200	70	111	20	80	210	M10	48	285	154	154	45	45	152	335	300	100	300	400	400

[a] Thread depth for mounting screw *GK*.

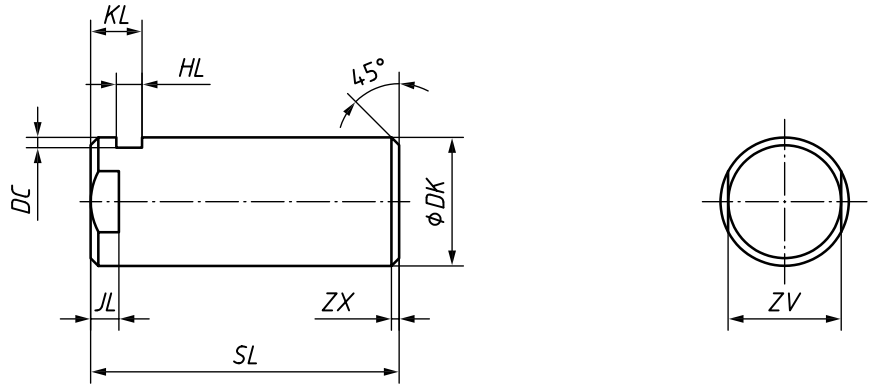


Figure 3 — AA6-L — Pivot pin, spherical bearing, locking plate

Table 3 — Dimensions of AA6-L — Pivot pin, spherical bearing, locking plate

Dimensions in millimetres

Type	**Nominal force** N	*DK* h6	*SL* ± 1	*KL* ± 0,5	*HL* +0,2 0	*JL* 0 −0,2	*ZV* h13	*DC* JS13	*ZX* max.
12	8 000	12	40	8	3,3	4,5	10	4	1
16	12 500	16	50	8	3,3	5,5	13	4	1
20	20 000	20	62	10	4,5	5,5	17	5	1,5
25	32 000	25	72	10	4,5	5,5	22	5	1,5
30	50 000	30	85	13	5,5	7,5	24	6	2
40	80 000	40	100	16	6,5	9,5	32	7	2
50	125 000	50	122	19	9	10	41	8	2
60	200 000	60	145	20	9	11	50	9	2
80	320 000	80	190	26	11	15	70	11	3
100	500 000	100	235	30	13	15	90	14	3

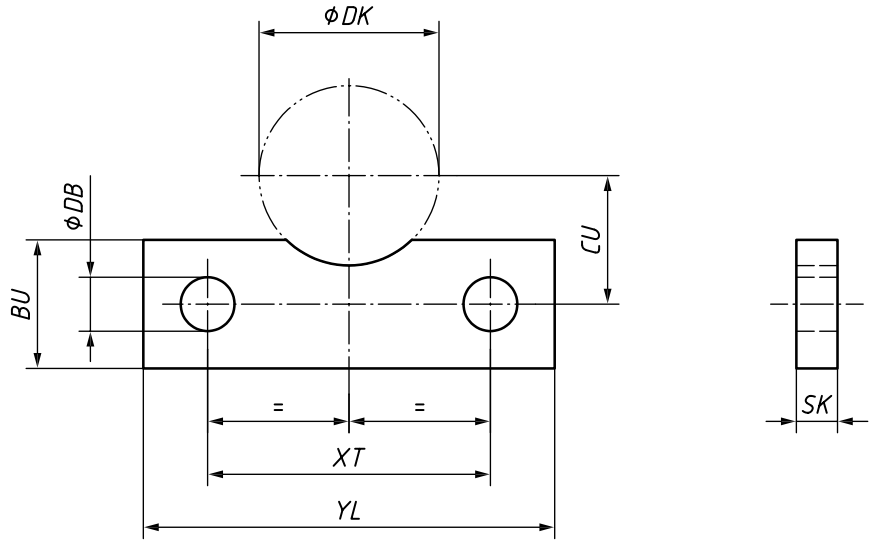


Figure 4 — AL6 — Locking plate for pivot pin

Table 4 — Dimensions of AL6 — Locking plate for pivot pin

Dimensions in millimetres

Type	*DB* H13	*DK* h6	*BU* JS14	*CU* ± 0,1	*SK* ± 0,2	*YL* JS14	*XT* ± 0,1	**Screw**
12	6,4	12	15	9,5	3	27	16	M6 × 12
16	6,4	16	15	11,5	3	40	25	M6 × 12
20	6,4	20	18	14,5	4	40	25	M6 × 16
25	6,4	25	18	16,5	4	40	25	M6 × 16
30	6,4	30	20	19	5	45	30	M6 × 16
40	8,4	40	20	23	6	62	42	M8 × 20
50	8,4	50	25	29,5	8	65	45	M8 × 20
60	10,5	60	25	33,5	8	80	55	M10 × 25
80	10,5	80	30	44	10	90	60	M10 × 25
100	10,5	100	40	56	12	120	90	M10 × 25

