Magnetic gear wheel encoder SGM2G-A with anlog output signals

Contactless incremental encoder for measuring rotary motion

- Compatible with the measuring system for main spindle drives **SIMAG H2** from SIEMENS
- High-resolution measurement of rotational speed and rotational angle up to 60,000 1/min
- Rotational direction recognition
- Robust, not sensitive to dirt
- Temperature stability up to 110°C
- High EMC and ESD stability (up to 30kV)
- Bespoke specifications due to a flexible design principle
- I2C interface for the fine-tuning of signal parameters if required
- Automatic stabilisation of signal amplitudes (option)
- Use in drive spindles of machine tools
  Installation in drive motors

Output signals

- SIN- and COS signals with 1Vpp
- Reference signal
- Remote Sense RS_UB
- Supply voltage UB = 5V
- Reverse voltage protection
- Short-circuit proof

Principle of measurement

- Magnetic, contactless gauging of the steel gear wheels with module M = **0.32.**
- Use of magneto-resistive (GMR) sensor elements
- High degree of measurement accuracy when using e.g. type **ZR32-256/Di** or **ZR32-400/Di** measuring gear wheels

Design

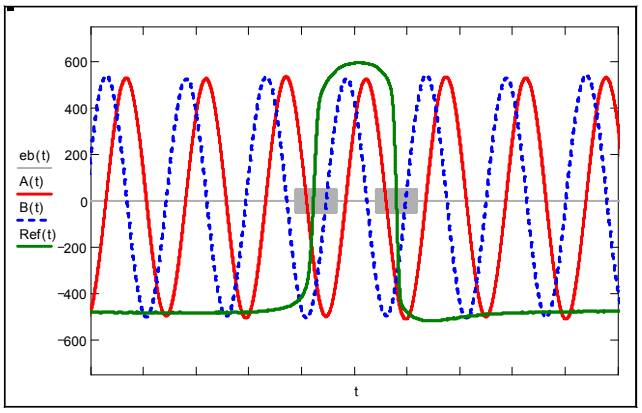
- Robust metal sensor housing
- GMR-Sensor elements
- Frontal coverage of the sensor elements using metal foil to act as extra protection against ESD impulses
- Electronics for signal conditioning
- Complete sealing of sensor interior
- Screened connection cable with AWG28
- Optional connector plug

SGM2G-A-...

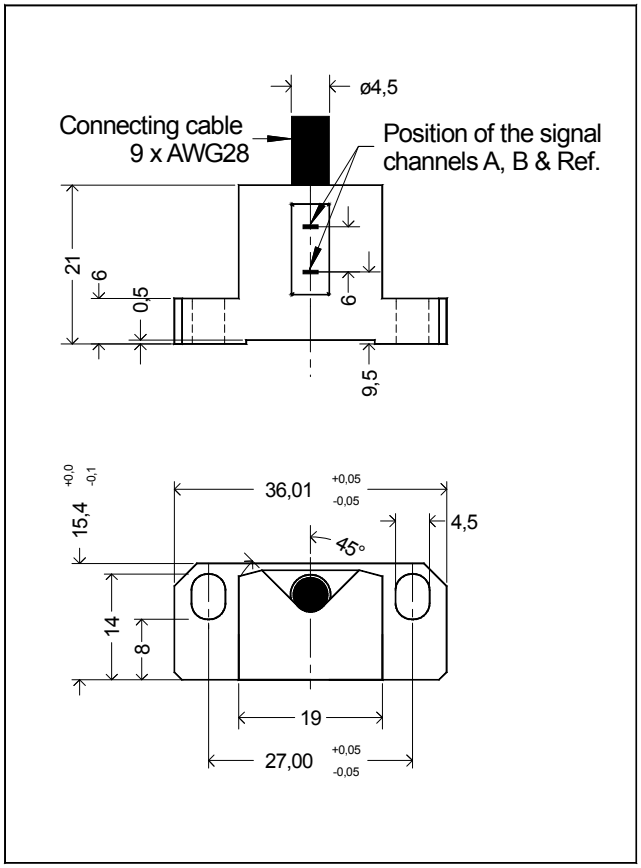
... compatible with SIMAG H2

VS Sensorik GmbH, Edisonstr. 19, D-33689 Bielefeld, Tel: 05205 / 99 88 69 0, Fax: 05205 / 99 88 69 99, www.vs-sensorik.com

Magnetic gear wheel encoder SGM2G-A
Specifications



Typical signal aspect. The signal spurs A, B and ref. are depicted. The area highlighted in grey shows the optimal position of the 0 channels for the ref. signals (area of unambiguousness).



Signal parameters

Before delivery, each encoder is balanced at the nominal distance encoder - gear wheel do = 0.15mm on optimal signal values (amplitude 1 Vpp, offset 0 mV, phase 90°, unambiguousness of the reference pulse; signal aspect type - see figure).

The signal parameters may deviate from the optimal values due to subsequent tolerances of attached parts, gear wheel quality and the influence of temperature and rotational speed.

■ Signal type	Analog, differential signals SIN (spur A), COS (spur B) Ref. pulse Inverted signals A, B & Ref.
■ Signal amplitude A & B	1Vpp +/- 20% *
■ Amplitude differential A/B	0.9 ... 1.1 *
■ Phase A to B	90° +/- 1°
■ Offset - static	+/- 20mV
■ Freq. of measurement	0 ... 200kHz

* Conditions: UB = 5VDC; f < 50 kHz; automatic stabilisation of signal amplitudes is inactive (see page 4).

