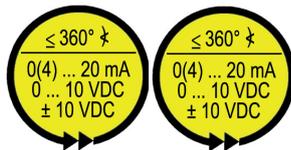


Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SB01



2 x



- Redundant analogue single-turn rotary encoder
- Robust design for rough applications, e.g. crane technology, construction machines and plant engineering
- Dual-chamber system for separating the rotor and electronics
- Measuring ranges of the two redundant sensor units can be selected independently and can be configured by the customer.
- Protection type IP 67
(higher protection types up to IP 69K possible)

Design

- Robust housing (wall thicknesses 5 mm) manufactured from seawater-proof aluminium (AlMgSi1) or stainless steel (material: 1.4305 optionally 1.4404).
- Redundant voltage supply plus sensor system and electronics.
- Shaft (measurement axis) with ball bearing, shaft seal and permanent magnet in prechamber.
- Sensor circuit consisting of ASICs with Hall elements and interface electronics in sealed main chamber.
- The contactless electromagnetic sensor systems are extended by a 12-bit D/A converter so that the measured variable is available as an analogue signal from 0 (4) to 20 mA or 0 to 10 VDC. Other outputs on request.
- Electrical connections via 2x connectors M12x1.

Function

A positive mechanical connection between the customer and sensor shaft ensures that the sensor shaft magnet precisely reflects the customer shaft's rotations. Two autonomously operating, redundant sensor units record the position of the magnet. A sensor unit consists of a sensor, an interpolator, a microcontroller and a D/A converter.

The sensor units' redundancy offers the user two analogue output signals which are not influenced by each other. The so-called teach-in functionality enables the execution of functions such as zero point, end value, pre-set value and default value setting and enables the code direction to be changed independently for each channel. The zero point and end value setting functions allow the slope of the output signal to be changed.

Absolute single-turn rotary encoder

TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Technical data

Electrical data

- Sensor system: ASICs with Hall elements
- Operating voltage: 9 to 36 VDC, protected against polarity reversal (output: A, B, C****)
(5 VDC on request)
- Power consumption: < 1.8 W per channel
- Measuring range: Up to 360°
- D/A converter: 12-bit
- Code path: CW* or CCW** can be set
- Accuracy: ± 0.15 % (with reference to 360°)
- Reproducibility: ± 0.02 % (with reference to 360°)
- Temperature drift: < 0.01 % / °K typ. (with reference to 360°)
- System synchronisation: Static ≤ 0.5 % (with reference to 360°)
Dynamic ≤ 5 % (with reference to 360°) at 3000 rpm

Electrical output data

- Current output A, B:
Burden: A: 0 to 20 mA; B: 4 to 20 mA
0 ... 500 Ω
- Voltage output C:
Output current: C: 0 to 10 VDC;
Max. 5 mA corresp. to load resistance ≥ 2 kΩ
resistant to short-circuit

Mechanical data

- Operating speed: 12,000 rpm
- Angular acceleration: 10⁵ rad/s² max.
- Moment of inertia (rotor): 20 gcm²
- Operating torque: ≤ 2 Ncm
- Starting torque: ≤ 3 Ncm
- Perm. shaft load: 250 N axially, 250 N radially
- Bearing service life: ≥ 10⁹ revolutions ***
- Weight: Aluminium approx. 0.4 kg,
stainless steel approx. 0.6 kg

