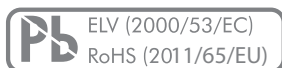


Product description

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»)



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

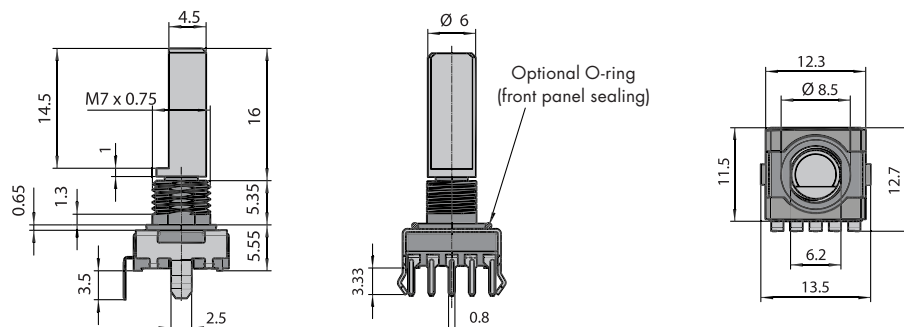
- Value and menu control for industrial PLCs
- Avionics, measurement and test equipment
- Frequency and channel selection for two way radios
- User interface controls for medical devices
- Volume and menu setting for transportation control and entertainment systems

