

INTERNATIONAL
STANDARD

IEC
60915

Second edition
2006-11

**Fixed capacitors for use in electronic equipment –
Preferred dimensions of shaft ends, bushes and
for the mounting of single-hole, bush-mounted,
shaft-operated electronic components**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT –
PREFERRED DIMENSIONS OF SHAFT ENDS, BUSHES AND FOR THE
MOUNTING OF SINGLE-HOLE, BUSH-MOUNTED, SHAFT-OPERATED
ELECTRONIC COMPONENTS**

FOREWORD

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International Standard IEC 60915 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This second edition cancels and replaces the first edition published in 1987 and constitutes a minor revision, related to Tables, Figures and references.

The text of this standard is based on the following documents:

CDV	Report on voting
40/1654/CDV	40/1783/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

FIXED CAPACITORS FOR USE IN ELECTRONIC EQUIPMENT – PREFERRED DIMENSIONS OF SHAFT ENDS, BUSHES AND FOR THE MOUNTING OF SINGLE-HOLE, BUSH-MOUNTED, SHAFT-OPERATED ELECTRONIC COMPONENTS

1 Scope and object

This International Standard is applicable to variable capacitors, potentiometers and variable resistors for use in electronic equipment.

The dimensions given in this standard have been selected from IEC 60390 and IEC 60620 because the ranges of dimensions included in these standards were considered too large and contained too many variants for capacitors and resistors for electronic equipment. Consequently this standard contains preferred dimensions for shaft ends and bushes and for the mounting of single-hole, bush-mounted, shaft-operated variable capacitors, variable resistors and potentiometers. If other dimensions not listed in this standard have to be used, it is recommended to select them also from the above-mentioned standards.

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.

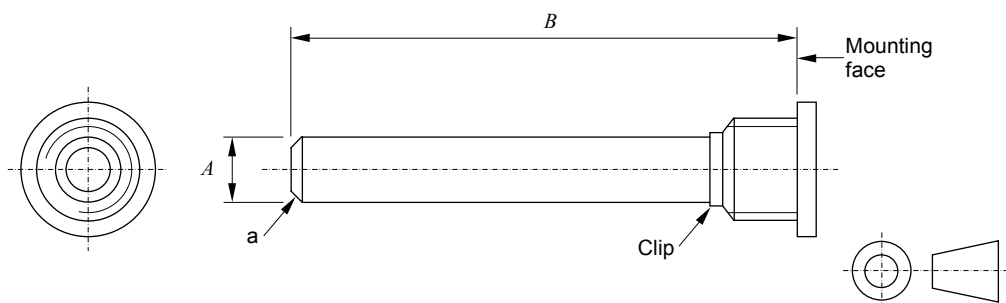
IEC 60390, *Dimensions of spindle ends for manually operated electronic components*

IEC 60620, *Dimensions for the mounting of single-hole, bush-mounted, spindle-operated electronic components*

3 Preferred dimensions of shaft ends and bushes

All dimensions are in mm.

3.1 Plain round shaft



^a Chamfer at 40°/50° or a radius for a depth of between 5 % and 10 % of the dimension *A*.

Figure 1 – Plain round shaft

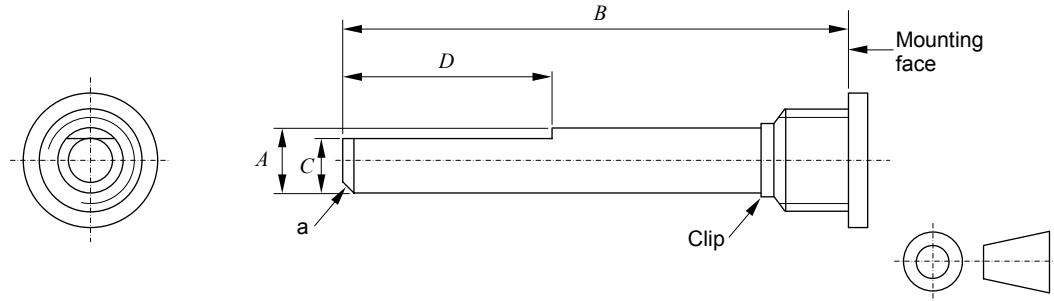
Table 1 – Preferred dimensions of plain round shaft

