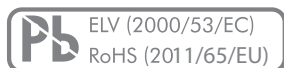


## Product description

### MAIN FEATURES

#### MECHANICAL INCREMENTAL ENCODER

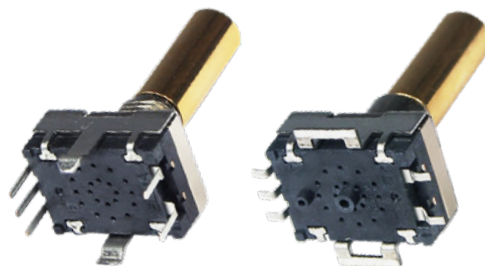
- › Body size: 14.4 x 11.4 x 6.5 mm
- › Rotational life: Up to 150'000 revolutions
- › Resolution: 16, 24 or 30 detents
- › Detent torque: 0.5, 1.5 or 2.5 Ncm
- › With or without push button
- › Push force: 3, 6 N
- › Gold plated sliding contacts
- › IP68 shaft sealing available
- › Various shaft types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



MIL-STD-202G

SWISS CLICK INDEXING SYSTEM™

(for more information see chapter «Technical explanations»)

**E18**

### PRODUCT VARIETY

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

### POSSIBLE CUSTOMIZATIONS

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

### TYPICAL APPLICATIONS

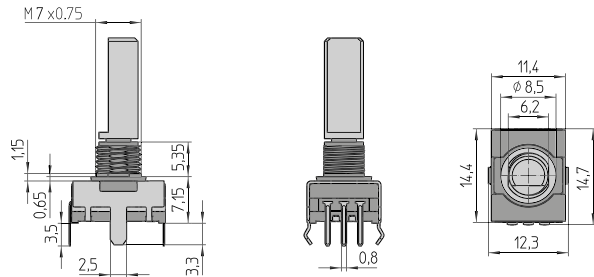
- White goods applications
- Household applications
- Home automation
- Two way radio applications
- Power and heat distribution controls
- Water distribution controls
- Industrial controllers
- Audio and entertainment systems

## Dimensions and pin assignment

### SWITCH DESIGN

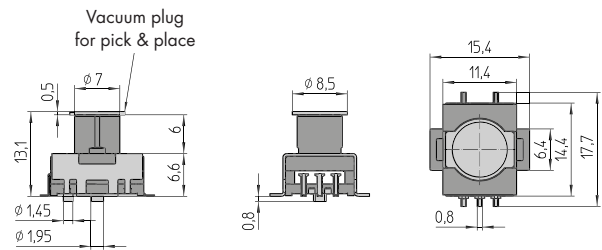
#### THT VERTICAL

Example of illustration with thread



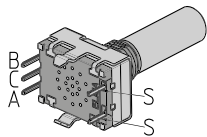
#### SMT

Example of illustration without thread

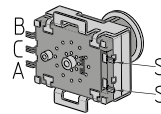


### PIN ASSIGNMENT

#### THT VERTICAL



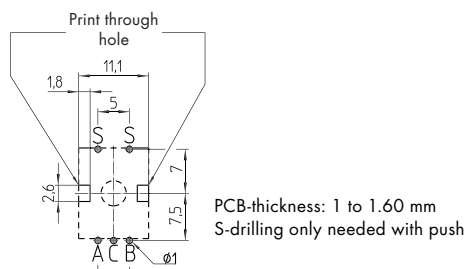
#### SMT



### DRILLING DIAGRAM AND FOOTPRINT

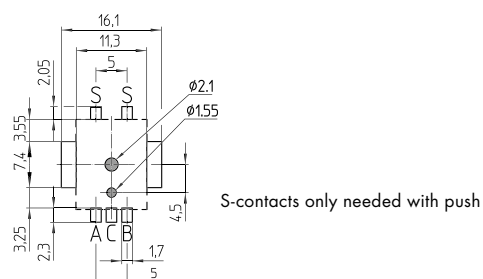
#### THT VERTICAL

View from component side of the PCB



#### SMT

View from component side of the PCB

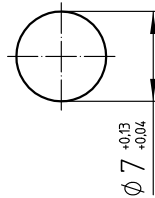
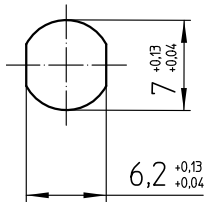


