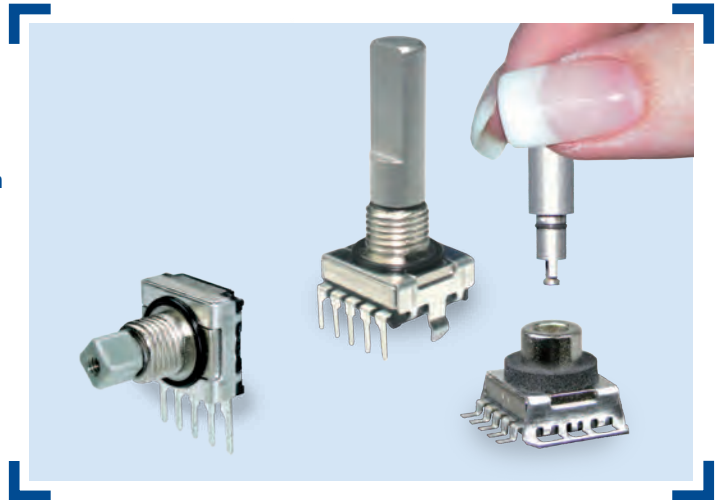
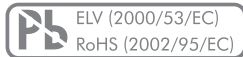


Incremental Encoder Type E33

- 16 or 32 detents standard resolution
- 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 or 2.5 Ncm switching torque (remains consistent over life)
- Gold plated contacts
- Robust metal housing with metal shaft
- 11.5 x 12.3 x 4.9 mm body size
- Optional IP68 front panel sealing
- Operating temperature range: -40 to +85°C
- Various options and customization

MIL-STD-202G compliant

SWISS CLICK INDEXING SYSTEM™



Summary

E33 is a high quality, cost effective incremental encoder available with or without push button switch. This new, low profile encoder boasts a unique combination of ruggedness with available options, while providing an excellent indexing feel. The E33's versatile and scalable system platform enables Elma's engineers to react quickly to requests for customer-specific solutions, even in small quantities. Elma's world-famous product quality, performance and reliability make the E33 an ideal choice for applications range from industrial automation to defense.

Standard Product Variety

- Vertical or horizontal mounting
- THT or SMT reflow (vacuum pick & place)
- Threaded or non-threaded bushing
- 3 or 6 N push button force or without push button
- 32/16, 32/8, 16/16, 16/8 detents/pulses per rev. (PPR)
- 0.5, 1.5, 2.0 or 2.5 Ncm switching torque or no detents
- IP60 or IP68¹ front panel sealing
- Shaft mounted, separated or without shaft
- Various standard shafts available
- Tray or tape & reel packaging

Possible Customization

- Shaft dimensions and shape
- Switching torque and push button actuation force
- Indexing resolution and PPR
- Others

Preference Types Selection Chart²

Push Button	IP Sealing	Resolution	Torque	THT Vertical (Threaded bushing ³)	SMT Vertical (Non-threaded bushing)
Yes, 6 N	IP60	32 detents (16 PPR)	2.0 Ncm	E33-VT610-M01T	E33-SN610-M01T
		16 detents (8 PPR)	2.5 Ncm	E33-VT630-M01T	E33-SN630-M01T
	IP68 ¹ (Shaft & front panel)	32 detents (16 PPR)	2.0 Ncm	E33-VT612-M01T	E33-SN612-M01T
		16 detents (8 PPR)	2.5 Ncm	E33-VT632-M01T	E33-SN632-M01T
No	IP60	32 detents (16 PPR)	2.0 Ncm	E33-VT010-M01T	E33-SN010-M01T
		16 detents (8 PPR)	2.5 Ncm	E33-VT030-M01T	E33-SN030-M01T
	IP68 ¹ (Shaft & front panel)	32 detents (16 PPR)	2.0 Ncm	E33-VT012-M01T	E33-SN012-M01T
		16 detents (8 PPR)	2.5 Ncm	E33-VT032-M01T	E33-SN032-M01T

¹ Non-threaded bushing: gasket provides IP65.

² For other types/options, see type key.

