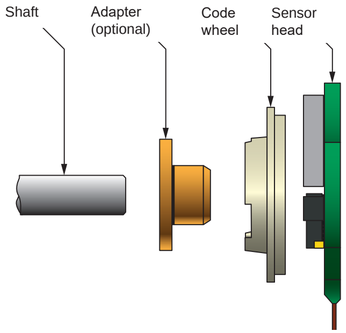
Modular System

Code disc and sensor can be purchased as a set without housing. The user can thus integrate the modular system into his own housing, motor or other systems. Due to the special calibration procedure after installation in the customer's application, e. g. motor, position tolerances are largely eliminated. There are no complex adjustment measures and assembly is made easier. After calibration, the user has an absolutely adapted system that delivers output signals with low tolerances. The system can be supplemented by adapters, e. g. to adapt the inner diameter of the code disc to the motor shaft. The encoder with aluminium housing is also designed for different mounting options. It is already fully calibrated and ready to use.

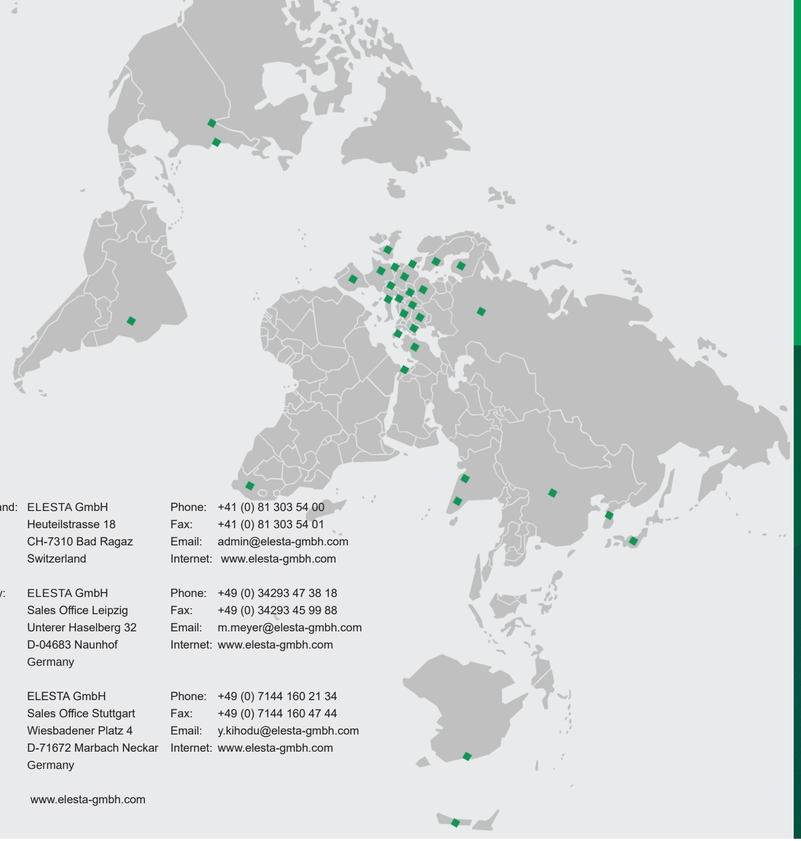


High Reliability

ELESTA's optical encoders are robust even under difficult environmental conditions and are therefore suitable for applications with special requirements. Vibration and shock loads up to 30g can affect the system just as little as temperatures up to 85°C or a relative humidity of 85%. The output signals will remain stable over the entire temperature range and within the tolerances.

Customer-specific solutions

The ELESTA encoder series offers a high degree of flexibility in adapting to customer-specific requirements.
Our encoder team is always available to help you with the realisation of individual ideas regarding the design of the sensor or the code disc.



