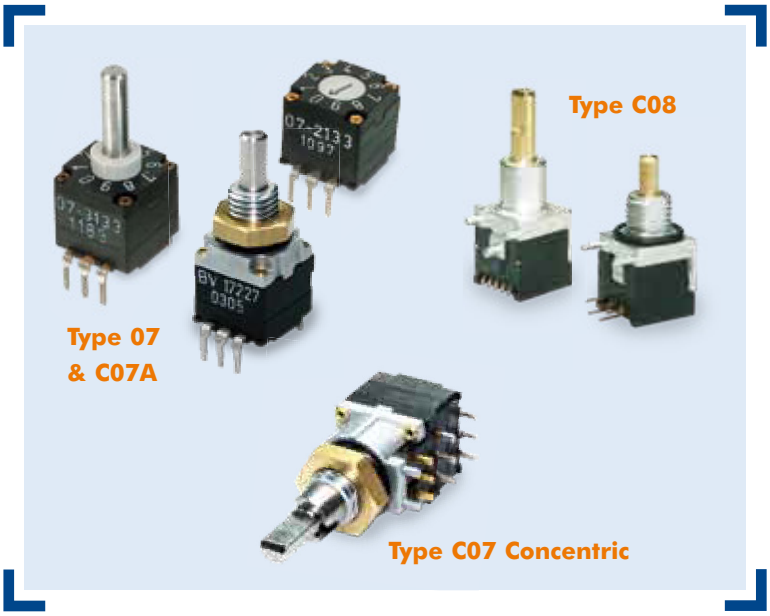
Coded Switches Overview

- **2 to 16 positions miniature coded switches**
- **For rugged environments**
- **Up to 3.5 Ncm switching torque**
- **THT or THR/SMT reflow**
- **Optional IP68 front panel sealing (up to 5 bar)**
- **Operating temperature range: -40 to +85°C**
- **Various options and customization**

ELV (2000/53/EC)
RoHS (2002/95/EC)

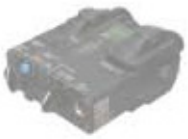


Type Comparison

Features / Switch Type	Type 07 & C07A	Type C07 Concentric	Type C08
Function	2 to 16 positions absolute coding	16 positions absolute coding (inner shaft), 2/3 positions selector switch (outer shaft)	16 positions absolute coding
Coding	BCD, BCD compl. (max. 10 pos.) Hex, hex compl. Gray	Hex, gray 3 pos. switch; center off or 2 pos. switch; on/off	Gray
Indexing angle	BCD: 36°, hex/gray: 22.5°	22.5°	22.5°
THT/SMT	THT (reflow version on request)	THT (reflow version on request)	THT/SMT (reflow)
Contact material plating	AuCo (hard gold)	AuCo (hard gold)	Ni (nickel)
Rotational life	10,000 cycles	10,000 cycles (2/3 pos. switch: 7,500 cycles)	20,000 cycles
Standard switching torque	BCD: 2.2 Ncm hex/gray: 3.2 Ncm	3.5 Ncm (2/3 pos. switch: 6.0 Ncm)	2.5 Ncm SWISS CLICK INDEXING SYSTEM™
Shaft style	Various; screwdriver actuation, round or D-shape (stainless steel)	Inner shaft: ⅛" D-shape (stainless steel)	⅛" D-shape (brass)
Bushing	Threaded M6 x 0.75, non-threaded or no bushing	Threaded M6 x 0.75 or non-threaded	Threaded M6 x 0.75 or non-threaded
Profile dimensions	10 x 10 mm	10 x 10 mm	9 x 9 mm
Standard product variety	▪ Vertical or horizontal mounting ▪ Bushing style ▪ Coding ▪ Number of positions ▪ 3.2 or 3.5 Ncm torque ▪ With end stop or endless rotating ▪ IP60 or IP68 front panel sealing ▪ Shaft style and length	▪ Threaded or non-threaded bushing ▪ Coding ▪ 2 or 3 pos. outer shaft selector switch ▪ IP60 or IP68 front panel sealing ▪ Tray or tape & reel packaging	▪ THT (THR) or SMT reflow ▪ Threaded or non-threaded bushing ▪ With end stop or endless rotating ▪ IP60 or IP68 front panel sealing ▪ Various shaft types ▪ Tray or tape & reel packaging
See page	5-10	11-13	15-18

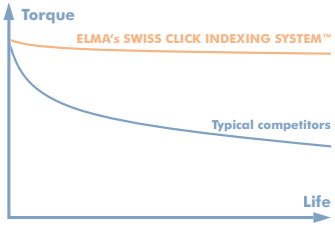
Application Examples


Mobile radio


Laser target aiming


Handheld radios

SWISS CLICK INDEXING SYSTEM™

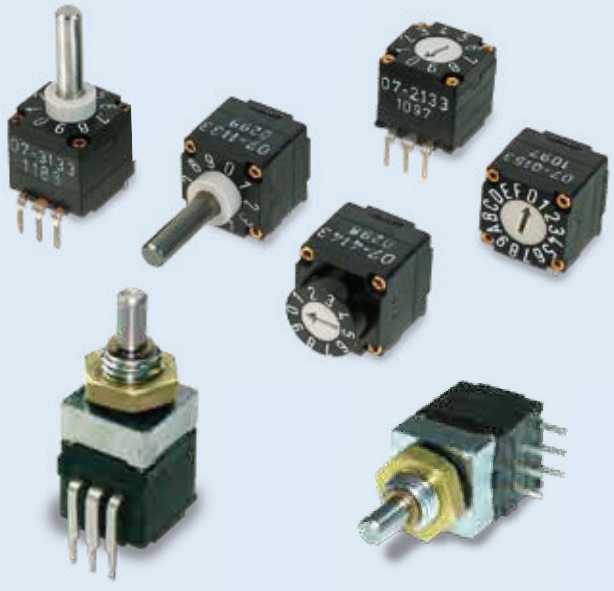


The Swiss Click Indexing System™ ensures consistent torque over life.

