variable capacitors

survey

For detailed information
Handbook CM2b

Precision tuning capacitors
Used in the top flight of telecommunication and measuring equipment. They feature high stability under extreme conditions, close law tolerance, and allow design flexibility.

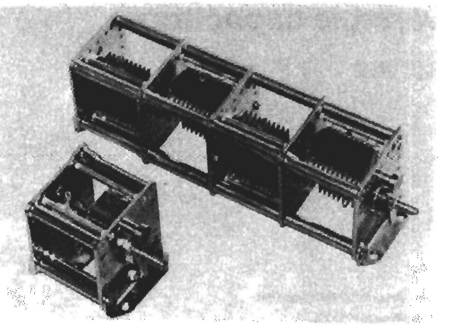
Tubular ceramic trimmers
Compact, rugged, reliable, and environmentally immune, these tubular trimmers come in a broad range of styles. Unique design and process technology plus extensive mechanization ensure low parameter spreads, low losses and negligible d.c. leakage with a long operational life.

Film dielectric trimmers
State-of-the-art in both design and materials, these capacitors bring the advantages of film dielectric to the trimmer field. While taking the same or less space than conventional trimmers, they offer superior performance and better adjustment means at lower cost.

application	capacitance max C_{min}/ min C_{max} pF	rated d.c. voltage V	temperature coefficient range ppm/ °C	series no.	status	page
Precision tuning capacitors	10 to 640	400/1500	20 to 50	805	D	368
Tubular ceramic trimmers						
v.h.f.; radio, tv	0,8/3 to 1/12	400/500	−200 ± 200 −300 ± 200	801 200	D	369
v.h.f. and u.h.f.	0,5/3 to 0,7/6	500	+ 150 ± 100	801 960	C	369
u.h.f.	0,3/1,5 to 1/6	400	+ 50 ± 100 −300 ± 300	801 961	C	370
v.h.f.; industrial equipment	0,5/3 to 1,7/18	500	− 10 ± 60 −250 ± 250	802 200	C	371
u.h.f.; tv aerial amplifiers, etc.	0,5/3 to 1/12	400/500	− 10 ± 60 −200 ± 150	802 960	C	372 – 373
Film dielectric trimmers						
radio	1,4/5,5 to 12/120	250	0 ± 300 −750 ± 300	808	D	374 – 375
for miniature h.f. equipment in measurement and telecommunication, etc.	1/3,5 to 5/60	300	−250 ± 150 −350 ± 75	809 50 809 80 809 90	D	376 – 377
	1,5/5 to 7/100	200/350	0 ± 200	809 70	D	378

variable capacitors

precision tuning capacitors



2222 805

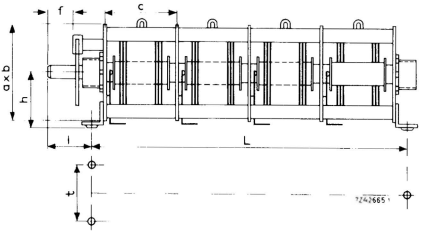
These capacitors are used in the top flight of telecommunication and measuring equipment. They feature high stability under extreme conditions, close law tolerance, and allow design flexibility. We can supply standard products as shown below, or custom designs to meet your specific needs – including special laws and gear mechanisms.

Rated d.c. voltage	50 to 75% of test voltage depending on ambient conditions
Category temperature range	–40 to +85 °C
Temperature coefficient	20 to 50 ppm/ °C
Insulation resistance	> 10 000 MΩ
Contact resistance	⩽ 5 mΩ

