INTERNATIONAL STANDARD

ISO 7285

First edition
1995-12-01

Pneumatic cylinders for mechanized multiple spot welding

Vérins pneumatiques pour soudage multipoints mécanisé

Reference number
ISO 7285:1995(E)

Contents

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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.

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 7285 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding*.

Annexes A, B and C form an integral part of this International Standard. Annex D is for information only.

Pneumatic cylinders for mechanized multiple spot welding

1 Scope

This International Standard specifies the requirements of the geometrical and mechanical characteristics of pneumatic cylinders used for multiple spot welding machines and their manufacturing, delivery and test specifications.

These cylinders for a nominal air pressure of 1 MPa (10 bar) are double-acting, with two piston stages in series for the advance during the operational stroke and the force, and a single piston stage for the return.

2 Normative reference

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

ISO 4394-1:1980, *Fluid power systems and components — Cylinder barrels — Part 1: Requirements for steel tubes with specially finished bores.*

3 Nominal characteristics

The cylinders covered by this International Standard are characterized by their nominal stroke, their nominal force and their outside dimensions.

3.1 Nominal strokes

The nominal strokes standardized, in millimetres, are

25 — 31,5 — 40 — 50 — 63 — 80 — 100 — 125 — 160

3.2 Nominal forces

The nominal forces standardized, in kilonewtons, for a pressure of 1 MPa (10 bar) are

2,19 — 2,86 — 3,61 — 4,61 — 5,92 — 7,60 — 9,74

4 Fixing the cylinder

The cylinder is mounted on the machine by one of the methods A to H described in annex A.

5 Dimensions

5.1 Outside dimensions

Depending on the method of mounting the cylinder, the nominal force and the nominal stroke, the cylinders shall have the dimensions indicated in the drawings in annex C taking into account the characteristics of the electrode holder attachment indicated in annex B.

The nominal values of the maximum outside dimensions, in millimetres, are

46 — 51 — 56 — 63 — 71 — 80 — 90

5.2 Bore diameter

The recommended dimensions, in millimetres, are

40 — 45 — 50 — 56 — 63 — 71 — 80

Tolerances shall be in accordance with ISO 4394-1 — H12.

6 Operating specifications

6.1 Nominal force

The nominal force shall be given at a pressure of 1 MPa (10 bar) with a tolerance of ± 5 %.

6.2 Return force

The return force shall not be less than 40 % of the nominal force.

6.3 Maximum supply pressure

The maximum supply pressure is 1,6 MPa (16 bar).

7 Construction

7.1 Point of application of the reaction

The cylinders shall function correctly when the reaction to the nominal force is being applied at a maximum distance of 28 mm from the axis of thrust.

7.2 Piston rod

The sliding bearing surfaces of the rod shall have an adequate hardness to avoid friction, wear, oxidization and any scale caused by sputtering (sparks).

7.3 Rotation

The piston rod assembly is considered as non-rotating. The anti-rotating device shall withstand, without being damaged, a rotary torque of 150 N·m applied in either direction and at any point of the travel of the piston rod.

7.4 Seals

The seals shall be compatible with fluids used to lubricate the cylinder.

7.5 Perpendicularity — Parallelism between the mounting point and the attachment

Any faults in perpendicularity or parallelism of the bearing surface of the body of the cylinder with respect to the axis of the shank cone of the electrode holder shall not exceed 0,2 % (for inspection, see 10.2).

7.6 Leakage

The bodies of the cylinders shall not leak in normal conditions of use (to check this, see 10.5).

7.7 Behaviour under pressure

The body of the cylinder shall be able to withstand without being damaged a test pressure equal to two times the maximum supply pressure applied for 1 min in each direction (see 10.4).

7.8 Electrode holder attachment

The electrode holder attachment shall be completely electrically insulated with respect to the body of the cylinder (to check this, see 10.3). This subclause does not apply to electrode holder attachments according to Nos. 13 and 22.

7.9 Endurance

The cylinders shall be able to withstand the endurance test described in 10.8 according to the requirements of 10.8.5 and 10.8.6.

7.10 Finish

The outer surfaces shall be protected against corrosion.

8 Marking

8.1 Identification of the cylinders

The cylinders are identified by an alphanumeric symbol, the different numbers or letters of which are separated by a dash and arranged as follows:

— apparatus operating with a pneumatic fluid:	letter P
— two-stage cylinder:	number 2
— double-action cylinder:	letter D
— method of mounting:	letter A to H in accordance with annex A
— nominal force:	indicate the number from 3.2
— dimensions of the body or width of the cylinder defining the overall dimensions of the cylinder:	number giving dimension *E* of annex C
— nominal stroke:	number consisting of three figures giving the nominal stroke
— electrode holder attachment:	number consisting of two figures symbolizing the attachment in accordance with annex B

Examples:

P — 2 — D — A — 2,19 — 46 — 025 — 11
P — 2 — D — C — 4,61 — 63 — 100 — 22

8.2 Rating plate

See figure 1.

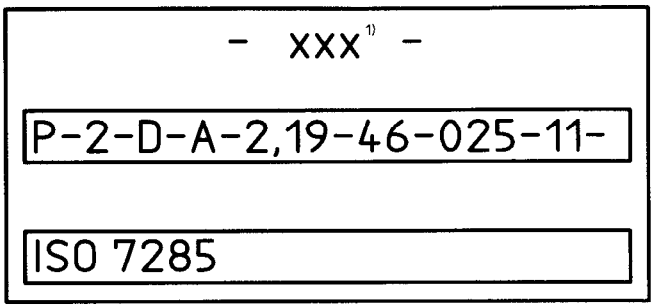
The cylinders shall have the following information on a rating plate or stamped directly on the body of the cylinder:

— name of the manufacturer;

— alphanumeric identification symbol in accordance with 8.1;

— reference to ISO 7285.

These indications shall be permanent and shall not be affected by any industrial chemical in common use.



1) Name of the manufacturer.

Figure 1 — Example of a rating plate

9 Delivery conditions

The cylinders shall be supplied

— in good working order;

— protected so that even after prolonged storage at the user's premises in the original packing, all the parts likely to deteriorate (rods, seals, internal surfaces, cones, openings, etc.) retain the qualities required by ISO 7285;

— with the openings stopped up;

— in packing the outside of which is marked with the identification specified in clause 8.

10 Inspection and type tests

10.1 Visual inspection

Conformity to the specifications of 7.10 and clauses 8 and 9 is checked by visual inspection.

