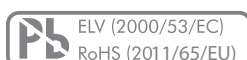


ENCODERS OVERVIEW

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- Detent resolution 16 to 32
- High life expectancy
- Various switching torques from 0 to 4.5 Ncm
- Gold plated contacts / optical sensing
- THT or THR/SMT reflow
- Front panel sealing up to IP68
- Operating temperature range: up to -40 to +85°C
- Various options and customizations



TYPES E20 & E27 / E33 / E37 / E50



¹ For information about the SWISS CLICK INDEXING SYSTEM™ see chapter "Technical explanations"

TYPE COMPARISON

FEATURES/ SWITCH TYPE	TYPE E20 & E27 (100'000 REVOLUTIONS)	TYPE E33 (1'000'000 REVOLUTIONS)	TYPE E37 (DUAL)	TYPE E50 (MAGNETO-OPTICAL)
Summary	Mechanical incremental encoder with 16 or 30 detents and optional push button switch.	Mechanical incremental encoder with 16 or 32 detents and optional push button switch.	Concentric encoder with 16 or 32 detents and optional push button switch.	Magneto-optical high-end encoder with 24 or 32 detents and optional push button switch.
PCB mounting	THT (E27) or SMT (E20)	THT or SMT	THT	None (cable connector)
Contact plating	AuCo (hard gold)	AuCo (hard gold)	AuCo (hard gold)	Contactless; optical sensing
Rotational life	100'000 revolutions	Up to 1'000'000 revolutions	Up to 1'000'000 revolutions	10'000'000 revolutions
Standard switching torque	0.5, 1.5, 2.5 Ncm or no detent	0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.5 Ncm or no detent ¹ SWISS CLICK INDEXING SYSTEM™	0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.5 Ncm or no detent ¹ SWISS CLICK INDEXING SYSTEM™	0.45, 0.6, 1.3 or 1.5 Ncm (magnetic indexing) ¹ SWISS CLICK INDEXING SYSTEM™
Push button force	3, 6 N or no push button	3, 6, 10, 14 N or no push button	3, 6, 10, 14 N or no push button	5 N or no push button
Operating temp.	-30 to +85°C	-40 to +85°C	-40 to +85°C	-20 to +70°C
IP sealing	IP50, optional IP65	IP60, opt. IP68 (2 bar, 1 h)	IP60, opt. IP68 (2 bar, 1 h)	IP50
Shaft style	Metal, snap-in mechanism	Metal, snap-in mechanism	Metal	Plastic
Bushing	Threaded M7 x 0.75 or non-threaded, plastic	Threaded M7 x 0.75 or non-threaded, metal	Threaded M7 x 0.75 or non-threaded, metal	Threaded M10 x 0.75, plastic
Body dimensions	11.5 x 13.75 x 6.5 mm	11.5 x 12.3 x 4.9 mm	11.5 x 12.3 x 9.1 mm	30.3 x 30.3 x 30.5 mm
Packaging	Tray or tape & reel	Tray or tape & reel	Tray	Tray
Product variety	<ul style="list-style-type: none"> ■ Vertical or horizontal ■ THT (THR) or SMT reflow ■ Threaded or non-threaded ■ With or without push button ■ 16, 30 or no detents ■ Switching torque ■ IP50 or IP65 sealing ■ Various shaft types ■ Tray or tape & reel 	<ul style="list-style-type: none"> ■ Vertical or horizontal ■ THT (THR) or SMT reflow ■ Threaded or non-threaded ■ With or without push button ■ 16, 32 or no detents ■ Switching torque ■ IP60 or IP68 sealing ■ Various shaft types ■ Tray or tape & reel 	<ul style="list-style-type: none"> ■ Vertical or horizontal ■ Threaded or non-threaded ■ With or without push button ■ 16, 32 or no detents ■ Switching torque ■ IP60 or IP68 sealing 	<ul style="list-style-type: none"> ■ With or without push button ■ 24 or 32 detents ■ Switching torque ■ 6 mm or 1/4" shaft diameter ■ 5 VDC regulated or 5 to 26 VDC operating voltage
SEE PAGE	4-8	9-14	15-19	20-23

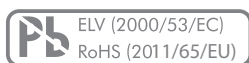
ENCODERS TYPE E20 & E27

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MAIN FEATURES

NORMAL PERFORMANCE

- › Standard resolution 16 or 30 detent
- › With or without integrated push button
- › Rotational life: 100,000 revolutions
- › Switching torque 0.5, 1.5 or 2.5 Ncm
- › Gold plated contacts
- › Optional front panel sealing IP65
- › Operating temperature range: -30 to +85°C
- › Various options and customizations



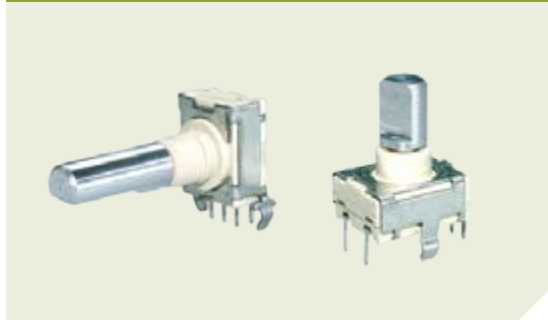
PRODUCT VARIETY

- Vertical or horizontal mounting
- THT or SMT reflow (vacuum pick & place)
- Threaded or non-threaded bushing
- Push button force 3 or 6 N or without push button
- Detent/pulses per revolution (PPR) 16/8 or 30/15
- Switching torque 0.5, 1.5 or 2.5 Ncm or no detent
- Front panel sealing IP50 or IP65
- Shaft mounted, separated or without shaft
- With or without shaft insulation
- With or without nut
- Various standard shafts available
- Tray or tape & reel packaging

TYPE E20 (SMT)



TYPE E27 (THT)



TYPICAL APPLICATIONS

- Value and menu control for industrial PLCs
- Avionics, instrumentation, 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

1 PREFERENCE TYPES SELECTION CHART

¹ For other types/options, see type key.

TYPE E20 (SMT)

TORQUE	PUSH BUTTON	PART NUMBER 30 DETENT	PART NUMBER 16 DETENT
1.5 Ncm	Yes, 6 N	E20-0-51141AL032	E20-1-51141AL032
	Yes, 3 N	E20-0-52141AL032	E20-1-52141AL032
	No	E20-0-50141AL032	E20-1-50141AL032

TYPE E27 (THT)

ORIENTATION	TORQUE	BUSHING	PUSH BUTTON	PART NUMBER 30 DETENT	PART NUMBER 16 DETENT
Vertical	1.5 Ncm	Threaded	Yes, 6 N	E27-0-21151AL011	E27-1-21151AL011
			No	E27-0-20151AL011	E27-1-20151AL011
	2.5 Ncm	Threaded	Yes, 6 N	E27-0-21251AL011	E27-1-21251AL011
			No	E27-0-20251AL011	E27-1-20251AL011

ENCODERS TYPE E20 & E27

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SPECIFICATIONS

MECHANICAL DATA

Resolution:	16 or 30 detent
Switching torque (new condition):	0.5, 1.5 or 2.5 Ncm (+/- 50%)
Rotational life:	100'000 revolutions min. with 0.5 or 1.5 Ncm 75'000 revolutions min. with 2.5 Ncm
Shaft strength:	50 N min. pull
Fastening torque of nut:	25 Ncm max.

ELECTRICAL DATA

Coding/output:	2-bit quadrature
Resolution:	8 or 15 pulses per revolution (PPR) per channel
Operating speed:	60 RPM max.
Load current:	10 mA max. (resistive load, 15 VDC max. voltage)
Contact bouncing time:	2 ms max.
Contact resistance:	10 Ω max. (over the entire rotational life)
Insulation resistance:	100 M Ω min. 250 VDC
Dielectric withstanding voltage:	2 kV (optional with push button)

MATERIAL DATA

Shaft:	Aluminum
Housing:	Fiber enforced plastic
Nut:	Brass
Contact system:	CuZn gal. Ni1 Au flash / steel gal. Ni1 Au flash
Soldering leads:	CuBe alloy, tin plated
Housing clamp, retention clips:	Tin-plate

ENVIRONMENTAL DATA

Operating temperature range:	-30 to +85°C
Storage temperature range:	-55 to +90°C
IP sealing:	IP50, optional IP65 shaft/front panel sealing
Vibration:	50 G _{rms} max. @ 10 to 500 Hz
Flammability:	UL94-V0

ADDITIONAL DATA FOR PUSH BUTTON SWITCH

MECHANICAL DATA

Push button actuation force (new condition):	6 N (+/- 50%), optional 3 N (+/- 50%)
Push button switch travel:	0.5 (+0.4/-0.3) mm
Push button switch life:	100'000 actuations min.

