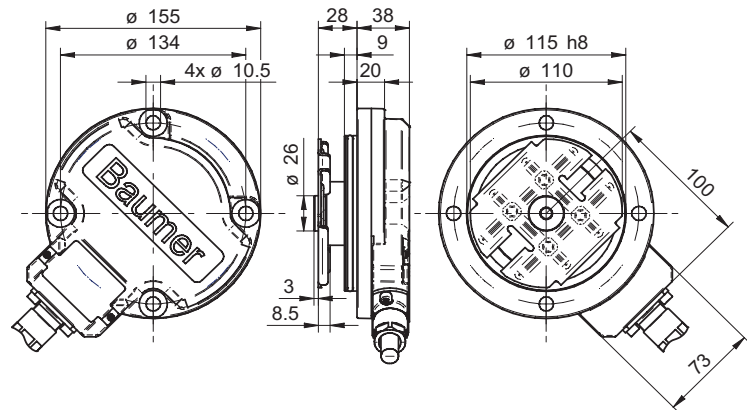


General data

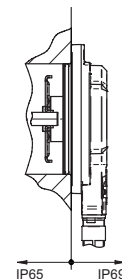
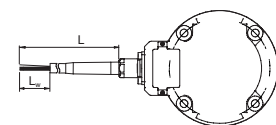
- Robust, magnetic measuring principle
- Field maintainable, exchangeable bearing package
- Excellent signal quality and resolution
- High flexibility in configuration

**Technical data - electrical ratings**

Ambient temperature	EN 50125-1, TX
EMC immunity	EN 50121-3-2
EMC emissions	EN 50121-3-2
Insulation resistance min.	100 MOhm at 500 VDC
Dielectric strength	2200 VDC (1500 VAC) altitude up to 2500 m ASL 1900 VDC (1300 VAC) altitude up to 4000 m ASL 1700 VDC (1200 VAC) altitude up to 5500 m ASL
Reverse polarity protection	Yes
Short circuit protection	Yes

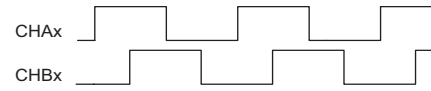
Technical data - mechanical design

Type of protection	According to EN 60529
Material (housing)	GD-AISI10Mg, RAL7021, powder-coated
Speed	≤1500 rpm
Saltmist	EN 50155
Shock and vibration	EN 61373, Cat. 3
Fire protection cable	EN 45545-2, R15/R16 HL3
Fire protection conduit	EN 45545-2, R23 HL3
Weight ca.	2.1 kg (without cable, conduit and connector)
Cable	Cable: 12 x 0.5 mm ² , Ø 12.6 mm ±0.3 mm, Cable length: L = 6.00 m +0.05 / -0.00 m Conduit: without Bending radius: min. 70 mm (fixed installation), min. 130 mm (moved)
Connector	without

Definition of the protection class**Definition of cable length**

General data

Signal diagram



Signal sequence when looking at fork coupling and clockwise shaft rotation (CW)

Terminal assignment

Color	Signal	Description
BN	+Vs1	Encoder Unit 1 power supply
GN-WH	0V1	Encoder Unit 1 power supply
GY	TempB1	Encoder Unit 1 temperature sensor
OG	TempA1	Encoder Unit 1 temperature sensor
GN	CHA1	Encoder Unit 1 incremental track A
YE	CHB1	Encoder Unit 1 incremental track B

All other wires are not connected

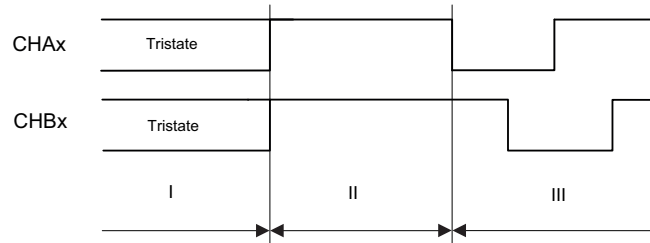
color chart

short code	WH	BN	GN	YE	GY	OG	BU	RD	BK	VT
color	white	brown	green	yellow	grey	orange	blue	red	black	violet
Farbe	weiss	braun	grün	gelb	grau	orange	blau	rot	schwarz	violett
short code	BK-WH	VT-WH	RD-WH	GN-WH						
color	black-White	violet-white	red-white	green-white						
Farbe	schwarz-weiss	violett-weiss	rot-weiss	grün-weiss						