	linear law a x b = 40 x 40 mm single-stator or differential type		split-stator type		**linear law** a x b = 60 x 60 mm single-stator type		split-stator type		**logarithmic law** a x b = 60 x 60 mm single-stator type		split-stator type	
nom swing pF	C_{min} ± 1 pF pF	d.c. test voltage V	C_{min} ± 1 pF pF	d.c. test voltage V	C_{min} ± 1 pF pF	d.c. test voltage V	C_{min} ± 1 pF pF	d.c. test voltage V	C_{min} ± 1 pF pF	d.c. test voltage V	C_{min} ± 1 pF pF	d.c. test voltage V
10			3	3000								
16	8	2500	3,6	2000								
25	8,5	2000	4	2000			5	4000			5	2500
32							5	3000			5	2500
40	9	1500	4	1600			5	3000			5,5	2000
50							5	2500			5,5	2000
64	9	1000	4	1300			5,5	2000			5,5	1600
80							5,5	2000			5,5	1600
100	10	1000			14,5	2000	5,5	2000	13	1500	5,5	1600
125					15	2000	6	1600	13	1250	5,5	1300
160	11	800			15,5	1500			14,5	1000		
200					16	1250			14,5	1000		
250	11,5	650			16	1250			14	1000		
320					17,5	1000			14	800		
400					19	1000			14	800		
500					20,5	1000			14	650		
640					21,5	800						

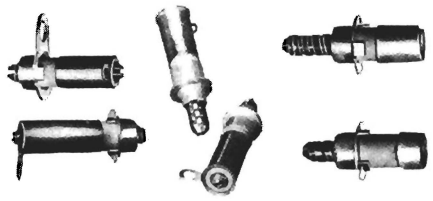
Dimensions (mm)

a x b		40 x 40	60 x 60
L	1 gang	45	67
	2 gangs	76,5	117,5
	3 gangs	108	168
	4 gangs	139,5	218,5
t		22	35
c		31,5	50,5
l		16	18
h		22,5	32,5
f		10	14,5



tubular ceramic trimmers

2222 801



20001 to 08 *20051 and 52* *96002 and 03*

2222 801 20001 to 08

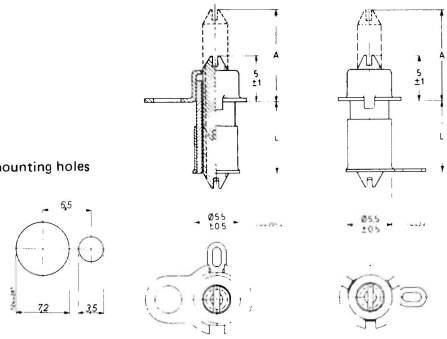
Rated voltage (d.c.)	500 V
Test voltage (d.c.)	1000 V
Category temperature range	–50 to +100 °C
Temperature coefficient	–200 + 200 ppm/ °C
Insulation resistance	⩾ 10 000 MΩ
Contact resistance	< 10 mΩ
Tan δ at 1 MHz (C_{max})	< 20 x 10^{-4}
Climatic category IEC 68	50/100/21

capacitance max C_{min} pF	min swing pF	effective angle of rotation x 360°	L mm	A mm	catalogue no. 2222 801 200 . version A	version B
0,8	3	3	5,5	13,5	01	05
0,8	6	5	8,5	16,5	02	06
0,9	9	7	11,5	19,5	03	07
1	12	9	14,5	22,5	04	08

