



Model Number

ENA58PL-H12DS5-0013SS2-RAA

Features

- Industrial standard housing Ø58 mm
- Suitable for SIL2/PLd applications
- Absolute value data from SSI interface
- 13 Bit singleturn
- Incremental signals from sin/cos output

Description

This singleturn sin/cos rotary encoder transmits a position value corresponding to the shaft setting via the SSI interface (Synchronous Serial Interface). In addition to the position values also sin/cos incremental signals are transmitted. Hearby a real time control of e. g. a motor is ensured.

The control module sends a clock bundle to the rotary encoder to obtain the position data. The rotary encoder then sends the position data synchronous to the cycles of the control module. It is possible to select the following items with function inputs

- the counting direction and
- the zero-set function (preset value)

Technical data

General specifications

Detection type	photoelectric sampling
Device type	Singleturn absolute rotary encoder with incremental output (sin/cos)

Functional safety related parameters

Safety Integrity Level (SIL)	SIL 2
Performance level (PL)	PL d
MTTF _d	1000 a
Mission Time (T _M)	20 a
PFH _d	4.6 E-10
L ₁₀	70 E+9 at 1.5 rpm
Diagnostic Coverage (DC)	99.7 %

Electrical specifications

Operating voltage U _B	24 V DC ± 25 %
No-load supply current I ₀	max. 100 mA
Time delay before availability t _v	< 250 ms
Output code	Gray code
Code course (counting direction)	cw ascending (clockwise rotation, code course ascending)

Interface

Interface type	SSI + incremental track (sin/cos)
Monoflop time	≤ 15 μs

Resolution	
Single turn	13 Bit
Overall resolution	13 Bit
Transfer rate	max. 500 kBit/s
Standard conformity	RS 422

Input 1

Input type	Selection of counting direction (cw/ccw)
Signal voltage	
High	4.5 ... 24 V
Low	0 ... 2 V
Input current	< 6 mA
Switch-on delay	< 20 ms

Input 2

Input type	zero-set (PRESET 1)
Signal voltage	
High	4.5 ... 24 V
Low	0 ... 2 V
Input current	< 6 mA
Signal duration	≥ 10 ms
Switch-on delay	< 20 ms

Output

Output type	sine / cosine
Pulses	2048
Amplitude	1 V _{SS} ± 10 %
Load current	max. per channel 10 mA, conditionally short-circuit proof (not with U _B), reverse polarity protected
Output frequency	max. 200 kHz (3 dB limit)

Connection

Connector	type 9416L (M23), 12-pin
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Standard conformity

Degree of protection	DIN EN 60529, IP65
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Salt spray test	DIN EN 60068-2-52, 672 h
Emitted interference	DIN EN 61000-6-4
Noise immunity	DIN EN 61000-6-2
Shock resistance	DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance	DIN EN 60068-2-6, 10 g, 10 ... 2000 Hz
Functional safety	IEC/EN 61508:2010 EN 62061/A2:2015 EN 61326-3-1:2008 EN 61800-5-2:2016 Suitable up to SIL 2, PL d, see leaflet.

Ambient conditions

Operating temperature	-40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)

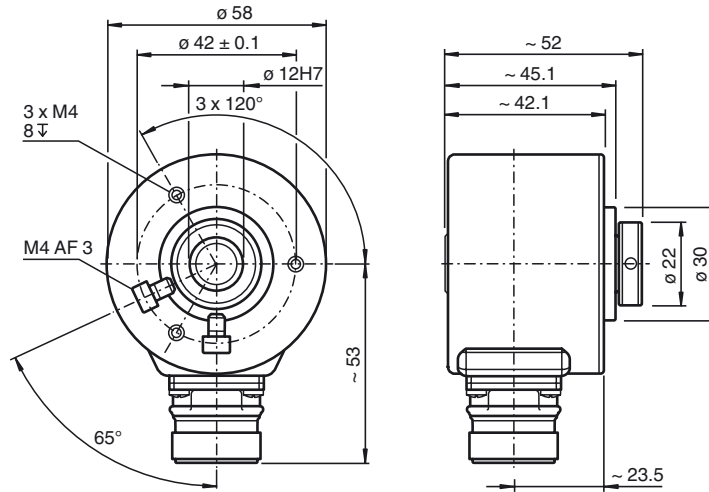
Mechanical specifications

Material	
Housing	3.2315 aluminum
Flange	3.2315 aluminum
Shaft	stainless steel 1.4404 / AISI 316L
Mass	approx. 220 g
Rotational speed	max. 10 min ⁻¹
Moment of inertia	≤ 80 gcm ²
Starting torque	< 10 Ncm
Shaft load	
Radial offset	max. 0.04 mm

Approvals and certificates

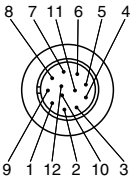
EAC conformity	TR CU 020/2011
TÜV approval	Cert. no. Z10 17 03 68273 002