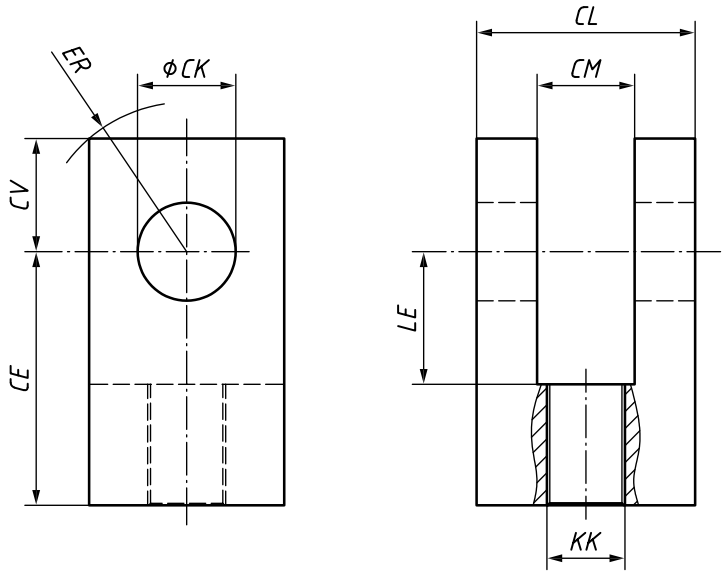


Figure 5 — AP2 — Rod clevis, female thread

Table 5 — Dimensions of AP2 — Rod clevis, female thread

Dimensions in millimetres

Type	**Typical rod diameter**	**Typical bore**	**Nominal force** N	*KK* 6H	*CK* H9	*CM* A13	*CV* max.	*ER* max.	*CE* JS13	*LE* min.	*CL* max.
10	12	25	8 000	M10 × 1,25	10	12	12	12	32	13	26
12	14	32	12 500	M12 × 1,25	12	16	17	17	36	19	34
16	18	40	20 000	M14 × 1,5	14	20	17	17	38	19	42
20	22	50	32 000	M16 × 1,5	20	30	29	29	54	32	62
25	28	63	50 000	M20 × 1,5	20	30	29	29	60	32	62
30	36	80	80 000	M27 × 2	28	40	34	34	75	39	83
40	45	100	125 000	M33 × 2	36	50	50	50	99	54	103
50	56	125	200 000	M42 × 2	45	60	53	53	113	57	123
60	70	160	320 000	M48 × 2	56	70	59	59	126	63	143
80	90	200	500 000	M64 × 3	70	80	78	78	168	83	163