ELECTRICAL DATA

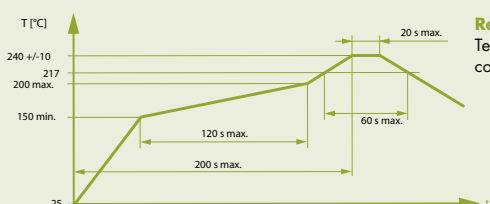
Contact bouncing time:	2 ms max.
Contact resistance:	10 Ω max. (over the entire rotational life)

PACKAGING QUANTITY

Tray:	80 pcs.
Tape & reel:	300 pcs.

SOLDERING CONDITIONS

Hand soldering:	300°C max. during 3 sec max.
Wave soldering:	260°C max. peak temperature during 4 sec max.



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

Temperatures or process duration exceeding rated maximum conditions may harm encoder function.

ENCODERS TYPE E20 & E27

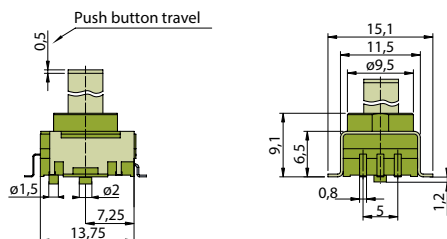
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DRAWINGS

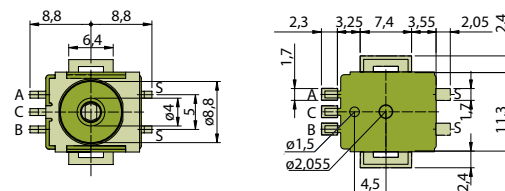
Tolerances unless otherwise specified DIN ISO 2768-1 (m)

TYPE E20 (SMT)

BASIC STYLE

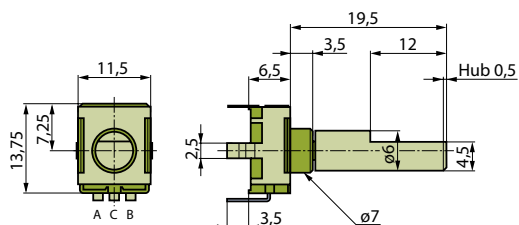


THREADED BUSHING



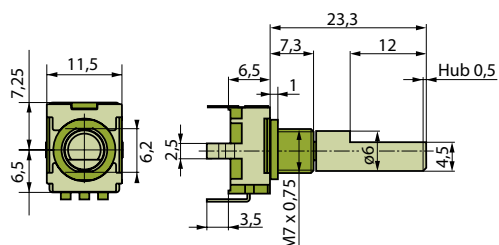
TYPE E27 (THT)

VERTICAL, NON-THREADED BUSHING

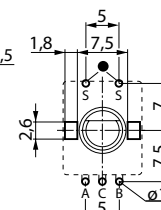


Applicable only to the version with integrated push button function. Height of switch housing is reduced from 6,5 mm to 5,3 mm for the version without integrated push button function.

VERTICAL, THREADED BUSHING



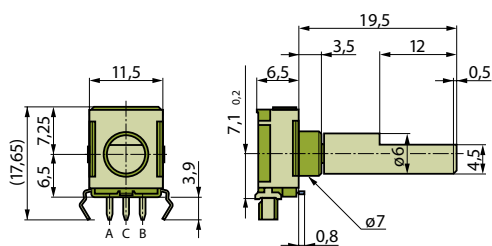
DRILLING DIAGRAM



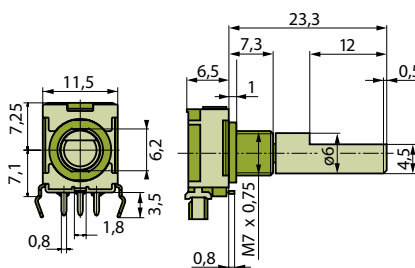
● Applicable only to integrated push button function.

View from component side of the PCB

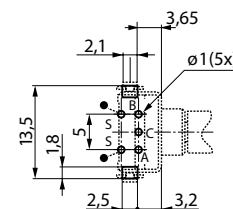
HORIZONTAL, NON-THREADED BUSHING



HORIZONTAL, THREADED BUSHING



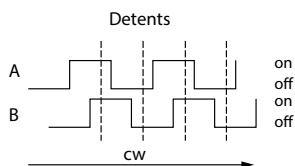
DRILLING DIAGRAM



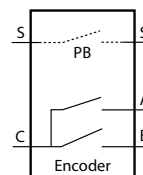
View from component side of the PCB

Signal Output

30 DETENT (15 PPR)/ 16 DETENT (8 PPR)



ELECTRIC DIAGRAM



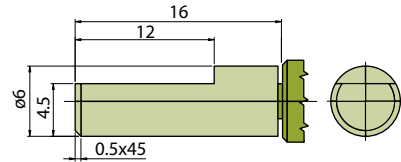
ENCODERS TYPE E20 & E27

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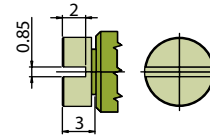
SHAFT DRAWINGS

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

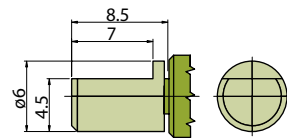
1 - STANDARD (D-SHAPE)



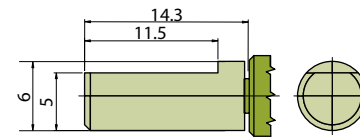
2 - SCREW DRIVER SLOT



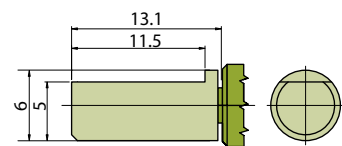
3 - D-SHAPE 8.5 mm



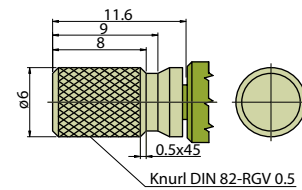
5 - D-SHAPE 14.3 mm



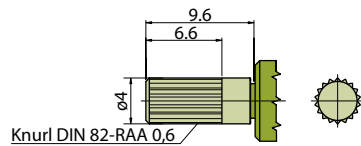
6 - D-SHAPE 13.1 mm



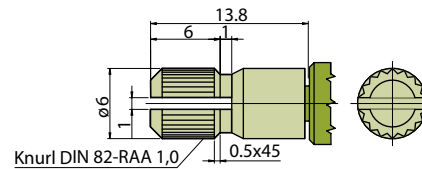
7 - CROSS-KNURL



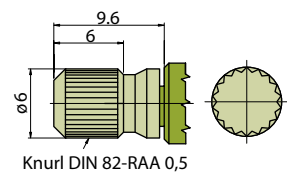
8 - KNURL



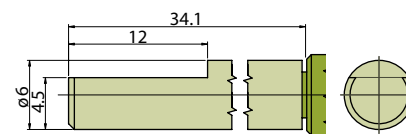
9 - SLOTTED, KNURL



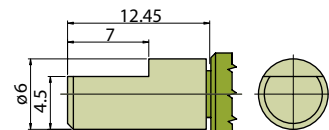
H - KNURL



I - D-SHAPE 34.1 mm














M - D-SHAPE 12.45 mm



ENCODERS TYPE E20 & E27

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TYPE KEY

E 20 (E27)		-	-	-	-	-	-	-	-	-	-
RESOLUTION											
0	30 detent (15 PPR)										
1	16 detent (8 PPR)										
ORIENTATION/MOUNTING											
1	THT horizontal										
2	THT vertical										
5	SMT vertical										
PUSH BUTTON											
0	Without push button										
1	6 N										
2	3 N										
TORQUE											
0	No detent										
1	1.5 Ncm										
2	2.5 Ncm										
3	0.5 Ncm										
BUSHING STYLE											
0	THT, non-threaded Ø 7 mm x 3.5 mm										
4	SMT, non-threaded Ø 9 mm x 2.6 mm										
5	THT, threaded M7 x 0.75 x 7.3 mm										
PACKAGING											
1	Tray (THT or SMT, 80 pcs.)										
2	Tape & reel (SMT only, 300 pcs., shaft separated)										
NUT, WASHER, SHAFT											
0	Without nut and washer										
1	With nut										
2	With nut and washer										
3	Shaft separated										
4	Shaft separated, with nut										
5	Shaft separated, with nut and washer										
IP SEALING											
0	IP50										
1	IP65 shaft sealing (O-ring)										
2	IP65 front panel sealing (gasket)										
3	IP65 shaft/front panel sealing										
SHAFT, SHAFT INSULATION											
00	Without shaft										
AL	Aluminum										
AE	Aluminum, 2 kV shaft insulation (only applicable with push button)										
SHAFT TYPE											
		FOR BUSHING STYLE									
			0	4	5						
0	WITHOUT SHAFT	X	X	X	X						
1	 ¹ D-SHAPE 16 mm	X	X	X	X						
2	 SCREW DRIVER SLOT	X									
3	 D-SHAPE 8.5 mm	X			X						
5	 D-SHAPE 14.3 mm	X									
6	 D-SHAPE 13.1 mm	X			X						
7	 CROSS-KNURL	X			X						
8	 KNURL	X									
9	 SLOTTED, KNURL	X	X	X	X						
H	 KNURL	X									
I	 D-SHAPE 34.1 mm	X									
M	 D-SHAPE 12.45 mm	X									
¹ Basic type											