Dimension <i>A</i> ^a		Dimension <i>B</i>										
General	Precision	10 ±0,5	12,5 ±0,5	15 ±0,5	20 ±0,5	22 ±0,5	25 ±0,5	30 ±1,0	32 ±1,0	35 ±1,0	40 ±1,0	50 ±1,0
3.0 ⁰ _{-0,06}	3.00 ⁰ _{-0,025}	X	X	X	X	X	X	X	X			
4.0 ⁰ _{-0,075}	4.00 ⁰ _{-0,03}	X	X	X	X	X	X	X	X	X	X	X
6.0 ⁰ _{-0,075}	6.00 ⁰ _{-0,03}		X	X	X	X	X ^b	X	X	X	X	X
10.0 ⁰ _{-0,09}	10.00 ⁰ _{-0,036}			X	X	X	X	X	X	X	X	X

^a Dimension *A* includes finish requirements.

^b When specifically required this variant may have a cross-hole, with a diameter of 3,15 mm ± 0,05 mm, at 5 ± 0,4 mm from the end of the shaft. The centre line of the cross-hole shall not deviate from the centre line of the shaft by more than 0,1 mm.

3.2 Flatted shaft



^a Chamfer at 40°/50°, or a radius for a depth of between 5 % and 10 % of dimension *A*.

Figure 2 – Flatted shaft

Table 2 – Preferred dimensions of flatted shaft

Dimension <i>A</i> ^a		Dimension <i>B</i> ^b											Dimension <i>C</i> ^{c,d}		Dimension <i>D</i>
General	Precision	10 ±0,5	12.5 ±0,5	15 ±0,5	20 ±0,5	22 ±0,5	25 ±0,5	30 ±1,0	32 ±1,0	35 ±1,0	40 ±1,0	50 ±1,0	Screwed knob	Push-on knob	
3,00 ⁰ _{-0,06}	3,00 ⁰ _{-0,025}	X	X	X	X	X	X	X	X				2,5 ⁰ _{-0,1}	2,0 ⁰ _{-0,1}	From 4 mm in increments of 2 mm (4,6,8,12 mm) Tolerance ±0,5 mm
4,00 ⁰ _{-0,075}	4,00 ⁰ _{-0,03}	X	X	X	X	X	X	X	X	X	X		3,5 ⁰ _{-0,1}	3,0 ⁰ _{-0,1}	
6,00 ⁰ _{-0,75}	6,00 ⁰ _{-0,03}		X	X	X	X	X	X	X	X	X	X	5,0 ⁰ _{-0,2}	4,0 ⁰ _{-0,1} 4,5 ⁰ _{-0,2}	
10,0 ⁰ _{-0,09}	10,0 ⁰ _{-0,036}				X	X	X	X	X	X	X	X	9,0 ⁰ _{-0,2}	7,0 ⁰ _{-0,1}	

^a Dimension *A* includes finish requirements.

^b If additional values are required, they should preferably be chosen from the R20 series.

^c Dimensions *C* and *D* of the flat shall be selected from the options given in Table 2 and dimension *D* shall be specified in the detail specification of the component in consideration of the diameter and length of shaft.

^d The angle of flat shall be specified in steps of 22,5° ± 5° clockwise from the reference line (the position of the reference line shall be defined).