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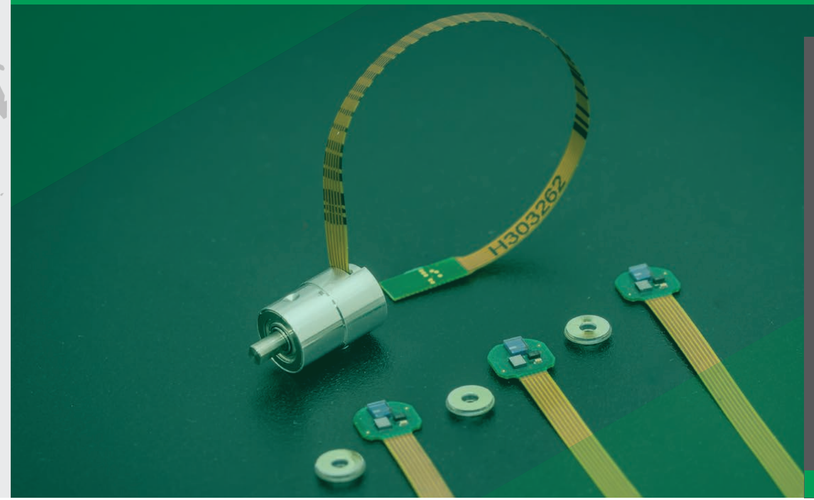
Your ELESTA Partner

Optical Encoder
E OI R 3 channel • incremental



Product Information

ELESTA GmbH 11_2017

ELESTA sensors

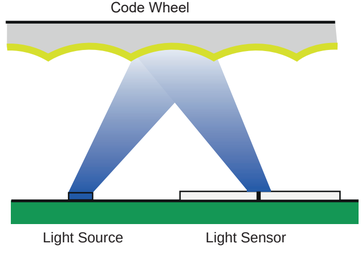
Precise optics in the smallest of spaces
Energy efficient design
Flexible design options

Optical encoder E OI R

In many areas of mechanical engineering, medical technology, robotics or measurement technology, the acquisition, monitoring and evaluation of position and speed are important for the function of a device. Optical encoders offer advantages when it comes to high EMC immunity, precise resolution and high speeds. A high degree of miniaturization of the encoder is achieved by using reflected light technology.
Based on its experience in the field of micromechanics and sensor development, ELESTA has taken a special approach to the implementation of this process. This enables ELESTA to build optical encoders with low power consumption, precise output signals and high reliability. The special features of the patented ELESTA encoder system are reflected in the optical functionality of the code disc and the special design of the sensor.

Functional principle

In the reflected light method, the light source is on the same plane as the light sensor. The light emitted by the light source is reflected by the segments of the opposite rotating code wheel and detected by the light sensor. Photocurrent pulses are generated in the light sensor and further processed into evaluable pulses. In contrast to conventional systems, ELESTA's code disk segments are parabolically shaped. The precise geometry of these segments and the focusing of the reflected light sharply limit the light spot. Photocurrent pulses with steep edges are generated, from which rectangular pulses are generated with high precision, low hysteresis and very small tolerances.



High energy efficiency

Due to the functional principle, the light sensor achieves such a high light intensity that an LED with low power consumption can be used as the light source. The generated photo current is sufficient to generate usable pulses. As a result, the total current consumption of the system at an operating voltage of 5 VDC is only typ. 4 mA; an important application criterion for battery-dependent applications.

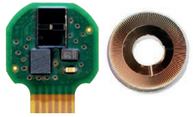
High-precision resolution

The encoder of the E-OI-R007 series presented here consists of a code disc of 4,4 mm diameter with 128 segments and a sensor with FFC connection cable. A variant with aluminium housing is also available. The angular resolution of channels A and B is 2,81° with a maximum tolerance of +/-0,14° per channel. If the edge changes on channels A and B are evaluated externally, a resolution of 512 pulses per revolution is achieved, increasing the angular resolution by a factor of 4 to 0,7°. This resolution is maintained even at speeds well above 100 000 rpm. The output signals are stable over the entire speed range and within the specified tolerances. The low hysteresis of the output signals allows for use in precise small angle sensors.