Version A: screw mounting

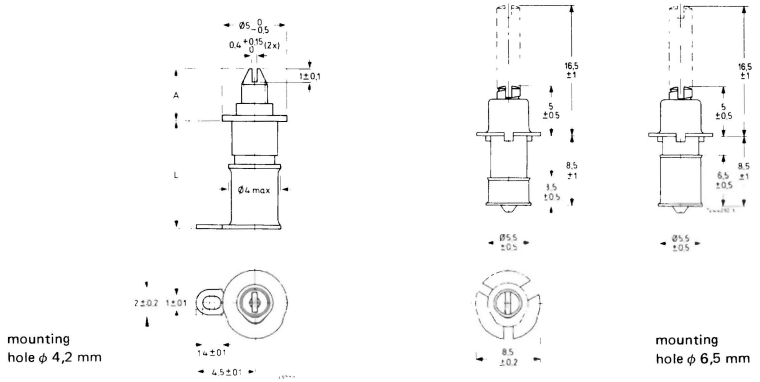
Version B: direct soldering

mounting holes



2222 801 ..... 20051 20052 96003 96002

Capacitance max C_{min}	0,8	0,8	0,5	0,7	pF
min swing	3	6	3	6	pF
Rated voltage (d.c.)	400	400	500	500	V
Test voltage (d.c.)	800	800	1000	1000	V
Category temperature range	–50 to +100	–50 to +100	–50 to +100	–50 to +100	°C
Temperature coefficient	–200 ± 200	–300 + 200	+150 ± 150	+150 ± 100	ppm/ °C
Insulation resistance	> 10 000	> 10 000	> 10 000	> 10 000	MΩ
Contact resistance	< 10	< 10	< 3	< 3	mΩ
Tan δ at 1 MHz (C_{max})	20 x 10^{-4}	20 x 10^{-4}	20 x 10^{-4}	20 x 10^{-4}	
Climatic category IEC 68	50/100/21	50/100/21	50/100/21	50/100/21	
L	8,2 ± 0,5	11,2 ± 0,5			mm
A at C_{min}	10,5 + 1	13,5 + 1			mm



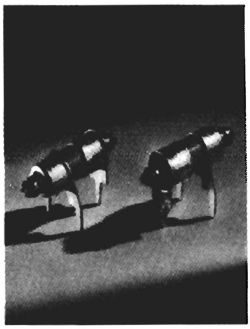
mounting hole ϕ 4,2 mm

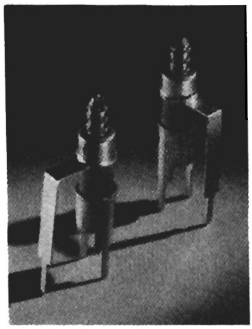
mounting hole ϕ 6,5 mm

variable capacitors

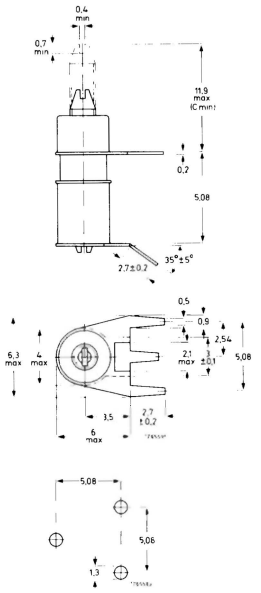
tubular ceramic trimmers

2222 801 961 . .



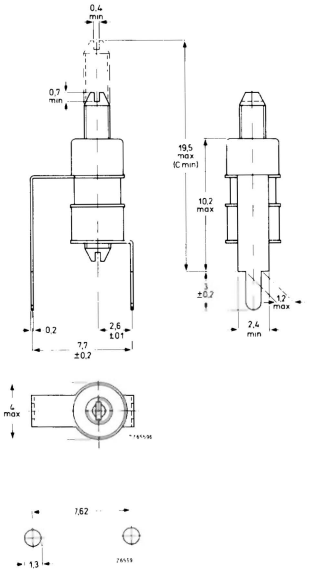


Catalogue no. **2222 801**	**96124**	**96127**	**96135**	**96138**	**96139**	
Capacitance max C_{min}	0,3	0,5	1	0,5	1	pF
min C_{max}	1,5	3,5	6	3	5,5	pF
Temperature coefficient	+50 ± 100	−200 ± 200	−300 ± 300	+150 ± 200	+100 ± 300	ppm/ °C
Overall dimensions	9 x 6 x 6			12 x 4 x 8		mm
Rated voltage (d.c.)			400			V
Test voltage (d.c.)			800			V
Category temperature range			−50 to +100			°C
Insulation resistance			> 10 000			MΩ
Contact resistance			< 10			mΩ
Tan δ at 1 MHz (C_{max})			< 20 x 10^{-4}			
Climatic category IEC 68			50/100/21			



colour of ceramic tube

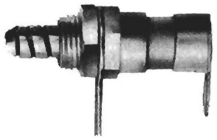
2222 801	96124	black
	96127	beige
	96135	red



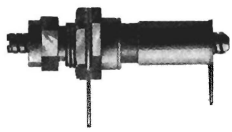
colour of ceramic tube

2222 801	96138	beige
	96139	red

2222 802 200 . .