General parameters

■ Supply voltage UB	5VDC +/- 5%
■ Wattage Without load	50mA
■ Operating temperature	-20 ... 85°C (up to 100°C on request)
■ Storage temperature	-30 ... 110°C
■ Optimal distance **do** encoder - gear wheel	0.15 +/- 0.02mm for **M = 0.32**
■ Vibration resistance	bis 200 m/s²
■ Shock resistance	bis 2000 m/s²
■ Type of protection	IP67

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Magnetic gear wheel encoder SGM2G-A
Assembly & Electrical connection

Assembly

The encoder is assembled using the following procedure:

1. Gauge blocks of the corresponding gauges do are located on the front side of the encoder.

2. Fix the encoder using 2 M4 screws. The screws are still not firmly tightened. The encoder should be loose.

3. Push the encoder slightly against the gear wheel. Completely tighten the screws alternately.

4. After screwing the encoder tightly, remove the gauge block (spacer) in the upward direction.

Distance encoder - gear wheel d (air gap)

The optimal distance encoder - gear wheel **do** is:

- 0.15 +/- 0.02mm for Modul **M = 0.32**

For this distance do the encoders are balanced on optimal signal parameters. If required, the signal parameters can be adjusted via the I2C signal interface (see page 4).

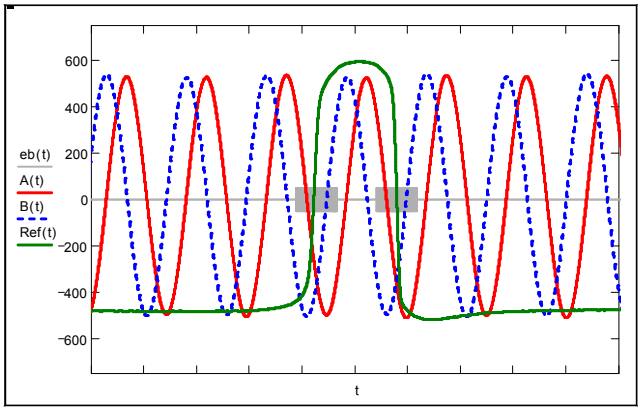
Cable assignment (Type T)

A shielded cable with 9 wires, AWG28, is attached at the sensor output. The outer sheath is green according to RAL6018, based on DESINA specifications.

The cable is assigned as follows:

■ Signal **A +**	white
■ Signal **A -**	brown
■ Signal **B +**	pink
■ Signal **B -**	black
■ Signal **Ref +**	grey
■ Signal **Ref -**	yellow
■ UB = 5VDC	red
■ GND (0V)	blue
■ RS_5V	green

The **shield** is connected to the casing on the encoder side.



Typical signal aspect during counter-clockwise rotation of the gear wheel with a view to the encoder. The signal spurs A, B and ref. are depicted. The area highlighted in grey shows the optimal position of the 0 channels of the ref. signals (area of unambiguousness).

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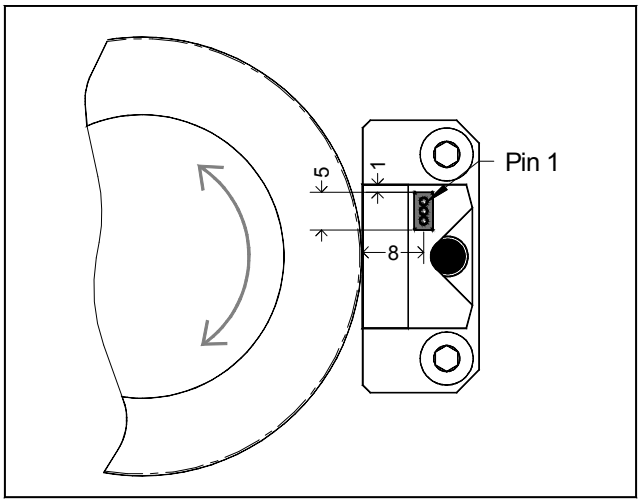
Magnetic gear wheel encoder SGM2G-A
I2C Interface



Position and configuration of the connection sockets for the I2C interface on the back of the encoder.
The connection sockets can be reached after partially removing the guard tag.

I2C-Interface

If required, the I2C interface can facilitate the fine-tuning of the parameters amplitude, offset and phase of the encoder signals A, B & Ref.

Before dispatch, the utmost care is taken to ensure that all RGM2G encoder signals are working optimally. In spite of this, a single fine-adjustment of the signal parameters might be required. There are two possibilities for that:

1. By "sensitively" adjusting the position of the encoder to the gear wheel you can set the best possible signal parameters. This method requires a lot of time and experience when installing the encoder.

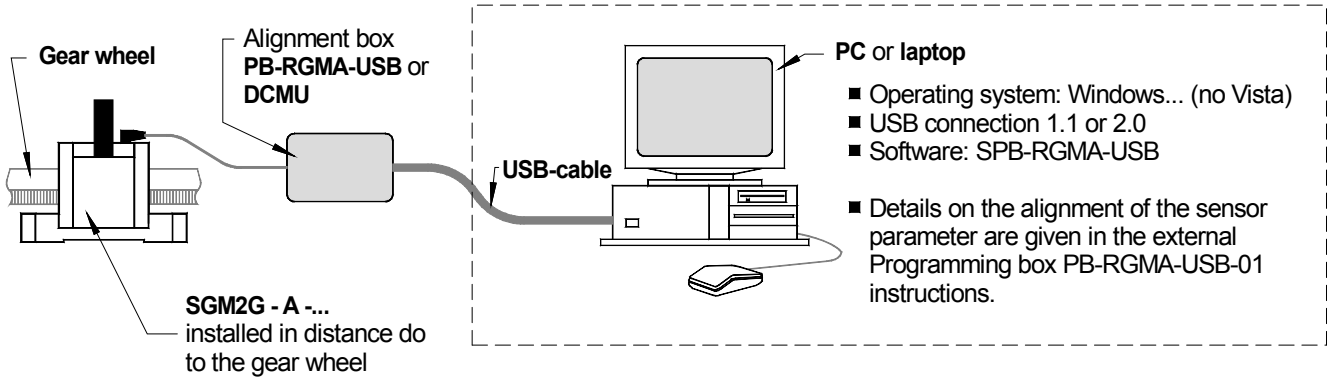
2. After installing the SGM2G encoder at the required distance do from the gear wheel, the required fine-adjustment of the encoder signals is quickly made via the I2C-interface.

