

# INSTRUCTION MANUAL

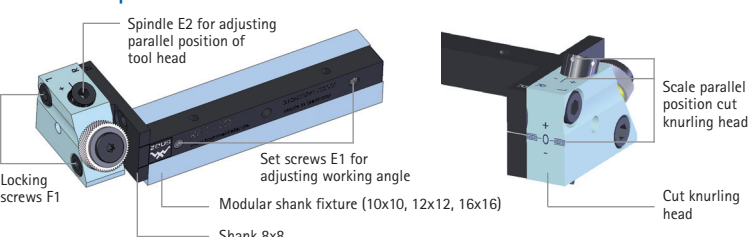
## zeus RF1-LD Series / Knurling Tool 231-A



### 1. Assembly of knurling wheels – Knurling profile on knurling wheel (DIN 403)

Tool Series	Tool direction	Knurling profile on work piece (DIN 82)		
		RAA	RBR 30°	RBL 30°
231-xx right-hand turning machines	axial	BR30°	AA	AA
231-xx left-hand turning machines		BL30°	AA	AA

### 2. Tool Description



### 3. Work piece preparation

Chamfer work piece (in an angle 30-45° and with a minimum depth that corresponds to the tooth depth of the knurling wheels) on the beginning of the work piece or after a groove. Concentricity: +/- 0,05 mm

### 4. Adjust centre height

a) Centre height is upper shank side

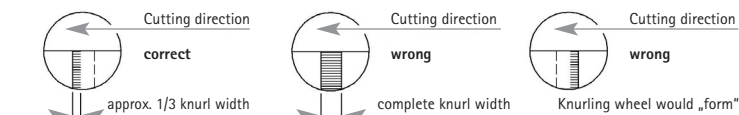
### 5. Tool clamping

Clamp tool 90° against work piece. A working angle of 0,8° is integrated into the tool holder.

### 6. Adjustment of the clearance angle

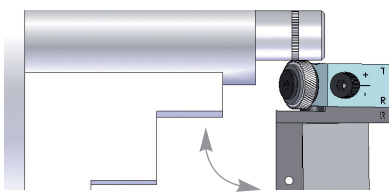
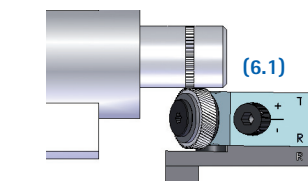
6.1 Touch knurling wheel carefully on the work piece.

6.2 In order to check the correct working angle, check the knurl impression on the work piece. With a correct working angle, the knurl impression is 1/3 of the knurl width.



### 7. Correction of working angle

Adjust angle between tool and work piece by means of the set screws E1, so that the knurl impression on the work piece equals approx. 1/3 of the knurling wheels' width.



### 8. Zero position of the tool

Approach the work piece in x-direction = zero position of the work piece on x-axis.

Note: Keep to the correct order of 9,10 and 11!

### 9. Starting position of the knurling wheel

Move the tool with its cutting edge to the following position:  
Z - direction: approx. 0,5-1,0 mm after chamfer  
X - direction: X+0,3 mm

### 10. Setting profile depth in X-direction

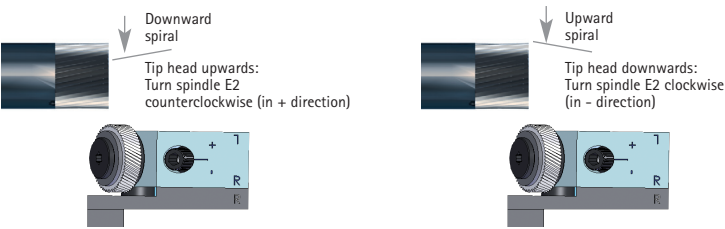
Profile depth = tooth depth +0,1mm +/-0,05 mm. After achieving the profile depth, dwell time should be approx. 0,5 - 1 seconds

### 11. Feeding in Z-direction

Start feeding in Z-direction with appropriate feed and speed rates. Ensure sufficient supply of coolant and lubrication.

### 12. Correct parallelity to the axis / parallelity of the cut knurling head

12.1 If the profile shows a spiral, correct the position of the cut knurling head. Loosen locking screws F1 and turn the tool head with spindle E2 into the required position.

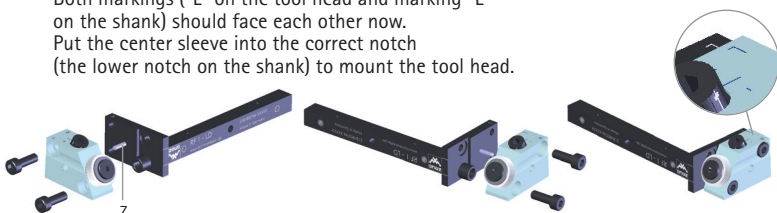


12.2 Tighten both locking screws (F1) and check parallelity of the new knurling profile. Repeat process if necessary.

12.3 For reproducible processes: Documentation of setting parameters by means of scale possible.

### 13. Change from right-hand to left-hand version

13.1 Take out locking screws F1 completely.  
13.2 Pull out tool head, turn it (180°). Turn shank (180°): Both markings ("L" on the tool head and marking "L" on the shank) should face each other now. Put the center sleeve into the correct notch (the lower notch on the shank) to mount the tool head.



13.3 Turn in both locking screws (F1) and tighten.

Important: Exchange knurling wheel. For a left-hand use, a knurling wheel BL30° is required!

### 14. Recommendation:

Exchange knurling wheel unit regularly (at the latest after the third knurling wheel).

### Trouble Shooting:

Problem:	Cause:	Solution:
Knurling profile RAA is not parallel to axis, profile is spiraled.	Cut knurling head is not set parallel to the axis.	Turn cut knurling head as explained in (12.1)
Undefined knurling profile.	Wrong knurling wheel assembled.	Assemble correct knurling wheel (see 1.)
Material displacement on knurl end. Profile appears „squeezed“.	Working angle not adjusted correctly. Tool presses on the work piece.	Correct working angle (see 6.1 - 6.2).
Profile is not fully formed.	x-feeding too small.	Set profile depth according to (10.)
Uneven profile sharpness.	Work piece does not run smoothly.	Turn work piece diameter to achieve concentricity (see 3.)
The profile at the beginning of the knurl is not clean.	No chamfer/ chamfer is too small.	Correct according to (3.) Preparation of the work piece.
Profile has an irregular structure.	Knurling wheels do not run smoothly.	Clean and lubricate knurling wheels and assemble again.
Uneven profile, shows scratches, little mountains and broken tips.	Chips are rolled into profile.	Ensure a sufficient supply of lubrication / coolant. If possible with high pressure.
Radius in the tooth ground.	Centre height not correct.	Adjust centre height (see 4.)
Flat knurling profile.	Worn knurling wheels.	Check knurling wheels' profile and replace if necessary.

Further application support (feed and speed rates, material displacement table, spare part drawings, etc.) are available from our catalogue or from the zeus Online Support. Please go to [www.zeus-tooling.de/support](http://www.zeus-tooling.de/support) for registration.