ENCODER TYPE E33

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MAIN FEATURES

HIGH PERFORMANCE

- › Standard resolution 16 or 32 detent
- › With or without integrated push button
- › Rotational life: Up to 1,000,000 revolutions
- › No detent up to 4.5 Ncm switching torque (remains consistent over lifetime)
- › Gold plated contacts
- › Robust metal housing with metal shaft
- › Body size 11.5 x 12.3 x 4.9 mm
- › Optional front panel sealing IP68
- › Operating temperature range: -40 to +85°C
- › Shaft electrically insulated > 500 VDC (shaft to contact system)
- › Various options and customizations

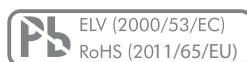
SWISS CLICK INDEXING SYSTEM™

MIL-STD-202G compliant

TYPE E33



For information about the SWISS CLICK INDEXING SYSTEM™ see chapter technical explanations



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 rev. (PPR) 32/16, 32/8, 16/16, 16/8
- Switching torque 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 or 4.5 Ncm or no detent
- Front panel sealing IP60 or ² IP68
- Shaft mounted, separated or without shaft
- Various standard shafts available
- Tray or tape & reel packaging

TYPICAL APPLICATIONS

- Value and menu control for industrial PLCs
- Avionics, instrumentation, 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

POSSIBLE CUSTOMIZATIONS

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

1 PREFERENCE TYPES SELECTION CHART

THREADED BUSHING, IP68

PUSH BUTTON	IP SEALING	RESOLUTION	TORQUE	PART NUMBER THT VERTICAL (³ THREADED BUSHING)	PART NUMBER SMT VERTICAL (NON-THREADED BUSHING)
Yes, 6 N	IP60	32 detent (16 PPR)	2.0 Ncm	E33-VT610-M01T	E33-SN610-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT630-M01T	E33-SN630-M01T
	² IP68 (Shaft & front panel)	32 detent (16 PPR)	2.0 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)	2.0 Ncm	E33-VT010-M01T	E33-SN010-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT030-M01T	E33-SN030-M01T
	² IP68 (Shaft & front panel)	32 detent (16 PPR)	2.0 Ncm	E33-VT012-M01T	E33-SN012-M01T
		16 detent (8 PPR)	2.5 Ncm	E33-VT032-M01T	E33-SN032-M01T

¹ For other types/options, see type key.² Non-threaded bushing: gasket provides IP65.³ Nut supplied.

All these types are tray packed and fitted with standard shaft type 01.

ENCODER TYPE E33

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SPECIFICATIONS

MECHANICAL DATA

Resolution:	32, 16 or no detent
¹ Switching torque (new condition):	For 32 detent: 0.5, 1.0, 1.5, 2.0 or 3.0 Ncm (+/- 30%) For 16 detent: 0.5, 1.5, 2.5, 3.5 or 4.5 Ncm (+/- 30%)
² Rotational life:	1'000'000 revolutions min. with 0.5, 1.0 or 1.5 Ncm switching torque or without detent 500'000 revolutions min. with 2.0 Ncm switching torque 300'000 revolutions min. with 2.5 Ncm switching torque 100'000 revolutions min. with 3.0, 3.5 or 4.5 Ncm switching torque
Residual switching torque (end of life):	90% typ.
Shaft strength:	100 N min. push, 100 N min. pull, 50 N min. bending (snap-in shaft mechanism)
Fastening torque of nut (front panel mounting):	100 Ncm max.

ELECTRICAL DATA

Coding/output:	2-bit quadrature
Resolution:	16 or 8 pulses per revolution (PPR) per channel
Phase shift (A leads B clockwise):	90° (+/- 70°)
Pulse width per channel:	180° (+/- 36°)
Operating speed:	60 RPM max.
Load current:	10 mA max. (resistive load, 15 VDC max. voltage)
Contact bouncing time:	2 ms max.
Contact resistance:	10 Ω max. (over the entire rotational life)
Insulation resistance:	1GΩ min 500 VDC
Breakdown voltage:	e.g. 500 VAC min. between insulated parts at standard atmospheric pressure.
Dielectric withstanding voltage to housing/shaft:	500 VDC during 60 seconds (MIL-STD-202G, method 301)

MATERIAL DATA

Shaft:	Brass (CuZn38Pb2) or stainless steel (1.4305); see shaft catalog in type key
Housing:	Zinc diecast with glossy nickel plating, fiber enforced high performance plastic
Nut:	Brass with glossy nickel plating
Contact system:	Alloy copper, AuCo plated (hard gold)
Soldering leads:	Alloy copper, tin plated
Housing clamp, retention clips:	Tinplate, tin plated
O-rings:	NBR (nitrile), 70 shore, reflowable
Gasket (non-threaded bushing):	Closed-cell EPDM based rubber, 45 shore A, complies with SAE J 18-79, reflowable

ENVIRONMENTAL DATA

² Operating temperature range:	-40 to +85°C (IEC 60068-2-14)
Storage temperature range:	-65 to +125°C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3)
Humidity (non condensing):	93% RH max. (MIL-STD-202G, method 103B, condition B)
IP sealing:	IP60, optional IP68 (2 bar, 1 h) shaft/front panel sealing (non-threaded bushing; gasket provides IP65)
Vibration:	29 G _{rms} max. @ 100 to 1000 Hz (MIL-STD-202G, method 214A, condition 1H/15 minutes)
Shock:	100 G max. (MIL-STD-202G, method 213B, condition C)
Flammability:	UL94-V0 (IP65/IP68: O-rings and non-threaded bushing gasket are UL94-HB)

PACKAGING QUANTITY

Tray:	10 or 50 pcs., depending on shipping qty. (nuts are supplied and packed separately)
Tape & reel:	200 pcs. (SMT only, with vacuum plug, shafts/nuts are supplied and packed separately)

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

² Rotational/actuation life is tested at room condition (+25°C, 50 to 60% RH). Operating speed is 60 RPM (encoder) and 2 Hz (push button). Different operating conditions may decrease life expectation dramatically.

ENCODER TYPE E33

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SPECIFICATIONS

ADDITIONAL DATA FOR PUSH BUTTON SWITCH: MECHANICAL DATA

Push button actuation force (new condition):	3, 6, 10, 14 N (+/- 30%) or without push button force
Push button switch travel:	0.5 (+/- 0.2) mm
² Push button switch life:	200'000 actuations min.
Residual push button actuation force (end of life):	90% typ.

ADDITIONAL DATA FOR PUSH BUTTON SWITCH: ELECTRICAL DATA

Load current:	10 mA max. (resistive load, 15 VDC max. voltage)
Contact bouncing time:	2 ms max.
Dielectric withstanding voltage to housing/shaft:	500 VDC during 60 seconds (MIL-STD-202G, method 301)

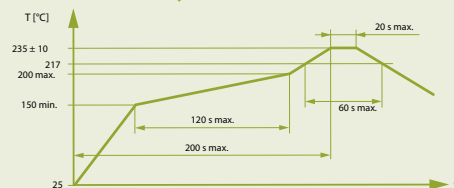
ADDITIONAL DATA FOR PUSH BUTTON SWITCH: MATERIAL DATA

Contact pads:	Alloy copper, AuCo plated (hard gold)
Membrane switch:	Stainless steel, AuCo plated (hard gold)

SOLDERING CONDITIONS

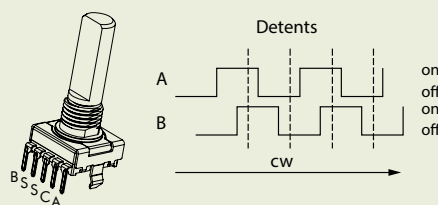
Hand soldering:	300°C max. during 3 sec max.
Wave soldering:	280°C max. peak temperature during 5 sec max.