Automatic amplitude stabilisation (option)

The signal electronics of the encoder enables the amplitude of signals A & B to be stabilised to a value of 1 Vpp. This helps to offset any problems the axis or gear-wheel has when rotating.

Stabilisation of the amplitude can be configured via the I2C-interface.

Fine-tuning via the I2C-interface



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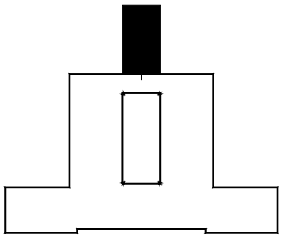
Magnetic gear wheel encoder SGM2G-A
Order identifiers - Standard version

SGM2G - A - □ 32Z - □□□ /T □□□ - □



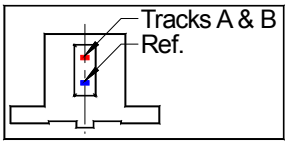
Connector plug

Cable length in cm (e.g. "050" for 50cm)

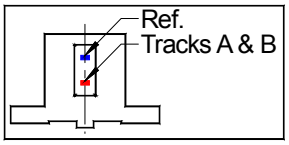
Optional: Number of teeth of the gear wheel N, if N is considerably different from 256 (e.g. "064" if N = 64)

Position of Signal tracks - "M" or "V":

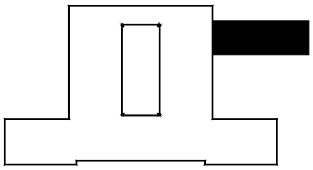
M



V



SGM2G - A - □ 32Z - □□□ /**S**T □□□ - □



Accessories

Measuring gear wheels: **ZR32-256/Di** or **ZR32-400/Di**
Other types of gear wheels on request.

External interpolation box for the digitalisation and interpolation of the analogue encoder signals

PB-RGMA-USB box with **SPB-RGMA-USB** software for the fine alignment of encoder signals via the I2C-interface

Digital calibration and measurement unit **DCMU** for the visualisation, detailed analysis and fine alignment of the encoder signals.

