

## Assembly and setting instructions for PCD tools with guide pads

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## 1 About these instructions

### 1.1 Read the operating instructions

Use and handling of the tool described below do not come naturally and are explained in the respective technical documentation.

The instructions help you to use the tool as intended, properly, effectively and safely.

Thus, read the following chapters thoroughly. If necessary, keep looking up facts that are essential for your operations.

Request new operating instructions if parts have been lost or damaged.

Always keep the instructions in a safe and accessible place close to the tool for future reference.



#### **See enclosed „General safety instructions“ for essential information**

The safety instructions needed to use the tool properly can be found in the short version of the „General safety instructions“ that come with the tool.

Read and strictly observe the instructions in this document.

#### **Remaining risks**

These documents gives information and warns you of remaining risks for which the risk reduction by design and protective measures takes no or no complete effect.

### 1.2 Explanation of general icons

Icon	Explanation
	<b>Important information</b> This icon shows important extra information.
	<b>Information on machine documentation</b> This icon refers to other parts of the documentation that need to be given special or extra attention (as for example supplier's instructions etc).

Tab. 1: General icons



## 1.3 Representation of requirements and operating instructions

### 1.3.1 Requirements

If certain requirements are mandatory in order to carry out a certain action on the tool, they are indicated and represented in the text with a checkbox.

E.g. Requirement

...

The thread is coated with holder lubricant

### 1.3.2 Operating instructions in a fixed order

For many actions taken on the tool it is absolutely mandatory to carry out the working steps in a fixed order.

These steps are given operating instructions and have consecutive numbers. In addition, the operating instructions provide intermediate and final results. Intermediate results represent processes which are not run by the user and are marked by an arrowhead ▶.

Final results indicate the end of the action and are marked with a checkmark ✓.

The order of the working steps needs to be absolutely maintained and operating instructions must be observed under all conditions.

E.g. Operating instructions in fixed order

1. Switch on machine at main switch

▶ The machine control system boots

2. Start the software

▶ The software starts and the following screen appears:

✓ Machine and software are ready for use

## 2 Identification of tool

### 2.1 Tool identification

Tool name of PCD tool with guide pads

Article number / SAP no.: see chapter 3.3 Technical data/Article no. Overview

Year of construction: 2017

### 2.2 Manufacturer's data

#### Main Headquarters

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## 3 Tool description, Technical data

### 3.1 Proper use

PCD tools with guide pads are suitable for use on CNC-controlled machines or machining stations with HSK or SK tool holder. Coolant lubricant emulsions or minimal lubrication is provided to be used as cooling agent for internal cooling. The tools must be installed only on machines that are in perfect conditions.

The Gühring EV-800 adjusting unit or any equivalent unit must be used for setting.

PCD tools with guide pads are only suitable for fine machining (radial cutting depth < 1.5 mm).

### 3.2 Improper use

PCD tools with guide pads are not suitable for use on manual machine tools. No internal cooling or the use of compressed air are not permissible as the guide pads need to be lubricated.

Tools with PCD cutting edges must not be measured mechanically (e.g. by means of a calliper).

PCD tools with guide pads are not suitable for machining with radial cutting depths > 1.5 mm.

If the tool is used differently as described in chapter 3.1 „Proper use“, the tool’s function cannot be guaranteed. No liability is assumed for any damages caused to the tool, machine or work piece.

### 3.3 Technical data/Article no. Overview

Name	Article no.	Code no.
Cutting edge	6790	75,020
Clamping screw (torque 15)	6128	3,504
Clamping claw	6791	1,000
Eccentric bolt	6792	1,000
Threaded key adjustment	4007	4,503

Tab. 2: Technical data/Article no.

#### Emission values

##### Important information

The tool itself does not cause any emissions. But the machine on which the tool runs does. Therefore, it is mandatory to observe the machine operating instructions!



## 4 Basic safety instructions

### Important information in document „General safety instructions“

The safety instructions needed for using the tool properly can be found in document „General safety instructions“.

