

Rotary Switches

PRODUCT CATALOG

SYSTEM SOLUTIONS

ENCLOSURE & COMPONENTS

ROTARY SWITCHES

ROTARY SWITCHES

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Customer-specific solutions

Our engineers have the necessary know-how and resources to realize the special requirements of our customers quickly and affordably.



CONTACT US

CUSTOMER-SPECIFIC SOLUTIONS

Why Elma?

BECAUSE WE ARE «YOUR SOLUTION PARTNER»

Elma's rotary switches encompasses a broad range of switching and indicating solutions, control knobs, LEDs and banana sockets. They are the haptic and optical interface for commands between human and machine. Our products appeal with high quality, reliability and performance. They are designed for simple, but especially for demanding applications. It is the reason why we are leading in many markets.

Our products are being developed in Switzerland and USA. The production plants are in Switzerland and Romania. We serve all markets worldwide where rotary switches, knobs, LEDs and terminal solutions are needed.

FIRST-CLASS CUSTOMER SUPPORT



ONE SOLUTION IN SIX STEPS

Let's create a new solution for a two way radio. Below you will find an example of the implementation of a typical customer-specific solution in six steps.

CUSTOMER DESCRIBES THE ACTUAL SITUATION

2 functions, 2 switches

CUSTOMER DESCRIBES THE IDEA

2 functions, 1 switch

CUSTOMER DESCRIBES THE REQUIREMENTS FOR THE NEW SWITCH

- Profile dimensions: 14 x 13 x 11 mm
- Bushing: Threaded M7 max.
- Shaft: Ø 6 mm (length adjustable), stainless steel
- Sealing: Up to IP68
- Soldering leads: THT vertical
- Resolution | Torque: 32 detent (16 PPR) 2 Ncm
- Push button force: 6 N
- Rotational life: Min. 500'000 revolutions

ELMA DESIGNS

Elma designs and develops the new switch and provides the solution to customer for assesment.

ELMA PRODUCES

Elma produces first samples to test the new switch.

ELMA PROVIDES THE NEW SWITCH TO THE CUSTOMER

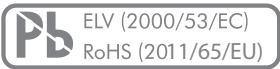
Multi rotary switches

Our multi-functional switches with Hall-effect or mechanical contact system are ready to provide a reliable long-lasting output.

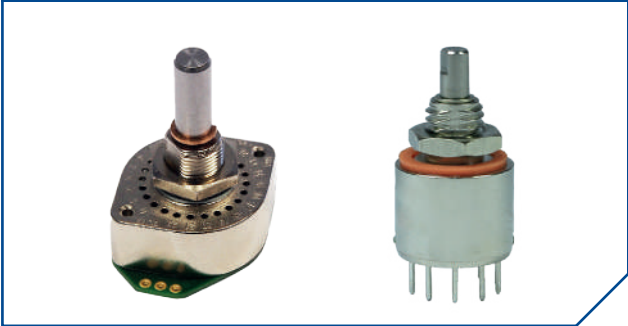
CONTACT US

MULTI ROTARY SWITCHES

- › Selector or coded switch with push button
- › Rugged design
- › Sealing up to IP68
- › High switching torques: Up to 20 Ncm
- › Up to 48 switching positions
- › Operating temperature range: -45 to +85 °C
- › Various options and customizations
- › Not ITAR related



X4 AND MR50



TYPE COMPARISON

FEATURES SWITCH TYPE	X4	MR50
Main feature	Hall-sensed contact system	Mechanical contact system
Dimensions	32 x 25 mm	Ø 1/2" (12.7 mm)
Mounting type	Double-D; M10 x 0.75	Double-D; 1/4"-28 UNF-2A
Electrical connection	FFC connector, Micro-MaTch socket or soldering eyelets	Pins vertical
Detent angle positions	7.5° 48 15° 24 30° 12	22.5° 16 30° 12 36° 10
Rotary limitation end stop	Configurable	Configurable
Switching torque	1.5, 4, 8, 15 or 20 Ncm	3 or 6 Ncm
Rotational life of detent system	Up to 1 Million cycles	20'000 cycles
Selector switch function	Not available	Standard
Coded switch function	5 bit gray code with analog and PWM output	On request
Encoder switch function	12 PPR	Not available
Operating force of push button	7 or 14 N	Not available
Shaft type	Ø 6 mm, round	Ø 1/8", D-shape
IP-sealing	IP60 or IP68	IP60 or IP68
Operating temperature range	-30 to +85 °C	-45 to +85 °C
SEE	PAGE 6	PAGE 12

MULTI ROTARY SWITCH

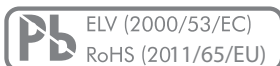
X4

Product description

MAIN FEATURES

HIGH PERFORMANCE, HALL-SENSED SWITCH
WITH VARIOUS INTERFACES

- › 12, 24 or 47/48 positions with selectable end stop
- › Switching torque: 1.5 to 20 Ncm
- › Switching cycles: Up to 1 Million
- › Absolut or incremental version
- › Analog, PWM, Parallel and UART output
- › With or without push button function
- › Operating voltage: 2.85 to 5.25 VDC
- › Operating temperature range: -30 to +85 °C
- › IP60 or IP68 sealing
- › Qualified by MIL-STD-202G and MIL-STD-810F



PRODUCT VARIETY

- Output incremental or absolut
- Shaft length
- IP60 or IP68 front panel sealing
- Push force
- Switching torque

POSSIBLE CUSTOMIZATIONS

- Shaft types
- Number of detents
- Mechanical interface: Connector type, cable connection and pin assignment
- Electrical interface: Operating voltage, data bus

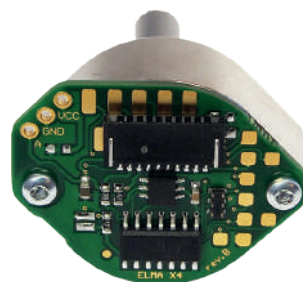
TYPICAL APPLICATIONS

- Construction site
- Transportation controls
- Machine tools
- Defense applications
- Industrial applications
- Plant construction

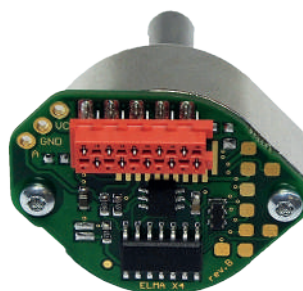
X4



X4 with FFC connector



X4 with Micro-MaTch socket

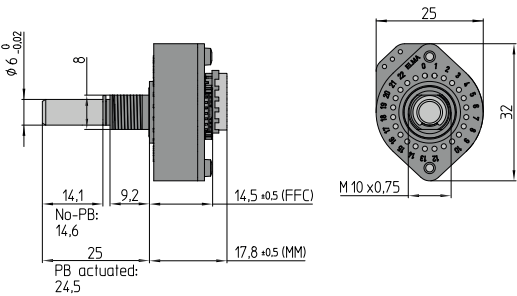


MULTI ROTARY SWITCH

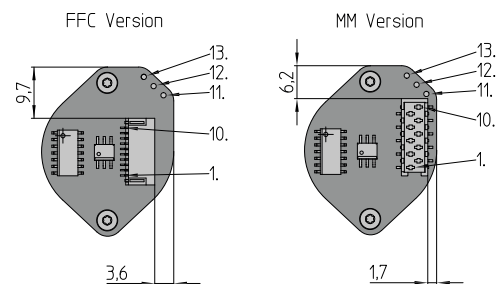
X4

Dimensions and pin assignment

SWITCH DESIGN



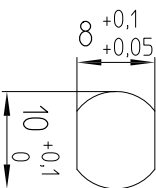
PIN ASSIGNMENT



UART mode can be activated by solder bridge or UART EN (Pin #7) set to low.

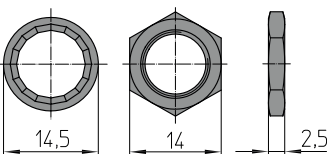
- 1. Vcc
- 2. GND
- 3. Bit 1/A (UART 1)
- 4. Bit 2/B (UART 2)
- 5. Bit 3 (UART 3)
- 6. Bit 4 (UART RQ)
- 7. Bit 5 (UART EN)
- 8. Push button
- 9. Analog out
- 10. PWM (Bit 6)
- 11. Vcc
- 12. GND
- 13. Analog out

FRONT PANEL CUT OUT



NUT

LOCK WASHER AND HEX NUT (SUPPLIED)



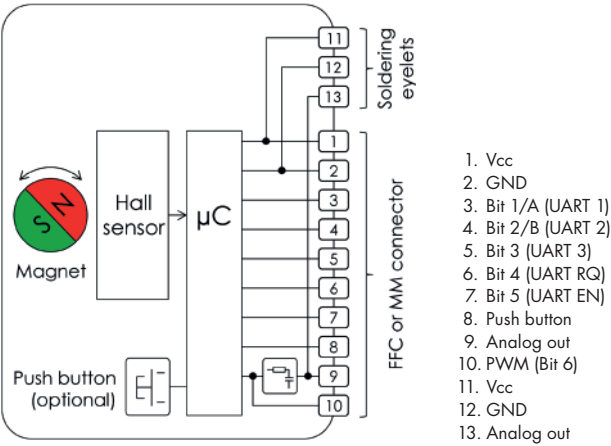
Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

MULTI ROTARY SWITCH

X4

Circuit diagram

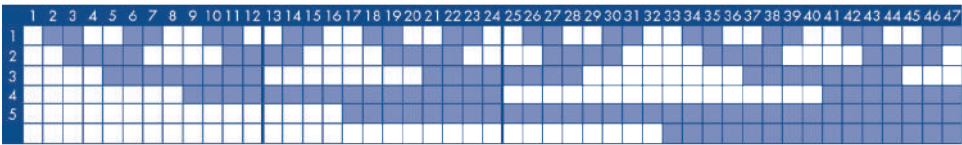
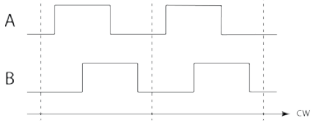
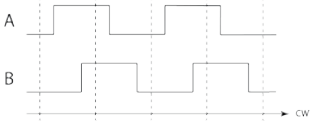
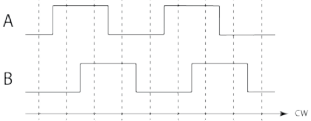
CONNECTIONS



External magnetic fields may interfere function.

Output signal

SIGNAL OVERVIEW

		INDEXING RESOLUTION		
		12 POSITIONS	24 POSITIONS	47/48 POSITIONS
Absolute	UART	At every change of position the absolut position is sent to UART 1		
	Parallel	Absolute Code Output (Gray)		
				
	Analog	0° ± GNDd to 359° = Vcc, intermediate values proportional to rotation angle		Not available
	PWM	0° ± 0 % to 359° = 100 %, intermediate values proportional to rotation angle		Not available
Incremental	UART	At every change of position a command is sent to UART 1	At every change of position a command is sent to UART 2	At every change of position a command is sent to UART 3
	Parallel	12 positions	24 positions	48 positions
				
	Analog	Not available		
	PWM	Not available		
	Push button	Active high		

MULTI ROTARY SWITCH

X4

Ordering information

ORDERING CODE

X4	-	-	-	-	--	-	-	-	-
----	---	---	---	---	----	---	---	---	---

PUSH BUTTON

N No
P Push button 7 N
S Push button 14 N

INDEXING RESOLUTION

1 12 positions (30° indexing)
2 24 positions (15° indexing)
3 47/48 positions (7.5° indexing)

SWITCHING TORQUE

A 1.5 Ncm
B 4 Ncm (2.5 Ncm with 47/48 positions)
C 8 Ncm (5 Ncm with 47/48 positions)
D 15 Ncm (not available with 47/48 positions)
E 20 Ncm (not available with 47/48 positions)

END STOP

XX Number of positions (for 47 positions only odd numbers: 3, 5, 7...47)
00 Continuously rotating

SHAFT STYLE

1 Round, Ø 6 mm x 25 mm
2 Round, Ø 6 mm x 16.5 mm

IP SEALING

N IP60
S IP68

OUTPUT | CONNECTOR TYPE

1 Absolute	FFC connector
2 Absolute	Micro-MaTch socket
3 Incremental	FFC connector
4 Incremental	Micro-MaTch socket

PACKAGING

ESD bag: Individual packaging (nut and lock washer mounted)

ACCESSORIES AND SPARE PARTS

Spare nut: Part number 5622-16
Stop screw: Part number 5330-30

MULTI ROTARY SWITCH

X4

Specifications

MECHANICAL DATA

Detent angle positions:	7.5° detent angle 48 positions (absolute-version has max. 47 positions) 15° detent angle 24 positions 30° detent angle 12 positions
Rotary limitation end stop:	7.5°: Configurable 15°: Configurable 30°: Configurable
Switching torque:	7.5°: 1.5, 2.5 or 5 Ncm (±30 % over life time) 15° and 30°: 1.5, 4, 8, 15 or 20 Ncm (±30 % over life time)
Rotational life:	> 1'000'000 cycles with 1.5 Ncm switching torque (tested at room temperature) > 250'000 cycles with 4 or 8 Ncm (tested at room temperature) > 50'000 cycles with 15 or 20 Ncm (tested at room temperature)
Allowed shaft load:	1'000 N push, 200 N pull and 200 N side force (static at 20 mm from supporting surface)
Rotational stop strength:	> 250 Ncm
Fastening torque of nut (front panel mounting):	M10 x 0.75: < 300 Ncm

ELECTRICAL DATA

Electrical connection:	FFC connector (1 mm pitch, 10 pins, top contact) Micro-MaTch socket (1.27 mm pitch, 10 pins) Soldering eyelets
Operating voltage (Vcc):	2.85 to 5.25 VDC (stabilized), with 47/48 positions 2.85 to 3.15 VDC incremental version
Current consumption:	< 25 mA
Digital outputs:	< 1 mA per output
UART interface:	Configuration: 38.4 kbaud, 1 byte non-inverted, even parity, 1 stop-bit. Absolute: 0 to 11 / 23 / 46 / 47 dec, push button actuated 100 dec. Command output aprox. 500 ms after power-on, at changing position, push button actuation or upon request. For request set pin #6 low. Incremental: Non-rotating = 21 dec Turn left = 22 dec Turn right = 25 dec Push button actuation adds 16 dec
Parallel output:	Absolute: 12, 24 or 47/48 positions Gray code, toggle-free Incremental: 12 PPR, A leading clockwise, toggle-free
Analog output:	Absolute: Output voltage = Vcc x (current position -1) (number of positions -1), output resistance: 1 k ohm, ripple: ±1 % at room temperature
PWM output:	Absolute: PWM output = 100 % x (current position -1) (number of positions -1), 10 bit resolution, 4 kHz, at room temperature
Output accuracy:	< ±5° linearity error, max. ±1° temperature drift
Response time:	< 100 ms (max. 120 rpm), push button: Max. 10 ms
Dielectric strength:	1'000 VDC during 60 s (MIL-STD-202G, method 301, pin-to-housing, pin-to-shaft)
Insulation resistance:	> 1 GΩ at 500 VDC (pin-to-housing, pin-to-shaft, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting (nickel plated)
Hex nut:	Brass (nickel plated)
Snap ring:	Spring steel (galvanized)
O-rings:	NBR (nitrile rubber), 70 shore A
Front panel sealing:	NBR (nitrile rubber), 75 shore A

MULTI ROTARY SWITCH

X4

Specifications

ENVIRONMENTAL DATA

Operating temperature:	-30 to +85 °C (IEC 60068-2.14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14, MIL-STD-202G, method 107G, condition B-3)
Humidity:	< 93 % relative humidity (MIL-STD-202G, method 103B, condition B)
Salt atmosphere against front panel:	Only with IP68 gasket (MIL-STD-810F, method 509.4)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (5 bar, 4 h)
Vibration:	29 G _{RMS} (MIL-STD-202G, method 214A, duration 15 min)
Shock:	100 G (MIL-STD-202G, method 213B, condition C)

MECHANICAL DATA FOR PUSH BUTTON

Actuation force:	7 or 14 N (±30 % in new condition)
Travel:	0.8 (±0.3) mm
Lifecycles:	> 1'000'000 cycles with 7 N actuation force (tested at room temperature) > 500'000 cycles with 14 N actuation force (tested at room temperature)

ELECTRICAL DATA FOR PUSH BUTTON

Contact resistance:	< 10 Ω (in new condition)
Switching current:	< 10 mA
Contact bouncing:	< 2 ms

MATERIALS FOR PUSH BUTTON

Contact surface:	Cu alloy (Au plated)
Snap dome:	Stainless steel

MULTI ROTARY SWITCH

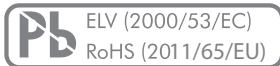
MR50

Product description

MAIN FEATURES

1/2" SELECTOR SWITCH

- › Dimensions Ø 1/2"
- › Switching mode: Shorting or non-shorting
- › 10, 12 and 16 selector switch positions
- › Switching torque: Up to 6 Ncm
- › Gold plated contacts
- › Rugged design
- › Sealing up to IP68
- › Operating temperature range: -45 to +85 °C
- › Not ITAR related
- › Various options and customizations



MR50



PRODUCT VARIETY

- Number of selector positions | indexing angles
- Shaft styles
- Shorting or non-shorting
- Switching torque with 3 or 6 Ncm
- Front panel sealing IP60 and IP68

POSSIBLE CUSTOMIZATIONS

- Shaft style and material
- Bushing style
- Switching torque
- Number of poles
- Customizable end position
- Interface solutions (socket plug)
- Shaft diameter

TYPICAL APPLICATIONS

- Target aiming devices
- Night vision devices
- Two way radios
- Cockpit applications (aircraft, automotive, construction machines, military vehicles)
- Portable devices (communication, medical, rescue, sports, transportation, measuring, photo / video)
- Test equipment

MULTI ROTARY SWITCH

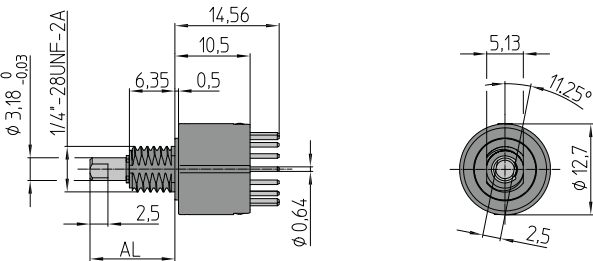
MR50

Dimensions and pin assignment

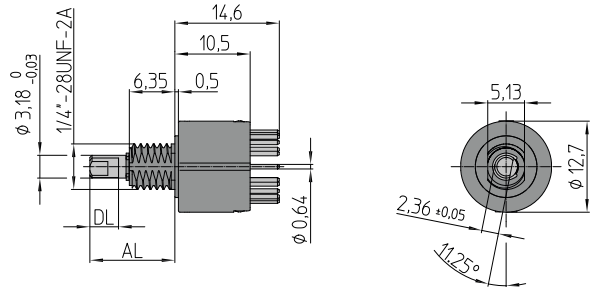
SWITCH DESIGN

	DL	
	11.85 mm ±0.3 mm	4 mm
AL	16.35 mm ±0.3 mm	8.5 mm
	21.35 mm ±0.3 mm	13.5 mm

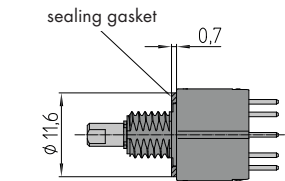
ROUND SHAFT



D-SHAFT



FRONT PANEL SEALING IP68



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

MULTI ROTARY SWITCH

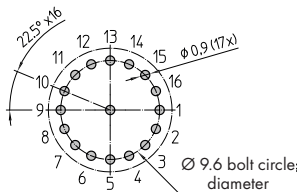
MR50

Dimensions and pin assignment

DRILLING DIAGRAM AND FOOTPRINT

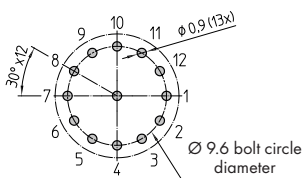
16 POSITIONS | 1 POLE

View from the PCB



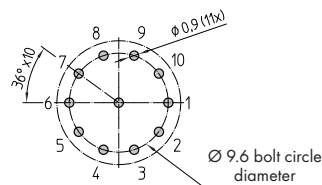
12 POSITIONS | 1 POLE

View from the PCB



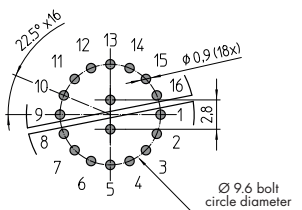
10 POSITIONS | 1 POLE

View from the PCB



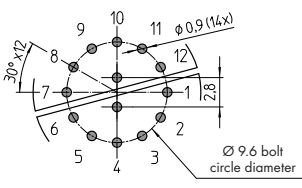
8 POSITIONS | 2 POLE

View from the PCB



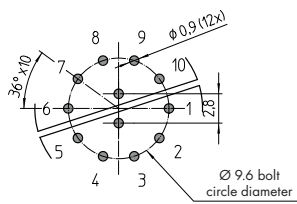
6 POSITIONS | 2 POLE

View from the PCB



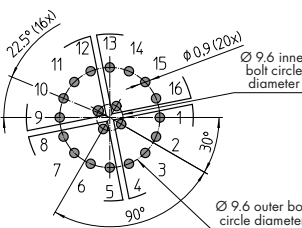
5 POSITIONS | 2 POLE

View from the PCB



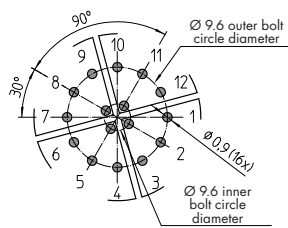
4 POSITIONS | 4 POLE

View from the PCB



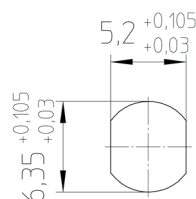
3 POSITIONS | 4 POLE

View from the PCB



FRONT PANEL CUT OUT

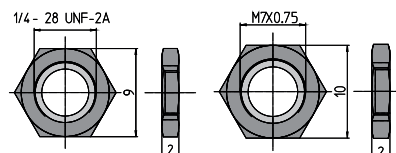
FOR BUSHING 1/4"-28 UNF-2A



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

NUT

HEX NUT (SUPPLIED)



Ordering information

ORDERING CODE

MR50	-	-	-	-	-	-	-	-	-
------	---	---	---	---	---	---	---	---	---

DETENT ANGLE | POLE | SWITCHING MODE

A1	22.5°	1 pole	shorting
A2	22.5°	1 pole	non-shorting
A3	22.5°	2 pole	shorting
A4	22.5°	2 pole	non-shorting
A5	22.5°	4 pole	shorting
A6	22.5°	4 pole	non-shorting

B1	30°	1 pole	shorting
B2	30°	1 pole	non-shorting
B3	30°	2 pole	shorting
B4	30°	2 pole	non-shorting
B5	30°	4 pole	shorting
B6	30°	4 pole	non-shorting

C1	36°	1 pole	shorting
C2	36°	1 pole	non-shorting
C3	36°	2 pole	shorting
C4	36°	2 pole	non-shorting

Explanation see chapter «Technical explanations»

NUMBER OF POSITIONS

0	No end position (endless rotation)
1	End position between position 1 and last position
2	Positions
3	Positions
4	Positions
5	Positions
6	Positions
7	Positions
8	Positions
9	Positions
A	10 Positions
B	11 Positions
C	12 Positions
D	13 Positions
E	14 Positions
F	15 Positions

MOUNTING | SWITCH ORIENTATION | STOP CONTACTS | IP-SEALING

Hex nut (supplied)

A	1/4"-28 UNF-2A x 6.35 mm vertical THT PCB assembly IP60
B	1/4"-28 UNF-2A x 6.35 mm vertical THT PCB assembly IP68

X Customized solutions on request

Central mounting dimension and shape see drawing
1/4" = 6.35 mm

SHAFT STYLE (AL) AND MATERIAL

12	Ø 1/8" x 11.85 mm	round	stainless steel
13	Ø 1/8" x 11.85 mm	D-shaft	stainless steel
16	Ø 1/8" x 16.35 mm	round	stainless steel
17	Ø 1/8" x 16.35 mm	D-shaft	stainless steel
21	Ø 1/8" x 21.35 mm	round	stainless steel
22	Ø 1/8" x 21.35 mm	D-shaft	stainless steel

XX Customized solutions on request

Shaft dimensions and shape see drawing
Ø 1/8" = Ø 3.18 mm

FACTORY SET CHARACTER

1

SWITCHING TORQUE

B	3 Ncm
D	6 Ncm

X Customized solutions on request

PACKAGING

- Antistatic tray (50 pieces)

MULTI ROTARY SWITCH

MR50

Ordering information

PREFERENCE TYPES SELECTION CHART¹

IP-SEALING	SWITCHING MODE	DETENT ANGLE POSITIONS	SWITCHING TORQUE	PART NUMBER
IP68	Shorting	22.5° 16	3 Ncm	MR50-A11B-B113
			6 Ncm	MR50-A11B-D113
		30° 12	3 Ncm	MR50-B11B-B113
			6 Ncm	MR50-B11B-D113
		36° 10	3 Ncm	MR50-C11B-B113
			6 Ncm	MR50-C11B-D113
	Non-shorting	22.5° 16	3 Ncm	MR50-A21B-B113
			6 Ncm	MR50-A21B-D113
		30° 12	3 Ncm	MR50-B21B-B113
			6 Ncm	MR50-B21B-D113
		36° 10	3 Ncm	MR50-C21B-B113
			6 Ncm	MR50-C21B-D113

PACKAGING

Antistatic blister box: 50 pieces

ACCESSORIES AND SPARE PARTS

Hex nut: 1/4"28 UNF-2A
Part number 4516-50 (50 pieces / bag), brass, nickel plated

¹ For other types | options see ordering code

MULTI ROTARY SWITCH

MR50

Specifications

MECHANICAL DATA

Detent angle positions:	22.5° detent angle 16 positions 30° detent angle 12 positions 36° detent angle 10 positions
Rotary limitation end stop:	Configurable
Switching torque:	3 or 6 Ncm (± 30 % over life time)
Rotational life:	> 20'000 cycles (tested at room temperature)
Allowed shaft load:	400 N push, 400 N pull and 200 N side force (static at 10 mm from supporting surface)
Rotational stop strength:	> 85 Ncm
Fastening torque of nut (front panel mounting):	1/4"-28 UNF-2A: < 170 Ncm

ELECTRICAL DATA

Electrical connection:	Pins $\varnothing$ 0.9 mm
Switching voltage:	< 28 VDC (resistive load)
Switching current:	< 200 mA (resistive load)
Contact resistance:	< 50 m Ω (in new condition)
Switching mode:	Shorting or non-shorting
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting (nickel plated)
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (nickel and tin plated)
Hex nut:	Brass (nickel plated)
Snap ring:	Spring steel (nickel plated)
O-rings:	FPM (Viton), 70 shore A
Front panel sealing:	MVQ (silicone), 60 shore A

ENVIRONMENTAL DATA

Operating temperature:	-45 to +85 °C (IEC 60068-2-14)
Storage temperature:	-50 to +125 °C (IEC 60068-2-14)
Humidity:	< 93 % relative humidity (MIL-STD-202G, method 103B, condition B)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz (MIL-STD-202G, method 214A, condition 1/C)
Shock:	100 G (MIL-STD-202G, method 213B, condition C)
Flammability:	UL94-V0 Gaskets UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 300 °C during 3 s
Wave soldering:	< 280 °C during 5 s

Coded switches

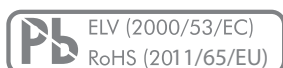
Elma offers coded switches with HEX, Gray or BCD coding. They are available as simple standard and costeffective rugged switches up to a multi-functional or dual shaft version.

CONTACT US

CODED SWITCHES

- › 2 to 16 positions miniature coded switches
- › For rugged environments
- › Concentric function
- › Push button function
- › Multi layer
- › Push to turn function
- › Switching torque: Up to 7 Ncm
- › THT or SMT reflow
- › Optional IP68 front panel sealing (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations

07 AND C07A | C07 CONCENTRIC | M07 | 07PL | 07ML | 07P2T | C08 | C15 | C16



TYPE COMPARISON

FEATURES SWITCH TYPE	07 AND C07A	C07 CONCENTRIC	M07	07PL	07ML	07P2T	C08	C15	C16
Main feature	Universal	Two independent wafers	Robust	Push button	Two dependent wafers	Push to turn	Compact	Compact	Low priced
Dimensions	10 x 10 mm	10 x 10 mm	10 x 10 mm	10 x 10 mm	10 x 10 mm	11.5 x 11.5 mm	9 x 9 mm	9.3 x 7.7 mm	10 x 11 mm
Mounting type	Thread M6 x 0.75, without thread or without bushing	Thread M6 x 0.75 or without thread	Thread M8 x 0.75	Thread M6 x 0.75	Thread M6 x 0.75	Thread M6 x 0.75	Thread M6 x 0.75 or without thread	Soldered	Thread M7 x 0.75
Electrical connection	THT horizontal THT vertical	THT horizontal	THT horizontal THT vertical	THT horizontal	THT horizontal	THT horizontal THT vertical	SMT THT horizontal	THT horizontal	THT horizontal
Detent angle positions	36° 10 22.5° 16	Inner shaft: 22.5° 16 Outer Shaft: 22.5° 2 or 3	36° 10 22.5° 16	22.5° 16	36° 10 22.5° 16	36° 10	22.5° 16	22.5° 16	20° 16 22.5° 16
Rotary limitation end stop	Configurable	Between first and last position	Configurable	Configurable	Configurable	Configurable	Without or between first and last position	Between first and last position	20°: With end stop 22.5°: Without
Switching torque	2.2 to 3.5 Ncm	Inner shaft: 3.5 Ncm Outer shaft: 5 Ncm	2.2 to 4.5 Ncm	2.2 to 3.5 Ncm	1.5 to 5 Ncm	7 Ncm	2.5 Ncm	3 Ncm	3 Ncm
Rotational life of detent system	10'000 cycles	Up to 10'000 cycles	10'000 cycles	10'000 cycles	10'000 cycles	10'000 cycles	20'000 cycles	15'000 cycles	15'000 cycles
Coding	BCD, BCD compl., Hex, Hex compl., Gray	Hex, Gray and On Off	BCD, BCD compl., Hex, Hex compl., Gray	Hex, Hex compl., Gray	BCD, BCD compl., Hex, Hex compl., Gray	BCD, BCD compl.	Gray	Gray	Gray
Shaft type	With slot, D-shape or round	Inner shaft: 1/4" D-shape Outer shaft: Ø 5 mm double slot	Ø 6 mm, D-shape	Ø 3.2 mm, D-shape	Ø 3.2 mm, D-shape	Ø 3.2 mm, round	Ø 1/8", D-shape	Ø 4.75 mm, D-shape	Ø 4.75 mm, D-shape
IP-sealing	IP60 or IP68	IP60 or IP68	IP60 or IP68	IP60 or IP68	IP60	IP60 or IP68	IP60 or IP68	IP60 or IP68	IP67
Operating temperature	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-30 to +60 °C	-40 to +85 °C
SEE	PAGE 20	PAGE 30	PAGE 36	PAGE 41	PAGE 47	PAGE 54	PAGE 61	PAGE 67	PAGE 70

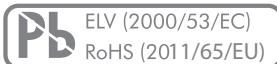
CODED SWITCHES 07 & C07A

Product description

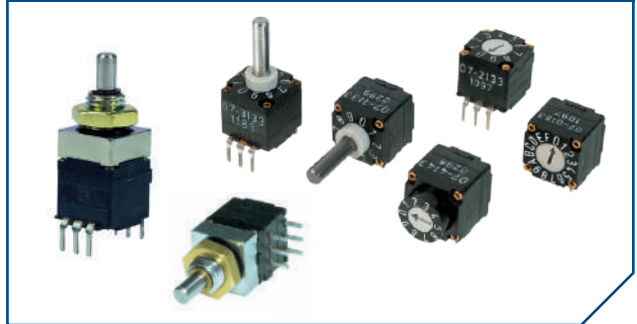
MAIN FEATURES

COMPACT

- › 2 to 16 positions BCD, Hex or Gray coding
- › Switching mode: Shorting or non-shorting
- › For rugged environments
- › Switching torque: Up to 3.5 Ncm
- › Gold plated contacts
- › THT vertical or horizontal
- › IP68 front panel sealing (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



07



C07A threaded bushing and compact size



PRODUCT VARIETY

- Vertical or horizontal mounting
- Bushing style
- BCD, Hex or Gray coding
- Shorting or non-shorting
- Number of positions
- Switching torque BCD: 2.2 or 3.5 Ncm
- Switching torque Hex and Gray: 3.2 or 3.5 Ncm
- With end stop or endless rotating
- Front panel sealing IP60 or IP68
- Various shaft styles and lengths

POSSIBLE CUSTOMIZATIONS

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

TYPICAL APPLICATIONS

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

CODED SWITCHES

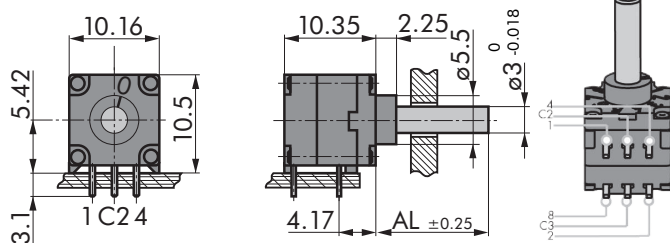
07 & C07A

Dimensions and pin assignment

SWITCH DESIGN AND PIN ASSIGNMENT

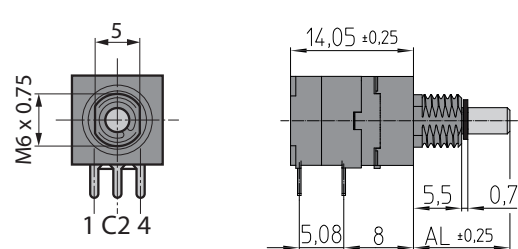
07 HORIZONTAL

With shaft, without threaded bushing



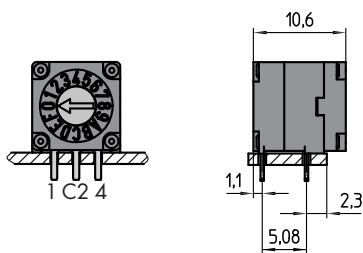
AL: See type key

With shaft, with threaded bushing

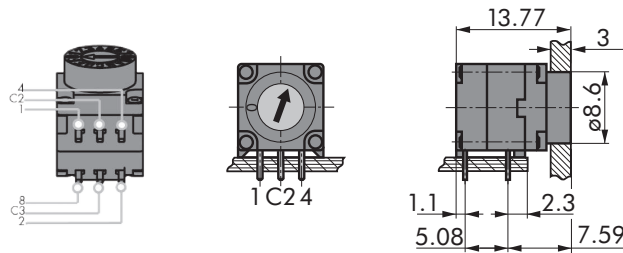


AL: See type key

Screwdriver without bezel

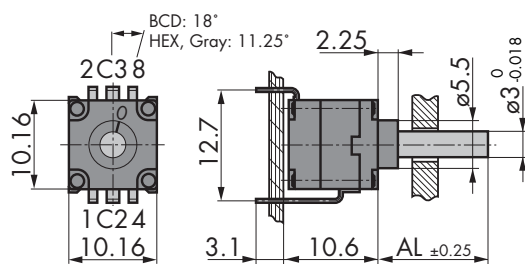


Screwdriver with bezel, front panel operation



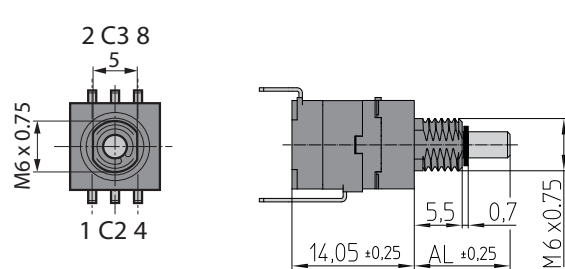
07 VERTICAL

With shaft, without threaded bushing



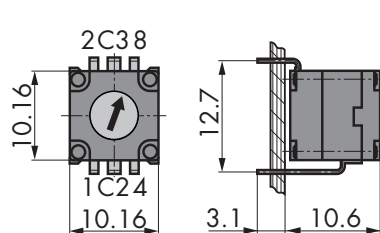
AL: See type key

With shaft, with threaded bushing

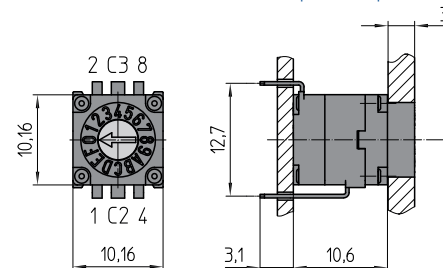


AL: See type key

Screwdriver without bezel



Screwdriver with bezel, front panel operation



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCHES

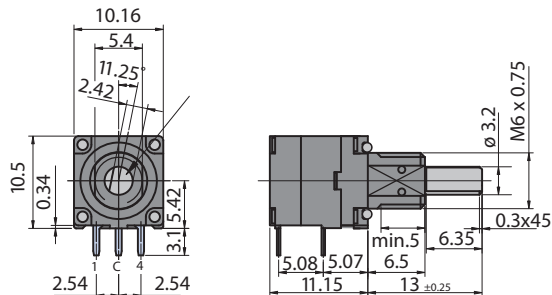
07 & C07A

Dimensions and pin assignment

SWITCH DESIGN AND PIN ASSIGNMENT

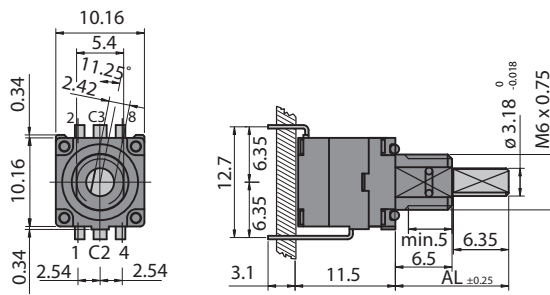
C07A HORIZONTAL AND VERTICAL

Horizontal with threaded bushing



AL: See type key

Vertical with threaded bushing

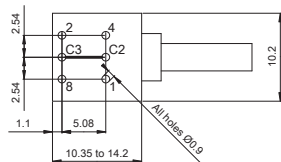


AL: See type key

DRILLING DIAGRAM AND FOOTPRINT

07 HORIZONTAL

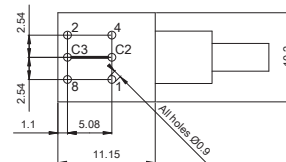
View from component side of the PCB



Commons (C2, C3) must be connected together on the PCB

07 HORIZONTAL

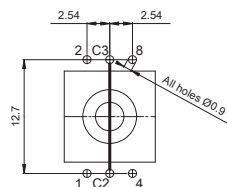
View from component side of the PCB



Commons (C2, C3) must be connected together on the PCB

07 & C07A VERTICAL

View from component side of the PCB



Commons (C2, C3) must be connected together on the PCB

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

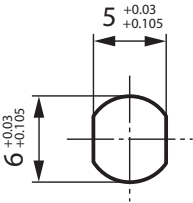
CODED SWITCHES

07 & C07A

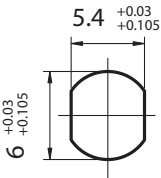
Dimensions and pin assignment

FRONT PANEL CUT OUT

07 THREADED BUSHING

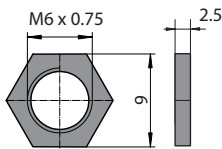


C07A

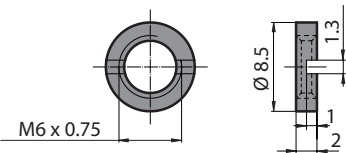


NUT

HEX NUT (SUPPLIED)



SLOTTED NUT



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCHES

07 & C07A

Ordering information

ORDERING CODE

07	-	-	-	-	-	-	-	-	-	-	-
C07A	A										

STYLE¹

0 Horizontal | screwdriver without bezel
1 Horizontal | with shaft
2 Vertical | screwdriver without bezel
3 Vertical | with shaft
4 Horizontal | screwdriver with bezel
5 Vertical | screwdriver with bezel

¹ C07A only available in style 1 and 3

END STOP

0 Endless rotating (not for C07A, BCD code)
1 With end stop

CODING²

3 BCD (max. 10 positions)
4 BCD complementary (max. 10 positions)
5 Hex
6 Hex complementary
7 Gray

Explanation see chapter «Technical explanations»
² C07A only available with code 5, 6 and 7

SWITCHING MODE³

3 Shorting
4 Non-shorting

Explanation see chapter «Technical explanations»
³ Non-shorting not possible with Gray code, BCD complementary and Hex complementary

NUMBER OF POSITIONS⁴

0 Standard (10 or 16 positions)
E 15 positions (0 – E)
D 14 positions (0 – D)
C 13 positions (0 – C)
B 12 positions (0 – B)
A 11 positions (0 – A)
9 10 positions (0 – 9)
8 9 positions (0 – 8)
7 8 positions (0 – 7)
6 7 positions (0 – 6)
5 6 positions (0 – 5)
4 5 positions (0 – 4)
3 4 positions (0 – 3)
2 3 positions (0 – 2)
1 2 positions (0 – 1)

⁴ C07A only available with standard number of positions

SHAFT LENGTH (AL)

000 With shaft without threaded bushing: 12.8 mm
 With shaft with threaded bushing: 11.5 mm
 With shaft with C07A-bushing: 13 mm
XXX⁵ Customized shaft length (AL)
 Not available for C07A
 (shaft length rounded to next 0.5 mm,
 e.g. 10.3 mm = 10.5 mm or 10 mm)

⁵ Customized shaft length / shaft length (AL): Description measured from mounting face (see picture below). Max. shaft length: 30 mm, for threaded bushing: 26 mm, for C07A: 20 mm.