3.3 Slotted shaft

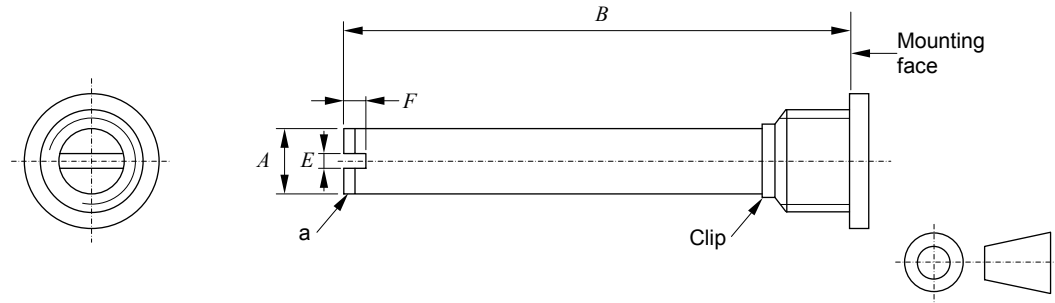


Figure 3 – Slotted shaft

Table 3 – Preferred dimensions of slotted shaft

Dimension A^a		Dimension B^b											Dimension E	Dimension F
General	Precision	10 $\pm 0,5$	12,5 $\pm 0,5$	15 $\pm 0,5$	20 $\pm 0,5$	22 $\pm 0,5$	25 $\pm 0,5$	30 $\pm 1,0$	32 $\pm 1,0$	35 $\pm 1,0$	40 $\pm 1,0$	50 $\pm 1,0$		
3,00 ⁰ _{-0,06}	3,00 ⁰ _{-0,025}	X	X	X	X	X	X	X	X				0,6 ± 0,1 1,0 ± 0,1	1,0 ± 0,1 1,2 ± 0,2
4,00 ⁰ _{-0,075}	4,00 ⁰ _{-0,03}		X	X	X	X	X	X	X	X	X		0,8 ± 0,1 1,0 ± 0,1	1,2 ± 0,2 1,5 ± 0,2
6,00 ⁰ _{-0,075}	6,00 ⁰ _{-0,03}			X	X	X	X	X	X	X	X	X	1,0 ± 0,1	1,6 ± 0,2 2,0 ± 0,2
10,0 ⁰ _{-0,09}	10,00 ⁰ _{-0,036}				X	X	X	X	X	X	X	X	2,0 ± 0,1	3,0 ± 0,2

^a Dimension A includes finish requirements.
^b If additional values are required they should preferably be chosen from the R20 series.

3.4 Concentric shafts

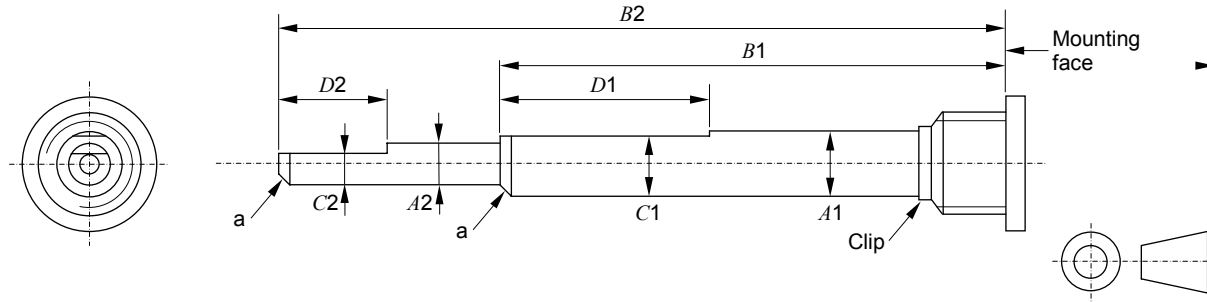


Figure 4 – Concentric shaft

Table 4 – Preferred dimensions of concentric shafts

Dimension $A1^a$	Dimension $A2^a$	Dimension $B1^b$											$B2$	$C1^d$	$C2^{c,d}$		Dimensions $D1, D2^c$	
		10 $\pm 0,5$	12,5 $\pm 0,5$	15 $\pm 0,5$	20 $\pm 0,5$	22 $\pm 0,5$	25 $\pm 0,5$	30 $\pm 1,0$	32 $\pm 1,0$	35 $\pm 1,0$	40 $\pm 1,0$	50 $\pm 1,0$			Screwed knob	Push- on knob		
6,00 ⁰ _{-0,07}	3,00 ⁰ _{-0,06}			X	X	X	X	X	X	X	X	X	X	$B1 + 10 \pm 1,0$	5,3 ⁰ _{-0,3}	2,5 ⁰ _{-0,1}	2,0 ⁰ _{-0,1}	From 4 mm in increments of 2 mm Tolerance of $\pm 0,5$ mm
6,00 ⁰ _{-0,07}	4,00 ⁰ _{-0,075}			X	X	X	X	X	X	X	X	X	NA		3,5 ⁰ _{-0,1}	3,0 ⁰ _{-0,1}		
10,0 ⁰ _{-0,09}	6,00 ⁰ _{-0,075}				X	X	X	X	X	X	X	X	$B1 + 12,5 \pm 1,0$	9,0 ⁰ _{-0,2}	5,0 ⁰ _{-0,2}	4,0 ⁰ _{-0,1}		

^a Dimension A includes finish requirements.