- **2 to 16 positions BCD, hex or gray coding**
- **For rugged environments**
- **Up to 3.5 Ncm switching torque**
- **Gold plated contacts**
- **THT (reflow version on request)**
- **Washable (sealed contact system)**
- **Optional IP68 front panel sealing (up to 5 bar)**
- **Operating temperature range: -40 to +85°C**
- **Various options and customization**

ELV (2000/53/EC)
RoHS (2002/95/EC)

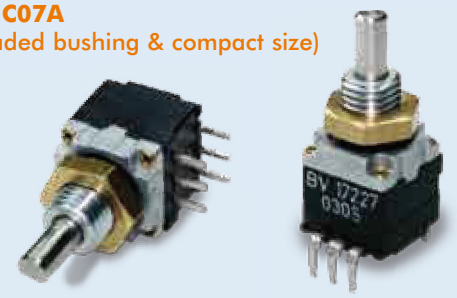
Type 07



Standard Product Variety

- Vertical or horizontal mounting
- Bushing style
- BCD, hex or gray coding
- Number of positions
- 3.2 or 3.5 Ncm switching torque
- With end stop or endless rotating
- IP60 or IP68 front panel sealing
- Various shaft styles and lengths

Type C07A
(threaded bushing & compact size)



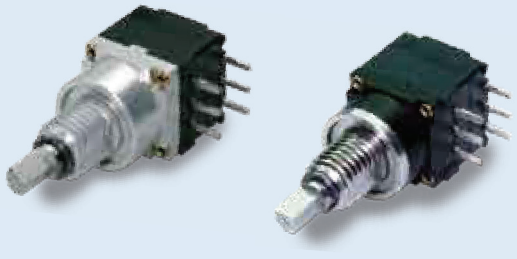
Possible Customization

- Shaft dimensions and shape
- Bushing, mounting
- Switching torque
- Others

Typical Applications

- Frequency and channel selection for two way radios
- Target aiming devices
- Aircraft transponders
- Medical equipment
- Industrial automation

Examples of Customization

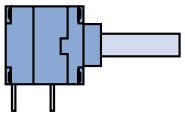


Examples of Customization

- Aluminum or stainless steel bushing
- 5 bar sealing
- Elevated torque on specific position

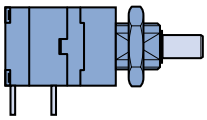
Preference Types Selection Chart[1]

07 Horizontal



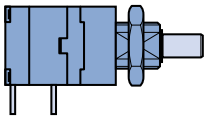
Basic Style

Coding	Switching Mode	Positions	Indexing Angle	With End Stop	Endless Rotating
BCD	Shorting	10 (0-9)	36°	07-1133	07-1033
	Non-shorting	10 (0-9)	36°	07-1134	07-1034
BCD compl.	Shorting	10 (0-9)	36°	07-1143	07-1043
Hex	Shorting	16 (0-F)	22.5°	07-1153	07-1053
	Non-shorting	16 (0-F)	22.5°	07-1154	07-1054
Hex compl.	Shorting	16 (0-F)	22.5°	07-1163	07-1063
Gray	Shorting	16 (0-F)	22.5°	07-1173	07-1073



Threaded Bushing, IP68, with End Stop

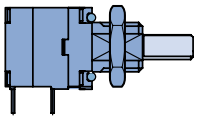
Coding	Switching Mode	Positions	Indexing Angle	With End Stop
BCD	Shorting	10 (0-9)	36°	07-1133-300000
	Non-shorting	10 (0-9)	36°	07-1134-300000
BCD compl.	Shorting	10 (0-9)	36°	07-1143-300000
Hex	Shorting	16 (0-F)	22.5°	07-1153-300000
	Non-shorting	16 (0-F)	22.5°	07-1154-300000
Hex compl.	Shorting	16 (0-F)	22.5°	07-1163-300000



Threaded Bushing, IP68, Endless Rotating

Coding	Switching Mode	Positions	Indexing Angle	Endless Rotating
BCD	Shorting	10 (0-9)	36°	07-1033-300000
	Non-shorting	10 (0-9)	36°	07-1034-300000
BCD compl.	Shorting	10 (0-9)	36°	07-1043-300000
Hex	Shorting	16 (0-F)	22.5°	07-1053-300000
	Non-shorting	16 (0-F)	22.5°	07-1054-300000
Hex compl.	Shorting	16 (0-F)	22.5°	07-1063-300000
Gray	Shorting	16 (0-F)	22.5°	07-1073-300000

C07A Horizontal

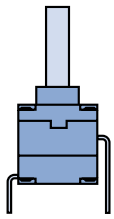


Threaded Bushing, IP68, with End Stop

Coding	Switching Mode	Positions	Indexing Angle	With End Stop
Hex	Shorting	16 (0-F)	22.5°	C07A1153-300000
	Non-shorting	16 (0-F)	22.5°	C07A1154-300000
Hex compl.	Shorting	16 (0-F)	22.5°	C07A1163-300000
Gray	Shorting	16 (0-F)	22.5°	C07A1173-300000

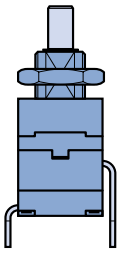
[1] For other types/options, see type key.