BUSHING | IP SEALING

00 Non (type 07 only)
20 Threaded (nut supplied)
30 Threaded | IP68 (hex nut supplied)

SWITCHING TORQUE | PACKAGING

- 3.2 Ncm (BCD: 2.2 Ncm) | tray (50 or 200 pieces)
V 3.2 Ncm (BCD: 2.2 Ncm) | antistatic tray (100 pieces)
T 3.5 Ncm (BCD: 3.5 Ncm) | tray (50 or 200 pieces)
S 3.5 Ncm (BCD: 3.5 Ncm) | antistatic tray (100 pieces)

CODED SWITCHES

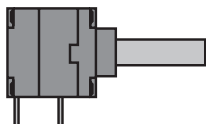
07 & C07A

Ordering information

PREFERENCE TYPES SELECTION CHART¹

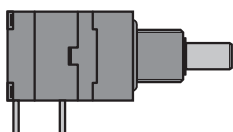
07 HORIZONTAL

With shaft, without threaded bushing



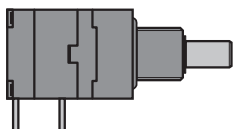
CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				WITH END STOP	ENDLESS ROTATING
BCD	Shorting	36°	10 (0 – 9)	07-1133	07-1033
	Non-shorting	36°	10 (0 – 9)	07-1134	07-1034
BCD complementary	Shorting	36°	10 (0 – 9)	07-1143	07-1043
Hex	Shorting	22.5°	16 (0 – F)	07-1153	07-1053
	Non-shorting	22.5°	16 (0 – F)	07-1154	07-1054
Hex complementary	Shorting	22.5°	16 (0 – F)	07-1163	07-1063
Gray	Shorting	22.5°	16 (0 – F)	07-1173	07-1073

With shaft, with threaded bushing, IP68, with end stop



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER
BCD	Shorting	36°	10 (0 – 9)	07-1133-300000
	Non-shorting	36°	10 (0 – 9)	07-1134-300000
BCD complementary	Shorting	36°	10 (0 – 9)	07-1143-300000
Hex	Shorting	22.5°	16 (0 – F)	07-1153-300000
	Non-shorting	22.5°	16 (0 – F)	07-1154-300000
Hex complementary	Shorting	22.5°	16 (0 – F)	07-1163-300000
Gray	Shorting	22.5°	16 (0 – F)	07-1173-300000

With shaft, with threaded bushing, IP68, endless rotating



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER
BCD	Shorting	36°	10 (0 – 9)	07-1033-300000
	Non-shorting	36°	10 (0 – 9)	07-1034-300000
BCD complementary	Shorting	36°	10 (0 – 9)	07-1043-300000
Hex	Shorting	22.5°	16 (0 – F)	07-1053-300000
	Non-shorting	22.5°	16 (0 – F)	07-1054-300000
Hex complementary	Shorting	22.5°	16 (0 – F)	07-1063-300000
Gray	Shorting	22.5°	16 (0 – F)	07-1073-300000

¹ For other Types | options see type key

CODED SWITCHES

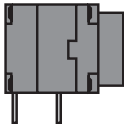
07 & C07A

Ordering information

PREFERENCE TYPES SELECTION CHART¹

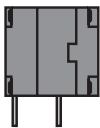
07 HORIZONTAL

Screwdriver with bezel front panel operation



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				WITH END STOP	ENDLESS ROTATING
BCD	Shorting	36°	10 (0 – 9)	07-4133	07-4033
	Non-shorting	36°	10 (0 – 9)	07-4134	07-4034
BCD complementary	Shorting	36°	10 (0 – 9)	07-4143	07-4043
Hex	Shorting	22.5°	16 (0 – F)	07-4153	07-4053
	Non-shorting	22.5°	16 (0 – F)	07-4154	07-4054
Hex complementary	Shorting	22.5°	16 (0 – F)	07-4163	07-4063
Gray	Shorting	22.5°	16 (0 – F)		07-4073

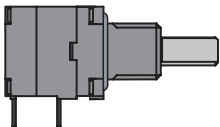
Screwdriver without bezel



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				WITH END STOP	ENDLESS ROTATING
BCD	Shorting	36°	10 (0 – 9)	07-0133	
	Non-shorting	36°	10 (0 – 9)	07-0134	07-0034
BCD complementary	Shorting	36°	10 (0 – 9)	07-0143	
Hex	Shorting	22.5°	16 (0 – F)	07-0153	07-0053
	Non-shorting	22.5°	16 (0 – F)	07-0154	07-0054
Hex complementary	Shorting	22.5°	16 (0 – F)	07-0163	
Gray	Shorting	22.5°	16 (0 – F)	07-0173	07-0073

C07A HORIZONTAL

Threaded bushing, IP68, with end stop



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER
				WITH END STOP
Hex	Shorting	22.5°	16 (0 – F)	C07A1153-300000
	Non-shorting	22.5°	16 (0 – F)	C07A1154-300000
Hex complementary	Shorting	22.5°	16 (0 – F)	C07A1163-300000
Gray	Shorting	22.5°	16 (0 – F)	C07A1173-300000

¹ For other Types | options see type key

CODED SWITCHES

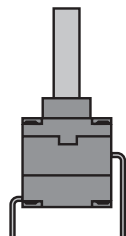
07 & C07A

Ordering information

PREFERENCE TYPES SELECTION CHART¹

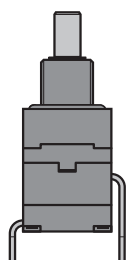
07 VERTICAL

With shaft, without threaded bushing



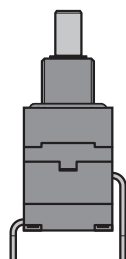
CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				WITH END STOP	ENDLESS ROTATING
BCD	Shorting	36°	10 (0 – 9)	07-3133	07-3033
	Non-shorting	36°	10 (0 – 9)	07-3134	07-3034
BCD complementary	Shorting	36°	10 (0 – 9)	07-3143	07-3043
Hex	Shorting	22.5°	16 (0 – F)	07-3153	07-3053
	Non-shorting	22.5°	16 (0 – F)	07-3154	07-3054
Hex complementary	Shorting	22.5°	16 (0 – F)	07-3163	07-3063
Gray	Shorting	22.5°	16 (0 – F)	07-3173	07-3073

With shaft, with threaded bushing, IP68, with end stop



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				WITH END STOP	
BCD	Shorting	36°	10 (0 – 9)	07-3133-300000	
	Non-shorting	36°	10 (0 – 9)	07-3134-300000	
BCD complementary	Shorting	36°	10 (0 – 9)	07-3143-300000	
Hex	Shorting	22.5°	16 (0 – F)	07-3153-300000	
	Non-shorting	22.5°	16 (0 – F)	07-3154-300000	
Hex complementary	Shorting	22.5°	16 (0 – F)	07-3163-300000	
Gray	Shorting	22.5°	16 (0 – F)	07-3173-300000	

With shaft, with threaded bushing, IP68, endless rotating



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				ENDLESS ROTATING	
BCD	Shorting	36°	10 (0 – 9)	07-3033-300000	
	Non-shorting	36°	10 (0 – 9)	07-3034-300000	
BCD complementary	Shorting	36°	10 (0 – 9)	07-3043-300000	
Hex	Shorting	22.5°	16 (0 – F)	07-3053-300000	
	Non-shorting	22.5°	16 (0 – F)	07-3054-300000	
Hex complementary	Shorting	22.5°	16 (0 – F)	07-3063-300000	
Gray	Shorting	22.5°	16 (0 – F)	07-3073-300000	

¹ For other Types | options see type key

CODED SWITCHES

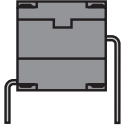
07 & C07A

Ordering information

PREFERENCE TYPES SELECTION CHART¹

07 VERTICAL

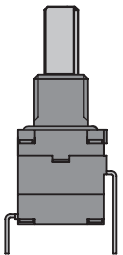
Screwdriver without bezel



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER	
				WITH END STOP	ENDLESS ROTATING
BCD	Shorting	36°	10 (0 – 9)	07-2133	07-2033
	Non-shorting	36°	10 (0 – 9)	07-2134	07-2034
BCD complementary	Shorting	36°	10 (0 – 9)	07-2143	
Hex	Shorting	22.5°	16 (0 – F)	07-2153	07-2053
	Non-shorting	22.5°	16 (0 – F)	07-2154	
Hex complementary	Shorting	22.5°	16 (0 – F)	07-2163	07-2063
Gray	Shorting	22.5°	16 (0 – F)	07-2173	

C07A VERTICAL

Threaded bushing, IP68, with end stop



CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS	PART NUMBER
				WITH END STOP
Hex	Shorting	22.5°	16 (0 – F)	C07A3153-300000
	Non-shorting	22.5°	16 (0 – F)	C07A3154-300000
Hex complementary	Shorting	22.5°	16 (0 – F)	C07A3163-300000
Gray	Shorting	22.5°	16 (0 – F)	C07A3173-300000

PACKAGING

Foam polystyrene box:

50 or 200 pieces (depending on shipment quantity)

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75:

Part number 4424-22 (50 pieces / bag), brass

Slotted nut M6 x 0.75:

Part number 4424-28 (50 pieces / bag), brass

Part number 4424-31 (50 pieces / bag), stainless steel (cross slot)

¹ For other Types | options see type key

CODED SWITCHES

07 & C07A

Specifications

MECHANICAL DATA

Detent angle positions:	22.5° detent angle 16 positions 36° detent angle 10 positions
Rotary limitation end stop:	Configurable
Switching torque:	22.5°: 3.2 or 3.5 Ncm (±25 % in new condition) 36°: 2.2 or 3.5 Ncm (±25 % in new condition)
Rotational life:	> 10'000 cycles (tested at room temperature)
Rotational stop strength:	22.5° detent angle: > 35 Ncm 36° detent angle: > 45 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.4 x 0.7 mm
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 200 mA (resistive load)
Contact resistance:	< 50 mΩ (in new condition)
Switching breaking capacity:	< 5 VA
Signal coding:	10 positions: BCD or BCD complementary 16 positions: Hex, Hex complementary or Gray
Switching mode:	Shorting or non-shortng (non-shortng with Gray, BCD complementary and Hex complementary not possible)
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 GΩ at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting, fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass
Slotted nut:	Brass or stainless steel
O-rings:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

CODED SWITCHES

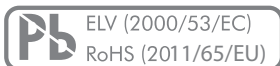
C07 CONCENTRIC

Product description

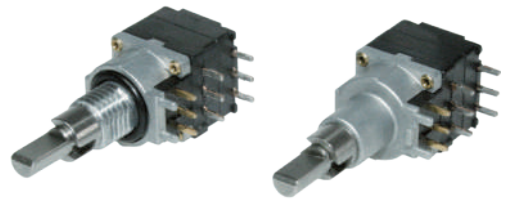
MAIN FEATURES

CONCENTRIC FUNCTION

- › 16 positions Hex or Gray coding inner shaft
- › Switching mode: Shorting
- › For rugged environments
- › Switching torque: 3.5 Ncm
- › Gold plated contacts
- › THT horizontal
- › IP68 front panel sealing (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Tape & reel packaging
- › Various options and customizations



C07 CONCENTRIC



PRODUCT VARIETY

- Threaded or non-threaded bushing
- Hex or Gray coding
- Selector switch with 2 or 3 positions outer shaft
- Front panel sealing IP60 or IP68
- Tray or tape & reel packaging

POSSIBLE CUSTOMIZATIONS

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

TYPICAL APPLICATIONS

- Channel selection for portable radios
- Cockpit controls

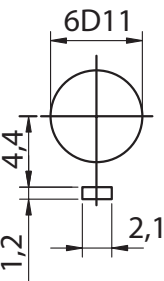
CODED SWITCHES

C07 CONCENTRIC

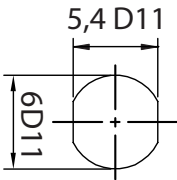
Dimensions and pin assignment

FRONT PANEL CUT OUT

NON-THREADED BUSHING

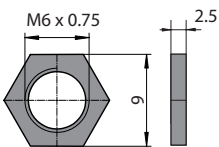


THREADED BUSHING, IP68

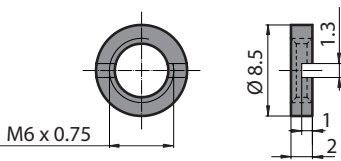


NUT

HEX NUT (SUPPLIED)



SLOTTED NUT



Output signal

CODING

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 positions

	A	B
1		
2		
3		

Outer shaft: 2 positions

	A	B
1		
2		

☒ On
☐ Off

Dimensions in mm
 Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCHES

C07 CONCENTRIC

Ordering information

ORDERING CODE

C07	-	1	1	-	3	-	-	-	-	-	-	-
-----	---	---	---	---	---	---	---	---	---	---	---	---

CODING	
5	Hex (inner shaft) 3 positions (outer shaft)
7	Gray (inner shaft) 3 positions (outer shaft)
8	Hex (inner shaft) 2 positions (outer shaft)
9	Gray (inner shaft) 2 positions (outer shaft)

BUSHING IP SEALING	
-	Non-threaded
300000	Threaded IP68 (nut supplied)

PACKAGING	
-	Tray (50 or 200 pieces / tray)
T	Tape & reel (250 pieces / tray)

PREFERENCE TYPES SELECTION CHART¹

NON-THREADED BUSHING

CODING	SWITCHING MODE	INDEXING ANGLE	POSITIONS		PART NUMBER	
			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		PART NUMBER	
			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 SWITCHES

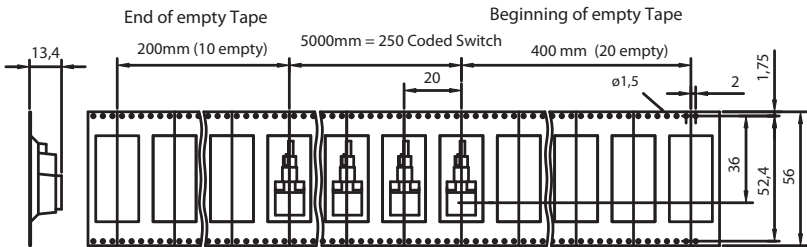
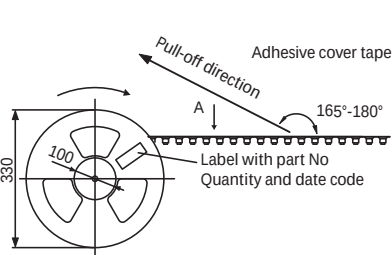
C07 CONCENTRIC

Ordering information

PACKAGING

Foam polystyrene box:	50 or 200 pieces (depending on shipment quantity)
Tape & reel:	250 pieces

TAPE & REEL PACKAGING



Part conforms to EIA-481-B standards

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75:	Part number 4424-22 (50 pieces / bag), brass
Slotted nut M6 x 0.75:	Part number 4424-28 (50 pieces / bag), brass
	Part number 4424-31 (50 pieces / bag), stainless steel (cross slot)

CODED SWITCHES

C07 CONCENTRIC

Specifications

MECHANICAL DATA

Detent angle positions:	Inner shaft: 22.5° detent angle 16 positions Outer shaft: 22.5° detent angle 2 or 3 positions
Rotary limitation end stop:	Between first and last positions
Switching torque:	Inner shaft: 3.5 Ncm (± 25 % in new condition) Outer shaft: 5.0 Ncm (± 25 % in new condition)
Rotational life:	Inner shaft: > 10'000 cycles (tested at room temperature) Outer shaft: > 7'500 cycles (tested at room temperature)
Rotational stop strength:	Inner shaft: > 40 Ncm Outer shaft: > 24 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.4 x 0.7 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 50 m Ω (in new condition)
Signal coding:	Inner shaft: Hex or Gray Outer shaft: On / Off / On (3 positions) or On / Off (2 positions)
Switching mode:	Shorting
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting, fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass
Slotted nut:	Brass or stainless steel
O-rings:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 600068-2-14)
Storage temperature:	-40 to +85 °C (IEC 600068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

CODED SWITCH

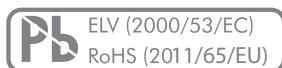
M07

Product description

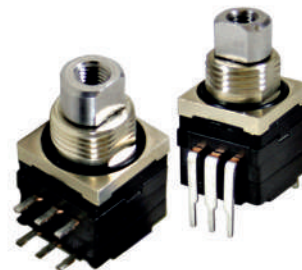
MAIN FEATURES

RUGGED

- › Gray, Hex or BCD coding 2 to 16 positions
- › Ruggedised stainless steel 6 mm tapped shaft
- › Switching torque: 4.5 Ncm
- › Switching mode: Shorting or non-shorting
- › Gold plated contacts, nickel silver bushing
- › THT vertical or horizontal
- › IP68 front panel sealing (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



M07



PRODUCT VARIETY

- Vertical or horizontal mounting
- BCD, Hex or Gray coding (shorting or non-shorting)
- Number of positions
- Switching torque BDC: 2.2 or 4 Ncm
- Switching torque Hex and Gray: 3.2 or 4.5 Ncm
- With end stop or endless rotating
- IP60 or IP68 front panel sealing

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Bushing, mounting
- Switching torque
- High / low torque function «on» / «off»
- Others

TYPICAL APPLICATIONS

- Frequency and channel selection for two way radios
- Target aiming devices
- Aircraft transponders
- Portable medical equipment
- Industrial automation
- Vision and optical products
- Mobile PCs

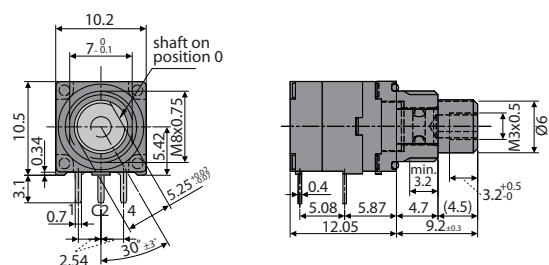
CODED SWITCH

M07

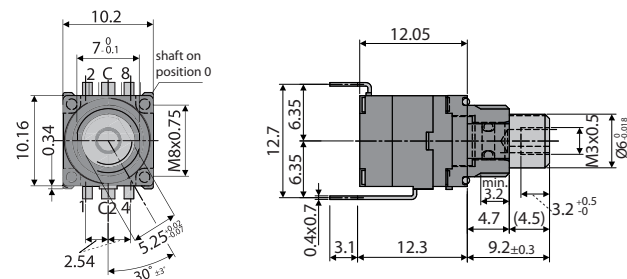
Dimensions and pin assignment

SWITCH DESIGN AND PIN ASSIGNMENT

HORIZONTAL



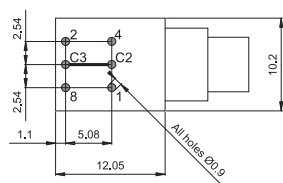
VERTICAL



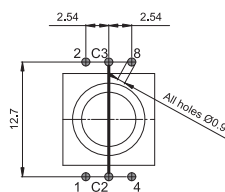
DRILLING DIAGRAM AND FOOTPRINT

HORIZONTAL

View from component side of the PCB

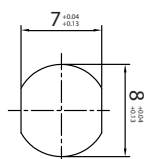


VERTICAL

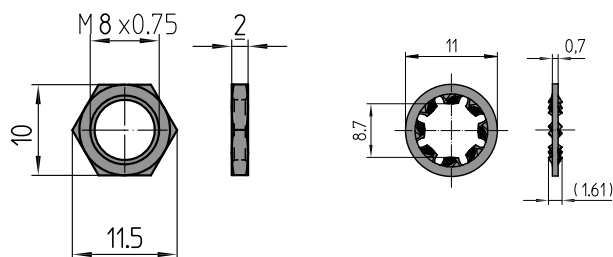


Commons (C2, C3) must be connected together on the PCB

FRONT PANEL CUT OUT



NUT AND LOCK WASHER (SUPPLIED)



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

M07

Ordering information

ORDERING CODE

M07	-	-	-	-	-	-	-	-	-	-	-	-
-----	---	---	---	---	---	---	---	---	---	---	---	---

STYLE

1

Horizontal

3

Vertical

END STOP

0

Endless rotating

1

With end stops

CODING

3

BCD (max. 10 positions)

4

BCD complementary (max. 10 positions)

5

Hex

6

Hex complementary

7

Gray

Explanation see chapter «Technical explanations»

SWITCHING MODE¹

3

Shorting

4

Non-shorting

Explanation see chapter «Technical explanations»
¹ Non-shorting not possible with Gray code, BCD complementary and Hex complementary

NUMBER OF POSITIONS

0

Standard (10 or 16 positions)

E

15 positions (0 – E)

D

14 positions (0 – D)

C

13 positions (0 – C)

B

12 positions (0 – B)

A

11 positions (0 – A)

9

10 positions (0 – 9)

8

9 positions (0 – 8)

7

8 positions (0 – 7)

6

7 positions (0 – 6)

5

6 positions (0 – 5)

4

5 positions (0 – 4)

3

4 positions (0 – 3)

2

3 positions (0 – 2)

1

2 positions (0 – 1)

SHAFT STYLE

000

Basic style shaft: See drawing

IP SEALING

20

IP60

30

IP68

TORQUE | PACKAGING

H

4.5 Ncm (BCD: 4 Ncm) (50 or 200 pieces)

-

3.2 Ncm (BCD: 2.2 Ncm) (50 or 200 pieces)

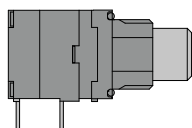
CODED SWITCH

M07

Ordering information

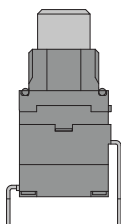
PREFERENCE TYPES SELECTION CHART¹

HORIZONTAL



IP SEALING	CODING	SWITCHING MODE	INDEXING ANGLE POSITIONS	TORQUE	PART NUMBER WITH END STOP	ENDLESS ROTATING
IP60	Gray	Shorting	22.5° 16	3.2 Ncm	M07-1173-200000	M07-1073-200000
				4.5 Ncm	M07-1173H200000	M07-1073H200000
	BCD	Shorting	36° 10	2.2 Ncm	M07-1133-200000	M07-1033-200000
				4.0 Ncm	M07-1133H200000	M07-1033H200000
IP68	Gray	Shorting	22.5° 16	3.2 Ncm	M07-1173-300000	M07-1073-300000
				4.5 Ncm	M07-1173H300000	M07-1073H300000
	BCD	Shorting	36° 10	2.2 Ncm	M07-1133-300000	M07-1033-300000
				4.0 Ncm	M07-1133H300000	M07-1033H300000

VERTICAL



IP SEALING	CODING	SWITCHING MODE	INDEXING ANGLE POSITIONS	TORQUE	PART NUMBER WITH END STOP	ENDLESS ROTATING
IP60	Gray	Shorting	22.5° 16	3.2 Ncm	M07-3173-200000	M07-3073-200000
				4.5 Ncm	M07-3173H200000	M07-3073H200000
	BCD	Shorting	36° 10	2.2 Ncm	M07-3133-200000	M07-3033-200000
				4.0 Ncm	M07-3133H200000	M07-3033H200000
IP68	Gray	Shorting	22.5° 16	3.2 Ncm	M07-3173-300000	M07-3073-300000
				4.5 Ncm	M07-3173H300000	M07-3073H300000
	BCD	Shorting	36° 10	2.2 Ncm	M07-3133-300000	M07-3033-300000
				4.0 Ncm	M07-3133H300000	M07-3033H300000

PACKAGING

Foam polystyrene box:

50 or 200 pieces (depending on shipment quantity)

ACCESSORIES AND SPARE PARTS

Hex nut M8 x 0.75:

Part number 4024-81 (10 pieces / bag), brass, nickel plated

Lock washer:

Part number 5708-06 (1 pieces / bag, MOQ 10 pieces)

¹ For other types | options see type key

Specifications

MECHANICAL DATA

Detent angle positions:	22.5° detent angle 16 positions 36° detent angle 10 positions
Rotary limitation end stop:	Configurable
Switching torque:	22.5°: 3.2 or 4.5 Ncm ($\pm 25\%$ in new condition) 36°: 2.2 or 4 Ncm ($\pm 25\%$ in new condition)
Rotational life:	> 10'000 cycles (tested at room temperature)
Rotational stop strength:	22.5° detent angle: > 35 Ncm 36° detent angle: > 45 Ncm
Fastening torque of nut (front panel mounting):	M8 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connections:	Pins 0.4 x 0.7 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 50 m Ω (in new condition)
Signal coding:	10 positions: BCD or BCD complementary 16 positions: Hex, Hex complementary or Gray
Switching mode:	Shorting or non-shorting (non-shorting with Gray, BCD complementary and Hex complementary not possible)
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Nickel silver, fiber enforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass (nickel plated)
O-rings:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL

Operating temperature:	-40 to +85 °C (IEC 600068-2-14)
Storage temperature:	-40 to +85 °C (IEC 600068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (5 bar, 4 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

CODED SWITCH

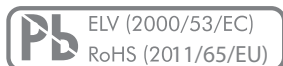
07PL

Product description

MAIN FEATURES

PUSH BUTTON FUNCTION

- › Integrated push button function
- › Push button forces up to 14 N
- › 10 positions BCD coding with end stop
- › 16 positions Hex or Gray coding with end stop
- › Switching mode: Shorting or non-shorting
- › For rugged environments
- › Switching torque: Up to 3.5 Ncm
- › Gold plated contacts
- › THT horizontal
- › IP68 front panel sealing (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



07PL



PRODUCT VARIETY

- Shaft length
- Shorting or non-shorting
- Push button force
- Hex, Gray or BCD coding
- Switching torque: 3.2 or 3.5 Ncm
- IP60 or IP68 front panel sealing

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Bushing, mounting
- IP sealing
- Push button force
- Switching torque
- BCD coding

TYPICAL APPLICATIONS

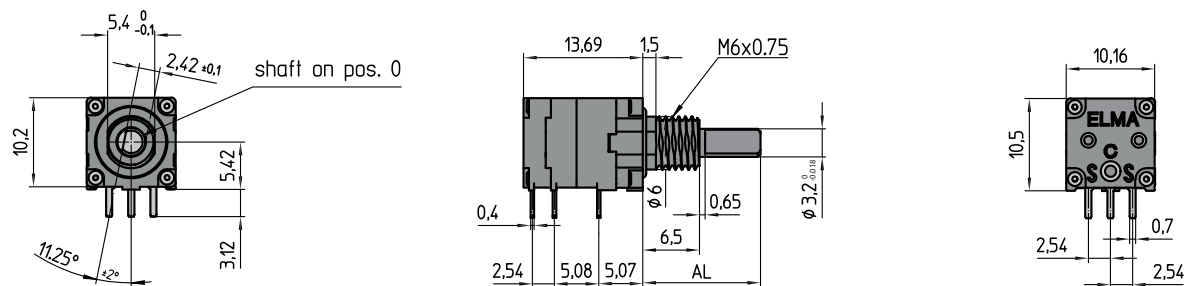
- Frequency and channel selection for two way radios
- Target aiming devices
- Aircraft transponders
- Medical equipment
- Industrial automation
- Cockpit applications

CODED SWITCH

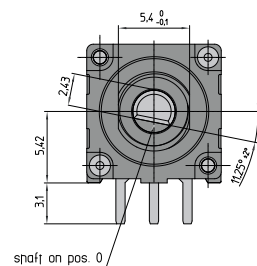
07PL

Dimensions and pin assignment

SWITCH DESIGN

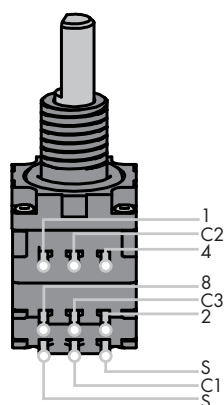


SHAFT POSITION AT BCD CODING



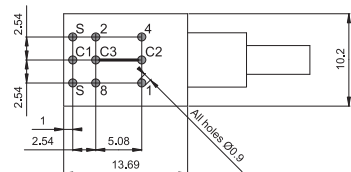
	13.5 mm ±0.25 mm
AL	15.0 mm ±0.25 mm
	16.0 mm ±0.25 mm

PIN ASSIGNMENT



DRILLING DIAGRAM AND FOOTPRINT

View from component side of the PCB



Commons (C2, C3) must be connected together on the PCB

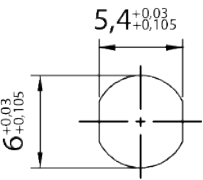
Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

07PL

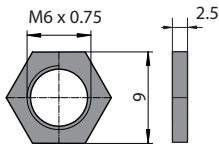
Dimensions and pin assignment

FRONT PANEL CUT OUT

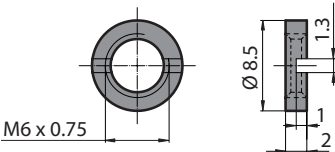


NUT

HEX NUT (SUPPLIED)

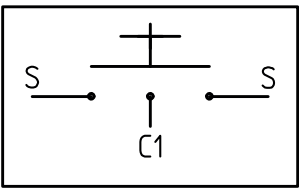


SLOTTED NUT



Circuit diagram

CONNECTIONS PUSH BUTTON



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

07PL

Ordering informations

ORDERING INFORMATION

STANDARD: HORIZONTAL SHAFT WITH END STOP (HEX OR GRAY: 16 POSITIONS)

07PL	-	-	-	-	-	-	-	-	-	-
------	---	---	---	---	---	---	---	---	---	---

PUSH BUTTON FORCE

1 3 N
2 5 N
5 10 N
7 14 N

X Customized solutions on request

CODING

5 Hex
7 Gray
8 BCD

X Customized solutions on request

Explanation see chapter «Technical explanations»

BUSHING | IP SEALING | NUT

10 Threaded | IP60 | hex nut
20 Threaded | IP60 | slotted nut
30 Threaded | IP68 | hex nut
40 Threaded | IP68 | slotted nut
50 Threaded | IP60 | without nut
60 Threaded | IP68 | without nut

XX Customized solutions on request

PACKAGING

- Standard tray 50 or 200 pieces¹
A Antistatic tray 100 pieces

¹ The packaging size depends on shipment quantity. If the shipment quantity is
< 200 pieces then standard tray 50 pieces
≥ 200 pieces then standard tray 200 pieces

SWITCHING MODE

S Shorting
N Non-shorting²

² Non-shorting not possible with Gray Code, BCD complementary, Hex complementary

D-SHAFT LENGTH

13 Standard | 13.5 mm length
15 Standard | 15 mm length
16 Standard | 16 mm length

XX Customized solutions on request

Shaft dimensions and shape see drawing

TORQUE

1 2.2 Ncm
2 3.5 Ncm

X Customized solutions on request

CODED SWITCH

07PL

Ordering informations

PREFERENCE TYPES SELECTION CHART¹

STANDARD SHAFT, IP68, HEX NUT SUPPLIED, SHORTING

CODING	INDEXING ANGLES POSITIONS	TORQUE	PUSH BUTTON FORCE	PART NUMBER
Hex	22.5° 16 (0 – F)	3.2	3 N	07PL-1530-113S
			5 N	07PL-2530-113S
Hex complementary	22.5° 16 (0 – F)	3.2	3 N	07PL-1630-113S
			5 N	07PL-2630-113S
Gray	22.5° 16 (0 – F)	3.2	3 N	07PL-1730-113S
			5 N	07PL-2730-113S

PACKAGING

Foam polystyrene box: 50 or 200 pieces (depending on shipment quantity)

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75: Part number 4424-22 (50 pieces / bag), brass
Slotted nut M6 x 0.75: Part number 4424-28 (50 pieces / bag), brass
Part number 4424-30 (50 pieces / bag), stainless steel

¹ For other types | options see ordering code

CODED SWITCH

07PL

Specifications

MECHANICAL DATA

Detent angle positions:	22.5° detent angle 16 positions 36° detent angle 10 positions
Rotary limitation end stop:	Configurable
Switching torque:	2.2 or 3.5 Ncm ($\pm 25\%$ in new conditions)
Rotational life:	> 10'000 cycles (tested at room temperature)
Rotational stop strength:	> 35 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connections:	Pins 0.4 x 0.7 mm
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 200 mA (resistive load)
Contact resistance:	< 50 m Ω (in new condition)
Switching breaking capacity:	< 5 VA
Signal coding:	10 positions: BCD or BCD complementary 16 positions: Hex, Hex complementary or Gray
Switching mode:	Shorting or non-shortening (non-shortening with Gray, BCD complementary and Hex complementary not possible)
Dielectric strength:	1'500 VDC during 60 s (pin-to-pin, pin-to-housing and between housing and shaft)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting, fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass
Slotted nut:	Brass or stainless steel
O-rings:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 600068-2-14)
Storage temperature:	-40 to +85 °C (IEC 600068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

MECHANICAL DATA FOR PUSH BUTTON

Actuation force:	3, 5, 10, 14 N ($\pm 30\%$ in new condition)
Travel:	0.5 (± 0.2) mm
Lifecycles:	> 200'000 cycles (tested at room temperature)

ELECTRICAL DATA FOR PUSH BUTTON

Contact resistance:	< 1 Ω
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact bouncing:	< 2 ms (at 2 Hz)

CODED SWITCH

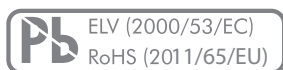
07ML

Product description

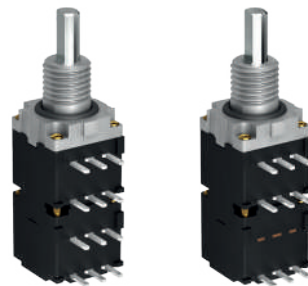
MAIN FEATURES

MULTI LAYER OR ON / OFF FUNCTION

- › Multi layer coded switch (up to 2 layers)
- › High / low torque function «on» / «off»
- › BCD, Hex or Gray coding 2 to 16 positions
- › Switching mode: Shorting
- › Switching torque per layer: Up to 3.5 Ncm
- › For rugged environments
- › Gold plated contacts
- › THT horizontal
- › IP68 front panel sealing (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



07ML



PRODUCT VARIETY

- BCD, Hex or Gray coding
- Multi layer (up to 2 layers)
- Switching torque per layers
 - BCD: 1.5, 2.2 or 3.5 Ncm
 - Hex or Gray: 1.5, 3.2 or 3.5 Ncm
- With or without high / low torque function «on» / «off»
- With end stop or endless rotating
- Numbers of positions
- Shaft length
- Front panel sealing IP60 or IP68

POSSIBLE CUSTOMIZATIONS

- Additional layers
- Non-shorting
- Shaft dimension and shape
- Bushing style
- IP sealing
- Switching torque
- 4 (5) positions selector switch

TYPICAL APPLICATIONS

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

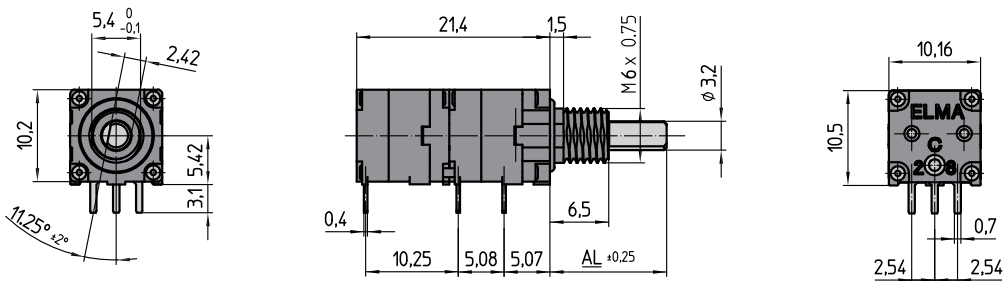
CODED SWITCH

07ML

Dimensions and pin assignment

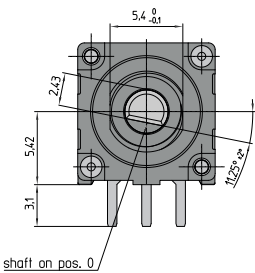
SWITCH DESIGN

WITH ON / OFF FUNCTION

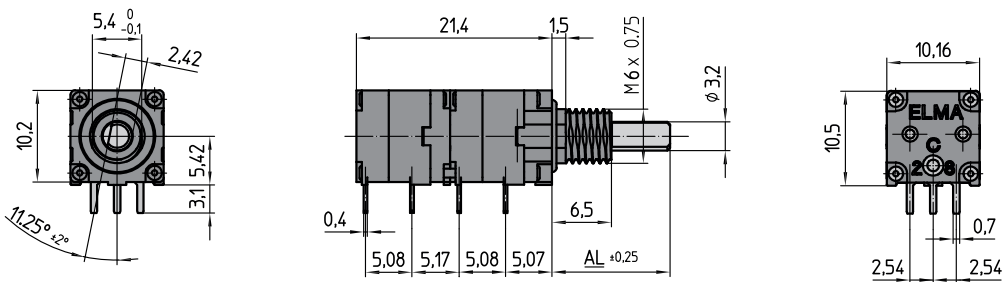


	13 mm ± 0.25 mm
AL	15 mm ± 0.25 mm
	16 mm ± 0.25 mm

SHAFT FOR BCD CODING



WITHOUT ON / OFF FUNCTION, ONLY SECOND LAYER

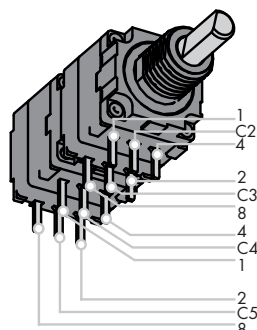
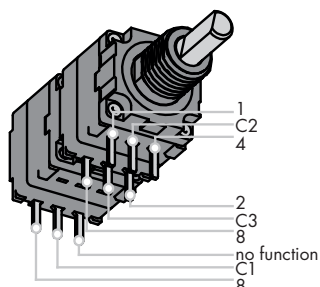


	13 mm ± 0.25 mm
AL	15 mm ± 0.25 mm
	16 mm ± 0.25 mm

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

07ML

PIN ASSIGNMENT



WITH ON / OFF FUNCTION

Commons (C2, C3) must be connected together on the PCB

WITHOUT ON / OFF FUNCTION, ONLY SECOND LAYER

Commons (C2, C3) must be connected together on the PCB

Dimensions in mm

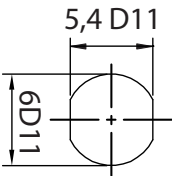
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

07ML

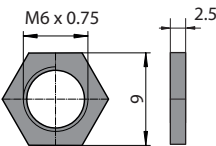
Dimensions and pin assignment

FRONT PANEL CUT OUT

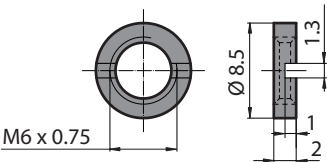


NUT

HEX NUT

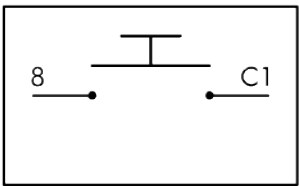


SLOTTED NUT



Circuit diagram

CONNECTIONS ON / OFF FUNCTION



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

07ML

Ordering information

ORDERING CODE

07ML	-	-	-	-	-	-	-	-	-	-
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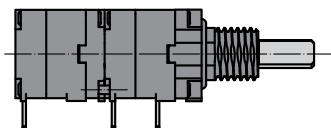
CODED SWITCH

07ML

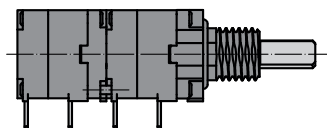
Ordering information

PREFERENCE TYPES SELECTION CHART¹

WITH ON / OFF FUNCTION



WITHOUT ON / OFF FUNCTION



STANDARD SHAFT LENGTH, IP68, HEX NUT SUPPLIED, SHORTING

CODING	INDEXING ANGLES POSITIONS	ON / OFF FUNCTION	TORQUE LAYER	PART NUMBER
BCD	36° 10 (0 – 9)	With	Layer 1: 3.5 Ncm Layer 2: 5 Ncm ²	07ML-330A-13DOS
		Without	Layer 1: 3.5 Ncm Layer 2: 3.5 Ncm	07ML-330S-13DDS
BCD complementary	36° 10 (0 – 9)	With	Layer 1: 3.5 Ncm Layer 2: 5 Ncm ²	07ML-430S-13DOS
		Without	Layer 1: 3.5 Ncm Layer 2: 3.5 Ncm	07ML-430S-13DDS
Hex	22.5° 16 (0 – F)	With	Layer 1: 3.5 Ncm Layer 2: 5 Ncm ²	07ML-530S-13DOS
		Without	Layer 1: 3.5 Ncm Layer 2: 3.5 Ncm	07ML-530S-13DDS
Hex complementary	22.5° 16 (0 – F)	With	Layer 1: 3.5 Ncm Layer 2: 5 Ncm ²	07ML-630S-13DOS
		Without	Layer 1: 3.5 Ncm Layer 2: 3.5 Ncm	07ML-630S-13DDS
Gray	22.5° 16 (0 – F)	With	Layer 1: 3.5 Ncm Layer 2: 5 Ncm ²	07ML-730S-13DOS
		Without	Layer 1: 3.5 Ncm Layer 2: 3.5 Ncm	07ML-730S-13DDS

PACKAGING

Foam polystyrene box:

50 or 200 pieces (depending on shipment quantity)

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75:

Part number 4424-22 (50 pieces / bag), brass

Slotted nut M6 x 0.75:

Part number 4424-28 (50 pieces / bag), brass

Part number 4424-31 (50 pieces / bag), stainless steel (cross slot)

¹ For other types | options see type key

² Torque of 5 Ncm only applies for the on / off function

Specifications

MECHANICAL DATA

Detent angle positions:	22.5° detent angle 16 positions 36° detent angle 10 positions
Rotary limitation end stop:	Configurable
Switching torque:	22.5°: 1.5, 3.2 or 3.5 Ncm (±25 % in new condition) 36°: 1.5, 2.2 or 3.5 Ncm (±25 % in new condition) On / off function: 5 Ncm (±25 % in new condition)
Rotational life:	> 10'000 cycles (tested at room temperature)
Rotational stop strength:	22.5° detent angle: > 35 Ncm 36° detent angle: > 45 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.4 x 0.7 mm
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 200 mA (resistive load)
Contact resistance:	< 50 mΩ (in new condition)
Switching breaking capacity:	< 5 VA
Signal coding:	10 positions: BCD or BCD complementary 16 positions: Hex, Hex complementary or Gray
Switching mode:	Shorting or non-shorting (non-shorting with Gray, BCD complementary and Hex complementary not possible)
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 GΩ at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless 1.4305
Bushing housing:	Zinc die casting, fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass
Slotted nut:	Brass or stainless steel

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 600068-2-14)
Storage temperature:	-40 to +85 °C (IEC 600068-2-14)

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

CODED SWITCH

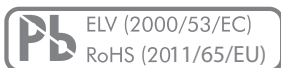
07P2T

Product description

MAIN FEATURES

PUSH TO TURN FUNCTION

- › Integrated push to turn function
- › Push forces up to 11 N
- › BCD coding 2 to 10 positions
- › Switching mode: Shorting or non-shorting
- › Switching torque: Up to 7 Ncm
- › For rugged environments
- › Gold plated contacts
- › THT vertical or horizontal
- › Front panel sealing IP68 (up to 5 bar)
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



07P2T



PRODUCT VARIETY

- Push to turn (all positions locked or on / off locked)
- Shaft length
- Shorting or non-shorting
- Terminal style (horizontal, vertical)
- Front panel sealing IP60 or IP68
- Number of positions
- With end stop or endless rotating

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Bushing, mounting
- Switching torque
- Pull to turn function
- IP sealing

TYPICAL APPLICATIONS

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

CODED SWITCH

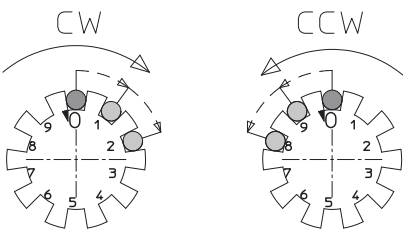
07P2T

Product description

PUSH TO TURN EXPLANATION

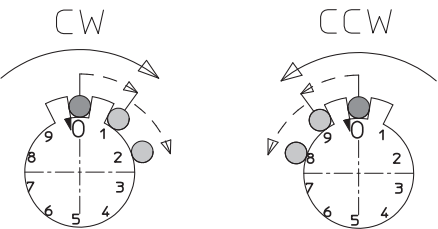
ALL POSITIONS LOCKED

Before actuation every position is locked.



