# MULTI ROTARY SWITCH

X4

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## Product description

### MAIN FEATURES

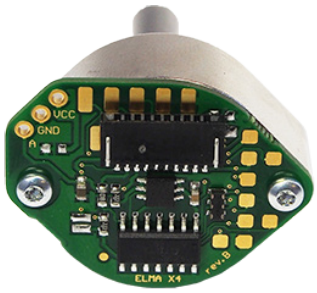
HIGH PERFORMANCE, HALL-SENSED SWITCH WITH VARIOUS INTERFACES

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

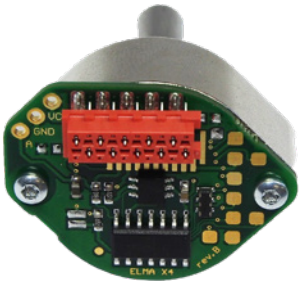
Pb ELV (2000/53/EC)
RoHS (2011/65/EU)

**X4**

**X4** with FFC connector




**X4** with Micro-MaTch socket




### PRODUCT VARIETY

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

### POSSIBLE CUSTOMIZATIONS

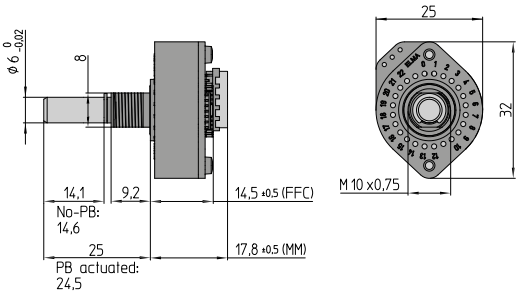
- Shaft types
- Number of detents
- Mechanical interface: Connector type, cable connection and pin assignment
- Electrical interface: Operating voltage, data bus

### TYPICAL APPLICATIONS

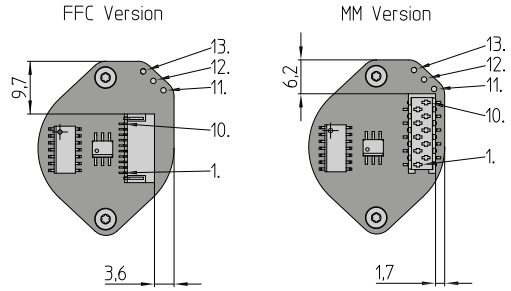
- Construction site
- Transportation controls
- Machine tools
- Defense applications
- Industrial applications
- Plant construction

# Dimensions and pin assignment

## SWITCH DESIGN



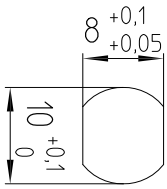

## PIN ASSIGNMENT




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

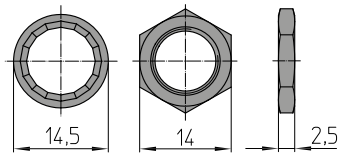
UART mode can be activated by solder bridge or UART EN (Pin #7) set to low.

## FRONT PANEL CUT OUT




## NUT

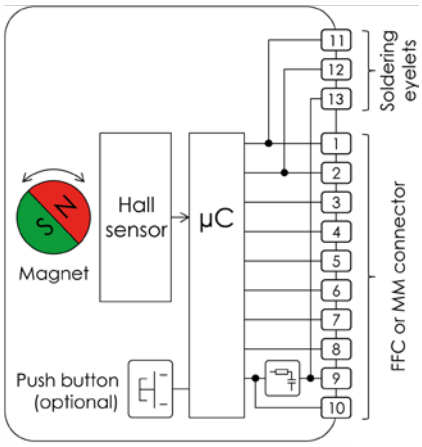
LOCK WASHER AND HEX NUT (SUPPLIED)




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

# Circuit diagram

## CONNECTIONS

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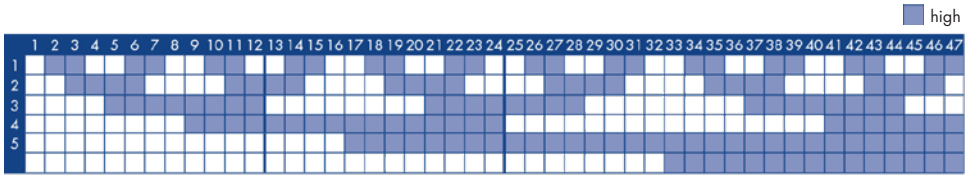
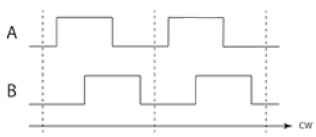
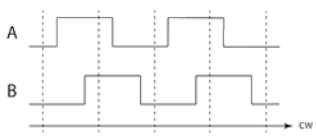
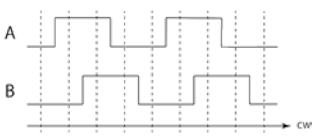
11. Vcc
12. GND
13. Analog out

External magnetic fields may interfere function.

# Output signal

## SIGNAL OVERVIEW

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

# Ordering information

## ORDERING CODE

| X4 | - | _ | _ | _ | __ | - | _ | _ | _ |
|---|---|---|---|---|---|---|---|---|---|

### PUSH BUTTON

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

### INDEXING RESOLUTION

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

### SWITCHING TORQUE

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

### END STOP

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

### SHAFT STYLE

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

### IP SEALING

**N** IP60
**S** IP68

### OUTPUT | CONNECTOR TYPE

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

## PACKAGING

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

## ACCESSORIES AND SPARE PARTS

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

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# Specifications

## MECHANICAL DATA

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

## ELECTRICAL DATA

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

## MATERIALS

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

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# Specifications

## ENVIRONMENTAL DATA

| | |
|---|---|
| Operating temperature: | -30 to +85 °C (IEC 60068-2.14) |
| Storage temperature: | -40 to +85 °C (IEC 60068-2-14, MIL-STD202G, method 107G, condition B-3) |
| Humidity: | < 93 % relative humidity (MIL-STD-202G, method 103B, condition B) |
| Salt atmosphere against front panel: | Only with IP68 gasket (MIL-STD-810F, method 509.4) |
| IP sealing against front panel: | IP60 without sealing<br>IP68 with shaft and front panel sealing (5 bar, 4 h) |
| Vibration: | 29 $G_{RMS}$ (MIL-STD-202G, method 214A, duration 15 min) |
| Shock: | 100 G (MIL-STD-202G, method 213B, condition C) |

## MECHANICAL DATA FOR PUSH BUTTON

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

## ELECTRICAL DATA FOR PUSH BUTTON

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

## MATERIALS FOR PUSH BUTTON

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



**Please contact our sales team for more details.**

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