10.2 Dimensional inspection

Dimensional inspection includes

— verification of conformity with the drawings;

— inspection of the shank cone of the electrode holder by means of a standard gauge, which should show a minimum of 2/3 blue, with a bias towards the base diameter;

— checking of the perpendicularity or parallelism (see 7.5).

10.3 Inspection of the electrical insulation of the electrode holder attachment

A voltage of 48 V d.c. is applied between the attachment and the mounting. The resistance shall not be less than 1 MΩ.

10.4 Pressure type test

Conformity with the specifications of 7.7 is checked by applying a liquid (water) pressure of 3,2 MPa (32 bar) at the inlet or outlet of the cylinder for 1 min in each direction. After drying, the cylinder is subjected to the test described in 10.5.

10.5 Leak type test

The cylinder supplied with air is immersed in water. The test is carried out at two different air pressures, 0,2 MPa (2 bar) and 1,0 MPa (10 bar), which shall be kept constant for 1 min and in the forward and return position. No air bubbles shall appear when a new cylinder is tested.

10.6 Separation force type test

The supplied pressure of the cylinder shall increase progressively from 0 MPa (0 bar) to 0,1 MPa (1 bar). The movement of the piston shall commence before 0,1 MPa (1 bar) and shall continue smoothly without jolts. Before the test, carry out five forward and return cycles.

10.7 Nominal force type test

The measuring device shall be accurate to ± 1,5 %.

10.8 Endurance type test

For the purpose of this endurance type test, cylinders of nominal force of 2,86 kN and 4,61 kN and of 50 mm stroke serve as reference.

10.8.1 Test set-up

Cables shall not be restricted.

— Electrodes offset by: 28 mm.

— Centre to centre spacing of the cylinders (d) and gaps as a function of the force (see table 1 and figure 2).

Table 1

Force kN	**Centre to centre spacing** (d) mm
2,19	53
2,86	60
3,61	67
4,61	75
5,92	85
7,60	95
9,74	106