2222 802 20001 to 05



2222 802 20011 to 15
High stability trimmer

2222 802 20001 to 05

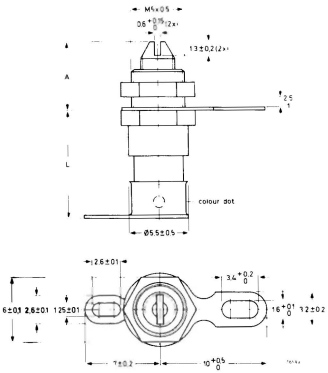
Rated voltage (d.c.)	500 V
Test voltage (d.c.)	1000 V
Category temperature range	−50 to +100 °C
Temperature coefficient	−200 ± 200 ppm/ °C
Insulation resistance	> 10 000 MΩ
Contact resistance	⩽ 10 mΩ
Tan δ at 1 MHz (C_{max})	< 20 x 10^{-4}
Climatic category IEC 68	50/100/21

2222 802 20011 to 15

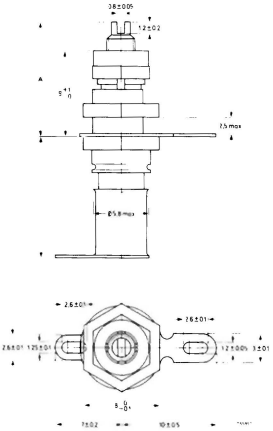
Rated voltage (d.c.)	500 V
Test voltage (d.c.)	1000 V
Category temperature range	−50 to +100 °C
Temperature coefficient	see table
Insulation resistance	> 10 000 MΩ
Contact resistance	⩽ 3 mΩ
Tan δ at 1 MHz (C_{max})	< 20 x 10^{-4}
Climatic category IEC 68	50/100/21

capacitance max C_{min} pF	capacitance min swing pF	angle of rotation x 360°	dimensions L mm	dimensions A mm	last two digits of cat. no.	colour of marking dot
0,8	3	7	10	13,5	01	orange
0,8	6	7	13	16,5	02	blue
0,9	9	9	16	19,5	03	white
1	12	11	19	22,5	04	red
1,7	18	11	19	22,5	05	grey

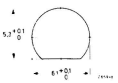
capacitance max C_{min} pF	capacitance min swing pF	temp. coefficient ppm/ °C	angle of rotation x 360°	dimensions L mm	dimensions A mm	last two digits of cat. no.
0,5	3	− 10 ± 60	8	12,7	22,5	11
0,6	4,5	− 10 ± 60	10	15,7	25,5	12
0,7	6	− 10 ± 60	11	18,2	28	13
0,9	9	−250 ± 250	10	15,7	25,5	14
1	12	−250 ± 250	11	18,7	28	15



2222 802 20001 to 05
mounting hole ϕ 5,2 mm



2222 802 20011 to 15



mounting hole

variable capacitors

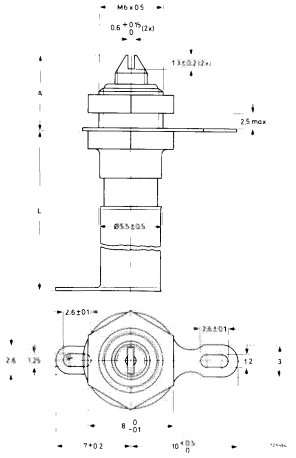
tubular ceramic trimmers

2222 802 960 . . – gold-plated rotor

High stability capacitors with friction locking device.
Screw mounting or direct soldering.