REFLOW PROFILE (COMPLIES WITH IPC/JEDEC J-STD-020C)

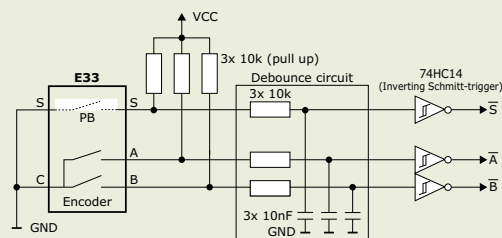


RECOMMENDED SYSTEM INTERFACE

Timing diagram shows 32/16 (16/8) detents/PPR resolution



Connection diagram (Example)



² Rotational/actuation life is tested at room condition (+25°C, 50 to 60% RH). Operating speed is 60 RPM (encoder) and 2 Hz (push button). Different operating conditions may decrease life expectation dramatically.

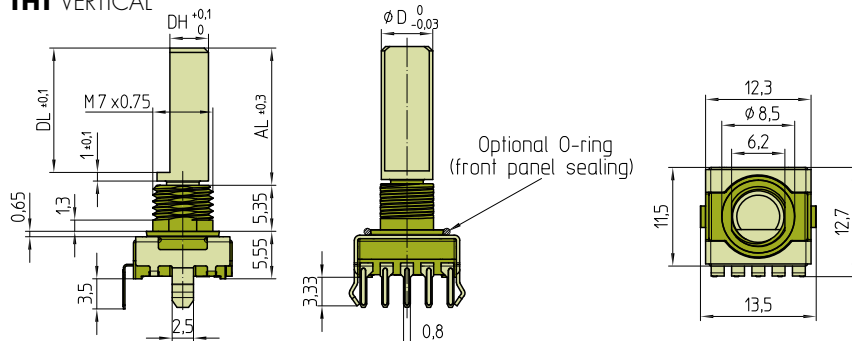
ENCODER TYPE E33

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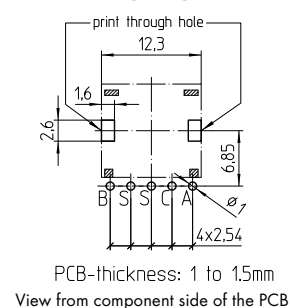
DRAWINGS

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

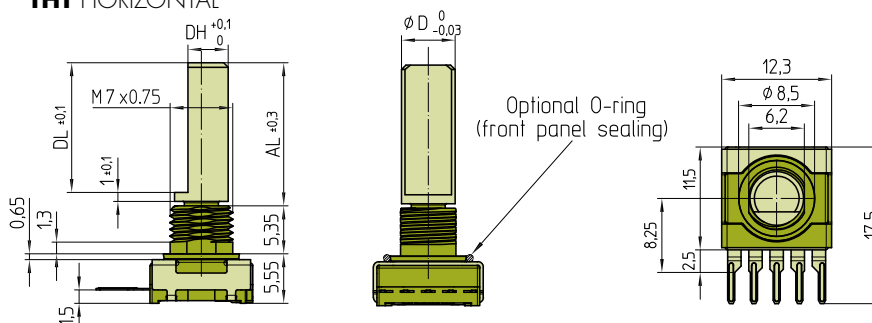
THT VERTICAL



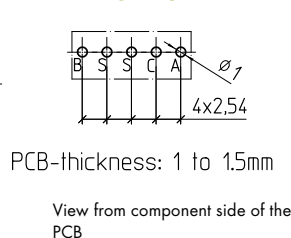
DRILLING DIAGRAM



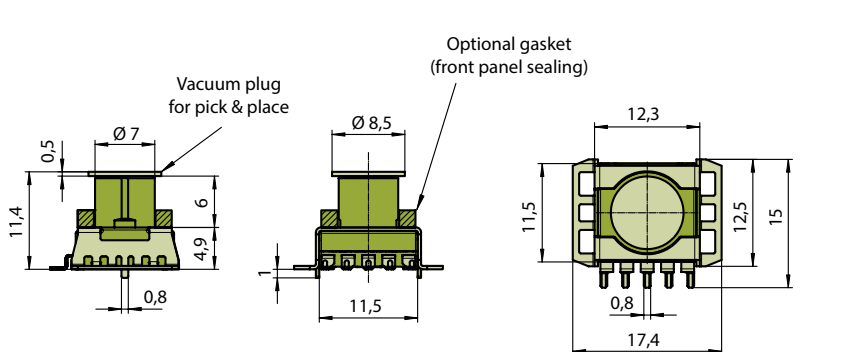
THT HORIZONTAL



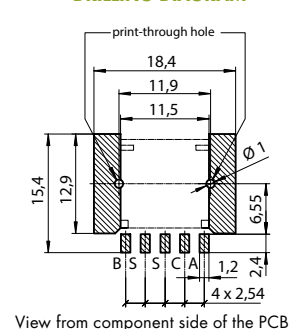
DRILLING DIAGRAM



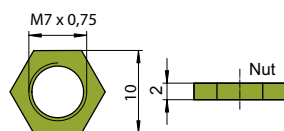
SMT VERTICAL



DRILLING DIAGRAM

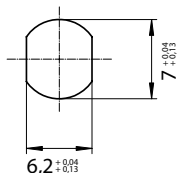


NUT

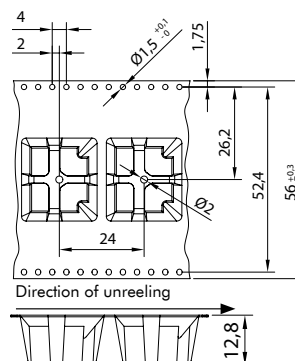


Spare part
Part Number (50 pcs. bag)
- Brass nickel plated: 4516-40

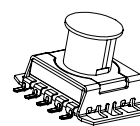
FRONT PANEL CUT OUT



TAPE & REEL PACKAGING



Reel size: 13"
200 pcs. per reel
Tape width: 56 mm
Tape pitch: 24 mm



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

ENCODER TYPE E33

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TYPE KEY

E 33

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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

6 6 N

3 3 N

0 Without push button

3 A 10 N

3 E 14 N

3 Available beginning 2015

RESOLUTION, 1 TORQUE

1 32 detent (16 PPR) 2.0 Ncm

2 16 detent (8 PPR) 1.5 Ncm

3 16 detent (8 PPR) 2.5 Ncm

4 32 detent (8 PPR) 2.0 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) 1.0 Ncm

2 C 32 detent (16 PPR) 1.5 Ncm

2 D 32 detent (16 PPR) 3.0 Ncm

2 E 16 detent (8 PPR) 0.5 Ncm

2 F 16 detent (8 PPR) 3.5 Ncm

G 16 detent (8 PPR) 4.5 Ncm

PACKAGING

T Tray (THT or SMT, 10 or 50 pcs.
tray size, depending on shipping qty.)

R Tape & reel with vacuum plug
(SMT only, 200 pcs. per reel, shafts
separated)

SHAFT TYPE

For all available shaft types please see next
page

SHAFT SEPARATION

M Mounted

S Separated (snap-in shaft mechanism)

N No shaft

IP SEALING


0 IP60

11 IP68 shaft sealing

12 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.

O-RING MOUNTING TOOL

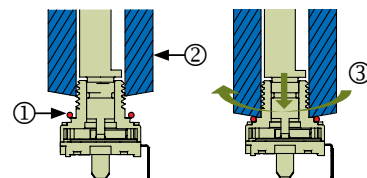


Part Number: E33-ORING-TOOL

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.