Dimensions in millimetres

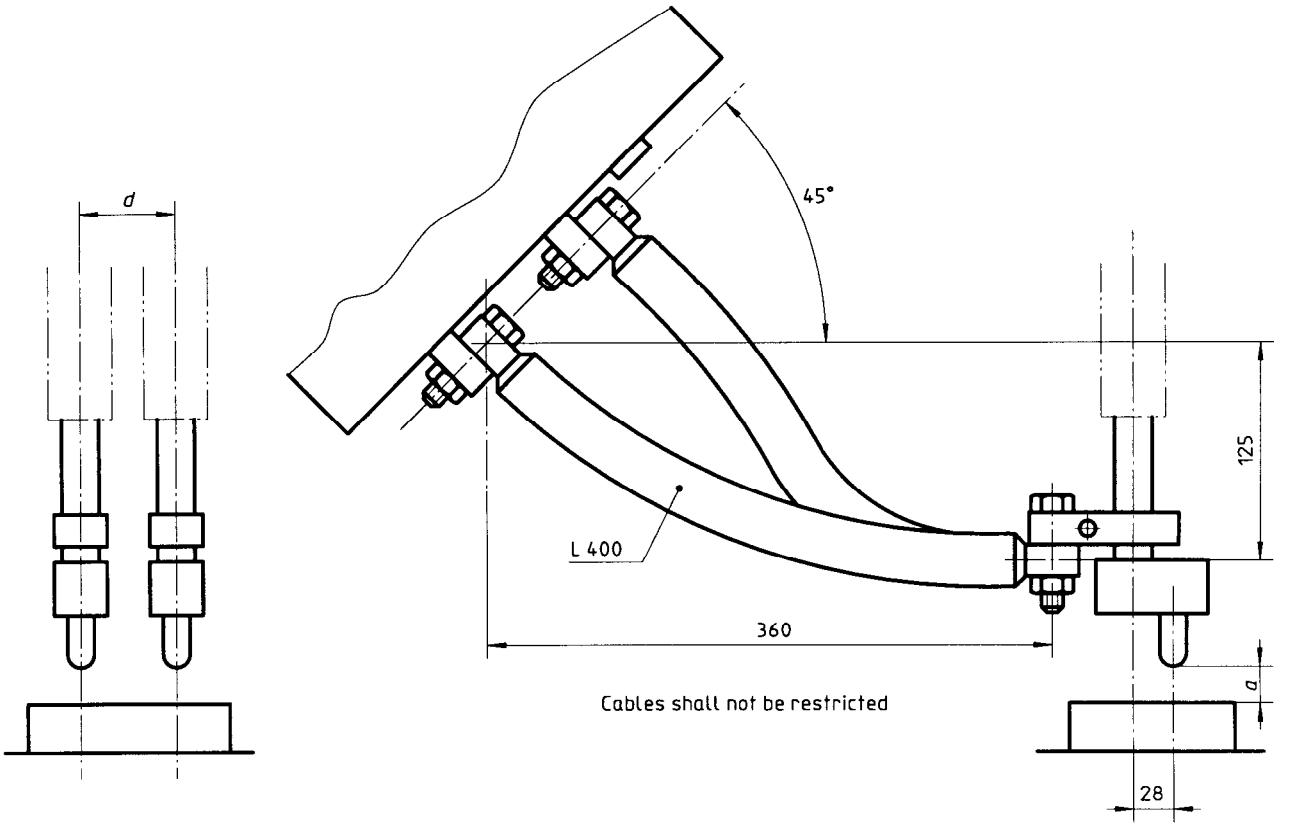


Figure 2 — Test set-up

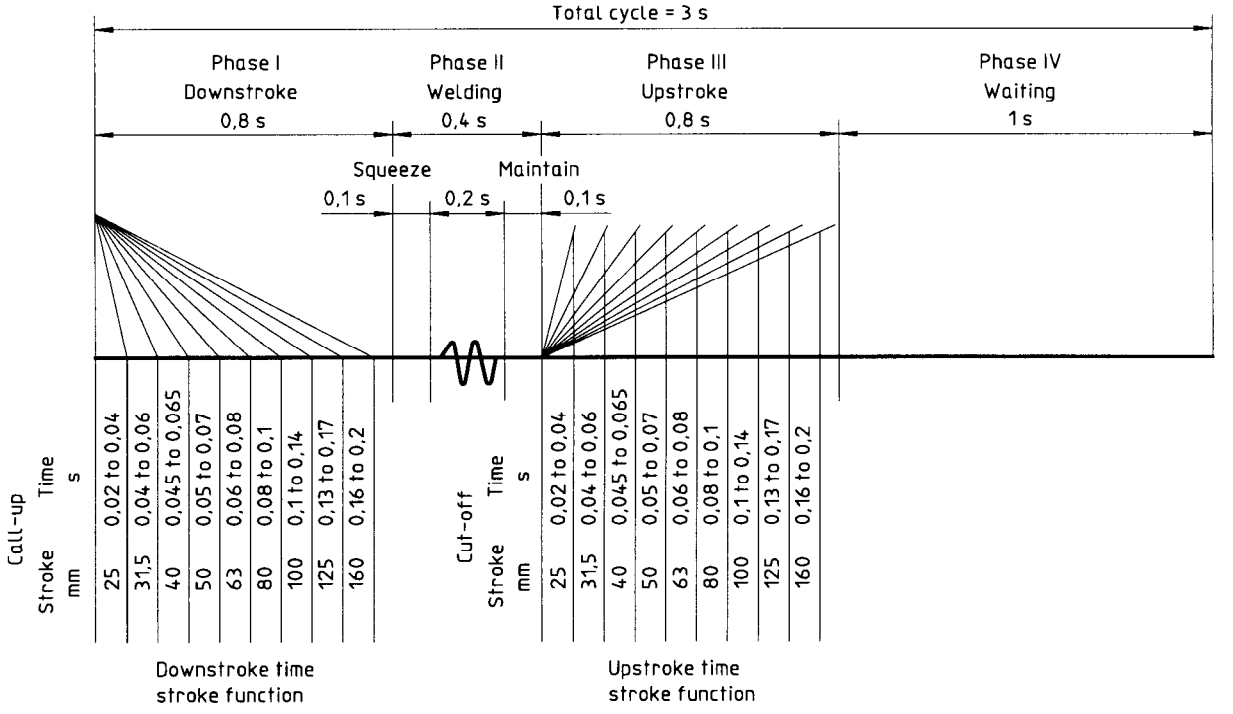


Figure 3 — Schematic representation of the cycle

10.8.2 Air supply

Dry oil-free air with 40 µm filtration under a pressure of 1 MPa (10 bar).

10.8.3 Stroke of the cylinder and number of cycles

A schematic representation of the cycle is given in figure 3.

The stroke of the cylinder during the course of these tests is equal to the nominal stroke less 5 mm on the forward stroke.

The number of cycles to be performed is given as a function of the nominal stroke in table 2.

Table 2

Nominal stroke mm	Test stroke *a* mm	Number of cycles
25	20	2 225 000
31,5	26,5	1 700 000
40	35	1 300 000
50	45	1 000 000
63	58	800 000
80	75	600 000
100	95	500 000
125	120	400 000
160	155	300 000

10.8.4 Welding current

The intensity of the current that is to circulate in the test device is given in table 3 as a function of the nominal force.

Table 3

Nominal force kN	Current kA
2,19	12,5
2,86	14
3,61	14
4,61	16
5,92	16
7,60	20
9,74	20

10.8.5 Leakage

A further leakage test is carried out after the endurance test. The cylinder is subjected to a pressure of 1,0 MPa (10 bar) and then shut off from the supply. At 10 s after shut-off the pressure shall not have fallen by more than 0,1 MPa (1 bar) (10 % of the test pressure applied).

10.8.6 Measurement of play after the endurance test

With the piston rod extended to a length equal to the nominal stroke at a torque of 70 N·m applied in one direction and then the other, the piston rod shall not turn by more than 2°.

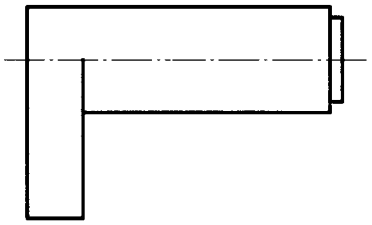
Annex A
(normative)

Methods of mounting the cylinders

For electrode holder attachment, see annex B.

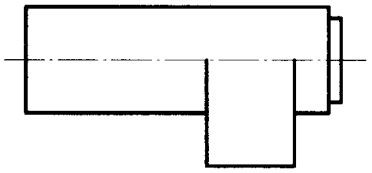
A) Rear simple mounting at right angles

(See clause C.1)



B) Forward flange mounting

(See clause C.2)

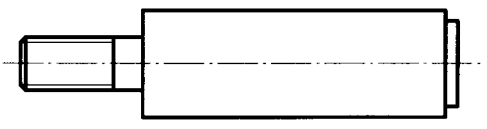


C) Rear male-jointed mounting

(See clause C.3)

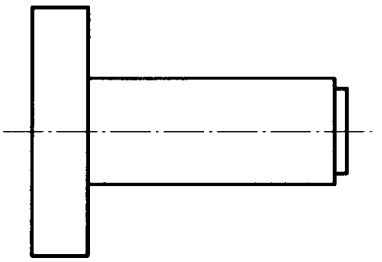
D) Rear threaded stem mounting

(See clause C.4)



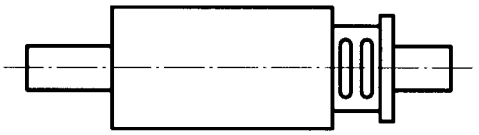
E) Rear double mounting at right angles

(See clause C.5)



F) Collar mounting

(See clause C.6)

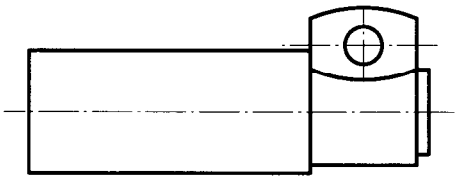


G) Gudgeon mounting for pinching

(See clause C.7)

H) Eye mounting for pinching

(See clause C.8)

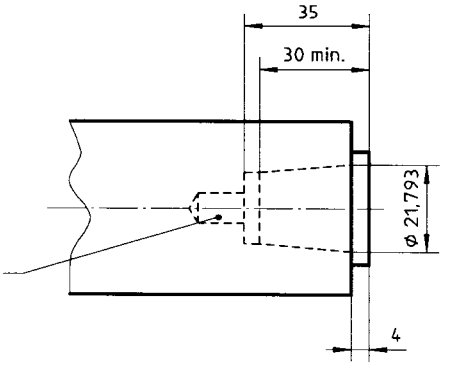
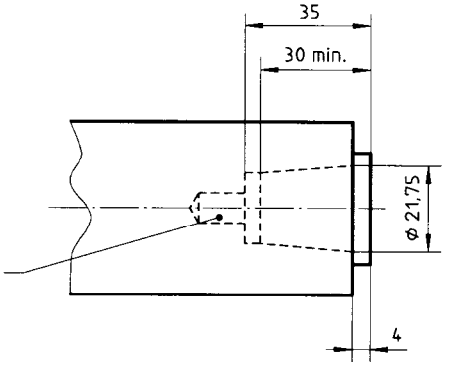
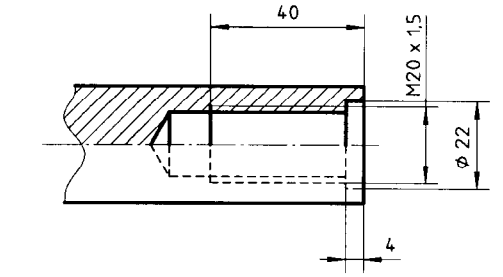