Rated voltage (d.c.)	500				500				400			V
Test voltage (d.c.)	1000				1000				800			V
Category temperature range	–50 to +100				–50 to +100				–50 to +100			°C
Temperature coefficient	–10 ± 60				–200 ± 150				–200 ± 150			ppm/ °C
Insulation resistance	> 10 000				> 10 000				> 10 000			MΩ
Contact resistance	< 5				< 5				< 5			mΩ
Tan δ at 1 MHz (C_{max})	< 20 x 10^{-4}				< 20 x 10^{-4}				< 20 x 10^{-4}			
Climatic category IEC 68	50/100/21				50/100/21				50/100/21			
Capacitance: max C_{min}	0,5	0,6	0,7		0,8	0,8	0,9	1	0,8	0,8		pF
min swing	3	4,5	6		3	6	9	12	3	6		pF
Dimensions	see Figs 1 and 2				see Figs 1 and 2				see Figs 3 and 4			
L	13	16	18		10	13	16	19	9	12		mm
A at C_{min}	16,5	19,5	22,5		13,5	16,5	19,5	22,5	8	11		mm
Last two digits of catalogue no. for screw mounting	**66**	**67**	**68**		**44**	**45**	**46**	**47**	**55**	**56**		
solder mounting	**69**	**71**	**72**		**51**	**52**	**53**	**54**	**57**	**58**		

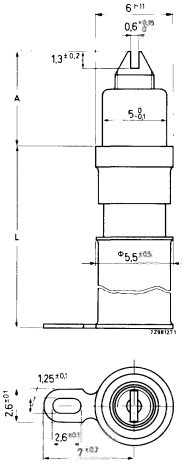
Screw mounting



Mounting hole ϕ 6,2 + 0,2 mm

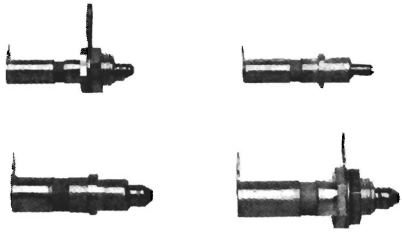
Fig.1 **44** to **47** and **66** to **68**

Solder mounting

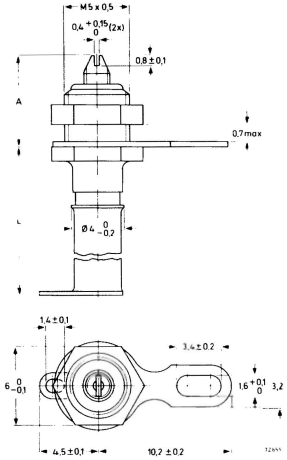


Mounting hole ϕ 5,1 + 0,2 mm

Fig.2 **51** to **54** and **69** to **72**



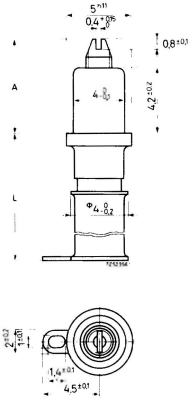
Screw mounting



Mounting hole ϕ 5,2 + 0,2 mm

Fig.3 **55** and **56**

Solder mounting



Mounting hole ϕ 4,1 + 0,2 mm

Fig.4 **57** and **58**

variable capacitors

film dielectric trimmers

2222 808

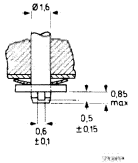
High stability trimmers for consumer or professional use, vertical or horizontal on PCB mounting.