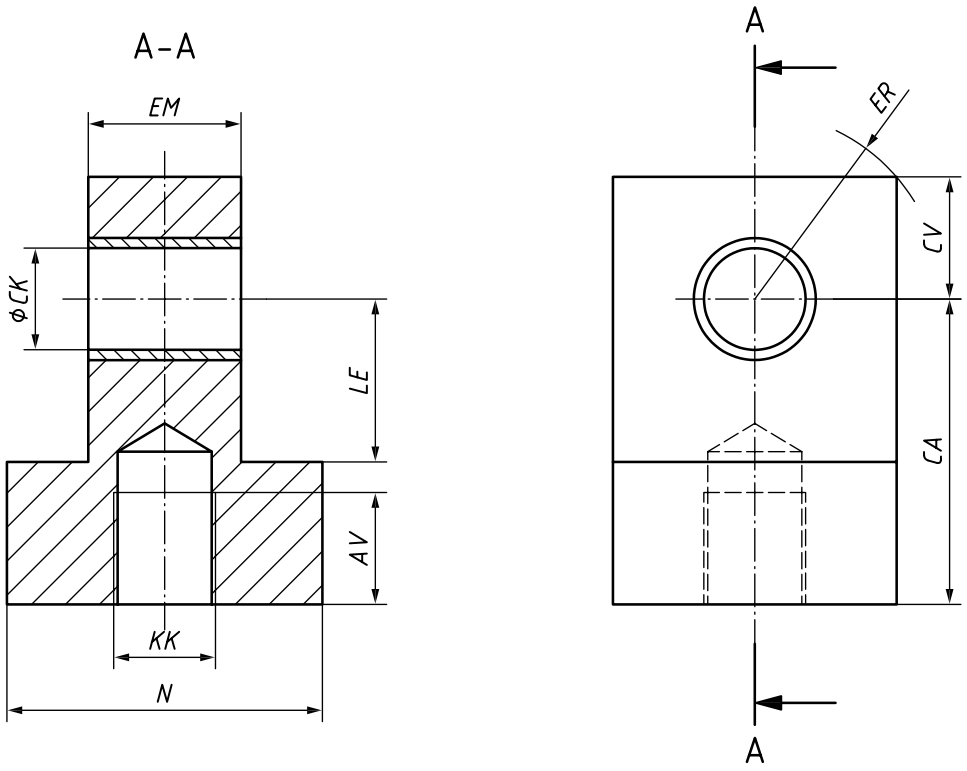


Figure 6 — AP4 — Rod eye plain, female thread

Table 6 — Dimensions of AP4 — Rod eye plain, female thread

Dimensions in millimetres

Type	**Typical rod diameter**	**Typical bore**	**Nominal force** N	*KK* 6H	*CK* H9	*EM* h13	*CV* max.	*ER* max.	*CA* JS13	*AV* min.	*LE* min.	*N* max.
10	12	25	8 000	M10 × 1,25	10	12	12	12	32	14	13	26
12	14	32	12 500	M12 × 1,25	12	16	17	17	36	16	19	34
16	18	40	20 000	M14 × 1,5	14	20	17	17	38	18	19	42
20	22	50	32 000	M16 × 1,5	20	30	29	29	54	22	32	62
25	28	63	50 000	M20 × 1,5	20	30	29	29	60	28	32	62
30	36	80	80 000	M27 × 2	28	40	34	34	75	36	39	83
40	45	100	125 000	M33 × 2	36	50	50	50	99	45	54	103
50	56	125	200 000	M42 × 2	45	60	53	53	113	56	57	123
60	70	160	320 000	M48 × 2	56	70	59	59	126	63	63	143
80	90	200	500 000	M64 × 3	70	80	78	78	168	85	83	163

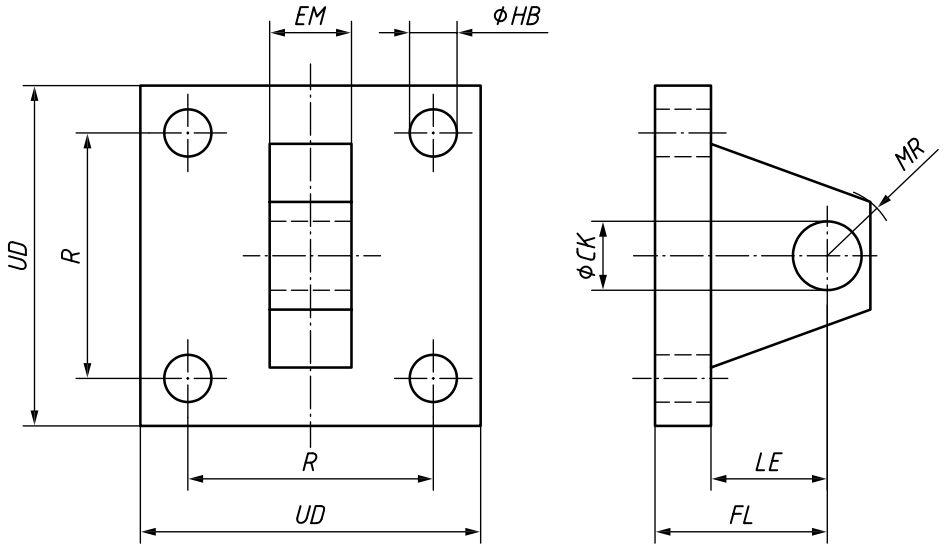


Figure 7 — AB2 — Eye bracket

Table 7 — Dimensions of AB2 — Eye bracket

Dimensions in millimetres

Type	**Typical bore**	**Nominal force** N	*CK* H9	*EM* h13	*FL* js13	*MR* max.	*LE* min.	*UD* max.	*HB* H13	*R* js13
10	25	8 000	10	12	23	12	13	40	5,5	28,3
12	32	12 500	12	16	29	17	19	46	6,6	33,2
16	40	20 000	14	20	29	17	19	65	9	41,7
20	50	32 000	20	30	48	29	32	79	13,5	52,3
25	63	50 000	20	30	48	29	32	91	13,5	64,3
30	80	80 000	28	40	59	34	39	118	17,5	82,7
40	100	125 000	36	50	79	50	54	132	17,5	96,9
50	125	200 000	45	60	87	53	57	174	24	125,9
60	160	320 000	56	70	103	59	63	215	30	154,9
80	200	500 000	70	80	132	78	82	256	33	190,2

