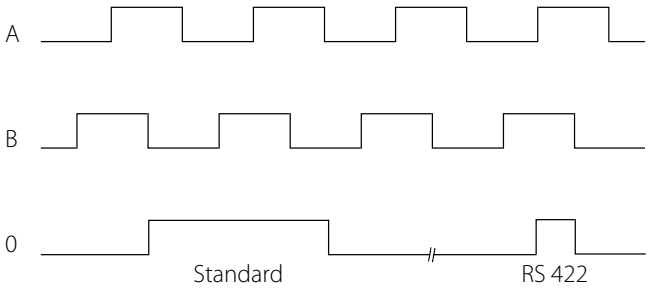
General description

Incremental rotary encoders are sensors for detecting rotary movements. An optoelectronic scanning unit con-verts the division (circular disc with light and dark fields, also referred to as increments) supplied by a measuring body into a proportional number of electronic pulses. The number of output pulses is a measure for the angle of the encoder. The subsequent electronics used by the user enable the measuring of angles, distances or speeds. Different signal outputs and output circuits are available for adapting to the controls used.

Signal outputs



Two square pulse trains offset by 90° el, with channel A lagging in clockwise rotation.

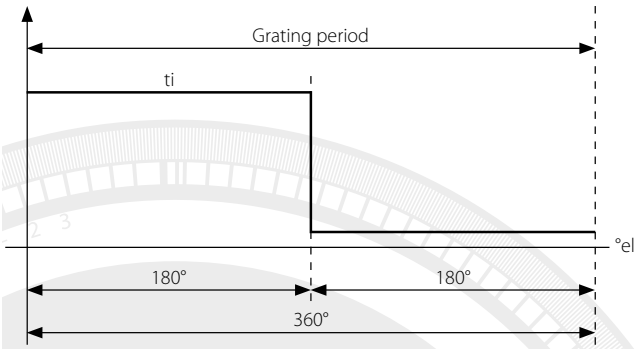
Reference pulse 0 once per revolution, position and length optional, linked for RS 422.

All output signals measured against GND!

All channels can also be executed inversely.

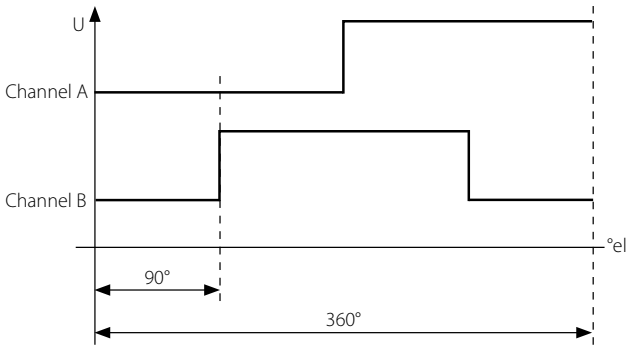
Pulse and Phase tolerance

Puls tolerance



ti : tp 180° el: 180° el ± 10%

Phase tolerance



90° el ± 10%

Calculation of permissible speed

$$n \left(\frac{u}{min} = \frac{f_{max}\ (Hz)}{\text{No. of pulses}} \right) \times 60$$

Attention: Observe permissible mechanical speed

Power supply

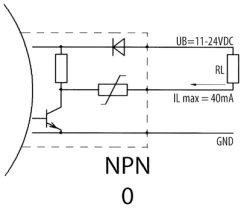
U_B = 5 V DC ± 5%

U_B = 10 V...30 V DC

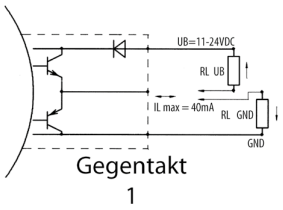
The limits of supply voltage, including the residual ripple, may not be exceeded as this could cause malfunctions, or damage the device.

Output circuits

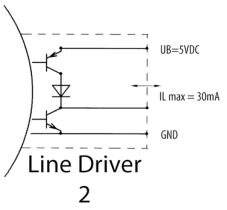
0 Darlington Driver
ULN 2003 o.ä.
max. 40 mA per channel
short-circuit-proof



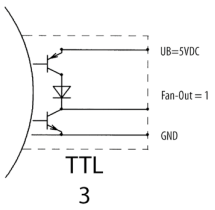
1 Push-pull –
Power driver
max. 30 mA/or 100 mA
per channel
short-circuit-proof



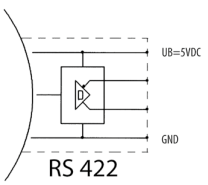
2 TTL Line Driver
75114 or sim.



3 TTL
max. 1.6 mA per channel
(1 TTL load)

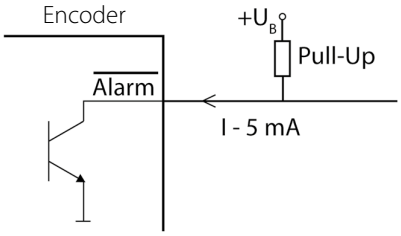


6 Driver according to E/A standard
RS 422
AM 26 LS 31 C
DS 26 C 31 C or sim.



Alarm output

Output circuit



Technical data

Output	NPN - Open collector
Output load max.	5 mA/24 V at UB = 5 V DC 5 mA/32 V at UB = 10...30 V DC
Level	Output active (fault): L 0.7 V DC Output inactive: high impedance (H level, possibly via external pull-up resistor)
Error reporting period	• 20 ms

Function

The rotary encoders with alarm outputs are equipped with monitoring electronics reporting essential operating errors via a separate output. The alarm output can be used for selecting an optical control (LED; for circuit, see above) or the control system (PLC or similar). The alarm outputs of several encoders can also be interconnected by parallel connection to a common "System alarm".

The following errors are reported:

Category I	Category II	Category III
- Glass breakage	- Overtemperature 1 V DC < U < 4 V DC	Voltage range
- Defective LED	- Overload e.g. due to short circuit	- Voltage drop on the supply lines
- Contamination		

Category I errors cannot be remedied; replacing the encoder is necessary.

Category II errors are detected by means of a thermal monitoring unit in the electronics. The error message expires after removing the cause for the temperature increase.

Category III errors indicate an insufficient power supply. This category also reports short-term disturbances of the power supply, e.g. due to electrostatic discharges, which may distort the output signals. Remedial action ensues by intercepting the interfering effects, e.g. by carefully selecting the cable routin

Cable lengths (AWI 58 H)

Output RS 422 (R)	depending on output voltage and frequency (at 25°C)	
	length	RS 422
	10 m	5 V DC, 300 kHz
	50 m	5 V DC, 300 kHz
	100 m	5 V DC, 300 kHz

Output Push-pull (K)	depending on output voltage and frequency (at 25°C)	
	length	Push-pull (K)
		5 V DC, 10 mA	10...30 V DC, 30 mA
	10 m	300 kHz	12 V DC, 200 kHz 24 V DC, 200 kHz 30 V DC, 200 kHz
	50 m		12 V DC, 200 kHz 24 V DC, 200 kHz 30 V DC, 100 kHz
	100 m		12 V DC, 200 kHz 24 V DC, 100 kHz 30 V DC, 50 kHz

Output Push-pull antivalent (I)	depending on output voltage and frequency (at 25°C)	
	length	Push-pull antivalent
	10 m	12 V DC, 200 kHz 24 V DC, 200 kHz 30 V DC, 200 kHz
	50 m	12 V DC, 200 kHz 24 V DC, 50 kHz 30 V DC, 25 kHz
	100 m	12 V DC, 150 kHz 24 V DC, 25 kHz 30 V DC, 12 kHz