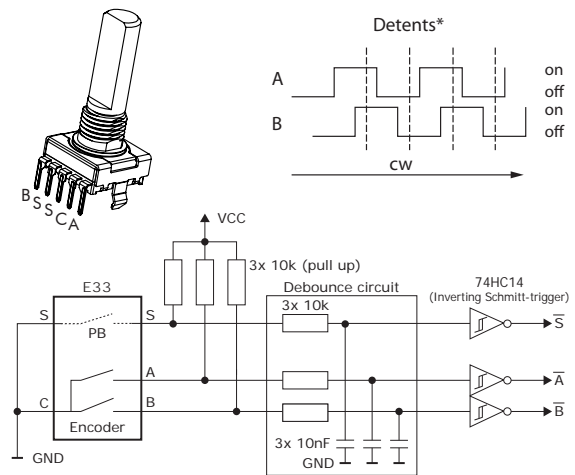
³ Nut supplied.

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

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

Recommended System Interfacing



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

Incremental Encoder Type E33

Specifications

Encoder

Mechanical Data

Resolution:	32, 16 or no detents
Switching torque (new condition): ¹	For 32 detents: 0.5, 1.0 or 2.0 Ncm (+/- 30%) For 16 detents: 1.5 or 2.5 Ncm (+/- 30%)
Rotational life: ²	1,000,000 revolutions min. with 0.5, 1.0 or 1.5 Ncm switching torque or with no detents 500,000 revolutions min. with 2.0 Ncm switching torque 300,000 revolutions min. with 2.5 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 (snap-in shaft mechanism)
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 Ohms max. (over the entire rotational life)
Dielectric withstanding voltage to housing/shaft:	500 VDC during 60 seconds (MIL-STD-202G, method 301)

Material Data

Shaft:	Aluminum
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:	Tin-plate
O-rings:	NBR (Nitril), 70 shore, reflowable
Gasket (non-threaded bushing):	Closed-cell EPDM based rubber, 45 shore A, complies to SAE J 18-79, reflowable

Environmental Data

Operating temperature range: ²	-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 ¹ (1 bar, 1 hour) shaft/front panel sealing (non-threaded bushing; gasket provides IP65 ¹)
Vibration:	29 Grms 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 Sizes

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)

Additional Data for Push Button Switch

Mechanical Data

Push button actuation force (new condition):	6 N (+/- 30%), optional 3 N (+/- 30%)
Push button switch travel:	0.5 (+/- 0.2) mm
Push button switch life: ²	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

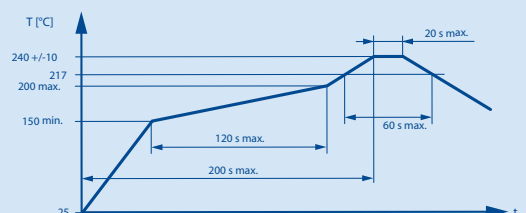
Contact pads:	Alloy copper, AuCo plated (hard gold)
Membrane switch:	Stainless steel, AuCo plated (hard gold)

Soldering Conditions

Hand soldering:	340°C max. during 2 s max.
Wave soldering:	280°C max. peak temperature during 5 s max.

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

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



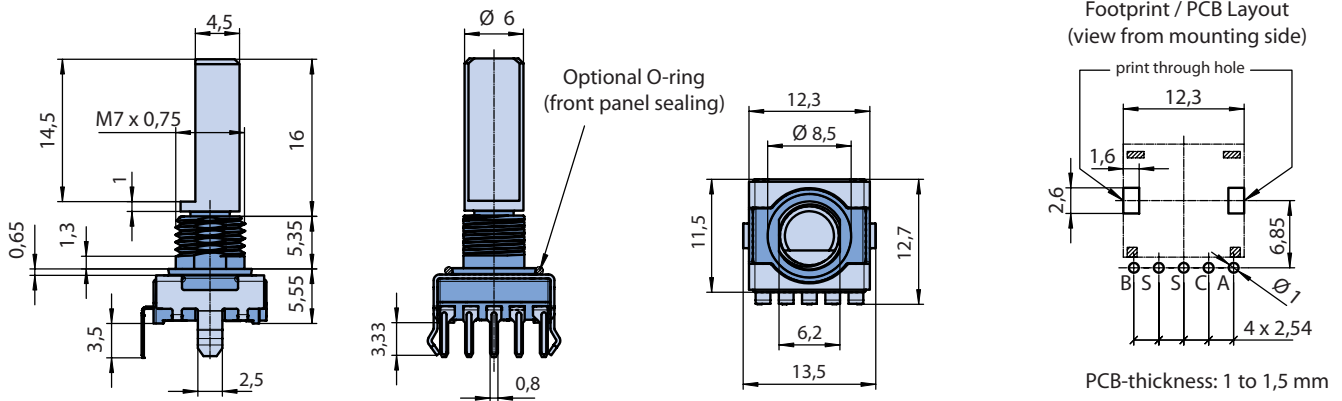
¹ O-ring of IP65/IP68 shaft sealing may slightly increase switching torque.