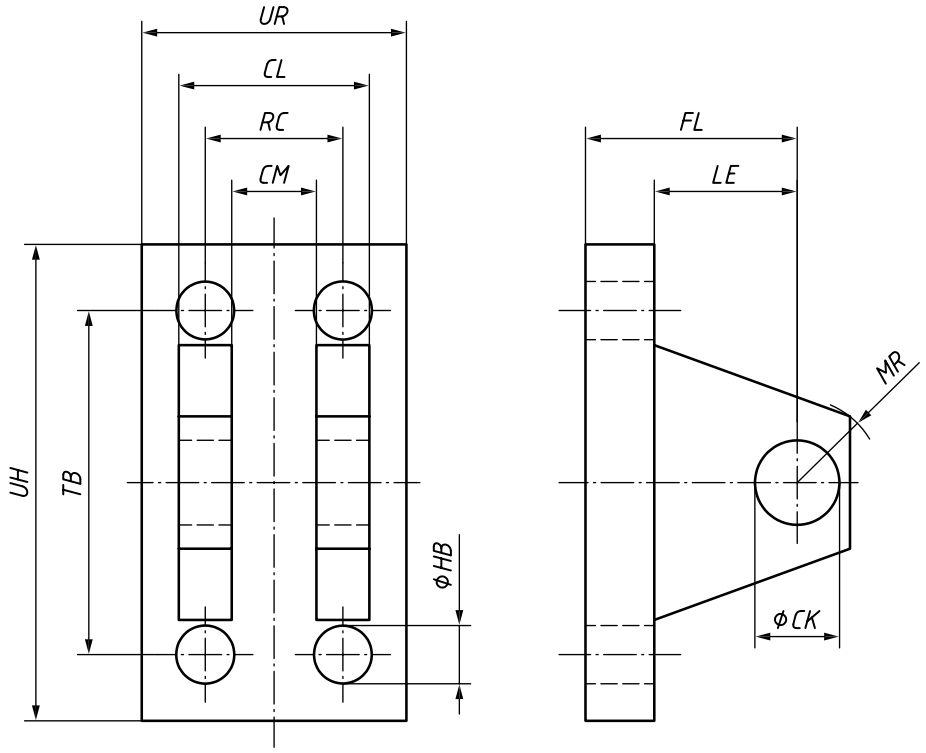


Figure 8 — AB4 — Clevis bracket, straight

Table 8 — Dimensions of AB4 — Clevis bracket, straight

Dimensions in millimetres

Type	**Typical bore**	**Nominal force** N	*CK* H9	*UH* max.	*UR* max.	*CM* A13	*FL* js13	*MR* max.	*HB* H13	*LE* min.	*RC* js13	*TB* js13	*CL* max.
10	25	8 000	10	60	35	12	23	12	5,5	13	18	47	26
12	32	12 500	12	70	45	16	29	17	6,6	19	24	57	34
16	40	20 000	14	86	55	20	29	17	9	19	30	68	42
20	50	32 000	20	129	80	30	48	29	13,5	32	45	102	62
25	63	50 000	20	129	80	30	48	29	13,5	32	45	102	62
30	80	80 000	28	170	100	40	59	34	17,5	39	60	135	83
40	100	125 000	36	202	130	50	79	50	17,5	54	75	167	103
50	125	200 000	45	251	150	60	87	53	24	57	90	203	123
60	160	320 000	56	302	180	70	103	59	30	63	105	242	143
80	200	500 000	70	366	200	80	132	78	33	82	120	300	163

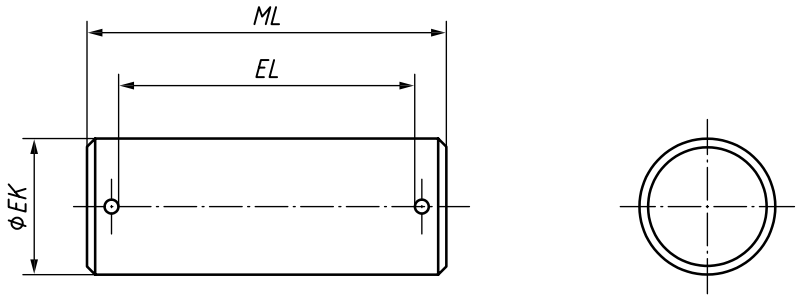


Figure 9 — AA4-S — Pivot pin, plain (split pin)