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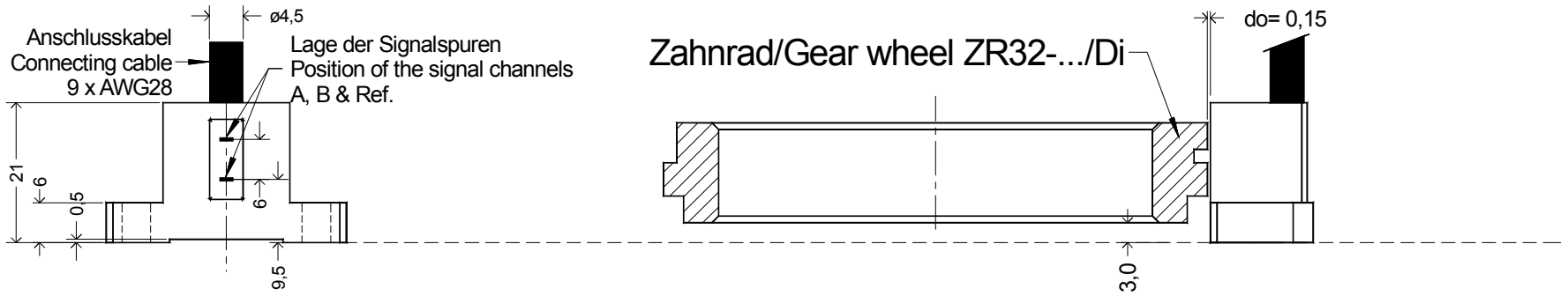
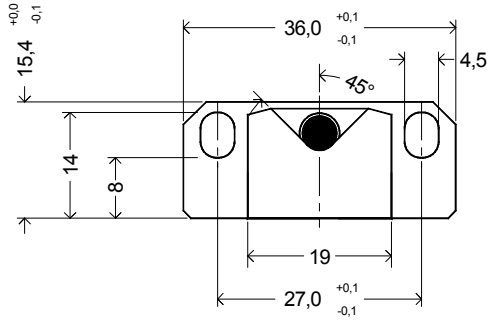
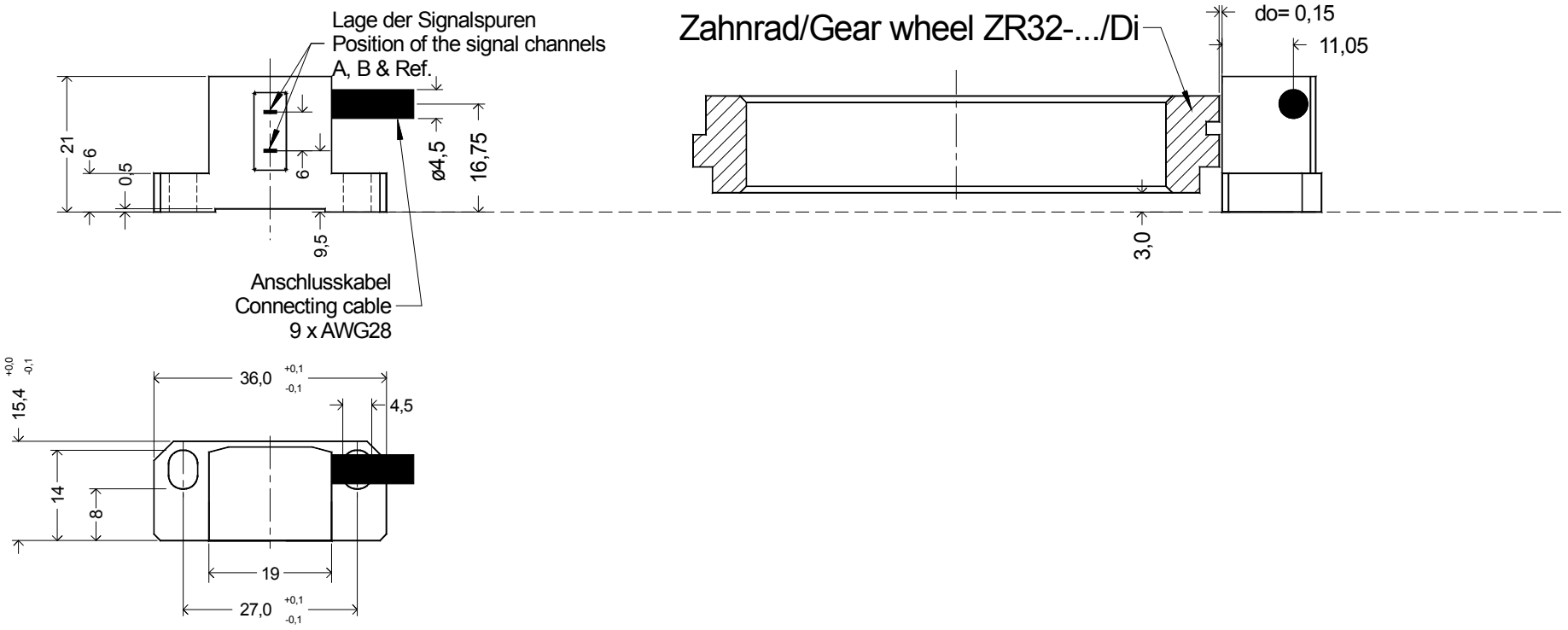
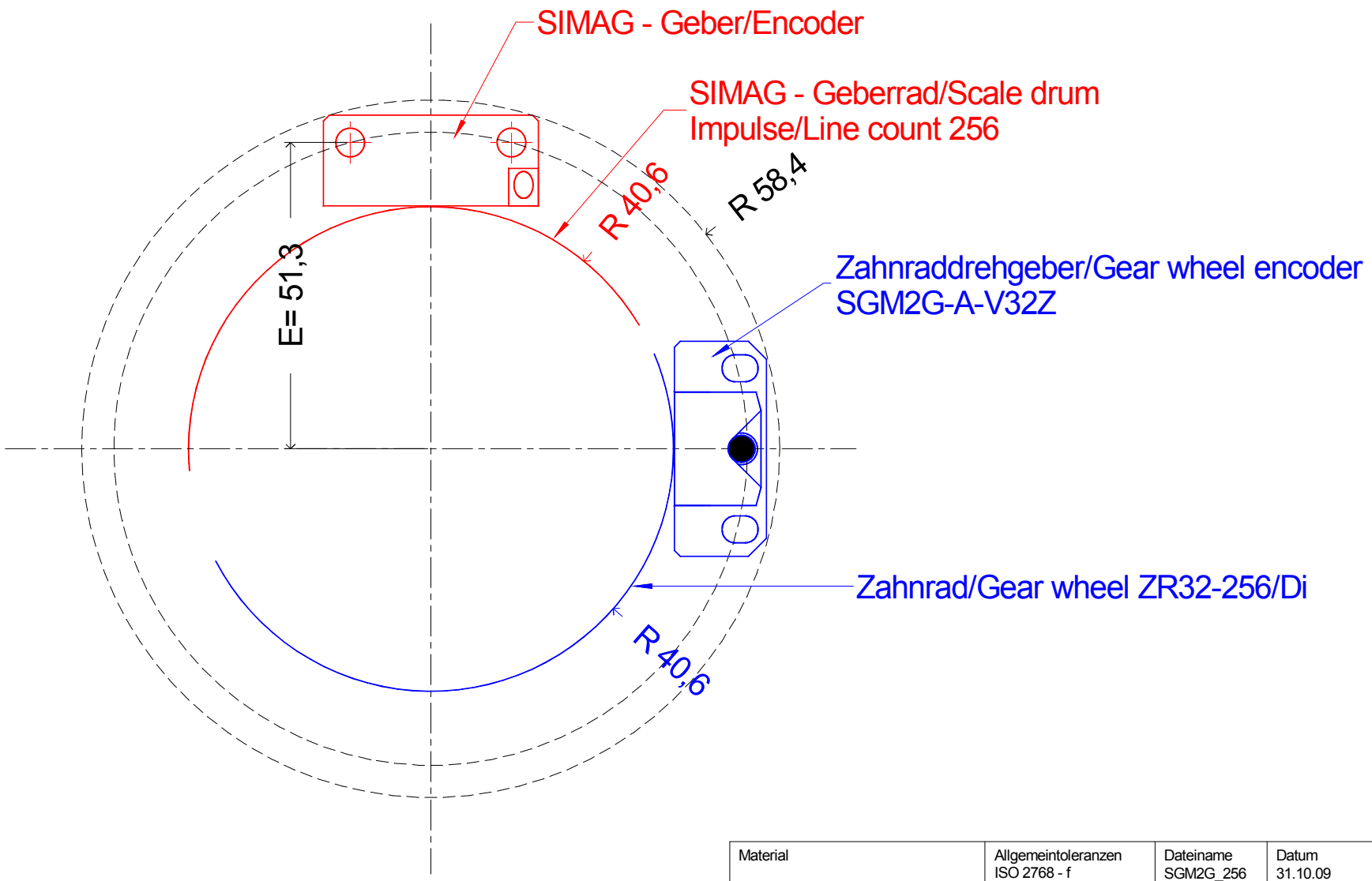