07 Vertical



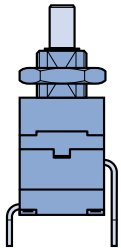
Basic Style

Coding	Switching Mode	Positions	Indexing Angle	With End Stop	Endless Rotating
BCD	Shorting	10 (0-9)	36°	07-3133	07-3033
	Non-shorting	10 (0-9)	36°	07-3134	07-3034
BCD compl.	Shorting	10 (0-9)	36°	07-3143	07-3043
Hex	Shorting	16 (0-F)	22.5°	07-3153	07-3053
	Non-shorting	16 (0-F)	22.5°	07-3154	07-3054
Hex compl.	Shorting	16 (0-F)	22.5°	07-3163	07-3063
Gray	Shorting	16 (0-F)	22.5°	07-3173	07-3073



Threaded Bushing, IP68, with End Stop

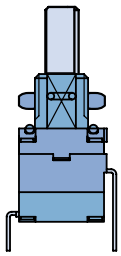
Coding	Switching Mode	Positions	Indexing Angle	With End Stop
BCD	Shorting	10 (0-9)	36°	07-3133-300000
	Non-shorting	10 (0-9)	36°	07-3134-300000
BCD compl.	Shorting	10 (0-9)	36°	07-3143-300000
Hex	Shorting	16 (0-F)	22.5°	07-3153-300000
	Non-shorting	16 (0-F)	22.5°	07-3154-300000
Hex compl.	Shorting	16 (0-F)	22.5°	07-3163-300000
Gray	Shorting	16 (0-F)	22.5°	07-3173-300000



Threaded Bushing, IP68, Endless Rotating

Coding	Switching Mode	Positions	Indexing Angle	Endless Rotating
BCD	Shorting	10 (0-9)	36°	07-3033-300000
	Non-shorting	10 (0-9)	36°	07-3034-300000
BCD compl.	Shorting	10 (0-9)	36°	07-3043-300000
Hex	Shorting	16 (0-F)	22.5°	07-3053-300000
	Non-shorting	16 (0-F)	22.5°	07-3054-300000
Hex compl.	Shorting	16 (0-F)	22.5°	07-3063-300000
Gray	Shorting	16 (0-F)	22.5°	07-3073-300000

C07A Vertical



Threaded Bushing, IP68, with End Stop

Coding	Switching Mode	Positions	Indexing Angle	With End Stop
Hex	Shorting	16 (0-F)	22.5°	C07A3153-300000
	Non-shorting	16 (0-F)	22.5°	C07A3154-300000
Hex compl.	Shorting	16 (0-F)	22.5°	C07A3163-300000
Gray	Shorting	16 (0-F)	22.5°	C07A3173-300000

Specifications

Mechanical Data

Resolution: ..... BCD: 10 positions max. (36° indexing)
Other codings: 16 positions max. (22.5° indexing)
End stops are factory settable from 2 to 16 (10) positions
Switching torque (new condition): ..... BCD: 2.2 or 3.5 Ncm (+/- 25%)
Other codings: 3.2 or 3.5 Ncm (+/- 25%)
Rotational life: ..... 10,000 cycles min.
End stop strength: ..... BCD: 45 Ncm min.
Other codings: 35 Ncm min.
Fastening torque of nut (front panel mounting): ..... 100 Ncm max.

Electrical Data

Coding/output: ..... BCD, BCD complementary, hex, hex complementary or gray
Contact resistance (new condition): ..... 50 mOhms max.
Dielectric withstanding voltage: ..... 500 VDC during 60 seconds (pins to pins, pins to housing)

Material Data

Shaft: ..... Stainless steel
Housing: ..... Zinc diecast, fiber enforced high performance plastic
Nut: ..... Brass
Contact system: ..... CuBe alloy, AuCo plated (hard gold)
Soldering leads: ..... CuBe alloy, tin plated
O-rings: ..... NBR (Nitril), 70 shore

Environmental Data

Operating temperature range: ..... -40 to +85°C max.
IP sealing: ..... IP60, optional IP68 (2 bar, 1 hour) shaft/front panel sealing (5 bar, 4 hours on request)
Washable (sealed contact system)
Vibration: ..... 10 G_{rms} max. @ 10 to 2000 Hz

Packaging Sizes

Tray: ..... 50 or 200 pcs. (antistatic tray: 100 pcs.)

Soldering Conditions

Hand soldering: ..... 300°C max. during 3 s max.
Wave soldering: ..... 280°C max. peak temperature during 5 s max.