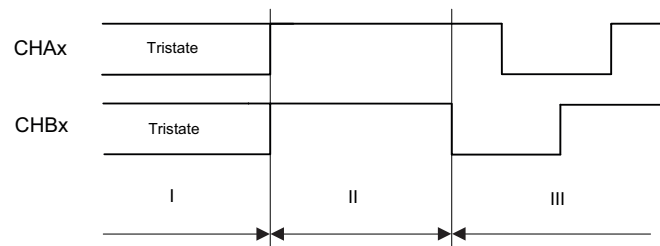
General data

Behavior at startup¹⁾

Signal sequence at startup process with subsequent movement in direction of rotation CW



Signal sequence at startup process with subsequent movement in direction of rotation CCW

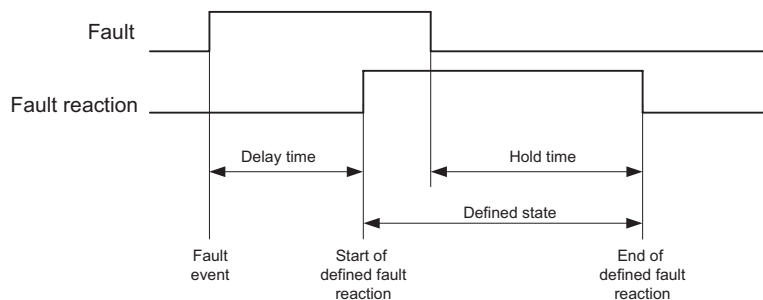


- Phases:
- I Start-up, outputs are high-impedance (duration approx. 750 ms)
 - II Until the first movement the outputs remain at HIGH level
 - III Start of movement

Behavior in fault situations¹⁾

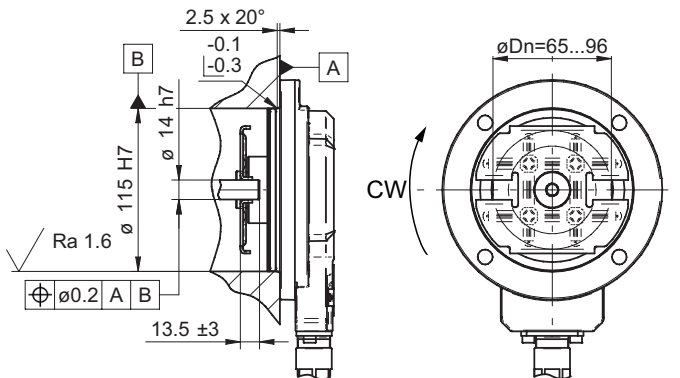
The encoder is equipped with a fault detection system for various fault situations that lead to a defined state. Fault reactions lead to a defined state change of the outputs according to the following figure.

Parameter	Description
Delay time	Time until the function is restored. Time span between the occurrence of an fault and the change to the defined state. For SIL2-certified encoders, the delay time corresponds to the TTRS (Time to return to safety).
Hold time	After the fault disappears, the described fault reaction is continued for a given hold time. After this time, the outputs behave in accordance with signal diagrams.



1) Details see specific data per encoder unit

Assembly, handling and maintenance



The axle encoder is fastened with 4 screws M10 INOX hexagon socket (ISO 4762) and washers M10 INOX (ISO 7089), screw locking with adhesive. Max. surface pressure: 110 N/mm²

A low-impedance connection of the axle encoder to the bogie frame must be ensured. This can be done via the fastening screws. The conductive surface on the sensor head in the area of the fastening screws is provided for this purpose.