ON / OFF LOCKED

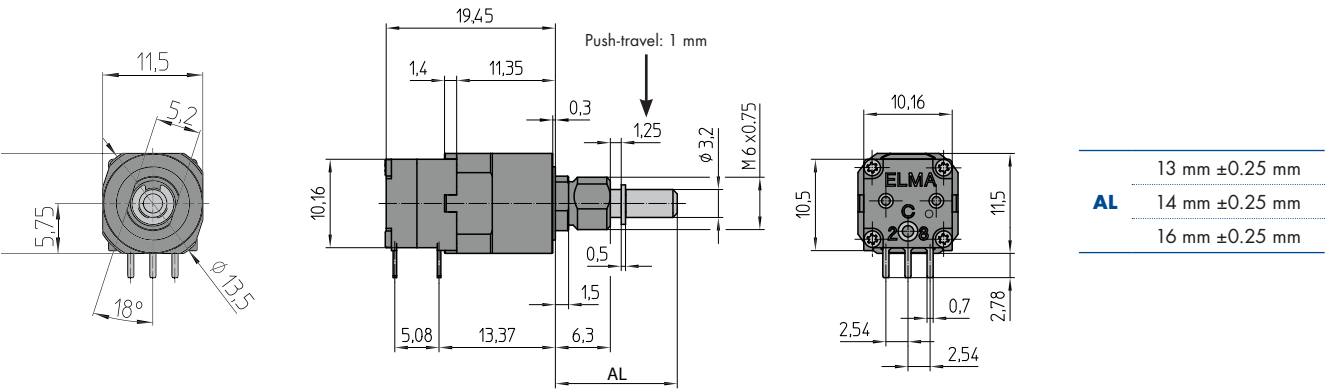
Before actuation only position 0 is locked. All other positions are movable.



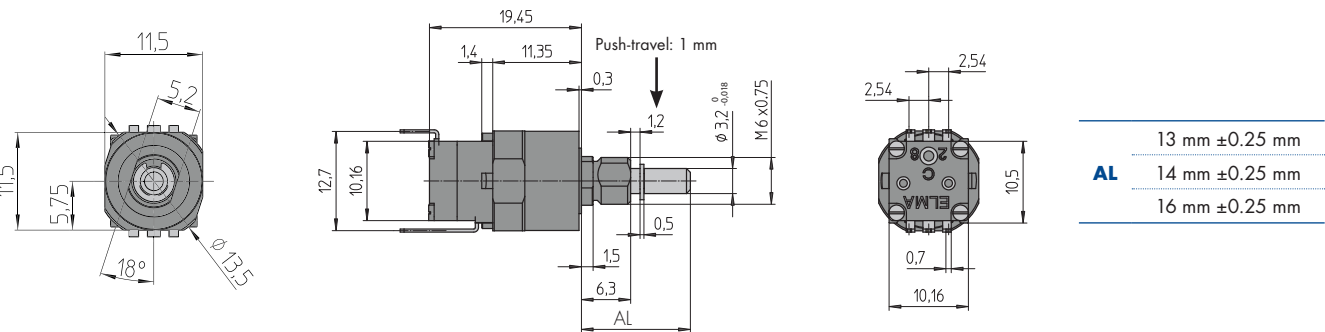
Dimensions and pin assignment

SWITCH DESIGN

HORIZONTAL



VERTICAL



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

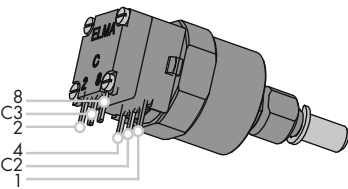
CODED SWITCH

07P2T

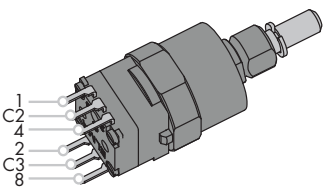
Dimensions and pin assignment

PIN ASSIGNMENT

HORIZONTAL



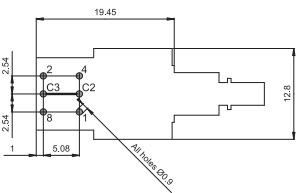
VERTICAL



DRILLING DIAGRAM AND FOOTPRINT

HORIZONTAL

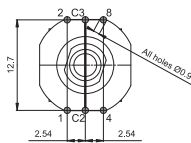
View from component side of the PCB



Commons (C2, C3) must be connected together on the PCB

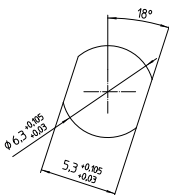
VERTICAL

View from component side of the PCB



Commons (C2, C3) must be connected together on the PCB

FRONT PANEL CUT OUT



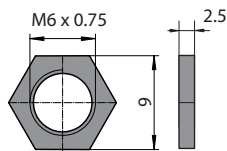
Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH
07P2T

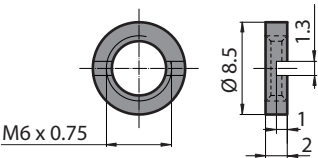
Dimensions and pin assignment

NUT | LOCK WASHER | FRONT PANEL SEALING

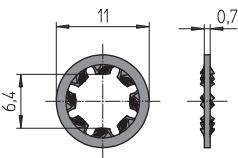
HEX NUT



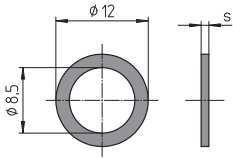
SLOTTED NUT



LOCK WASHER



FRONT PANEL SEALING



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

Ordering information

ORDERING CODE

07P2T	-	-	-	-	-	-	-	-	-	-	-	-	-
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TERMINAL STYLE

- 1** Horizontal, push to turn
- 3** Vertical, push to turn
- X** Ask for customized solution

CODING

- 3** BCD (max. 10 positions)
- 4** BCD complementary (max. 10 positions)
- X** Customized solutions on request

Explanation see chapter «Technical explanations»

BUSHING | IP SEALING | NUT AND WASHER

- 10** Threaded | IP60 | hex nut and washer
- 20** Threaded | IP60 | slotted nut and washer
- 30** Threaded | IP68 | hex nut and washer
- 40** Threaded | IP68 | slotted nut and washer
- 50** Threaded | IP60 | without nut and washer
- 60** Threaded | IP68 | without nut and washer
- XX** Customized solutions on request

PACKAGING

- Standard tray (25 or 50 pieces)

SWITCHING TORQUE

- 7** 7 Ncm
- X** Customized solutions on request

SHAFT LENGTH (AL)

- 13** Standard | 13 mm length
- 14** Standard | 14 mm length
- 16** Standard | 16 mm length
- XX** Customized solutions on request

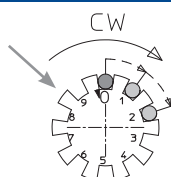
For shaft dimension and shape see drawing

ALL POSITIONS LOCKED CLOCKWISE

Adjustable «all positions locked» positions. Start at pos. 0.

- 5** BCD: 10 positions
- 1** 0 - 1: 2 positions
- 2 0 - 2: 3 positions**
- 3** 0 - 3: 4 positions
- 4** 0 - 4: 5 positions
- 5** 0 - 5: 6 positions
- 6** 0 - 6: 7 positions
- 7** 0 - 7: 8 positions
- 8** 0 - 8: 9 positions
- X** Customized solutions on request

Total up to max. 9 positions for locked options



SWITCHING MODE

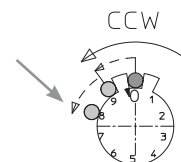
- S** Shorting
- N** Non-shorting (only with BCD)

ON / OFF LOCKED COUNTERCLOCKWISE

Adjustable «on / off locked» positions. Start at position 0.

- 5** BCD: 10 positions
- 1** 0 - 9: 2 positions
- 2 0 - 8: 3 positions**
- 3** 0 - 7: 4 positions
- 4** 0 - 6: 5 positions
- 5** 0 - 5: 6 positions
- 6** 0 - 4: 7 positions
- 7** 0 - 3: 8 positions
- 8** 0 - 2: 9 positions
- X** Customized solutions on request

Total up to max. 9 positions for locked options

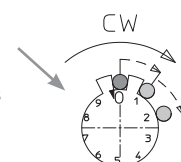


ON / OFF LOCKED CLOCKWISE

Adjustable «on / off locked» positions. Start at position 0.

- 5** BCD: 10 positions
- 1** 0 - 1: 2 positions
- 2 0 - 2: 3 positions**
- 3** 0 - 3: 4 positions
- 4** 0 - 4: 5 positions
- 5** 0 - 5: 6 positions
- 6** 0 - 6: 7 positions
- 7** 0 - 7: 8 positions
- 8** 0 - 8: 9 positions
- X** Customized solutions on request

Total up to max. 9 positions for locked options

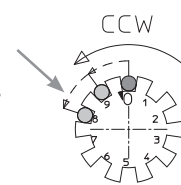


ALL POSITIONS LOCKED COUNTERCLOCKWISE

Adjustable «on / off locked» positions. Start at position 0.

- 5** BCD: 10 positions
- 1** 0 - 9: 2 positions
- 2 0 - 8: 3 positions**
- 3** 0 - 7: 4 positions
- 4** 0 - 6: 5 positions
- 5** 0 - 5: 6 positions
- 6** 0 - 4: 7 positions
- 7** 0 - 3: 8 positions
- 8** 0 - 2: 9 positions
- X** Customized solutions on request

Total up to max. 9 positions for locked options



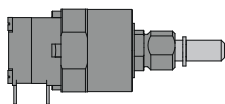
CODED SWITCH

07P2T

Ordering information

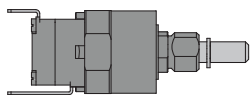
PREFERENCE TYPES SELECTION CHART¹

HORIZONTAL, STANDARD-POSITIONS (BCD: 10 POS.), SHORTING, STANDARD SHAFT LENGTH 14 MM, IP68



CODING	INDEXING ANGLE POSITIONS	TORQUE	PUSH TO TURN	PART NUMBER BCD 10 POSITIONEN (0 – 9)
BCD	36° 10 (09)	7 Ncm	All positions locked	07P2T-1330-714S000S
			On / off locked	07P2T-1330-71400S0S
BCD complementary	36° 10 (09)	7 Ncm	All positions locked	07P2T-1430-714S000S
			On / off locked	07P2T-1430-71400S0S

VERTICAL, STANDARD-POSITIONS (BCD: 10 POS.), SHORTING, STANDARD SHAFT LENGTH 14 MM, IP68



CODING	INDEXING ANGLE POSITIONS	TORQUE	PUSH TO TURN	PART NUMBER BCD 10 POSITIONS (0 – 9)
BCD	36° 10 (09)	7 Ncm	All positions locked	07P2T-3330-714S000S
			On / off locked	07P2T-3330-71400S0S
BCD complementary	36° 10 (09)	7 Ncm	All positions locked	07P2T-3430-714S000S
			On / off locked	07P2T-3430-71400S0S

PACKAGING

Foam polystyrene box:	50 pieces
Antistatic blister box:	50 pieces

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75:	Part number 4424-22 (50 pieces / bag), brass
Slotted nut M6 x 0.75:	Part number 4424-28 (50 pieces / bag), brass
	Part number 4424-31 (50 pieces / bag), stainless steel (cross slot)

¹ For other types | Options see type key

CODED SWITCH

07P2T

Specifications

MECHANICAL DATA

Detent angle positions:	36° detent angle 10 positions
Rotary limitation end stop:	Configurable
Switching torque:	7 Ncm (± 25 % in new condition)
Rotational life:	> 10'000 cycles (tested at room temperature)
Rotational stop strength:	> 70 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connections:	Pins 0.4 x 0.7 mm
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 200 mA (resistive load)
Contact resistance:	< 50 m Ω (in new condition)
Switching breaking capacity:	< 5 VA
Signal coding:	BCD or BCD complementary
Switching mode:	Shorting or non-shortening (non-shortening only with BCD possible)
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting, fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass
Slotted nut:	Brass or stainless steel
Lock washer:	Steel (zinc plated)
Snap ring:	Stainless steel
O-rings:	NBR (nitrile rubber), 70 shore A
Front panel sealing:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 600068-2-14)
Storage temperature:	-40 to +85 °C (IEC 600068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

CODED SWITCH

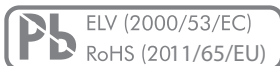
C08

Product description

MAIN FEATURES

MINIATURE DESIGN

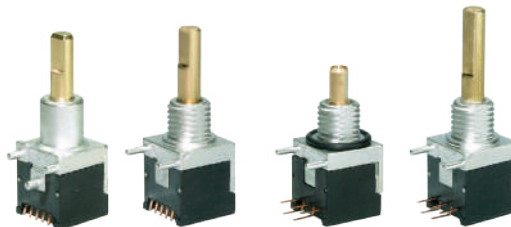
- › Gray coding 16 positions
- › Switching mode: Shorting
- › Switching torque: 2.5 Ncm
- › Body size: 9 x 9 x 10 mm
- › Lowest profile PCB to shaft center line: 4.65 mm
- › Switching cycles 20'000
- › THT horizontal
- › IP68 front panel sealing
- › Operating temperature range: -40 to +85 °C



PRODUCT VARIETY

- Threaded or non threaded bushing
- With end stop or endless rotating
- Front panel sealing IP60 or IP68
- Various shaft types
- Tray or tape & reel packaging

C08



POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Others

TYPICAL APPLICATIONS

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

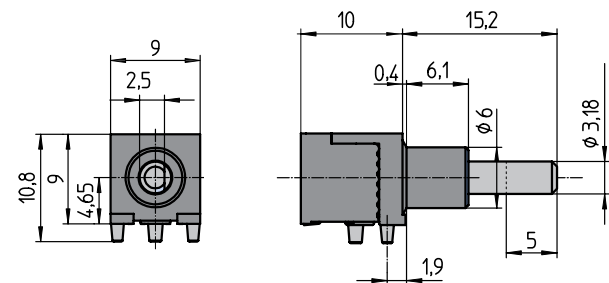
CODED SWITCH

C08

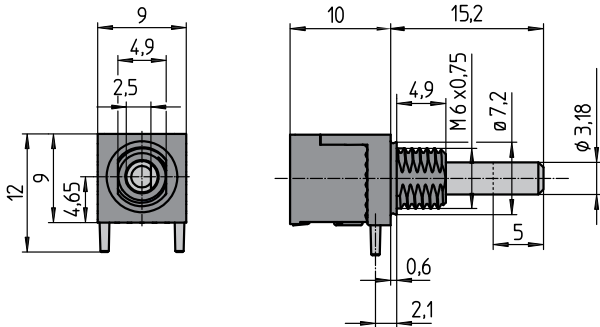
Dimensions and pin assignment

SWITCH DESIGN

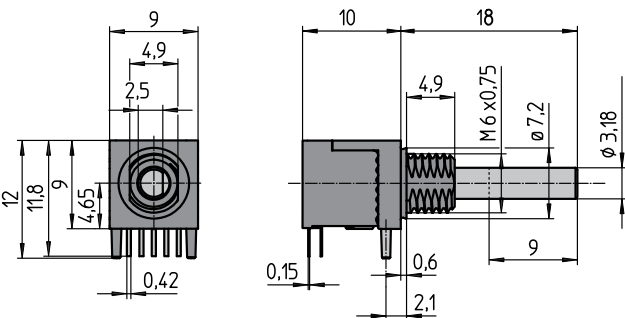
SMT NON-THREADED



SMT THREADED



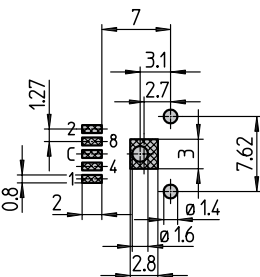
THT THREADED



PIN ASSIGNMENT AND DRILLING DIAGRAM

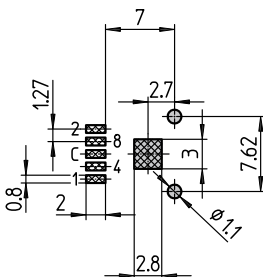
SMT NON-THREADED

View from component side of the PCB



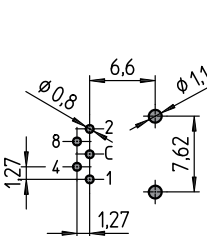
SMT THREADED

View from component side of the PCB



THT NON-THREADED

View from component side of the PCB



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (M), unless otherwise specified

CODED SWITCH

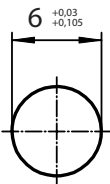
C08

Dimensions and pin assignment

FRONT PANEL CUT OUT

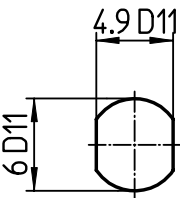
SMT NON-THREADED

View from component side of the PCB



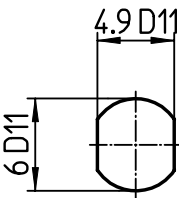
SMT THREADED

View from component side of the PCB



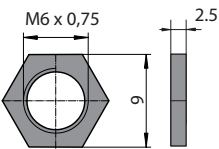
THT THREADED

View from component side of the PCB

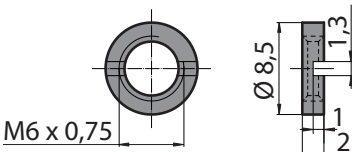


NUT

HEX NUT (SUPPLIED)



SLOTTED NUT



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

C08

Ordering information

ORDERING CODE

C08	-	-	-	1	-	-
-----	---	---	---	---	---	---

MOUNTING

S

 SMT

T

 THT

BUSHING

1

 Threaded (nut supplied, packed separately)

2

 Non-threaded (available for SMT only)

3

 Threaded | IP68 | shaft / front panel sealing (nut supplied, packed separately)

END STOP

1

 With end stop

2

 Endless rotating

PACKAGING

T

 Tray (50 pieces / tray, donut supplied for SMT types)

R

 Tape & reel (300 pieces / reel, donut supplied)

SHAFT TYPE

S

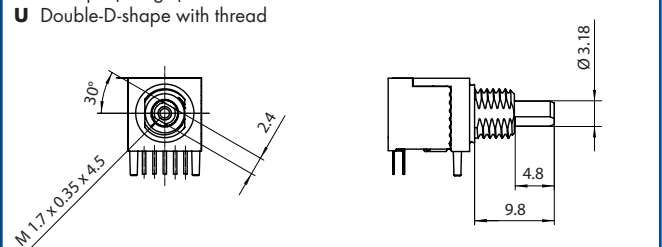
 D-shape | short | 15.2 mm

L

 D-shape | long | 18.0 mm

U

 Double-D-shape with thread



PREFERENCE TYPES SELECTION CHART¹

PACKAGING	IP SEALING	PCB MOUNTING	BUSHING	SHAFT LENGTH	PART NUMBER	
					WITH END STOP	ENDLESS ROTATING
Tray	IP60	SMT	Non-threaded	15.2 mm	C08S211ST	C08S221ST
			Threaded	15.2 mm	C08S111ST	C08S121ST
		THT	Threaded	18 mm	C08T111LT	C08T121LT
			Threaded	15.2 mm	C08T111ST	C08T121ST
	IP68	SMT	Threaded	15.2 mm	C08S311ST	C08S321ST
			Threaded	18 mm	C08T311LT	C08T321LT
		THT	Threaded	18 mm	C08T311LT	C08T321LT
			Threaded	15.2 mm	C08T311ST	C08T321ST

¹ For other types | options, see type key

CODED SWITCH

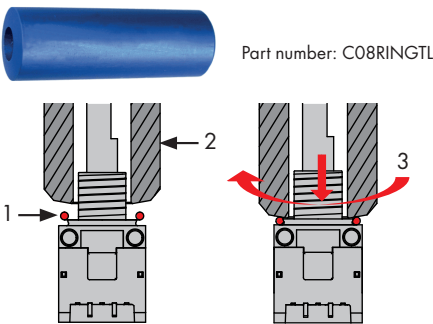
C08

Ordering information

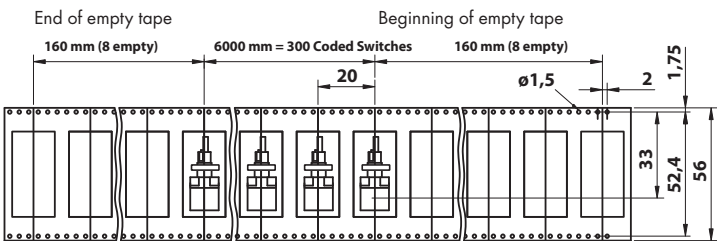
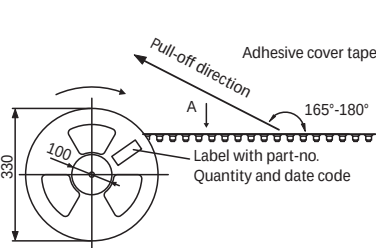
PACKAGING

Blister box:	50 pieces
Tape & reel:	300 pieces

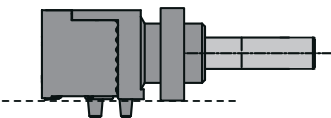
O-RING MOUNTING TOOL



TAPE & REEL PACKAGING



SOLDERING SUPPORT DONUT



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

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75:	Part number 4424-22 (50 pieces / bag), brass
Slotted nut M6 x 0.75:	Part number 4424-28 (50 pieces / bag), brass
	Part number 4424-31 (50 pieces / bag), stainless steel (cross slot)

CODED SWITCH

C08

Specifications

MECHANICAL DATA

Detent angle positions:	22.5° detent angle 16 positions
Rotary limitation end stop:	Without or between first and last position
Switching torque:	2.5 Ncm ($\pm 30\%$ in new condition)
Rotational life:	> 20'000 cycles (tested at room temperature)
Rotational stop strength:	> 40 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	SMT: Soldering surfaces THT: Pins 0.15 x 0.42 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact surface:	< 50 m Ω (in new condition)
Signal coding:	Gray
Switching mode:	Shorting
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Brass CuZn39Pb3
Bushing housing:	Zinc die casting (with miralloy plating), fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy
Hex nut:	Brass
Slotted nut:	Brass or stainless steel
O-rings:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

CODED SWITCH

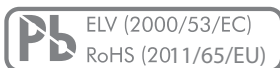
C15

Product description

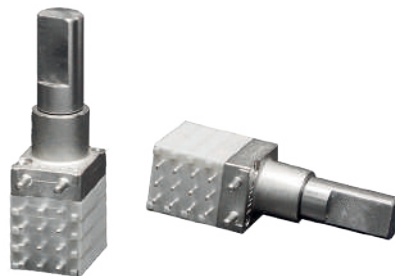
MAIN FEATURES

COSTEFFECTIVE AND MINIATURE DESIGN

- › Gray coding 16 positions
- › Switching mode: Shorting
- › Switching torque: Up to 3 Ncm
- › Body size: 7.7 x 9.35 x 11.1 mm
- › THT horizontal
- › Switching cycles: 15'000
- › Operating temperature range: -30 to +60 °C



C15



PRODUCT VARIETY

- Detent angle 20°, 16 positions, with end stop
- Detent angle 22.5°, 16 positions, endless rotating

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape

TYPICAL APPLICATIONS

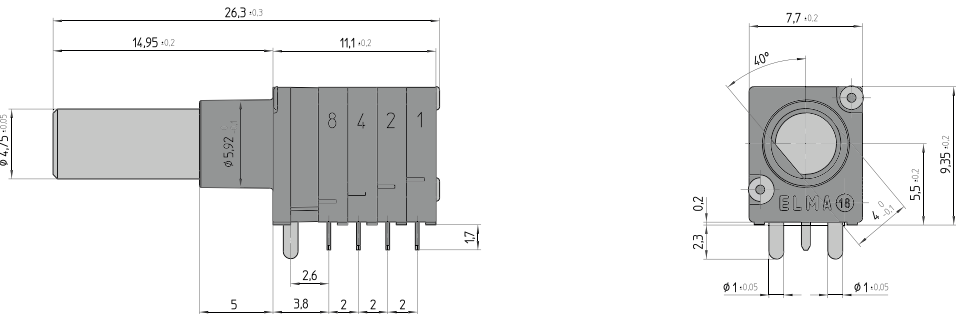
- Frequency and channel selection for two way radios
- Other miniaturized mobile applications

CODED SWITCH

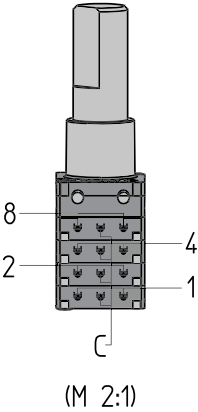
C15

Dimensions and pin assignment

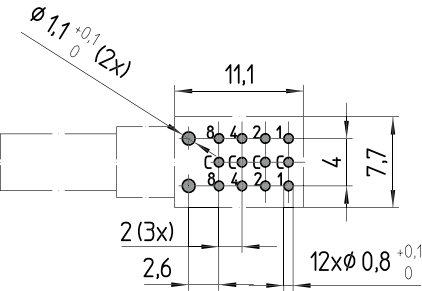
SWITCH DESIGN



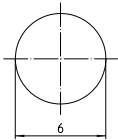
PIN ASSIGNMENT



DRILLING DIAGRAM AND FOOTPRINT



FRONT PANEL CUT OUT



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

CODED SWITCH

C15

Specifications

MECHANICAL DATA

Detent angle positions:	20° detent angle 16 positions
Rotary limitation end stop:	Between first and last position
Switching torque:	3 Ncm (±25 % in new condition)
Rotational life:	> 15'000 cycles (tested at room temperature)
Allowed shaft load:	300 N push and 300 N pull (max. during 60 s)
Rotational stop strength:	> 65 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.25 x 0.6 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 50 mΩ (in new condition) < 1 Ω (after 15'000 cycles)
Signal coding:	Gray
Switching mode:	Shorting
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 100 MΩ at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting (nickel plated)

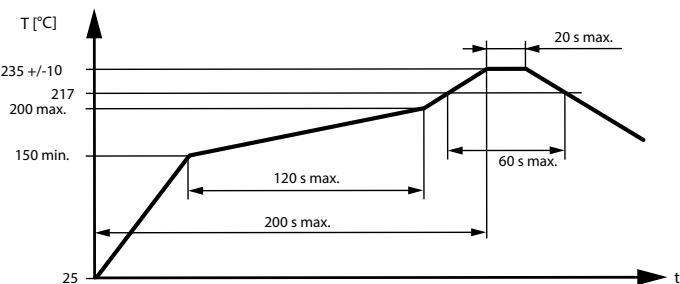
ENVIRONMENTAL DATA

Operating temperature:	-30 to +60 °C (IEC 60068-2-14)
Storage temperature:	-55 to +85 °C (IEC 60068-2-14)
Humidity:	< 80 % relative humidity (at 25 ±2 °C)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	Frequency: 10 to 60 Hz within 1 min Travel: 1.524 mm Testing time: 30 min per axis

SOLDERING CONDITIONS

Hand soldering:	< 350 °C during 3 s
Wave soldering:	< 280 °C during 2 s
Reflow soldering:	according to IPC / JEDEC J-STD-020C

REFLOW SOLDERING



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

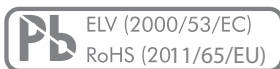
CODED SWITCH

C16

Product description

MAIN FEATURES

- › Gray coding 16 positions
- › Switching mode: Shorting
- › Switching torque: 3 Ncm
- › Body size: 10 x 11 x 9.1 mm
- › THT
- › Switching cycles: 15'000
- › Operating temperature range: -40 to +85 °C



PRODUCT VARIETY

- Detent angle 20°, 16 positions, with end stop
- Detent angle 22.5°, 16 positions, endless rotating

POSSIBLE CUSTOMIZATIONS

- Shaft dimension, shape and material

TYPICAL APPLICATION

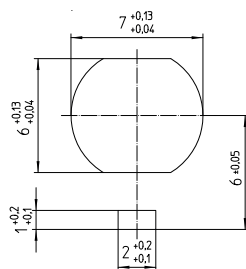
- Frequency and channel selection for two way radios
- Other miniaturized mobile applications

C16



C16

SWITCH DESIGN



71

CODED SWITCH

C16

Specifications

MECHANICAL DATA

Detent angle positions:	20° detent angle 16 positions 22.5° detent angle 16 positions
Rotary limitation end stop:	20°: With end stop 22.5°: Without end stop
Switching torque:	3 Ncm (±30 % in new condition)
Rotational life:	> 15'000 cycles (tested at room temperature)
Allowed shaft load:	150 N push and 100 N pull
Rotational stop strength:	> 65 Ncm
Fastening torque of nut (front panel mounting):	M7 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.15 x 1 mm
Switching voltage:	< 10 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 1 Ω
Signal coding:	Gray
Switching mode:	Shorting
Dielectric strength:	250 VAC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 100 MΩ at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting (nickel plated)

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-65 to +125 °C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3)
Humidity:	< 93 % relative humidity (MIL-STD-202G, method 103B, condition B)
IP sealing against front panel:	IP67 only shaft sealing
Vibration:	10 G _{RMS} at 50 to 2'000 Hz (MIL-STD-202G, method 214A, duration 15 min)

SOLDERING CONDITIONS

Hand soldering:	< 350 °C during 3 s
Wave soldering:	< 270 °C during 5 s

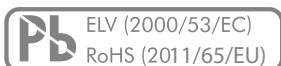
Encoder

Elma offers various mechanical encoders with highest haptic standards, single or dual shaft, with or without PCB, up to turnkey or a customized solution.

CONTACT US

ENCODER

- › 16 to 32 detent resolution
- › Up to 1 Million rotations
- › Various switching torques from 0 to 4.5 Ncm
- › Gold plated contacts | optical sensing
- › THT vertical or horizontal | SMT reflow
- › IP68 shaft and front panel sealing
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



E18 | E33 | E33 IFS | E37



TYPE COMPARISON

FEATURES PER SWITCH TYPE	E18	E33	E33 INTERFACE SOLUTIONS	E37
Main feature	Market typical footprint	High performance	Interface for encoder E33 with and without debouncing	Two independent wafers
Dimensions	14.4 x 11.4 x 6.5 mm	11.5 x 12.3 x 4.9 mm	24.3 x 19 x 8.1 mm	11.5 x 12.3 x 9.1 mm
Mounting type	Thread M7 x 0.75 or without thread	Thread M7 x 0.75 or without thread	According to E33	Thread M7 x 0.75 or without thread
Electrical connection	SMT THT vertical	SMT THT horizontal THT vertical	Micro-MaTch socket FFC connector Soldering connection Ribbon cable	THT horizontal THT vertical
Positions	16, 24 or 30 positions	16, 32 positions or no detent	According to E33	Inner shaft: 16 positions or no detent Outer shaft: 16, 32 positions or no detent
Switching torque	0.5 to 2.5 Ncm	0.5 to 4.5 Ncm or no detent	According to E33	0.5 to 4.5 Ncm or no detent
Rotational life of detent system	Up to 150'000 revolutions	Up to 1 Million revolutions	According to E33	Up to 1 Million revolutions
PPR (Pulses Per Revolution)	8, 12 or 15 PPR	8 or 16 PPR	According to E33	8 or 16 PPR
Actuation force of push button	3, 6 N or without push button	3 to 14 N or without push button	According to E33	3 to 14 N or without push button
Shaft type	32 shaft types	32 shaft types	According to E33	2 shaft types
IP-sealing	IP60 or IP68 (shaft sealing)	IP60, IP65 or IP68	According to E33	IP60, IP65 or IP68
Operating temperature	-40 to +85 °C	-40 to +85 °C	-25 to +85 °C	-40 to +85 °C
SEE	PAGE 76	PAGE 83	PAGE 92	PAGE 97

ENCODER

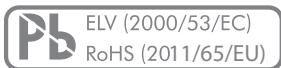
E18

Product description

MAIN FEATURES

MECHANICAL INCREMENTAL ENCODER

- › Body size: 14.4 x 11.4 x 6.5 mm
- › Rotational life: Up to 150'000 revolutions
- › Resolution: 16, 24 or 30 detents
- › Detent torque: 0.5, 1.5 or 2.5 Ncm
- › With or without push button
- › Push force: 3, 6 N
- › Gold plated sliding contacts
- › IP68 shaft sealing available
- › Various shaft types in brass and stainless steel available
- › Reflow ability
- › Various options and customizations possible

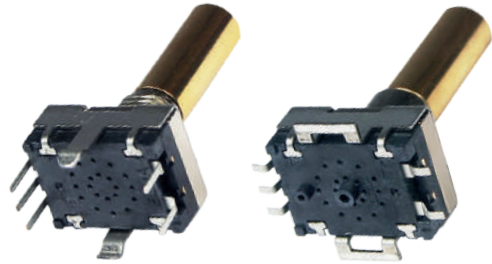


MIL-STD-202G

SWISS CLICK INDEXING SYSTEM™

(for more information see chapter «Technical explanations»)

E18



PRODUCT VARIETY

- With and without push button
- THT or SMT reflow
- Threaded or non-threaded bushing
- Detent torque with 0.5, 1.5 or 2.5 Ncm
- Tray or tape & reel packaging
- Shaft mounted, separated or without shaft

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Detent torque
- Front panel sealing

TYPICAL APPLICATIONS

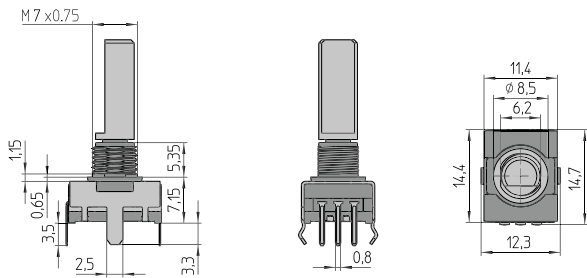
- White goods and household applications
- Home automation
- Two way radio applications
- Power and heat distribution controls
- Water distribution controls
- Industrial controllers
- Audio and entertainment systems

Dimensions and pin assignment

SWITCH DESIGN

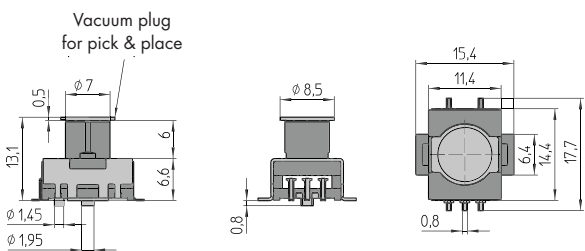
THT VERTICAL

Example of illustration with thread



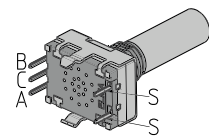
SMT

Example of illustration without thread

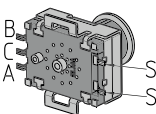


PIN ASSIGNMENT

THT VERTICAL



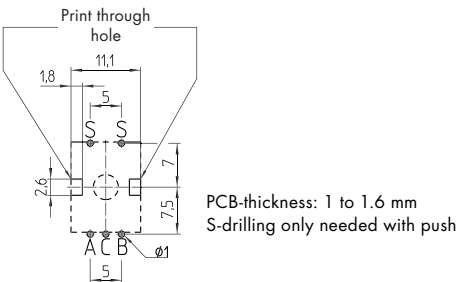
SMT



DRILLING DIAGRAM AND FOOTPRINT

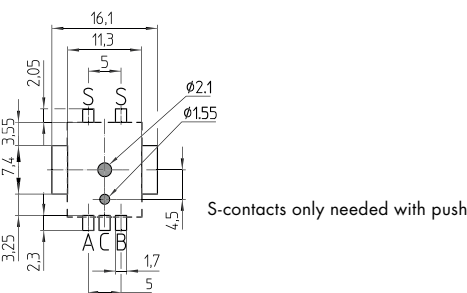
THT VERTICAL

View from component side of the PCB



SMT

View from component side of the PCB



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

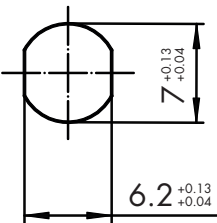
ENCODER

E18

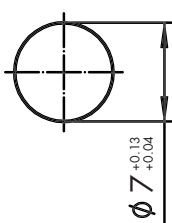
Dimensions and pin assignment

FRONT PANEL CUT OUT

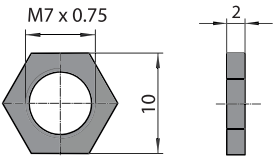
THREADED



NON-THREADED

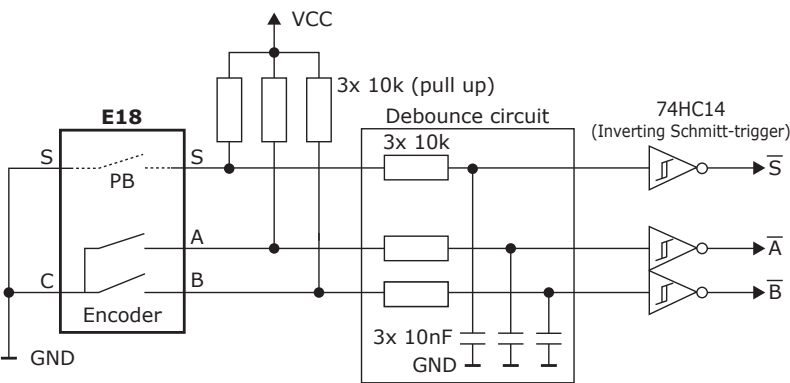


NUT



Circuit diagram

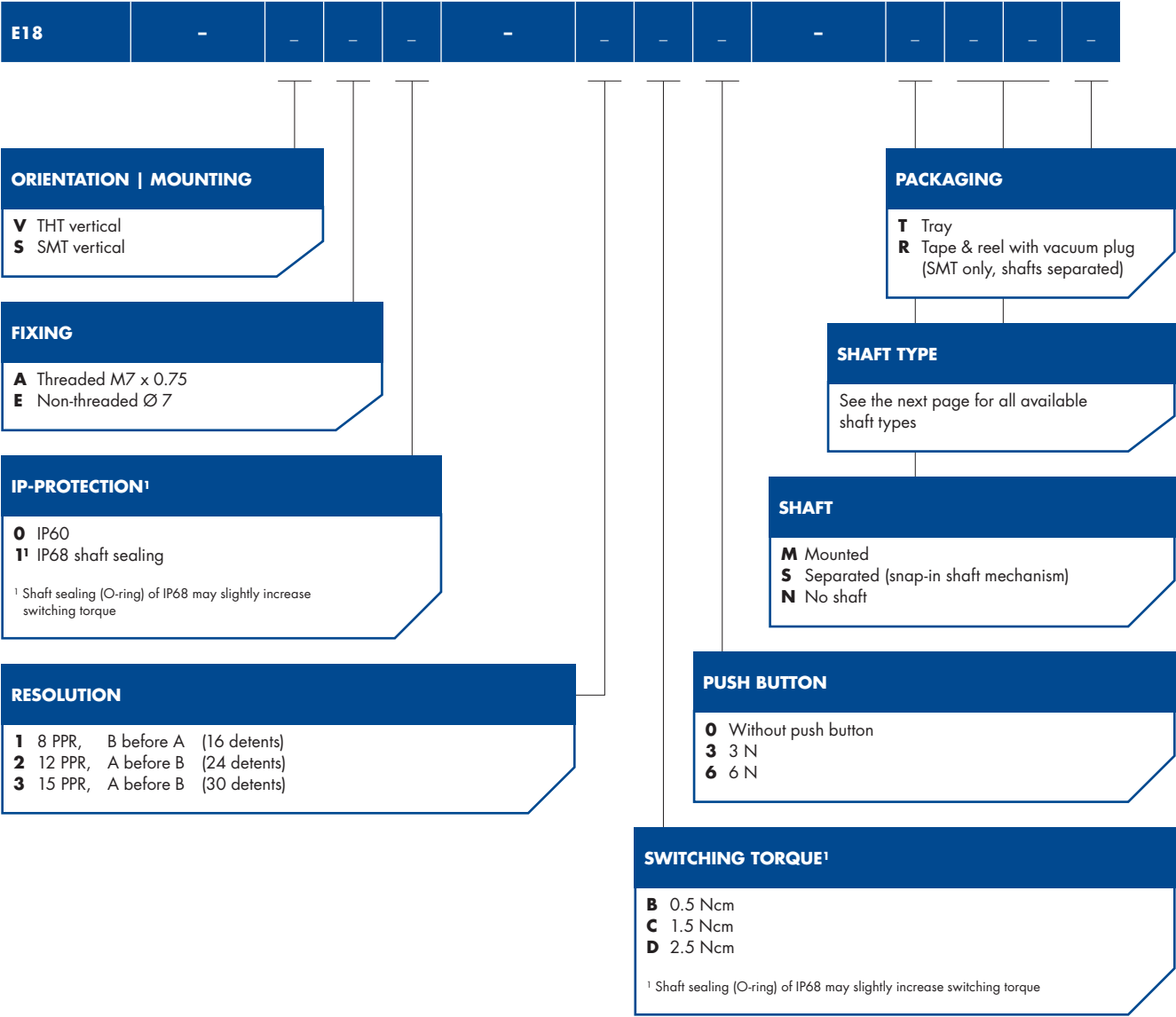
RECOMMENDED SYSTEM INTERFACE



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

Ordering information

ORDERING CODE



Ordering information

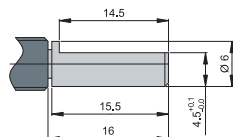
¹ Threaded bushing: Shaft to be ordered separately; shaft mounting after encoder assembly to front panel (nut does not fit 1/4" shaft diameter). OTHER SHAFTS ARE AVAILABLE ON REQUEST.

