

# INTERNATIONAL STANDARD

**ISO**  
**6020-3**

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

### **Part 3:**

Compact series with bores from 250 mm to  
500 mm

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

*Partie 3: Série compacte, alésages de 250 mm à 500 mm*



Reference number  
ISO 6020-3:1994(E)

## 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.

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.

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

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*

Annex A of this part of ISO 6020 is for information only.

## 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 which 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.

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

## Part 3:

Compact series with bores from 250 mm to 500 mm

### 1 Scope

This part of ISO 6020 establishes metric mounting dimensions for compact-series cylinders with bores from 250 mm to 500 mm, 16 MPa [160 bar<sup>1)</sup>], as required for interchangeability of commonly used hydraulic cylinders.

#### NOTES

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

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

This part of ISO 6020 only applies to the dimensions of manufactured products. It does not apply to their functional characteristics.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6020. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6020 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 273:1979, *Fasteners — Clearance holes for bolts and screws.*

ISO 3320:1987, *Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series.*

ISO 4395:1978, *Fluid power systems and components — Cylinders — Piston rod thread dimensions and types.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 6162:1994, *Hydraulic fluid power — Four-screw split-flange connections for use at pressures of 2,5 MPa to 40 MPa (25 bar to 400 bar) — Type I metric series and type II inch series.*

### 3 Definitions

For the purposes of this part of ISO 6020, the definitions given in ISO 5598 and the following definitions apply.

**3.1 cylinder:** Device which converts fluid power into linear mechanical force and motion.

**3.2 cylinder bore:** Internal diameter of the cylinder body.

**3.3 piston rod:** Element which transmits mechanical force and motion from the piston.

1) 1 bar = 0,1 MPa = 10<sup>5</sup> Pa; 1 MPa = 1 N/mm<sup>2</sup>

**3.4 mounting:** Device by which a cylinder is fastened to its mating element.

## 4 Dimensions

Mounting dimensions for cylinders manufactured in accordance with this part of ISO 6020 shall be selected from tables 1 to 9.

## 5 Bore sizes

The following bore sizes, in millimetres, are included in this compact series:

250 — 320 — 360<sup>2)</sup> — 400 — 500

## 6 Mounting styles

This part of ISO 6020 includes the following mounting styles, in accordance with ISO 6099.

MF5 — Head, square flange (see figure 2 and table 2)

MF6 — Cap, square flange (see figure 3 and table 3)

MP1 — Cap, fixed clevis (see figure 4 and table 4)

MP3 — Cap, fixed eye (see figure 5 and table 5)

MP5 — Cap, fixed eye with spherical plain bearing (see figure 6 and table 6)

MT1 — Head, integral trunnion (male) (see figure 7 and table 7)

MT2 — Cap, integral trunnion (male) (see figure 8 and table 8)

MT4 — Intermediate fixed or movable trunnion (male) (see figure 9 and table 9).

## 7 Piston rod characteristics

**7.1** This part of ISO 6020 covers piston rods which have a shouldered male thread end (see figure 1 and table 1 for basic dimensions).

**7.2** For internally threaded rod ends, see ISO 4395.

**7.3** For rod end eyes, International Standards are being prepared.

## 8 Identification statement (Reference to this part of ISO 6020)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 6020:

"Interchangeable cylinder mounting dimensions selected in accordance with ISO 6020-3:1994, *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series — Part 3: Compact series with bores from 250 mm to 500 mm.*"

2) Non-preferred size.