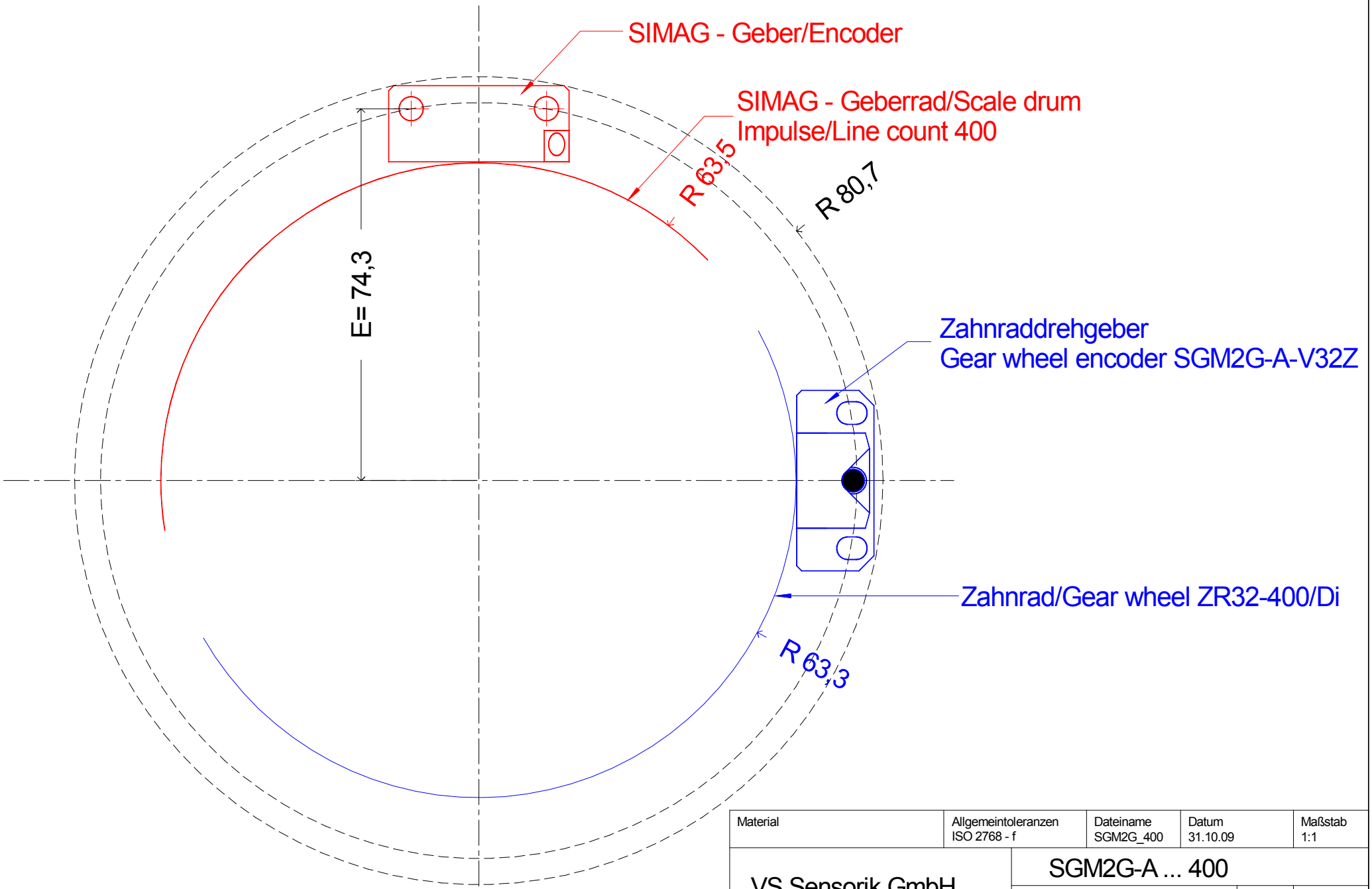
Material	Allgemeintoleranzen ISO 2768 - f	Dateiname SGM2G-V32Z	Datum 23.07.09	Maßstab 1:1
VS Sensorik GmbH	SGM2G-A-V32Z			
	09VS072303		Version 1.0	Blatt 1