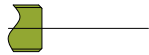
ENCODER TYPE E33

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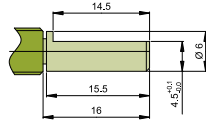
SHAFT TYPES FOR E33 TYPE KEY

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

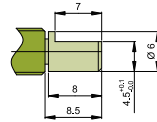
TYPE 00 - NO SHAFT



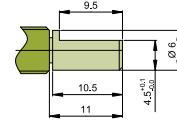
TYPE 01 - BRASS



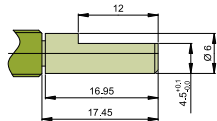
TYPE 03 - BRASS



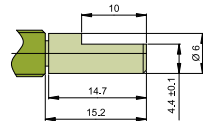
TYPE 30 - BRASS



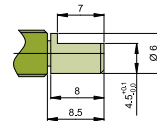
TYPE 31 - STAINLESS STEEL



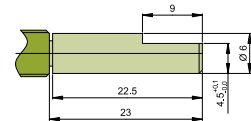
TYPE 32 - BRASS



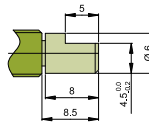
TYPE 33 - STAINLESS STEEL



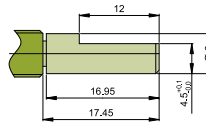
TYPE 34 - BRASS



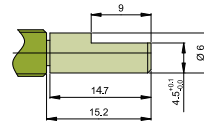
TYPE 37 - STAINLESS STEEL



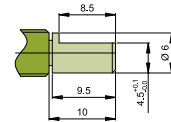
TYPE 70 - BRASS



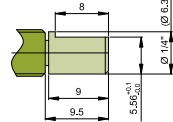
TYPE 71 - BRASS



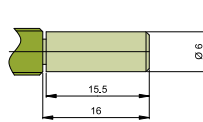
TYPE 72 - BRASS



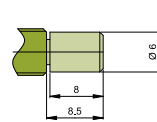
3 TYPE 51 - BRASS



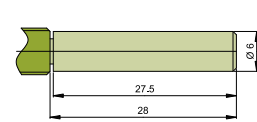
TYPE 10 - BRASS



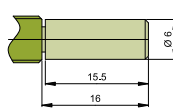
TYPE 11 - BRASS



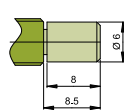
TYPE 12 - BRASS



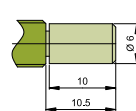
TYPE 13 - STAINLESS STEEL



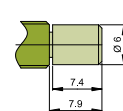
TYPE 14 - STAINLESS STEEL



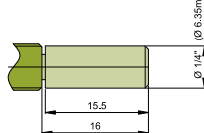
TYPE 15 - BRASS



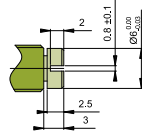
TYPE 16 - BRASS



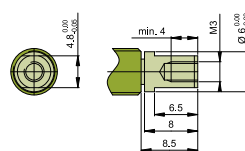
3 TYPE 20 - BRASS



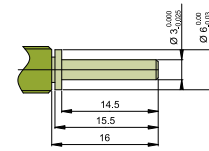
TYPE 02 - BRASS



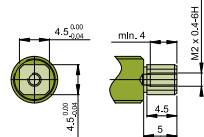
TYPE 43 - BRASS



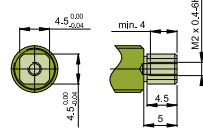
TYPE 42 - BRASS



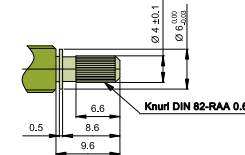
TYPE 45 - STAINLESS STEEL



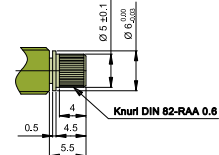
TYPE 47 - BRASS



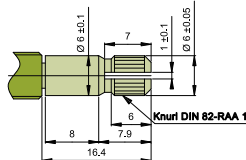
TYPE 08 - BRASS



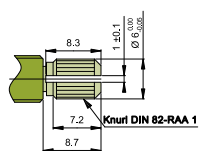
TYPE 40 - BRASS



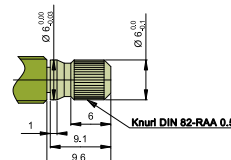
TYPE 41 - BRASS



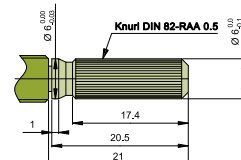
TYPE 60 - BRASS



TYPE 0H - BRASS



TYPE 44 - BRASS



3 Threaded bushing: Shaft to be ordered separately; shaft mounting after encoder assembly to front panel (nut does no fit over 1/4" shaft diameter).

OTHER SHAFTS ARE AVAILABLE ON REQUEST.

ENCODER TYPE E37

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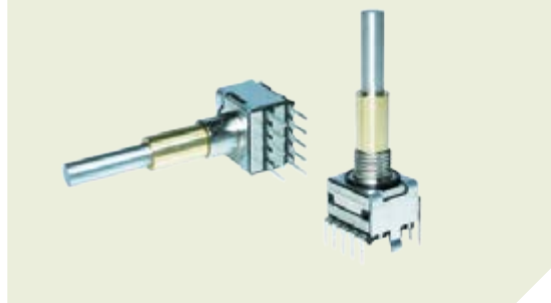
MAIN FEATURES

DUAL FUNCTION AND HIGH PERFORMANCE

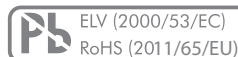
- Dual encoder: Two encoders - one space
- Standard resolution 16 or 32 detent
- With or without integrated push button
- Rotational life: Up to 1'000'000 revolutions
- Excellent indexing feel with 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 or 4.5 Ncm switching torque (remains consistent over life)
- Gold plated contacts
- Robust metal housing with metal shaft
- Body size 11.5 x 12.3 x 9.1 mm
- Optional front panel sealing IP68
- Operating temperature range: -40 to +85°C
- Shaft electrically insulated > 500 VDC (shaft to contact system)
- Various options and customizations

SWISS CLICK INDEXING SYSTEM™ MIL-STD-202G compliant

TYPE E37



For information about the SWISS CLICK INDEXING SYSTEM™ see chapter technical explanations



PRODUCT VARIETY

- Vertical or horizontal mounting
- Threaded or non-threaded bushing
- Push button force 6 N or without push button
- detent/pulses per rev. (PPR)
- 32/16, 32/8, 16/16, 16/8
- Switching torque 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 or 4.5 Ncm or no detent
- Front panel sealing IP60 or ² IP68

POSSIBLE CUSTOMIZATIONS

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

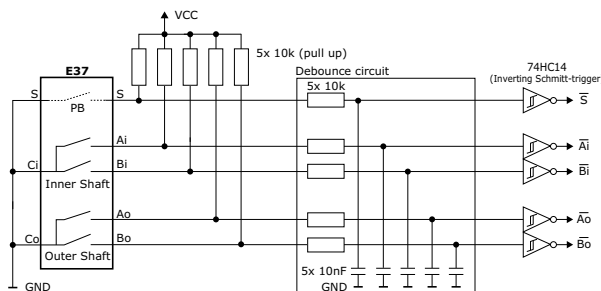
TYPICAL APPLICATIONS

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

1 PREFERENCE TYPES SELECTION CHART

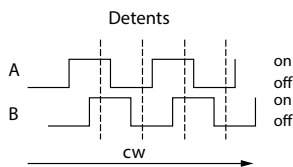
PUSH BUTTON	INNER SHAFT	OUTER SHAFT	IP SEALING	PART NUMBER THT VERTICAL (³ THREADED BUSHING)	PART NUMBER THT HORIZONTAL (³ THREADED BUSHING)
Yes, 6 N	16 detent (8 PPR) 2.5 Ncm	16 detent (8 PPR) 2.5 Ncm	IP60	E37-VT6330-1	E37-CT6330-1
			IP68	E37-VT6332-1	E37-CT6332-1
		32 detent (16 PPR) 2.0 Ncm	IP60	E37-VT6310-1	E37-CT6310-1
			IP68	E37-VT6312-1	E37-CT6312-1

RECOMMENDED SYSTEM INTERFACE



Pin#	1	2	3	4	5
	Bi	S	S	Cl	Ai
	6	7	8	9	10
	Bo	NC	NC	Co	Ao

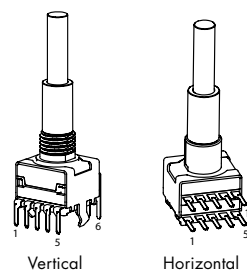
Timing diagram shows 32/16 (16/8) detents/PPR resolution



¹ For other types/options, see type key.

² Non-threaded bushing: gasket provides IP65.

³ Nut supplied.



