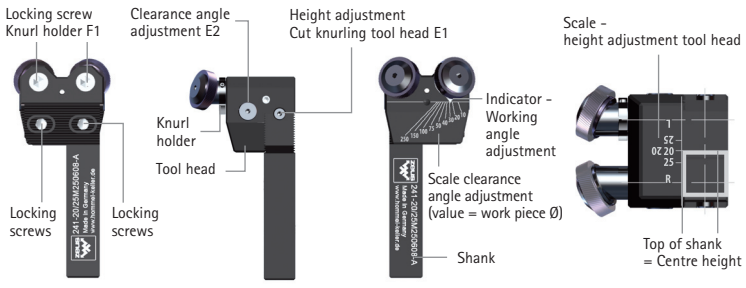
INSTRUCTION MANUAL

zeus RF 2-A Series / Knurling Tools 241-A.1

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

Tool Series	Tool direction	Knurling profile on work piece (DIN 82)	
		RGE 30°	RGE 45°
241-20/25M200806-A	axial	2xAA	BL15°/BR15°

2. Tool description - Right-hand version

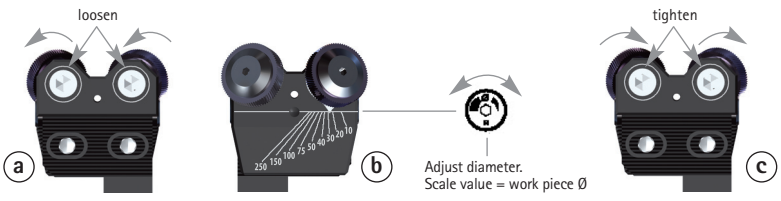


3. Work piece preparation

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

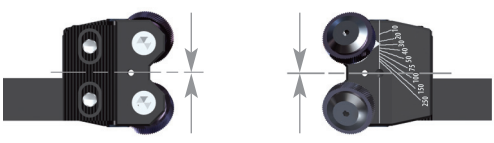
4. Angle adjustment of the knurling wheels

Loosen both locking screws (F1) of the knurl holders (a). Adjust the work piece diameter through turning the spindle (E2) (b), tighten locking screws (F1) again (c).



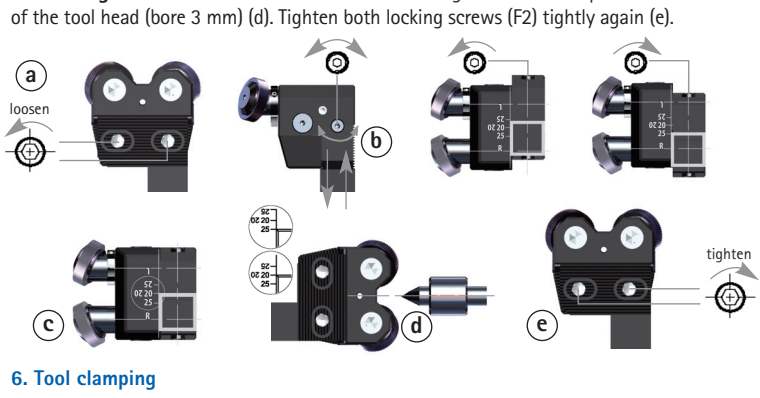
5. Adjust centre height

5.1 Generally, the centre height is integrated in the middle of the tool head (centre of 3 mm bore)



5.2 Height adjustment of tool head - Centre height adjustment

Loosen both locking screws (F2) of the cut knurling head (a). Turn spindle (E1) to check whether the height of the tool can be set (b).
Centre height for CNC-Machines: Centre height is upper shank side, nominal size 20 mm or 25 mm is even with division mark and upper shank side (c).
Centre height for conventional machines: Centre height is the center point of the tool head (bore 3 mm) (d). Tighten both locking screws (F2) tightly again (e).



6. Tool clamping

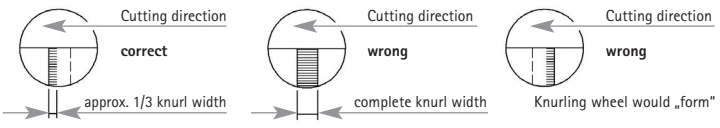
Clamp tool 90° against work piece.

7. Fine adjustment of knurling tool head (Symetry of knurling wheels)

Move knurling tool carefully against work piece. Both knurling wheels have to touch the work piece equally. If they don't, correct the height of the tool as shown in 5.2.

8. Check knurl impression / Correction of the clearance angle

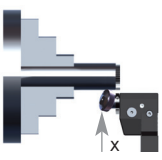
Touch work piece carefully again and check the impression of the knurl:



Adjust knurl holder (according to 4), until approx. 1/3 of the knurling wheel is impressed. If the complete knurling wheel width is impressed, the diameter has to be reduced.

9. Zero position of the tool

Approach work piece in X-direction
= zero position on the work piece on X-axis

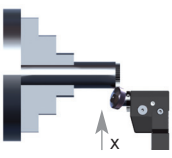


10. Starting position of the knurling wheel

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

11. Setting profile in X-direction

Set the profile by moving in X-direction. Feeding according to recommended feed and speed rate. After achieving profile depth, dwell time should be 0,5-1 second (time for knurl centering). Profile depth = Tooth depth +0,1 mm +/-0,05 mm.



12. Feeding in Z-direction

Recommended values for feed and speed rate are included in the zeus Knurling Technology Catalogue or can be downloaded from the Internet: **www.zeus-tooling.de/support**
Start feeding in Z-direction. Retract from work piece in X-direction. Check profile.
If the profile is not fully formed, repeat setting in X-direction.

Note: Please adhere to the order of step 10, 11 and 12.
Ensure sufficient supply of coolant and lubrication.

Changing from right-hand to left-hand version: see Internet.

Trouble Shooting:

Problem:	Cause:	Solution:
Undefineable knurling profile	Knurling wheels not correctly assembled	Change knurling wheels according to (1.)
Material displacement on knurl end. Profile apears "squeezed"	Working angle not adjusted correctly. Tool presses on work piece	Correct working angle adjustment (see 8.)
Profile not fully formed	x-feeding too small	Set profile depth according to (11.)
Uneven profile sharpness	Working piece does not run smoothly	Turn work piece diameter to achieve concentricity (see 3.)
Uneven profile depth	Incorrect fine adjustment of tool head, one wheel mills deeper than the other	Correct fine adjustment (see 6.)
The profile at the beginning of the knurl is not clean	No chamfer/ chamfer is too small	See step (3.) - Preparation of work piece
Profile appears with irregular structure	Knurling wheels do not run smoothly	Clean and lubricate knurling wheels, and assemble according to (1.)
Uneven profile, shows scratches, little mountains and broken tips	Chips are rolled into the profile	Ensure sufficient supply of lubrication/coolant
Knurling profile is not sharp	Worn knurling wheels	Replace with new zeus knurling wheels

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.