Annex B
(normative)

Electrode holder attachment

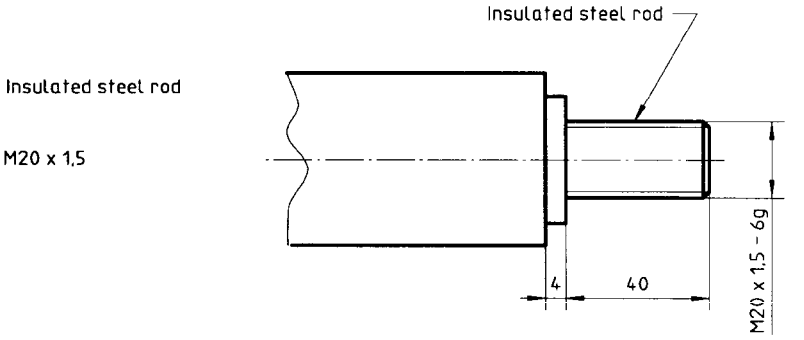
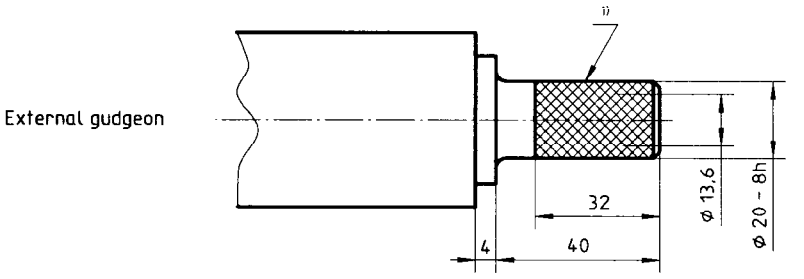
B.1 Internal electrode holder attachment

Dimensions in millimetres

Index	
11	Following taper Morse taper No. 3 (insulated) Hole mounting M8 - 6H, recessed, insulated, effective length = 16 mm Minimum of 2/3 blue 
12	1 : 10 taper (insulated) Hole mounting M8 - 6H, recessed, insulated, effective length = 16 mm Minimum of 2/3 blue 
13	Female thread 

B.2 External electrode holder attachment

Dimensions in millimetres

Index	
21	
22	 1) Axial and circumferential knurl (recessed).

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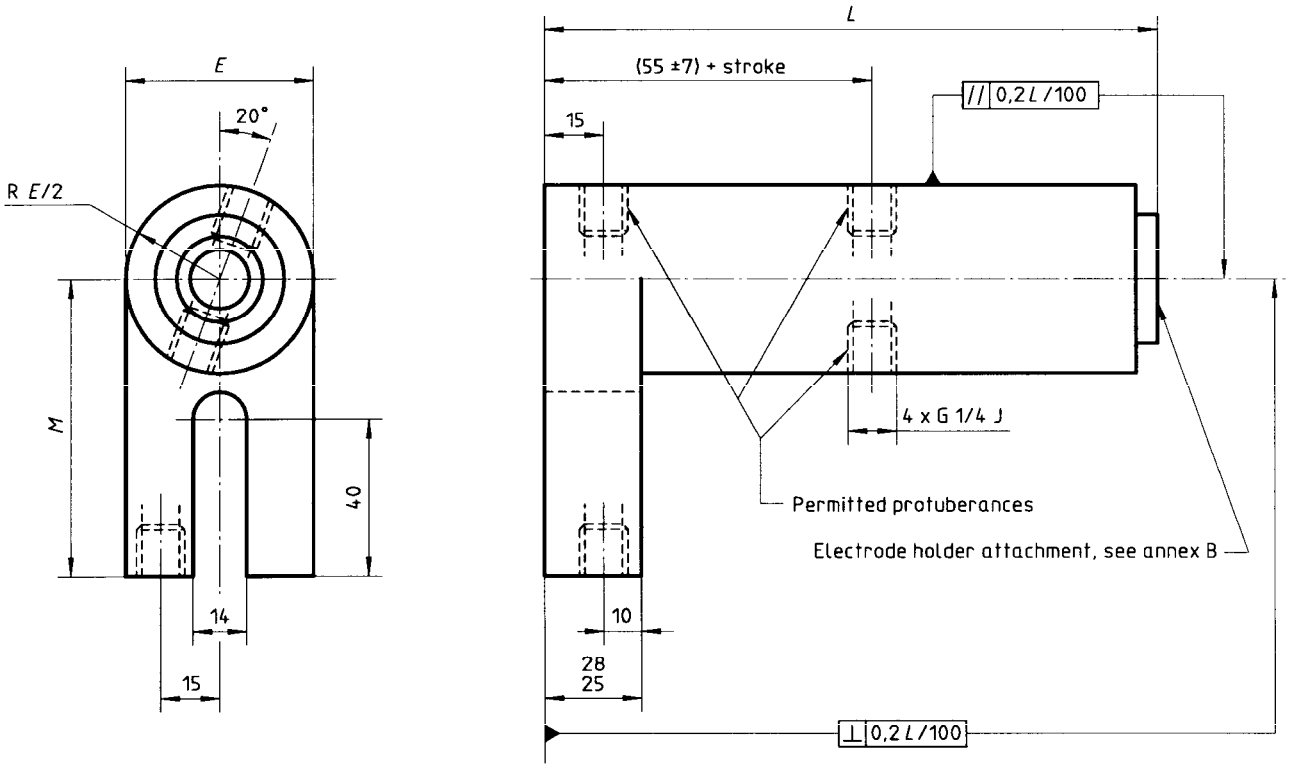
Annex C
(normative)