ENCODER TYPE E37

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SPECIFICATIONS

MECHANICAL DATA

¹ Inner shaft:	16 detent with 2.5 Ncm or 4.5 Ncm (+/- 30%) or no detent
¹ Outer shaft:	For 32 detent: 0.5, 1.0, 1.5, 2.0 or 3.0 Ncm (+/- 30%) For 16 detent: 0.5, 1.5, 2.5, 3.5 or 4.5 Ncm (+/- 30%)
² Rotational life:	1'000'000 revolutions min. with 0.5, 1.0 or 1.5 Ncm switching torque or with no detent 500'000 revolutions min. with 2.0 Ncm switching torque 300'000 revolutions min. with 2.5 Ncm switching torque 100'000 revolutions min. with 3.0, 3.5 or 4.5 Ncm switching torque
Residual switching torque (end of life):	90% typ.
Shaft strength:	100 N min. push, 100 N min. pull, 50 Ncm min. bending
Fastening torque of nut:	100 Ncm max.

ELECTRICAL DATA

Coding/output:	2-bit quadrature
Resolution:	16 or 8 pulses per revolution (PPR) per channel
Phase shift (A leads B clockwise):	90° (+/- 70°)
Pulse width per channel:	180° (+/- 36°)
Operating speed:	60 RPM max.
Contact bouncing time:	2 ms max.
Contact resistance:	10 Ω max. (over the entire rotational life)
Insulation resistance:	1 GΩ min 500 VDC
Dielectric withstanding voltage to housing/shaft:	500 VDC during 60 seconds (MIL-STD-202G, method 301)

MATERIAL DATA

Shaft:	Outer shaft; brass (CuZn38Pb2), inner shaft; stainless steel (1.4305)
Housing:	Zinc diecast with glossy nickel plating, fiber enforced high performance plastic
Nut:	Brass with glossy nickel plating
Contact system:	Alloy copper, AuCo plated (hard gold)
Soldering leads:	Alloy copper, tin plated
Housing clamp, retention clips:	Tinplate, tin plated
O-rings:	NBR (nitrile), 70 shore
Gasket (non-threaded bushing):	Closed-cell EPDM based rubber, 45 shore A, complies with SAE J 18-79

ENVIRONMENTAL DATA

² Operating temperature range:	-40 to +85°C (IEC 60068-2-14)
Storage temperature range:	-65 to +125°C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3)
Humidity (non condensing):	93% RH max. (MIL-STD-202G, method 103B, condition B)
IP sealing:	IP60, optional IP68 (2 bar, 1h) shaft/front panel sealing (non-threaded bushing; gasket provides IP65)
Vibration:	29 G _{rms} max. @ 100 to 1000 Hz (MIL-STD-202G, method 214A, condition 1H/15 minutes)
Shock:	100 G max. (MIL-STD-202G, method 213B, condition C)
Flammability:	UL94-V0 (IP65/IP68: O-rings and non-threaded bushing gasket are UL94-HB)

PACKAGING QUANTITY

Tray:	20 pcs. (nuts are supplied and packed separately)
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ADDITIONAL DATA FOR PUSH BUTTON SWITCH

MECHANICAL DATA

Push button actuation force (new condition):	3, 6, 10, 14 N (+/- 30%) or without push button force
Push button switch travel:	0.5 (+/- 0.2) mm
² Push button switch life:	200,000 actuations min.
Residual push button actuation force (end of life):	90% typ.

ELECTRICAL DATA

Contact bouncing time:	2 ms max.
Dielectric withstanding voltage to housing/shaft:	500 VDC during 60 seconds (MIL-STD-202G, method 301)

MATERIAL DATA

Contact pads:	Alloy copper, AuCo plated (hard gold)
Membrane switch:	Stainless steel, AuCo plated (hard gold)

SOLDERING CONDITIONS

Hand soldering:	300°C max. during 3 sec max.
Wave soldering:	280°C max. peak temperature during 5 sec max.
Reflow soldering is not applicable!	

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

² Rotational/actuation life is tested at room condition (+25°C, 50 to 60% RH).

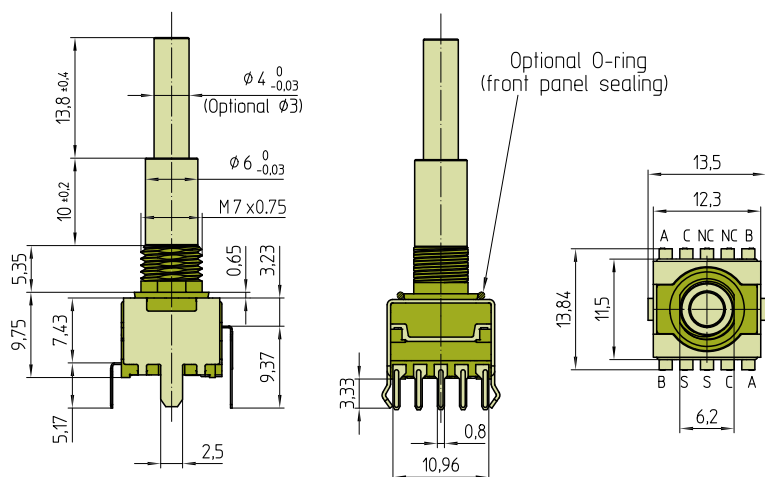
Operating speed is 60 RPM (encoder) and 2 Hz (push button). Different operating conditions may decrease life expectation dramatically.

ENCODER TYPE E37

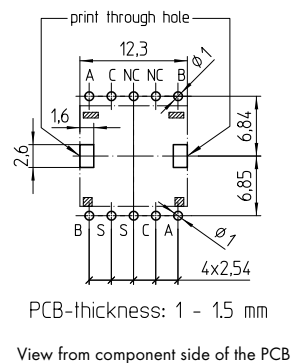
ELMA.COM

DRAWINGS

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

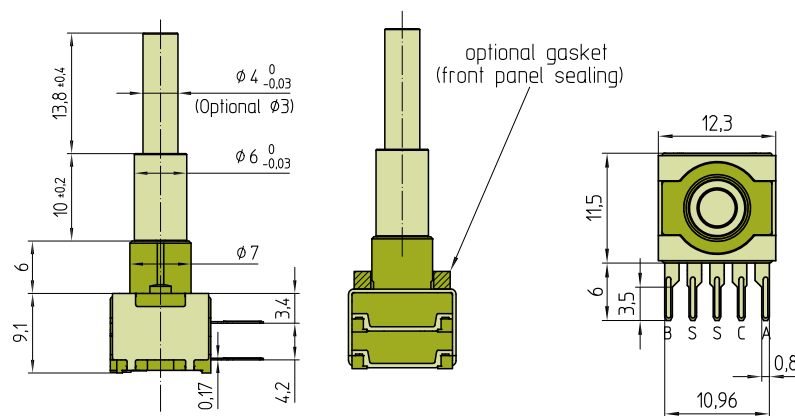
THT VERTICAL

DRILLING DIAGRAM

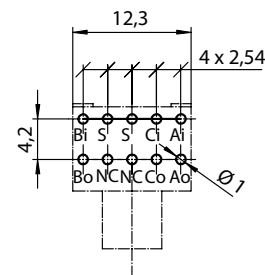


Both threaded and non-threaded bushings are available for all versions; THT vertical or THT horizontal (see type key).

THT HORIZONTAL



DRILLING DIAGRAM



PCB-thickness: 1 - 1,5 mm
View from component side of the PCB

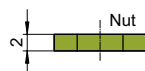
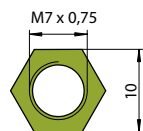
Both threaded and non-threaded bushings are available for all versions; THT vertical or THT horizontal (see type key).

ENCODER TYPE E37

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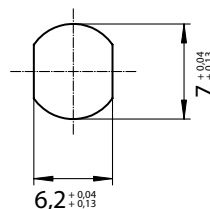
DRAWINGS

NUT



Spare Part
Part Number (50 pcs. bag)
- Brass nickel plated: 4516-40

FRONT PANEL CUT OUT



RECOMMENDED KNOBS



TYPE 1 - SOFT TOUCH COLLETS; 15/21 mm (FOR SHAFT TYPE Ø 4mm)

Inner shaft	Cap	15 mm black, glossy	K51-C150-01
	Knob	15 mm, soft touch, collet	K60-S150-004
Outer shaft	Knob	21 mm, soft touch, collet	K60-S210-006

Also see Rotary Switches main catalog; page 127 (soft touch collet knobs; K60 series).