These can be viewed or downloaded via the QR code or the link in the short version of the general safety instructions that come with the tool.

If no access to the Internet is guaranteed or the General safety instructions are needed also in paper form, please do not hesitate to contact your partner at Gühring.

Gühring will of course send you the document in paper form. Read and strictly observe the instructions in document „General safety instructions“ and its short version.





## 5 Assembly and setting of tool

### 5.1 Preliminary remarks on safety



#### Important information on your safety

It lies in your responsibility!

In any case the safety instructions in document „General safety instructions“ and the local safety regulations must be observed and followed.

### 5.2 Name of single components

To ensure a clear definition and name of the single components they are named according to the following illustrations:

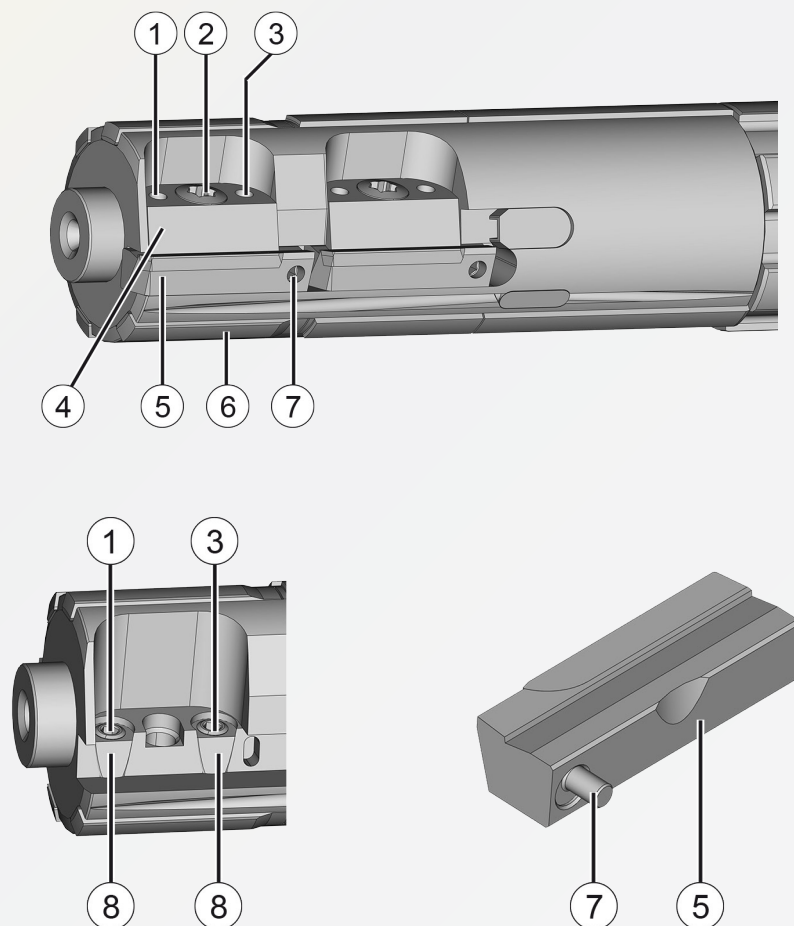


Fig. 1: PCD tool Side view

1	Upper radial adjusting screw (for diameter setting)	4	Clamping claw	7	Axial adjusting screw/ eccentric bolt
2	Clamping screw (torque 15)	5	Cutting edge	8	Threaded key adjustment
3	Lower radial adjusting screw (for tapering setting)	6	Reference line		



## 5.3 Setting a mounted cutting edge

### Requirements

- ☑ Gühring EV-800 adjusting unit (or equivalent adjusting unit)
- ☑ Dial gauge + stand
- ☑ Drawing of tool (Customer drawing)
- ☑ SW 1.5 Allen key
- ☑ Torque wrench with torque 15 socket wrench

The tool ex- works has been mounted and preset. This means the concentricity of the module Alignment adapter has been set (concentricity  $\leq 3 \mu\text{m}$ ). The cutting edge is set at the lowest position in axial direction and approx.  $40 \mu\text{m}$  below the guiding or adjusting rail in radial direction. The torque clamping screw is easily attached.