The encoder must be mounted centrally. The centering collar $\varnothing 115$ on the encoder housing is used for this purpose. An eccentric mounting will result in a periodic error of the speed signal. The design of the mechanical interface on the wheel axle must correspond to the drawing above. In order to prevent damage to the O-ring during assembly, the design of the insertion phase for the O-ring in particular must be observed.

The rotor of the axle encoder is coupled via a fork coupling. This coupling consists of a driving plate with fork opening (part of the axle encoder) and the driving pin $\varnothing 14$. The driving pin is not included in the scope of delivery.

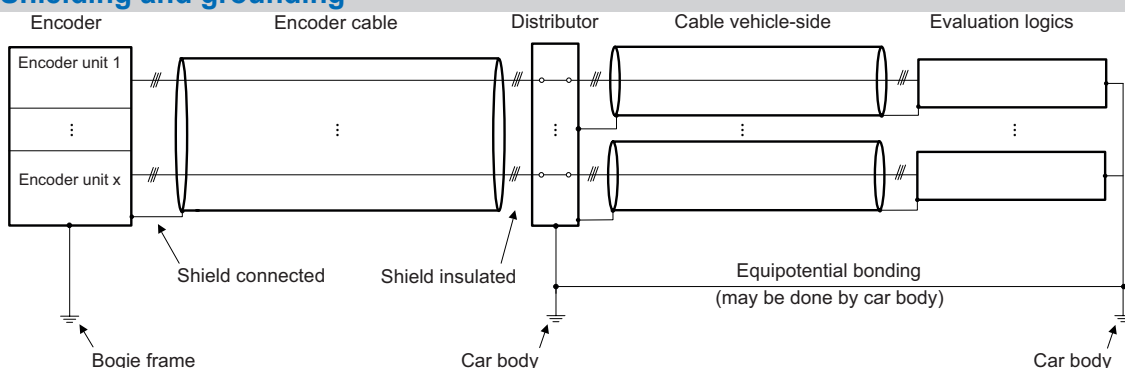
The driving pin should be mounted on the largest possible rotation circle $\varnothing D_n$ to minimize eccentricity errors. The driving pin must be captively inserted into the wheel axle of the vehicle. Dimensions and position must correspond to the assembly drawing above. In the case of different designs, exceeding forces can occur at the contact point between the driving pin and fork, which can lead to increased wear on the pin and encoder mechanics. It is recommended to check the condition of the customer's driving pin regularly.

To seal the mechanical interface of the axle encoder towards the mounting plate (e.g. axle cover), either a flat gasket for the flange surface or an O-ring on the centering collar can be used.

The rotary encoder has a bearing package which is subjected to operational wear. The maintenance is, according to the application parameters, to be planned in consultation with Baumer.

Apart from the bearing pack, the rotary encoder does not have any parts that require maintenance. We recommend a visual inspection as part of bogie maintenance. In addition, the verification of the seat of the mounting screws recommended as part of bogie maintenance. In the case of a defect, the complete, unopened encoder must be returned to the supplier. Manipulation on the device by the user is not allowed.

Shielding and grounding



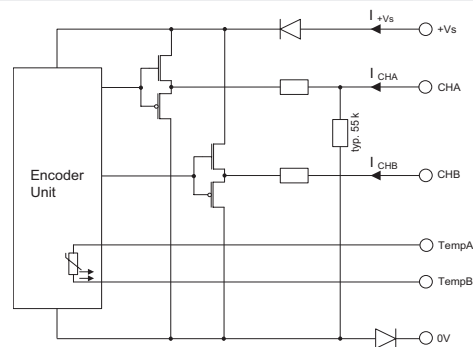
- The cable between distributor and evaluation electronics must be shielded separately for each encoder unit to prevent signal cross talk
- The lines of an encoder unit with voltage incremental signals may not be routed separately between distributor and evaluation logics
- See also safety-related application conditions