Mounting methods — Dimensions

C.1 Mounting method A — Rear simple mounting at right angles

Dimensions in millimetres



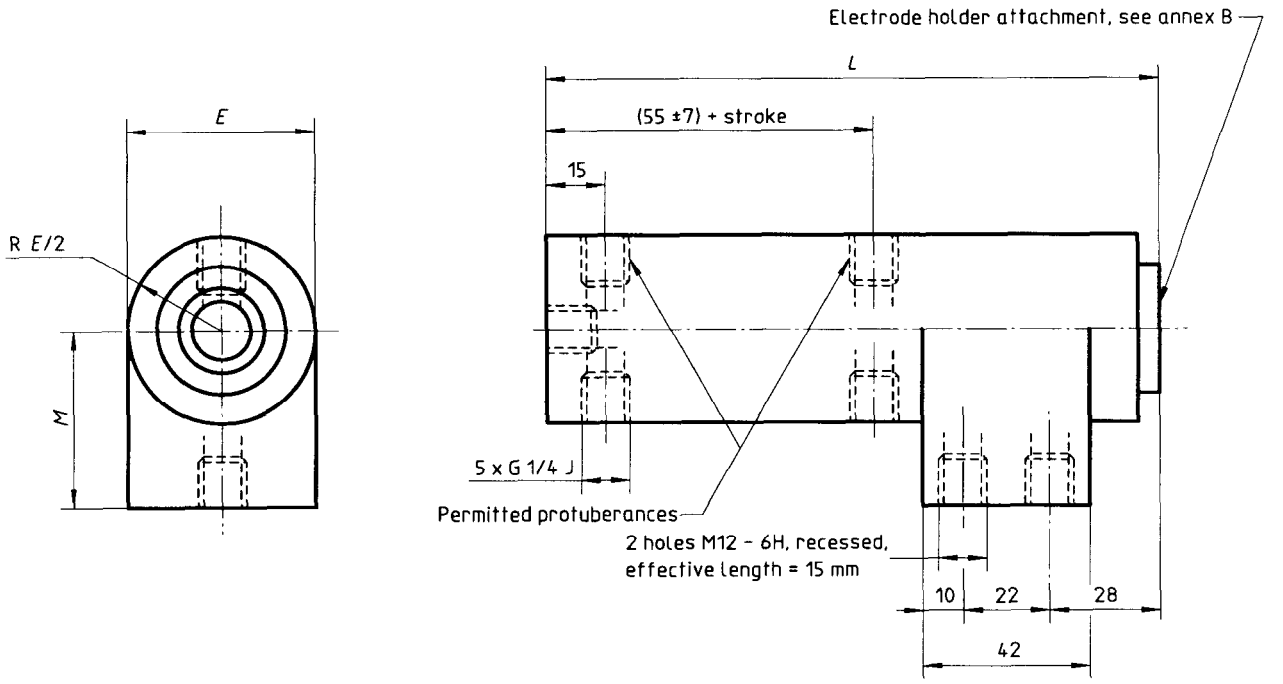
Dimensions in millimetres

E	*M*	**Force at 1 MPa (10 bar)** kN ± 5 %	**Nominal stroke**	*L* ± 1	**Inside bore**[1)]
46	75	2,19	25	155	40
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
51	80	2,86	25	155	45
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
56	80	3,61	25	155	50
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
63	85	4,61	25	155	56
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
71	90	5,92	25	155	63
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
80	100	7,60	25	155	71
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
90	100	9,74	25	155	80
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	

1) See 5.2.

C.2 Mounting method B — Forward flange mounting

Dimensions in millimetres



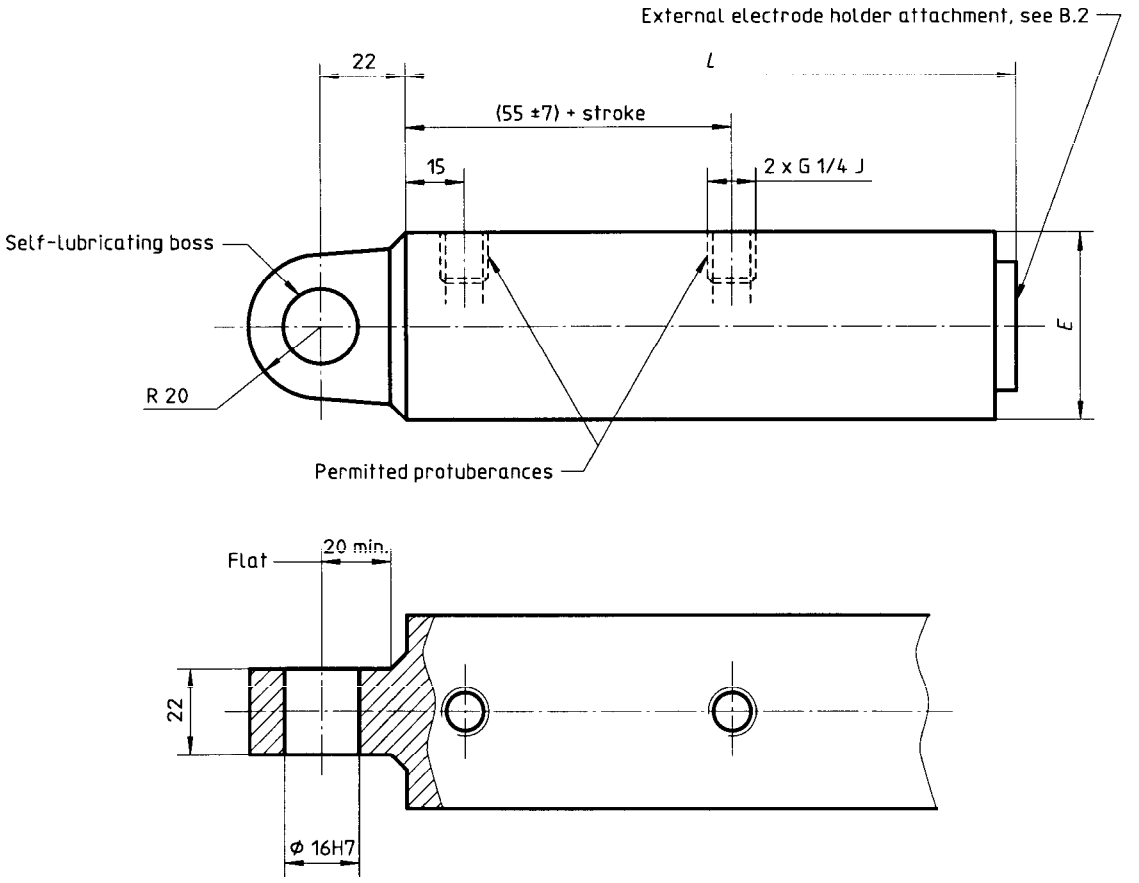
Dimensions in millimetres

E	*M*	**Force at 1 MPa (10 bar)** kN ± 5 %	**Nominal stroke**	*L* ± 1	**Inside bore**[1]
46	45	2,19	25	155	40
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
51	50	2,86	25	155	45
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
56	50	3,61	25	155	50
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
63	50	4,61	25	155	56
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
71	63	5,92	25	155	63
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
80	63	7,60	25	155	71
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	
90	63	9,74	25	155	80
			31,5	168	
			40	185	
			50	205	
			63	231	
			80	265	
			100	305	
			125	355	
			160	425	

1) See 5.2.