Dimensions and pin assignment

SWITCH DESIGN

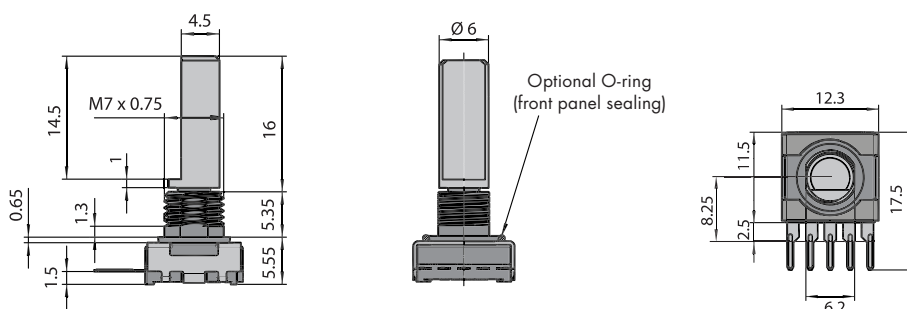
THT VERTICAL

Example of illustration with thread



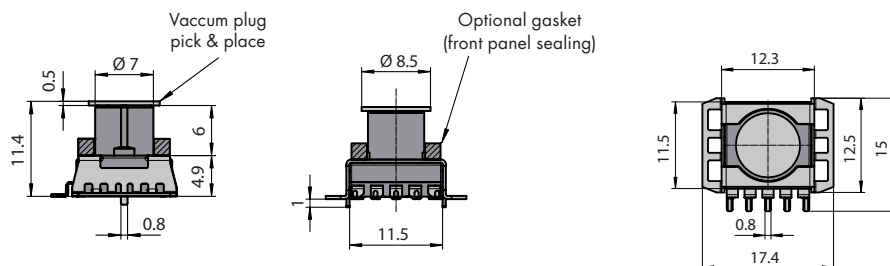
THT HORIZONTAL

Example of illustration with thread



SMT VERTICAL

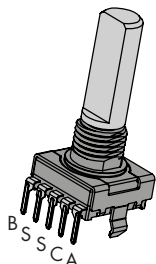
Example of illustration without thread



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

Dimensions and pin assignment

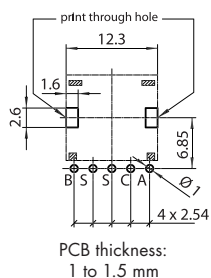
PIN ASSIGNMENT



DRILLING DIAGRAM AND FOOTPRINT

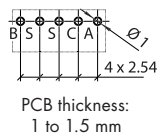
THT VERTICAL

View from component side of the PCB



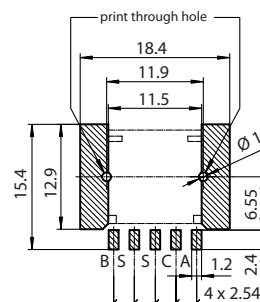
THT HORIZONTAL

View from component side of the PCB



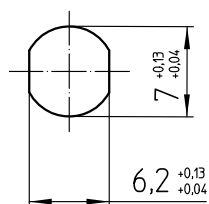
SMT VERTICAL

View from component side of the PCB

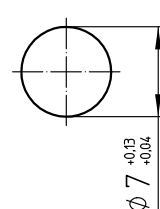


FRONT PANEL CUT OUT

THREADED

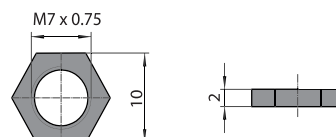


NON-THREADED



NUT

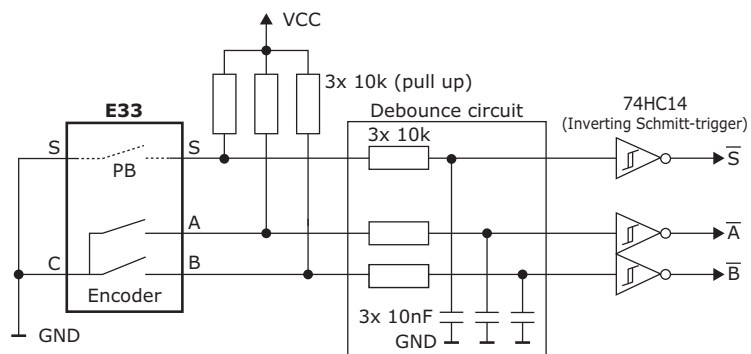
HEX NUT (SUPPLIED)



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

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 information

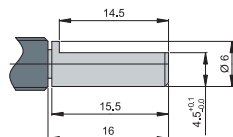
¹ Threaded bushing: Shaft to be ordered separately; shaft mounting after encoder assembly to front panel (nut does not fit 1/4" shaft diameter). OTHER SHAFTS ARE AVAILABLE ON REQUEST.