Before starting to make the setting, check the spindle of the adjusting unit by means of a test pin and a dial gauge with stand. Concentricity and angle error should be  $\leq 3 \mu\text{m}$ . If this is not the case, re-adjust the spindle of the adjusting unit.

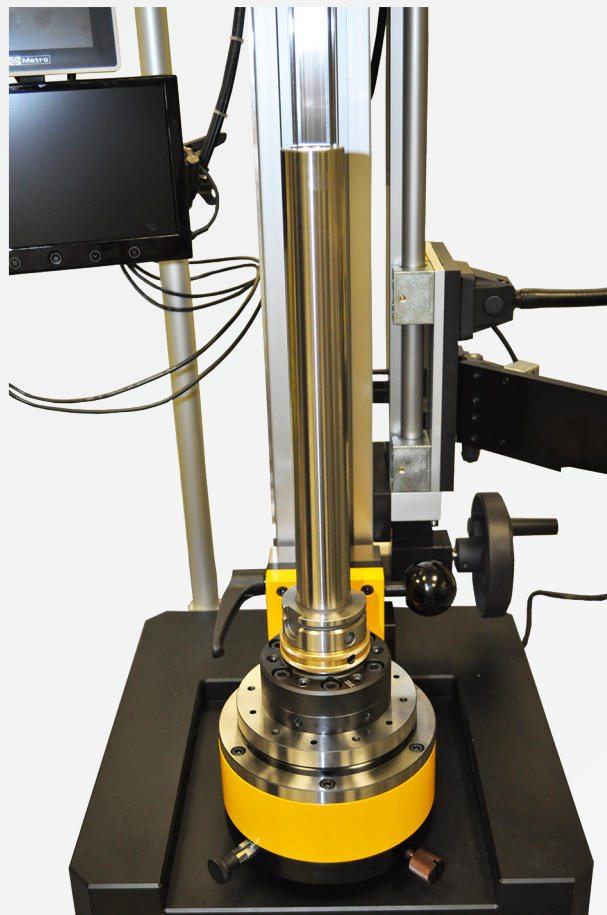


Fig. 2: Test pin mounted

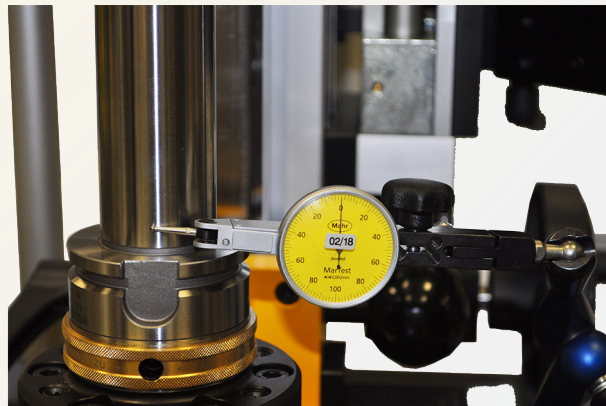


Fig. 3: Check concentricity of spindle by means of test pin and dial gauge

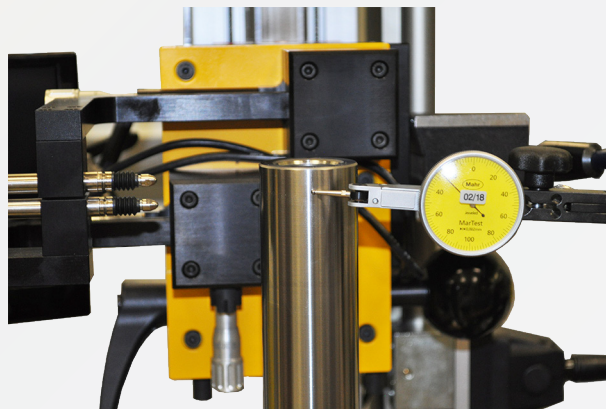


Fig. 4: Check angle error of spindle by means of test pin and dial gauge



**Important information in a different document**

The right approach can be found in document „Operating instructions for vertical adjusting unit EV-800“.