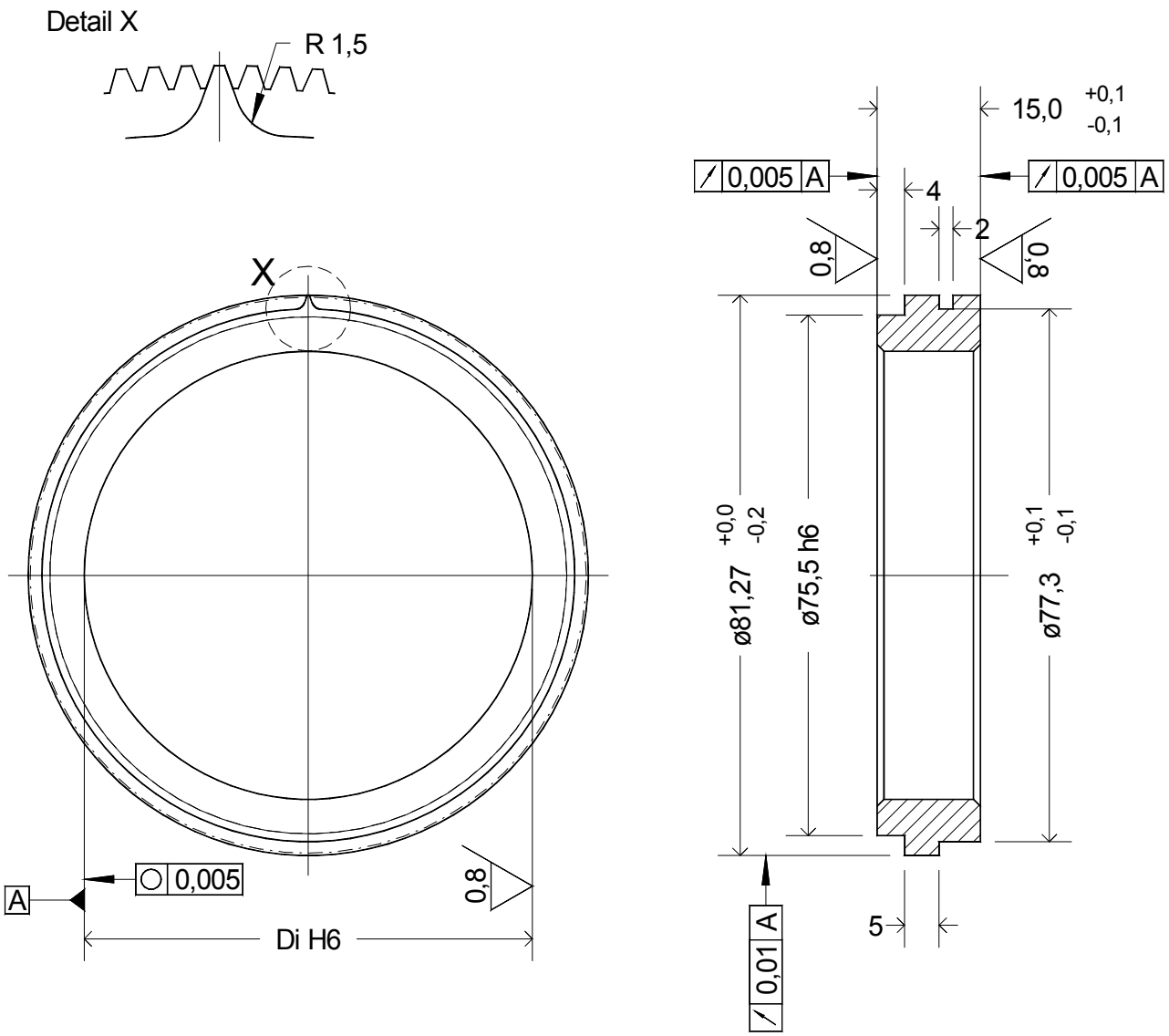
Material	Allgemeintoleranzen ISO 2768 - f	Dateiname SGM2G-V32ZS	Datum 23.07.2009	Maßstab 1:1
VS Sensorik GmbH	SGM2G-A-V32Z/S			
	09VS072302		Version 1.0	Blatt 1



Material	Allgemeintoleranzen ISO 2768 - f	Dateiname SGM2G_256	Datum 31.10.09	Maßstab 1:1
VS Sensorik GmbH	SGM2G-A ... 256			
			Version	Blatt 1



Material	Allgemeintoleranzen ISO 2768 - f	Dateiname SGM2G_400	Datum 31.10.09	Maßstab 1:1
VS Sensorik GmbH		SGM2G-A ... 400		
			Version	Blatt 1



Zahnrad Typ ZR32-256/Di
Gear Wheel Type ZR32-256/Di

Typenbezeichnung
Type Designation

ZR32 - 256/□

- **Di** (Di < 66mm)
- **Nz = 256** Zähnezahl/Number of Teeth
- **M = 0,315** Modul/Module

Stirnrad nach DIN 3960
Spur Gear according DIN 3960

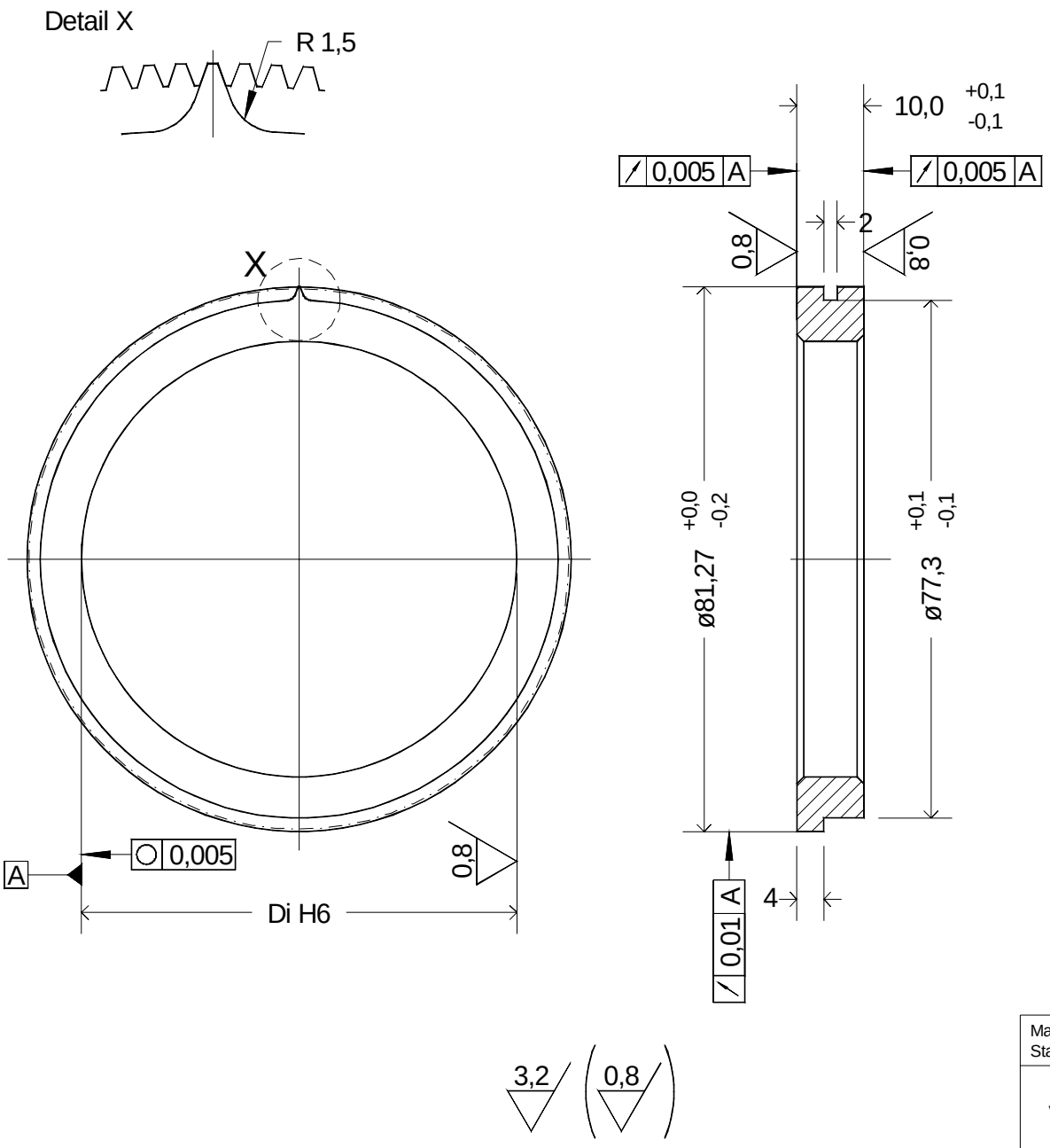
Modul / Module **M**	0,315
Zähnezahl / Number of Teeth **N**	256
Eingriffswinkel / Pressure Angle	20°
Qualität u. Toleranzfeld / Quality	6h
Material	16MNCr5, 9SMn28K oder/or CK45