SHAFT TYPES

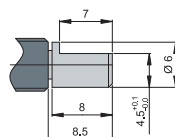
Type 00 - no shaft



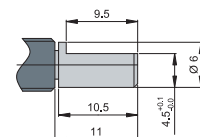
Type 01 - brass



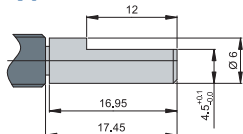
Type 03 - brass



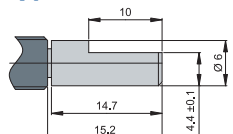
Type 30 - brass



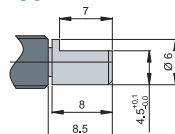
Type 31 - stainless steel



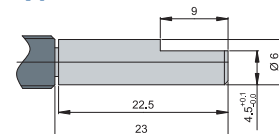
Type 32 - brass



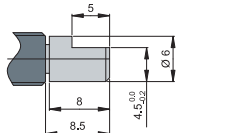
Type 33 - stainless steel



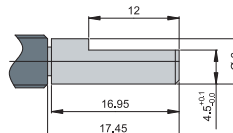
Type 34 - brass



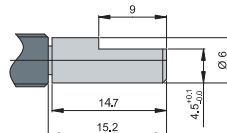
Type 37 - stainless steel



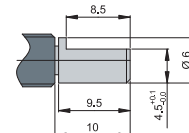
Type 70 - brass



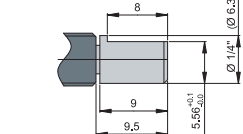
Type 71 - brass



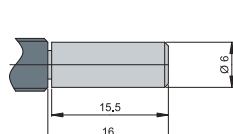
Type 72 - brass



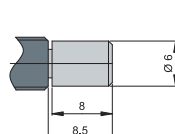
Type¹ 51 - brass



Type 10 - brass



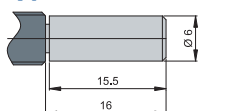
Type 11 - brass



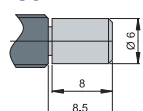
Type 12 - brass



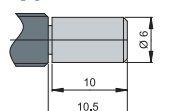
Type 13 - stainless steel



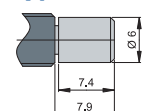
Type 14 - stainless steel



Type 15 - brass



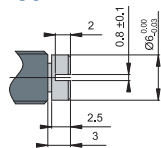
Type 16 - brass



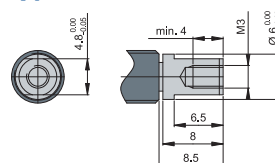
Type¹ 20 - brass



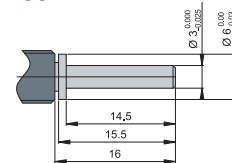
Type 02 - brass



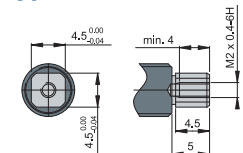
Type 43 - brass



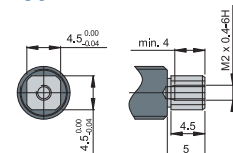
Type 42 - brass



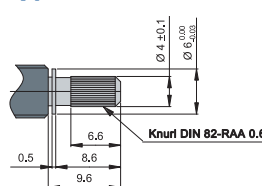
Type 45 - stainless steel



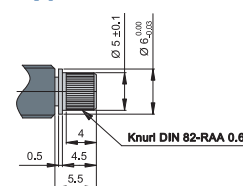
Type 47 - brass



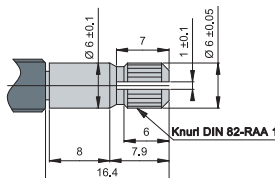
Type 08 - brass



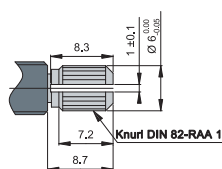
Type 40 - brass



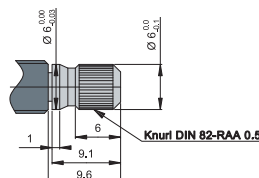
Type 41 - brass



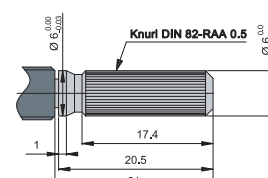
Type 60 - brass



Type 0H - brass



Type 44 - brass



Ordering information

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.

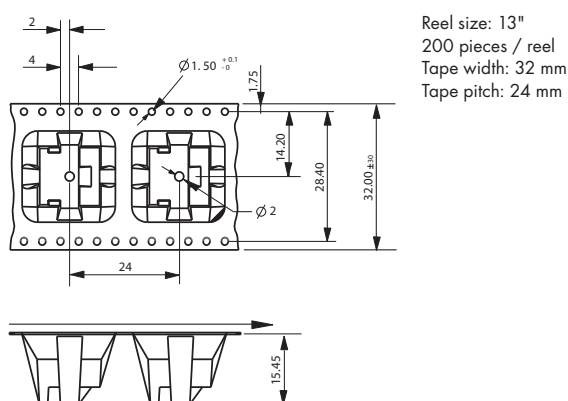
³ Nut supplied.

PACKAGING

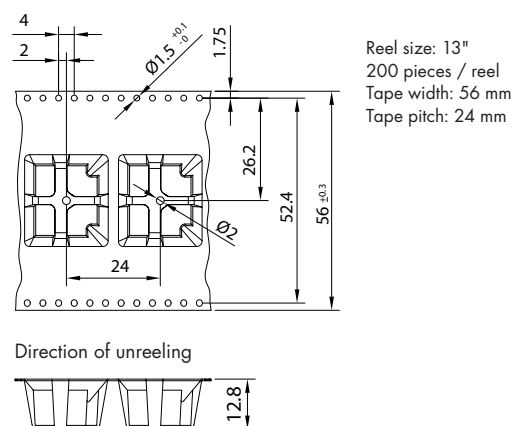
Tray:	10 or 50 pieces (depending on shipment quantity, nuts are supplied and packed separately)
Tape & reel:	200 pieces (SMT only, shaft and nuts are packed separately)

TAPE & REEL PACKAGING

THT VERTICAL



SMT VERTICAL



Ordering information

ACCESSORIES AND SPARE PARTS

HEX NUT

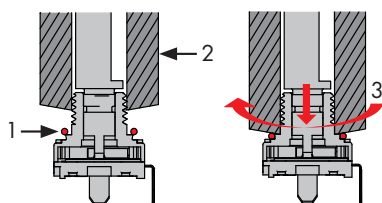
Hex nut M7 x 0.75:

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
Reflow soldering:	IPC/JEDEC J-STD-020C
Wave 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)

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