C.3 Mounting method C — Rear male-jointed mounting

Dimensions in millimetres



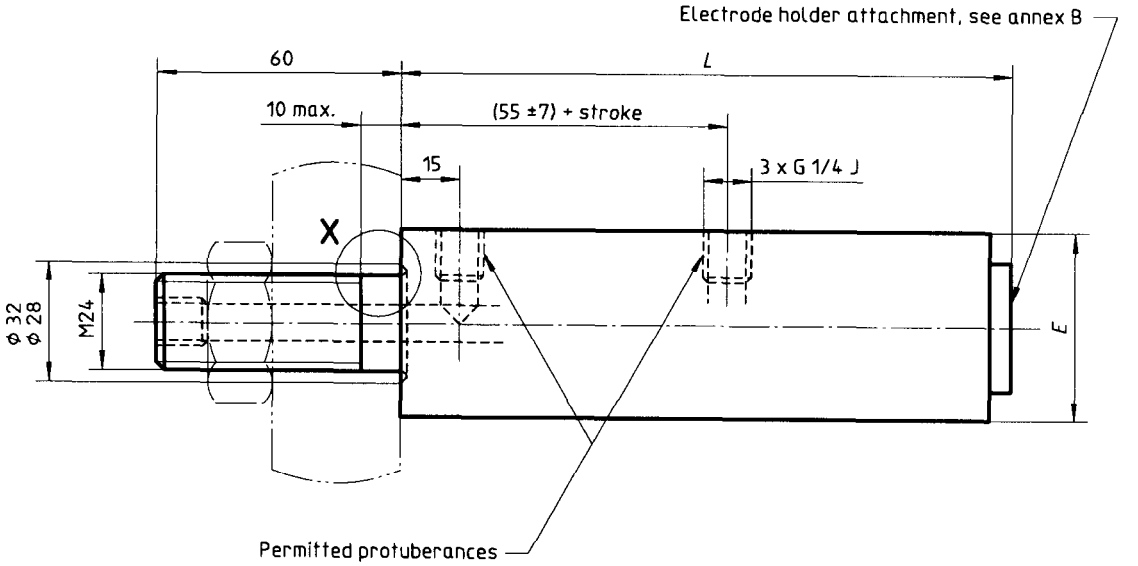
Dimensions in millimetres

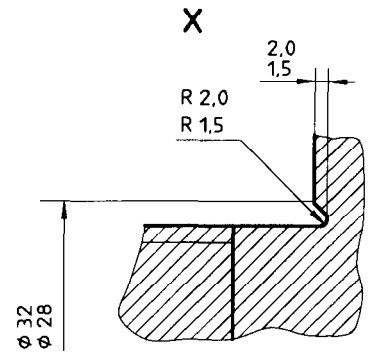
E	Force at 1 MPa (10 bar) kN ± 5 %	Nominal stroke	$L \pm 1$	Inside bore[1)]
46	2,19	25	155	40
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
51	2,86	25	155	45
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
56	3,61	25	155	50
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
63	4,61	25	155	56
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
71	5,92	25	155	63
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
80	7,60	25	155	71
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
90	9,74	25	155	80
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	

1) See 5.2.

C.4 Mounting method D — Rear threaded stem mounting

Dimensions in millimetres





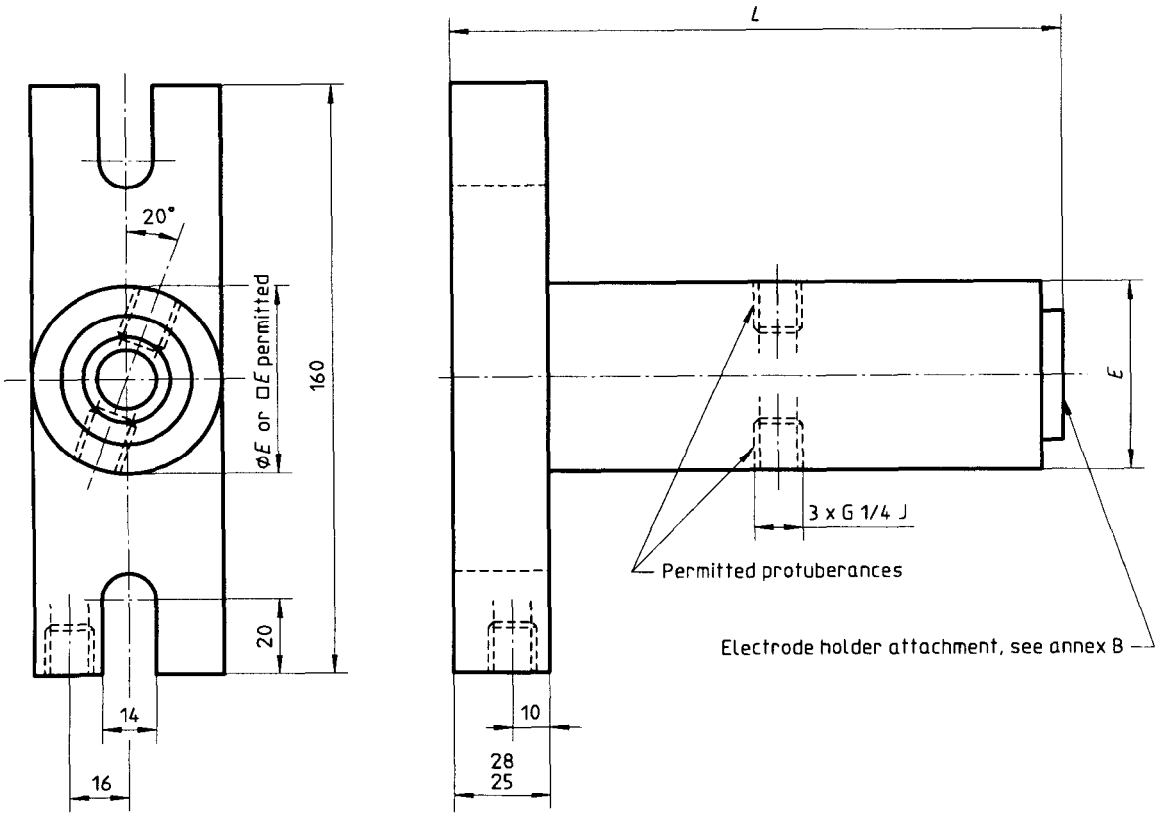
Dimensions in millimetres

E	Force at 1 MPa (10 bar) kN ± 5 %	Nominal stroke	$L \pm 1$	Inside bore[1)]
46	2,19	25	155	40
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
51	2,86	25	155	45
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
56	3,61	25	155	50
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
63	4,61	25	155	56
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
71	5,92	25	155	63
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
80	7,60	25	155	71
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
90	9,74	25	155	80
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	

1) See 5.2.