*) CW = increasing signal clockwise viewed looking towards the shaft

**) CCW = increasing signal counter-clockwise viewed looking towards the shaft

***) This value applies at maximum shaft load

****) See page 6

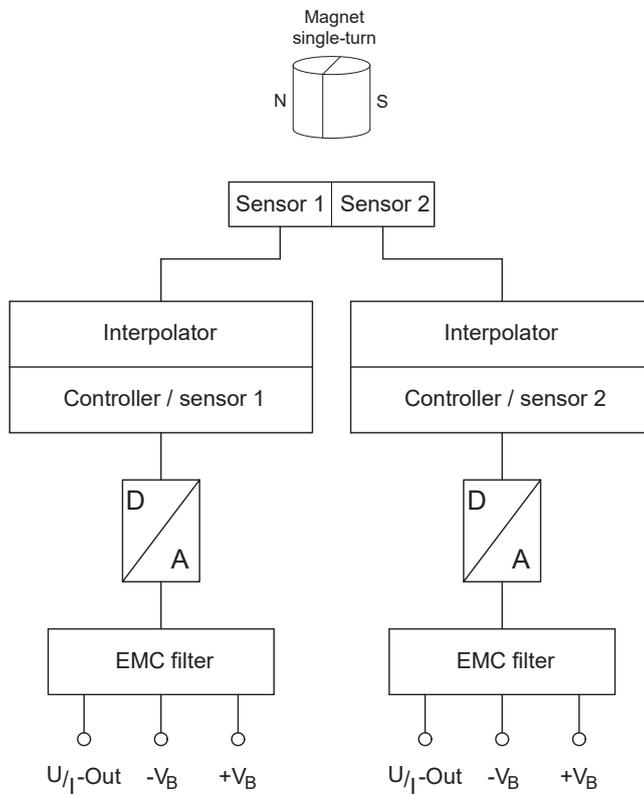
Environmental data

- Operating temperature range: - 40 °C to + 85 °C
- Storage temperature range: - 40 °C to + 100 °C (without packaging)
- Resistance
 - To shock: 500 m/s²; 11 ms
DIN EN 60068-2-27
 - To vibration: 500 m/s²; 10 Hz ... 2000 Hz
DIN EN 60068-2-6
- EMC standards: DIN EN 61 000 - 6 - 2 Imission (burst/ESD/etc.)
DIN EN 61 000 - 6 - 4 Emission
- Protection type (DIN EN 60529): IP 67
(For higher protection types up to IP 69K, please contact our technical staff)

Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Principle circuit diagram



Absolute single-turn rotary encoder TBA redundant analogue

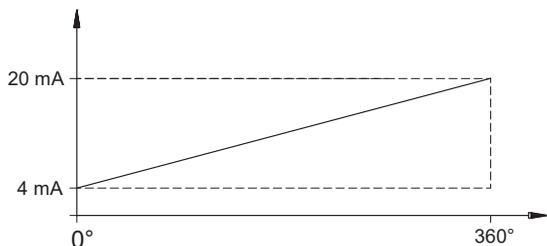
Model: TBA58-KA360WR2SBxx

Measuring range setting

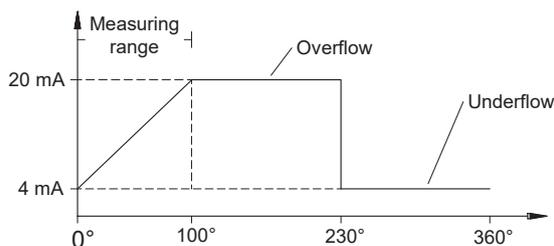
Standard measuring range

Both redundant sensor units are set to a measuring range of 360° as default (characteristic curve 1). If a smaller measuring range is specified in the order number, both sensor units are synchronously set to this specified measuring range in the factory. Outside of the measuring range, the characteristic curves then have a symmetrically subdivided overflow and underflow (characteristic curve 2). Special characteristic curves, e.g. without overflow or underflow, are possible on request.

Characteristic curve 1: measuring range 360° (output B*)



Characteristic curve 2: measuring range 100° as an example (output B*)

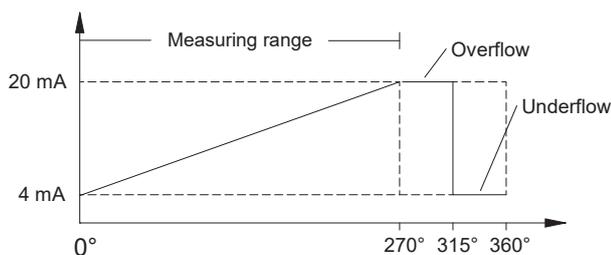


Alternative measuring range

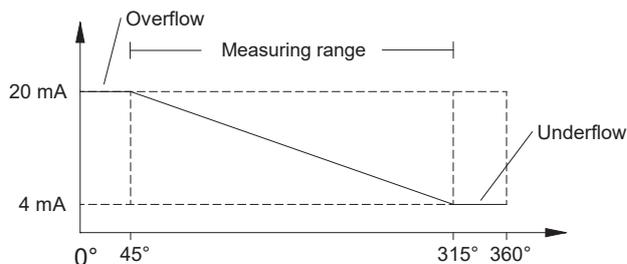
Different measuring ranges can be set for both redundant sensor units with the aid of the multifunctional pins (characteristic curve 3). These can also be set in the factory on request.