SHAFT TYPES

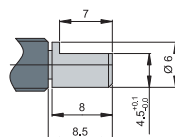
Type 00 - no shaft



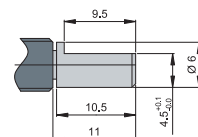
Type 01 - brass



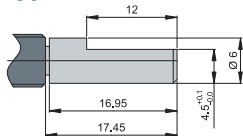
Type 03 - brass



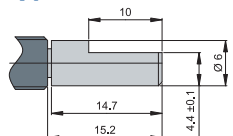
Type 30 - brass



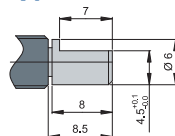
Type 31 - stainless steel



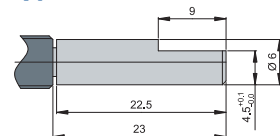
Type 32 - brass



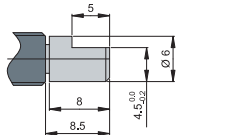
Type 33 - stainless steel



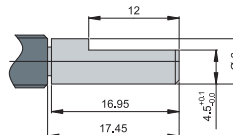
Type 34 - brass



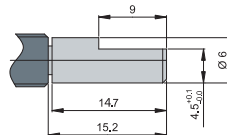
Type 37 - stainless steel



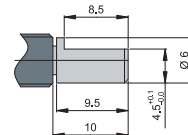
Type 70 - brass



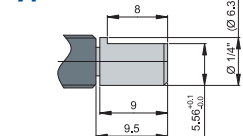
Type 71 - brass



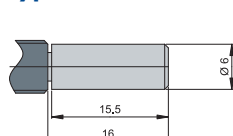
Type 72 - brass



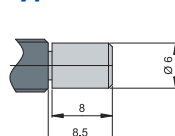
Type¹ 51 - brass



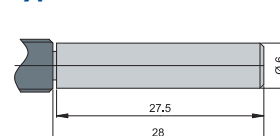
Type 10 - brass



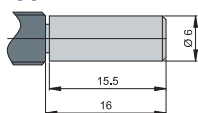
Type 11 - brass



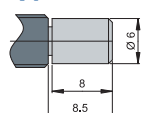
Type 12 - brass



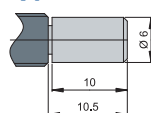
Type 13 - stainless steel



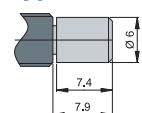
Type 14 - stainless steel



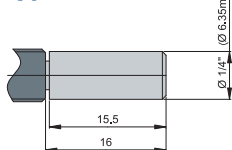
Type 15 - brass



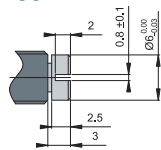
Type 16 - brass



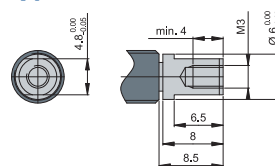
Type¹ 20 - brass



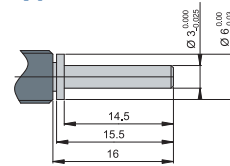
Type 02 - brass



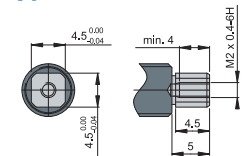
Type 43 - brass



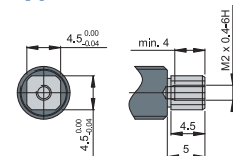
Type 42 - brass



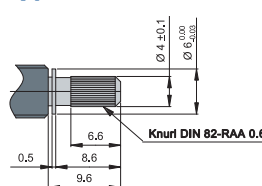
Type 45 - stainless steel



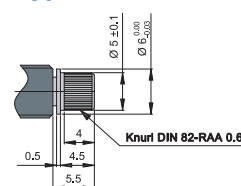
Type 47 - brass



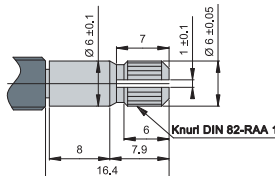
Type 08 - brass



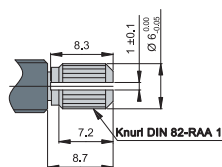
Type 40 - brass



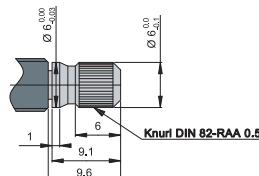
Type 41 - brass



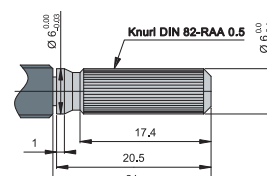
Type 60 - brass



Type 0H - brass



Type 44 - brass



Ordering information

PACKAGING

Blister box:	50 pieces (depending on shipment quantity, nuts are supplied and packed separately)
Tape & reel:	200 pieces (only SMT, shafts and nuts are packed separately)

ACCESSORIES AND SPARE PARTS

Hex nut M7 x 0.75:	Part number 4516-40 (50 pieces / bag), brass, nickel plated
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Specifications

MECHANICAL DATA

Positions:	16 positions 24 positions 30 positions
Switching torque:	0.5, 1.5 or 2.5 Ncm (± 30 % in new condition)
Rotational life:	> 150'000 revolutions with 0.5 Ncm (tested at room temperature) > 100'000 revolutions with 1.5 Ncm (tested at room temperature) > 60'000 revolutions with 2.5 Ncm (tested at room temperature)
Allowed shaft load:	100 N push, 100 N pull and 50 N side load (static at 20 mm from the support surface)
Fastening torque of nut (front panel mounting):	M7 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.2 x 0.8 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 10 Ω (over the entire rotational life)
Signal coding:	2-Bit quadrature
Resolution (pulses per revolution):	8, 12 or 15 PPR per channel
Phase shift:	90° ($\pm 45^\circ$)
Contact bouncing:	< 8 ms (at 15 RPM)
Dielectric strength:	500 VDC during 60 s (MIL-STD-202G, method 301, between housing and shaft)
Insulation resistance:	> 100 M Ω at 250 VDC (in new condition)

MATERIALS

Shaft:	Brass CuZn38Pb2 or stainless steel 1.4305
Bushing housing:	Zinc die casting (nickel plated), fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass (nickel plated)
Housing clamp:	Tinplate
O-rings:	NBR (nitrile rubber), 70 shore A

Specifications

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-65 to +105 °C (IEC 60068-2-14)
Humidity:	< 93 % relative humidity (MIL-STD-202G, method 103B, condition B)
IP sealing against front panel:	IP60 without sealing IP68 with shaft sealing (2 bar, 1 h)
Vibration:	9 G _{RMS} at 50 to 2'000 Hz (MIL-STD-202G, method 214A, duration 15 min)
Shock:	100 G (MIL-STD-202G, method 213B, condition C)
Flammability:	UL94-V0 Gaskets UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 300 °C during 3 s
Wave soldering:	< 280 °C during 5 s
Reflow soldering:	according to IPC / JEDEC J-STD-020C*

MECHANICAL DATA FOR PUSH BUTTON

Actuation force:	3, 6 N (±30 % in new condition)
Travel:	0.5 (±0.2) mm
Lifecycles:	> 100'000 cycles (tested at room temperature)

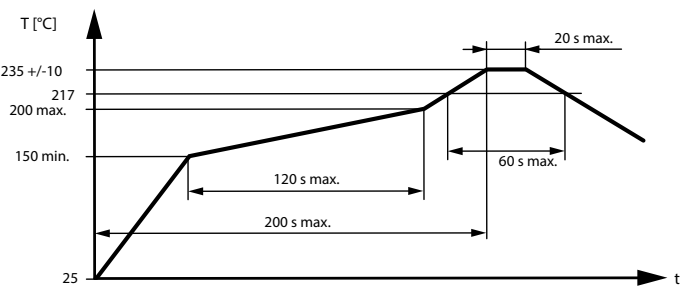
ELECTRICAL DATA FOR PUSH BUTTON

Contact resistance:	< 10 Ω (over entire rotational life)
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact bouncing:	< 2 ms (at 2 Hz)

MATERIALS FOR PUSH BUTTON

Contact surface:	Cu alloy (Au plated)
Snap dome:	Stainless steel

*REFLOW SOLDERING



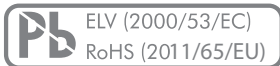
Temperatures or process durations exceeding rated maximum conditions may harm switch function.

Product description

MAIN FEATURES

HIGH PERFORMANCE

- › Standard resolution: 16 or 32 detents
- › With or without integrated push button
- › Rotational life: Up to 1 Million revolutions
- › Up to 4.5 Ncm switching torque (remains consistent over lifetime)
- › Gold plated contacts
- › Robust metal housing with stainless steel or brass shaft
- › Body size: 11.5 x 12.3 x 4.9 mm
- › IP68 shaft and front panel sealing
- › Operating temperature range: -40 to +85 °C
- › Shaft electrically insulated > 500 VDC (shaft to contact system)
- › Various options and customizations possible

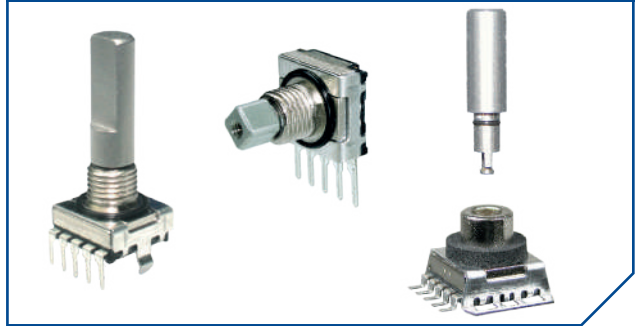


MIL-STD-202G

SWISS CLICK INDEXING SYSTEM™

(for more information see chapter «Technical explanations»)

E33



PRODUCT VARIETY

- Vertical or horizontal mounting
- THT or SMT reflow (vacuum pick & place)
- Threaded or non-threaded bushing
- Push button force 3, 6, 10, 14 N or without push button
- Detent | pulses per revolution (PPR)
32 / 16, 32 / 8, 16 / 16, 16 / 8
- Switching torque 0.5, 1, 1.5, 2, 2.5, 3, 3.5 or 4.5 Ncm or no detent
- Front panel sealing IP60 or IP68
- Shaft mounted, separated or without shaft
- Various standard shafts available
- Tray or tape & reel packaging

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Stainless steel housing
- Switching torque and push button actuation force
- Indexing resolution and PPR

TYPICAL APPLICATIONS

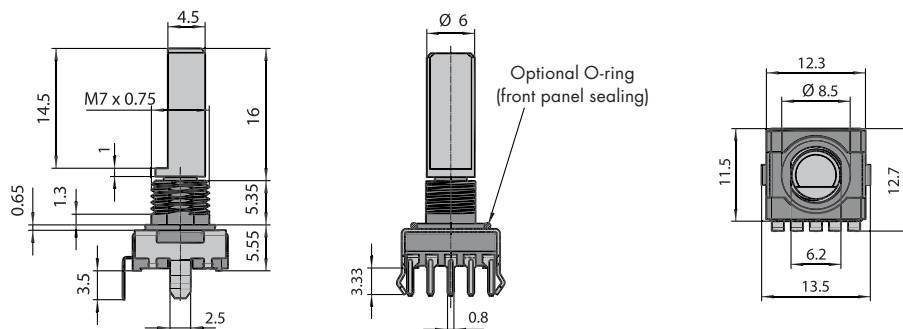
- Value and menu control for industrial PLCs
- Avionics, measurement and test equipment
- Frequency and channel selection for two way radios
- User interface controls for medical devices
- Volume and menu setting for transportation control and entertainment systems

Dimensions and pin assignment

SWITCH DESIGN

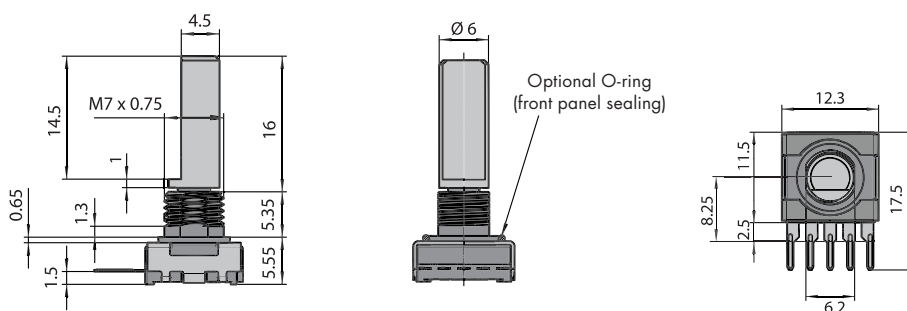
THT VERTICAL

Example of illustration with thread



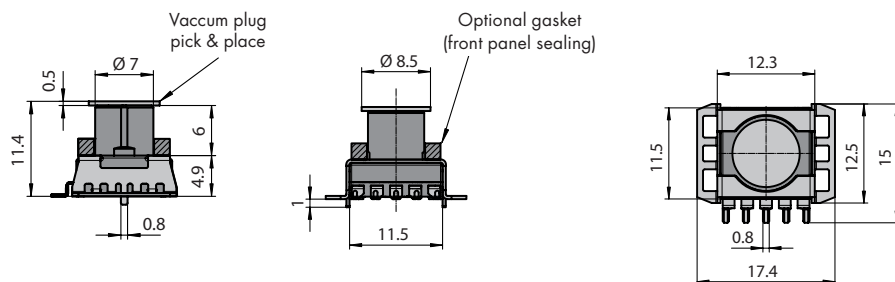
THT HORIZONTAL

Example of illustration with thread



SMT VERTICAL

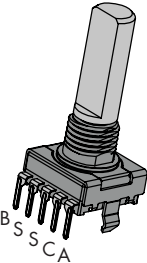
Example of illustration without thread



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

Dimensions and pin assignment

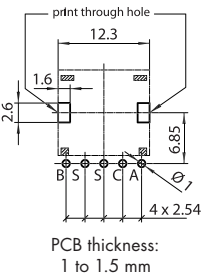
PIN ASSIGNMENT



DRILLING DIAGRAM AND FOOTPRINT

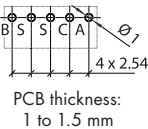
THT VERTICAL

View from component side of the PCB



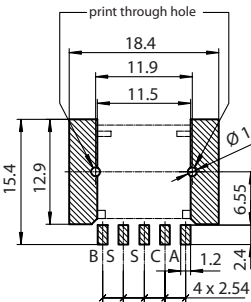
THT HORIZONTAL

View from component side of the PCB



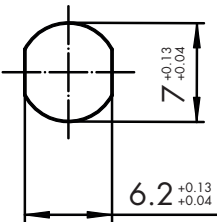
SMT VERTICAL

View from component side of the PCB

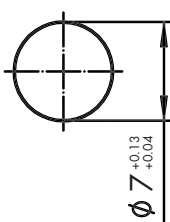


FRONT PANEL CUT OUT

THREADED



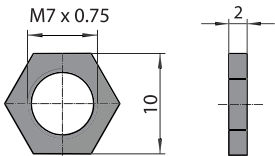
NON-THREADED



All shaft and bushing types are available for all versions, THT vertical, THT horizontal or SMT vertical (see type key).

NUT

HEX NUT (SUPPLIED)



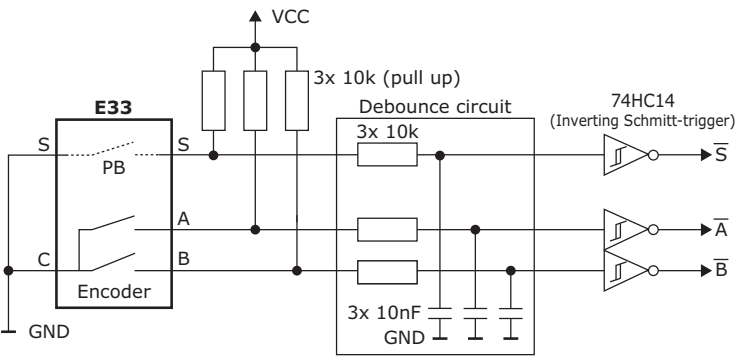
Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

ENCODER

E33

Circuit diagram

RECOMMENDED SYSTEM INTERFACE



Ordering information

ORDERING CODE

E33	-	-	-	-	-	-	-	-	-	-	-
-----	---	---	---	---	---	---	---	---	---	---	---

ORIENTATION | MOUNTING

- V** THT vertical
- C** THT horizontal
- S** SMT vertical

BUSHING

- T** Threaded M7 x 0.75 x 6 mm
(nut supplied, packed separately)
- N** Non-threaded Ø 7 x 6 mm

PUSH BUTTON

- 0** Without push button
- 3** 3 N
- 6** 6 N
- A** 10 N
- E** 14 N

RESOLUTION | (RESOLUTION) | SWITCHING TORQUE¹

1	32 detent	(16 PPR)	2 Ncm
2	16 detent	(8 PPR)	1.5 Ncm
3	16 detent	(8 PPR)	2.5 Ncm
4	32 detent	(8 PPR)	2 Ncm
5	16 detent	(16 PPR)	1.5 Ncm
6	16 detent	(16 PPR)	2.5 Ncm
8	No detent	(16 PPR)	
9	No detent	(8 PPR)	
A	32 detent	(16 PPR)	0.5 Ncm
B	32 detent	(16 PPR)	1 Ncm
C	32 detent	(16 PPR)	1.5 Ncm
D	32 detent	(16 PPR)	3 Ncm
E	16 detent	(8 PPR)	0.5 Ncm
F	16 detent	(8 PPR)	3.5 Ncm
G	16 detent	(8 PPR)	4.5 Ncm

¹ O-ring of IP65 / IP68 shaft sealing may slightly increase switching torque.

PACKAGING

- T** Tray (THT or SMT, 10 or 50 pieces, tray size depending on shipping quantity)
- R** Tape & reel with vacuum plug (SMT and THT vertical only, 200 pieces / reel, shafts separated)

SHAFT TYPE

For all available shaft types please see next page

SHAFT (DELIVERY CONDITION)

- M** Mounted
- S** Separated (snap-in shaft mechanism)
- N** No shaft

IP SEALING

- 0** IP60
- 1¹** IP68 shaft sealing
- 2¹** IP68 shaft and front panel sealing
(non-threaded bushing gasket provides IP65, O-ring and gasket is mounted)

¹ O-ring of IP65 / IP68 shaft sealing may slightly increase switching torque

Ordering informatio

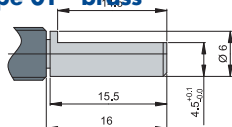
¹ Threaded bushing: Shaft to be ordered separately; shaft mounting after encoder assembly to front panel (nut does not fit 1/4" shaft diameter).
OTHER SHAFTS ARE AVAILABLE ON REQUEST.

SHAFT TYPES

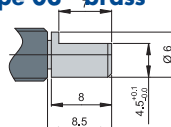
Type 00 - no shaft



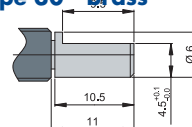
Type 01 - brass



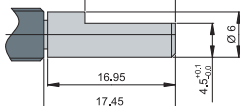
Type 03 - brass



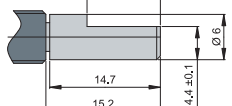
Type 30 - brass



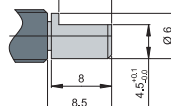
Type 31 - stainless steel



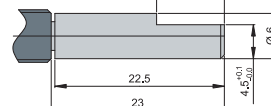
Type 32 - brass



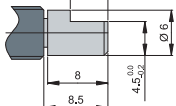
Type 33 - stainless steel



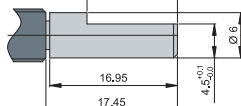
Type 34 - brass



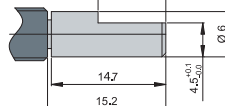
Type 37 - stainless steel



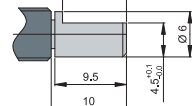
Type 70 - brass



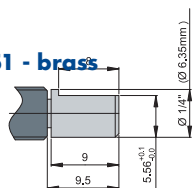
Type 71 - brass



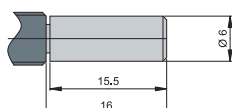
Type 72 - brass



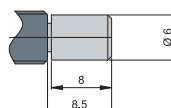
Type¹ 51 - brass



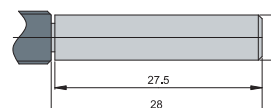
Type 10 - brass



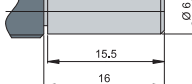
Type 11 - brass



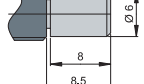
Type 12 - brass



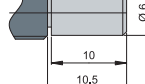
Type 13 - stainless steel



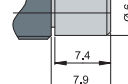
Type 14 - stainless steel



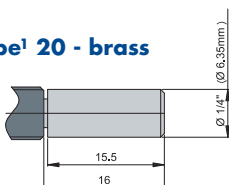
Type 15 - brass



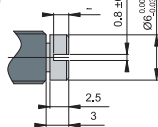
Type 16 - brass



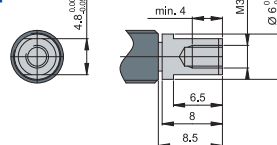
Type¹ 20 - brass



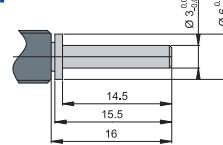
Type 02 - brass



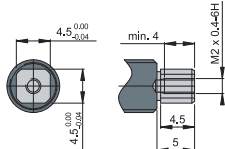
Type 43 - brass



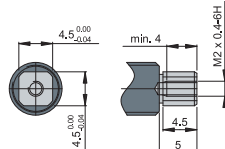
Type 42 - brass



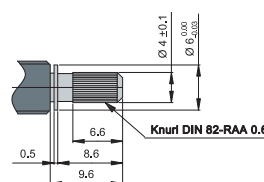
Type 45 - stainless steel



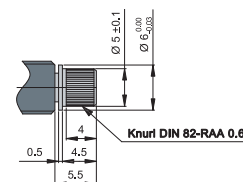
Type 47 - brass



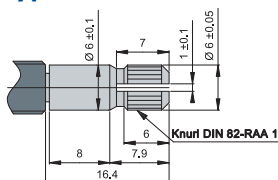
Type 08 - brass



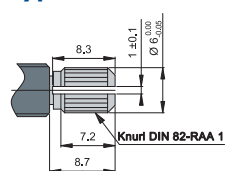
Type 40 - brass



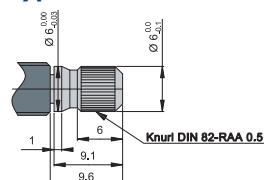
Type 41 - brass



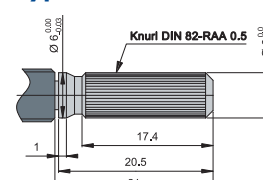
Type 60 - brass



Type 0H - brass



Type 44 - brass



Ordering information

PREFERENCE TYPES SELECTION CHART¹

PUSH BUTTON	IP SEALING	RESOLUTION	SWITCHING TORQUE	THT VERTICAL (THREADED BUSHING ³)	SMT VERTICAL (NON THREADED BUSHING)
Yes, 6 N	IP60	32 detent (16 PPR)	2 Ncm	E33-VT610-M01T	E33-SN610-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT630-M01T	E33-SN630-M01T
	IP68 ² (Shaft & front panel)	32 detent (16 PPR)	2 Ncm	E33-VT612-M01T	E33-SN612-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT632-M01T	E33-SN632-M01T
No	IP60	32 detent (16 PPR)	2 Ncm	E33-VT010-M01T	E33-SN010-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT030-M01T	E33-SN030-M01T
	IP68 ² (Shaft & front panel)	32 detent (16 PPR)	2 Ncm	E33-VT012-M01T	E33-SN012-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT032-M01T	E33-SN032-M01T

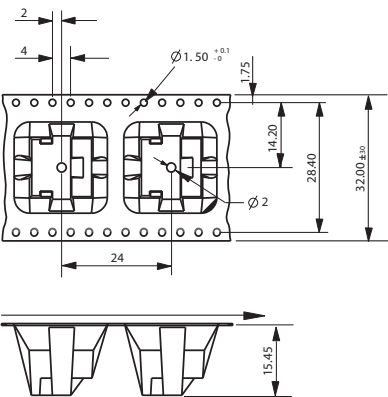
All of these types are tray packed and fitted with standard shaft type 01.
¹ For other types | options see ordering code.
² Non-threaded bushing: Gasket provides IP65.
³ Nut supplied.

PACKAGING

- Tray:
- 10 or 50 pieces (depending on shipment quantity, nuts are supplied and packed separately)
- Tape & reel:
- 200 pieces (SMT only, shaft and nuts are packed separately)

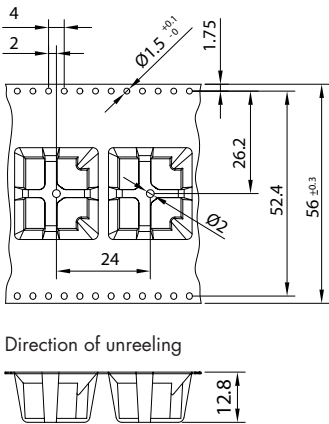
TAPE & REEL PACKAGING

THT VERTICAL



Reel size: 13"
200 pieces / reel
Tape width: 32 mm
Tape pitch: 24 mm

SMT VERTICAL



Reel size: 13"
200 pieces / reel
Tape width: 56 mm
Tape pitch: 24 mm

Ordering information

ACCESSORIES AND SPARE PARTS

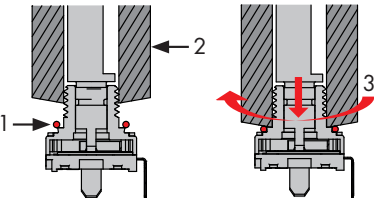
HEX NUT

Hex nut M7 x 0.75: Part number 4516-40 (50 pieces / bag), brass nickel plated

O-RING MOUNTING TOOL



Part number: E33-ORING-TOOL



- 1 Slip the lubricated O-ring over the bushing.
- 2 Slide the mounting tool over the bushing.
- 3 While pushing down the O-ring simultaneously rotate the mounting tool.

Specifications

MECHANICAL DATA

Positions:	12 positions 32 positions No detent
Switching torque:	16 positions: 0.5, 1.5, 2.5, 3.5 or 4.5 Ncm ($\pm 30\%$ in new condition) 32 positions: 0.5, 1, 1.5, 2 or 3 Ncm ($\pm 30\%$ in new condition) No detent
Rotational life:	> 1'000'000 revolutions with 0.5, 1 or 1.5 Ncm switching torque or no detent > 500'000 revolutions with 2 Ncm switching torque > 300'000 revolutions with 2.5 Ncm switching torque > 100'000 revolutions with 3, 3.5 or 4.5 Ncm switching torque (tested at room temperature)
Allowed shaft load:	50 N push, 50 N pull and 50 N side load (static at 20 mm from the support surface)
Fastening torque of nut (front panel mounting):	M7 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.23 x 0.8 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 10 Ω (over the entire rotational life)
Signal coding:	2-Bit-quadrature
Resolution (pulses per revolution):	16 or 8 PPR per channel (A leads B clockwise)
Rotational speed:	< 60 rpm
Phase shift:	90° ($\pm 70^\circ$)
Contact bouncing:	< 2 ms (at 60 rpm)
Dielectric strength:	500 VDC during 60 s (MIL-STD-202G, method 301)
Insulation resistance:	> 1 G Ω at 500 VDC (in new condition)

Specifications

MATERIALS

Shaft:	Brass CuZn38Pb2 or stainless steel 1.4305
Bushing housing:	Zinc die casting (nickel plated), fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass (nickel plated)
Housing clamp:	Tinplate
O-rings:	NBR (nitrile rubber), 70 shore A
Front panel sealing:	Threaded bushing: O-ring Non-threaded bushing: EPDM-rubber, 45 shore A, complies with SAE J 18-79

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-65 to +125 °C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3)
Humidity:	< 93 % relative humidity (MIL-STD-202G, method 103B, condition B)
IP sealing against front panel:	IP60 without sealing IP65 with non-threaded bushing, shaft and front panel sealing IP68 with threaded bushing, shaft and front panel sealing (2 bar, 1h)
Vibration:	29 G _{RMS} at 100 to 1'000 Hz (MIL-STD-202G, method 214A, condition 1 h / 15 min)
Shock:	100 G (MIL-STD-202G, method 213B, condition C)
Flammability:	UL94-V0 Gasket UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 300 °C during 3 s
Wave soldering:	< 280 °C during 5 s
Reflow soldering:	according to IPC/JEDEC J-STD-020C*

MECHANICAL DATA FOR PUSH BUTTON

Actuation force:	3, 6, 10 or 14 N (±30 % in new condition)
Travel:	0.5 (±0.2) mm
Lifecycles:	> 200'000 cycles (tested at room temperature)

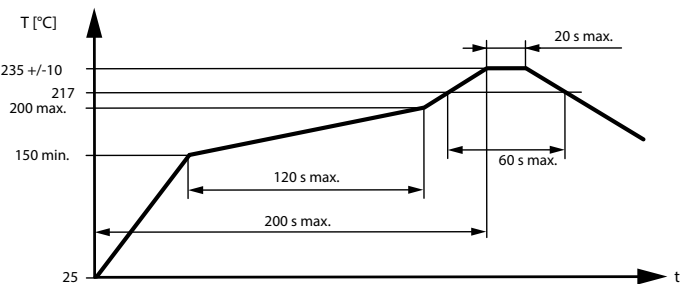
ELECTRICAL DATA FOR PUSH BUTTON

Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact bouncing:	< 2 ms (at 2 Hz)

MATERIALS FOR PUSH BUTTON

Contact surface:	Cu alloy (Au plated)
Snap dome:	Stainless steel (Au plated)

*REFLOW SOLDERING



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

ENCODER

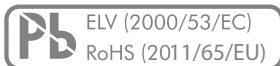
E33 INTERFACE SOLUTIONS

Product description

MAIN FEATURES

CABLE AND CONNECTOR CONNECTION

- › E33 types only with SMT option available
- › With and without debounce circuit
- › Various option and customization possible
- › Easy assembly and integration of the turnkey solution



MIL-STD-202G

SWISS CLICK INDEXING SYSTEM™

(for more information see chapter «Technical explanations»)

PRODUCT VARIETY

- With and without debounce circuit
- With Micro-MaTch socket
- With FFC connector
- With soldering connection
- With ribbon cable

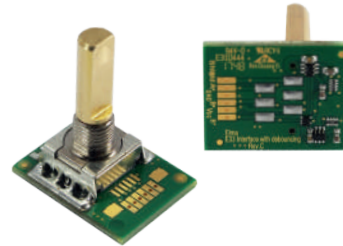
POSSIBLE CUSTOMIZATIONS

- Other connector types
- Different cable length
- Flexible circuit board
- Integration of a custom circuit

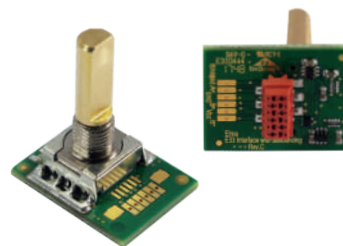
TYPICAL APPLICATIONS

- Value and menu controls for programmable industrial controllers
- Aerospace electronics, measuring and testing equipment
- Controls of the user interface for medical devices
- Volume and menu settings for transport controls and entertainment systems

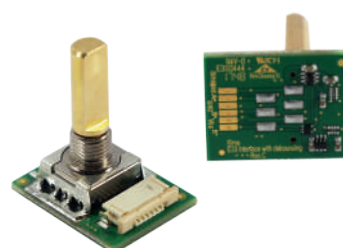
E33 INTERFACE with debounce circuit & soldering connection



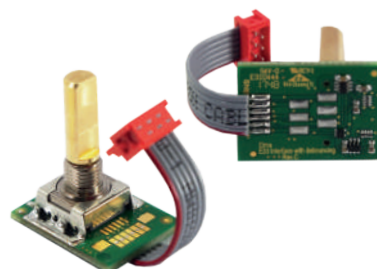
E33 INTERFACE with Micro-MaTch socket



E33 INTERFACE with FFC connector



E33 INTERFACE with ribbon cable



ENCODER

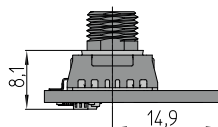
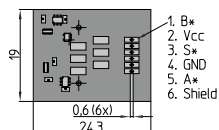
E33 INTERFACE SOLUTIONS

Dimensions and pin assignment

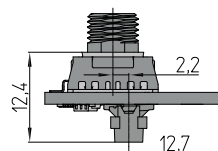
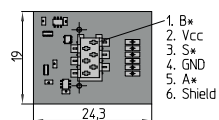
SWITCH DESIGN

WITH DEBOUNCING

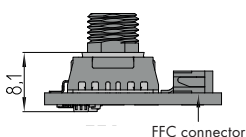
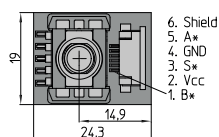
With soldering connection



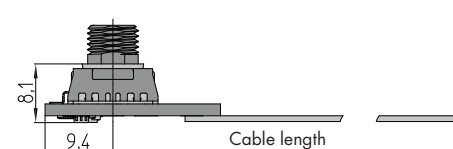
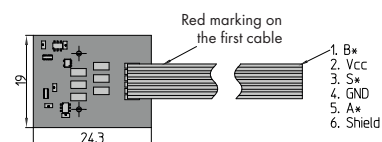
With Micro-MaTch socket



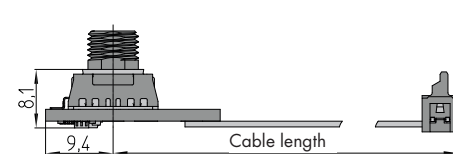
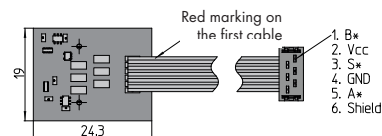
With FFC connector



With ribbon cable



With ribbon cable and Micro-MaTch socket



Dimensions in mm

Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

ENCODER

E33 INTERFACE SOLUTIONS

Dimensions and pin assignment

SWITCH DESIGN

WITHOUT DEBOUNCING

With soldering connection



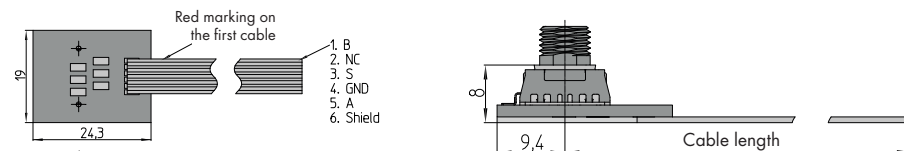
With Micro-MaTch socket



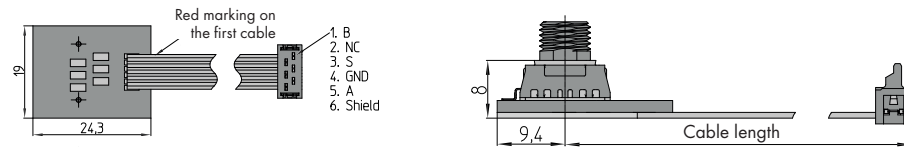
With FFC connector



With ribbon cable



With ribbon cable and Micro-MaTch connector



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

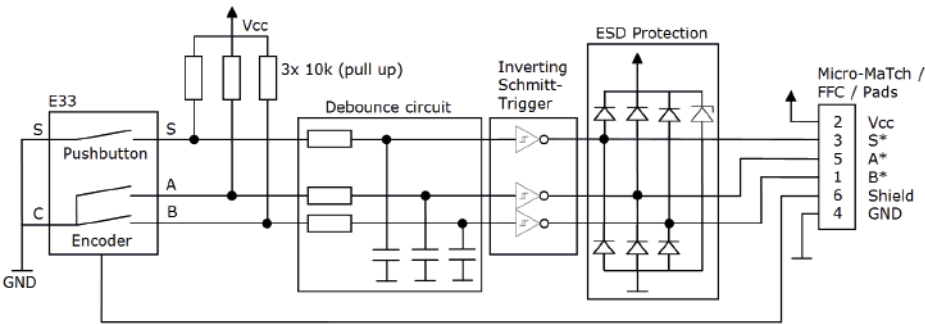
ENCODER

E33 INTERFACE SOLUTIONS

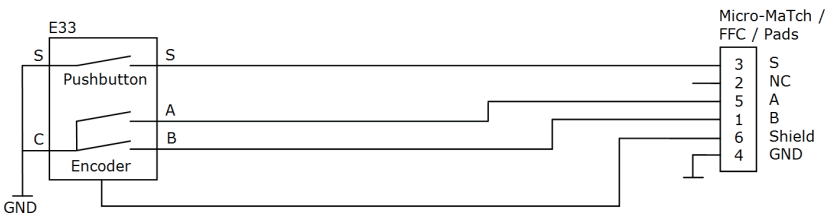
Circuit diagram

RECOMMENDED SYSTEM INTERFACE

WITH DEBOUNCING



WITHOUT DEBOUNCING



Ordering information

ORDERING CODE

E33	-	-	-	-
-----	---	---	---	---

DEBOUNCING
D With pull-up and debouncing
N Without debouncing

CONNECTOR CABLE ON PCB
W Without connector, without cable
M Micro-MaTch socket (1.27 mm pitch, 6 pins)
F FFC connector (1 mm pitch, 6 pins)
1 5 cm ribbon cable (1.27 mm pitch, 6 wires)
2 10 cm ribbon cable (1.27 mm pitch, 6 wires)
3 15 cm ribbon cable (1.27 mm pitch, 6 wires)
4 20 cm ribbon cable (1.27 mm pitch, 6 wires)
5 25 cm ribbon cable (1.27 mm pitch, 6 wires)
6 30 cm ribbon cable (1.27 mm pitch, 6 wires)

CONNECTOR AT CABLE END
A Without connector
B Micro-MaTch socket*
* The connector can only be selected if the PCB is selected with a cable

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

ENCODER

E33 INTERFACE SOLUTIONS

Ordering information

PACKAGING

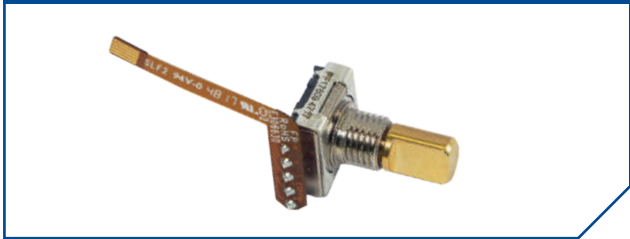
Antistatic blister box: 23 pieces

Customized solutions

CUSTOMIZED FLEXIBLE CIRCUIT BOARDS

- › Customized flexible circuit board layout
- › Customized rigid-flex circuit boards

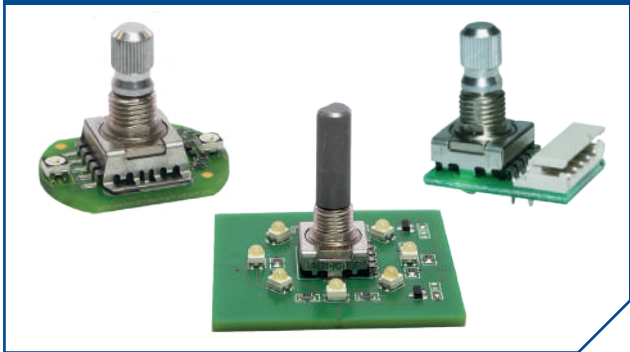
E33 with flexible circuit board



CUSTOMIZED SOLUTIONS ON REQUEST

- › Integration of electronic components / modules
- › Integration of individual lighting solutions (LED)
- › Integration of individual connector solutions