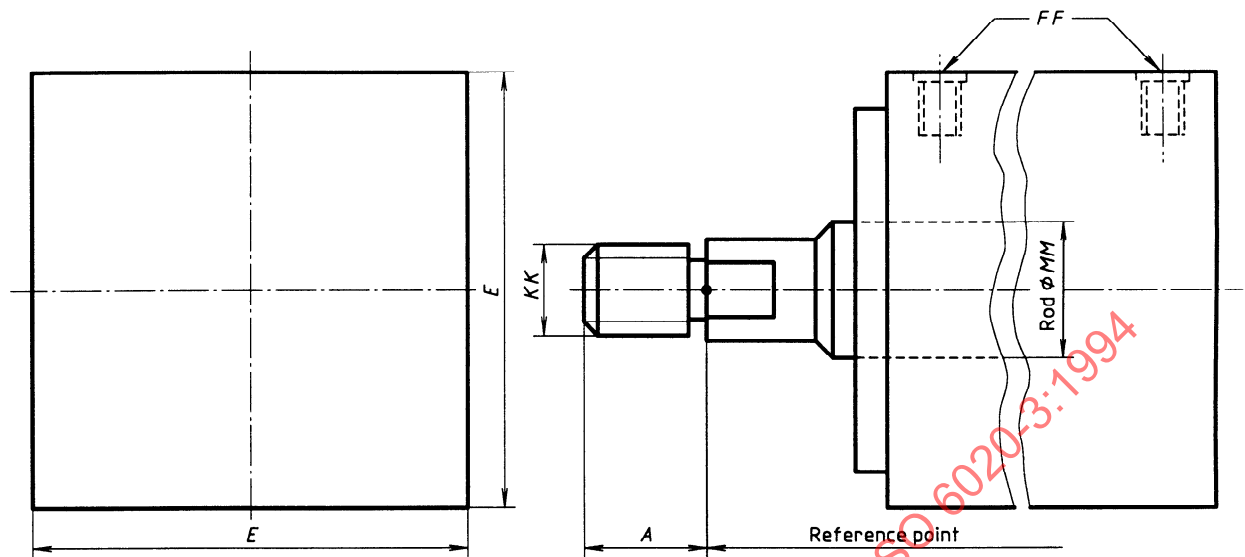


Figure 1 — General dimensions

Table 1 — General dimensions and part sizes

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | KK       | A   | E<br>max. | FF <sup>2)</sup> |
|-------------------|-------------------------|----------|-----|-----------|------------------|
| 250               | 140                     | M100 × 3 | 112 | 320       | DN 51            |
|                   | 180                     | M125 × 4 | 125 |           |                  |
| 320               | 180                     | M125 × 4 | 125 | 400       | DN 64            |
|                   | 220                     | M160 × 4 | 160 |           |                  |
| 360 <sup>3)</sup> | 180                     | M125 × 4 | 125 | 450       | DN 64            |
|                   | 250                     | M180 × 4 | 180 |           |                  |
| 400               | 220                     | M160 × 4 | 160 | 500       | DN 64            |
|                   | 280                     | M200 × 4 | 200 |           |                  |
| 500               | 280                     | M200 × 4 | 200 | 630       | DN 64            |
|                   | 360                     | M250 × 6 | 250 |           |                  |

1) Other piston rods that appear in ISO 3320 may be used.

2) See ISO 6162 for flange port dimensions.

3) 360 mm bore is a non-preferred size.