^b If additional values are required, they should preferably be chosen from the R20 series.

^c Dimensions $C2$, $D1$ and $D2$ of the flats shall be selected from the options given in Table 4.

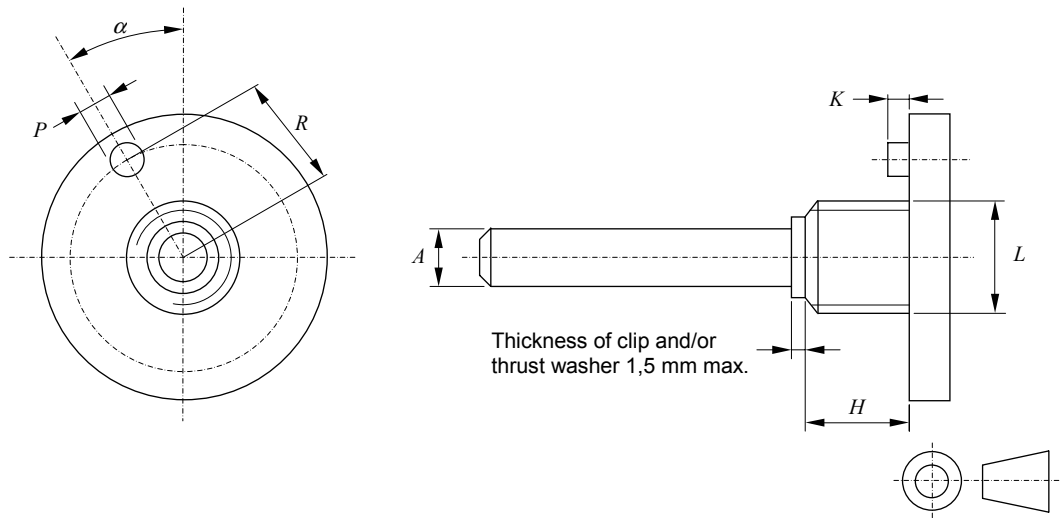
^d The angle of flat shall be specified in steps of $22,5^\circ \pm 5^\circ$ clockwise from the reference line (the position of the reference line shall be defined).

NA = Not applicable.

4 Preferred dimensions for the mounting of single-hole, bush mounted shaft - operated electronic components

All dimensions are in mm.

4.1 Single-hole bush mounting with antirotation lug (non-turn device) on mounting face



The angular position of the lug (α) shall be specified in the relevant detail specification of the component.

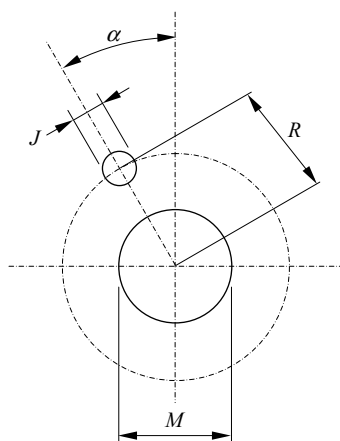
The minimal panel thickness shall be specified in the relevant detail specification of the component.

NOTE 1 Two symmetrical lugs may be used.

NOTE 2 The shape of the lug is optional within dimension P .

NOTE 3 If required by the relevant detail specification, the lug may be omitted, in which case the panel cut-out would be simplified.

Figure 5 – Essential component dimensions



The angular position of the lug (α) shall be specified in the relevant detail specification of the component.

The minimal panel thickness shall be specified in the relevant detail specification of the component.

NOTE 1 Two symmetrical lugs may be used.

NOTE 2 The shape of the lug is optional within dimension P .

NOTE 3 If required by the relevant detail specification, the lug may be omitted, in which case the panel cut-out would be simplified.