C.5 Mounting method E — Rear double mounting at right angles

Dimensions in millimetres



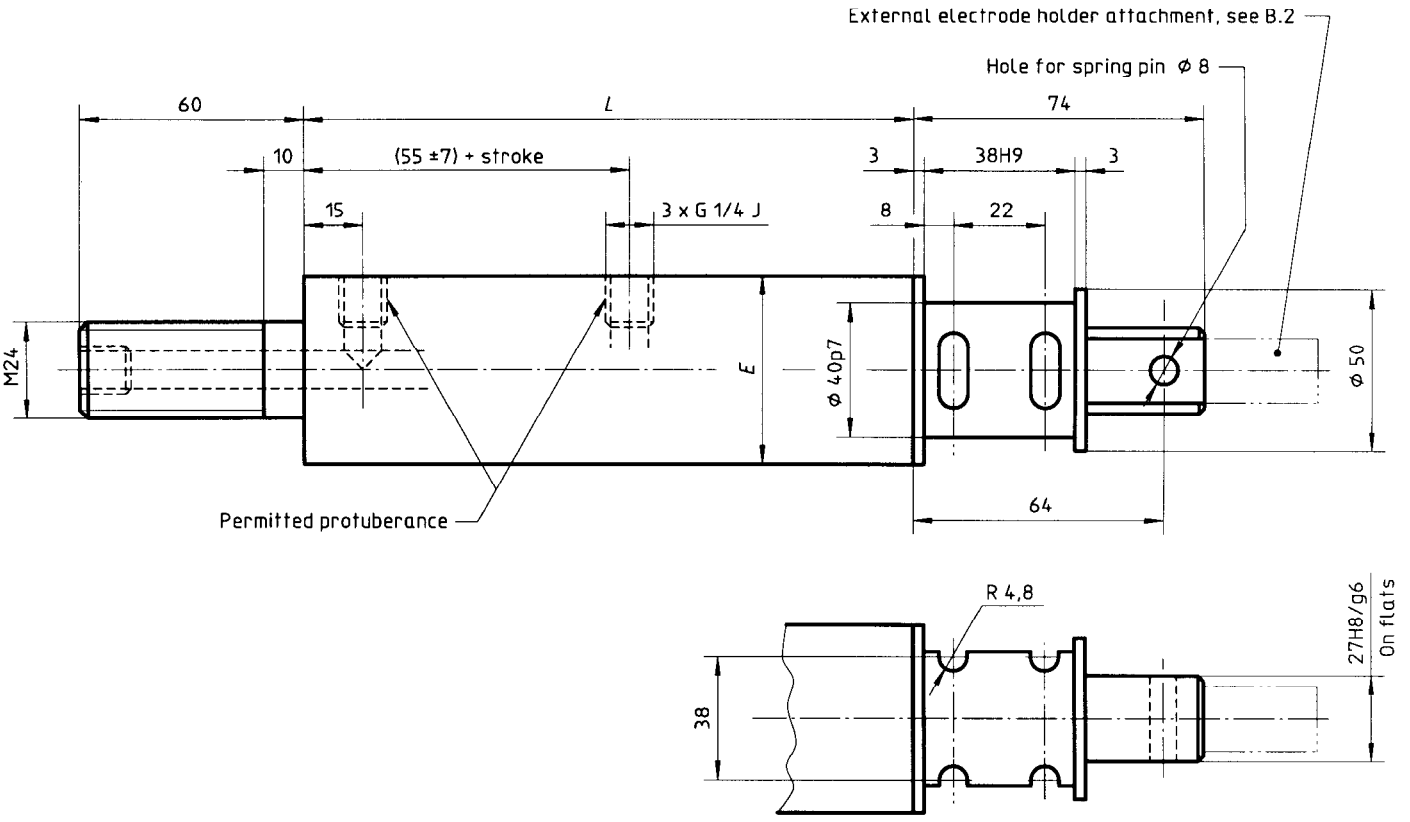
Dimensions in millimetres

E	**Force at 1 MPa (10 bar)** kN ± 5 %	**Nominal stroke**	$L \pm 1$	**Inside bore**[1]
71	5,92	25	155	63
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
80	7,60	25	155	71
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	
90	9,74	25	155	80
		31,5	168	
		40	185	
		50	205	
		63	231	
		80	265	
		100	305	
		125	355	
		160	425	

1) See 5.2.