Dimensions in millimetres

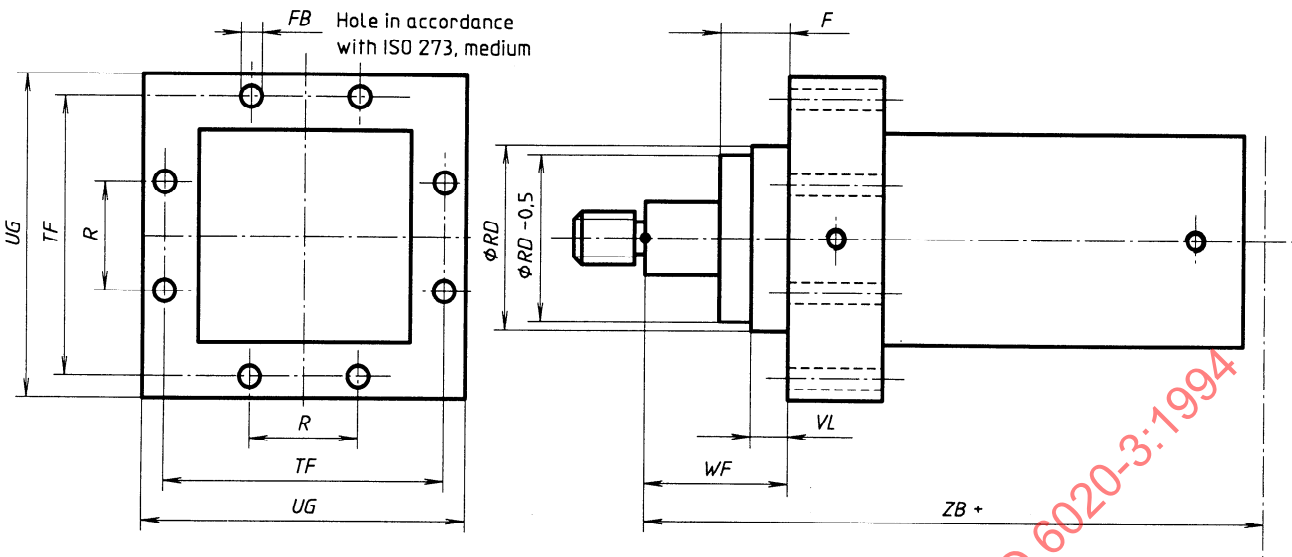


Figure 2 — MF5 — Head mounting, square flange

Table 2 — Dimensions of head mountings, square flange

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | RD<br>f8 | TF  | FB | R   | WF  | F<br>max. | VL<br>min. | UG<br>max. | ZB<br>max. |
|-------------------|-------------------------|----------|-----|----|-----|-----|-----------|------------|------------|------------|
| 250               | 140                     | 280      | 380 | 30 | 235 | 110 | 75        | 5          | 445        | 460        |
|                   | 180                     |          |     |    |     |     |           |            |            |            |
| 320               | 180                     | 325      | 472 | 36 | 283 | 110 | 75        | 5          | 549        | 520        |
|                   | 220                     |          |     |    |     |     |           |            |            |            |
| 360 <sup>2)</sup> | 180                     | 350      | 528 | 39 | 305 | 110 | 75        | 5          | 611        | 575        |
|                   | 250                     |          |     |    |     |     |           |            |            |            |
| 400               | 220                     | 380      | 588 | 45 | 340 | 110 | 75        | 5          | 683        | 625        |
|                   | 280                     |          |     |    |     |     |           |            |            |            |
| 500               | 280                     | 490      | 740 | 56 | 425 | 110 | 75        | 5          | 858        | 775        |
|                   | 360                     |          |     |    |     |     |           |            |            |            |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.