Material	Allgemeintoleranzen	Dateiname	Datum	Maßstab
Stahl/Steel	ISO 2768 - f	ZR32-256	21.07.11	1:1

VS Sensorik GmbH

ZR32-256/Di

11VS072101 | Version 2 | Blatt 1



Zahnrad Typ ZRE32-256/Di
Gear Wheel Type ZRE32-256/Di

Typenbezeichnung
Type Designation

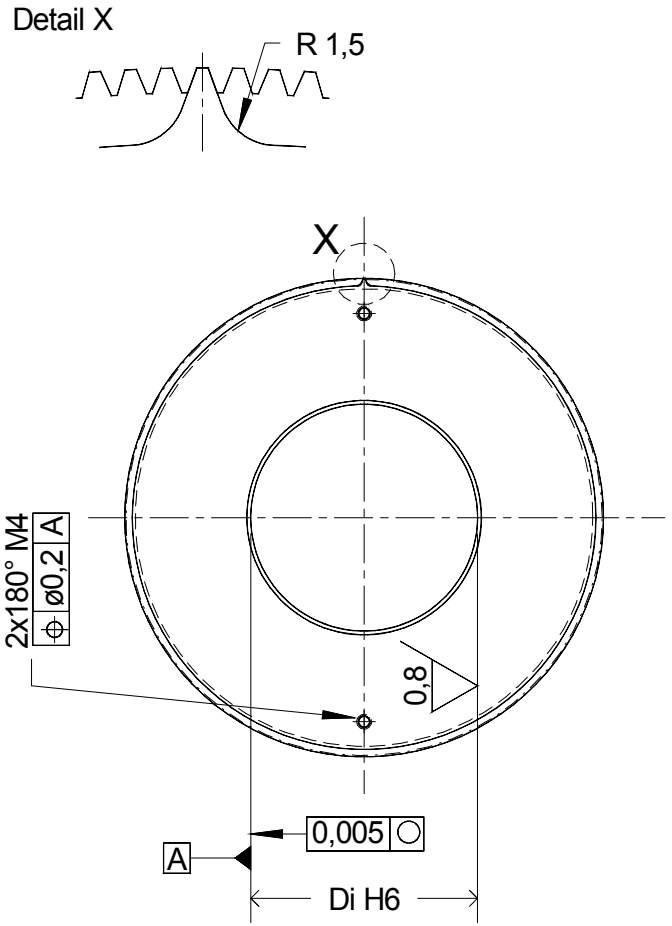
ZRE32-256/45	Di = 45mm
ZRE32-256/55	Di = 55mm
ZRE32-256/60	Di = 60mm
ZRE32-256/65	Di = 65mm

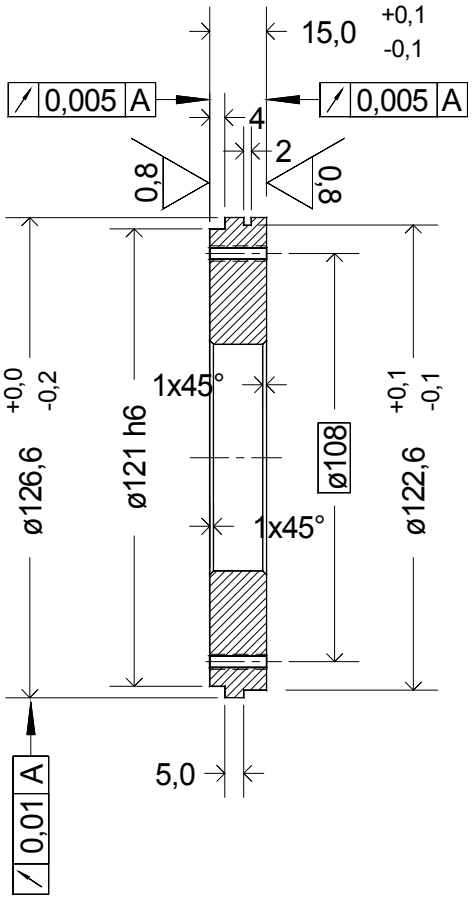
Stirnrad nach DIN 3960
Spur Gear according DIN 3960

Modul / Module **M**	0,315
Zähnezahl / Number of Teeth **N**	256
Eingriffswinkel / Pressure Angle	20°
Qualität u. Toleranzfeld / Quality	6h
Material	16MNCr5, 9SMn28K oder/or CK45