Rated voltage (d.c.)	250 V
Test voltage (d.c.) for 1 minute	500 V
Category temperature range	−40 to +70 °C
Temperature coefficient	see table
Insulation resistance	> 10 000 MΩ
Contact resistance	< 10 mΩ
Tan δ	see table
Climatic category IEC 68	40/070/21
Angle of rotation	180°

Adjustments (see tables opposite)

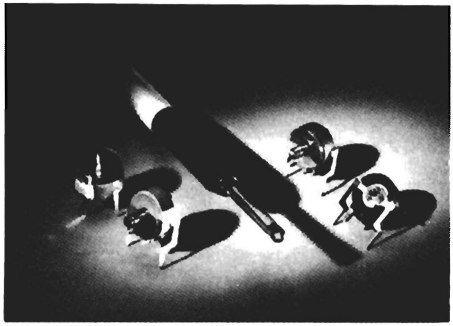
	top	bottom
a	screwdriver	key (detail Z)
b	hexagonal head	key (detail Z)
c	screwdriver	screwdriver
d	hexagonal head	screwdriver

Adjustment tools available



detail Z, turned 90°
see drawings opposite
not for **41**121; **44**121
71121; **74**121

reference to current ranges pF	guaranteed max C_{min}/min C_{max} pF	max tan δ at C_{max} and at 1 MHz	100 MHz	temperature coefficient ppm/°C	base colour	last five digits of catalogue no. vertical mounting	horizontal mounting
1,2/6	1,4/5,5	10×10^{-4}	25×10^{-4}	−750 ± 300	grey	**11**558	
1,4/10	2 /10	10×10^{-4}	25×10^{-4}	−200 ± 300	yellow	**11**109	
1,6/15	2 /15	10×10^{-4}	25×10^{-4}	−400 ± 300	blue	**11**159	
1,8/15	2 /15	10×10^{-4}	25×10^{-4}	−100 ± 400	blue	**31**159; **32**159	
					grey		**61**159
1,8/22	2 /22	10×10^{-4}	25×10^{-4}	−350 ± 250	green	**11**229	
2,5/25	3 /22	10×10^{-4}	25×10^{-4}	−100 ± 400	green	**31**229; **32**229	
					yellow		**61**229
2 /30	2 /27	50×10^{-4}	–	0 ± 300	red	**11**279	
4 /40	5,5/40	10×10^{-4}	25×10^{-4}	−150 ± 350	grey	**31**409; **32**409	
					yellow		**61**409
4,5/70	5,5/65	10×10^{-4}	25×10^{-4}	−200 ± 300	yellow	**31**659; **32**659	**61**659
5 /90	5,5/80	50×10^{-4}	–	−100 ± 300	red	**31**809; **32**809	**61**809
					red	**34**809	**64**809
8 /130	12 /120	50×10^{-4}	–	−150 ± 300	green	**41**121	**71**121
					green	**44**121	**74**121



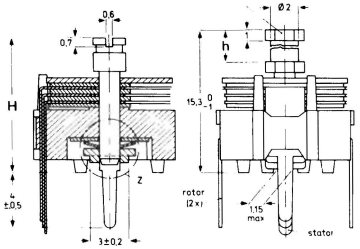
Vertical mounting

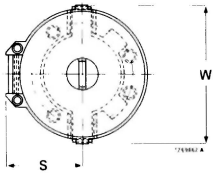
catalogue no.	adj.	H max	W max	S max	h
2222 808 **11** .	a	10	8	5	–
31 .	a	11	10,6	6	–
32 .	a	11	10,6	6	–
34809	b	15,3	10,6	6	5,8
41121	c	11	14,1	8,2	–
44121	d	14	14,1	8,2	4,5

Horizontal mounting

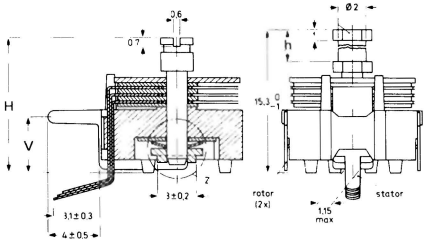
catalogue no.	adj.	H max	W max	S max	V max	h
2222 808 **61** .	a	11	10,6	6,05	4,2	
64809	b	15,3	10,6	6,05	4,2	5,8
71121	c	11	14,1	–	5,4	–
74121	d	14	14,1	–	5,4	4,5

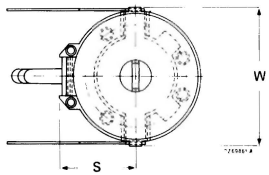
version with hexagonal head;
distance across flats 2,5-0,06 mm





version with hexagonal head;
distance across flats 2,5-0,06 mm

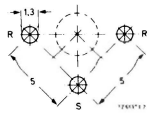




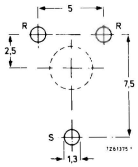
Hole patterns for 2222 808 .....