Figure 6 – Essential panel cut-out dimensions

Table 5 – Preferred dimensions of bush, lug (non-turn device) and related place

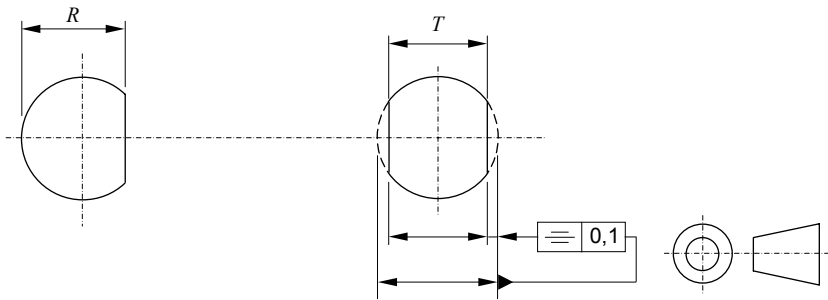
Shaft diameter	Component				Panel cut-out		
	Thread designation	Bush length	Antirotation lug length	Dimensions	Diameter of mounting hole	Diameter of antirotation lug hole	Hole distance
<i>A</i>	<i>L</i> ^a	<i>H</i>	<i>K</i>	<i>P</i>	<i>M</i>	<i>J</i>	<i>R</i> ^b
3	M5 × 0,5	5 ± 0,5	1,0 ± 0,2	c	5,1	3,5 ^{+0,12} ₀	9,5 ± 0,1
	M6 × 0,75	6 ± 0,5	1,5 ± 0,2		7,1	Note 2	
	M7 × 0,75	8 ± 0,5					
4	M7 × 0,75	6 ± 0,5	1,0 ± 0,2		7,1	3,5 ^{+0,12} ₀	9,5 ± 0,1
	M8 × 0,75	8 ± 0,5	1,5 ± 0,2		8,1		
			2,0 ± 0,2				
6	M7 × 0,75	5 ± 0,5	1,0 ± 0,2		7,1	3,5 ^{+0,12} ₀	9,5 ± 0,1
	M9 × 0,75	8 ± 0,5	1,5 ± 0,2		10,1	4,5 ^{+0,12} ₀	13,5 ± 0,1
	M10 × 0,75	10 ± 0,5	2,0 ± 0,2				
10	M15 × 1,0	12 ± 0,5	1,0 ± 0,2		15,1	3,5 ^{+0,12} ₀	13,5 ± 0,1
			1,5 ± 0,2			4,5 ^{+0,12} ₀	15,0 ± 0,1
			2,0 ± 0,2				
			2,5 ± 0,2				

^a Unless otherwise specified in the detail specification.

^b For potentiometers with a diameter less than 19 mm, the diameter *R* is given in the detail specification.

^c The relevant detail specification shall specify dimensions *P* and *R* in such a way that the angular tolerance does not exceed ± 2,5° and that the mountability is ensured.

4.2 Single and double flatted bush mounting



NOTE Dimensions A, L and H are given in Figure 5.