ELESTA sensors

E OI R007 Series

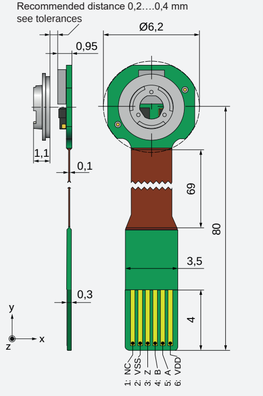
E OI R007 C0128 DSET SA CMOS FC1



Features

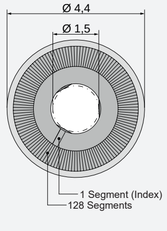
- Optical miniature encoder system
- Singleturn, incremental
- 3 channels: 2 pulse tracks, 1 index pulse
- Unique code wheel with high-precision optics
- Starrflex PCB
- Very small installation space
- Low power consumption
- Easy assembly
- Low sensitivity to installation tolerances
- Inverse-polarity protection
- Short-circuit proof

Dimensions and Pin Configuration Sensor



Flexprint connection	6-pol. pitch 0,5 mm
Recommended Flexprint-connector	6-pol. ZIF/LIF pitch 0,5 mm / thickness 0,3 mm

Dimensions Code Wheel



Electrical Specifications (after calibration)

Supply voltage (DC)	3,5 V...6 V
Supply current	2 mA...6 mA
Output drive current (at 4,5 V)	typ. 5 mA
Rotational speed (higher rotational speed on request)	100 000 min-1
Pulse count/revolution	
Channel A/B	128
Channel Z (index)	1
Duty cycle for A and B	50 % ±5 %
Phase shift between A to B (Φ) (see table for tolerances)	typ. 90 °e ±5 °e
Pulse width index (Z)	90 °e ±10 °e
Signal rise time	100 ns
Signal fall time (R=1 kΩ, C=0,47 pF)	100 ns
Interface	CMOS/TTL

Tolerances

Distance code wheel / sensor in mm	Permissible position tolerance code wheel / sensor in mm X-Orientation	Y-Orientation	Phase shift A to B in °e
0,20 - 0,40	±0,10	±0,05	90 ± 5
0,20 - 0,40	±0,15	±0,10	90 ± 10
0,20 - 0,40	±0,20	±0,15	90 ± 25
0,41 - 0,70	±0,15	±0,05	90 ± 5
0,41 - 0,70	±0,15	±0,10	90 ± 10
0,71 - 1,00	±0,15	±0,05	90 ± 5

Environmental Specifications

Operational temperature	-20 °C to 85 °C
Storage temperature	-20 °C to 85 °C
Relative humidity (without condensation)	85 %

Tests, Regulations

Burst (IEC 61000-4-4)	±1 kV
ESD (IEC 61000-4-2)	±4 kV / ±8 kV
Shock stability (IEC 60068-2-27)	half sine wave, 30g, 6 ms
Vibration resistance (IEC 60068-2-6)	5 Hz - 120 Hz Amp. 1 mm, 9 min 1 mm, 9 min
Isolation values	on request

Options

In preparation

Accessories

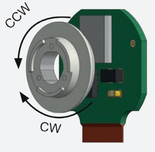
Calibration device (EFI-Board)
Notes for installation
PC Software

Product Key

E OI R007 C0128 DSET SA CMOS FC1

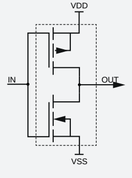
- Type of connection
- Interface
- Output pulse count per rotation
- Single turn / Multi turn
- Set encoder & code wheel
- Segment count on code wheel
- Series

Direction of Rotation

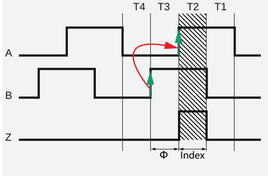


CW clockwise
CCW counter-clockwise

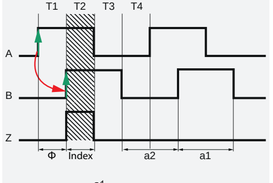
Output Diagram (per Channel A, B and Z)