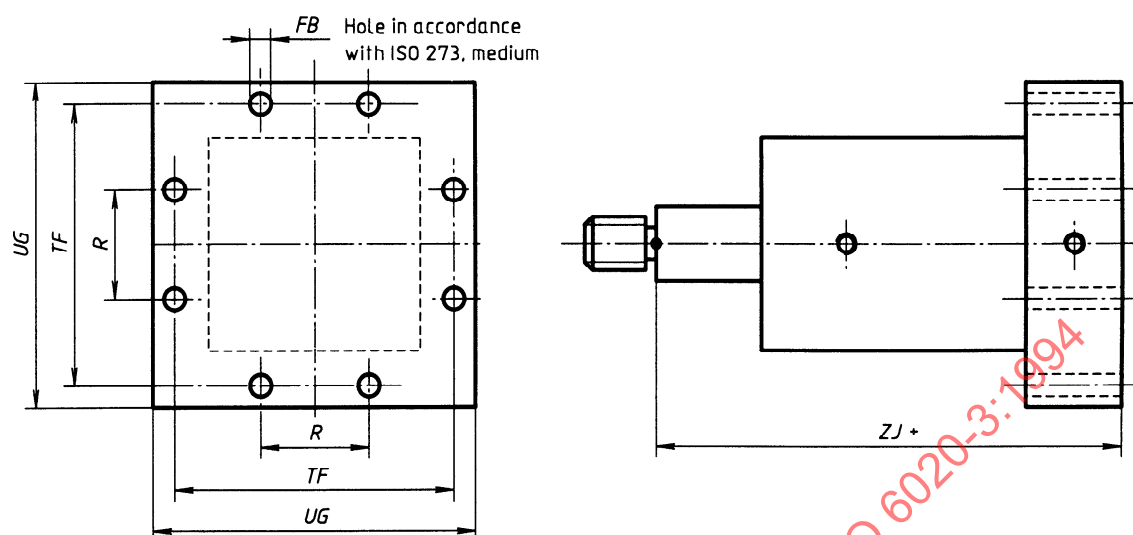


Figure 3 — MF6 — Cap mounting, square flange

Table 3 — Dimensions of cap mountings, square flange

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | TF  | FB | R   | ZJ  | UG<br>max. |
|-------------------|-------------------------|-----|----|-----|-----|------------|
| 250               | 140                     | 380 | 30 | 235 | 420 | 445        |
|                   | 180                     |     |    |     |     |            |
| 320               | 180                     | 472 | 36 | 283 | 475 | 549        |
|                   | 220                     |     |    |     |     |            |
| 360 <sup>2)</sup> | 180                     | 528 | 39 | 305 | 530 | 611        |
|                   | 250                     |     |    |     |     |            |
| 400               | 220                     | 588 | 45 | 340 | 580 | 683        |
|                   | 280                     |     |    |     |     |            |
| 500               | 280                     | 740 | 56 | 425 | 710 | 858        |
|                   | 360                     |     |    |     |     |            |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.

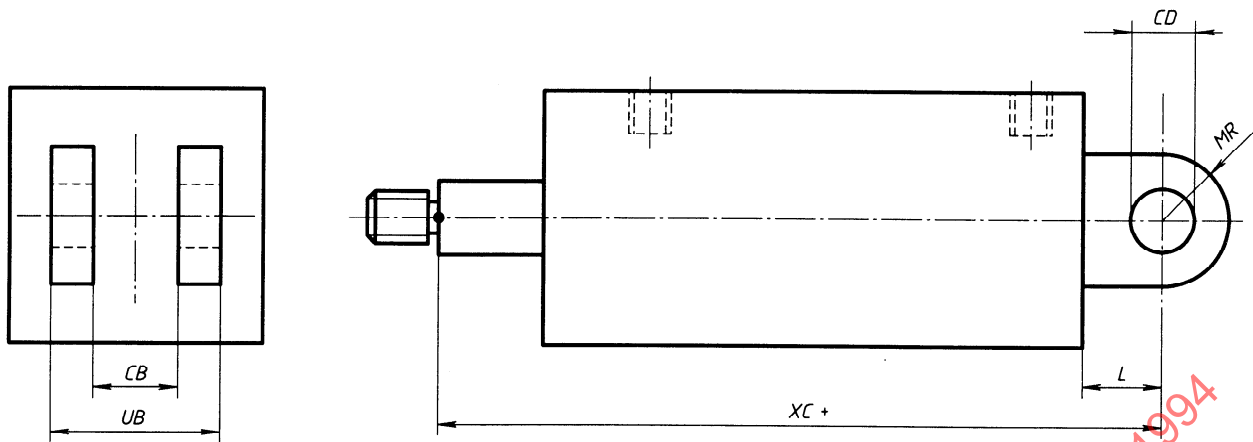


Figure 4 — MP1 — Cap mounting, fixed clevis

Table 4 — Dimensions of cap mountings, fixed clevis

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | CB  | CD  | MR<br>max. | L<br>min. | XC  | UB  |
|-------------------|-------------------------|-----|-----|------------|-----------|-----|-----|
| 250               | 140                     | 90  | 90  | 100        | 125       | 545 | 180 |
|                   | 180                     |     |     |            |           |     |     |
| 320               | 180                     | 110 | 110 | 120        | 152       | 627 | 220 |
|                   | 220                     |     |     |            |           |     |     |
| 360 <sup>2)</sup> | 180                     | 125 | 125 | 140        | 175       | 705 | 250 |
|                   | 250                     |     |     |            |           |     |     |
| 400               | 220                     | 140 | 140 | 160        | 195       | 775 | 280 |
|                   | 280                     |     |     |            |           |     |     |
| 500               | 280                     | 180 | 180 | 200        | 250       | 960 | 360 |
|                   | 360                     |     |     |            |           |     |     |

1) Other piston rods that appear in ISO 3320 may be used.  
 2) 360 mm bore is a non-preferred size.