R = rotor; S = stator; large hole only for bottom adjustment

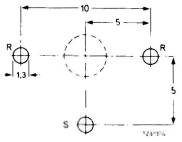
11 .



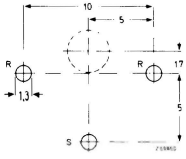
32 . .



31 . . **61** . 71121
34809 **64**809 **74**121



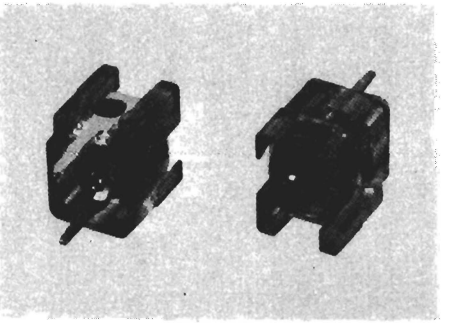
41121
44121



variable capacitors

film dielectric trimmers

2222 809 050
2222 809 080 – high-temperature
2222 809 090

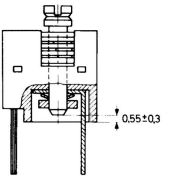


Rated voltage (d.c.)	300 V
Test voltage (d.c.)	600 V
Category temperature range	–40 to +125 °C
Insulation resistance	> 10 000 MΩ
Contact resistance	< 5 mΩ
Angle of rotation	180°
Climatic category IEC 68	40/125/21

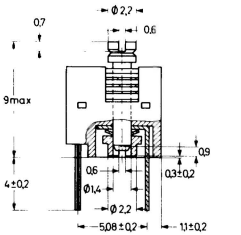
capacitance max C_{min} pF	capacitance min C_{max} pF	temperature coefficient ppm/ °C	max tan δ at 100 MHz	last two digits of catalogue no. top adjustment	last two digits of catalogue no. top + bottom adjustment	colour of marking dot on stator
050 series						
1	3,5	–250 ± 150	20×10^{-4}	01	04	orange
1,8	10	–300 ± 75	20×10^{-4}	02	05	white
2	18	–350 ± 75	40×10^{-4}	03	06	red
080 series						
4	40	–250 ± 150	35×10^{-4}		02	yellow
5	60	–250 ± 150	35×10^{-4}		03	blue
090 series						
1,4	5,5	–250 ± 150	15×10^{-4}		01 04	green
2	9	–250 ± 150	15×10^{-4}		02 05	white
2	18	–250 ± 150	15×10^{-4}		03 06	red

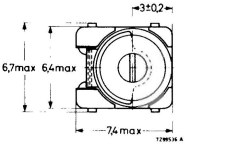
050 series

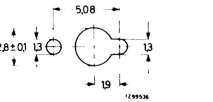
01
02
03



04
05
06



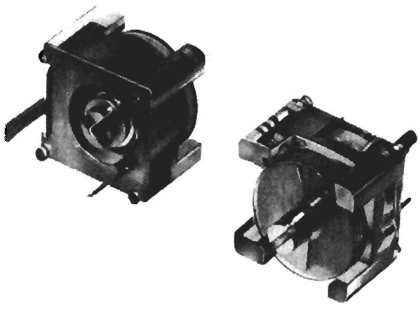




Hole pattern for type with top and bottom adjustment.