E33 customized circuit board solutions



Specifications

Electrical data

Electrical connection:	Micro-MaTch socket FFC connector Soldering connection Ribbon cable
Operating voltage (Vcc):	1.65 to 5.5 V (for version with debouncing)
Switching voltage:	< 15 VDC (for version without debouncing)
Contact bouncing:	< 2 ms (at 60 rpm) (for version without debouncing)

Environmental data

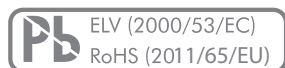
Operating temperature:	-25 to 85 °C (IEC 60068-2-14)
Storage temperature:	-65 to +125 °C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3)

Product description

MAIN FEATURES

DUAL FUNCTION AND HIGH PERFORMANCE

- › Dual encoder: Two encoders - one space
- › Resolution: 16 or 32 detent
- › With or without integrated push button
- › Rotational life: Up to 1 Million revolutions
- › Excellent indexing feel with 0.5, 1, 1.5, 2, 2.5, 3, 3.5 or 4.5 Ncm switching torque (remains consistent over life)
- › Gold plated contacts
- › Robust metal housing
- › Body size: 11.5 x 12.3 x 9.1 mm
- › IP68 shaft and front panel sealing
- › Operating temperature: -40 to +85 °C
- › Shaft electrically insulated > 500 VDC (Shaft to contact system)
- › Various options and customizations

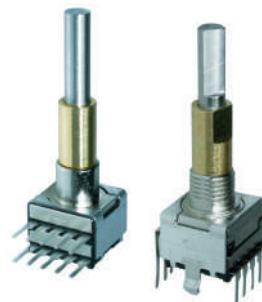


MIL-STD-202G

SWISS CLICK INDEXING SYSTEM™

(for more information see chapter «Technical explanations»)

E37



PRODUCT VARIETY

- Vertical or horizontal mounting
- Threaded or non-threaded bushing
- Push button force 3, 6, 10, 14 N or without push
- Resolution / pulses per revolution (PPR)
32 / 16, 32 / 8, 16 / 16, 16 / 8
- Switching torque 0.5, 1, 1.5, 2, 2.5, 3, 3.5 or 4.5 Ncm or no detent
- Front panel sealing IP60 or IP68

POSSIBLE CUSTOMIZATIONS

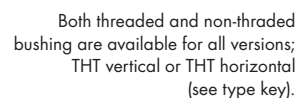
- Shaft dimension and shape
- Stainless steel housing
- Switching torque and push button actuation force
- Indexing resolution and PPR

TYPICAL APPLICATIONS

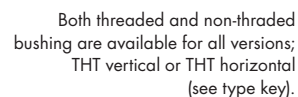
- Cockpit control, radios and navigation
- Desktop and mobile radios
- Professional, portable audio equipment
- Applications where user interface is space critical

SWITCH DESIGN

Example of illustration with thread



Example of illustration without thread



PIN	1	2	3	4	5
	Bi	S	S	Ci	Ai
	6	7	8	9	10
	Bo	NC	NC	Co	Ao

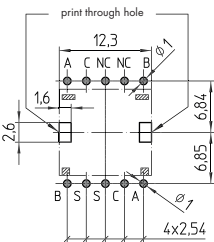
Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

Dimensions and pin assignment

DRILLING AND FOOTPRINT

THT VERTICAL

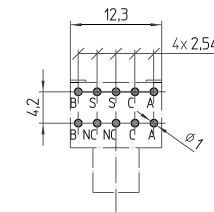
View from component side of the PCB



PCB-thickness: 1 to 1.5 mm

THT HORIZONTAL

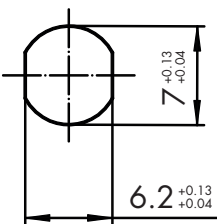
View from component side of the PCB



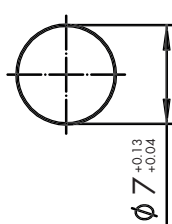
PCB-thickness: 1 to 1.5 mm

FRONT PANEL CUT OUT

THREADED

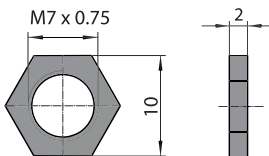


NON-THREADED



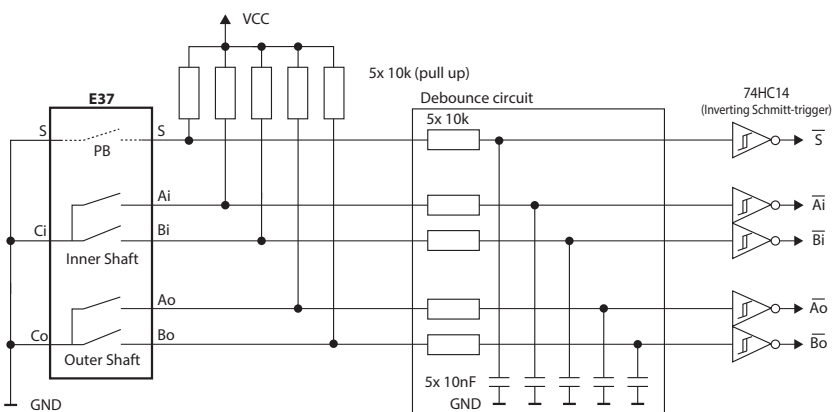
NUT

HEX NUT (SUPPLIED)



Circuit diagram

RECOMMENDED SYSTEM INTERFACE



Ordering information

ORDERING CODE

E37	-	-	-	-	-	-	-	-	-
-----	---	---	---	---	---	---	---	---	---

ORIENTATION | MOUNTING

- V** THT vertical
- C** THT horizontal

BUSHING

- T** Threaded M7 x 0.75 x 6 mm
(nut supplied, packed separately)
- N** Non-threaded Ø 7 x 6 mm

PUSH BUTTON

- 0** Without push button
- 3** 3 N
- 6** 6 N
- A** 10 N
- E** 14 N

INNER SHAFT¹ | RESOLUTION | TORQUE

- | | | | |
|----------|-----------|----------|---------|
| 2 | 16 detent | (8 PPR) | 1.5 Ncm |
| 3 | 16 detent | (8 PPR) | 2.5 Ncm |
| 4 | 16 detent | (16 PPR) | 1.5 Ncm |
| 6 | 16 detent | (16 PPR) | 2.5 Ncm |
| 8 | No detent | (16 PPR) | |
| 9 | No detent | (8 PPR) | |
| G | 16 detent | (8 PPR) | 4.5 Ncm |

¹ O-ring of IP65 / IP68 shaft sealing may slightly increase switching torque

SHAFT TYPE

- 1** Basic (see drawing)
- 2** Inner shaft; Ø 3 mm, same length as basic type

IP SEALING

- 0** IP60
- 1'** IP68 shaft sealing
- 2'** IP68 shaft | front panel sealing
(non-threaded bushing gasket provides IP65,
O-ring | gasket is mounted)

¹ O-ring of IP65 / IP68 shaft sealing may slightly increase switching torque

OUTER SHAFT¹ | RESOLUTION | TORQUE

- | | | | |
|----------------------|-----------|----------|---------|
| 1 | 32 detent | (16 PPR) | 2 Ncm |
| 2 | 16 detent | (8 PPR) | 1.5 Ncm |
| 3 | 16 detent | (8 PPR) | 2.5 Ncm |
| 4 | 32 detent | (8 PPR) | 2 Ncm |
| 5 | 16 detent | (16 PPR) | 1.5 Ncm |
| 6 | 16 detent | (16 PPR) | 2.5 Ncm |
| 8 | No detent | (16 PPR) | |
| 9 | No detent | (8 PPR) | |
| A | 32 detent | (16 PPR) | 0.5 Ncm |
| B² | 32 detent | (16 PPR) | 1 Ncm |
| C | 32 detent | (16 PPR) | 1.5 Ncm |
| D | 32 detent | (16 PPR) | 3 Ncm |
| E | 16 detent | (8 PPR) | 0.5 Ncm |
| F | 16 detent | (8 PPR) | 3.5 Ncm |
| G | 16 detent | (8 PPR) | 4.5 Ncm |

¹ O-ring of IP65 / IP68 shaft sealing may slightly increase switching torque

² Available with non-threaded bushing only

Ordering information

PREFERENCE TYPES SELECTION CHART¹

PUSH BUTTON	INNER SHAFT	OUTER SHAFT	IP SEALING	PART NUMBER	
				THT VERTICAL (THREADED BUSHING)	THT HORIZONTAL (THREADED BUSHING)
Yes, 6 N	16 detent (8 PPR) 2.5 Ncm	16 detent (8 PPR) 2.5 Ncm	IP60	E37-VT6330-1	E37-CT6330-1
			IP68	E37-VT6332-1	E37-CT6332-1
		32 detent (16 PPR) 2 Ncm	IP60	E37-VT6310-1	E37-CT6310-1
			IP68	E37-VT6312-1	E37-CT6312-1

PACKAGING

Blister box: 20 pieces (nuts are supplied and packed separately)

ACCESSORIES AND SPARE PARTS

Hex nut M7 X 0.75: Part number 4516-40 (50 pieces / bag), brass, nickel plated

RECOMMENDED KNOBS



CLASSIC COLLETS 10 / 14.5 MM (FOR SHAFT TYPE Ø 3 MM)

Inner shaft	Cap	10 mm black, glossy	040-1020
	Knob	10 mm, classic collet, glossy	020-2120
Outer shaft	Knob	14.5 mm, classic collet, glossy	020-3440
Inner shaft	Cap	10 mm black, matt	040-1025
	Knob	10 mm, classic collet, matt	020-2125
Outer shaft	Knob	14.5 mm, classic collet, matt	020-3445



METAL KNOBS 11 / 15 MM (FOR SHAFT TYPES Ø 4 MM)

Inner shaft	11 mm, metal
Outer shaft	15 mm, metal

2 pc sets:

Silver: CAE041559

Black: CAE041560

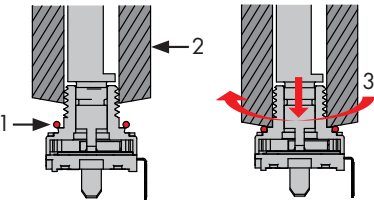
¹ For other types | options see ordering code

Ordering information

ACCESSORIES AND SPARE PARTS



Part number: E33-ORING-TOOL



- 1 Slip the lubricated O-ring over the bushing.
- 2 Slide the mounting tool over the bushing.
- 3 While pushing down the O-ring simultaneously rotate the mounting tool.

Specifications

MECHANICAL DATA

Positions:	Inner shaft: 16 positions or no detent Outer shaft: 16, 32 positions or no detent
Switching torque:	Inner shaft: 16 positions with 1.5, 2.5 Ncm, 4.5 Ncm or without detent ($\pm 30\%$ in new condition) Outer shaft: 32 positions with 0.5, 1, 1.5, 2 or 3 Ncm ($\pm 30\%$ in new condition) 16 positions with 0.5, 1.5, 2.5, 3.5, 4.5 Ncm or no detent ($\pm 30\%$ in new condition)
Rotational life:	> 1'000'000 revolutions with 0.5, 1 or 1.5 Ncm switching torque or no detent > 500'000 revolutions with 2 Ncm switching torque > 300'000 revolutions with 2.5 Ncm switching torque > 100'000 revolutions with 3, 3.5 or 4.5 Ncm switching torque (tested at room temperature)
Allowed shaft load:	50 N push, 50 N pull and 50 N side load (static at 20 mm from support surface)
Fastening torque of nut (front panel mounting):	M7 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.23 x 0.8 mm
Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact resistance:	< 10 Ω (over the entire rotational life)
Signal coding:	2-Bit quadrature
Resolution (pulses per revolution):	16 or 8 PPR per channel
Rotational speed:	< 60 rpm
Phase shift:	90° ($\pm 70^\circ$)
Contact bouncing:	< 2 ms (at 60 rpm)
Dielectric strength:	500 VDC during 60 s (MIL-STD-202G, method 301)
Insulation resistance:	> 1 G Ω at 500 VDC (in new condition)

Specifications

MATERIALS

Shaft:	Inner shaft: Stainless steel 1.4305 Outer shaft: Brass CuZn38Pb2
Bushing housing:	Zinc die casting (nickel plated), fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass (nickel plated)
Housing clamp:	Tinplate
O-rings:	NBR (nitrile rubber), 70 shore A
Front panel sealing:	Threaded bushing: O-ring Non-threaded bushing: EPDM-rubber, 45 shore A, complies with SAE J 18-79

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-65 to +125 °C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3)
Humidity:	< 93 % relative humidity (MIL-STD-202G, method 103B, condition B)
IP sealing against front panel:	IP60 without sealing IP65 with non-threaded bushing, shaft and front panel sealing IP68 with threaded bushing, shaft and front panel sealing (2 bar, 1 h)
Vibration:	29 G _{RMS} at 100 to 1'000 Hz (MIL-STD-202G, method 214A, condition 1 h / 15 min)
Shock:	100 G (MIL-STD-202G, method 213B, condition C)
Flammability:	UL94-V0 Gaskets UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 300 °C during 3 s
Reflow soldering:	< 280 °C during 5 s

MECHANICAL DATA FOR PUSH BUTTON

Actuation force:	3, 6, 10 or 14 N (±30 % in new condition)
Travel:	0.5 (±0.2) mm
Lifecycles:	> 200'000 cycles (tested at room temperature)

ELECTRICAL DATA FOR PUSH BUTTON

Switching voltage:	< 15 VDC (resistive load)
Switching current:	< 10 mA (resistive load)
Contact bouncing:	< 2 ms (at 2 Hz)

MATERIALS FOR PUSH BUTTON

Contact surface:	Cu alloy (Au plated)
Snap dome:	Stainless steel (Au plated)

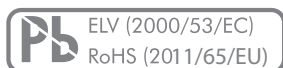
Selector switches

Our range of mechanical selectors with its robust and innovative design will provide the required reliability.

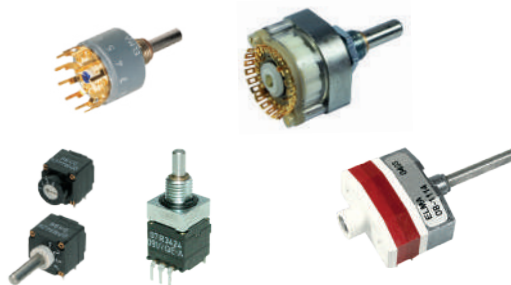
CONTACT US

SELECTOR SWITCHES

- › Very robust designs for rugged environments
- › High switching torques: Up to 20 Ncm
- › Operating temperature range: -40 to +85 °C
- › IP68 shaft and front panel sealing
- › Various options and customizations



01 | 04 | 07R | 08



TYPE COMPARISON

FEATURES PER SWITCH TYPE	01	04	07R	08
Main feature	Compact	Robust	Miniature for circuit board	PCB mounting
Dimensions	Ø 18 mm	32 x 25 mm	10 x 10 mm	31 x 13 mm
Mounting type	Bushing with thread M8 x 0.75	Bushing with thread M10 x 0.75	Various	2 x M2 screws sideways
Electrical connection	Soldering eyelets or Pins for PCB	Soldering eyelets or Pins for PCB	THT horizontal THT vertical	THT horizontal
Switching current	< 2 A	< 2 A	< 0.2 A	< 1.5 A
Detent angle positions	30° 12 36° 10 60° 6	15° 24 30° 12	36° 5	30° 12
Rotary limitation end stop	Configurable	Configurable	Configurable	Configurable
Switching torque	2 to 6 Ncm	1.5 to 20 Ncm	2.2 or 3.5 Ncm	3 to 9 Ncm
Rotational life of detent system	25'000 cycles	25'000 cycles	10'000 cycles	25'000 cycles
Switching function	1 x 12 to 4 x 3 poles x positions per wafer, max. 2 wafers	1 x 24 to 6 x 3 poles x positions per wafer, max. 8 wafers	1 pole, 2 to 5 positions	1 x 12 to 4 x 3 poles x positions per wafer, max. 8 wafers
Shaft type	Ø 3 to 6 mm, round	Ø 6 mm or 1/4", round	Ø 3 mm, round	Ø 4 mm, double-D-shape
IP-sealing	IP60 or IP68	IP60 or IP68	IP60 or IP68	IP60
Operating temperature	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
SEE	PAGE 106	PAGE 114	PAGE 123	PAGE 130

SELECTOR SWITCH

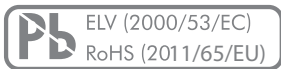
01

Product description

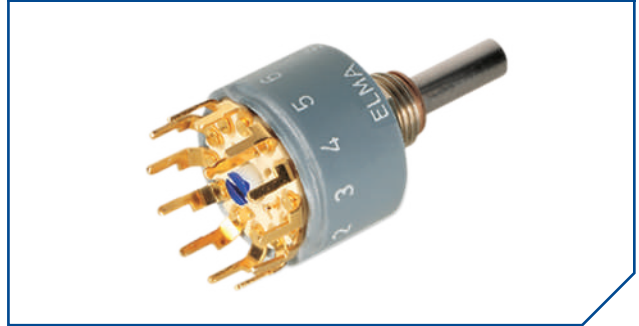
MAIN FEATURES

COMPACT, UP TO 12 POSITIONS

- › 25'000 switching cycles with up to 6 Ncm switching torque
- › Gold plated contacts: 3 micron
- › Robust metal bushing and shaft
- › Operating temperature range: -40 to +85 °C
- › IP68 front panel sealing
- › Various options and customizations



01



PRODUCT VARIETY

- Soldering eyelets or pins for PCB
- Poles x positions per wafer from 1 x 12 to 4 x 3
- 1 or 2 wafers
- Detent angle 30°, 36° or 60°
- Shorting or non-shorting
- Switching torque: 2, 4 or 6 Ncm
- Front panel sealing IP60 or IP68
- Configurable end stops
- Shaft diameter: 3, 4 or 6 mm
- Shaft length

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Central lock dimensions
- Switching torque
- Hollow shaft, inner shaft
- Push function | pull to turn function
- Others

TYPICAL APPLICATIONS

- Industrial controls
- Avionics, measurement and test systems
- Medical and audio equipment
- Transport and constructions machines

SELECTOR SWITCH

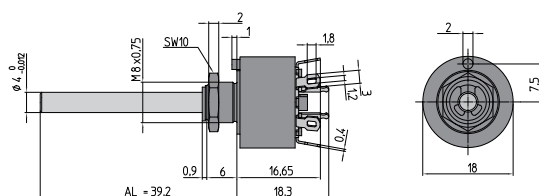
01

Dimensions and pin assignment

SWITCH DESIGN

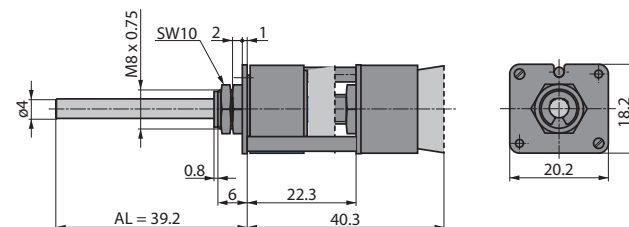
WITH SOLDERING EYELETS

1 Wafer

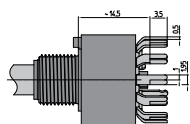


SW = Key spanner

2 Wafers

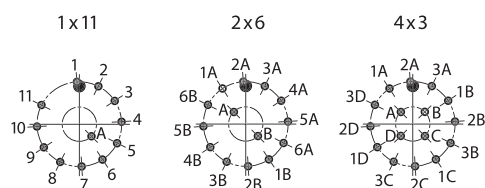
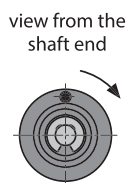
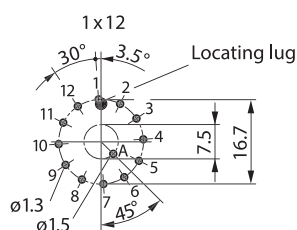


WITH PINS FOR PCB

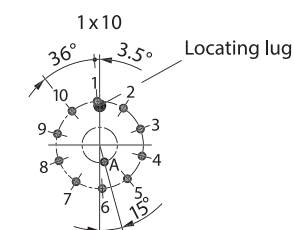


PIN ASSIGNMENT AND DRILLING DIAGRAM

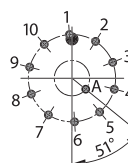
30° DETENT ANGLE



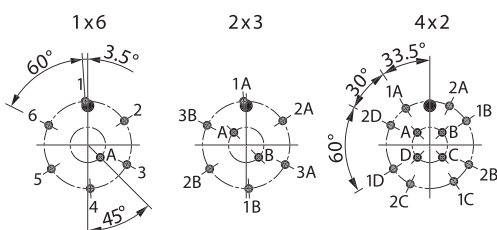
36° DETENT ANGLE



1 x 10, endless rotating



60° DETENT ANGLE



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

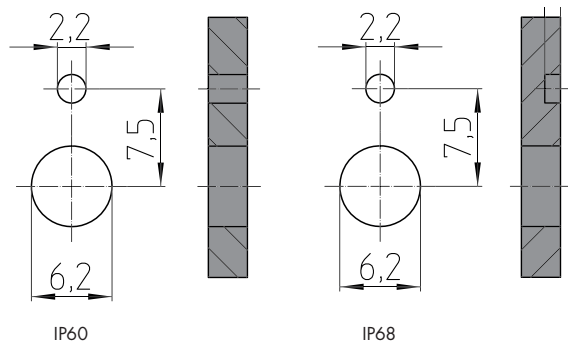
SELECTOR SWITCH

01

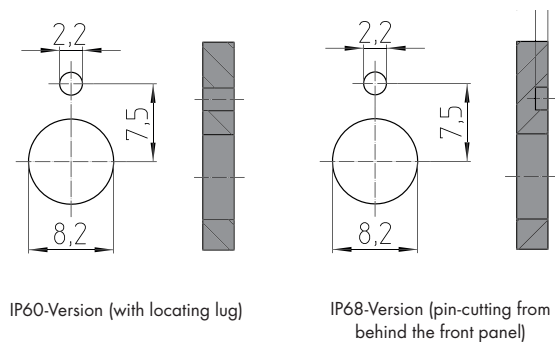
Dimensions and pin assignment

FRONT PANEL CUT OUT

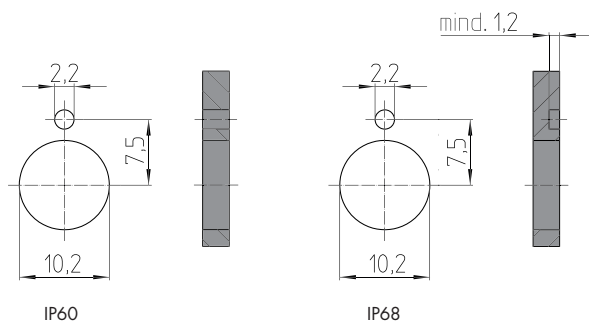
SHAFT Ø 3 MM, NUT M6 X 0.75



SHAFT Ø 4 MM, NUT M8 X 0.75

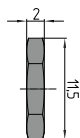


SHAFT Ø 6 MM, NUT M10 X 0.75



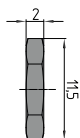
NUT (SUPPLIED)

SHAFT Ø 3 MM



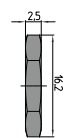
Screw wrench 10 mm M6 x 0.75

SHAFT Ø 4 MM



Screw wrench 10 mm M8 x 0.75

SHAFT Ø 6 MM



Screw wrench 14 mm M10 x 0.75

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

SELECTOR SWITCH

01

ORDERING INFORMATION

ORDERING CODE

01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
----	---	---	---	---	---	---	---	---	---	---	---	---	---	---

BASIC CODE

See standard types

NUMBER OF WAFERS

See standard types

NUMBER OF POLES

See standard types

FACTORY SET CHARACTER

See standard types

SWITCHING MODE

3

 Shorting

4

 Non-shorting

SWITCHING TORQUE

-

 4 Ncm (standard)

M

 2 Ncm

N

 6 Ncm

SHAFT DIAMETER

- O

 4 mm
- M

 3 mm
- N

 6 mm

NUMBER OF POSITIONS

- 00

 Standard
- 11

 11 positions
- 10

 10 positions
- 09

 9 positions
- 08

 8 positions
- 07

 7 positions
- 06

 6 positions
- 05

 5 positions
- 04

 4 positions
- 03

 3 positions
- 02

 2 positions

SHAFT LENGTH (AL)

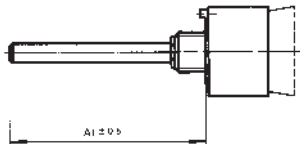
- 000

 59 mm (Ø 3 mm shaft)
- 39.2 mm (standard Ø 4 mm shaft)
- 28 mm (Ø 6 mm shaft)
- xxx¹

 Customized
- (shaft length rounded to next 0.5 mm,
- e.g. 10.3 mm = 10.5 mm or 10 mm)

¹ Customized shaft length (AL)
AL measured from base of housing (see picture below)

Max. shaft length (AL):
Ø 3 and 4 mm = 80 mm
Ø 6 mm = 28 mm



PIN STYLE | IP SEALING

- 00

 Soldering eyelets | IP60
- 20

 Pins for PCB | IP60
- 30²

 Soldering eyelets | IP68
- 70²

 Pins for PCB | IP68

² Only deliverable for version with a wafer with 3 or 4 mm shaft diameter

SELECTOR SWITCH

01

ORDERING INFORMATION

PREFERENCE TYPES SELECTION CHART¹

DETENT ANGLE 30°, SHORTING

CONTACT ARRANGEMENT	NUMBER OF WAFERS (MAX. 2 WAFERS AVAILABLE)	FUNCTION (POLES X POSITIONS)	PART NUMBER	
			WITH SOLDERING EYELETS	WITH PINS FOR PCB
		1 x 12 endless rotating	01-1123	01-1123-20
		2 x 12 endless rotating	01-2123	–
		1 x 12	01-1183	01-1183-20
		2 x 12	01-2183	–
		1 x 11	01-1113	01-1113-20
		2 x 11	01-2113	–
		2 x 6	01-1263	01-1263-20
		4 x 6	01-2263	–
		4 x 3	01-1433	01-1433-20
		8 x 3	01-2433	–

DETENT ANGLE 30°, NON-SHORTING

CONTACT ARRANGEMENT	NUMBER OF WAFERS (MAX. 1 WAFERS AVAILABLE)	FUNCTION (POLES X POSITIONS)	PART NUMBER	
			WITH SOLDERING EYELETS	WITH PINS FOR PCB
		1 x 12 endless rotating	01-1124	01-1124-20
		1 x 12	01-1184	01-1184-20
		1 x 11	01-1114	01-1114-20
		2 x 6	01-1264	01-1264-20
		4 x 3	01-1434	01-1434-20

¹ For other types | options see ordering code

SELECTOR SWITCH

01

ORDERING INFORMATION

PREFERENCE TYPES SELECTION CHART¹

DETENT ANGLE 36°, SHORTING

CONTACT ARRANGEMENT	NUMBER OF WAFERS (MAX. 2 WAFERS AVAILABLE)	FUNCTION (POLES X POSITIONS)	PART NUMBER	
			WITH SOLDERING EYELETS	WITH PINS FOR PCB
		1 x 10 endless rotating	01-1103	01-1103-20
		1 x 10	01-1193	01-1193-20

DETENT ANGLE 60°, NON-SHORTING

CONTACT ARRANGEMENT	NUMBER OF WAFERS (MAX. 2 WAFERS AVAILABLE)	FUNCTION (POLES X POSITIONS)	PART NUMBER	
			WITH SOLDERING EYELETS	WITH PINS FOR PCB
		1 x 6 endless rotating	01-1104	01-1104-20
		1 x 6	01-1164	01-1164-20
		2 x 3	01-1234	01-1234-20
		4 x 2	01-1424	01-1424-20

PACKAGING

Foam polystyrene box: 10 pieces

ACCESSORIES AND SPARE PARTS

Hex nut M8 x 0.75:	Part number 4024-81 (10 pieces / bag), brass, nickel plated
Hex nut M6 x 0.75:	Part number 4024-80 (10 pieces / bag), brass, nickel plated
Hex nut M10 x 0.75:	Part number 4024-82 (10 pieces / bag), brass, nickel plated
Stop pins (end stop):	Part number 4007-36 (10 pieces / bag) Part number 4007-35 (50 pieces / bag)

¹ For other types | options see ordering code

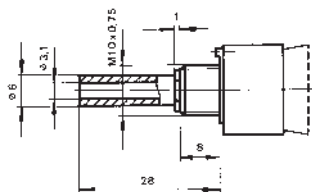
SELECTOR SWITCH

01

Customized solutions

HOLLOW SHAFT SYSTEM

HOLLOW SHAFT

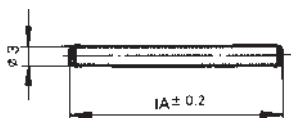


FRONT PANEL CUT OUT

Front panel cut out see on the pages before.

The hollow shaft enables the operation of either two switches or e.g. a switch and a potentiometer. The inner shaft ($\varnothing 3$ mm) must be ordered separately.

INNER SHAFT

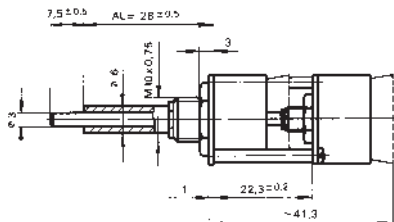


For switches with mounting plate or hollow shaft.

Hollow shaft must be ordered separately.

Please state exact length.

SWITCH WITH TWO SHAFTS



FRONT PANEL CUT OUT

Front panel cut out see on the pages before.

It is possible to operate two switches individually on the same mounting by using two independently rotating shafts. For ordering, the type number of each switch must be given and specified.

SELECTOR SWITCH

01

Specifications

MECHANICAL DATA

Detent angle positions:	30° detent angle 12 positions 36° detent angle 10 positions 60° detent angle 6 positions
Rotary limitation end stop:	Configurable
Switching torque:	2, 4 or 6 Ncm (± 25 % in new condition)
Rotational life:	> 25'000 cycles (tested at room temperature)
Allowed shaft load:	500 N push, 500 N pull and 100 N side load (static at 20 mm from the support surface)
Rotational stop strength:	30° detent angle: > 100 Ncm 36° and 60° detent angle: > 150 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm M8 x 0.75: < 300 Ncm M10 x 0.75: < 300 Ncm

ELECTRICAL DATA

Electrical connection:	Soldering eyelets Pins for PCB
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 2000 mA (resistive load)
Contact resistance:	< 10 m Ω (in new condition)
Switching capacity:	< 1 pF (between the contacts)
Switching function:	1 x 12 to 4 x 3 poles x positions per wafer, max. 2 wafers
Switching mode:	Shorting (for 30° and 36° detent angle) Non-shorting (for 30° and 60° detent angle)
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Nickel silver, fiberglass reinforced plastic
Contact surface:	Cu alloy (Au plated)
Insulation material:	Wafer: PEAK or ceramic Rotor: Polybutylen
Soldering leads:	Cu alloy (Au plated)
Hex nut:	Brass (nickel plated)

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 340 °C during 2 s
Wave soldering:	< 280 °C during 5 s

SELECTOR SWITCH

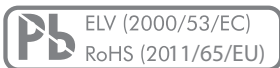
04

Product description

MAIN FEATURES

VERY ROBUST, MULTI WAFER,
UP TO 24 POSITIONS

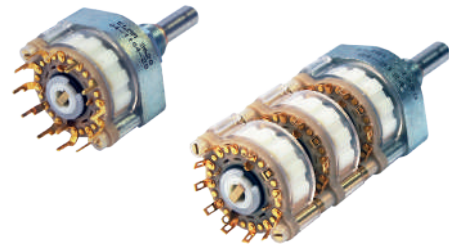
- › 25'000 switching cycles with up to 20 Ncm switching torque
- › Gold plated contacts: 3 micron
- › IP68 front panel sealing
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



PRODUCT VARIETY

- Soldering eyelets or pins for PCB
- From 1 x 24 to 6 x 3 poles x positions per wafer
- Up to 8 wafers
- Detent angle 15° or 30°
- Shorting or non-shorting
- Switching torque: 1.5, 8, 15 or 20 Ncm
- Front panel sealing IP60 or IP68
- Configurable end stops
- Shaft diameter: 6 mm or 1/4"
- Shaft length

04



POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Bushing dimensions
- Switching torque
- Hollow shaft, inner shaft
- Others

TYPICAL APPLICATIONS

- Industrial controls
- Avionics, instrumentation, test systems
- Medical and audio equipment
- Transport and construction machinery

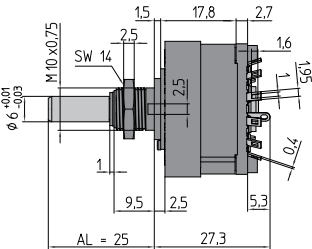
SELECTOR SWITCH

04

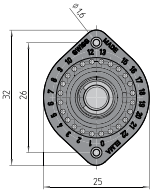
Dimensions and pin assignment

SWITCH DESIGN

WITH SOLDERING EYELETS



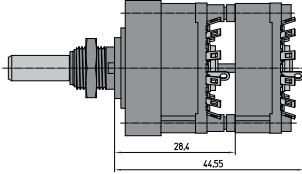
SW = key spanner



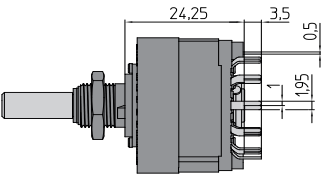
IP60 version
(with locating lug)



IP68 version
(without locating lug)



WITH PINS FOR PCB MOUNTING



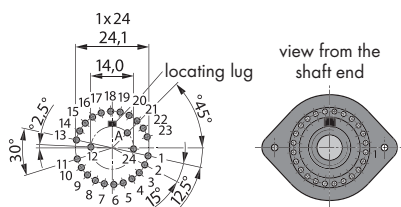
SELECTOR SWITCH

04

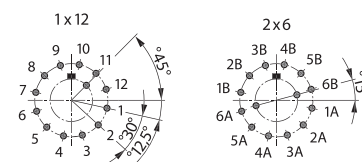
Dimensions and pin assignment

PIN ASSIGNMENT AND DRILLING DIAGRAM

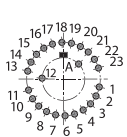
15° DETENT ANGLE



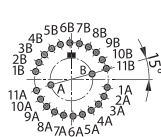
30° DETENT ANGLE



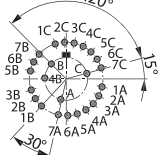
1x23



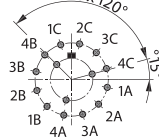
2x11



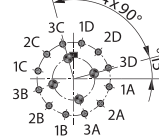
3x7



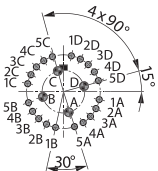
3x4



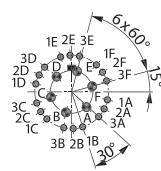
4x3



4x5

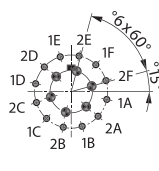


6x3



● = $\varnothing 1,3$ mm
● = $\varnothing 2,3$ mm

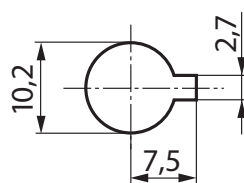
6x2



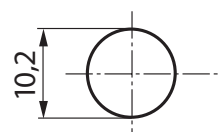
● = $\varnothing 1,3$ mm
● = $\varnothing 2,3$ mm

FRONT PANEL CUT OUT

IP60 VERSION (WITH LOCATING LUG)

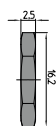


IP68 VERSION (WITHOUT LOCATION LUG)



NUT

HEX NUT (SUPPLIED) SHAFT $\varnothing 6$ MM



Screw wrench
14 mm 10 x 0.75

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

SELECTOR SWITCH

04

Ordering information

ORDERING CODE

04	-	-	-	-	-	-	-	-	-	-	-	-	-	-
----	---	---	---	---	---	---	---	---	---	---	---	---	---	---

BASIC CODE

See standard types

NUMBER OF WAFERS

See standard types

NUMBER OF POLES

See standard types

FACTORY SET CHARACTER

See standard types

SWITCHING MODE

3 Shorting
4 Non-shorting (not for 15° index. angle)

SWITCHING TORQUE

- 15 Ncm (standard)
M 8 Ncm
N 20 Ncm
R 1.5 Ncm

SHAFT DIAMETER

0 6 mm
Z 1/4" (6.35 mm)

NUMBER OF POSITIONS

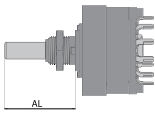
00 Standard
23 23 positions
22 22 positions
21 21 positions
20 20 positions
19 19 positions
18 18 positions
17 17 positions
16 16 positions
15 15 positions
14 14 positions
13 13 positions
12 12 positions
11 11 positions
10 10 positions
09 9 positions
08 8 positions
07 7 positions
06 6 positions
05 5 positions
04 4 positions
03 3 positions
02 2 positions

SHAFT LENGTH (AL)

000 25 mm
xxx¹ customized
(shaft length rounded to next 0.5 mm,
e.g. 10.3 mm = 10.5 mm or 10 mm)

¹ Customized shaft length (AL)
AL measured from mounting face (see picture below)

Max. shaft length (AL):
Ø 1/4" = 25 mm
Ø 6 mm = 50 mm



PIN STYLE | IP-SEALING

00 Soldering eyelets | IP60
20 Pins for PCB | IP60
30 Soldering eyelets | IP68
70 Pins for PCB | IP68

SELECTOR SWITCH

04

Ordering information

STANDARD TYPES¹

DETENT ANGLE 15°, SHORTING (NON-SHORTING NOT AVAILABLE)

CONTACT ARRANGEMENT	NUMBER OF WAFERS	FUNCTION (POLES X POSITIONS)	PART NUMBER	
			WITH SOLDER EYELETS	WITH PINS FOR PCB
	1—H	1 x 24 endless rotating	04-1103	04-1103-20
	2—HH	2 x 24 endless rotating	04-2103	—
	3—HHH	3 x 24 endless rotating	04-3103	—
	4—HHHH	4 x 24 endless rotating	04-4103	—
	1—H	1 x 24	04-1133	04-1133-20
	2—HH	2 x 24	04-2133	—
	3—HHH	3 x 24	04-3133	—
	4—HHHH	4 x 24	04-4133	—
	1—H	2 x 11	04-1213	04-1213-20
	2—HH	4 x 11	04-2213	—
	3—HHH	6 x 11	04-3213	—
	4—HHHH	8 x 11	04-4213	—
	1—H	3 x 7	04-1373	04-1373-20
	2—HH	6 x 7	04-2373	—
	3—HHH	9 x 7	04-3373	—
	4—HHHH	12 x 7	04-4373	—
	1—H	4 x 5	04-1453	04-1453-20
	2—HH	8 x 5	04-2453	—
	3—HHH	12 x 5	04-3453	—
	4—HHHH	16 x 5	04-4453	—
	1—H	6 x 3	04-1633	04-1633-20
	2—HH	12 x 3	04-2633	—
	3—HHH	18 x 3	04-3633	—
	4—HHHH	24 x 3	04-4633	—

¹ For other types | options see ordering code

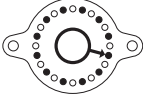
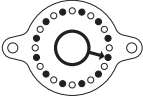
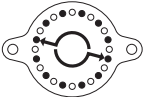
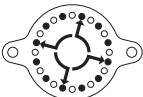
SELECTOR SWITCH

04

Ordering information

STANDARD TYPES¹

DETENT ANGLE 30°, NON-SHORTING (SHORTING ON REQUEST)

CONTACT ARRANGEMENT	NUMBER OF WAFERS	FUNCTION (POLES X POSITIONS)	PART NUMBER	
			WITH SOLDER EYELETS	WITH PINS FOR PCB
	1—H	1 x 12 endless rotating	04-1104	04-1104-20
	2—HH	2 x 12 endless rotating	04-2104	—
	3—HHH	3 x 12 endless rotating	04-3104	—
	4—HHHH	4 x 12 endless rotating	04-4104	—
	1—H	1 x 12	04-1124	04-1124-20
	2—HH	2 x 12	04-2124	—
	3—HHH	3 x 12	04-3124	—
	4—HHHH	4 x 12	04-4124	—
	1—H	2 x 6	04-1264	04-1264-20
	2—HH	4 x 6	04-2264	—
	3—HHH	6 x 6	04-3264	—
	4—HHHH	8 x 6	04-4264	—
	1—H	3 x 4	04-1344	04-1344-20
	2—HH	6 x 4	04-2344	—
	3—HHH	9 x 4	04-3344	—
	4—HHHH	12 x 4	04-4344	—
	1—H	4 x 3	04-1434	04-1434-20
	2—HH	8 x 3	04-2434	—
	3—HHH	12 x 3	04-3434	—
	4—HHHH	16 x 3	04-4434	—
	1—H	6 x 2	04-1624	04-1624-20
	2—HH	12 x 2	04-2624	—
	3—HHH	18 x 2	04-3624	—
	4—HHHH	24 x 2	04-4624	—

¹ For other types | options see ordering code

SELECTOR SWITCH

04

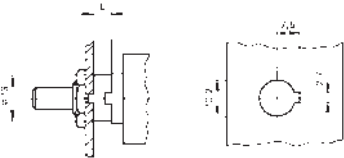
Ordering information

PACKAGING

Foam polystyrene box: 10 pieces

ACCESSORIES AND SPARE PARTS

Hex nut M10 x 0.75:	Part number 4124-21 (10 pieces / bag), brass, galvanized and passivated
Stop screw M1.4:	Part number 4124-21 (10 pieces / bag), steel
	Part number 4124-20 (100 pieces / bag), steel
Spacer:	Spacers can be used in many cases instead of shortened bushes; made of glass-fibre reinforced plastic to compensate the front panel thickness; available in two standard lengths. Can not be used for IP68 versions.
	Part number 4124-31 (10 pieces / bag), 3.5 mm length (L)
	Part number 4124-30 (100 pieces / bag), 3.5 mm length (L)
	Part number 4124-36 (10 pieces / bag), 5.5 mm length (L)
	Part number 4124-35 (100 pieces / bag), 5.5 mm length (L)



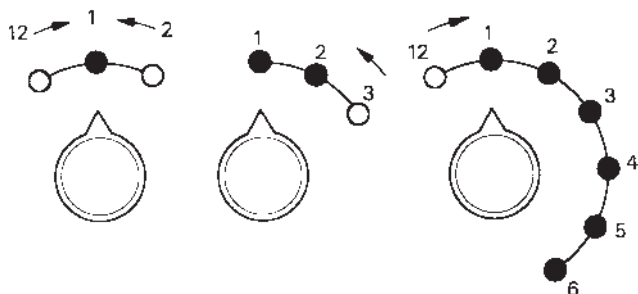
SELECTOR SWITCH

04

Customized solutions

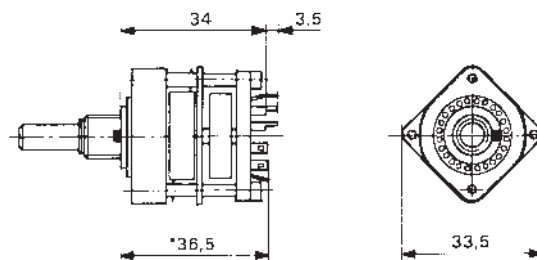
SWITCH WITH MOMENTARY CONTACT

EXAMPLES



● Detent position
○ Momentary contact

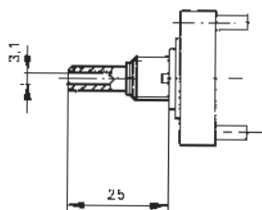
DIMENSIONS



*17.5 mm extra per wafer

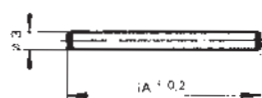
HOLLOW SHAFT SYSTEM

HOLLOW SHAFT



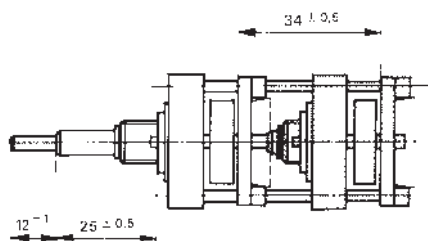
Available for switches up to 5 wafers.
Inner shaft ($\varnothing 3$ mm) must be ordered separately.