Dimensions



Release date: 2019-01-30 12:04 Date of issue: 2019-01-30 291655_eng.xml

Electrical connection

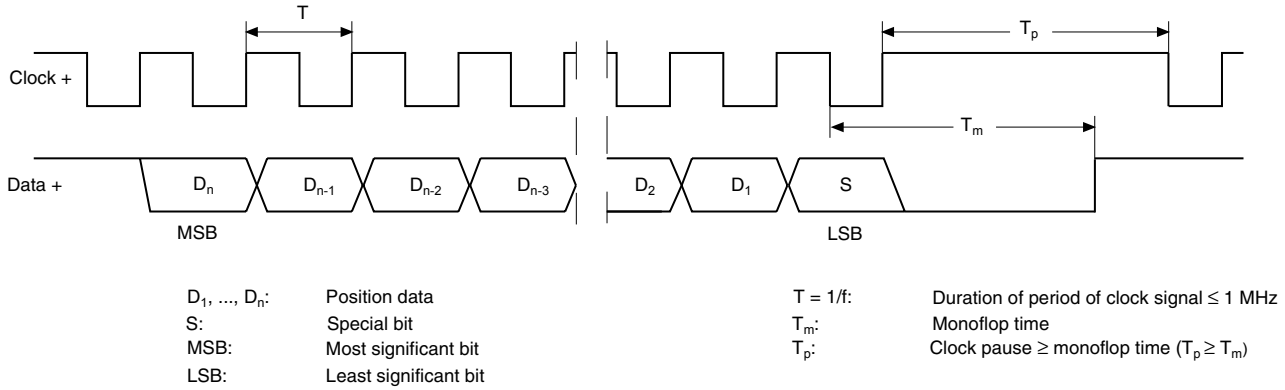
Signal	Connector 9416L, 12-pin	Explanation
GND (encoder)	1	Power supply
U_B (encoder)	2	Power supply
Clock (+)	3	Positive cycle line
Clock (-)	4	Negative cycle line
Data (+)	5	Positive transmission data
Data (-)	6	Negative transmission data
Preset	7	Zero-setting input
V/R	8	Input for selection of counting direction
A / Cos	9	Cosinus signal
$\bar{A} / \bar{\text{Cos}}$	10	Inverted cosinus signal
B / Sin	11	Sinus signal
$\bar{B} / \bar{\text{Sin}}$	12	Inverted sinus signal
		

Description

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



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) and special bit (S)) 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.

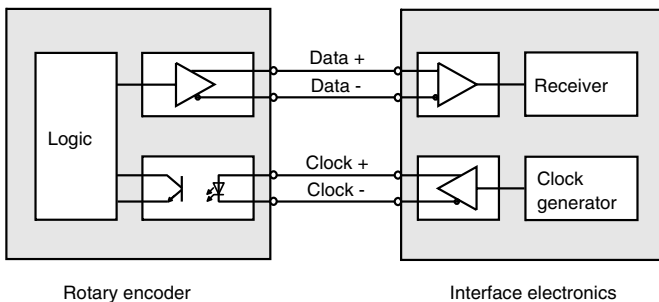
SSI output format ring slide operation (multiple transmission)

- 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, 13 bits are transferred per data word in standard format.
- 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 transmission, the 26th pulse controls data repetition. If the 26th 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.
Ring slide operation is possible up to max. 13 bits.

Block diagram

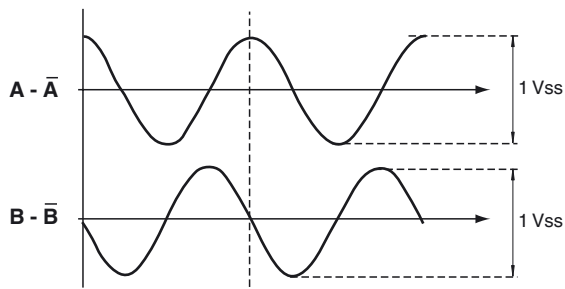


Line length

Line length in m	Baudrate in kHz
< 50	< 400

Release date: 2019-01-30 12:04 Date of issue: 2019-01-30 291655_eng.xml

Signal outputs



↻ cw - flange view

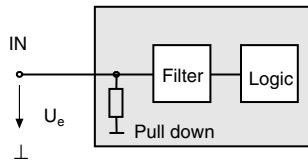
mesuré en mode différence

$$0.5 \leq \sin^2 + \cos^2 \leq 1.5$$

THD < 10 % (0 ... 200 kHz)

Inputs

The selection of the counting direction input (cw/ccw) and the zero-set input (PRESET 1) are activated with 1-level.



Release date: 2019-01-30 12:04 Date of issue: 2019-01-30 291655_eng.xml