

- Special design for play compensation
- For use with rotary encoders
- Standard modules 2 to 24
- Crown circle diameter up to 350 mm
- Long lasting elastic plastic
- Excellent for long time use at temperatures up to +150 °C
- Applicant specific dimensions can be realized

KEY INFORMATION OVERVIEW

DESIGN & FUNCTION

The measuring gear ZRS allows the play free measurement of gear or rack positions with a rotary encoder. The long lasting elastic plastic and the form of the teeth ensure that at least one flank of the measuring gear fits to the application gear. Thereby false measuring values are avoided when the rotating direction is reversed. The teeth shape is derived from the involute gear profile and the standard version is delivered without profile shifting.

The design of the shaft mount (12 mm, flattened to 11 mm) ensures torsion-free mounting. By using TWK encoders with the special shaft design for gear wheels, captive mounting on the encoder is possible. Fastening material for attaching the ZRS to TWK encoders is supplied. Special, customer-specific shaft designs are available on request.

The size of the ZRS is limited to a crown circle diameter d_a of 350 mm. Hence, the number of teeth z is also limited depending on the module m . These values are related by the following formula $d_a = (z+2) * m$ (valid for gears or racks without phase shift and / or tip alteration).

The measuring gear is designed for the use e.g. in cranes, wind turbines and mobile machines.

FEATURES OF ASSOCIATED TWK ROTARY ENCODERS

The ZRS is generally used in combination with robust encoders e.g. from the T-series with analog or digital interface, such as CANopen / CANopen Safety, PROFINET / PROFIsafe, EtherCAT / FSoE and many others.

On request, a special slewing ring software developed by TWK is available for TWK multiturn encoders, which reliably converts the position of the sensor shaft position to the position of the used slewing ring by using the transmission ratio i .

This also applies if the shaft is turned as far as required in one direction and the measuring range is therefore traversed completely and several times.

Even when switched off, the encoder shaft may be turned by at least 1024 revolutions. The position is output correctly after switching on again.

TECHNICAL DATA

MECHANICAL DATA

Material	plastic
Colour	red-brown
Temperature range	- 40 °C to + 150 °C
Tensile strength	~110 N/mm ²
Load cycle	2x10 ⁶ at 50 rpm
Thickness	10 mm (for small modules the thickness is reduced for production reasons)
Pressure angle	20°
Shaft adaption	∅ 12 mm with flat to 11 mm, other diameters on request (6, 8, 10 mm)

REQUIRED PARAMETERS FOR CUSTOMER-SPECIFIC VERSIONS

PARAMETERS

Customer-specific measuring gears can be made on request. The profile of the ZRS is derived from the involute gear profile but it is not always exactly an involute gear profile. Therefore a 3D-file of the customer gear or rack is needed to construct a proper ZRS. Also the following parameters of the slewing ring and / or ZRS are needed:

External tooth	yes/no
Internal tooth	yes/no
Number of teeth	Z
Transmission ratio	i
Module	m [mm]
Normal pressure angle on the reference circle	αt [°]
Facewidth	b [mm]
Reference diameter	d [mm]
Crown circle diameter	d _a [mm]
Root diameter	d _f [mm]
Profile shift (x * m)	[mm] - signed
Tip alteration (k * m)	[mm] - signed
Center distance	[mm]

ORDER CODE FORMAT

ZRS	- 12	- 10	- A01	STANDARD VERSION
ZRS	Play-compensating measuring gear			
12	Module	2 ... 24	Module of the measuring gear	
10	Number of teeth	Possible values depend on the module	Number of teeth of the measuring gear	
A01	Mechanical variants*	A01	Standard	

* The basic versions according to the data sheet bear the number 01. Deviations are marked with a variant number and documented at TWK.

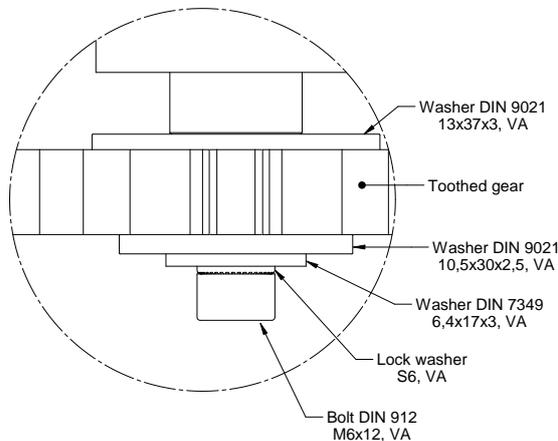
ACCESSORY AND ASSEMBLY

SCOPE OF DELIVERY ZRS

For standards of the ZRS the accessory is adapted for encoders with the special shaft and flange for measuring gears (e.g. „KZ“ for encoders of the T-series).