Figure 7 – Essential component dimensions

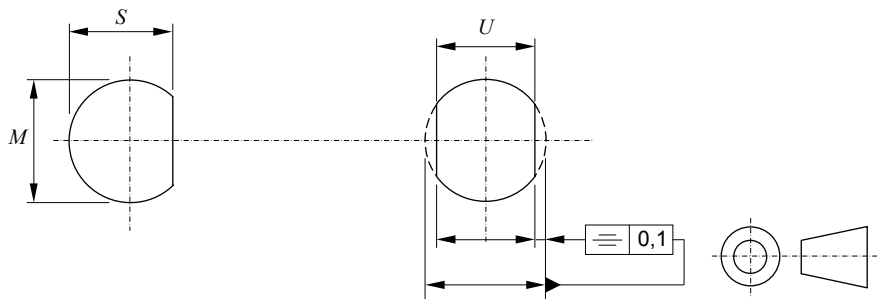


Figure 8 – Essential panel cut-out dimensions

Table 6 – Preferred dimensions of bush and mounting hole

Shaft diameter	Component		Diameter of mounting hole	Single flatted bush		Double flatted bush	
	Thread designation	Bush length		Bush dimension	Mounting hole dimension	Bush dimension	Mounting hole dimension
<i>A</i>	<i>L</i> ^a	<i>H</i>	<i>M</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>U</i>
3	M6 × 0,75	5 ± 0,5	6,1	5,55 ⁰ _{-0,09}	5,60 ^{+0,09} ₀	5,10 ⁰ _{-0,075}	5,15 ^{+0,09} ₀
	M7 × 0,75	8 ± 0,5	7,1	6,50 ⁰ _{-0,09}	6,55 ^{+0,09} ₀	6,00 ⁰ _{-0,075}	6,05 ^{+0,09} ₀
4	M7 × 0,75	6 ± 0,5	7,1	6,50 ⁰ _{-0,09}	6,55 ^{+0,09} ₀	6,00 ⁰ _{-0,075}	6,05 ^{+0,09} ₀
	M8 × 0,75	8 ± 0,5	8,1	7,40 ⁰ _{-0,09}	7,45 ^{+0,09} ₀	6,80 ⁰ _{-0,075}	6,85 ^{+0,09} ₀
6	M10 × 0,75	8 ± 0,5	10,1	9,25 ⁰ _{-0,09}	9,30 ^{+0,09} ₀	8,50 ⁰ _{-0,09}	8,55 ^{+0,09} ₀
		12 ± 0,5					
10	M15 × 1,0	12 ± 0,5	15,1	Under consideration		Under consideration	
The angular position of the flat(s) on the bush, with respect to the part of the component mounted behind the panel, shall be specified in the relevant detail specification. The double flatted bush is the preferred mounting. With this mounting, the angular play shall not exceed ±4°.							
NOTE Dimensions A, L and H are given in Figure 5.							
^a Unless otherwise specified in the detail specification.							

4.3 Single-hole bush mounting with antirotation lug (non-turn device) on bush

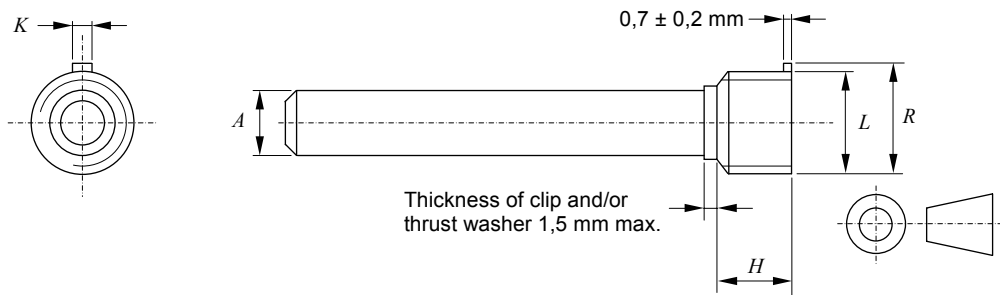
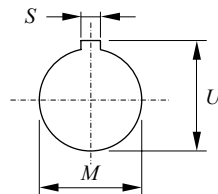


Figure 9 – Essential component dimensions



The angular position of the antirotation lug on the bush, with respect to the part of the component mounted behind the panel, shall be specified in the relevant detail specification.

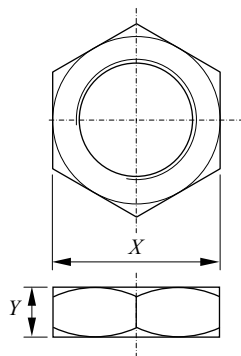
Figure 10 – Essential panel cut-out dimensions