INNER SHAFT



For switches with mounting plate or hollow shaft.
Hollow shaft must to be ordered separately.
Please state exact length.

SWITCHES WITH CONCENTRIC SHAFTS



Consisting of a hollow outer and inner shaft.
The inner shaft driving a max. of 3 wafers with 6 wipers each.
Please give type description of each switch.

SELECTOR SWITCH

04

Specifications

MECHANICAL DATA

Detent angle positions:	15° detent angle 24 positions 30° detent angle 12 positions
Rotary limitation end stop:	Configurable
Switching torque:	1.5, 8, 15 or 20 Ncm ($\pm 25\%$ in new condition)
Rotational life:	> 25'000 cycles (tested at room temperature)
Rotational stop strength:	> 250 Ncm
Fastening torque of nut (front panel mounting):	M10 x 0.75: < 300 Ncm

ELECTRICAL DATA

Electrical connection:	Soldering eyelets Pins for PCB
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 2'000 mA (resistive load)
Contact resistance:	< 10 m Ω (in new condition)
Switching capacity:	< 1 pF (between the contacts)
Switching function:	1 x 24 to 6 x 3 poles x positions per wafer, max. 8 wafers
Switching mode:	Shorting (for 15° and 30° detent angle) Non-shorting (for 30° detent angle)
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting (zinc plated and passivated)
Contact surface:	Cu alloy (Au plated)
Insulation material:	Wafer: PEAK or ceramic Rotor: Polybutylen (PB)
Soldering leads:	Cu alloy (Au plated)
Hex nut:	Brass (zinc plated and passivated)

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 340 °C during 2 s
Wave soldering:	< 280 °C during 5 s

SELECTOR SWITCH

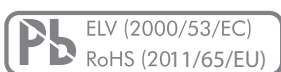
07R

Product description

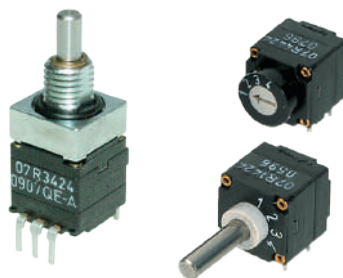
MAIN FEATURES

MINIATURE, UP TO 4 POSITIONS

- › PCB mounting (THT, reflow version on request)
- › Switching torque: Up to 3.5 Ncm
- › Gold plated contacts
- › Washable (sealed contact system)
- › IP68 front panel sealing
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



07R



PRODUCT VARIETY

- Vertical or horizontal mounting
- Shorting or non-shorting
- Switching torque 2.2 or 3.5 Ncm
- Front panel sealing IP60 or IP68
- Number of positions
- Bushing style
- Shaft style and length

POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Bushing dimension
- Switching torque
- Others

TYPICAL APPLICATIONS

- Industrial controls
- Avionics, test and measurement systems
- Medical and audio equipment
- Mobile equipment
- Transport and constructions machines

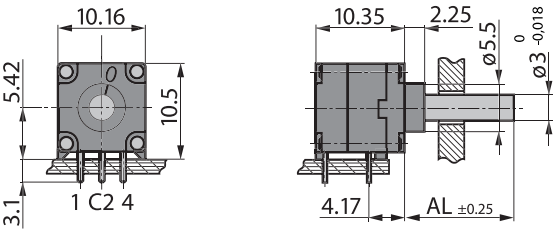
SELECTOR SWITCH

07R

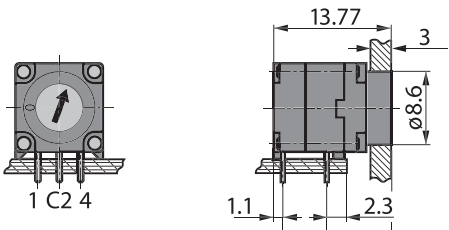
Dimensions and pin assignment

SWITCH DESIGN AND PIN ASSIGNMENT

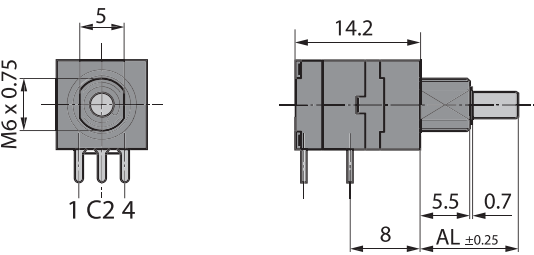
HORIZONTAL, WITH SHAFT,
WITHOUT THREADED BUSHING



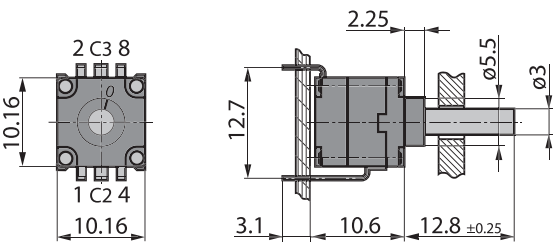
HORIZONTAL, SCREWDRIVER WITH BEZEL



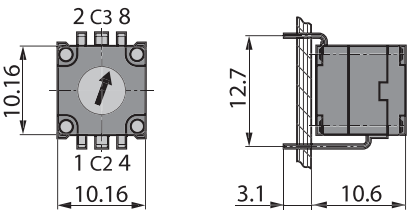
HORIZONTAL, WITH SHAFT, WITH THREADED BUSHING



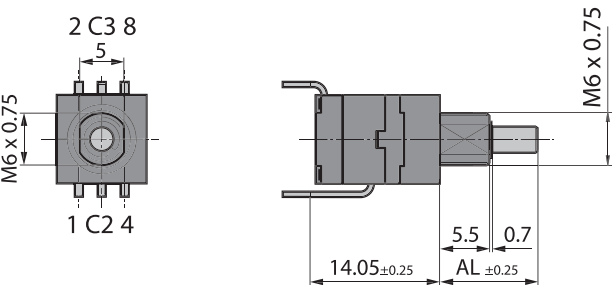
HORIZONTAL, WITH SHAFT,
WITHOUT THREADED BUSHING



VERTICAL, SCREWDRIVER WITHOUT BEZEL



VERTICAL, WITH SHAFT, WITH THREADED BUSHING



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

SELECTOR SWITCH

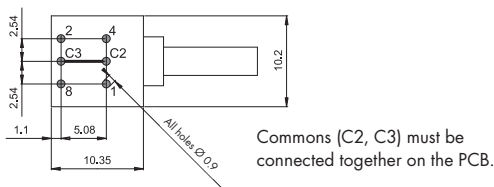
07R

Dimensions and pin assignment

DRILLING DIAGRAM AND FOOTPRINT

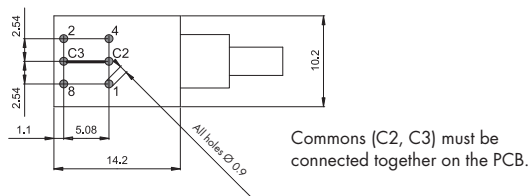
HORIZONTAL, WITH SHAFT,
WITHOUT THREADED BUSHING

View from component side of the PCB



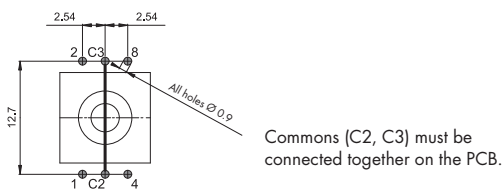
HORIZONTAL, WITH SHAFT,
WITH THREADED BUSHING

View from component side of the PCB



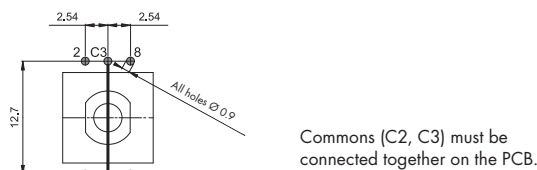
VERTICAL, WITH SHAFT,
WITHOUT THREADED BUSHING

View from component side of the PCB

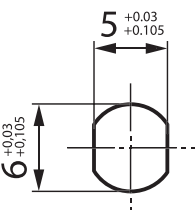


VERTICAL, WITH SHAFT,
WITH THREADED BUSHING

View from component side of the PCB

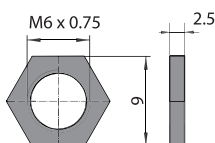


FRONT PANEL CUT OUT

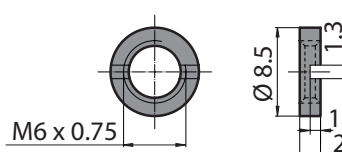


NUT

HEX NUT (SUPPLIED)



SLOTTED NUT



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

SELECTOR SWITCH

07R

Output signal

PIN TO POSITION DIAGRAM

PIN		8 4 2 1			
Position	0				
	1				
	2				
	3				
	4				

On

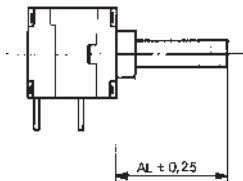
Off

Ordering information

ORDERING CODE

07R	-	-	-	-	-	-	-	-	-
-----	---	---	---	---	---	---	---	---	---

TYPE <table><tr><td>0</td><td>Horizontal</td><td>screwdriver without bezel</td></tr><tr><td>1</td><td>Horizontal</td><td>with shaft</td></tr><tr><td>2</td><td>Vertical</td><td>screwdriver without bezel</td></tr><tr><td>3</td><td>Vertical</td><td>with shaft</td></tr><tr><td>4</td><td>Horizontal</td><td>screwdriver with bezel</td></tr><tr><td>5</td><td>Vertical</td><td>screwdriver with bezel</td></tr></table>	0	Horizontal	screwdriver without bezel	1	Horizontal	with shaft	2	Vertical	screwdriver without bezel	3	Vertical	with shaft	4	Horizontal	screwdriver with bezel	5	Vertical	screwdriver with bezel	
0	Horizontal	screwdriver without bezel																	
1	Horizontal	with shaft																	
2	Vertical	screwdriver without bezel																	
3	Vertical	with shaft																	
4	Horizontal	screwdriver with bezel																	
5	Vertical	screwdriver with bezel																	
NUMBER OF POSITIONS AND CONTACTS <table><tr><td>2</td><td>2 positions (1 - 2)</td></tr><tr><td>3</td><td>3 positions (1 - 3)</td></tr><tr><td>4</td><td>4 positions (1 - 4)</td></tr><tr><td>5</td><td>5 positions (0 - 4, 0 has no connection)</td></tr></table>	2	2 positions (1 - 2)	3	3 positions (1 - 3)	4	4 positions (1 - 4)	5	5 positions (0 - 4, 0 has no connection)											
2	2 positions (1 - 2)																		
3	3 positions (1 - 3)																		
4	4 positions (1 - 4)																		
5	5 positions (0 - 4, 0 has no connection)																		
1 TO 4 5 POSITIONS <table><tr><td>1</td><td>5 positions (factory set for 5 positions)</td></tr><tr><td>2</td><td>1 to 4 positions (factory set for 2, 3 and 4 positions)</td></tr></table>	1	5 positions (factory set for 5 positions)	2	1 to 4 positions (factory set for 2, 3 and 4 positions)															
1	5 positions (factory set for 5 positions)																		
2	1 to 4 positions (factory set for 2, 3 and 4 positions)																		
SWITCHING MODE <table><tr><td>3</td><td>Shorting</td></tr><tr><td>4</td><td>Non-shorting</td></tr></table>	3	Shorting	4	Non-shorting															
3	Shorting																		
4	Non-shorting																		

SHAFT LENGTH (AL) <table><tr><td>000</td><td>Basic style: 12.8 mm Threaded bushing: 11.5 mm</td></tr><tr><td>xxx¹</td><td>Customized (shaft length rounded to next 0.5 mm, e.g. 10.3 mm = 10.5 mm or 10 mm)</td></tr></table> ¹ Customized shaft length (AL) AL measured from mounting face (see picture below) Max. shaft length (AL): Bushing basic style = 30 mm Bushing threaded = 26 mm 	000	Basic style: 12.8 mm Threaded bushing: 11.5 mm	xxx ¹	Customized (shaft length rounded to next 0.5 mm, e.g. 10.3 mm = 10.5 mm or 10 mm)									
000	Basic style: 12.8 mm Threaded bushing: 11.5 mm												
xxx ¹	Customized (shaft length rounded to next 0.5 mm, e.g. 10.3 mm = 10.5 mm or 10 mm)												
BUSHING IP-SEALING <table><tr><td>00</td><td>None</td></tr><tr><td>20</td><td>Threaded (nut supplied)</td></tr><tr><td>30</td><td>Threaded IP68 (nut supplied)</td></tr></table>	00	None	20	Threaded (nut supplied)	30	Threaded IP68 (nut supplied)							
00	None												
20	Threaded (nut supplied)												
30	Threaded IP68 (nut supplied)												
SWITCHING TORQUE PACKAGING <table><tr><td>-</td><td>2.2 Ncm</td><td>tray (50 / 200 pieces)</td></tr><tr><td>V</td><td>2.2 Ncm</td><td>antistatic tray (100 pieces)</td></tr><tr><td>T</td><td>3.5 Ncm</td><td>tray (50 / 200 pieces)</td></tr><tr><td>S</td><td>3.5 Ncm</td><td>antistatic tray (100 pieces)</td></tr></table>	-	2.2 Ncm	tray (50 / 200 pieces)	V	2.2 Ncm	antistatic tray (100 pieces)	T	3.5 Ncm	tray (50 / 200 pieces)	S	3.5 Ncm	antistatic tray (100 pieces)	
-	2.2 Ncm	tray (50 / 200 pieces)											
V	2.2 Ncm	antistatic tray (100 pieces)											
T	3.5 Ncm	tray (50 / 200 pieces)											
S	3.5 Ncm	antistatic tray (100 pieces)											

SELECTOR SWITCH

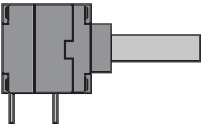
07R

Ordering information

STANDARD TYPES¹

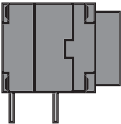
HORIZONTAL

With shaft, without threaded bushing



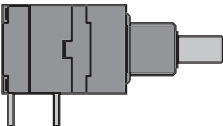
SWITCHING MODE	FUNCTION (POLES X POSITIONS)	PART NUMBER
Shorting	1 x 4	07R1423
Non-shorting	1 x 4	07R1424
Shorting	1 x 5 (4 electrical positions)	07R1513
Non-shorting	1 x 5 (4 electrical positions)	07R1514

Screwdriver with bezel | front panel operation



SWITCHING MODE	FUNCTION (POLES X POSITIONS)	PART NUMBER
Shorting	1 x 4	07R4423
Non-shorting	1 x 4	07R4424
Shorting	1 x 5 (4 electrical positions)	07R4513
Non-shorting	1 x 5 (4 electrical positions)	07R4514

With shaft, with threaded bushing, IP68



SWITCHING MODE	FUNCTION (POLES X POSITIONS)	PART NUMBER
Shorting	1 x 4	07R1423-30000
Non-shorting	1 x 4	07R1424-30000
Shorting	1 x 5 (4 electrical positions)	07R1513-30000
Non-shorting	1 x 5 (4 electrical positions)	07R1514-30000

¹ For other types | options see ordering code

SELECTOR SWITCH

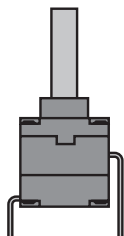
07R

Ordering information

STANDARD TYPES¹

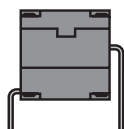
VERTICAL

With shaft, without threaded bushing



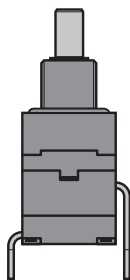
SWITCHING MODE	FUNCTION (POLES X POSITIONS)	PART NUMBER
Shorting	1 x 4	07R3423
Non-shorting	1 x 4	07R3424
Shorting	1 x 5 (4 electrical positions)	07R3513
Non-shorting	1 x 5 (4 electrical positions)	07R3514

Screwdriver with bezel | front panel operation



SWITCHING MODE	FUNCTION (POLES X POSITIONS)	PART NUMBER
Shorting	1 x 4	07R2423
Non-shorting	1 x 4	07R2424
Shorting	1 x 5 (4 electrical positions)	07R2513
Non-shorting	1 x 5 (4 electrical positions)	07R2514

With shaft, with threaded bushing, IP68



SWITCHING MODE	FUNCTION (POLES X POSITIONS)	PART NUMBER
Shorting	1 x 4	07R3423-30000
Non-shorting	1 x 4	07R3424-30000
Shorting	1 x 5 (4 electrical positions)	07R3513-30000
Non-shorting	1 x 5 (4 electrical positions)	07R3514-30000

PACKAGING

Foam polystyrene box:

50 or 200 pieces (depending on shipment quantity)

ACCESSORIES AND SPARE PARTS

Hex nut M6 x 0.75:

Part number 4424-22 (50 pieces / bag), brass

Slotted nut M6 x 0.75:

Part number 4424-28 (50 pieces / bag), brass

Part number 4424-31 (50 pieces / bag), stainless steel (cross slot)

¹ For other types | options see ordering code

SELECTOR SWITCH

07R

Specifications

MECHANICAL DATA

Detent angle positions:	36° detent angle 5 positions
Rotary limitation end stop:	Configurable
Switching torque:	2.2 or 3.5 Ncm ($\pm 25\%$ in new condition)
Rotational life:	> 10'000 cycles (tested at room temperature)
Rotational stop strength:	> 45 Ncm
Fastening torque of nut (front panel mounting):	M6 x 0.75: < 100 Ncm

ELECTRICAL DATA

Electrical connection:	Pins 0.4 x 0.7 mm
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 2'000 mA (resistive load)
Contact resistance:	< 50 m Ω (in new condition)
Switching function:	1 pole, 2 to 5 positions
Switching mode:	Shorting or non-shorting
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting, fiberglass reinforced high performance plastic
Contact surface:	Cu alloy (Au plated)
Soldering leads:	Cu alloy (tin plated)
Hex nut:	Brass
Slotted nut:	Brass or stainless steel
O-rings:	NBR (nitrile rubber), 70 shore A

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14)
IP sealing against front panel:	IP60 without sealing IP68 with shaft and front panel sealing (2 bar, 1 h)
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 280 °C during 2 s
Wave soldering:	< 280 °C during 2 s

SELECTOR SWITCH

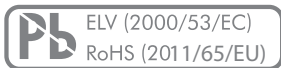
08

Product description

MAIN FEATURES

HORIZONTAL, MULTI WAFER,
PCB MOUNTING, UP TO 12 POSITIONS

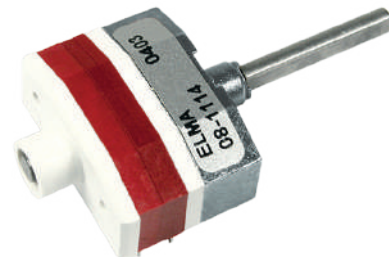
- › For PCB mounting
- › 25'000 switching cycles with up to 9 Ncm switching torque
- › Gold plated contacts 3 micron
- › Robust metal housing with metal shaft
- › Operating temperature range: -40 to +85 °C
- › Various options and customizations



PRODUCT VARIETY

- From 1 x 12 to 4 x 3 poles x positions per wafer
- Up to 8 wafers
- Shorting or non-shorting
- Switching torque: 3, 6 or 9 Ncm
- Configurable end stops

08



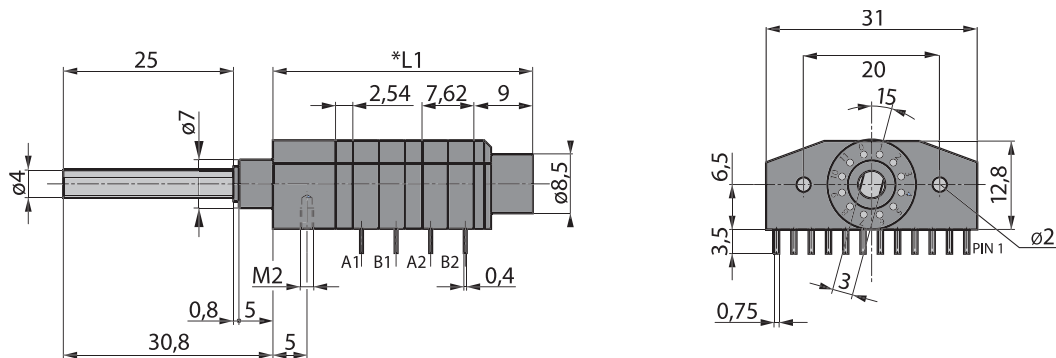
POSSIBLE CUSTOMIZATIONS

- Shaft dimension and shape
- Switching torque
- Hollow shaft, inner shaft
- Others

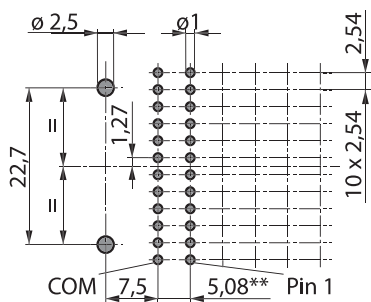
TYPICAL APPLICATIONS

- Industrial controls
- Avionics systems
- Test and measurement devices
- Medical and audio equipment

08



Ax = Common contact wafer of x
Bx = Switching contact wafer of x



- * L1 1 wafer 28.25 mm $\pm$ 0.3 mm
 2 wafers 38.32 mm $\pm$ 0.3 mm
 3 wafers 48.40 mm $\pm$ 0.3 mm
 4 wafers 58.45 mm $\pm$ 0.3 mm
 per additional wafer +10.08 mm
- ** All further steps are in 5.08 mm pitch

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

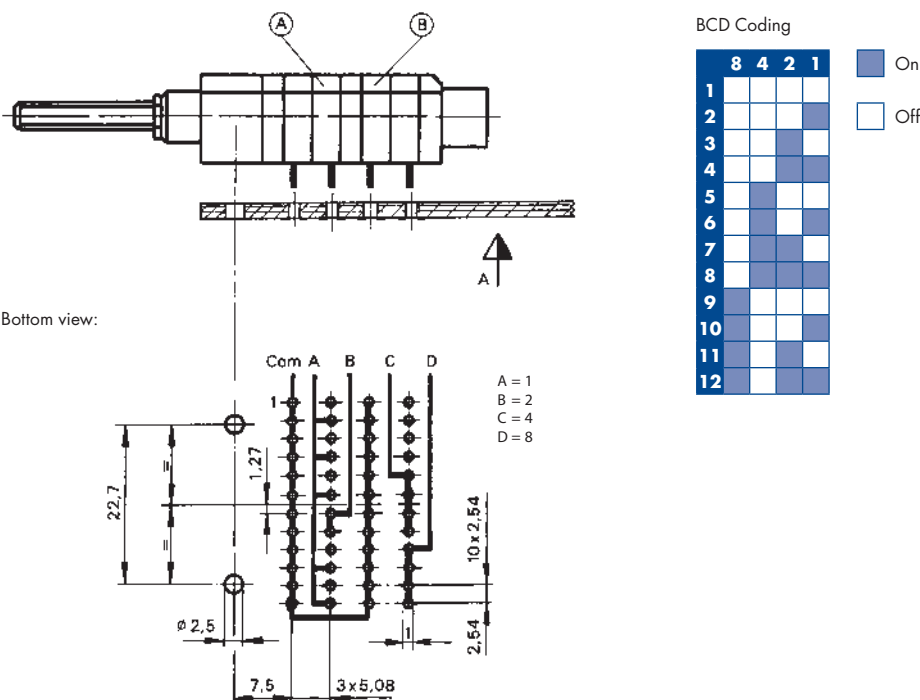
Dimensions and pin assignment

SWITCH DESIGN AND DRILLING DIAGRAM

SWITCH WITH BCD CODING

12 Position BCD coding

For 12 positions the coding will be made according to the layout on the left (on the printed circuit). If the switch is composed of component parts, the housings A (3 x 4) and B (1 x 12) have to be ordered. Limiting to 10 positions (BCD) is done with a stop screw M1.2 x 2.5.



08

ORDERING CODE[illegible]

See standard types

See standard types

See standard types

See standard types

See standard types

3 Shorting
4 Non-shorting

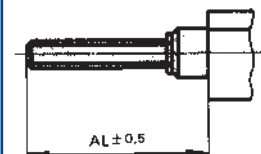
- 6 Ncm (standard)
- M** 3 Ncm
- N** 9 Ncm

- 00** Standard
- 11** 11 positions
- 10** 10 positions
- 09** 9 positions
- 08** 8 positions
- 07** 7 positions
- 06** 6 positions
- 05** 5 positions
- 04** 4 positions
- 03** 3 positions
- 02** 2 positions

000 30.8 mm
xxx¹ Customized
(shaft length rounded to next 0.5 mm,
e.g. 10.3 mm = 10.5 mm or 10 mm)

¹ Customized shaft length (AL)
AL measured from mounting face (see picture below)

Max. shaft length (AL): 30.8 mm

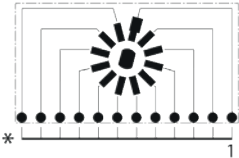
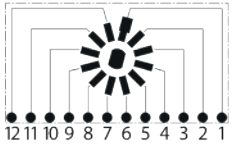
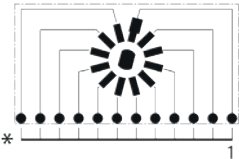
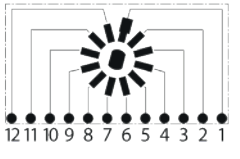
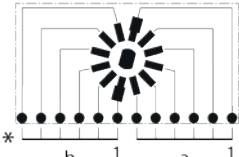
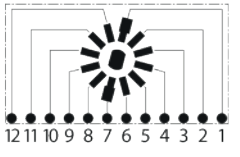
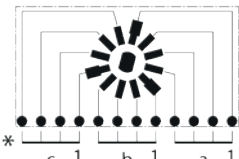
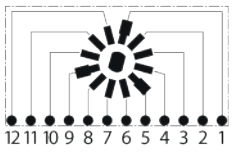
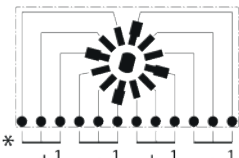
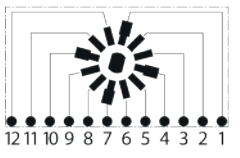


SELECTOR SWITCH

08

Ordering information

PREFERENCE TYPES SELECTION CHART¹

CONTACT ARRANGEMENT		NUMBER OF WAFERS	FUNCTION (POLES X POSITIONS)	PART NUMBER	
COMMON WAFER PART CONTACT	SWITCHING WAFER PART CONTACT			SHORTING	NON-SHORTING
		1	1 x 12 endless rotating	08-1103	08-1104
		2	2 x 12 endless rotating	08-2103	08-2104
		3	3 x 12 endless rotating	08-3103	08-3104
		4	4 x 12 endless rotating	08-4103	08-4104
		1	1 x 12	08-1113	08-1114
		2	2 x 12	08-2113	08-2114
		3	3 x 12	08-3113	08-3114
		4	4 x 12	08-4113	08-4114
		1	2 x 6	08-1263	08-1264
		2	4 x 6	08-2263	08-2264
		3	6 x 6	08-3263	08-3264
		4	8 x 6	08-4263	08-4264
		1	3 x 4	08-1343	08-1344
		2	6 x 4	08-2343	08-2344
		3	9 x 4	08-3343	08-3344
		4	12 x 4	08-4343	08-4344
		1	4 x 3	08-1433	08-1434
		2	8 x 3	08-2433	08-2434
		3	12 x 3	08-3433	08-3434
		4	16 x 3	08-4433	08-4434

PACKAGING

Foam polystyrene box:

Quantity depends on switch configuration

ACCESSORIES AND SPARE PARTS

Fixing screw M2 x 6:

Stop screw M1.2:

Stop screw M1.2:

Stop screw:

Part number 4224-01 (10 pieces / bag), steel

Part number 4224-11 (10 pieces / bag), steel

Part number 4224-10 (100 pieces / bag), steel

Configurable stop screws can be attached at any position between two and the maximum. Stop screws must be ordered separately.

¹ For other types | options see ordering code

*The common connection is to be connected on printed circuit boards

SELECTOR SWITCH

08

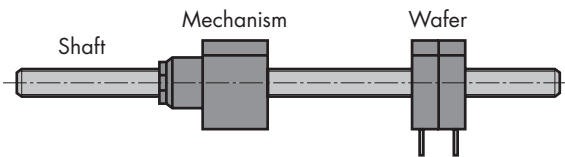
Ordering information

ACCESSORIES AND SPARE PARTS

Available in kit form:

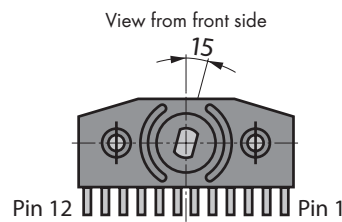
Mechanism, wafer and shaft are supplied separately. This offers more possibilities to place the switch onto the PC board.

Wafer



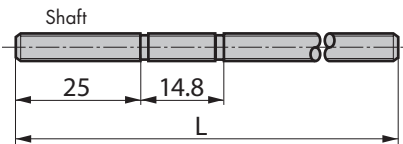
FUNCTION (POLES X POSITIONS)	PART NUMBER	
	SHORTING	NON-SHORTING
1 x 12	4217-10	4218-10
2 x 6	4217-11	4218-11
3 x 4	4217-13	4218-13
4 x 3	4217-12	4218-12

Switch mechanism



NUMBER OF POLES	POSITIONS	SWITCHING TORQUE	PART NUMBER
≤ 6	12	6 Ncm	4214-10
> 6	12	9 Ncm	4214-12

Shaft including assembly material



LENGTH L	NUMBER OF HOUSINGS	PART NUMBER
75 mm	3	4211-05
100 mm	5	4211-10
125 mm	7	4211-15
150 mm	9	4211-20

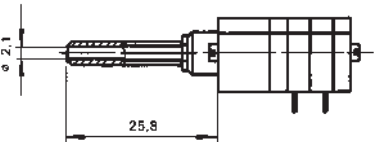
SELECTOR SWITCH

08

Customized solutions

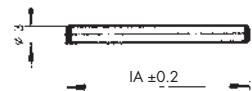
HOLLOW SHAFT SYSTEM

HOLLOW SHAFT



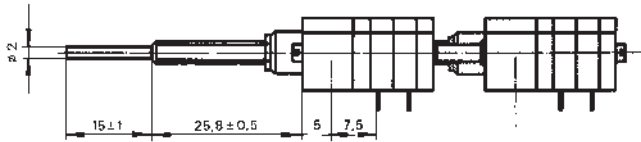
Available for switches up to 4 wafers.
Inner shaft ($\varnothing 2$ mm) must be ordered separately.

INNER SHAFT



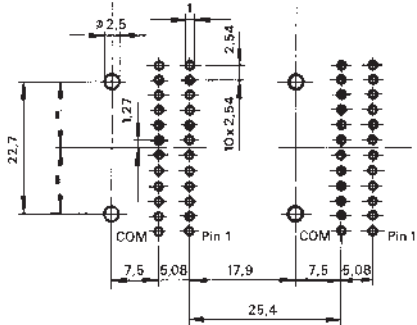
Must be ordered separately for switches with hollow shaft.

SWITCH WITH CONCENTRIC SHAFTS



Consisting of a hollow outer and inner shaft.
The inner shaft driving a max. of 3 wafers with 4 wipers each.
Please indicate type of each switch.

Top view:



SELECTOR SWITCH

08

Specifications

MECHANICAL DATA

Detent angle positions:	30° detent angle 12 positions
Rotary limitation end stop:	Configurable
Switching torque:	3, 6 or 9 Ncm (± 25 % in new condition)
Rotational life:	> 25'000 cycles (tested at room temperature)

ELECTRICAL DATA

Electrical connection:	Pins 0.4 x 0.75 mm
Switching voltage:	< 42 VDC (resistive load)
Switching current:	< 1'500 mA (resistive load)
Contact resistance:	< 20 m Ω (in new condition)
Switching capacity:	< 1 pF (between the contacts)
Switching function:	1 x 12 to 4 x 3 poles x positions per wafer, max. 8 wafers
Switching mode:	Shorting or non-shorting
Dielectric strength:	500 VDC during 60 s (pin-to-pin, pin-to-housing)
Insulation resistance:	> 1 G Ω at 500 VDC (pin-to-pin, pin-to-housing, in new condition)

MATERIALS

Shaft:	Stainless steel 1.4305
Bushing housing:	Zinc die casting (zinc plated and passivated)
Contact surface:	Cu alloy (Au plated)
Insulation material:	Wafer: PA6/6T Rotor: Polyacetal (POM)
Soldering leads:	Cu alloy (tin plated)

ENVIRONMENTAL DATA

Operating temperature:	-40 to +85 °C (IEC 60068-2-14)
Storage temperature:	-40 to +85 °C (IEC 60068-2-14)
IP sealing against front panel:	IP60 only shaft sealing
Vibration:	10 G _{RMS} at 10 to 2'000 Hz
Flammability:	UL94-HB

SOLDERING CONDITIONS

Hand soldering:	< 340 °C during 2 s
Wave soldering:	< 280 °C during 5 s

Knobs

Knobs have a major impact to aesthetics and usability of your product. Elma's variety of collet knobs and aluminum knobs can help you to achieve your product goals.