Signal Diagram CW



Signal Diagram CCW



Duty Cycle = $\frac{a1}{a1 + a2} \times 100\%$

ELESTA sensors

E OI R007 Series

E OI R007 C0128 CSV0 SA CMOS FC1

Features

- Highly precise optical miniature rotary encoder
- Singleturn, incremental
- 3 channels: 2 pulse tracks, 1 index pulse
- Low power consumption
- Easy assembly
- Aluminum housing
- Stainless steel shaft
- Two precision miniature ball bearings
- Simple mounting with grub screw

Electrical data

Supply voltage (DC)	3,5 V...6 V
Supply current	2 mA...6 mA
Output drive current (at 4,5 V)	typ. 5 mA
Speed (mechanically permissible maximum speed)	85 000 rpm
Pulse count/revolution (signal edges)	128 (512)
Channel Z (index)	1
Duty cycle for A and B	50 % ±5 %
Phase shift between A to B (Φ)	typ. 90 °e ±25 °e
Pulse width index (Z)	90 °e ±10 °e
Signal rise time	100 ns
Signal fall time	100 ns
(R=1 kΩ, C=0,47 pF)	
Interface	CMOS/TTL

Mechanical data

Weight	1,2 g
Radial Load	max. 3 N
Axial Load	max. 1 N

A general indication of the service life cannot be given due to the many influencing factors of the ambient conditions (operating mode, speed, vibrations, vibrations, operating temperature, shaft loads, type of mounting etc.).

Environmental Specifications

Operational temperature	-20 °C to 85 °C
Storage temperature	-20 °C to 85 °C
Relative humidity (without condensation)	85 %
IP protection	IP 50

Tests, Regulations

Burst (IEC 61000-4-4)	±1 kV
ESD (IEC 61000-4-2)	±4 kV / ±8 kV
Shock stability (IEC 60068-2-27)	half sine wave, 3 x 50g, 11 ms
Vibration resistance (IEC 60068-2-6)	5 Hz - 120 Hz Amp. 1 mm, 9 min 1 mm, 9 min

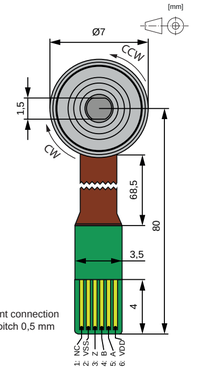
Connection and Installation

Flex print connector	type ZIF/LIF 6-pin pitch 0,5
Fastening with grub screw M3 x 5 mm	
Torque secured with bolt adhesive	max. 0,3 Nm

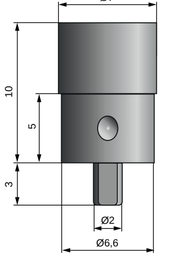
Options

Adaptation to customer-specific features possible.

Dimensions



Flexprint connection
6-pol. pitch 0,5 mm

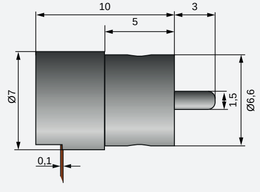


Product Key

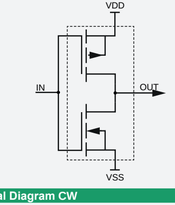
E OI R007 C0128 CSV0 SA CMOS FC1

- Type of connection
- Interface
- Output pulse count per rotation
- Single turn / Multi turn
- Housing with solid shaft
- Segment count on code wheel
- Series

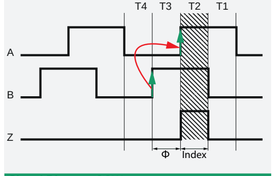
Dimensions



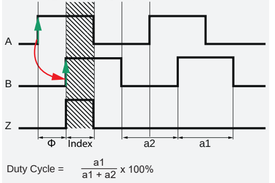
Output Diagram (per Channel A, B and Z)



Signal Diagram CW



Signal Diagram CCW



Duty Cycle = $\frac{a1}{a1 + a2} \times 100\%$