Table 7 – Preferred dimensions of bush, lug (non-turn device) and mounting hole

Shaft diameter	Component				Panel cut-out		
	Thread designation	Bush length	Antirotation lug width	Bush dimension	Diameter of mounting hole	Mounting hole dimension	Mounting hole dimension
<i>A</i>	<i>L</i> ^a	<i>H</i>	<i>K</i>	<i>R</i>	<i>M</i>	<i>U</i>	<i>S</i>
3	M6 × 0,75	5 ± 0,5	2,5 ⁰ _{-0,2}	8,1 ⁰ _{-0,2}	6,1	8,2 ^{+0,3} ₀	2,6 ^{+0,1} ₀
	M7 × 0,75	8 ± 0,5		9,1 ⁰ _{-0,2}	7,1	9,2 ^{+0,3} ₀	2,6 ^{+0,1} ₀
4	M7 × 0,75	6 ± 0,5	2,5 ⁰ _{-0,2}	9,1 ⁰ _{-0,2}	7,1	9,2 ^{+0,3} ₀	2,6 ^{+0,1} ₀
	M8 × 0,75	8 ± 0,5		10,1 ⁰ _{-0,2}	8,1	10,2 ^{+0,3} ₀	2,6 ^{+0,1} ₀
6	M9 × 0,75	8 ± 0,5	2,5 ⁰ _{-0,2}	11,1 ⁰ _{-0,2}	9,1	11,2 ^{+0,3} ₀	2,6 ^{+0,1} ₀
	M10 × 0,75	10 ± 0,5		12,1 ⁰ _{-0,2}	10,1	12,2 ^{+0,3} ₀	
		12 ± 0,5					
10	M15 × 1,0	12 ± 0,5	2,5 ⁰ _{-0,2}	17,1 ⁰ _{-0,2}	15,1	17,2 ^{+0,3} ₀	2,6 ^{+0,1} ₀

^a Unless otherwise specified in the detail specification.

4.4 Fixing (or mounting) nuts



Dimension Y shall be such as to provide at least two full threads and shall be specified in the detail specification.

Figure 11 – Fixing (or mounting) nuts

Table 8 – Preferred dimensions of fixing (or mounting) nuts

Thread designation L	Dimension X
M5 × 0,5	$7 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}$
M6 × 0,75	$8 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}$
M7 × 0,75	$10 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}, 11 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}$
M8 × 0,75	$11 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}$
M9 × 0,75	$11 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}, 12 \begin{smallmatrix} 0 \\ -0,22 \end{smallmatrix}, 14 \begin{smallmatrix} 0 \\ -0,27 \end{smallmatrix}$
M10 × 0,75	$14 \begin{smallmatrix} 0 \\ -0,27 \end{smallmatrix}$
M12 × 1,0	$18 \begin{smallmatrix} 0 \\ -0,27 \end{smallmatrix}$
M15 × 1,0	$22 \begin{smallmatrix} 0 \\ -0,33 \end{smallmatrix}$

4.5 Washers (flat, spring and internal tooth)

Dimensions for washers are under consideration.



Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

International Electrotechnical Commission

3, rue de Varembé
1211 Genève 20
Switzerland

or

Fax to: **IEC/CSC** at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

A Prioritaire

Nicht frankieren
Ne pas affranchir



Non affrancare
No stamp required

RÉPONSE PAYÉE

SUISSE

Customer Service Centre (CSC)
International Electrotechnical Commission
3, rue de Varembé
1211 GENEVA 20
Switzerland



Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: (e.g. 60601-1-1)

.....

Q2 Please tell us in what capacity(ies) you bought the standard (tick all that apply). I am the/a:

- purchasing agent
- librarian
- researcher
- design engineer
- safety engineer
- testing engineer
- marketing specialist
- other.....

Q3 I work for/in/as a: (tick all that apply)

- manufacturing
- consultant
- government
- test/certification facility
- public utility
- education
- military
- other.....

Q4 This standard will be used for: (tick all that apply)

- general reference
- product research
- product design/development
- specifications
- tenders
- quality assessment
- certification
- technical documentation
- thesis
- manufacturing
- other.....

Q5 This standard meets my needs: (tick one)

- not at all
- nearly
- fairly well
- exactly

Q6 If you ticked NOT AT ALL in Question 5 the reason is: (tick all that apply)

- standard is out of date
- standard is incomplete
- standard is too academic
- standard is too superficial
- title is misleading
- I made the wrong choice
- other

Q7 Please assess the standard in the following categories, using the numbers:

- (1) unacceptable,
- (2) below average,
- (3) average,
- (4) above average,
- (5) exceptional,
- (6) not applicable

- timeliness.....
- quality of writing.....
- technical contents.....
- logic of arrangement of contents
- tables, charts, graphs, figures.....
- other

Q8 I read/use the: (tick one)

- French text only
- English text only
- both English and French texts

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

.....



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