TYPE 2 - CLASSIC COLLETS; 10/14.5 mm (FOR SHAFT TYPE Ø 3mm)

Inner shaft	Cap	10 mm black	040-1020
	Knob	10 mm, classic collet	020-2120
Outer shaft	Knob	14,5 mm, classic collet	020-3440

Also see Rotary Switches main catalog; page 116-119 (classic collet knobs).



TYPE 3 - METAL KNOBS; 11/15 mm (FOR SHAFT TYPE Ø 4mm)

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

2 pc sets:


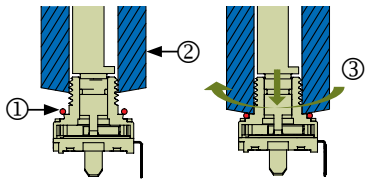
Silver: CAE041559

Black: CAE041560

ENCODER TYPE E37

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TYPE KEY

E 37	-	-	-	-	-	-	-	-																				
ORIENTATION/MOUNTING		BUSHING		PUSH BUTTON		1 INNER SHAFT RESOLUTION; TORQUE																						
V THT vertical C THT horizontal		T Threaded M7 x 0.75 x 6 mm (nut supplied, packed separately) N Non-threaded Ø 7 x 6 mm		6 6 N 0 Without push button 4A 10 N 4E 14 N 4 Available beginning 2015		<table><tr><td>3</td><td>16 detent</td><td>(8 PPR)</td><td>2.5 Ncm</td></tr><tr><td>6</td><td>16 detent</td><td>(16 PPR)</td><td>2.5 Ncm</td></tr><tr><td>8</td><td>No detent</td><td>(16 PPR)</td><td></td></tr><tr><td>9</td><td>No detent</td><td>(8 PPR)</td><td></td></tr><tr><td>G</td><td>16 detent</td><td>(8 PPR)</td><td>4.5 Ncm</td></tr></table> ¹ O-ring of IP65/IP68 shaft sealing may slightly increase switching torque.			3	16 detent	(8 PPR)	2.5 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
3	16 detent	(8 PPR)	2.5 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																									
SHAFT TYPE		IP SEALING		O-RING MOUNTING TOOL																								
1 Basic type (see drawing) 2 Inner shaft; Ø 3.0 mm, same length as basic type		0 IP60 1 1 IP68 shaft sealing 1 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.		 Part Number: E33-ORING-TOOL																								
																												
				<p>① Slip the lubricated O-ring over the bushing</p> <p>② Slide the mounting tool over the bushing</p> <p>③ While pushing down the O-ring simultaneously rotate the mounting tool.</p>																								
				</																								

ENCODER TYPE E50

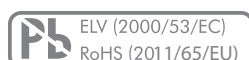
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MAIN FEATURES

MAGNETO-OPTICAL SENSING SYSTEM

- Wear-free design provides 10,000,000 revolutions
- Contactless magnetic indexing system enables free running operation (virtually no friction)
- Optical high speed contact sensing
- Resolution 24 or 32 detent
- With or without integrated push button
- Switching torque: From 0.45 to 1.5 Ncm

SWISS CLICK INDEXING SYSTEM™



TYPE E50



For information about the SWISS CLICK INDEXING SYSTEM™ see chapter "Technical explanations"

PRODUCT VARIETY

- Push button force 5 N or without push button
- Resolution 24 or 32 detent
- Switching torque 0.45, 0.6, 1.3 or 1.5 Ncm
- Shaft diameter 6 mm or 1/4"
- Operating voltage 5 VDC regulated or 5 to 26 VDC

POSSIBLE CUSTOMIZATIONS

- Shaft dimensions and shape
- Switching torque
- Software filtered pulse/level change
- Others

TYPICAL APPLICATIONS

- Time shift controls for test & measurement and audio/video mixer desks
- High value medical devices
- Applications with extensive use and/or long life cycles

1 PREFERENCE TYPES SELECTION CHART

¹ For other types/options, see type key.

THREADED BUSHING, IP50

PUSH BUTTON	SWITCHING TORQUE	PART NUMBER 24 DETENT	PART NUMBER 32 DETENT
Yes, 5N	0.45 Ncm	E50-1211-000X	-
	0.6 Ncm	-	E50-2213-000X
	1.3 Ncm	-	E50-2214-000X
	1.5 Ncm	E50-1212-000X	-

ENCODER TYPE E50

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SPECIFICATIONS

MECHANICAL DATA

Resolution:	24 or 32 detent
Switching torque:	24 detent: 0.45 or 1.5 Ncm (+/- 50%) 32 detent: 0.6 or 1.3 Ncm (+/- 50%)
Rotational life:	10'000'000 revolutions min.
Shaft load (continuous operation):	3 N max. radial, 2 N max. axial
Fastening torque of nut:	0.4 Nm max.

ELECTRICAL DATA

Coding/output:	2-bit quadrature
Resolution:	24 or 32 pulses per revolution (PPR) per channel
Operating speed:	600 RPM max.
Operating voltage:	Regulated version: 5 VDC (+/- 10%) or 5 to 26 VDC (with internal voltage regulator)
Output current load:	20 mA max.
Supply current:	40 mA typ. (at no load condition)

MATERIAL DATA

Shaft:	Plastic
Housing:	Plastic
Nut:	Plastic
Connector leads:	Alloy copper, gold plated (AuCo)

ENVIRONMENTAL DATA

Operating temperature range:	-20 to +70°C
Storage temperature range:	-20 to +80°C
IP sealing:	IP50 shaft/front panel sealing
Flammability:	UL94-HB

PACKAGING QUANTITY

Size:	1 pc
-------	------

ADDITIONAL DATA FOR PUSH BUTTON SWITCH

Push button actuation force (new condition):	5 N (+/- 50%)
Push button switch travel:	0.9 mm (+/- 0.2 mm)
Push button switch life:	5,000,000 actuations min.
Actuation strength:	50 N min.

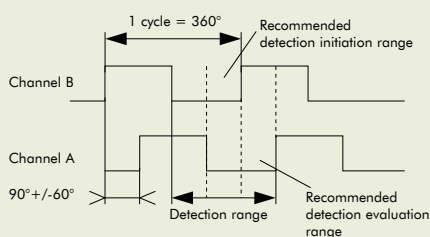
MATERIAL DATA

Contact pads:	Alloy copper, AuCo plated (hard gold)
Membrane switch:	Stainless steel, AuCo plated (hard gold)

SOLDERING CONDITIONS

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

OUTPUT TIMING

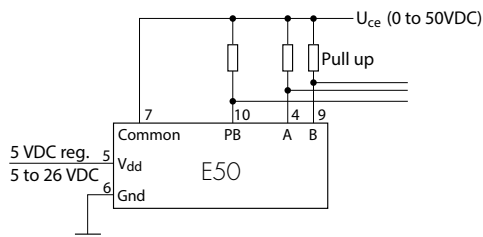


- Signal A is normally in quadrature to signal B (90° phase shift).
- A = B = High is the indexed position and is outside of the detection range because of magnetic indexing.
- The signals should not be evaluated until the state A = B = Low is reached.

ENCODER TYPE E50

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SYSTEM INTERFACE



Because driver ULN2003A, equipped with "Open Collector Output" and integrated suppression diodes for inductive loads is used, the cathodes of all diodes = *Common* (7) have to be connected to *UCE*. The pull-up resistors are also connected to *UCE*. This circuitry protects the encoder against e.g. surge currents.