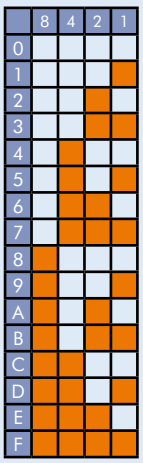
Codings

BCD

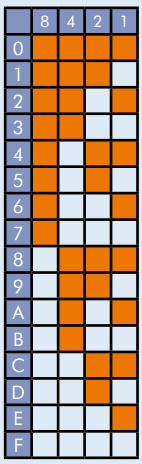
On
Off

BCD Complementary

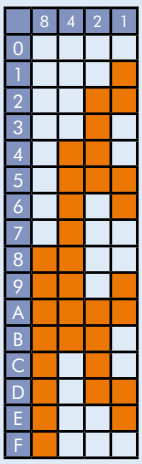
Hex



Hex Complementary



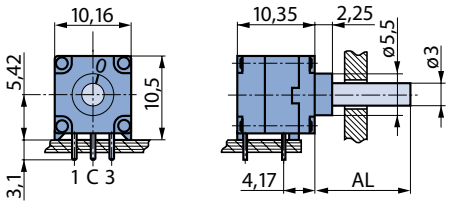
Gray



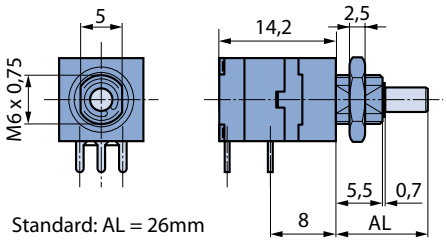
Drawings

07 - Horizontal

Basic Style

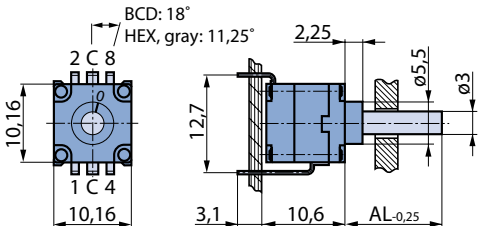


Threaded Bushing

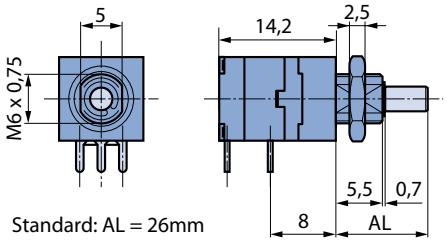


07 - Vertical

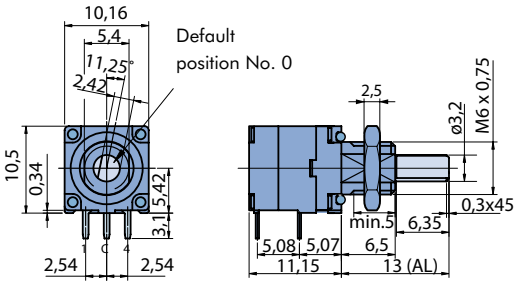
Basic Style



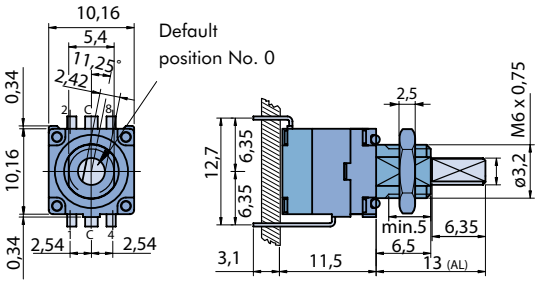
Threaded Bushing



C07A - Vertical

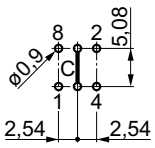


C07A - Horizontal



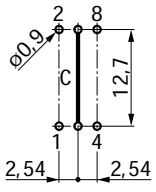
Drilling Diagrams (07 & C07A)

Vertical



View from mounting side

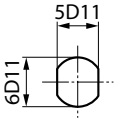
Horizontal



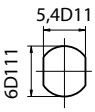
View from mounting side

Front Panel Cut Out

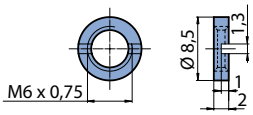
07 (Threaded Bushing)



C07A



Slotted Nut



Order number: 4424-28
(packaging unit: 50 pcs.)

Type Key

0	7	(C07A)	-	X	X	X	X	-	X	X	X	X	X	X

Style

0 - Horizontal, screwdriver
1 - Horizontal, basic style
2 - Vertical, screwdriver
3 - Vertical, basic style
4 - Horizontal, screwdriver (with bushing)
5 - Vertical, screwdriver (with bushing)

End Stop

0 - Endless rotating
1 - With end stop

Coding

3 - BCD (max. 10 pos.)
4 - BCD compl. (max. 10 pos.)
5 - Hex
6 - Hex compl.
7 - Gray

Switching Mode

3 - Shorting
4 - Non-shorting

Number of Positions

0 - 16 pos. (0 – F)
E - 15 pos. (0 – E)
D - 14 pos. (0 – D)
C - 13 pos. (0 – C)
B - 12 pos. (0 – B)
A - 11 pos. (0 – A)
9 - 10 pos. (0 – 9)
8 - 9 pos. (0 – 8)
7 - 8 pos. (0 – 7)
6 - 7 pos. (0 – 6)
5 - 6 pos. (0 – 5)
4 - 5 pos. (0 – 4)
3 - 4 pos. (0 – 3)
2 - 3 pos. (0 – 2)
1 - 2 pos. (0 – 1)

Shaft Length (AL)

000 - Basic style: 12.8 mm
(Threaded bushing: 11.5 mm, C07A: 13 mm)
xxx - Custom[1]
(e.g. 10.5 mm = 105)

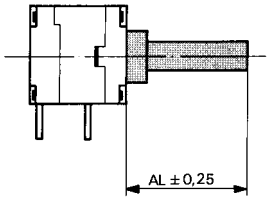
Bushing, IP Sealing

00 - None
20 - Threaded (nut supplied)
30 - Threaded, IP68 (nut supplied)

Torque, Packaging

– - 3.2 Ncm (BCD: 2.2 Ncm), tray (50/200 pcs.)
V - 3.2 Ncm (BCD: 2.2 Ncm), antistatic tray (100 pcs.)
T - 3.5 Ncm (BCD: 3.5 Ncm), tray (50/200 pcs.)
S - 3.5 Ncm (BCD: 3.5 Ncm), antistatic tray (100 pcs.)

[1] Customized Shaft Length
Please state shaft length (AL) measured from mounting face (max. AL = 30 mm).