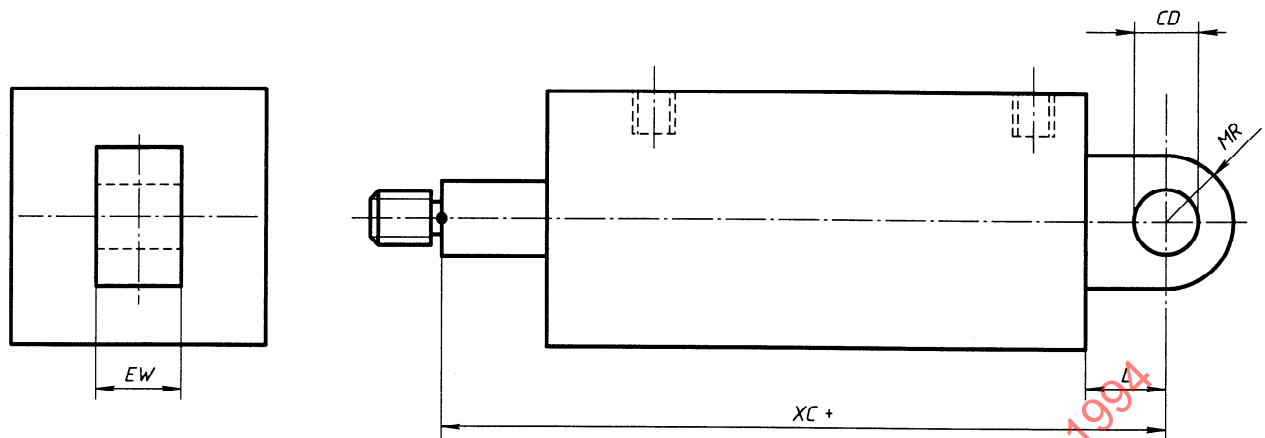


Figure 5 — MP3 — Cap mounting, fixed eye

Table 5 — Dimensions of cap mountings, fixed eye

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | EW  | CD  | MR<br>max. | L<br>min. | XC  |
|-------------------|-------------------------|-----|-----|------------|-----------|-----|
| 250               | 140                     | 90  | 90  | 100        | 125       | 545 |
|                   | 180                     |     |     |            |           |     |
| 320               | 180                     | 110 | 110 | 120        | 152       | 627 |
|                   | 220                     |     |     |            |           |     |
| 360 <sup>2)</sup> | 180                     | 125 | 125 | 140        | 175       | 705 |
|                   | 250                     |     |     |            |           |     |
| 400               | 220                     | 140 | 140 | 160        | 195       | 775 |
|                   | 280                     |     |     |            |           |     |
| 500               | 280                     | 180 | 180 | 200        | 250       | 960 |
|                   | 360                     |     |     |            |           |     |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.