PIN ALLOCATION

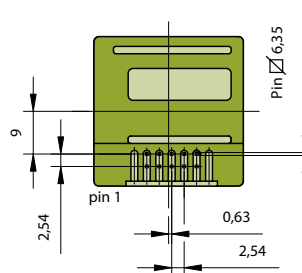
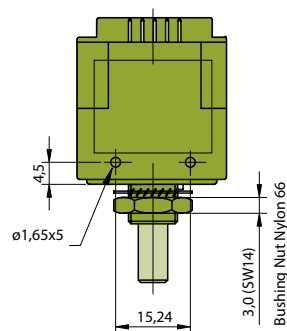
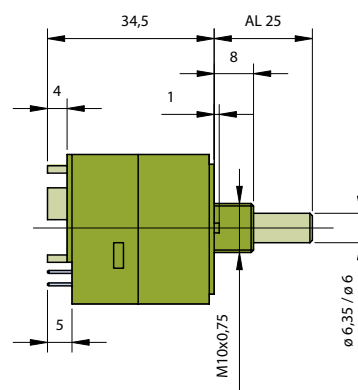
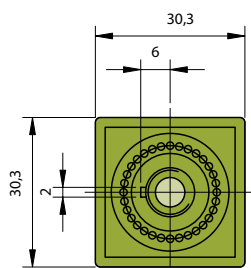
1	No connection	2	No connection
3	No connection	4	Channel A
5	V _{dd}	6	Ground
7	Common (clamp diodes)	8	No connection
9	Channel B	10	Push button

Connector Assignment

1	2
3	4
5	6
7	8
9	10

DRAWINGS

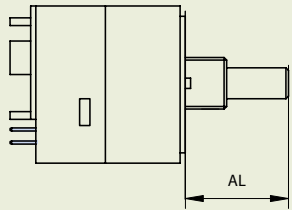
Tolerances unless otherwise specified DIN ISO 2768-1 (m)



ENCODER TYPE E50

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TYPE KEY

E 50	-	-	-	-	-	-	-	-	-	-
		RESOLUTION 1 24 detent (24 PPR) 2 32 detent (32 PPR)				SHAFT DIAMETER X 6 mm Z 1/4"				
		PUSH BUTTON 1 Without push button 2 With push button				SHAFT LENGTH (AL) 000 25 mm xxx ¹ Custom (e.g. 20.0 mm = 200) ¹ Customized shaft length Please state shaft length (AL) measured from mounting face (max. AL = 25 mm).				
		OPERATING VOLTAGE 1 5 VDC regulated 2 5 to 26 VCD								
		TORQUE 1 0.45 Ncm (24 detent) 2 1.5 Ncm (24 detent) 3 0.6 Ncm (32 detent) 4 1.3 Ncm (32 detent)								

TECHNICAL EXPLANATIONS

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GENERAL SWITCH TERMS

POSITION

A position is a mechanical detent of a switch actuation.

DETENT

A detent is a positioning device to mechanically stop the rotation of a switch. This can be achieved for instance with a spring-operated ball and an opponent chamfer.

POLE

A pole is capable of conducting a single electrical signal. Each layer is equivalent to one pole (1 layer = 1 pole). The number of poles indicates the number of electrical signals/circuits which are controlled by the switch.

WAFER, DECK OR LAYER

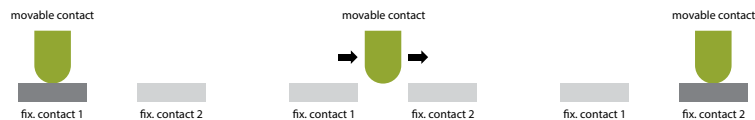
Here, a wafer is a construction of a fixed and a movable disk. One wafer consists of the necessary contacts for one pole.

INDEXING ANGLE

An indexing angle is the number of degrees between each consecutive position. For example: 12 positions of a total of 360 degrees results in a 30 degrees indexing angle.

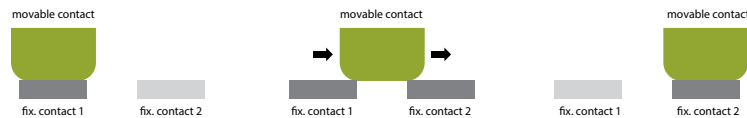
NON-SHORTING CONTACTS "BREAK BEFORE MAKE"

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 (see picture)



SHORTING CONTACTS "MAKE BEFORE BREAK"

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 (see picture).



CYCLE

A cycle is one rotation through all positions and back to the start position. The rotational life of coded or selector switches are usually specified by cycles.

REVOLUTION

A revolution is a 360 degree rotation through all positions. The rotational life of encoded switches is usually specified by revolutions.

BENEFITS OF GOLD-PLATED CONTACTS

Gold-plated contacts should be used for longer rotational life, in corrosive environment or in case the switch will not be actuated for a long period of time.

TECHNICAL EXPLANATIONS

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ELMA SWITCH TERMS

MULTI ROTARY SWITCH

Multi rotary switches contain different switch functions in the same switch body.

Switch functions can be the following: Selector switch, coded switch, encoder, potentiometer in combination with a push-button function.

MECHANICAL CODED SWITCHES (BCD, HEX, GRAY)

A mechanical coded switch usually works with 4 bits (bit values 1,2,4,8). A common contact (C) shorts the circuit. With 4 bits it is possible to achieve 10 to 16 switch positions (depending on the used code, see picture below) with only 5 connection pins. It is a cost effective way to realize a rotary switch.

Coded switches need a microcontroller with corresponding software.

CODE TABLES

BCD

	8	4	2	1
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				

BCD Complementary

	8	4	2	1
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				

Hex

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

Hex Complementary

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

Gray

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

On
Off

MECHANICAL ENCODER SWITCH

A mechanical encoded switch usually works with an incremental 2 bit (2 signals/contacts A, B) system. Both signals A and B are connected to common contact (C). With this contact system it is possible to achieve 8 to 16 PPR (pulses per revolution) with only 3 contacts and one of the incremental disc (see picture).

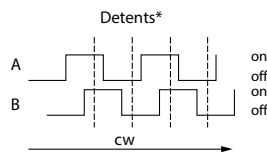
8 PPR incremental disc



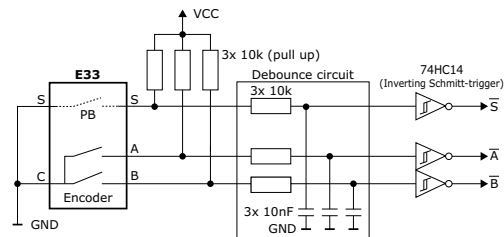
16 PPR incremental disc



Encoders are a simple technique to develop a very cost effective rotary switch. The following pictures show a signal flow chart and an example of an electric diagram.



* Timing diagram shows 32 detents / 16 PPR or 16 detents / 8 PPR.



TECHNICAL EXPLANATIONS

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ELMA SWITCH TERMS

SELECTOR SWITCHES

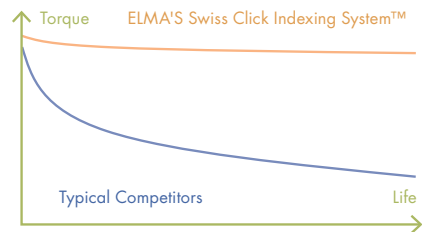
A selector switch has an array of terminals, arranged in a circle around the rotor, each of which serves as a contact for the "slider" through which any one of a number of different electrical circuits can be connected to the common contact (C) pin. Most of our selector switches are user configurable in relation to the number of positions, from 2 up to 24. Selector switches can also be used at higher voltages / current.

CONCENTRIC FUNCTION

A concentric rotary switch has two shafts (inner and outer) and logically two switching-functions packed in just one switch.

SWISS CLICK INDEXING SYSTEM™

The "Swiss click indexing system" is an Elma label, containing switches with a special indexing to ensure nearly consistent torque over life (see picture below). Switches with that feature are specially marked in the catalogue.



LOCAL SERVICE GLOBAL RESOURCES

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Headquartered in Wetzikon, Switzerland, Elma Electronic AG is a leader in servicing the worldwide electronic industry with precision coded switches, encoders and selector switches as well as electronic packaging solutions.

Founded in 1960, our core competence is the design and manufacturing of switches for the most demanding applications. Elma's world-renowned quality, reliability and cost effectiveness have always been the hallmark of our products and services.

We have the ability to respond rapidly, with superior solutions to our various customers' technical and logistical requirements in Aerospace, Defense, Communications, Security, Medical, Transportation, Research & Science and Industrial Automation.

We utilize local R&D, production and marketing capabilities in Switzerland, US, Germany, UK, France, Israel, China and Romania and we maintain a worldwide network of distribution partners in more than 22 countries.

Elma's Six Sigma quality level is reached through continuing improvement and adaptation of our methods, processes and procedures to meet the demand of our customers' ever changing requirements.

WHY CHOOSE ELMA?

Product Quality

The world leaders in their respective industries who set the standards for their markets choose Elma products for their designs.

Customization

Our proven business model is to perfectly adapt our products to the customers' exact requirements.

Global Resources

Our local presence on five continents ensures a close relation in the discourse of engineering, customization and marketing service.

Track Record

Our long term relationships with industry leading customers have solidified our understanding of the varied requirements of each marketplace.

QUALITY ASSURANCE

**ISO 9001:2008
ISO 14001:2004
ROHS, REACH
Environment**

Certificates

Quality Management
Environment Management
Declaration of Conformity
Certificate of the Swiss Private Sector
Energy Agency
Conflict Minerals Avoidance Policy
Counterfeit Materials Avoidance Policy

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