CONTACT US

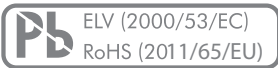
KNOBS

K1 Metal Knobs

- › Robust solid aluminum design (RoHS compliant)
- › For round shafts or D-shape
- › Anodized surface, scratch resistant, electrically non-conducting
- › Customized designs and colors on request

Classic Collect Knobs

- › Precise quality knobs
- › Secure collet mounting
- › Wide variety
- › Lots of accessories
- › Customized colors on request



K1 METAL | CLASSIC COLLET



TYPE COMPARISON

FEATURES PER KNOB TYPE	K1 METAL	CLASSIC COLLET
Main feature	High quality	Classic
Knob diameter	18 to 36 mm, various forms	9 to 45 mm
Shaft mounting	Set screw tightening	Collet
Shaft type	Ø 3, 4, 6 mm, 1/8" or 1/4"	Ø 2, 3, 4, 6 mm, 1/8" or 1/4"
Knob color	Natural aluminum or black	Gray or black
Surface	Anodized silk gloss	Glossy or matt
Cap color	No cap needed	Gray, black, red, blue, yellow, green
Additional options	-	Wing or crank knob
SEE	PAGE 140	PAGE 143

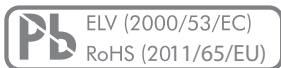
KNOBS

K1 METAL

Product description

MAIN FEATURES

- › Robust solid aluminum design (RoHS compliant)
- › For round shafts or D-shape
- › Anodized surface, scratch resistant, electrically non-conducting
- › Customized designs and colors on request



K1 METAL KNOBS



PRODUCT VARIETY

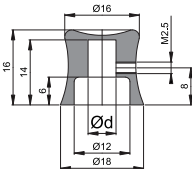
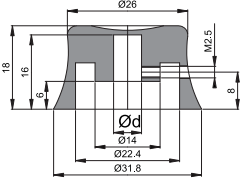
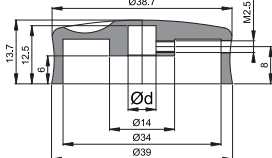
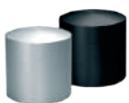
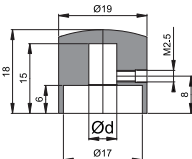
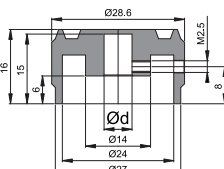
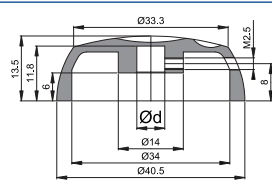
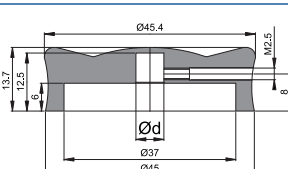
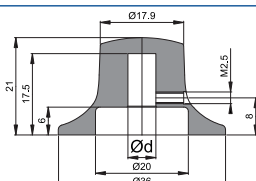
- Knob design: Shape, Shaper, Dimple, Pure, Robot, Space, Cone, Medic
- Shaft diameter (standard): 6 mm
- Anodized surface, silky sheen
- Black or natural color

POSSIBLE CUSTOMIZATIONS

- Knob design
- Shaft diameter 3 mm, 3.18 mm (1/8"), 4 mm, 6.35 mm (1/4")
- Colors: Red, gold, green, light or dark blue
additional colors available on request

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

		SHAFT DIAMETER $\varnothing d \begin{smallmatrix} +0.028 \\ -0.010 \end{smallmatrix}$ stock type*	PART NUMBER SILVER	BLACK
SHAPE 		3 mm	K1-SH-S30	K1-SH-B30
		3.18 mm (1/8")	K1-SH-S32	K1-SH-B32
		4 mm	K1-SH-S40	K1-SH-B40
		6 mm*	K1-SH-S60	K1-SH-B60
		6.35 mm (1/4")	K1-SH-S64	K1-SH-B64
SHAPER 		3 mm	K1-SR-S30	K1-SR-B30
		3.18 mm (1/8")	K1-SR-S32	K1-SR-B32
		4 mm	K1-SR-S40	K1-SR-B40
		6 mm*	K1-SR-S60	K1-SR-B60
		6.35 mm (1/4")	K1-SR-S64	K1-SR-B64
DIMPLE 		3 mm	K1-DM-S30	K1-DM-B30
		3.18 mm (1/8")	K1-DM-S32	K1-DM-B32
		4 mm	K1-DM-S40	K1-DM-B40
		6 mm*	K1-DM-S60	K1-DM-B60
		6.35 mm (1/4")	K1-DM-S64	K1-DM-B64
PURE 		3 mm	K1-PR-S30	K1-PR-B30
		3.18 mm (1/8")	K1-PR-S32	K1-PR-B32
		4 mm	K1-PR-S40	K1-PR-B40
		6 mm*	K1-PR-S60	K1-PR-B60
		6.35 mm (1/4")	K1-PR-S64	K1-PR-B64
ROBOT 		3 mm	K1-RB-S30	K1-RB-B30
		3.18 mm (1/8")	K1-RB-S32	K1-RB-B32
		4 mm	K1-RB-S40	K1-RB-B40
		6 mm*	K1-RB-S60	K1-RB-B60
		6.35 mm (1/4")	K1-RB-S64	K1-RB-B64
SPACE 		3 mm	K1-SC-S30	K1-SC-B30
		3.18 mm (1/8")	K1-SC-S32	K1-SC-B32
		4 mm	K1-SC-S40	K1-SC-B40
		6 mm*	K1-SC-S60	K1-SC-B60
		6.35 mm (1/4")	K1-SC-S64	K1-SC-B64
CONE 		3 mm	K1-CN-S30	K1-CN-B30
		3.18 mm (1/8")	K1-CN-S32	K1-CN-B32
		4 mm	K1-CN-S40	K1-CN-B40
		6mm*	K1-CN-S60	K1-CN-B60
		6.35 mm (1/4")	K1-CN-S64	K1-CN-B64
MEDIC 		3 mm	K1-MD-S30	K1-MD-B30
		3.18 mm (1/8")	K1-MD-S32	K1-MD-B32
		4 mm	K1-MD-S40	K1-MD-B40
		6 mm*	K1-MD-S60	K1-MD-B60
		6.35 mm (1/4")	K1-MD-S64	K1-MD-B64

Tolerances unless otherwise specified: DIN ISO 2768-m

KNOBS

K1 METAL

Ordering information

PACKAGING

CONTENT OF STANDARD PACKAGING

- 20 pieces for Shaper, Robot, Space, Dimple, Cone, Medic
- 40 pieces for Shape or Pure
- 1 piece allen key M2.5 x 4 mm per knob
- 1 piece allen key 1.3 mm



20 pieces for Shaper, Robot, Space, Dimple, Cone, Medic



40 pieces for Shape or Pure

ACCESSORIES AND SPARE PARTS

DESCRIPTION	QUANTITY	PART NUMBER
Allen key 1.3 mm	1 piece	K1-HEXKEY
Set screw M2.5 x 4 mm	1 piece	5404-32

Specifications

MECHANICAL DATA

Max. tightening torque of set screw 0.2 Nm

MATERIALS

Anodized aluminum

Product description

MAIN FEATURES

- › Precise quality knobs
- › Secure collet mounting
- › Wide variety
- › Lots of accessories
- › Customized colors on request



CLASSIC COLLET KNOBS



PRODUCT VARIETY

- Knob size 9 to 45 mm
- Shaft diameter: 2 mm to 1/4"
- Glossy or matt surface
- Knob color black or gray
- Various cap colors
- With or without line
- Various accessories

POSSIBLE CUSTOMIZATIONS

- Color
- Shaft diameter

OVERVIEW

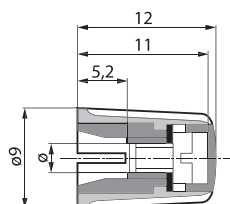
SHAFT DIAMETER Ø	KNOBS SIZE						
	 Ø 9 mm	 Ø 10 mm	 Ø 14.5 mm	 Ø 21 mm	 Ø 28 mm	 Ø 36 mm	 Ø 45 mm
2 mm	x	x					
3 mm	x	x	x				
4 mm		x	x	x			
6 mm			x	x	x	x	x
1/8"	x	x	x				
1/4"			x	x	x	x	x
Wing knob		x	x	x	x		
Crank knob							x
SEE	PAGE 144	PAGE 145	PAGE 146	PAGE 147	PAGE 148	PAGE 149	PAGE 150

Knob size vs. shaft diameter, wing and crank style

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

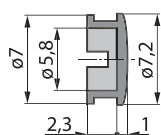
KNOB SIZE: Ø 9 MM



KNOB

TYPE	SHAFT DIAMETER	GRAY		BLACK	
		MATT	GLOSSY	MATT	GLOSSY
Without line 	2	020-1015	020-1010	020-1025	020-1020
	3	020-1115	020-1110	020-1125	020-1120
	1/8"	020-1215	020-1210	020-1225	020-1220
With line 	2	021-1015	021-1010	021-1025	021-1020
	3	021-1115	021-1110	021-1125	021-1120
	1/8"	021-1215	021-1210	021-1225	021-1220

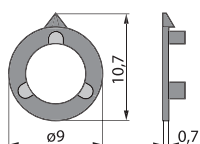
Packaging size: 100 pieces



CAP

TYPE	SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Without line 	Matt	040-1015	040-1025	040-1035	040-1045	040-1055	040-1065
	Glossy	040-1010	040-1020	040-1030	040-1040	040-1050	040-1060
With line 	Matt	040-1615	040-1625	040-1635	040-1645	040-1655	040-1665
	Glossy	040-1610	040-1620	040-1630	040-1640	040-1650	040-1660

Packaging size: 100 pieces



POINTER

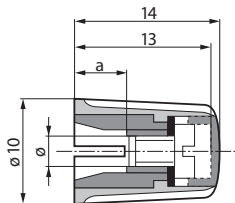
SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Matt	041-1015	041-1025	041-1035	041-1045	041-1055	041-1065
Glossy	041-1010	041-1020	041-1030	041-1040	041-1050	041-1060

Packaging size: 100 pieces

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

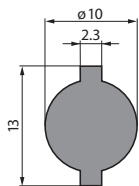
KNOB SIZE: Ø 10 MM



KNOB

TYPE	α	SHAFT DIAMETER	GRAY MATT	GLOSSY	BLACK MATT	GLOSSY
Without line	4.5	2	020-2015	020-2010	020-2025	020-2020
	5.2	3	020-2115	020-2110	020-2125	020-2120
	5.2	1/8"	020-2215	020-2210	020-2225	020-2220
	5.2	4	020-2315	020-2310	020-2325	020-2320
With line	4.5	2	021-2015	021-2010	021-2025	021-2020
	5.2	3	021-2115	021-2110	021-2125	021-2120
	5.2	1/8"	021-2215	021-2210	021-2225	021-2220
	5.2	4	021-2315	021-2310	021-2325	021-2320

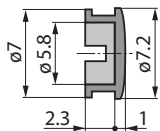
Packaging size: 100 pieces



WING KNOB

TYPE	α	SHAFT DIAMETER	GRAY MATT	GLOSSY	BLACK MATT	GLOSSY
With line	4.5	2	023-2015	023-2010	023-2025	023-2020
	5.2	3	023-2115	023-2110	023-2125	023-2120
	5.2	1/8"	023-2215	023-2210	023-2225	023-2220
	5.2	4	023-2315	023-2310	023-2325	023-2320

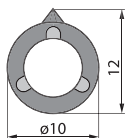
Packaging size: 100 pieces



CAP

TYPE	SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Without line	Matt	040-1015	040-1025	040-1035	040-1045	040-1055	040-1065
	Glossy	040-1010	040-1020	040-1030	040-1040	040-1050	040-1060
With line	Matt	040-1615	040-1625	040-1635	040-1645	040-1655	040-1665
	Glossy	040-1610	040-1620	040-1630	040-1640	040-1650	040-1660

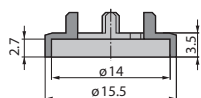
Packaging size: 100 pieces



POINTER

SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Matt	041-2015	041-2025	041-2035	041-2045	041-2055	041-2065
Glossy	041-2010	041-2020	041-2030	041-2040	041-2050	041-2060

Packaging size: 100 pieces



NUT COVER

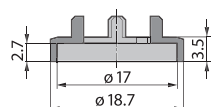
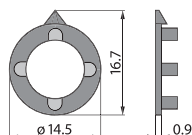
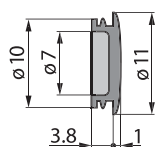
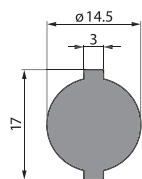
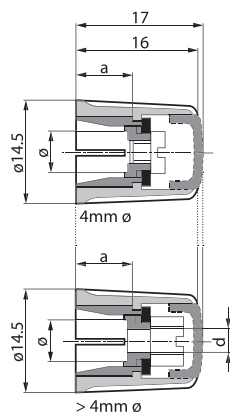
TYPE	SURFACE	GRAY	BLACK
Without line	Matt	044-2015	044-2025
	Glossy	044-2010	044-2020
With line	Matt	044-2115	044-2125
	Glossy	044-2110	044-2120

Packaging size: 100 pieces

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

KNOB SIZE: Ø 14.5 MM



KNOB

TYPE	a	d	SHAFT DIAMETER	GRAY MATT	GLOSSY	BLACK MATT	GLOSSY
Without line	5.2	-	3	020-3115	020-3110	020-3125	020-3120
	5.2	-	1/8"	020-3215	020-3210	020-3225	020-3220
	5.2	-	4	020-3315	020-3310	020-3325	020-3320
	7.0	3.2	6	020-3415	020-3410	020-3425	020-3420
	7.0	3.2	1/4"	020-3515	020-3510	020-3525	020-3520
With line	5.2	-	3	021-3115	021-3110	021-3125	021-3120
	5.2	-	1/8"	021-3215	021-3210	021-3225	021-3220
	5.2	-	4	021-3315	021-3310	021-3325	021-3320
	7.0	3.2	6	021-3415	021-3410	021-3425	021-3420
	7.0	3.2	1/4"	021-3515	021-3510	021-3525	021-3520

Packaging size: 100 pieces

WING KNOB

TYPE	a	d	SHAFT DIAMETER	GRAY MATT	GLOSSY	BLACK MATT	GLOSSY
With line	5.2	-	3	023-3115	023-3110	023-3125	023-3120
	5.2	-	1/8"	023-3215	023-3210	023-3225	023-3220
	5.2	-	4	023-3315	023-3310	023-3325	023-3320
	7.0	3.2	6	023-3415	023-3410	023-3425	023-3420
	7.0	3.2	1/4"	023-3515	023-3510	023-3525	023-3520

Packaging size: 100 pieces

CAP

TYPE	SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Without line	Matt	040-3015	040-3025	040-3035	040-3045	040-3055	040-3065
	Glossy	040-3010	040-3020	040-3030	040-3040	040-3050	040-3060
With line	Matt	040-3615	040-3625	040-3635	040-3645	040-3655	040-3665
	Glossy	040-3610	040-3620	040-3630	040-3640	040-3650	040-3660

Packaging size: 100 pieces

POINTER

SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Matt	041-3015	041-3025	041-3035	041-3045	041-3055	041-3065
Glossy	041-3010	041-3020	041-3030	041-3040	041-3050	041-3060

Packaging size: 100 pieces

NUT COVER

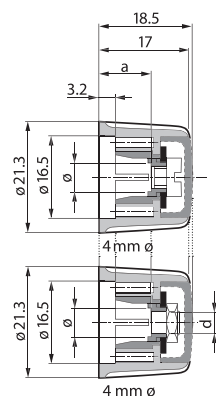
TYPE	SURFACE	GRAY	BLACK	ROT
Without line	Matt	044-3015	044-3025	044-3035
	Glossy	044-3010	044-3020	044-3030
With line	Matt	044-3115	044-3125	044-3135
	Glossy	044-3110	044-3120	044-3130
Only for wing knob	Matt	044-3215	044-3225	044-3235
	Glossy	044-3210	044-3220	044-3230

Packaging size: 100 pieces

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

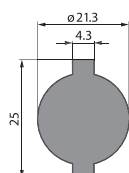
KNOB SIZE: Ø 21 MM



KNOB

TYPE	a	d	SHAFT DIAMETER	GRAY MATT	GLOSSY	BLACK MATT	GLOSSY
Without line	8.3	–	4	020-4315	020-4310	020-4325	020-4320
	10	4.05	6	020-4415	020-4410	020-4425	020-4420
	10	3.2	1/4"	020-4515	020-4510	020-4525	020-4520
With line	8.3	–	4	021-4315	021-4310	021-4325	021-4320
	10	4.05	6	021-4415	021-4410	021-4425	021-4420
	10	3.2	1/4"	021-4515	021-4510	021-4525	021-4520

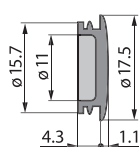
Packaging size: 100 pieces



WING KNOB

TYPE	a	d	SHAFT DIAMETER	GRAY MATT	GLOSSY	BLACK MATT	GLOSSY
With line	8.3	–	4	023-4315	023-4310	023-4325	023-4320
	10	4.05	6	023-4415	023-4410	023-4425	023-4420
	10	3.2	1/4"	023-4515	023-4510	023-4525	023-4520

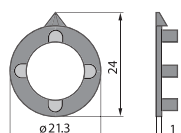
Packaging size: 100 pieces



CAP

TYPE	SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Without line	Matt	040-4015	040-4025	040-4035	040-4045	040-4055	040-4065
	Glossy	040-4010	040-4020	040-4030	040-4040	040-4050	040-4060
With line	Matt	040-4615	040-4625	040-4635	040-4645	040-4655	040-4665
	Glossy	040-4610	040-4620	040-4630	040-4640	040-4650	040-4660

Packaging size: 100 pieces



POINTER

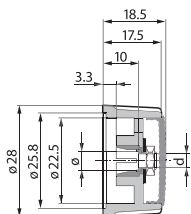
SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Matt	041-4015	041-4025	041-4035	041-4045	041-4055	041-4065
Glossy	041-4010	041-4020	041-4030	041-4040	041-4050	041-4060

Packaging size: 100 pieces

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

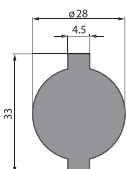
KNOB SIZE: Ø 28 MM



KNOB

TYPE	d	SHAFT DIAMETER	GRAY		BLACK	
			MATT	GLOSSY	MATT	GLOSSY
Without line 	4.05	6	020-5415	020-5410	020-5425	020-5420
	3.2	1/4"	020-5515	020-5510	020-5525	020-5520
With line 	4.05	6	021-5415	021-5410	021-5425	021-5420
	3.2	1/4"	021-5515	021-5510	021-5525	021-5520

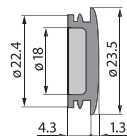
Packaging size: 100 pieces



WING KNOB

TYPE	d	SHAFT DIAMETER	GRAY		BLACK	
			MATT	GLOSSY	MATT	GLOSSY
With line 	4.05	6	023-5415	023-5410	023-5425	023-5420
	3.2	1/4"	023-5515	023-5510	023-5525	023-5520

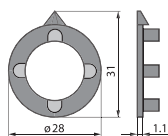
Packaging size: 100 pieces



CAP

TYPE	SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Without line 	Matt	040-5015	040-5025	040-5035	040-5045	040-5055	040-5065
	Glossy	040-5010	040-5020	040-5030	040-5040	040-5050	040-5060
With line 	Matt	040-5615	040-5625	040-5635	040-5645	040-5655	040-5665
	Glossy	040-5610	040-5620	040-5630	040-5640	040-5650	040-5660

Packaging size: 100 pieces



POINTER

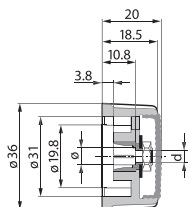
SURFACE	GRAY	BLACK	RED	BLUE	YELLOW	GREEN
Matt	041-5015	041-5025	041-5035	041-5045	041-5055	041-5065
Glossy	041-5010	041-5020	041-5030	041-5040	041-5050	041-5060

Packaging size: 100 pieces

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

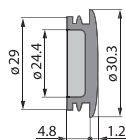
KNOB SIZE: Ø 36 MM



KNOB

TYPE	d	SHAFT DIAMETER	GRAY		BLACK	
			MATT	GLOSSY	MATT	GLOSSY
Without line 	4.05	6	020-6415	020-6410	020-6425	020-6420
	3.2	1/4"	020-6515	020-6510	020-6525	020-6520
With line 	4.05	6	021-6415	021-6410	021-6425	021-6420
	3.2	1/4"	021-6515	021-6510	021-6525	021-6520

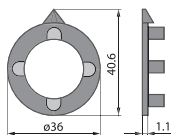
Packaging size: 100 pieces



CAP

TYPE		SURFACE	GRAY	BLACK	RED
Without line 		Matt	040-6015	040-6025	040-6035
		Glossy	040-6010	040-6020	040-6030
With line 		Matt	040-6615	040-6625	040-6635
		Glossy	040-6610	040-6620	040-6630

Packaging size: 100 pieces



POINTER

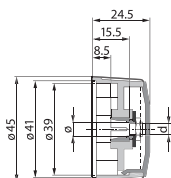
SURFACE	GRAY	BLACK	RED
Matt	041-6015	041-6025	041-6035
Glossy	041-6010	041-6020	041-6030

Packaging size: 100 pieces

Dimensions and ordering information

SHAPE, DIMENSION AND PART NUMBER

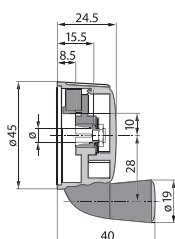
KNOB SIZE: Ø 45 MM



KNOB

TYPE	d	SHAFT DIAMETER	GRAY GLOSSY	BLACK GLOSSY
Without line	4.05	6	020-7410	020-7420
	3.2	1/4"	020-7510	020-7520
With line	4.05	6	021-7410	021-7420
	3.2	1/4"	021-7510	021-7520

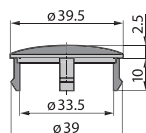
Packaging size: 50 pieces



CRANK KNOB

TYPE	d	SHAFT DIAMETER	GRAY GLOSSY	BLACK GLOSSY
	4.05	6	020-8410	020-8420

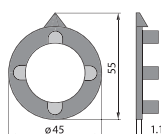
Packaging size: 40 pieces



CAP

TYPE	SURFACE	GRAY	BLACK	RED
Without line	Glossy	040-8010	040-8020	040-8030
				

Packaging size: 100 pieces



POINTER

TYPE	GRAY	BLACK	RED
Glossy	041-7110	041-7120	041-7130

Packaging size: 100 pieces

Ordering information

ORDERING CODE

02

-

-

-

-

-

-

TYPE | LINE

0 Knob without line

1 Knob with line

3 Wing knob with line

SURFACE

0 Glossy

5 Matt

COLOR

1 Gray

2 Black

KNOB SIZE	COLLET DIAMETER Ø							COLLET WITH THROUGH DRILLING Ø			
	2	3	4	5	6	1/8"	1/4"	4	6	1/8"	1/4"
9 mm	10	11				12					
10 mm	20	20	23			22					
14.5 mm	30	31	33	36	34	32	35			3 G	
21 mm	40	41	43	46	44	42	45	4 E	4 F	4 G	4 H
28 mm		51	53	56	54		55	5 E	5 F	5 G	5 H
36 mm			63	66	64		65	6 E	6 F		6 H
45 mm					74		75		7 F		7 H

Explanation:

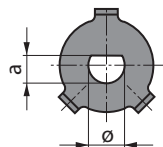
	Standard version
	Optional
	Not possible

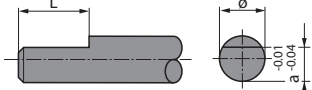
Ordering information

ACCESSORIES AND SPARE PARTS

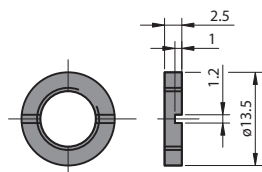
ANTI-SLIP BRACKET

D-shape prevents slipping on shaft and incorrect knob mounting. For knobs Ø 21, 28, 36 mm.



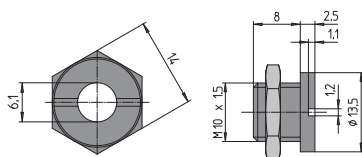
ANTI-SLIP BRACKET CORRESPONDING TO D-SHAFT	Ø	a	L	PART NUMBER
	6 mm	4.6 mm	9 mm	048-2300

SLOTTED NUT (BRASS)



THREAD	M6 X 0.75	M7 X 0.75	M8 X 0.75	M10 X 0.75	3/8" - 32
Slotted nut	046-1000	046-1500	046-2000	046-32000	046-4000

MOUNTING AID

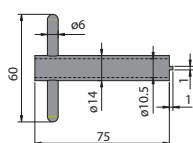


Mounting aid with through-hole Ø 6 mm

Part number 047-3000

MOUNTING TOOL

Tool for tightening of our slotted nuts and threaded bushings.



Mounting tool

Part number 048-1000

KNOBS

CLASSIC COLLET

Specifications

MECHANICAL DATA

FASTENING AND OPERATING TORQUE

KNOB DIAMETER Ø	COLLET DIAMETER Ø									
	2 mm		3 mm, 1/8"		4 mm		6 mm		1/4"	
	a	b	a	b	a	b	a	b	a	b
	Ncm	Ncm	Ncm	Ncm	Ncm	Ncm	Ncm	Ncm	Ncm	Ncm
9 mm	50	25	50	25						
10 mm			80	40	80	60				
14.5 mm			100	50	100	80	120	140	120	140
21 to 45 mm					100	80	160	140	120	140

a = max. admissible fastening torque for screws respective nuts

b = operating torque for stainless steel shafts with a tolerance of +0 / -0.018 mm for max. tightening torque

MATERIALS

Collets, sleeves, nuts:

Brass

Knobs:

Polyamid

ENVIRONMENTAL DATA

Operating temperature:

-40 to +70 °C

Flammability:

UL94-HB

LED Arrays

Several applications need an optical indication to show a specific situation. The robust and standardized design can be soldered easy and save to any standard PCB. We provide LED arrays in several shapes and colors.

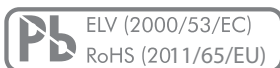
CONTACT US

LED ARRAYS

Product description

MAIN FEATURES

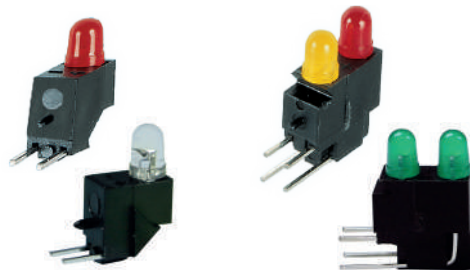
- › Pre-mounted single or double LED housings
- › Exact orientation and correct polarity are guaranteed with the locator pin
- › High luminosity with low power consumption
- › Various LED colors
- › Space-saving assembly thanks to small-size components
- › Adapted to DIN 41494, steps of 2.54 mm (0.1")
- › Assembly is quick and easy
- › No additional fixing are required
- › Soldering and cleaning by machine is possible
- › Available in blocks, ready for assembly with tinned terminals



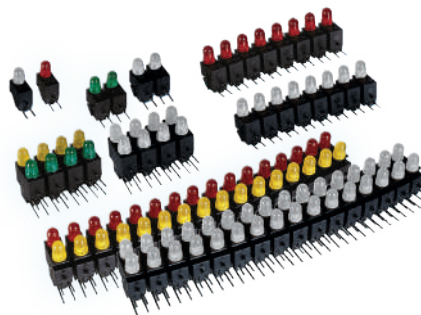
DESCRIPTION

- High quality diode and plastic body, forming a compact unit for easy assembly.
- Bi-color LED devices have two semiconductors connected antiparallel in the diffused white housing. The LED then lights up red or green depending on the polarity of the connected voltage.

STANDARD LED SOLUTIONS single or bi-color



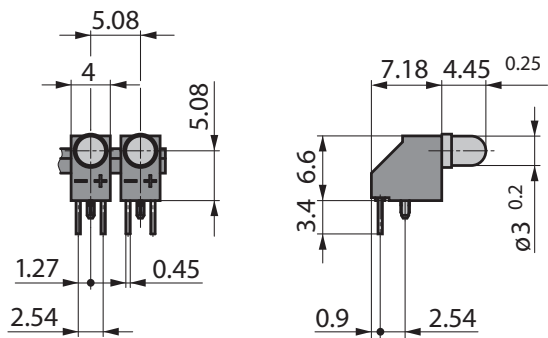
CUSTOMIZED SOLUTIONS on request



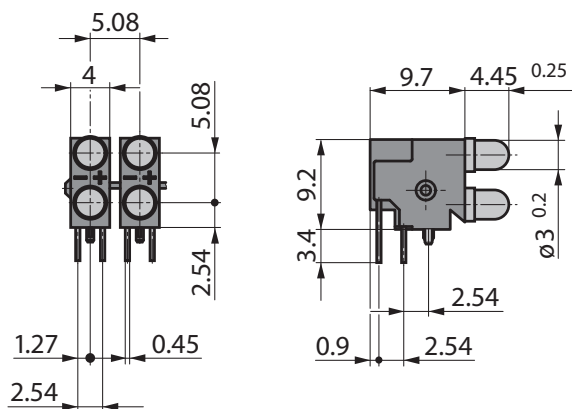
Dimensions

DESIGN

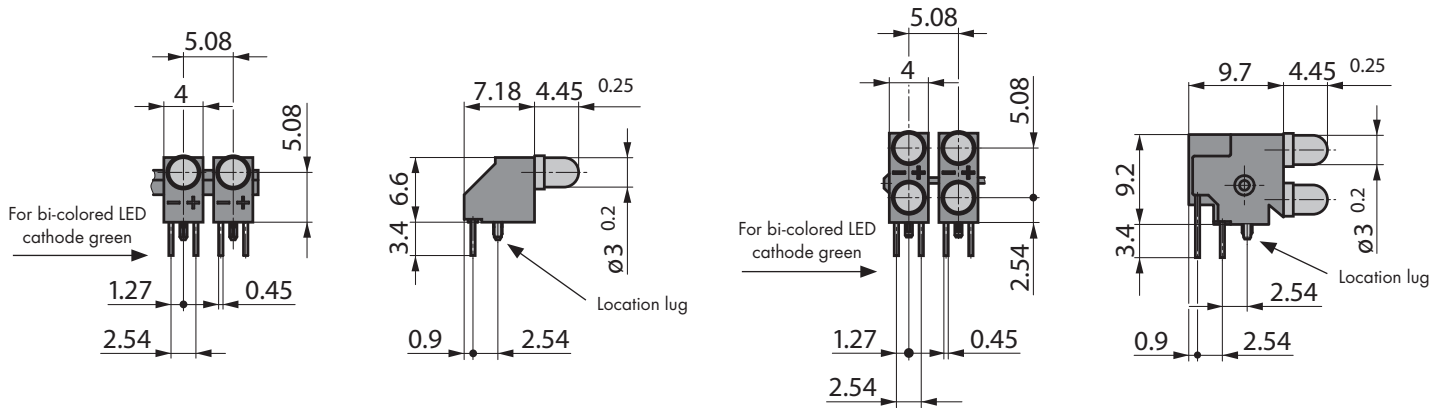
SINGLE LED ARRAYS



DOUBLE LED ARRAYS



SINGLE OR DOUBLE BI-COLOR LED ARRAYS



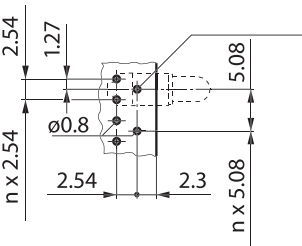
Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

LED ARRAYS

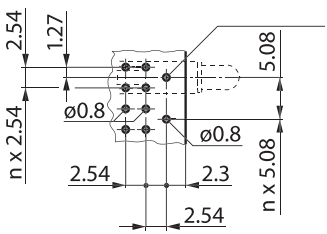
Dimensions

DRILLING DIAGRAM AND FOOTPRINT

SINGLE LED ARRAYS



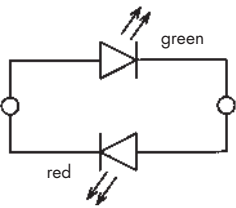
DOUBLE LED ARRAYS



Circuit diagram

CONNECTIONS

BI-COLOR LED



LED ARRAYS

Ordering information

SINGLE LED ARRAYS (RED, GREEN, YELLOW)



DESCRIPTION	CURRENT	RED	GREEN	YELLOW
Single elements	2 mA	09H0010-62	09H0011-62	09H0012-62
	10 mA	09H0010-60	09H0011-60	09H0012-60

DOUBLE LED ARRAYS (RED, GREEN, YELLOW)



DESCRIPTION	CURRENT	RED / RED	GREEN / GREEN	YELLOW / YELLOW	RED / YELLOW	RED / GREEN	YELLOW / GREEN
Double elements	2 mA	09H0010-63	09H0011-63	09H0012-63	09H0015-63	09H0016-63	09H0017-63
	10 mA	09H0010-61	09H0011-61	09H0012-61	09H0015-61	09H0016-61	09H0017-61

SINGLE LED ARRAYS (RED, GREEN, YELLOW)



DESCRIPTION	CURRENT	BLUE	BI-COLOR RED / GREEN
Single elements	20 mA	09-0013-64	09-0014-60

DOUBLE LED ARRAYS (BLUE OR BI-COLOR)



DESCRIPTION	CURRENT	BLUE	BI-COLOR RED / GREEN
Double elements	20 mA	09-0013-65	09-0014-61

LED ARRAYS

Specifications

ELECTRICAL DATA

ELECTRICAL DATA LED 2 mA	RED	GREEN	YELLOW
Light intensity IV (at IF = 2 mA)	min. 0.8 mcd typ. 2.1 mcd	min. 1.0 mcd typ. 2.1 mcd	min. 0.9 mcd typ. 1.6 mcd
Forward voltage UF (at IF = 2 mA)	typ. 1.8 V max. 2.0 V	typ. 1.8 V max. 2.2 V	typ. 1.9 V max. 2.5 V
Max. conducted current IF	7 mA	7 mA	7 mA
Reverse voltage UR (IR = 50 µA)	5 V	5 V	5 V
Viewing angle (50 % IV)	50°	50°	50°
Wave length (at IF = 2 mA)	626 nm	569 nm	585 nm
Dissipated power	24 mW	24 mW	36 mW

ELECTRICAL DATA LED 10 mA	RED	GREEN	YELLOW
Light intensity IV (at IF = 10 mA)	min. 3.4 mcd typ. 7 mcd	min. 3.6 mcd typ. 7 mcd	min. 2.6 mcd typ. 7 mcd
Forward voltage UF (at IF = 10 mA)	typ. 1.9 V max. 2.4 V	typ. 1.8 V max. 2.2 V	typ. 1.9 V max. 2.5 V
Max. conducted current IF	30 mA	30 mA	30 mA
Reverse voltage UR (IR = 50 µA)	5 V	5 V	5 V
Viewing angle (50 % IV)	typ. 60°	typ. 60°	typ. 60°
Wave length (at IF = 10 mA)	626 nm	569 nm	585 nm

ELECTRICAL DATA LED 20 mA	BLUE	RED / GREEN
Light intensity IV (at IF = 20 mA)	min. 30 mcd typ. 45 mcd	min. 2.5 mcd typ. 10 mcd
Forward voltage UF (at IF = 20 mA)	typ. 4.0 V max. 5.0 V	typ. 2.0 V max. 2.6 V
Max. conducted current IF	30 mA	25 mA
Reverse voltage UR (IR = 50 µA)	5 V	5 V
Viewing angle (50 % IV)	typ. 40°	typ. 100°
Wave length (at IF = 20 mA)	462 nm	567 / 650 nm

MATERIALS

Main body: High quality heat resistant thermoplastic

SOLDERING CONDITIONS

Hand soldering: < 260 °C during 5 s

ENVIRONMENTAL DATA

Temperature range:

- Storage temperature: -40 to +85 °C
- Operating temperature: -40 to +85 °C

Banana sockets

High precision test and measurement equipment and high-end audio gear demand high quality banana sockets. Elma's robust banana sockets accept all industry-standard banana plugs.

CONTACT US

BANANA SOCKETS

Product description

MAIN FEATURES

- › For Ø 4 mm plug connector
- › Additional plug connector for wire connection with up to Ø 2 mm
- › Safe clamping thread
- › With locking device
- › With captive insulation against body contact
- › Can be fitted to front panels up to 4 mm thickness
- › Colors grey, black, red, blue, yellow, green and yellow / green for ground wire
- › Most demanded socket type

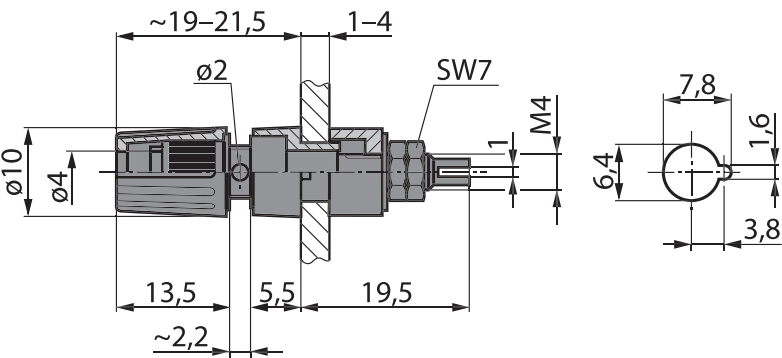


BANANA SOCKETS Ø 4 MM



Dimensions

DESIGN AND FRONT PANEL CUT OUT



Ordering information

GREY	BLACK	RED	BLUE	YELLOW	YELLOW / GREEN	GREEN
024-2010	024-2020	024-2030	024-2040	024-2050	024-2060	024-2070

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

BANANA SOCKETS

Specifications

MECHANICAL DATA

- Fastening torque of nut max. 290 Ncm
- Protection against accidental contact: Greater plug-in depth for the connector > 21 mm

ELECTRICAL DATA

- Continuous load 20 A
- Hold-off voltage 2'500 V ~ / 4'500 V ~
- Insulation resistance $10^{13} \Omega$
- Capacity 3 pF
- Insulation: Front panel feed-through of plastic material
Voltage proof for front panel of 2 mm thickness: 4'500 V ~ | 4 mm thickness: 2'500 V ~

MATERIALS

- Threaded bush in nickel plated brass, nuts and washers of steel
- Plastic parts made of polyamide





Audio solutions

Our audio experience for perfection in sound provides unique control products. Specially designed for studio as well as home audio and entertainment systems.

CONTACT US

AUDIO SOLUTIONS

SERIES A4

- › Excellent accoustic performance with precise switch feel
- › Low-bouncing contact system
- › Compatible with Elma’s Remote Audio Plus (see below)

SERIES A47

- › High resolution series audio attenuator with 47 positions
- › Exceptional sonic performance with precise switch feel
- › Compatible with Elma’s Remote Audio Plus (see below)

SERIES A47 JUMBO

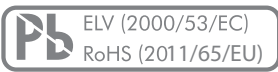
- › 47 position shunt type audio attenuator for large size THT resistors
- › Exceptional sonic performance with precise switch feel
- › Compatible with Elma’s Remote Audio Plus (see below)

UNI SELECTOR

- › 12 positions or 24 positions
- › 1 pole x 12 / 24 positions up to 4 poles x 3 / 6 positions per wafer
- › Shorting or non-shorting
- › Compatible with Elma’s Remote Audio Plus (see below)

REMOTE AUDIO PLUS

- › IR remote controlled with IR teach-in function
- › Adjustable to different Elma A4 | A47 switch types
- › Push button and host control remote options



PAGE OVERVIEW

TYPE	SERIES A4	SERIES A47	SERIES A47 JUMBO	UNI SELECTOR	REMOTE AUDIO PLUS
SEE	PAGE 166	PAGE 170	PAGE 173	PAGE 176	PAGE 180

AUDIO SOLUTION

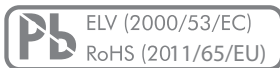
SERIES A4

Product description

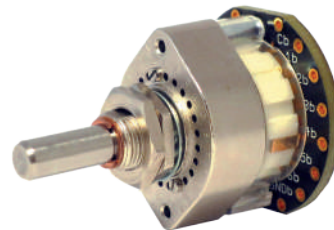
MAIN FEATURES

HIGH PERFORMANCE AUDIO SELECTOR SWITCHES AND SERIES TYPE ATTENUATORS

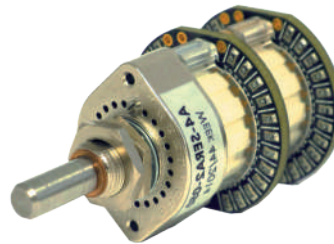
- › Exceptional sonic performance with precise switch feel
- › Low-bounce contact system



SERIES A4 single-wafer selector



SERIES A4 two-channel SMT series type attenuator



PRODUCT VARIETY SELECTOR SWITCHES

- 1 pole x 12 positions, 2 poles x 6 positions, 3 poles x 4 positions and 4 poles x 3 positions per wafer
- Non-shorting
- With selectable end stops
- Up to 8 wafers

PRODUCT VARIETY SERIES TYPE ATTENUATORS

- 24 positions, with selectable end stops
- Up to 8 channels
- Available with pre-populated thin-film SMT resistors or non-populated THT versions to be populated by the customer
- 600 ohm, 5 k, 10 k, 25 k, 100 k and 250 k ohm versions available as standard values
- Free Excel resistor calculator tool available

POSSIBLE CUSTOMIZATIONS

- Shafts, concentric construction

TYPICAL APPLICATIONS

- Mixing desks and outboard studio equipment
- Home audio and home theater

Product description

DESCRIPTION

The A4 audio switch series offers a comprehensive range of attenuators and selector switches. These high performance audio switches incorporate a PCB based switch contact system that is specifically designed to meet audiophile requirements for superb sonic performance.

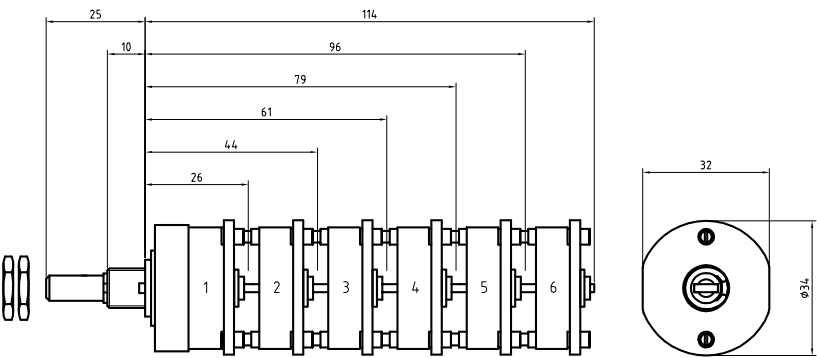
The selector switches feature switch torques from 1.5 to 15 Ncm and are available in up to 8 wafer versions. The switch functionality can be 1 pole x 12 positions, 2 poles x 6 positions, 3 pole x 4 positions or 4 pole x 3 positions per wafer, with non-shorting contacts. All switches feature selectable end stops.

The series type attenuators are available with up to 8 channels and offer feature switch torques from 1.5 to 15 Ncm. They are available either populated with low-noise, high precision SMT resistors (standard impedances are 600 ohm, 5 k, 10 k, 25 k, 50 k, 100 k or 250 k ohm), or non-populated THT versions which can be populated by the customer.

All switches feature Elma’s hallmark indexing feel for superior tactile feedback.

Dimensions, pin assignment and circuit diagram

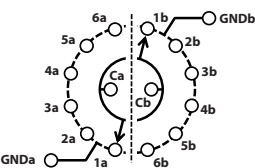
SWITCH DESIGN



PIN ASSIGNMENT AND CIRCUIT DIAGRAM

PIN ASSIGNMENT

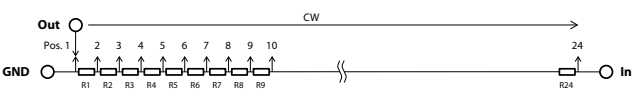
Example for the selector switch



GND, GND-surface on the printed circuit board. Printed circuit board with soldering eyelets.

PIN ASSIGNMENT AND CIRCUIT DIAGRAM

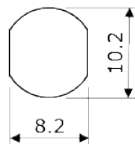
Example for the series type attenuator



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

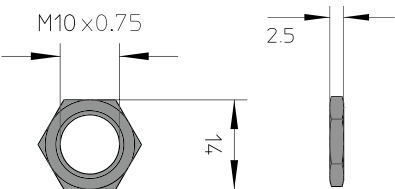
Dimensions, pin assignment and circuit diagram

FRONT PANEL CUT OUT

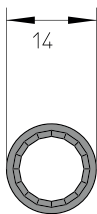


NUT

HEX NUT



LOCK WASHER



Ordering information

ORDERING CODE

A4	-	- - -	-	-	-	- - -	-
----	---	-------	---	---	---	-------	---

TYPE

SLV Selector switch vertical
SER Series type attenuator

SWITCHING TORQUE

A 1.5 Ncm (not recommended for > 2 wafers)
B 4 Ncm
C 8 Ncm
D 15 Ncm

NUMBER OF WAFERS

X Number of wafers (max. 8, SER have one wafer per channel)

SWITCHING MODE

For selector switches only | leave blank for attenuators
N Non-shorting

FUNCTION (per wafer)

Selector switches
E.g. 206 2 poles, 6 positions (30° indexing)

Attenuators

THT	THT, non-populated
0k6	600 ohm impedance
005	5 k ohm impedance
010	10 k ohm impedance
025	25 k ohm impedance
050	50 k ohm impedance
100	100 k ohm impedance
250	100 k ohm impedance

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

Ordering information

PACKAGING

Single piece packed, two nuts are included

ACCESSORIES AND SPARE PARTS

Spare nuts:	10 pieces / bag, part number 4124-41
Stop screws:	10 pieces / bag, part number 4124-21

Specifications

GENERAL

Indexing resolution:	12 positions (30° indexing 330° total switch travel) 24 positions (15° indexing 345° total switch travel)
Switching torque:	1.5, 4, 8 or 15 Ncm (±30 % over temperature range and life)
Rotational life:	25'000 cycles (over temperature range, at 120 RPM)
Contact system:	Low-bounce wiper with 3 micron hard gold plated PCB
SMT resistors:	Attenuators only, 0805 package, thin-film, ±0.1 %, TCR, ±25 ppm / °C
Input impedance:	Attenuators only, 600 ohm, 5 k, 10 k, 25 k, 50 k, 100 k or 250 k ohm
Electrical load:	Selector switches only, max. 42 VDC, max. 500 mA (resistive load, over temperature range and life)

DB ATTENUATION (SERIES TYPE ATTENUATORS)

SWITCH POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Attenuation (dB)	Off	-62	-53	-46	-41	-37	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2	0
Step size (dB)		9	7	5	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	

AUDIO SOLUTION

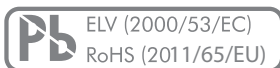
SERIES A47

Product description

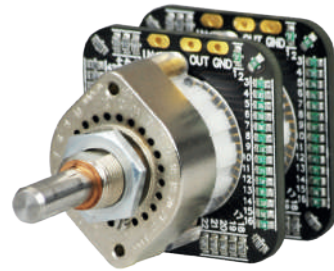
MAIN FEATURES

HIGH RESOLUTION SERIES AUDIO ATTENUATOR
WITH 47 POSITIONS

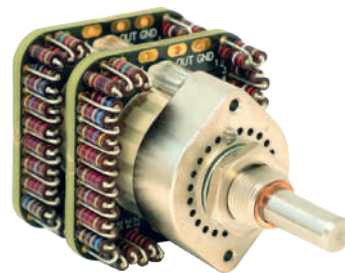
- › 47 positions with selectable end stops
- › Low profile: 36 x 36 mm
- › Up to 6 channels
- › Available with pre-populated thin-film SMT resistors or non-populated THT versions
- › 600 ohm, 10 k, 25 k, 50 k or 100 k ohm standard input impedances
- › Exceptional sonic performance with precise switch feel
- › Low-bounce contact system with 3 µm gold plating
- › Free Excel resistor calculator tool available



SERIES A47 two-channel SMT version



SERIES A47 two-channel THT version*



PRODUCT VARIETY

- Two-channel SMT version
- Two-channel THT version (supplied non-populated)

POSSIBLE CUSTOMIZATIONS

- Shafts, concentric construction

TYPICAL APPLICATIONS

- Mixing desks and outboard studio equipment
- Home audio and home theater

DESCRIPTION

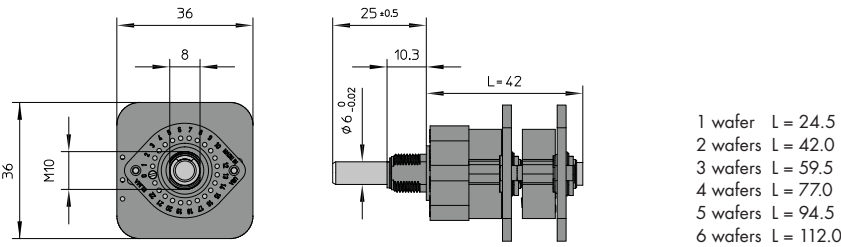
The A47 audio switch series incorporates a PCB based switch contact system that is specifically designed to meet audioophile requirements for superb sonic performance. These series attenuators provide 47 positions and are available from 1 to 6 channels. Switch torques of 1.5, 2.5 and 5 Ncm are available standard, populated with low-noise, high precision SMT resistors (standard input impedances are 600 ohm, 10 k, 25 k, 50 k or 100 k ohm) or non-populated THT versions (can be populated by the customer).