C.6 Mounting method F — Collar mounting

Dimensions in millimetres



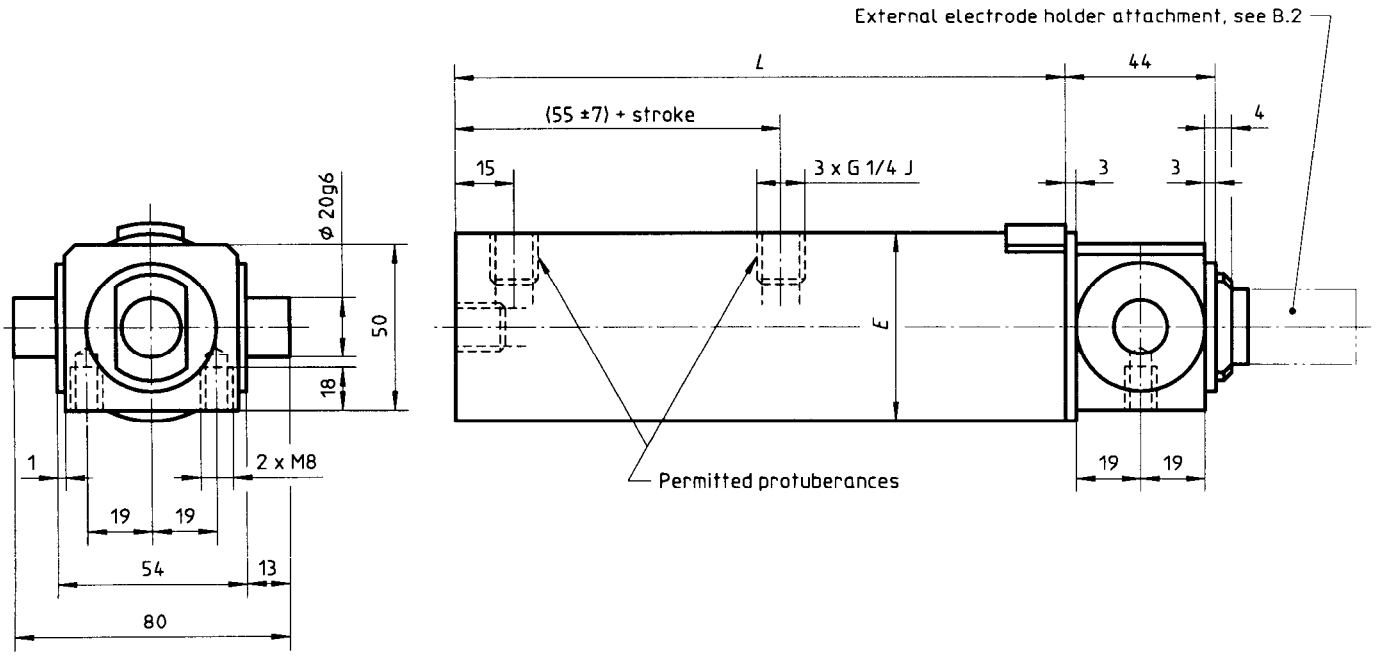
Dimensions in millimetres

E	Force at 1 MPa (10 bar) kN ± 5 %	Nominal stroke	$L \pm 1$	Inside bore[1)]
46	2,19	25	151	40
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
51	2,86	25	151	45
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
56	3,61	25	151	50
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
63	4,61	25	151	56
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
71	5,92	25	151	63
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
80	7,60	25	151	71
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
90	9,74	25	151	80
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	

1) See 5.2.

C.7 Mounting method G — Gudgeon mounting for pinching

Dimensions in millimetres



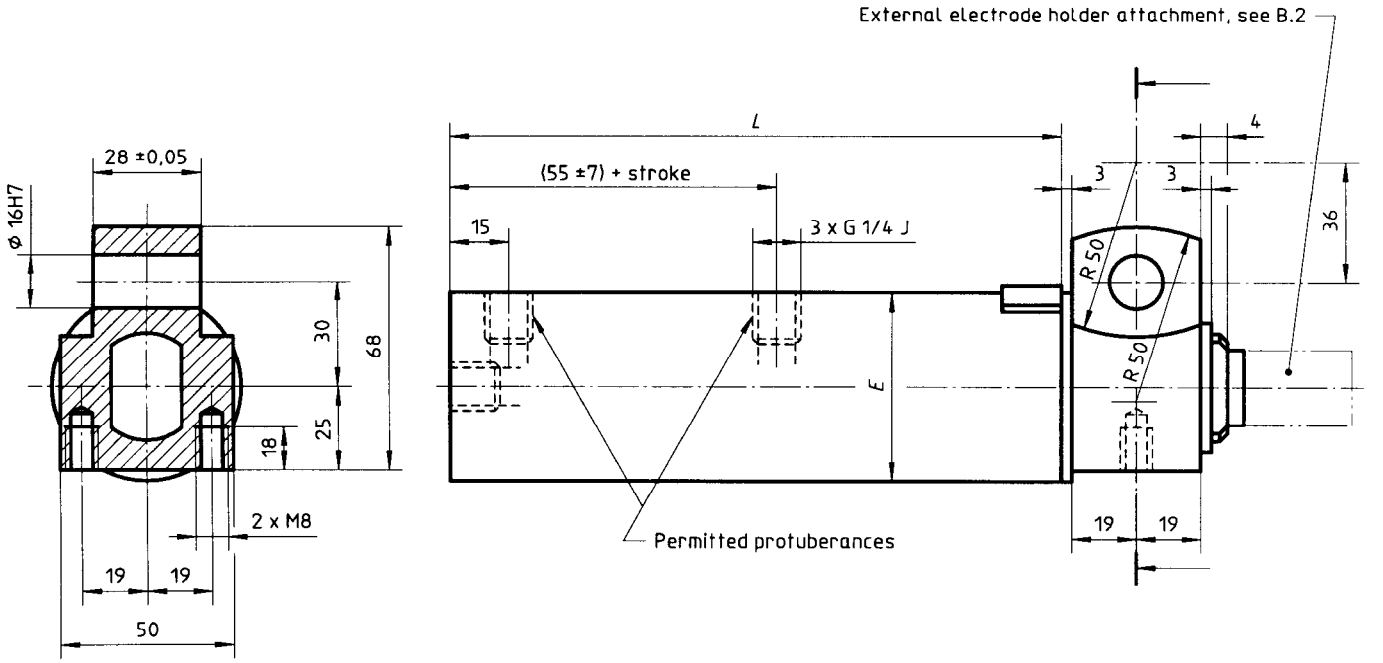
Dimensions in millimetres

E	Force at 1 MPa (10 bar) kN ± 5 %	Nominal stroke	$L \pm 1$	Inside bore[1)]
46	2,19	25	151	40
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
51	2,86	25	151	45
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
56	3,61	25	151	50
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
63	4,61	25	151	56
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
71	5,92	25	151	63
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
80	7,60	25	151	71
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
90	9,74	25	151	80
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	

1) See 5.2.

C.8 Mounting method H — Eye mounting for pinching

Dimensions in millimetres



Dimensions in millimetres

E	Force at 1 MPa (10 bar) kN ± 5 %	Nominal stroke	$L \pm 1$	Inside bore[1)]
46	2,19	25	151	40
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
51	2,86	25	151	45
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
56	3,61	25	151	50
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
63	4,61	25	151	56
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
71	5,92	25	151	63
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
80	7,60	25	151	71
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	
90	9,74	25	151	80
		31,5	164	
		40	181	
		50	201	
		63	227	
		80	261	
		100	301	
		125	351	
		160	421	

1) See 5.2.

Annex D
(informative)

Bibliography

[1] ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation.*

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

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ICS 25.160.30

Descriptors: welding, resistance welding, spot welding, welding equipment, pneumatic cylinders, specifications, dimensions, tests, marking, delivery condition.

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