Characteristic curve 3: example of different measuring ranges (output B*)

First sensor: measuring range 270°, ascending



Second sensor: measuring range 270°, descending, shifted by 45°



*) See page 6

Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Setting option via multifunctional pins

Setting option via multifunctional pins

The measuring range, code direction, zero point, end value and pre-set value parameters and default value setting can be set by the user according to the circumstances at the application location. To do this, two multifunctional inputs (MFPs) are planned for each sensor unit. The input circuit for the MFPs is E1 (see next page).

Tabelle für Multifunktionseingänge (MFP)			
Function	MFP 0	MFP 1	
Set zero point	1	0	Set pin MFP 0 to logical one for the duration of 4 s.
Set end value	0	1	Set pin MFP 1 to logical one for the duration of 4 s.
Set default value	1	1	Simultaneously set pins MFP 0 and MFP 1 to logical one for the duration of 4 s. The factory settings are restored.
Code direction change	1	0	Attention: with the same shaft position hold pin MFP 0 at logical one for the duration of 4 s.
	0	1	After a pause of at least 0.5 s hold pin MFP 1 at logical one for the duration of 4 s.
Set pre-set value (middle of measuring range)	1	0	Attention: with the same shaft position hold pin MFP 0 at logical one for the duration of 4 s.
	1	0	After a pause of at least 0.5 s hold pin MFP 0 at logical one for the duration of 4 s.
Normal operation	0	0	

The analogue hand programming device model PMA-05 (see data sheet [PMA11443](#)) is planned to simplify TBA programming.

Basic setting is carried out in the factory with the default values for a measuring range of 360° with a signal path of CW, i.e. the output signal increases on rotating the shaft clockwise when looking at the free end of the shaft. The pre-set value is set to the middle of the measuring range. Other values can be implemented in the factory.

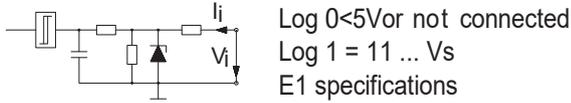
Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Input circuit, timing diagrams and output circuits

Input circuit for multifunctional pins (MFP)

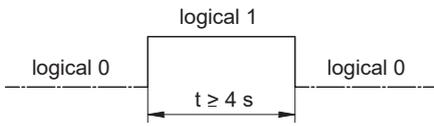
Input E1 aktive "high"



Timing diagrams for the MFP settings E1

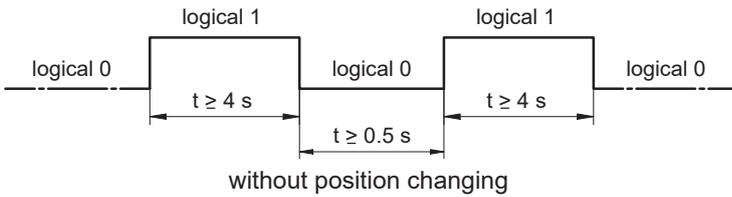
1. Set MFP 0 or MFP 1 once

Set zero point (MFP 0)
Set end value (MFP 1)



2. Set MFP 0 and/or MFP 1 twice with the same shaft position

Set pre-set value (MFP 0)
Code direction change (MFP 0 / MFP 1)



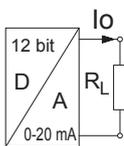
3. Set MFP 0 and MFP 1 simultaneously

Time difference between MFP 0 and MFP 1 ≤ 0.25 s.