The A47 series feature Elma's hallmark indexing feel for superior tactile feedback.

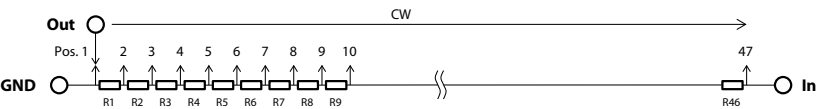
* Pictured with resistors, is supplied non-populated

Dimensions, pin assignment and circuit diagram

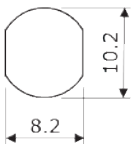
SWITCH DESIGN



PIN ASSIGNMENT AND CIRCUIT DIAGRAM

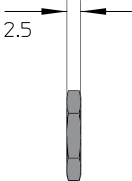
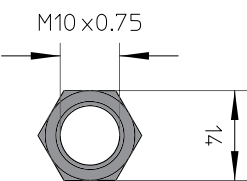


FRONT PANEL CUT OUT

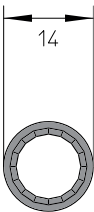


NUT

HEX NUT



LOCK WASHER



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

AUDIO SOLUTION

SERIES A47

Ordering information

ORDERING CODE

A47	-	SER	-	-	-	- - -
-----	---	-----	---	---	---	-------

SWITCHING TORQUE

- A** 1.5 Ncm (not recommended for > 2 wafers)
- B** 2.5 Ncm (not recommended for > 4 wafers)
- C** 5 Ncm

NUMBER OF WAFERS

- X** Number of wafers (max. 6)

FUNCTION (per wafer)

- THT** THT, non-populated
- 0k6** 600 ohm impedance
- 010** 10 k ohm impedance
- 025** 25 k ohm impedance
- 050** 50 k ohm impedance
- 100** 100 k ohm impedance

PACKAGING

Single piece packed, lock washer and two nuts are included

ACCESSORIES AND SPARE PARTS

Spare nut:

Part number 5622-16

Stop screws:

10 pieces / bag, part number 4124-21

SPECIFICATIONS

GENERAL

Indexing resolution:	47 positions (7.5° indexing 345° total switch travel)
Switching torque:	1.5, 2.5 or 5 Ncm (±30 % over temperature range and life)
Rotational life:	25'000 cycles (over temperature range, at 120 RPM)
Contact system:	Low-bounce wiper with 3 µm hard gold plated PCB
SMT resistors:	0805 package, thin-film, ±0.1 %, TCR; ±25 ppm / °C
THT resistors:	Non-populated, max. package size, 2.8 x 10 mm (0.6 mm wire)
Input impedance:	10 k, 25 k, 50 k, 100 k or 600 ohm

DB ATTENUATION (SERIES TYPE ATTENUATORS)

SWITCH POSITION	1	2	3	4	5	6	7	8	9	10	...	47
Attenuation (dB)	Off	-72	-69	-66	-64	-62	-60	-58.5	-57	-55.5	...	0
Step size (dB)		3	3	2	2	2	1.5	1.5	1.5	...	1.5	...

AUDIO SOLUTION

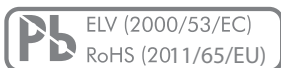
SERIES A47 JUMBO

Product description

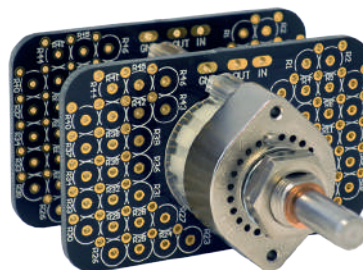
MAIN FEATURES

47 POSITIONS SHUNT TYPE AUDIO ATTENUATOR
FOR LARGE SIZE THT RESISTORS

- › 47 positions with selectable end stops
- › Low profile: 36 mm height
- › Up to 2 channels
- › For resistors with up to 5 mm body diameter
- › Exceptional sonic performance with precise switch feel
- › Low-bounce contact system with 3 µm gold plating
- › Free Excel resistor calculator tool available



SERIES A47 JUMBO two-channel version



PRODUCT VARIETY

- One or two channels available

POSSIBLE CUSTOMIZATIONS

- Shafts, concentric construction

TYPICAL APPLICATIONS

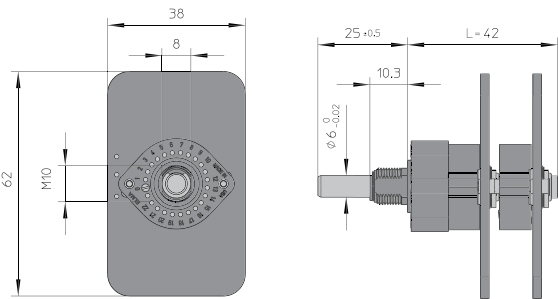
- Mixing desks and outboard studio equipment
- Home audio and home theater

DESCRIPTION

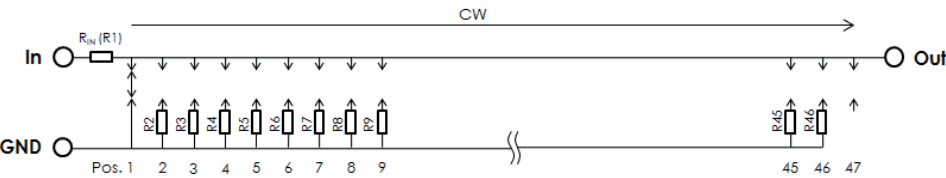
The A47 JUMBO audio switch series incorporates a PCB based switch contact system that is specifically designed to meet audiophile requirements for superb sonic performance. These shunt type attenuators provide 47 positions and are available in one or two channel versions, while offering switch turning torques of 1.5, 2.5 and 5 Ncm. The PCB is designed to accommodate a maximum resistor dimension of 5 mm body diameter by 12 mm body length. The A47 JUMBO series feature Elma's hallmark indexing feel for superior tactile feedback.

Dimensions, pin assignment and circuit diagram

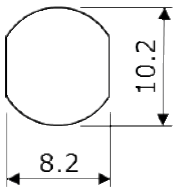
SWITCH DESIGN



PIN ASSIGNMENT AND CIRCUIT DIAGRAM

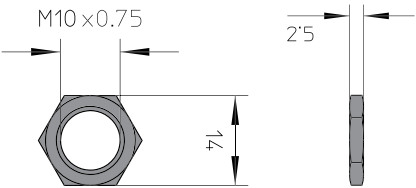


FRONT PANEL CUT OUT

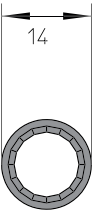


NUT

HEX NUT



LOCK WASHER



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

AUDIO SOLUTION

SERIES A47 JUMBO

Ordering information

ORDERING CODE

A47

-

JUM

-

-

SWITCHING TORQUE

A

 1.5 Ncm

B

 2.5 Ncm

C

 5 Ncm

NUMBER OF WAFERS

1

 1 wafer

2

 2 wafers

PACKAGING

Single piece packed, lock washer and two nuts are included

ACCESSORIES AND SPARE PARTS

Spare nut:

Stop screws:

Part number 5622-16

10 pieces / bag, part number 4124-21

Specifications

GENERAL	
Indexing resolution:	47 positions (7.5° indexing 345° total switch travel)
Switching torque:	1.5, 2.5 or 5 Ncm (± 30% over temperature range and life)
Rotational life:	25'000 cycles (over temperature range, at 120 RPM)
Contact system:	Low-bounce wiper with 3 µm hard gold plated PCB
Resistors dimension:	Ø 5 x 12 mm max. body size, Ø 1 mm max. lead diameter
Taper:	Use free calculator (excel) to determine resistor values according to desired tapers

AUDIO SOLUTION

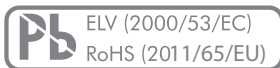
UNI SELECTOR

Product description

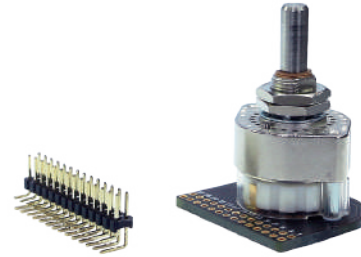
MAIN FEATURES

VERSATILE, MULTI-DECK SELECTOR SWITCH WITH HORIZONTAL PCB MOUNTING OPTION

- › Exceptionally low-bounce contact system and precise switch feel
- › 1.5, 4, 8 or 15 Ncm switching torque
- › User selectable end stop screw



UNI SELECTOR



PRODUCT VARIETY

- Up to 12 positions (30° indexing) or 24 positions (15° indexing)
- From 1 pole x 24 positions, up to 4 poles and 3 to 6 positions per wafer
- Shorting or non-shorting
- Up to 6 wafers

TYPICAL APPLICATIONS

- Test and measurement, medical
- Home audio and studio

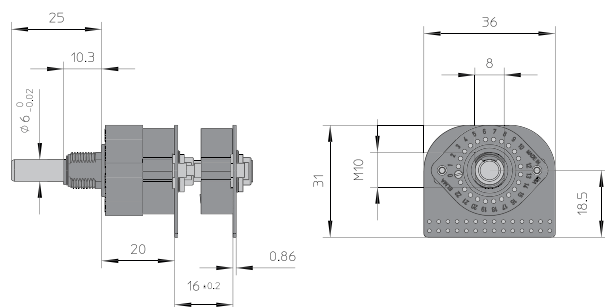
DESCRIPTION

Elma's Uni Selector is a versatile, multi-deck selector switch specifically designed for bounce sensitive, analog switching applications. The switch offers various torque options ranging from 1.5 to 15 Ncm while providing up to 12 position (30° indexing) or 24 position (15° indexing). The functionality per wafer comprises up to 4 poles x 3 or 6 positions (shorting or non-shorting) and up to 6 wafers. The number of positions can be customized by the user installing an end stop screw to the positions of his preference (to be ordered separately).

The Uni Selector comes with rectangular pin headers which allow the switch to be mounted horizontally on a PC board. For remote control applications, Elma offers motorized IR-remote kits (Remote Audio Plus), that can be directly attached to the switch.

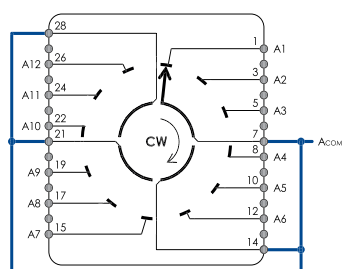
Dimensions, pin assignment and circuit diagram

SWITCH DESIGN

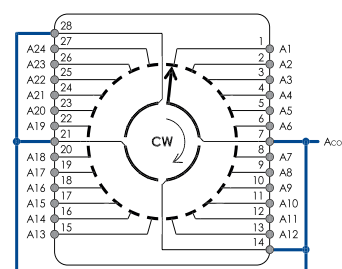


PIN ASSIGNMENT PER WAFER AND CIRCUIT DIAGRAM

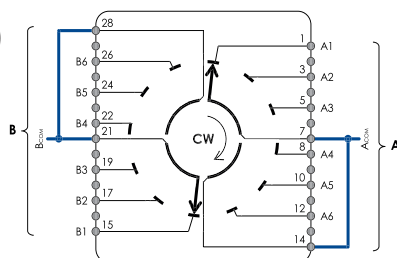
1 pole x 12 positions (30°)



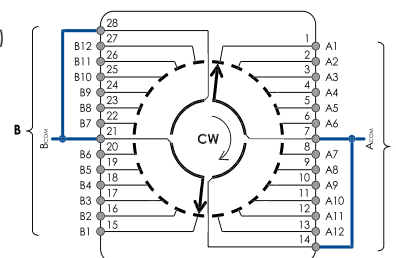
1 pole x 24 positions (15°)



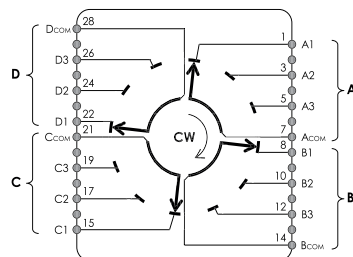
2 poles x 6 positions (30°)



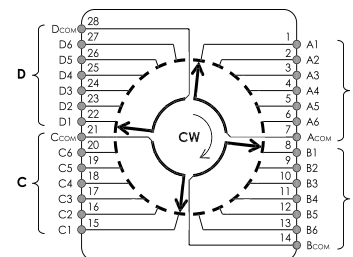
2 poles x 12 positions (15°)



4 poles x 3 positions (30°)



4 poles x 6 positions (15°)



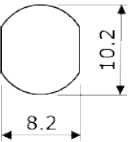
When using one or two pole configurations the four common soldering eyelets have to be interconnected as indicated above (blue lines).

AUDIO SOLUTION

UNI SELECTOR

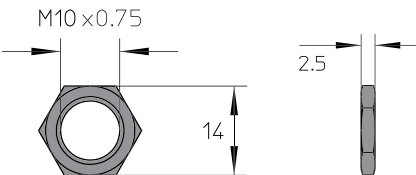
Dimensions, pin assignment and circuit diagram

FRONT PANEL CUT OUT

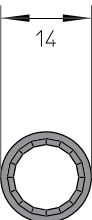


NUT

HEX NUT



LOCK WASHER



Ordering information

ORDERING CODE

US	-	-	-	-	- - -	-
----	---	---	---	---	-------	---

SWITCHING TORQUE	
A	1.5 Ncm (not recommended for > 2 wafers)
B	4 Ncm
C	8 Ncm
D	15 Ncm

NUMBER OF WAFERS	
X	Number of wafers (max. 6)

SWITCHING MODE	
S	Shorting
N	Non-shorting

FUNCTION (per wafer)		
112	1 pole	12 positions (30° indexing)
206	2 poles	6 positions (30° indexing)
403	4 poles	3 positions (30° indexing)
124	1 pole	24 positions (15° indexing)
212	2 poles	12 positions (15° indexing)
406	4 poles	6 positions (15° indexing)

Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

AUDIO SOLUTION

UNI SELECTOR

Ordering information

PACKAGING

Single piece packed, lock washer and two nuts are included

ACCESSORIES AND SPARE PARTS

Spare nut:	Part number 5622-16
Stop screw:	10 pieces / bag, part number 4124-21

Specifications

GENERAL

Indexing resolution:	12 positions (30° indexing 330° total switch travel) 24 positions (15° indexing 345° total switch travel)
Switching torque:	1.5, 4, 8 or 15 Ncm (±30 % over temperature range and life)
Rotational life:	25'000 cycles (over temperature range)
Contact system:	Low-bounce wiper with 3 µm hard gold plated PCB
Electrical load:	max. 442 VDC, max. 500 mA (resistive load, over temperature range and life)
Header:	Rectangular, 2x 14 pins, 0.1" pitch, gold plated, Digikey P/O# S2111EC-14-ND (included)

AUDIO SOLUTION

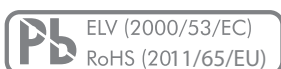
REMOTE AUDIO PLUS

Product description

MAIN FEATURES

IR CONTROLLED MOTOR DRIVER KIT FOR ELMA'S TYPE A4, A47 AND O4 SWITCHES

- › IR remote controlled with IR teach-in function
- › Adjustable to different switch types
- › Push button and host control remote options
- › Relay mute function
- › Zero EMI emission when not actuated
- › Switch feel virtually not affected by motor (LIN motor option)
- › Customer supplies their own remote
- › Note torque limits per motor type



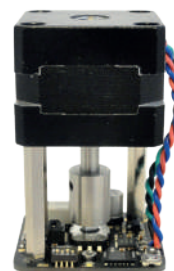
PRODUCT VARIETY

- Remote Audio Plus with LIN motor
- Standard version with standard motor

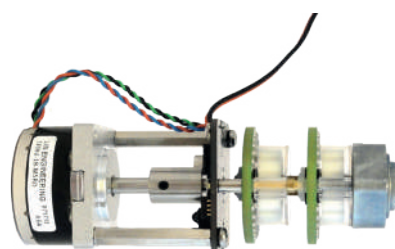
TYPICAL APPLICATIONS

- High-end audio and Pro audio
- Industrial controls

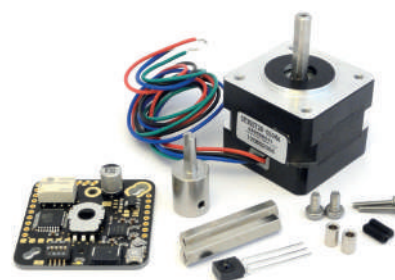
REMOTE AUDIO PLUS



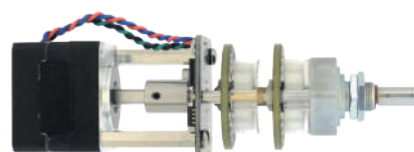
REMOTE AUDIO PLUS with LIN motor



KIT CONTENT*



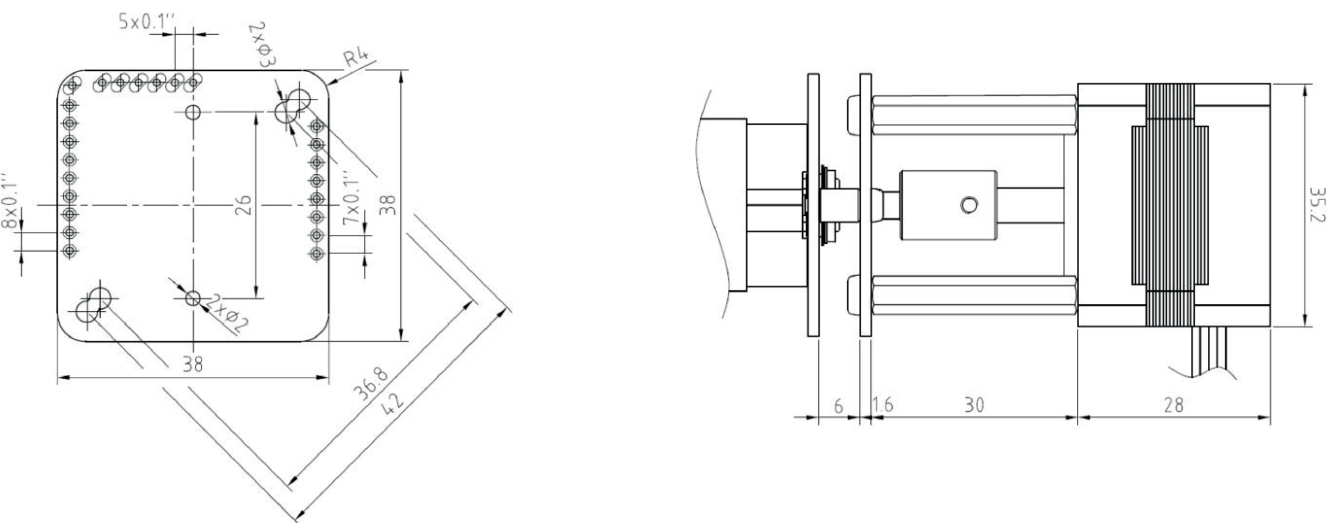
STANDARD VERSION with standard motor



* Switch and IR remote unit are not included

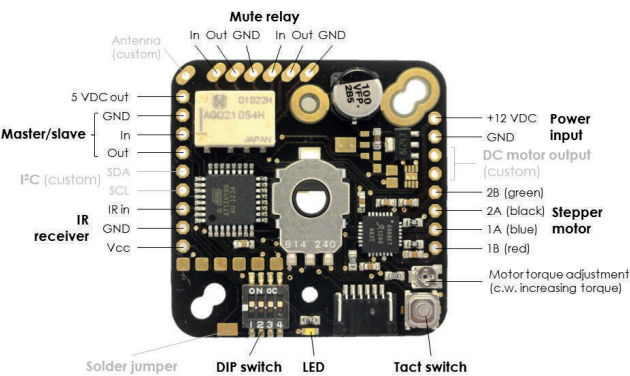
Dimensions, pin assignment and circuit diagram

SWITCH DESIGN



PIN ASSIGNMENT

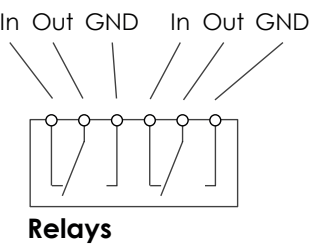
CONTROL MODULE



IR RECEIVER



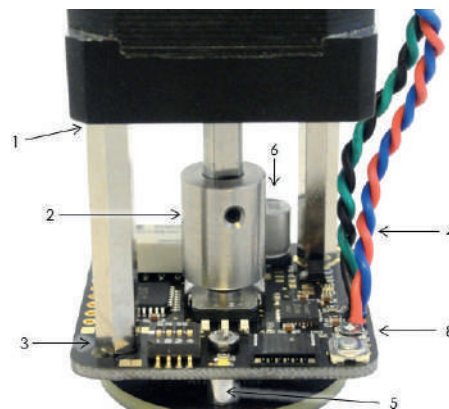
CIRCUIT DIAGRAM FOR RELAY MUTE FUNCTION



Dimensions in mm
Tolerances according to DIN ISO 2768-1 (m), unless otherwise specified

Assembling the kit

1. Mount the two 30 mm stand-offs to the stepper motor using the two set screws (do not tighten the set screws).
2. Feed the switch drive linkage onto the shaft of the stepper motor (do not tighten).
3. Assemble the stepper motor with its stand-offs and the linkage onto the control module using the two M3 screws (be careful when feeding the linkage through the position sensor in the middle of the control module).
4. Twist together the stepper motor's wires (blue with red, green with black) and solder them to the control module (see pin allocation).
5. Mount the assembled motor unit onto the rotary switch using the two M2 screws and the spacers (replacing the original M2 screws at the rear end of the switch).
6. Position the linkage to the switch and firmly tighten the set screw of the linkage.



7. Mount the switch / motor unit into your equipment and connect IR remote cables and 12 VDC power supply to the unit (see pin allocation).
8. Adjust the trim pot to max. position, follow the below setup procedure and finally adjust the trim pot to the minimum torque level needed.

Setup by DIP Switch

- | | |
|--|---|
| Switch #1: 12 / 24 positions | Select between 12 or 24 positions |
| Switch #2: 12 / 24 48 (47) positions | Select between 12 / 24 or 48 positions (if 48 positions is selectet, switch #1 is overridden) |
| Switch #3: Standard motor LIN motor | Select the corresponding stepper motor type in use |
| Switch #4: Slow fast | Chose either slow or fast switching speed |



End stop calibration and IR teach-in

USING THE TACT SWITCH

1. Push the tact switch until the LED flashes for approximately 1 second.
2. Turn the switch to the fully right position and quickly push the tact switch.
The LED flashes for approximately 300 milliseconds for confirmation.
3. Turn the switch to the fully left position and quickly | long push the tact switch.
Quick push: The LED flashes for approximately 300 milliseconds for confirmation.
Long push: Jumping to #5 (used when no IR receiver connected, e.g. in slave mode).
4. Quickly operate the buttons on your IR remote unit in the exact sequence of «up», «down», «mute», «left» and «right».
5. End of procedure (the LED bursts for approximately 1 millisecond).



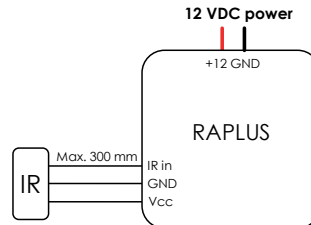
Important

- Avoid fluorescent light exposure during teach-in.
- If the teach-in process fails, repeat it after briefly disconnect the unit from power.
- IR remotes output unique codes, they only work with the originally-paired unit.

Application examples

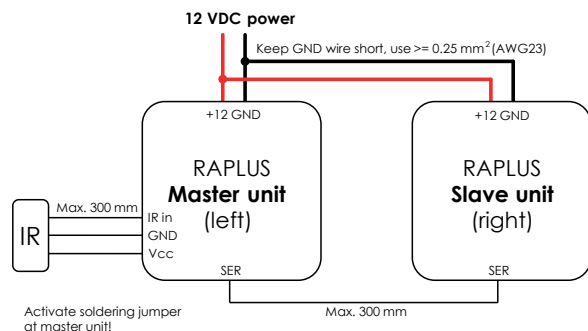
#1 CLASSIC SINGLE UNIT OPERATION

The classic mode of operation incorporates a single unit that is either manually or IR controlled. The versatile control module can be adjusted to individual end stop positions, switch resolutions and operating speeds. Any type of NEC compliant IR protocol can be used and «taught in». The power requirements are 12 VDC nominal at 1.2 A (2.4 A with LIN motor) peak current (see specifications). The supplied IR receiver can be directly connected to the control module using an unshielded 3-wire cable with maximum length of 300 mm. Assembling and setup needs to be done as described above. An IR controllable on-board audio mute relay may optionally be wired in the audio path as indicated under pin allocation.



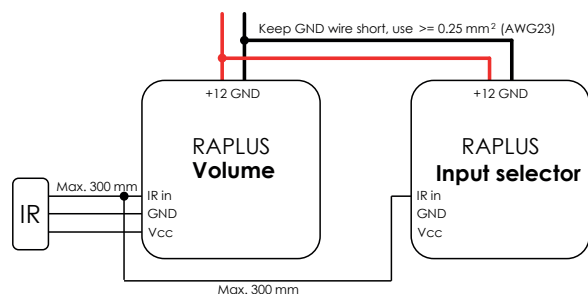
#2 MASTER | SLAVE OPERATION (Balance control)

When using two units in a balance configuration, left and right channels are attenuated with two independent units, with two independent switches. Connect the units in the master / slave configuration as shown. When operating the balance function using the IR remote, the two units will switch alternately in order to minimize the balance step size. The balance function needs to be enabled by activating the solder jumper (see picture) of the PC board of the control unit. The teach-in procedure has to be applied to both, master and slave units, whereas for slave unit the IR teach-in procedure is obsolete.



#3 TWIN UNIT OPERATION (volume and input selection)

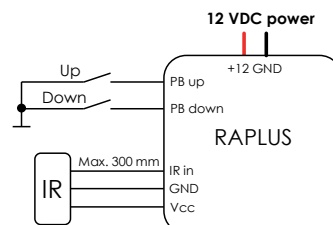
For both volume and input source selection two independent RAPLUS units can be used, wired to the same IR receiver. The volume control unit is set up as described under #1 above, whereas the second unit controlling the input selection will be taught in with the same IR control but using left and right buttons instead of up and down (the teach-in sequence follows the order of «right», «left», «center», «up», «down»).



Application examples

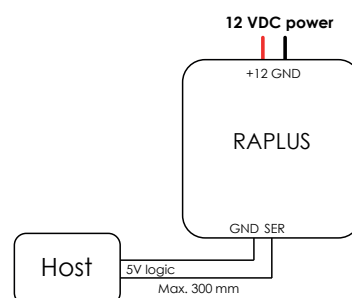
#4 PUSH BUTTON CONTROL

The unit can also be controlled by separate up and down buttons instead of turning the rotary switch manually. This way the assembled RAPLUS / switch combination does not need to be attached to the front panel, but can be placed anywhere in the chassis and operated in a completely wired mode.



#5 HOST SYSTEM CONTROL

Instead of using direct push button controls the unit may be remotely controlled by a host system, either by connecting the host system to the push button inputs «up» and «down», or by the SER interface for controlling «up», «down» and «mute» (see specifications for the SER interface).



Ordering information

ORDERING CODE

Remote Audio PLUS:	RAPLUS
Remote Audio PLUS (with LIN motor ¹):	RAPLUS-LIN
Standard motor (spare part):	STEPMOT ¹
Control module (spare part):	RAMOD

Specifications

CONTROL MODULE

Operating voltage:	8 to 15 VDC (12 VDC nominal)
Current consumption:	Standard motor: max. 1.2 A peak ² LIN motor: max. 2.4 A peak ² (at max. 12 VDC and torque) max. 20 mA stand-by (at 12 VDC, no motor operation, without display module)
5 VDC output:	Regulated, max. 100 mA load
Switch torque capacity:	Standard motor: max. 6 Ncm LIN motor: max. 10 Ncm (limitable by trim pot, at 12 VDC)
Indexing resolution:	12, 24 or 48 (47) positions
SER interface:	Single pulse PPM (low-active): «up» 500 µs «down» 1 ms «mute on» 2 ms «mute off» 4 ms (all ±20 %) Single pulse PPM (low-active): «up» 500 µs «down» 1 ms «mute on» 2 ms «mute off» 4 ms (receiver tolerance ±20 %)
IR input:	NEC protocol (included IR receiver: Sharp, part number GP1UX311QS)

¹ The LIN motor virtually does not affect the switch feel due to very little indexing and a high resolution of 400 versus 200 steps (standard motor). Furthermore the LIN provides a substantially higher torque capacity at a correspondingly higher current requirement.

² Using a 6'800 µF input buffer capacitor will reduce the peak current requirement to approx. 50 %.



Technical explanations

In order to be able to fully follow the information in the catalog, our experts have put together a technical explanation for you. If you have any questions, do not hesitate to contact us.

CONTACT US

TECHNICAL EXPLANATIONS

ROTARY SWITCHES

Rotary switch terms

POSITION

A position is a mechanical detent of a switch actuation.

DETENT

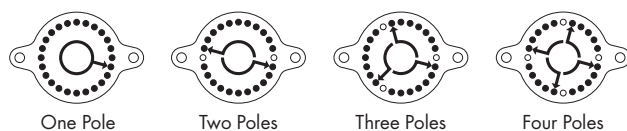
The switch is mechanically stopped in a detent position. For example, this can be achieved with a spring-actuated ball and an opposite chamfer.

INDEXING ANGLE

An indexing angle is the angle between each successive position. For example: 12 positions of a total of 360 degrees result in an indexing angle of 30 degrees.

POLE

A pole can conduct a single electrical signal. The number of poles indicates the number of electrical circuits controlled by the switch.



WAFER

On one wafer there is a movable disk, which generates the coding of the switch with the help of wipers.

PIN

A connector of a switch is called pin. Coding switches typically have 5 pins. Incremental switches typically have 3 pins.

CONTACT SURFACE

The contacts are usually gold-plated to ensure a longer life and ensure the function even after a long service life of the switch.

CYCLE

The life of the detent system is specified in cycles. For coded and selector switches, one cycle is defined as rotation through all positions and back to the start position. For incremental switches, one cycle means one revolution through 360 degrees.

PUSH BUTTON

Rotary switches can optionally be equipped with a push button. The respective switch has two additional pins which are connected together when actuated.

TECHNICAL EXPLANATIONS

ROTARY SWITCHES

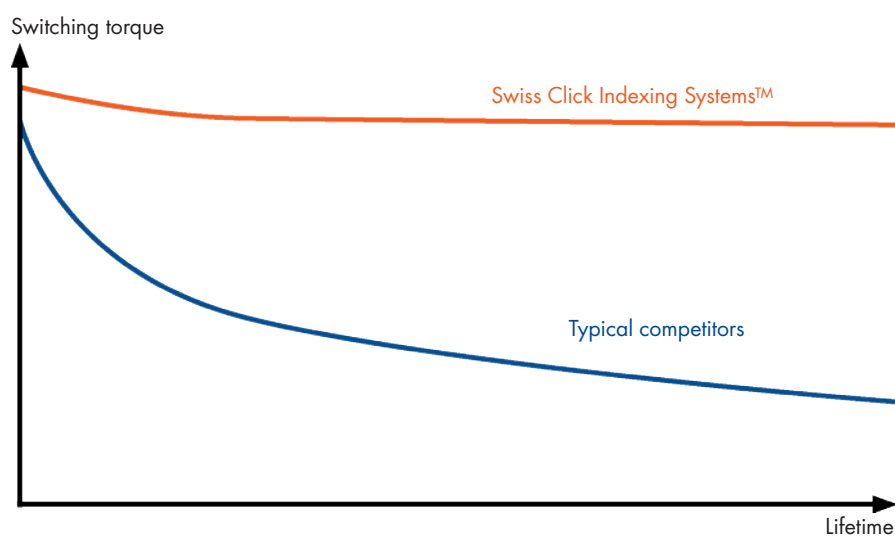
Rotary switch terms

INDEPENDENT FUNCTION OF TWO LEVELS

A switch with two functions has an inner and an outer shaft, therefore these rotary switches are called concentric. In a switch body, the following switching functions can be combined: Selector switch, coding switch, encoder, potentiometer in conjunction with a push button function.

SWISS CLICK INDEXING SYSTEMS™

The «Swiss Click Indexing System» is an Elma label, ensuring nearly consistent torque over life (see picture below). Switches with that feature are specially marked in the catalog.

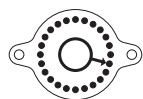


TECHNICAL EXPLANATIONS

SELECTOR SWITCHES

Selector switches terms

A selector switch has a connection pin for each position. Each pole serves as a common contact, so that the electric circuit can be closed. Selector switches can also be used at higher voltages and currents.

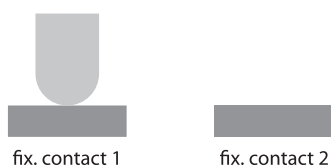


Connections outside,
Common contact inside

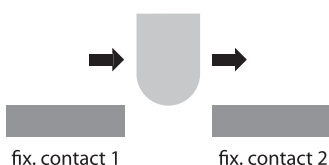
NON-SHORTING CONTACTS

A non-shorting contact is also known as «break-before-make» and describes the switching action of a pole when switching to the next position. The switch will momentarily be interrupted while it changes for instance from position 1 to position 2.

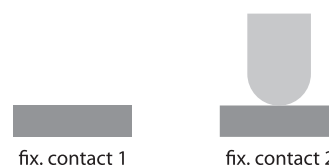
movable contact



movable contact



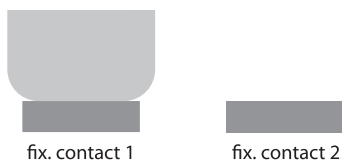
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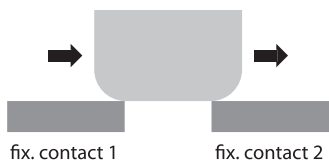
SHORTING CONTACTS

A shorting contact is also known as «make-before-break» and describes the switching action of a pole when switching to the next position. The switch will momentarily short two contacts while it changes for instance from position 1 to position 2.

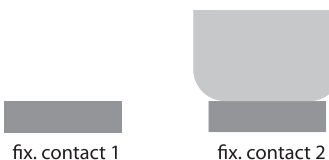
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TECHNICAL EXPLANATIONS

CODED SWITCHES

Coded switches terms

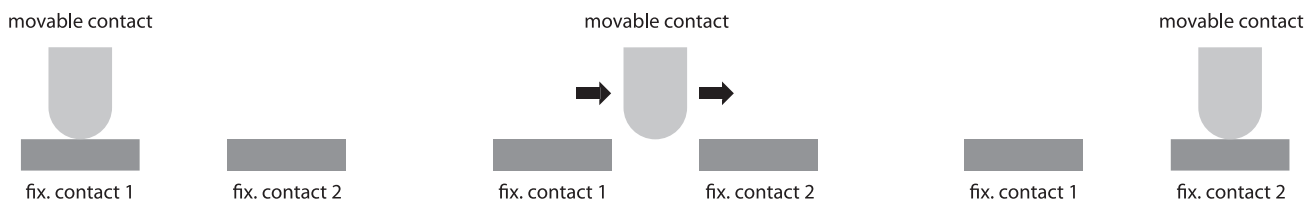
Coded switches often work with 4 bits (bit values 1, 2, 4, 8). A common contact (C) is used to short circuit the circuit. With 4 bits it is possible to achieve 10 to 16 switch positions (depending on the used code) with only 5 connection pins. Systems with a coded switch require a microcontroller to process the output code.

CODE TABLES

BCD	BCD complementary	Hex	Hex complementary	Gray																																																																																																																																																																																																																																																																																																																																																																														
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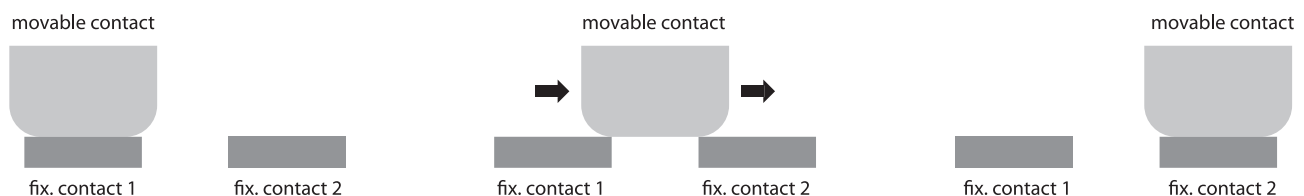
NON-SHORTING CONTACTS

A non-shorting contact is also known as «break-before-make» and describes the switching action of a pole when switching to the next position. The switch will momentarily be interrupted while it changes for instance from position 1 to position 2.



SHORTING CONTACTS

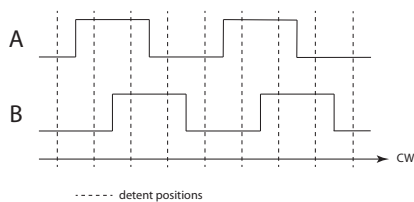
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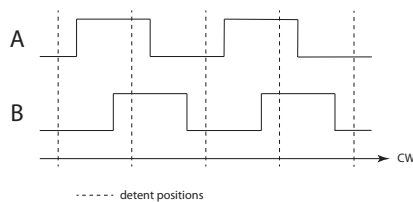
Encoder and incremental switches terms

An incremental switch, often called encoder, works with an incremental 2-bit system (2 signals: contacts A and B). Both signals A and B are connected to the common contact (C). With this contact system you can achieve 8 to 16 PPR (pulses per revolution) with just 3 contacts and one incremental disc. When turning to the right, signal A jumps first from «low» to «high» and shortly afterwards signal B.

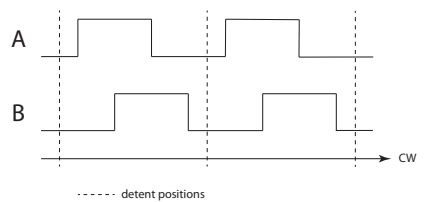
Signal flow diagram shows 32 detents | 8 PPR



Signal flow diagram shows 32 detents | 16 PPR resp. 16 detents | 8 PPR

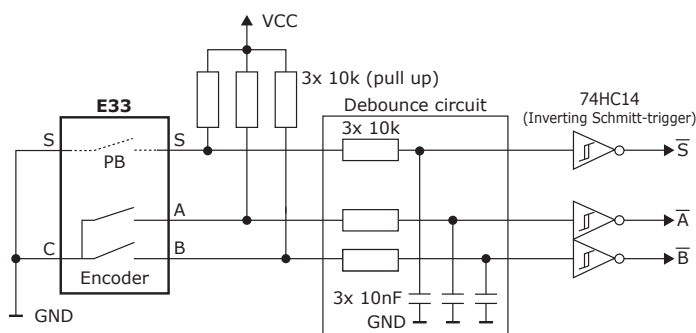


Signal flow diagram shows 16 detents | 16 PPR



DEBOUNCING

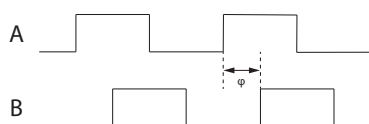
An incremental switch requires debouncing. This can be done either with a debounce circuit or by using a delayed query in the software.



PHASE SHIFT

The phase shift is used to detect the direction of rotation. The two signals rise in the same order as they fall. So if signal A rises before B when turning to the right, signal A will fall first.

Phase shift angle φ



Hall sensor switches

This contactless coding technology is often used with high lifetime requirements. The signal of the hall sensor can be used for the simulation of a coding switch or an encoder. It can also be used to output the position as an analog signal, PWM signal or via a UART interface.



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