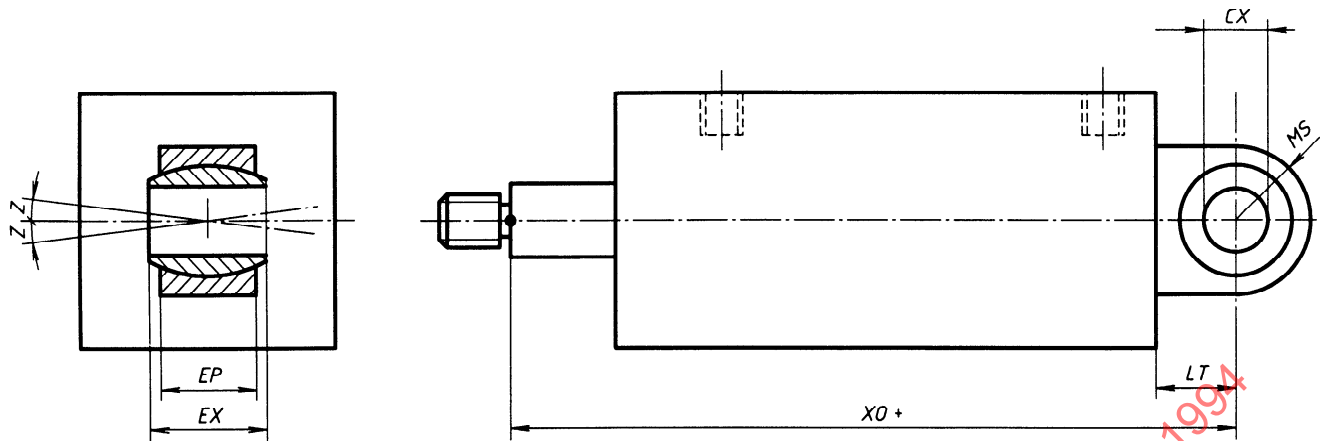


Figure 6 — MP5 — Cap mounting, fixed eye with spherical plain bearing

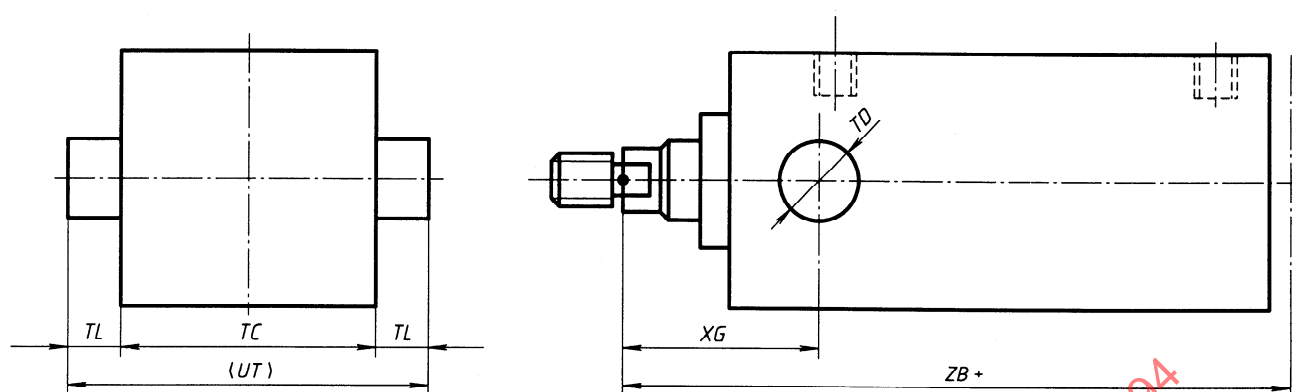
Table 6 — Dimensions of cap mountings, fixed eye with spherical plain bearing

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | EP  | EX  | CX  | MS<br>max. | LT  | XO    | Tilting angle<br>Z<br>min. |
|-------------------|-------------------------|-----|-----|-----|------------|-----|-------|----------------------------|
| 250               | 140                     | 102 | 125 | 125 | 160        | 160 | 580   | 4°                         |
|                   | 180                     |     |     |     |            |     |       |                            |
| 320               | 180                     | 130 | 160 | 160 | 200        | 200 | 675   |                            |
|                   | 220                     |     |     |     |            |     |       |                            |
| 360 <sup>2)</sup> | 180                     | 130 | 160 | 160 | 200        | 200 | 730   |                            |
|                   | 250                     |     |     |     |            |     |       |                            |
| 400               | 220                     | 162 | 200 | 200 | 250        | 250 | 830   |                            |
|                   | 280                     |     |     |     |            |     |       |                            |
| 500               | 280                     | 192 | 250 | 250 | 320        | 320 | 1 030 |                            |
|                   | 360                     |     |     |     |            |     |       |                            |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.



