Absolute rotary encoder

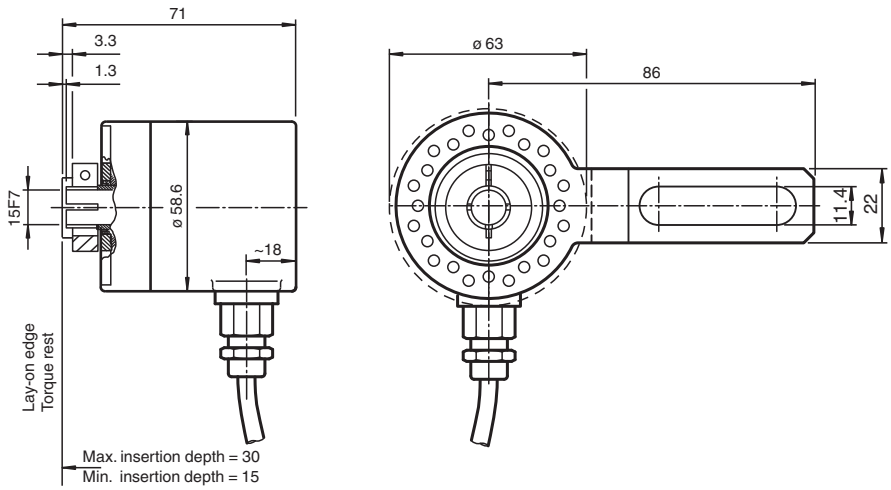
ENA58IL-R15YY5-1212SG1-RBY:01

- SSI interface
- Recessed hollow shaft
- Resolution: 12 singleturn, 12 bit multiturn
- Free of wear magnetic sampling
- High resolution and accuracy

Function

The ENA58IL series are high precision encoders with internal magnetic sampling.
This multiturn absolute encoder transmits a position value corresponding to the shaft setting via the SSI interface (Synchronous Serial Interface). The control module sends a start sequence to the absolute encoder to obtain the position data. The rotary encoder then sends the position data synchronous to the cycles of the control module.

Dimensions



Technical Data

General specifications		
Detection type		magnetic sampling
Device type		Absolute rotary encoder
Linearity error		≤ ± 0.1 °
UL File Number		E223176 "For use in NFPA 79 Applications only" , if UL marking is marked on the product.
Electrical specifications		
Operating voltage	U_B	4.5 ... 30 V
No-load supply current	I_0	typ. 50 mA
Power consumption	P_0	approx. 1.5 W
Time delay before availability	t_v	< 450 ms
Output code		Gray code
Code course (counting direction)		cw ascending
Interface		
Interface type		SSI
Resolution		

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Technical Data

Single turn	12 Bit
Multiturn	12 Bit
Transfer rate	0.1 ... 2 MBit/s
Cycle time	< 100 µs
Standard conformity	RS 422
Connection	
Fixed cable with plug	cable Ø8 mm, 8 x 2 x 0.14 mm² , length 300 mm , M12 connector, 8-pin
Standard conformity	
Degree of protection	DIN EN 60529, IP65
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 200 *g*, 6 ms
Vibration resistance	DIN EN 60068-2-6, 20 *g*, 10 ... 1000 Hz
Approvals and certificates	
UL approval	cULus Listed, General Purpose, Class 2 Power Source , if UL marking is marked on the product.
Ambient conditions	
Operating temperature	cable, flexing: -5 ... 70 °C (23 ... 158 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	98 % , no moisture condensation
Mechanical specifications	
Material	
Housing	nickel-plated steel , painted
Flange	Aluminum
Shaft	Stainless steel
Mass	approx. 300 g
Rotational speed	max. 12000 min $^{-1}$
Moment of inertia	50 gcm²
Starting torque	< 5 Ncm
Shaft load	
Axial	24 N
Radial	198 N
Angle offset	± 0.9 °
Axial offset	± 0.3 mm static
Radial offset	± 0.5 mm static
General information	
Scope of delivery	Spring plate is enclosed as accessory

Connection

Signal	Connector M12, 8-pin
Not connected	1
+U_B (rotary encoder)	2
Data (+)	3
Data (-)	4
Clock (+)	5
Clock (-)	6
GND (rotary encoder)	7
Not connected	8