Coded Switch Type C07 Concentric

- **16 positions hex or gray coding with 2/3 positions outer shaft selector switch**
- **For rugged environments**
- **3.5 Ncm switching torque**
- **Gold plated contacts**
- **THT (reflow version on request)**
- **Optional IP68 front panel sealing (up to 5 bar)**
- **Operating temperature range: -40 to +85°C**
- **Tape & reel packaging**
- **Various options and customization**

ELV (2000/53/EC)
RoHS (2002/95/EC)

Standard Product Variety

- Threaded or non-threaded bushing
- Hex or gray coding
- 2 or 3 positions outer shaft selector switch
- IP60 or IP68 front panel sealing
- Tray or tape & reel packaging

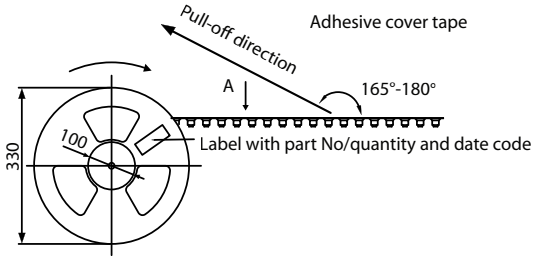
Possible Customization

- Shaft dimensions and shape
- Bushing, mounting
- Number of positions
- Switching torque
- Others

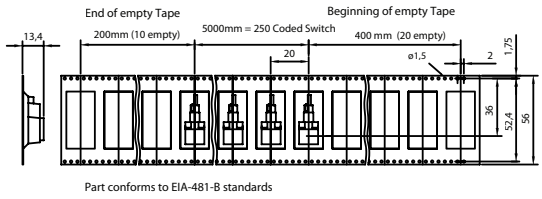
Typical Applications

- Channel selection for portable radios
- Cockpit controls

Tape & Reel Packaging



View A



Part conforms to EIA-481-B standards

Preference Types Selection Chart[1]

Non-Threaded Bushing

Coding	Switching Mode	Indexing Angle	Positions		Packaging	
			Inner Shaft	Outer Shaft	Tape & Reel	Tray
Hex	Shorting	22.5°	16	3 (center off)	C07-1153T	C07-1153
Gray	Shorting	22.5°	16	3 (center off)	C07-1173T	C07-1173

Threaded Bushing, IP68

Coding	Switching Mode	Indexing Angle	Positions		Packaging	
			Inner Shaft	Outer Shaft	Tape & Reel	Tray
Hex	Shorting	22.5°	16	2 (on/off)	C07-1183T300000	C07-1183-300000
				3 (center off)	C07-1153T300000	C07-1153-300000
Gray	Shorting	22.5°	16	2 (on/off)	C07-1193T300000	C07-1193-300000
				3 (center off)	C07-1173T300000	C07-1173-300000

[1] For other types/options, see type key.

Coded Switch Type C07 Concentric

Specifications

Mechanical Data

Resolution:	Inner shaft:	16 positions (22.5° indexing)
	Outer shaft:	2 or 3 positions (22.5° indexing)
Switching torque (new condition):	Inner shaft:	3.5 Ncm (+/- 25%)
	Outer shaft:	6.0 Ncm (+/- 25%)
Rotational life:	Inner shaft:	10,000 cycles min.
	Outer shaft:	7,500 cycles min.
End stop strength:	Inner shaft:	40 Ncm min.
	Outer shaft:	24 Ncm min.
Fastening torque of nut:	100 Ncm max.	

Electrical Data

Coding/output:	Inner shaft:	Hex or gray
	Outer shaft:	On/off/on (3 pos.) or on/off (2 pos.)
Contact resistance (new condition):	50 mOhms max.	
Dielectric withstanding voltage:	500 VDC during 60 seconds (pins to pins, pins to housing)	

Material Data

Shaft:	Stainless steel
Housing:	Zinc diecast, fiber enforced high performance plastic
Nut:	Brass
Contact system:	CuBe alloy, AuCo plated (hard gold)
Soldering leads:	CuBe alloy, tin plated
O-rings:	NBR (Nitril), 70 shore

Environmental Data

Operating temperature range:	-40 to +85°C max.
IP sealing:	IP60, optional IP68 (2 bar, 1 hour) shaft/front panel sealing (5 bar, 4 hours on request)
Vibration:	10 G_{rms} max. @ 10 to 2000 Hz

Packaging Sizes

Tray:	50 or 200 pcs.
Tape & reel:	250 pcs.

Soldering Conditions

Hand soldering:	300°C max. during 3 s max.
Wave soldering:	280°C max. peak temperature during 5 s max.

Codings

Inner Shaft: Hex

	8	4	2	1
0				
1				■
2			■	
3			■	■
4		■		
5		■		■
6		■	■	
7		■	■	■
8	■			
9	■			■
A	■		■	
B	■		■	■
C	■	■		
D	■	■		■
E	■	■	■	
F	■	■	■	■

Inner Shaft: Gray

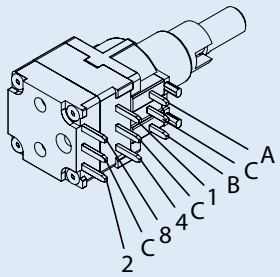
	8	4	2	1
0				
1				■
2			■	■
3			■	
4		■	■	
5		■	■	■
6		■		■
7		■		
8	■	■		
9	■	■		■
A	■	■	■	■
B	■	■	■	
C	■		■	
D	■		■	■
E	■			■
F	■			

Outer Shaft: 3 Pos.

	A	B
1	■	
2		
3		■

Outer Shaft: 2 Pos.