**Figure 7 — MT1 — Head mounting, integral trunnion (male)**

**Table 7 — Dimensions of head mountings, integral trunnion (male)**

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | TC  | UT    | TD  | XG  | TL  | ZB<br>max. |
|-------------------|-------------------------|-----|-------|-----|-----|-----|------------|
| 250               | 140                     | 320 | 520   | 125 | 178 | 100 | 505        |
|                   | 180                     |     |       |     |     |     |            |
| 320               | 180                     | 400 | 650   | 160 | 195 | 125 | 580        |
|                   | 220                     |     |       |     |     |     |            |
| 360 <sup>2)</sup> | 180                     | 450 | 740   | 180 | 205 | 145 | 640        |
|                   | 250                     |     |       |     |     |     |            |
| 400               | 220                     | 500 | 820   | 200 | 215 | 160 | 685        |
|                   | 280                     |     |       |     |     |     |            |
| 500               | 280                     | 630 | 1 030 | 250 | 240 | 200 | 825        |
|                   | 360                     |     |       |     |     |     |            |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.

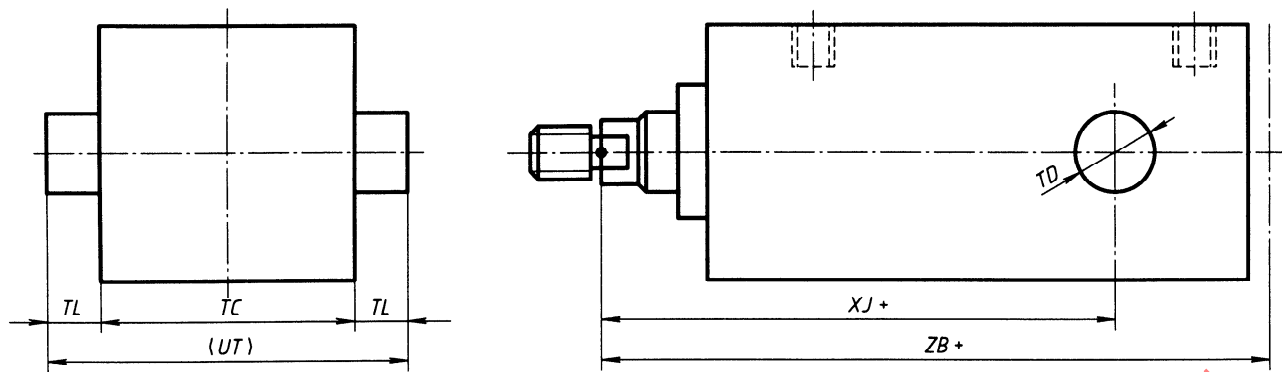


Figure 8 — MT2 — Cap mounting, integral trunnion (male)

Table 8 — Dimensions of cap mountings, integral trunnion (male)

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | TC  | UT    | TD  | XJ  | TL  | ZB<br>max. |
|-------------------|-------------------------|-----|-------|-----|-----|-----|------------|
| 250               | 140                     | 320 | 520   | 125 | 393 | 100 | 505        |
|                   | 180                     |     |       |     |     |     |            |
| 320               | 180                     | 400 | 650   | 160 | 450 | 125 | 580        |
|                   | 220                     |     |       |     |     |     |            |
| 360 <sup>2)</sup> | 180                     | 450 | 740   | 180 | 500 | 145 | 640        |
|                   | 250                     |     |       |     |     |     |            |
| 400               | 220                     | 500 | 820   | 200 | 525 | 160 | 685        |
|                   | 280                     |     |       |     |     |     |            |
| 500               | 280                     | 630 | 1 030 | 250 | 615 | 200 | 825        |
|                   | 360                     |     |       |     |     |     |            |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.