Measuring gear ZRS	
Washer DIN 9021-A2-13	1 pc
Washer DIN 9021-A2-10.5	1 pc
Washer DIN 7349-A2-6.4	1 pc
Lock washer A2 S6	1 pc
Screw A2 DIN 912 - M6x12	1 pc

ASSEMBLY INSTRUCTION



DOCUMENTATION

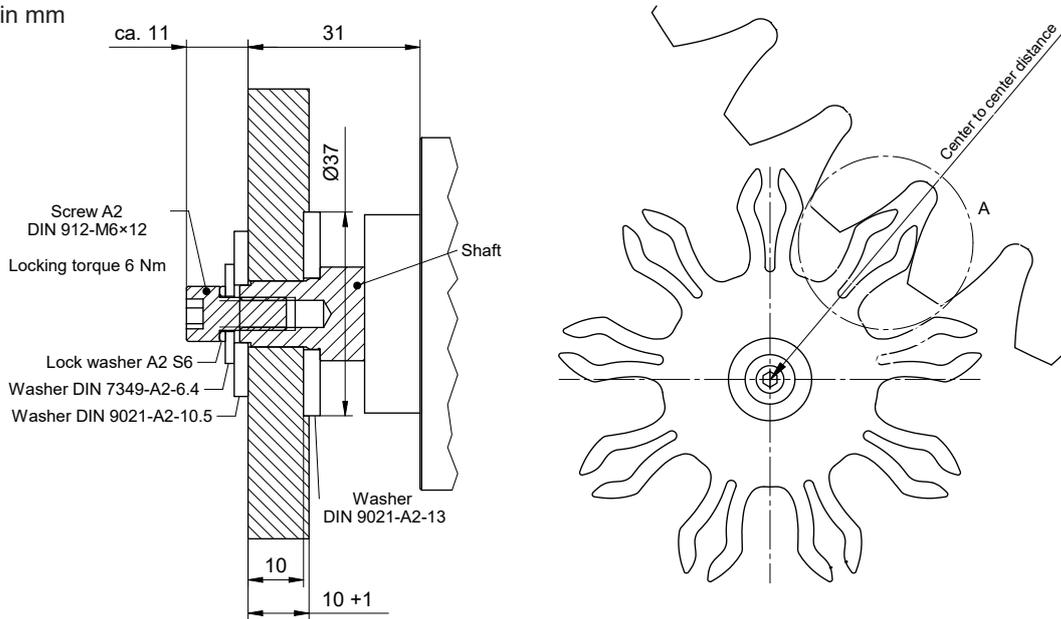
DOCUMENTATION

The following documents can be found in the Internet under www.twk.de/en in the documentation area, model ZRS.

Data sheet	ZRS11877
CE Declaration of Conformity	ZE12467
UKCA Declaration of Conformity	ZE16569
Reach compliant	QS15286
RoHS compliant	QS13284

INSTALLATION DRAWINGS

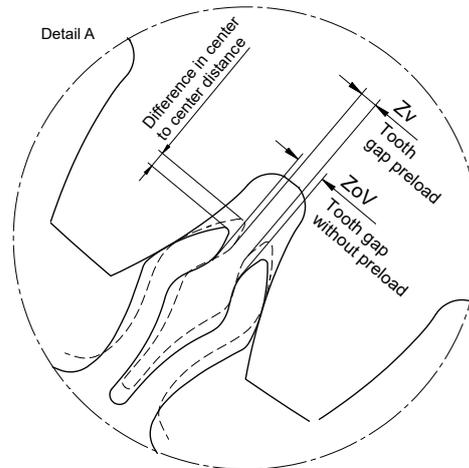
Dimensions in mm



ASSEMBLY

1. Mounting of the measuring gear in the application (it is important that the planes resp. the rotation axes of the two gears are parallel).
2. Implementation of the measuring gear ZRS in the drive gear until tooth flanks touch each other (ZoV).
3. Further insertion of the measuring gear ZRS until the tooth gap preload (Zv) is reached.

The measuring gear is now adjusted and ready for use.



Module m [mm]	Tooth gap without preload ZoV [mm]	Tooth gap with preload Zv [mm]	Difference in center to center distance [mm]
5	2.14	1.1	1.4
7	3.00	1.5	2.0
8	3.40	1.7	2.3
10	4.29	2.1	2.9
12	5.14	2.6	3.4
14	6.00	3.0	4.0
16	6.86	3.4	4.6
18	7.72	3.9	5.1
20	8.75	4.3	5.7
22	9.43	4.7	6.3
24	10.29	5.1	6.9