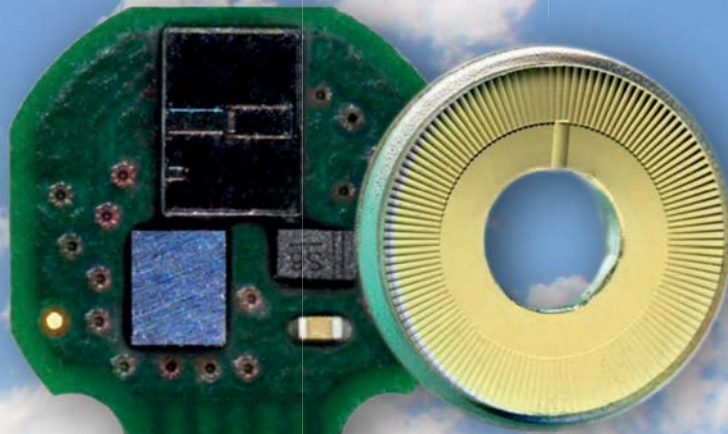




Optical Encoder System E OIR

3 channels • incremental



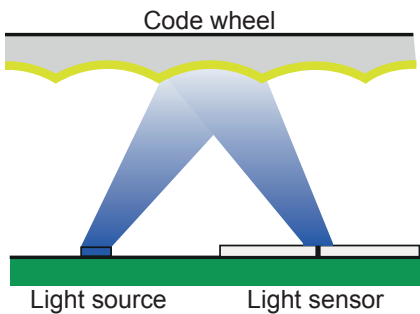
- Precise optics in the smallest space
 - Energy-efficient design
 - Flexible design options



Optical encoder systems are a standard in speed and position detection of moving systems. In contrast to the transmitted light method, the reflected light method has been established in the miniaturization of such systems. Based on the experience in the field of micromechanics and sensor development ELESTA has taken a special way in the implementation of this method. The specifics of the patented ELESTA encoder system can be seen in the optical functionality of the code wheel and the special design of the sensor. Low power consumption, accurate output signals and the modular design qualify the 3 channel system for a wide range of applications.

Functional Principle

According to the reflected light method, the emitted light from the light source is reflected by the segments of the code wheel and detected by a light sensor, that is seated on same substrate as the light source. The generated photo current pulses are converted into rectangular pulses by a digital converter. In contrast to conventional systems, the segments of code wheel are shaped parabolically.



The precise geometry of the code wheel segments and the focusing of the reflected light isolates the light spot sharply. The result is a system with highly accurate signal edges, low hysteresis and very low tolerances of the output signals.

High Energy Efficiency

Because of the functional principle a high energy density of the light at the light sensor is achieved. Sufficient photo current for signal formation is generated, allowing the use of a low-power LED. The resulting ultra-low current consumption of the encoder of typ. 4 mA at 5 VDC supply voltage is an important criterion especially in battery-dependent applications.

Highly Accurate Resolution

The E OI R007 system presented here, with 128 segments on a code disc of 4.4 mm in diameter, has a angular resolution of 2.81° with a maximum tolerance of $\pm 0.14^\circ$. Taking advantage of the edge change of channel A and B a resolution of 512 pulses per revolution can be achieved and the angular resolution can be increased to 0.7° .

Applications in miniature motors with speeds well over 100000 min^{-1} or in small precision angle sensors are no problem. The output signals remain stable and within the specified tolerances.

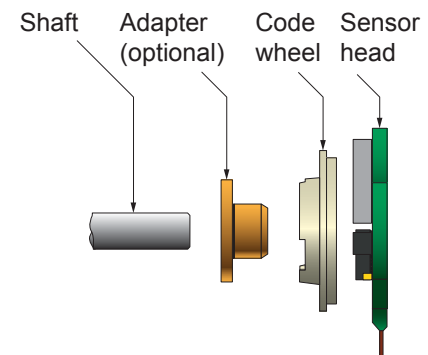


High Reliability

The encoder system is robust against harsh environmental conditions and is therefore also suitable for applications with special requirements. Vibration and shock up to 30g do as little harm to the system as temperatures up to 85°C or a relative humidity of 85%. The output signals remain stable over the temperature range and hardly change.

Modular System

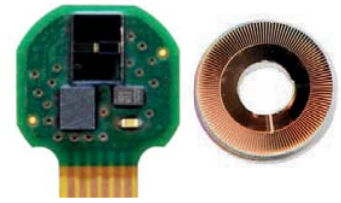
Code wheel and sensor are available as a kit. The user has the option to integrate the modular system in its own housing, in its own motor or other systems. Due to a special calibration after installation into the customer application (eg motor) position tolerances are largely eliminated. It makes complex adjustment measures obsolete and facilitates assembly. After calibration, the user has an absolutely customized system, that delivers output signals with low tolerances (see data sheet). The system may be supplemented with adapters, to adapt the inner diameter of the code wheel to the motor shaft, for example.