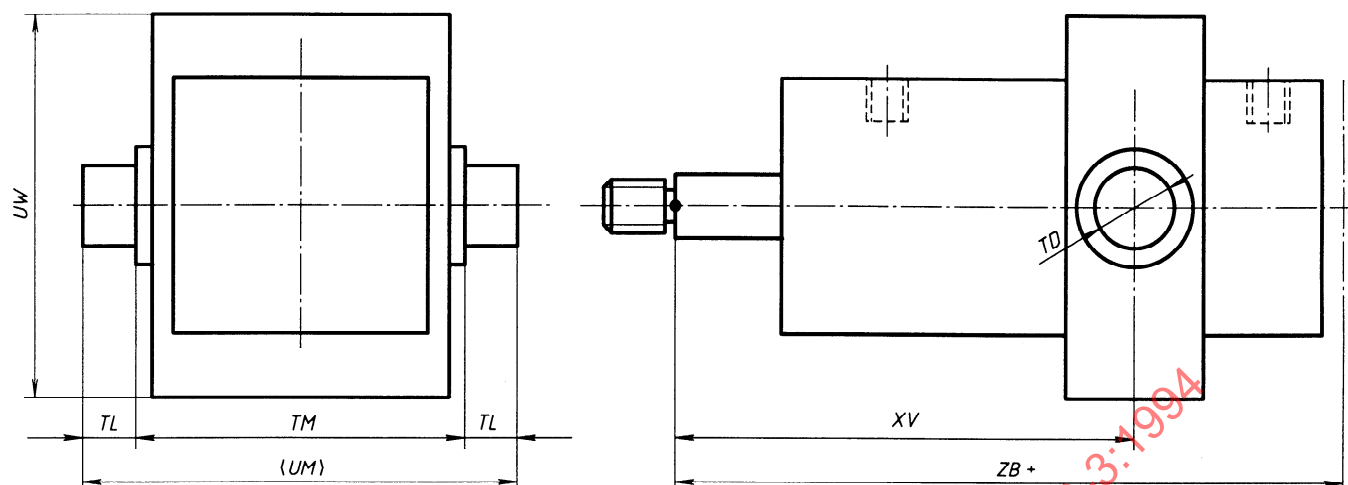


Figure 9 — MT4 — Mounting with intermediate fixed or movable trunnions (male)

Table 9 — Dimensions of mountings with intermediate fixed or movable trunnions (male)

Dimensions in millimetres

| Bore              | Rod <sup>1)</sup><br>MM | UW<br>max. | TM  | UM    | TD  | XV                     | ZB<br>max. | TL  |
|-------------------|-------------------------|------------|-----|-------|-----|------------------------|------------|-----|
| 250               | 140                     | 480        | 380 | 580   | 125 | variable <sup>3)</sup> | 460        | 100 |
|                   | 180                     |            |     |       |     |                        |            |     |
| 320               | 180                     | 600        | 485 | 735   | 160 |                        | 520        | 125 |
|                   | 220                     |            |     |       |     |                        |            |     |
| 360 <sup>2)</sup> | 180                     | 675        | 545 | 835   | 180 |                        | 575        | 145 |
|                   | 250                     |            |     |       |     |                        |            |     |
| 400               | 220                     | 750        | 605 | 925   | 200 |                        | 625        | 160 |
|                   | 280                     |            |     |       |     |                        |            |     |
| 500               | 280                     | 945        | 745 | 1 145 | 250 |                        | 775        | 200 |
|                   | 360                     |            |     |       |     |                        |            |     |

1) Other piston rods that appear in ISO 3320 may be used.

2) 360 mm bore is a non-preferred size.

3) XV min., XV max. and minimum stroke shall be as agreed between the manufacturer and user.

## **Annex A**

(informative)

### **Bibliography**

- [1] ISO 4393:1978, *Fluid power systems and components — Cylinders — Basic series of piston strokes.*
- [2] ISO 4394-1:1980, *Fluid power systems and components — Cylinder barrels — Part 1: Requirements for steel tubes with specially finished bores.*
- [3] ISO 6099:1985, *Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types.*

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