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.

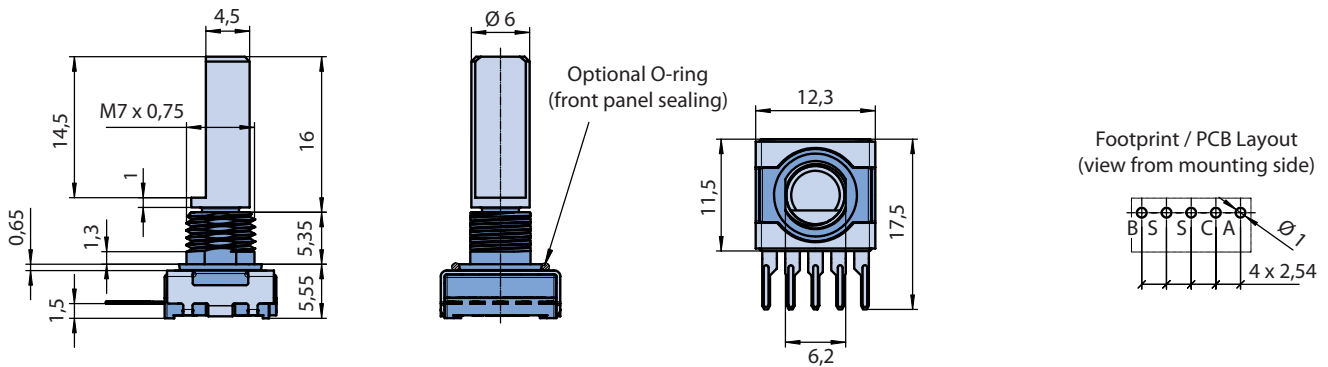
Incremental Encoder Type E33

Drawings

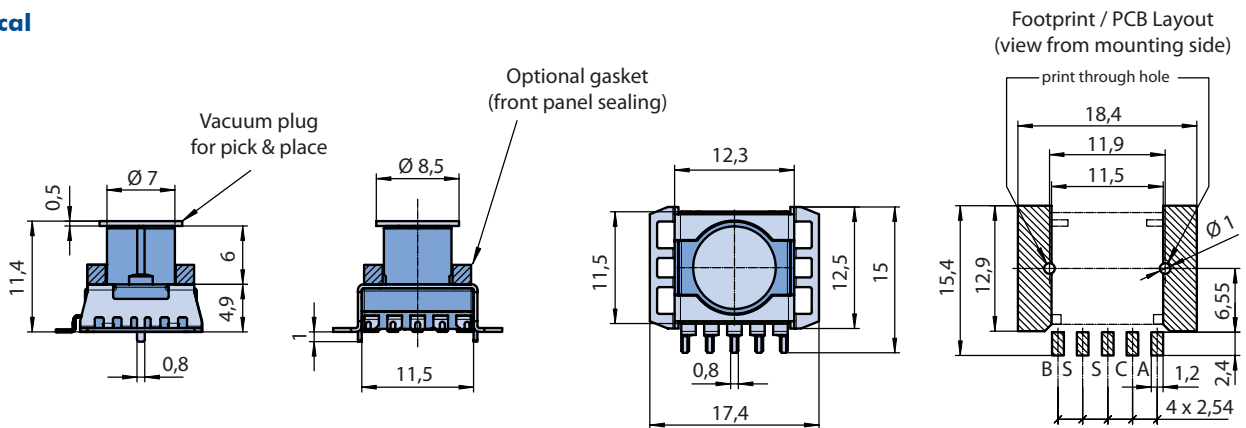
THT Vertical



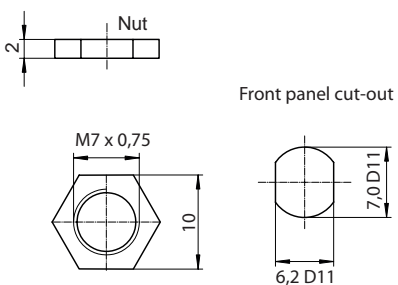
THT Horizontal



SMT Vertical

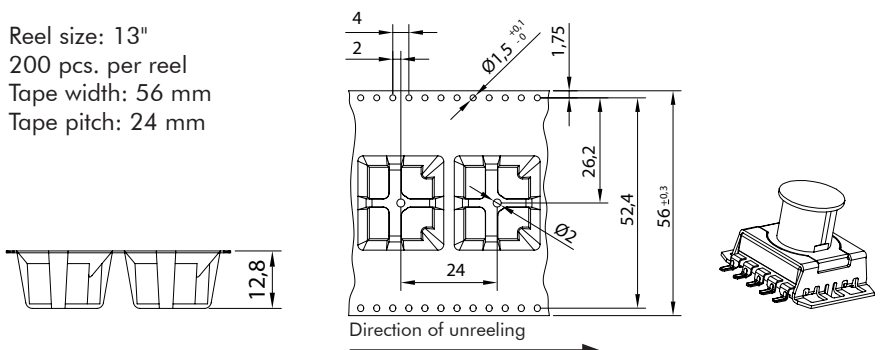


Nut and Front Panel Cut Out (Threaded Bushing)



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).

Incremental Encoder Type E33

Type Key

E 3 3 - X X X X X - X XX X

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

Resolution, Torque¹

- 1 - 32 detents (16 PPR) 2.0 Ncm
- 2 - 16 detents (8 PPR) 1.5 Ncm
- 3 - 16 detents (8 PPR) 2.5 Ncm
- 4 - 32 detents (8 PPR) 2.0 Ncm
- 5 - 16 detents (16 PPR) 1.5 Ncm
- 6 - 16 detents (16 PPR) 2.5 Ncm
- 8 - No detents (16 PPR)
- 9 - No detents (8 PPR)
- A - 32 detents (16 PPR) 0.5 Ncm
- B - 32 detents (16 PPR) 1.0 Ncm²

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

² Available with non-threaded bushing only.

IP Sealing

- 0 - IP60
- 1 - IP68¹ shaft sealing
- 2 - IP68¹ 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.

Shaft Separation

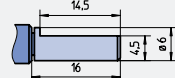
- M - Mounted
- S - Separated (snap-in shaft mechanism)
- N - No shaft

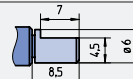
Packaging

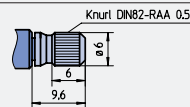