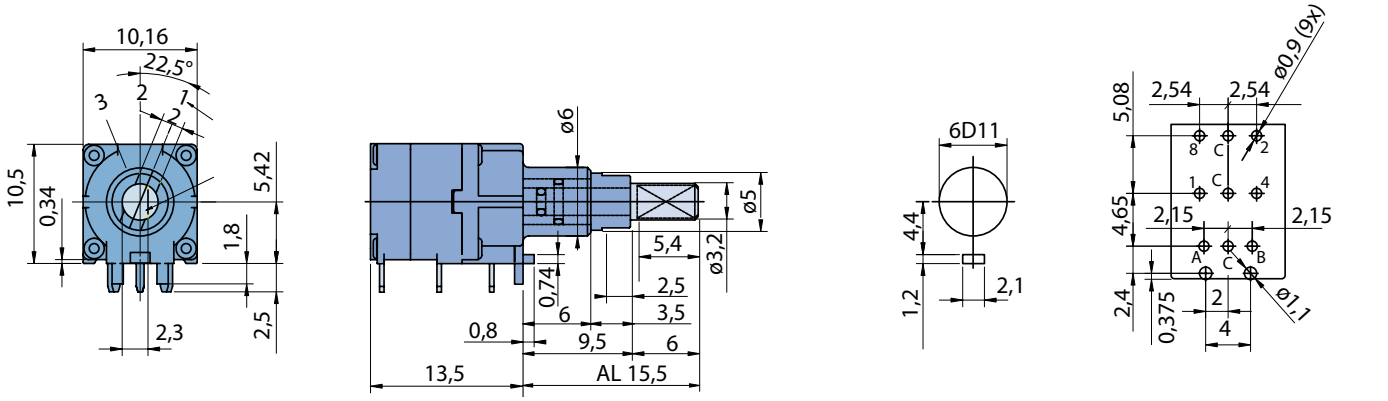
	A	B
1	■	
2		



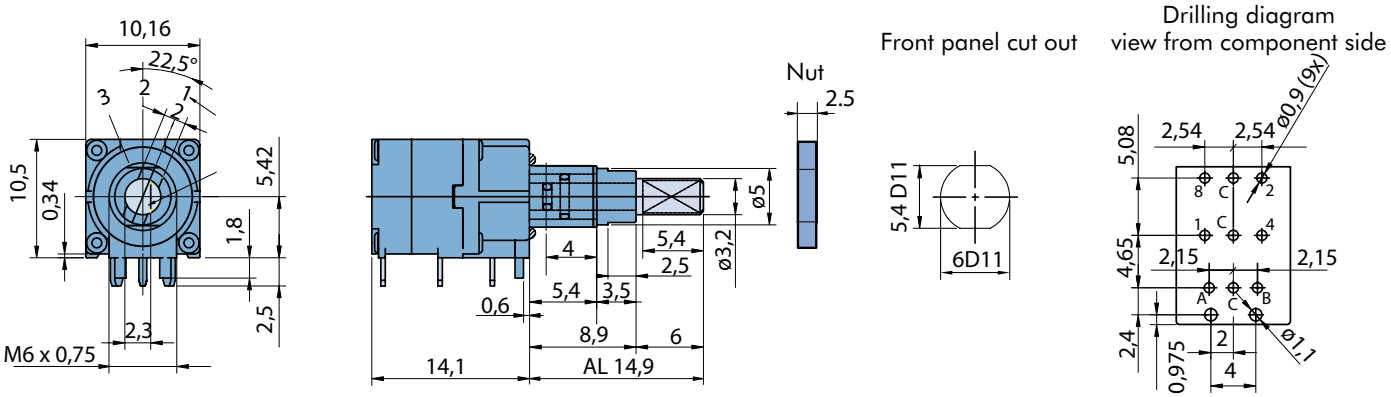
■ On
□ Off

Drawings

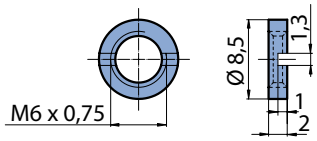
Non-Threaded Bushing



Threaded Bushing, IP68



Slotted Nut



Order number: 4424-28
(packaging unit: 50 pcs.)

Type Key

C	0	7	-	1	1	X	3	X	X	X	X	X	X	X

Coding

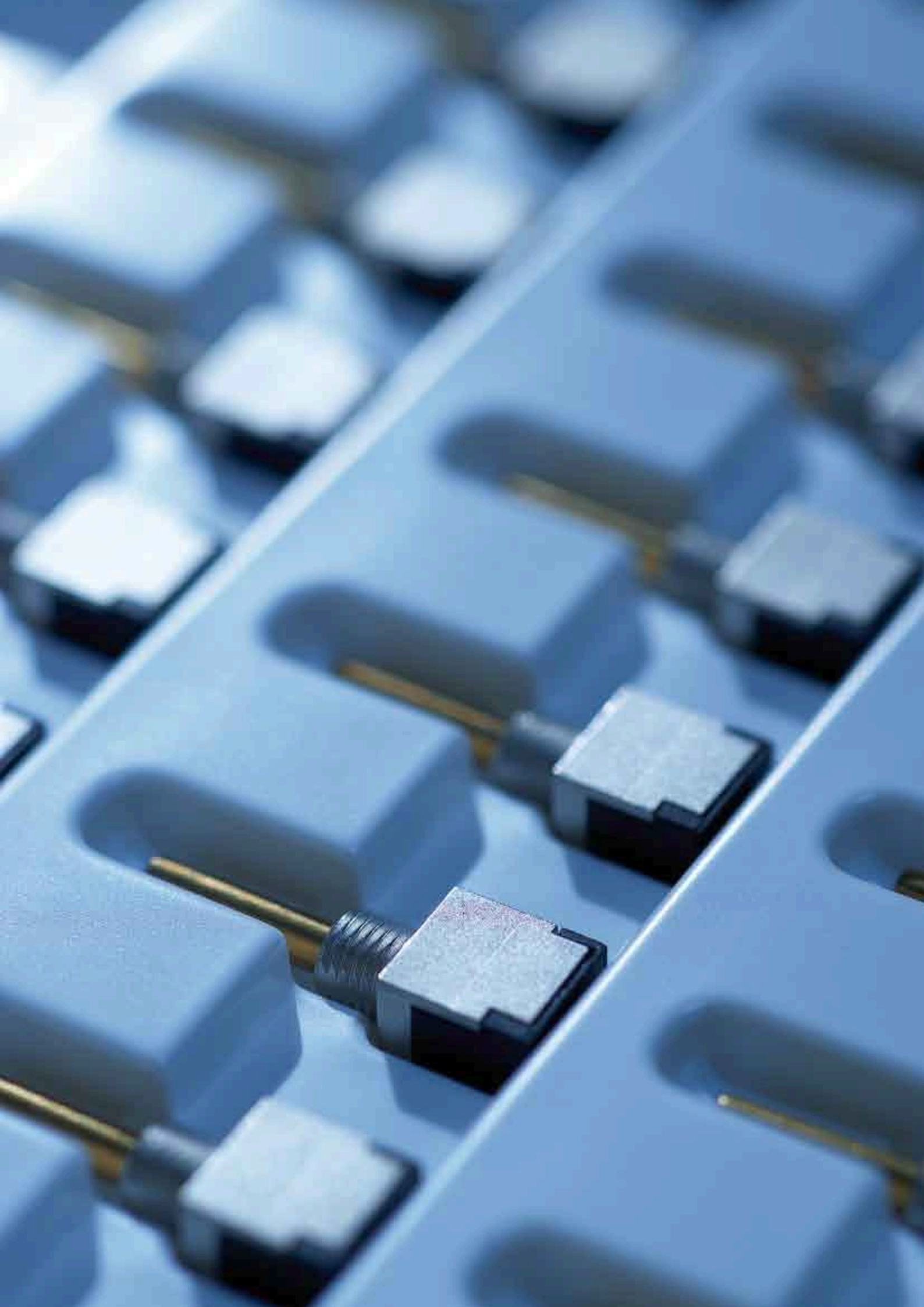
5 - Hex, 3 pos. outer shaft
7 - Gray, 3 pos. outer shaft
8 - Hex, 2 pos. outer shaft
9 - Gray, 2 pos. outer shaft