Material Stahl/Steel	Allgemeintoleranzen ISO 2768 - f	Dateiname ZRE32-256	Datum 01.02.10	Maßsta 1:1
VS Sensorik GmbH	ZRE32-256/Di			
	10VS020101		Version 1	Blatt 1

Zahnrad Typ ZR32-400/Di
Gear Wheel Type ZR32-400/Di





Typenbezeichnung
Type Designation

ZR32 - 400/□

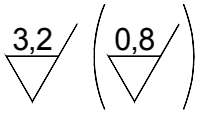
Di
(Di < 111mm)

Nz = 400
Zähnezahl/Number of Teeth

M = 0,315
Modul/Module

Stirnrad nach DIN 3960
Spur Gear according DIN 3960

Modul / Module **M**	0,315
Zähnezahl / Number of Teeth **N**	400
Eingriffswinkel / Pressure Angle	20°
Qualität u. Toleranzfeld / Quality	6h
Material	16MNCr5, 9SMn28K oder/or CK45



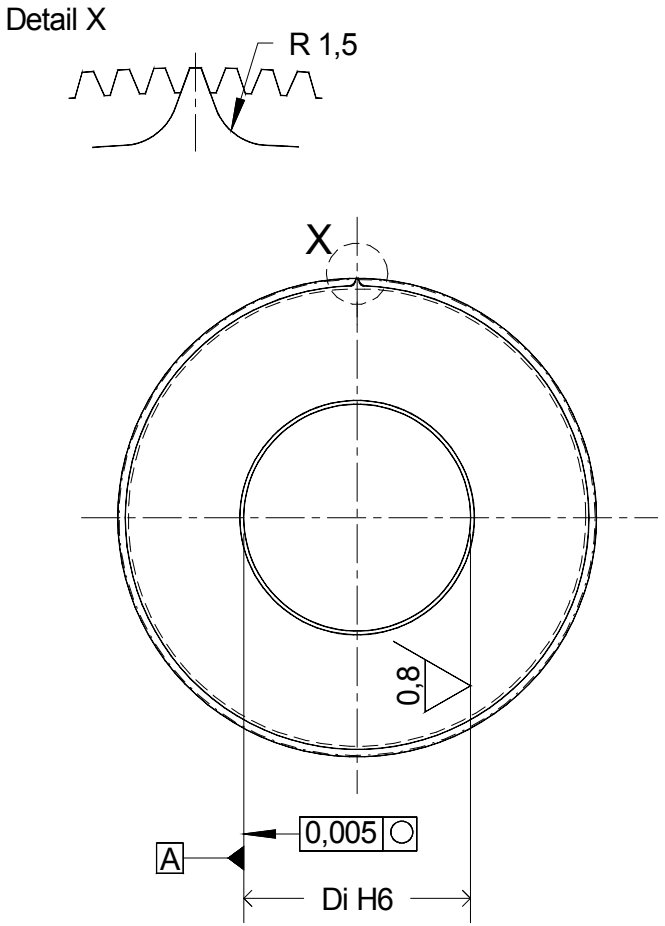
Material	Allgemeintoleranzen	Dateiname	Datum	Maßstab
Stahl/Steel	ISO 2768 - f	ZR32-400-Di	21.07.11	1:2

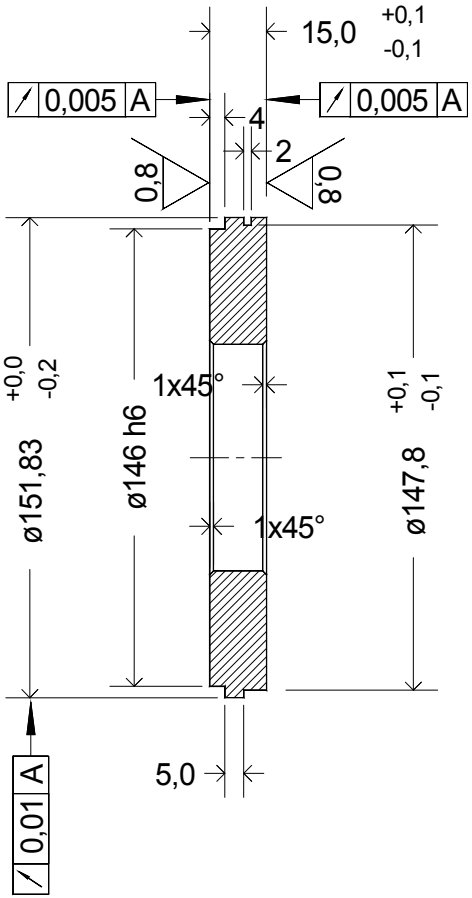
VS Sensorik GmbH

ZR32-400/Di

11VS072102	Version 2	Blatt 1

Zahnrad Typ ZR32-480/Di
Gear Wheel Type ZR32-480/Di





Typenbezeichnung
Type Designation

ZR32 - 480/□

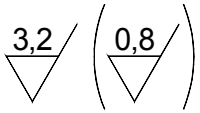
Di
(Di < 136mm)

Nz = 480
Zähnezahl/Number of Teeth

M = 0,315
Modul/Module

Stirnrad nach DIN 3960
Spur Gear according DIN 3960

Modul / Module **M**	0,315
Zähnezahl / Number of Teeth **N**	480
Eingriffswinkel / Pressure Angle	20°
Qualität u. Toleranzfeld / Quality	6h
Material	16MNCr5, 9SMn28K oder/or CK45



Material	Allgemeintoleranzen	Dateiname	Datum	Maßstab
Stahl/Steel	ISO 2768 - f	ZR32-480-Di	21.07.11	

VS Sensorik GmbH	ZR32-480/Di		
	11VS072103	Version 2	Blatt 1