- T - Tray (THT or SMT, 10 or 50 pcs. tray size, depending on shipping qty.)
- R - Tape & reel with vacuum plug (SMT only, 200 pcs. per reel, shafts separated)

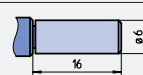
Shaft Type

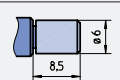
00 No shaft

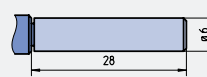
01  **Basic type**

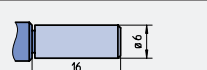
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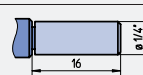
0H 

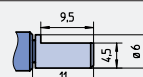
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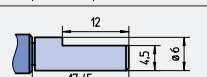
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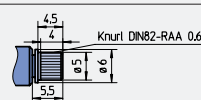
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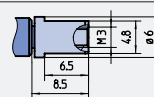
13  **Stainless steel, low play**

20² 

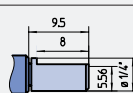
30 

31  **Stainless steel, low play**

40 

43 

45  **Stainless steel, low play**

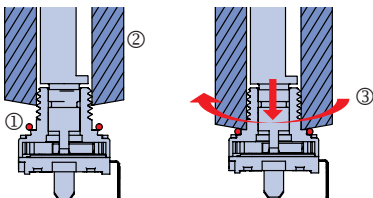
51² 

Other shafts are available on request.

² Threaded bushing: Shaft to be ordered separated; shaft mounting after encoder assembly to front panel (nut does not fit over 1/4" shaft diameter).

O-Ring Mounting Tool

Order 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, rotate the mounting tool simultaneously.