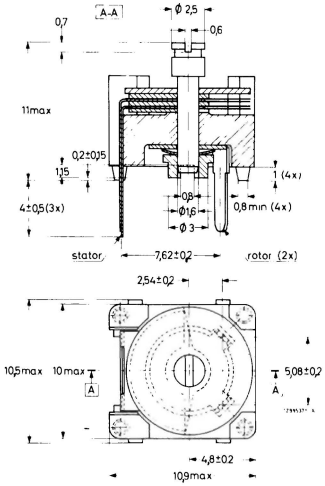


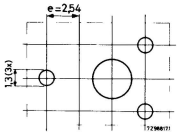
Hole pattern for type with top adjustment.



080 series

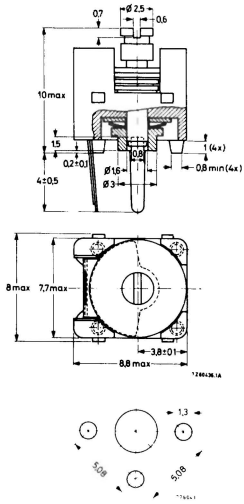
080 series



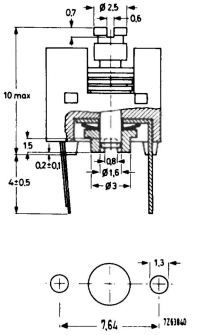


Hole pattern;
large hole is only
necessary for bottom
adjustment.

090 series



Hole pattern for the
three-pin versions **01**, **02** and **03**

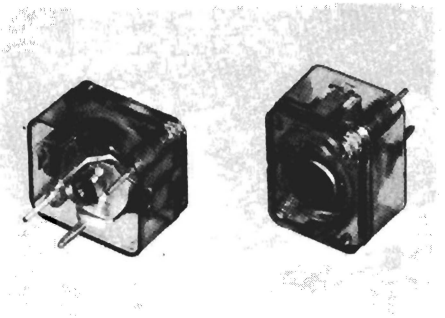


Hole pattern for the
two-pin versions **04**, **05** and **06**

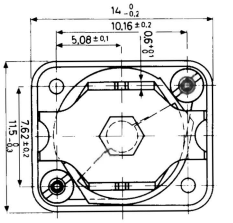
variable capacitors

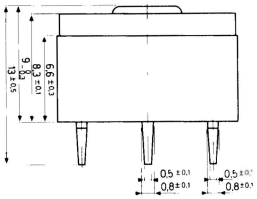
film dielectric trimmers

2222 809 070 – high-temperature

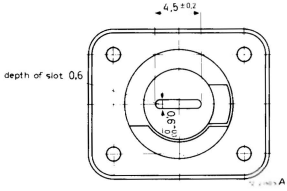


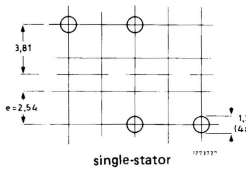
Rated voltage (d.c.)	50% of test voltage
Category temperature range	–40 to +125 °C
Temperature coefficient	0 ± 200 ppm/ °C
Insulation resistance	> 10 000 MΩ
Contact resistance	< 5 mΩ
Tan δ at 1 MHz	< 10 x 10^{-4}
Climatic category IEC 68	40/125/21
Angle of rotation	180°



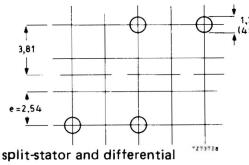


type	capacitance max C_{min} pF	capacitance min C_{max} pF	d.c. test voltage V	tan δ x 10^{-4} at 100 MHz	last two digits of catalogue no.
single-stator	2,5	20	700	17	04
	4	40	700	17	08
	5	60	400	25	11
	6	80	400	25	13
	7	100	400	25	15
split-stator	1,5	5	700	17	01
	2	10	700	17	02
	3	15	400	25	03
	3	20	400	25	05
	3	25	400	25	07
differential	2,5	20	700	17	06
	4	40	700	17	09
	5	60	400	25	12
	6	80	400	25	14
	7	100	400	25	16





single-stator



split-stator and differential