## Dimensions and pin assignment

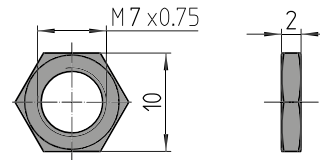
### FRONT PANEL CUT OUT

THREADED

NON-THREADED

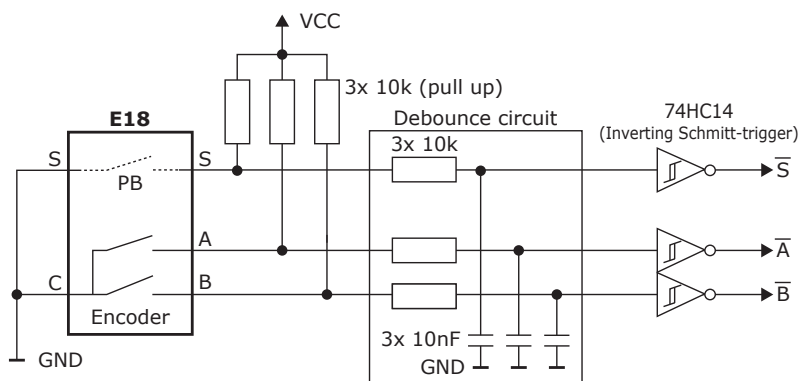


### NUT



## Circuit diagram

### RECOMMENDED SYSTEM INTERFACE



## Ordering information

### ORDERING CODE

E18	-	-	-	-	-	-	-	-	-	-	-	-	-
-----	---	---	---	---	---	---	---	---	---	---	---	---	---

**ORIENTATION | MOUNTING**

**V** THT vertical  
**S** SMT vertical

**FIXING**

**A** Threaded M7 x 0.75  
**E** Non-threaded Ø 7

**IP-PROTECTION<sup>1</sup>**

**0** IP60  
**1<sup>1</sup>** IP68 shaft sealing

<sup>1</sup> Shaft sealing (O-ring) of IP68 may slightly increase switching torque

**RESOLUTION**

**1** 8 PPR, B before A (16 detents)  
**2** 12 PPR, A before B (24 detents)  
**3** 15 PPR, A before B (30 detents)

**PACKAGING**

**T** Tray  
**R** Tape & reel with vacuum plug (SMT only, shafts separated)

**SHAFT TYPE**

See the next page for all available shaft types

**SHAFT**

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

**PUSH BUTTON**

**0** Without push button  
**3** 3 N  
**6** 6 N

**SWITCHING TORQUE<sup>1</sup>**

**B** 0.5 Ncm  
**C** 1.5 Ncm  
**D** 2.5 Ncm

<sup>1</sup> Shaft sealing (O-ring) of IP68 may slightly increase switching torque

<sup>1</sup> 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



Technical drawing of a shaft with the following dimensions:

- Overall length: 16
- Distance from left end to start of step: 14.5
- Distance from left end to end of step: 15.5
- Step height:  $4.5_{-0.1}^{+0.1}$
- Shaft diameter:  $\varnothing 6$

Technical drawing of a shaft with the following dimensions:

- 10
- 14.7
- 15.2
- 4.4  $\pm$  0.1
- $\varnothing$  6

Technical drawing of a shaft with a diameter of 28 mm and a length of 27.5 mm.

Technical drawing of a mechanical part. The drawing shows a cylindrical component with a diameter of 10.5 and a length of 15. A detail view of the end face shows a circular feature with a diameter of 0.5.

Technical drawing of a shaft-hub assembly. The shaft has a diameter of  $\varnothing 6_{-0.03}^{0.00}$  mm. The hub has an inner diameter of  $0.8 \pm 0.1$  mm. The shaft length is 2.5 mm, and the hub length is 3 mm. The shaft is shown with a keyway.

Technical drawing of a shaft with dimensions: 14.5, 15.5, 16, 3.000, 0.005, 0.6, 0.00.

The technical drawings show the dimensions of the screw head and thread. The top view shows a hexagonal head with a width across flats of 4.5 mm and a height of 4.0 mm. The side view shows the thread profile with a major diameter of 6 mm, a pitch of 0.75 mm, and a total length of 8 mm.

Technical drawing of a shaft with a knurl. The drawing shows a shaft with a knurled section. Dimensions include a total length of 9.6, a knurl length of 6.6, and a knurl diameter of  $\varnothing 4 \pm 0.1$ . The knurl is specified as DIN 82-RAA 0.6.

Technical drawing of a knurled shaft. The shaft has a total length of 5.5 units. The knurled section has a length of 4.5 units. The diameter of the shaft is  $\varnothing 5 \pm 0.1$ . The diameter of the knurled section is  $\varnothing 6_{-0.03}^{0.00}$ . The knurl is specified as Knurl DIN 82-RAA 0.6. The drawing also shows a 0.5 unit section at the end of the shaft.

Technical drawing of a knurled screw. The drawing shows a side view of the screw with the following dimensions: 8.3 (total length), 1 ± 0.1 (height of the knurled section), Ø 6.00 (diameter), 7.2 (length of the knurled section), and 8.7 (length of the unknurled section). The text "Knurl DIN 82-RAA 1" is present.

Technical drawing of a knurled shaft. The drawing shows a shaft with a knurled section. The total length is 9.6. The knurled section has a length of 6. The diameter of the shaft is  $\varnothing 6_{-0.00}^{+0.00}$ . The knurled section has a diameter of  $\varnothing 6_{-0.1}^{+0.0}$ . The drawing is labeled "Knurl DIN 82-RAA 0.5".

Technical drawing of a 12mm diameter, 20mm long ballpoint pen nib. The drawing shows a cross-section of the nib with a knurled section. Dimensions include a total length of 20mm, a knurled section length of 17.4mm, and a tip diameter of 12mm. The knurling is specified as DIN 82-RAA 0.5.

## Ordering information

### PACKAGING

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

### ACCESSORIES AND SPARE PARTS

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

### Mechanical data

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

### Electrical data

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

### Materials

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

## Specifications

### Environmental data

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

### Soldering conditions

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

### Mechanical data for push button

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

### Electrical data for push button

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

### Materials for push button

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

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