Customized Solutions

The modular ELESTA encoder system provides a high degree of flexibility in adapting to customer specific needs.

In the realization of individual ideas with regard to the shaping of the sensor or the code wheel, please contact our encoder support team at any time.

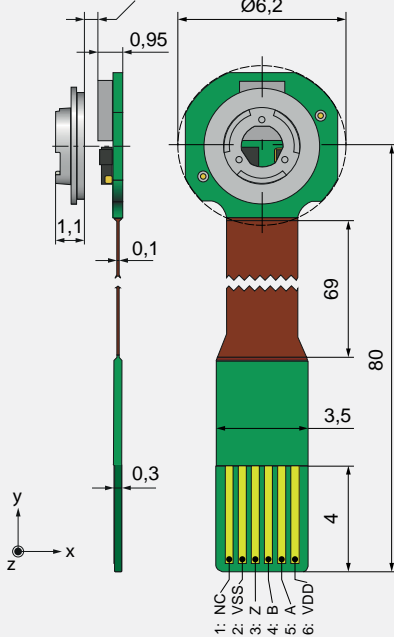


Features

- 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

Recommended distance 0,2...0,4 mm
see tolerances



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

Electrical Specifications (after calibration)

Supply voltage (DC)	3 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)	typ. 90 °e ±5 °e (see table for tolerances)
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

Tolerances

Distance code wheel / sensor in mm	Permissible position toler- ance code wheel / sensor in mm		Phase shift A to B in °e
	X-Orientation	Y-Orientation	
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

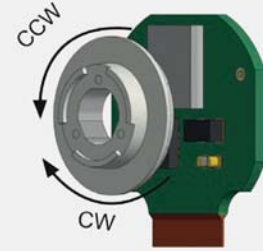
Environmental Specifications

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

Tests and Regulations

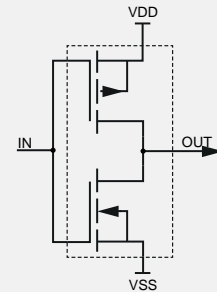
Burst (IEC 61000-4-4)	±1 kV
ESD (IEC 61000-4-2)	±4 kV / ±8 kV
Shock stability (IEC 60068-2-27)	half sine wave, 30g, 6 ms
Vibration resistance (IEC 60068-2-6)	5 Hz - 120 Hz Amp. 1 mm, 9 min
Isolation values	on request

Direction of Rotation

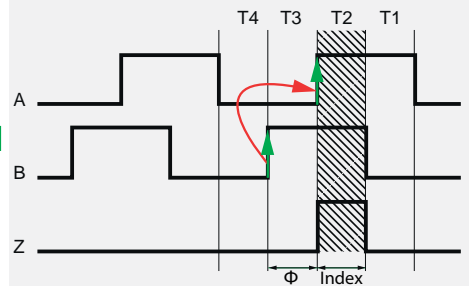


CW clockwise
CCW counter-clockwise

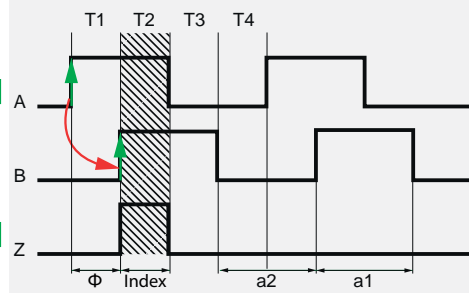
Output Diagram (per Channel A, B and Z)



Signal Diagram CW

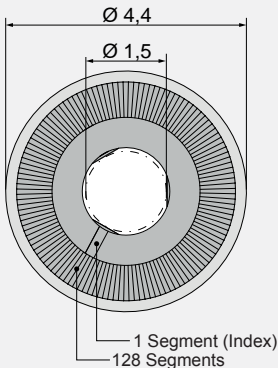


Signal Diagram CCW



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

Dimensions Code Wheel



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
- Singleturn / Multiturn
- Set encoder & code wheel
- Segment count on code wheel
- Series



ELESTA GmbH
Heuteilstrasse 18
CH-7310 Bad Ragaz
Switzerland

E-Mail: admin@elesta-gmbh.com
Web: www.elesta-gmbh.com

Fon: +41 (0)81 303 54 00
Fax: +41 (0)81 303 54 01