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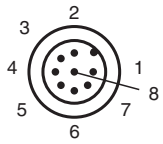
Connection Assignment



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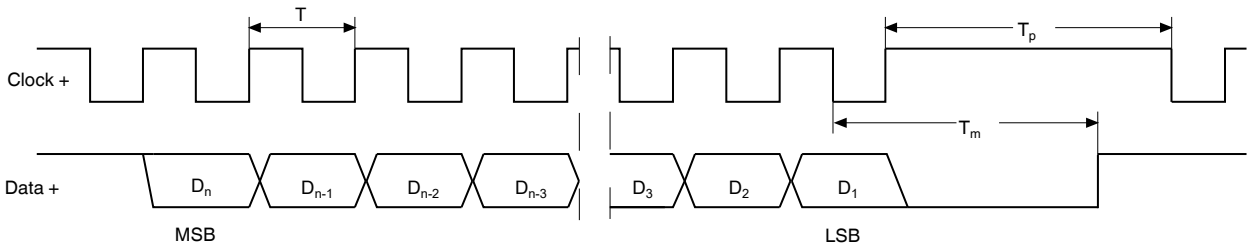
Interface

The Synchronous Serial Interface was specially developed for transferring the output data of an absolute encoder to a control device. The control module sends a clock bundle and the absolute encoder responds with the position value.

Thus only 4 lines are required for the clock and data, no matter what the resolution of the rotary encoder is. The RS 422 interface is optically isolated from the power supply.

SSI signal course Standard



$D_1, ..., D_n$:	Position data	T = 1/f:	Duration of period of clock signal ≤ 2 MHz
MSB:	Most significant bit	T_m:	Monoflop time 20 µs ± 1 µs
LSB:	Least significant bit	T_p:	Clock pause ≥ monoflop time ($T_p \geq T_m$)

SSI output format Standard

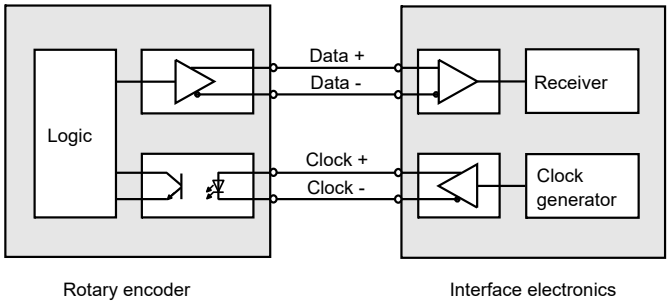
- At idle status signal lines "Data +" and "Clock +" are at high level (5 V).
- The first time the clock signal switches from high to low, the data transfer in which the current information (position data (D_n)) is stored in the encoder is introduced.±
- The highest order bit (MSB) is applied to the serial data output of the encoder with the first rising pulse edge.
- The next successive lower order bit is transferred with each following rising pulse edge.
- After the lowest order bit (LSB) has been transferred the data line switches to low until the monoflop time T_m has expired.
- No subsequent data transfer can be started until the data line switches to high again or the time for the clock pause T_p has expired.
- After the clock sequence is complete, the monoflop time T_m is triggered with the last falling pulse edge.
- The monoflop time T_m determines the lowest transmission frequency.

SSI output format ring slide operation (multiple transmission)

- In ring slide operation, multiple transmission of the same data word over the SSI interface makes it possible to offer the possibility of detecting transmission errors.
- In multiple transmission, n bits are transferred per data word in standard format. The value n equals the total resolution of the encoder.
  As an example: a multiturn encoder with a resolution of 8192 steps/revolution (13 bit) and a max. number of 4096 revolutions (12 bit) has a total resolution of n = 25 bit.
- If the clock change is not interrupted after the last falling pulse edge, ring slide operation automatically becomes active. This means that the information that was stored at the time of the first clock change is generated again.
- After the first position transmission, the n+1 pulse controls data repetition. If the n+1 pulse follows after an amount of time greater than the monoflop time T_m, a new current data word will be transmitted with the following pulses.

If the pulse line is exchanged, the data word is generated offset.

Block diagram



Line length

Line length in m	Baudrate in kHz
< 50	< 400
< 100	< 300
< 200	< 200
< 400	< 100

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