Table 9 — Dimensions of AA4-S — Pivot pin, plain (split pin)

Dimensions in millimetres

Type	**Nominal force** N	*ML* max.	*EL* min.	*EK* f8
10	8 000	39	29	10
12	12 500	47	37	12
16	20 000	55	45	14
25	50 000	84	66	20
30	80 000	100	87	28
40	125 000	127	107	36
50	200 000	149	129	45
60	320 000	174	149	56
80	500 000	198	169	70

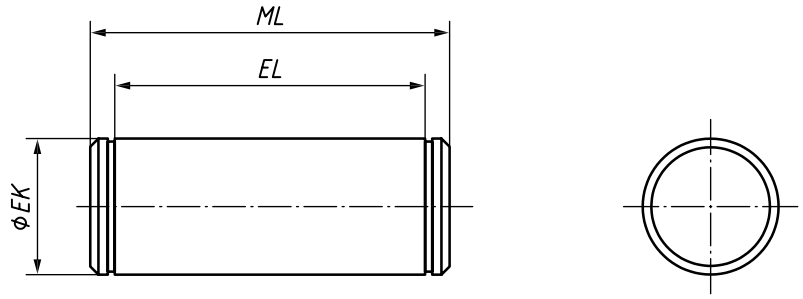


Figure 10 — AA4-R — Pivot pin, plain (ring type)

Table 10 — Dimensions of AA4-R — Pivot pin, plain (ring type)

Dimensions in millimetres

Type	**Nominal force** N	*ML* max.	*EL* min.	*EK* f8
10	8 000	39	29	10
12	12 500	47	37	12
16	20 000	55	45	14
25	50 000	84	66	20
30	80 000	100	87	28
40	125 000	127	107	36
50	200 000	149	129	45
60	320 000	174	149	56
80	500 000	198	169	70

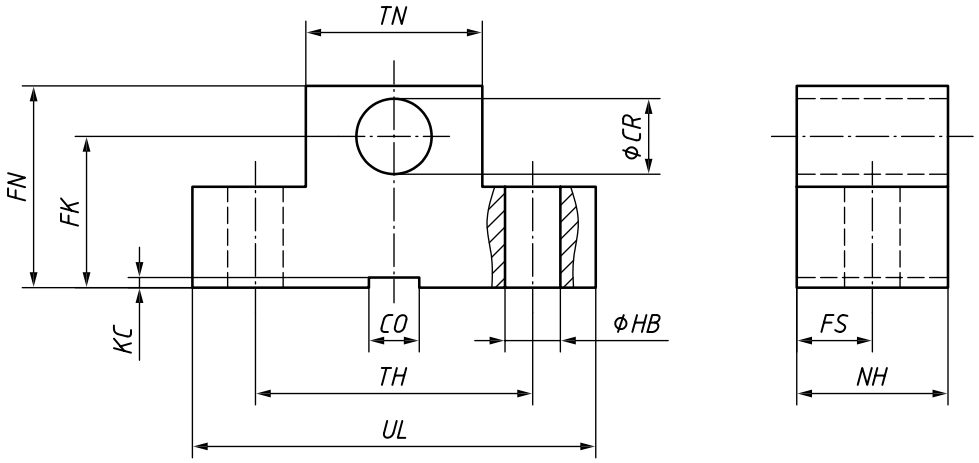


Figure 11 — AT4 — Trunnion bracket

Table 11 — Dimensions of AT4 — Trunnion bracket

Dimensions in millimetres

Type	**Nominal force** N	*CR* H7	*FK* js12	*FN* max.	*HB* H13	*NH* max.	*TH* JS14	*TN* max.	*UL* max.	*CO* N9	*KC* +0,3 0	*FS* JS14
12	8 000	12	38	55	9	16	40	24	63	10	3,3	8
16	12 500	16	45	65	11	21	50	31	80	16	4,3	10
20	20 000	20	55	80	11	21	60	41	90	16	4,3	10
25	32 000	25	65	90	13,5	26	80	56	110	25	5,4	12
32	50 000	32	75	110	17,5	33	110	70	150	25	5,4	15
40	80 000	40	95	140	22	41	125	88	170	36	8,4	16
50	125 000	50	105	150	26	51	160	105	210	36	8,4	20
63	200 000	63	125	195	33	61	200	130	265	50	11,4	25
80	320 000	80	150	230	39	81	250	170	325	50	11,4	31
100	500 000	100	200	300	52	101	320	215	410	63	12,4	42

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