Bushing, IP Sealing

– - Non-threaded
300000 - Threaded, IP68 (nut supplied)

Packaging

– - Tray (50/200 pcs. per tray)
T - Tape & reel (250 pcs. per tray)



Coded Switch Type C08

- **16 positions gray coding**
- **Excellent indexing feel with 2.5 Ncm switching torque (remains consistent over life)**
- **9 x 9 x 10 mm body size**
- **Lowest profile PCB to shaft center line: 4.65 mm**
- **SMT reflow version available**
- **20,000 switching cycles**
- **Optional IP68 front panel sealing**
- **Operating temperature range: -40 to +85°C**

SWISS CLICK INDEXING SYSTEM™

ELV (2000/53/EC)
RoHS (2002/95/EC)

Standard Product Variety

- THT or SMT reflow (vacuum pick & place)
- Threaded or non-threaded bushing
- With end stop or endless rotating
- IP60 or IP68 front panel sealing
- Various shaft types
- Tray or tape & reel packaging

Possible Customization

- Shaft dimensions and shape
- Others

Typical Applications

- Frequency and channel selection for two way radios
- Target aiming devices
- Other miniaturized, mobile applications

Preference Types Selection Chart[1]

Packaging	IP Sealing	PCB Mounting	Bushing	Shaft Length	With End Stop	Endless Rotating
Tray	IP60	SMT	Non-threaded	15.2 mm	C08S211ST	C08S221ST
			Threaded	15.2 mm	C08S111ST	C08S121ST
		THT	Threaded	18.0 mm	C08T111LT	C08T121LT
			Threaded	15.2 mm	C08T111ST	C08T121ST
	IP68	SMT	Threaded	15.2 mm	C08S311ST	C08S321ST
		THT	Threaded	18.0 mm	C08T311LT	C08T321LT
			Threaded	15.2 mm	C08T311ST	C08T321ST

[1] For other types/options, see type key.

Specifications

Mechanical Data

Resolution: ..... 16 positions (22.5° indexing)
Switching torque (new condition):..... 2.5 Ncm (+/- 30%)
Rotational life: ..... 20,000 cycles min.
Residual switching torque (end of life): ..... 90% typ.
End stop strength:..... 40 Ncm min.
Fastening torque of nut: ..... 100 Ncm max.

Electrical Data

Coding/output:..... Gray
Contact resistance: ..... 10 Ohms max. (over the entire rotational life)

Material Data

Shaft:..... Brass
Housing: ..... Zinc diecast with Miralloy plating, fiber enforced high performance plastic
Nut:..... Brass
Contact system: ..... Alloy copper, nickel plated
Soldering leads:..... Alloy copper
O-rings:..... NBR (Nitril), 70 shore, reflowable

Environmental Data

Operating temperature range:..... -40 to +85°C max.
IP sealing: ..... IP60, optional IP68 (2 bar, 1 hour) shaft/front panel sealing

Packaging Sizes

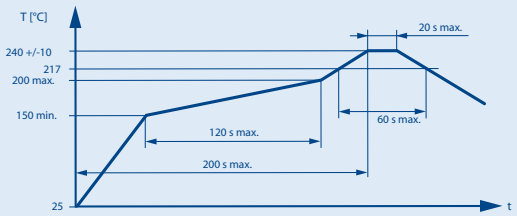
Tray: ..... 50 pcs.
Tape & reel:..... 300 pcs.

Soldering Conditions

Hand soldering:.....300°C max. during 3 s max.
Wave soldering:.....280°C max. peak temperature during 5 s max.

Temperatures or process durations exceeding rated maximum conditions may harm switch functions.