Specific data - Encoder Unit 1

Electrical ratings

Voltage supply	10.8 VDC ... 26.4 VDC
Current consumption without load typ. ²⁾	30 mA at 24 VDC 40 mA at 15 VDC 50 mA at 12 VDC
Sensor output circuits	Push-pull, load max. ± 30 mA UHIGH min. = +Vs - 2.5 V ULOW max. = 2.5 V
Output frequency max.	40 kHz
Pulses per revolution CHAx, CHBx	60 ppr
Temperature sensor	NTC 5 kOhm 5%

Block diagram



Safety-relevant key characteristics

Safety function	Speed derived from incremental signals and number of pulses, direction of rotation derived from the phase relation of the increment signals
Safety architecture	Single electronic structure based on reactive fail-safety, functional separation of safety and non-safety systems
Defined state	See sections „General data - Behavior in fault situations“ and „Behavior in fault situations - Details of fault reaction“ per encoder unit
Safety Integrity Level	not safety related
Failure rates in FIT	λ : 650 FIT
MTTR	1 h (exchange of sensor head)
Behavior at startup	See section „General data - Behavior at startup“. Afterwards, the outputs behave as specified.

2) At power up, the current consumption is higher than the given typical values. It is therefore recommended to design the power supply to min. 80 mA. After power up, load consumption must also be taken into account.

Specific data - Encoder Unit 1

Behavior in fault situations - Details fo fault reaction

Selftest at startup faulty

Behavior of outputs	CHA: TRISTATE CHB: TRISTATE
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Delay time	Not applicable
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Hold time	Fault reaction is present until the encoder is switched off
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Internal supply voltage outside the permissible range

Behavior of outputs	CHA: Pulse pattern according to signal diagrams ³⁾ CHB: Pulse pattern according to signal diagrams ³⁾
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Delay time	Not applicable
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Hold time	Not applicable
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Temperature exceeded

Behavior of outputs	CHA: Pulse pattern according to signal diagrams ³⁾ CHB: Pulse pattern according to signal diagrams ³⁾
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Delay time	Not applicable
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Hold time	Not applicable
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Rotational speed fault

Behavior of outputs	CHA: Pulse pattern according to signal diagrams ³⁾ CHB: Pulse pattern according to signal diagrams ³⁾
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Delay time	Not applicable
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Hold time	Not applicable
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Overload of the output driver caused e.g. by longer-lasting short-circuiting of the output signals

Behavior of outputs	CHA: TRISTATE CHB: TRISTATE
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Delay time	Not applicable
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Hold time	Not applicable
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3) Due to effects of the error, the speed signal may be incorrect.

Additional remarks

General

If not specified differently in the drawings, given dimensions are in mm and general tolerances according to ISO 2768 (tolerance class m) are valid.

For the standards applied and relevant to conformity, including date of issue, refer to the declaration of conformity.

Application conditions

- The recognition and handling of a cable break condition is in the responsibility of the user.
- The user is responsible for the evaluation of the function control signals (if configured) and the necessary measures on vehicle level.
- The prescribed shielding and grounding concept must be kept. Potential equalisation can be achieved with a separate potential equalisation line or over the railcar body.
- The power supply unit must ensure uninterrupted operation according to EN 50155 class S1. The permissible supply voltage range has to be kept.
- To ensure that non-safety-related encoder units do not interact with safety-related encoder units, the corresponding encoder units should be supplied separately and the supply and signal lines should be routed separately.

Scope of supply

Included is 1 axle encoder with encoder cable and 1 pc of Flat gasket 154.0/115.5*1.0 and 1 pc of O-Ring 106.0*3.0

Accessories and spare parts

Material number	Description
11218798	Flat gasket 154.0/115.5* 1.0 (25 pcs)
11218799	O-Ring 106.0 *3.0 (100 pcs)
11219327	Bearing package complete

Table of changes

Version	Changed	Checked	Released	Change
D1.00	14.12.22/egt	-	-	Creation
V1.01	11.01.23/egt	11.01.23/mho	18.01.23/grop	Materialnumber, NTC connected