Output circuits

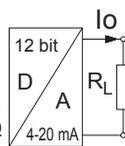
Output A

$I_o = 0 - 20 \text{ mA}$
 $R_L = 0 - 0.5 \text{ k}\Omega$



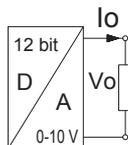
Output B

$I_o = 4 - 20 \text{ mA}$
 $R_L = 0 - 0.5 \text{ k}\Omega$



Output C

$V_o = 0 \dots 10 \text{ V}$
 $I_{o \text{ max.}} = 5 \text{ mA}$
 $R_{\text{min.}} = 2 \text{ k}\Omega$



Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Electrical connection, mating connector, pin diagrams, connection assignment

Electrical connection

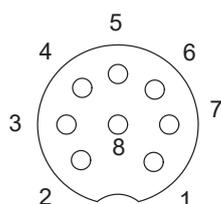
- Two round connectors M12x1, pin, 8-pin
- Refer to the tables below for the connection assignments; these are also enclosed with the devices.

Mating connectors (to be ordered separately)

Order number	STK8GS54	STK8WS86	STK8GS105
Type	M12X1	M12X1	M12X1
Number of pins	8	8	8
Contact design	Socket, A-coded	Socket, A-coded	Socket, A-coded
Connector design	Straight	Angled	Straight
Housing material	Nickel-plated brass	Nickel-plated brass	Stainless steel
Cable \varnothing (mm)	6 - 8	6 - 8	5.5 - 8.6
Connection type	Screws	Screws	Screws
Protection type	IP 67	IP 67	IP 67
Screening	On the housing	On the housing	On the housing
Max. connection cross-section (mm ²)	0.5	0.5	0.5

Please note: If angled mating connectors are used, please notify us so that the device connectors can be aligned accordingly.

Pin diagram for mating connector M12x1, 8-pin (view of insertion side)



Socket, 8-pin,
A-coded

Connection assignment

Contact No.	Assigned with
1	+V _S = 9...36 V, I _o typ. 80 mA
2	-V _S = 0 V
3	I _A = 4 ... 20 mA (4096 steps = 12-bit)
4	0V analogue reference potential
5	Multifunctional input 0 (input circuit E1)
6	Multifunctional input 1 (input circuit E1)
7/8	Not connected

Absolute single-turn rotary encoder

TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Order number

TBA	58	-	KP	A	360	W	R2	S	B	01
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01 **Electrical and mechanical variants***

Output signals:

A	0 - 20 mA
B	4 - 20 mA
C	0 - 10 VDC

Electrical connections:

S	Device connector M12
K	Cable 1 m, radial, other length on request

R2 Redundant design

Signal path:

W	CW
C	CCW

Measuring range:

360 Measuring range = 360°

Housing material:

A	Aluminium - 3.2315
S	Stainless steel - 1.4305
V	Stainless steel - 1.4404

Flange type:

58	K	Clamped flange, shaft 10 mm with flattened area
	KF	Clamped flange, shaft 10 mm with disk spring
	KP	Clamped flange, shaft 10 mm with feather key (recommended for safety applications)
	ST	Synchro flange, shaft 6 mm with flattened area
	SR	Synchro flange, clamped shaft for 12 mm (torque support, see accessories)
65	SP	Synchro flange, shaft 12 mm with feather key
66	K	Clamped flange, shaft 10 mm with flattened area

Design form:

Model:

TBA TBA redundant with analogue output

*) The basic versions (standard) according to the data sheet bear the number 01. Deviations are identified with a variant number and are documented in the factory.

Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Accessories

Accessories (to be ordered separately)

■ **Mating connectors**

STK 8GS54	Nickel-plated brass, straight
STK 8WA86	Nickel-plated brass, angled
STK 8GS105	Stainless steel, straight

■ Hand programming device for comfortable programming of the sensor

PMA-05 See data sheet [PMA11443](#)

■ Fastening clamps for sensor assembly

KL 66-2-S See data sheet [MZ10111](#)

■ Play-free clamping coupling for shaft connection

KK14N With groove for feather key according to DIN 6885 sheet 1 – JS9, see data sheet [KK12301](#)

■ Torque support/stator coupling for shaft offset compensation between the rotary encoder and drive

ZMS58 Manufactured from permanently elastic plastic, see data sheet [ZMS 12939](#)

Absolute single-turn rotary encoder TBA redundant analogue

Model: TBA58-KA360WR2SBxx

Installation drawing (Dimensions in mm)

Recommended design form: clamped flange and shaft \varnothing 10 mm with feather key

Order number: **TBA58 - KPA 360 W R2 S B01**