Reflow Profile (complies to IPC/JEDEC J-STD-020C)



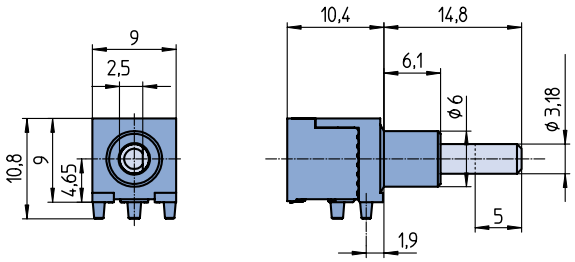
Gray Coding

	8	4	2	1
0				
1				■
2			■	■
3			■	
4		■	■	
5		■	■	■
6		■		■
7		■		
8	■	■		
9	■	■		■
A	■	■	■	■
B	■	■	■	
C	■		■	
D	■		■	■
E	■			■
F	■			

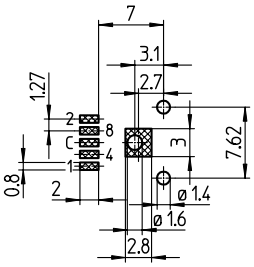
■ On
□ Off

Drawings

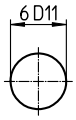
SMT Non-Threaded



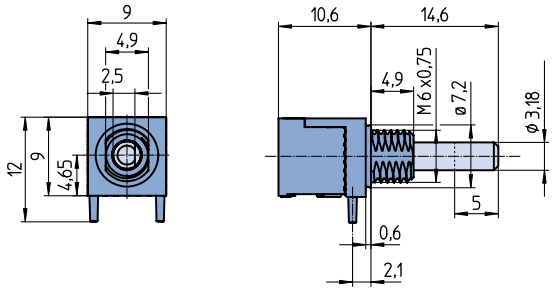
View from mounting side



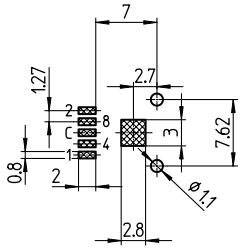
Front panel cut out



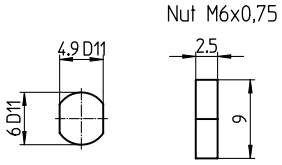
SMT Threaded



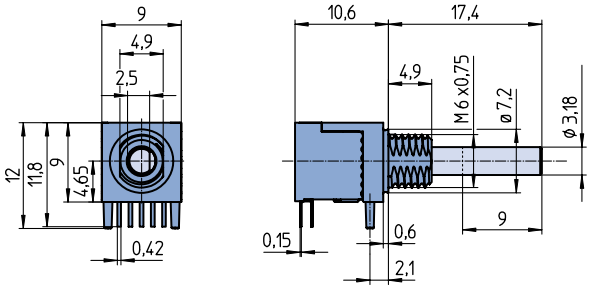
View from mounting side



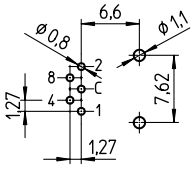
Front panel cut out



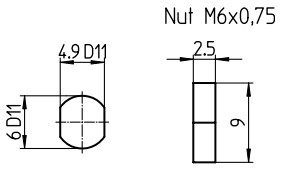
THT Threaded



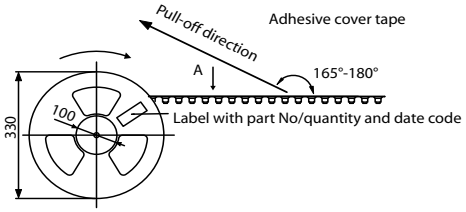
View from mounting side



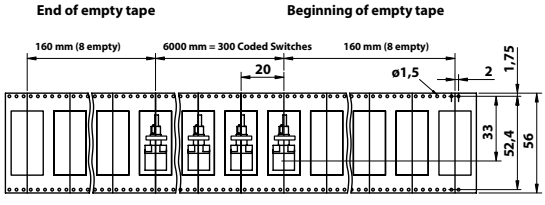
Front panel cut out



Tape & Reel Packaging

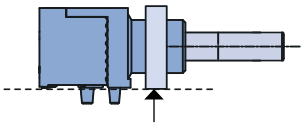


View A



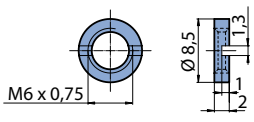
EIA 481 Norm

Soldering Support Donut



A soldering support donut is supplied on bushings with tape & real packaging or tray packed SMT types. To be removed after soldering.

Slotted Nut



Order number: 4424-28
(packaging unit: 50 pcs.)

Type Key

C	0	8	X	X	X	1	X	X

PCB Mounting
S - SMT
T - THT

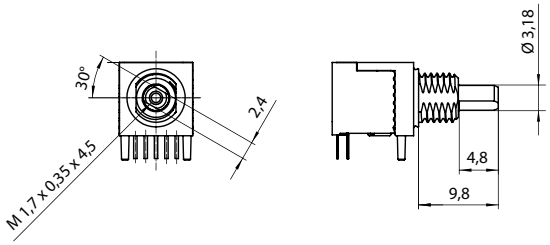
Bushing
1 - Threaded (nut supplied, packed separately)
2 - Non-threaded (available for SMT only)
3 - Threaded, IP68
(nut supplied, packed separately)

End Stop
1 - With end stop
2 - Endless rotating

Packaging
T - Tray (50 pcs. per tray, donut supplied for SMT types)
R - Tape & reel (300 pcs. per reel, donut supplied)

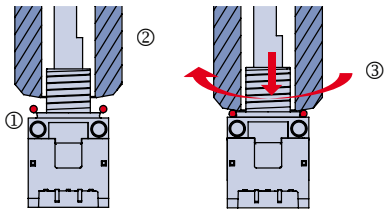
Shaft Type
S - D-shape, short; 15.2 mm
L - D-shape, long; 18.0 mm
U - Double-D shape with thread[1]

[1] **Double-D Shape Shaft**



O-Ring Mounting Tool

Order number: C08RINGTL



① Slip the lubricated O-ring over the bushing.

② Slide the mounting tool over the bushing.

③ While pushing down the O-ring, rotate the mounting tool simultaneously.

Desoldering Tool

Desoldering tool with individual soldering iron adaptor is available on request.