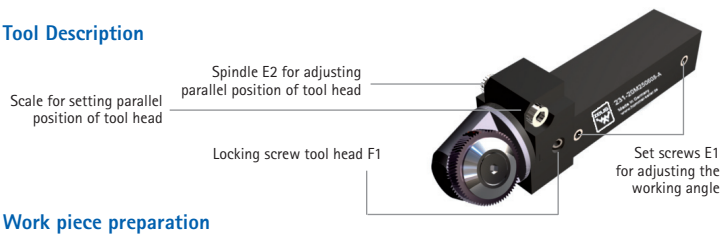
INSTRUCTION MANUAL

zeus RF 1-A Series / Cut Knurling Tools 231-A

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

Version	Tool direction	Knurling profile on work piece (DIN 82)		
		RAA	RBR 30°	RBL 30°
231-xx Right-hand turning	axial	BR30°	AA	AA
231-xx Left-hand turning		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 wheel) on the beginning of the work piece or after a groove. Concentricity: +/- 0,05 mm.

4. Adjust centre height

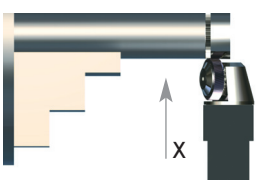
a) Conventional lathes: Centre height is upper shank side
b) CNC-lathes: Clamp into CNC- holder system
c) Sliding head machines / Multispindel lathes: Centre height is upper shank side

5. Tool clamping

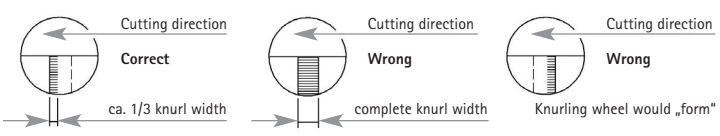
Clamp tool 90° against work piece. Usually position in clamping system.

6. Adjustment of working angle

6.1 Touch knurling wheel softly 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.

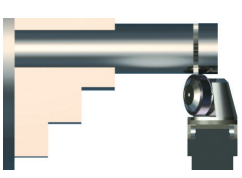


7. Correction of working angle

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

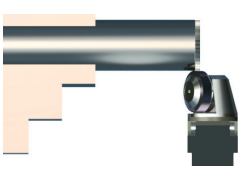
Approach the work piece in x-direction = zero position of work piece on x-axis.



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

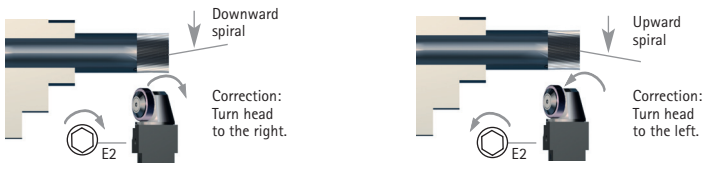
Set the profile depth by feeding in X-direction. Profile depth = tooth depth + 0,1 mm +/- 0,05 mm. After achieving the profile depth, dwell time should be approx. 0,5-1 seconds.

11. Feeding in Z-direction

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

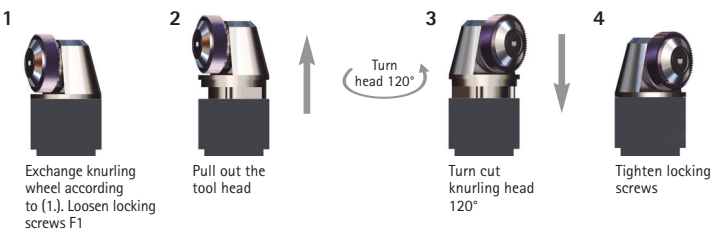
12. Correcting parallelity to the axis / parallelity of the cut knurling head

12.1 If the profile shows a spiral, correct the position of the cut knurling head. Loosen locking screws F1 and turn tool head with spindel E2 into the required direction. Clockwise: Head is tipped to the right. Anti-clockwise: Head is tipped to the left.



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

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



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.).
Undefineable 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 - 6.3).
Profile is not fully formed.	x-feeding too small.	Set profile depth according to (see 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 assemle according to (1.)
Uneven profile, shows scratches, little mountains and broken tips	Chips are rolled into profile	Ensure a sufficient supply of lubrication /coolant
Radius in the tooth ground	Centre height not correct	Check 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** for registration.

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