Also check concentricity of module Alignment adapter by attaching the dial gauge with stand to the collar (see arrowhead) and slowly turn tool. The concentricity should be  $\leq 3 \mu\text{m}$ . If this is not the case, re-set the concentricity of the module Alignment adapter.

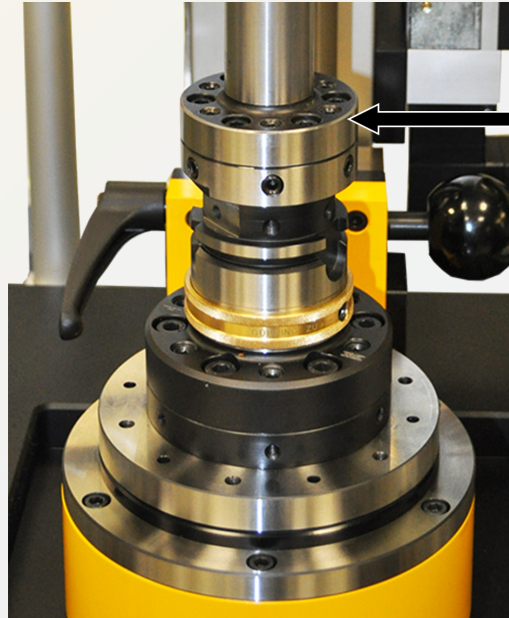


Fig. 5: Check concentricity of module alignment adapter



**Important information in a different document**

The right approach can be found in the „Assembly and setting instructions for module 6x6 and 4x4 alignment adapter“.



## 5.3.1 Checking the cutting edge pre-setting

To check the pre-setting of the cutting edge, proceed as follows:

1. Clamp the tool with the HSK holder between tips into the adjusting unit.
2. Position both measuring probes (for diameter and tapering) at a distance of 10 and 11 mm or in accordance with the drawing provided.



Fig. 6: Position measuring probe



3. Move both measuring probes towards the reference line. The reference line is the first guiding rail behind the cutting edge in rotational direction (see arrowhead figure 8). Apply the measuring probespecific pre-stressing to the reference line and then zeroset both probes.



### Important information

For the Gühring EV-800 measuring probes the specific pre-stressing is 150  $\mu\text{m}$ , as the inductive probes provide the most accurate measuring results. Due to the special geometry of the measuring probes cutting outbreaks can be prevented also at this pre-stressing force.

The pre-stressing force for PCD tools on other adjusting units should not exceed 40  $\mu\text{m}$ , as sensitive cutting edges or guiding rails could outbreak.

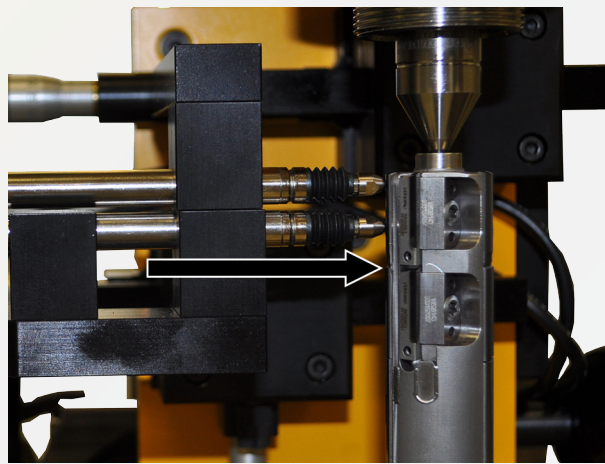


Fig. 7: Move measuring probes to reference line

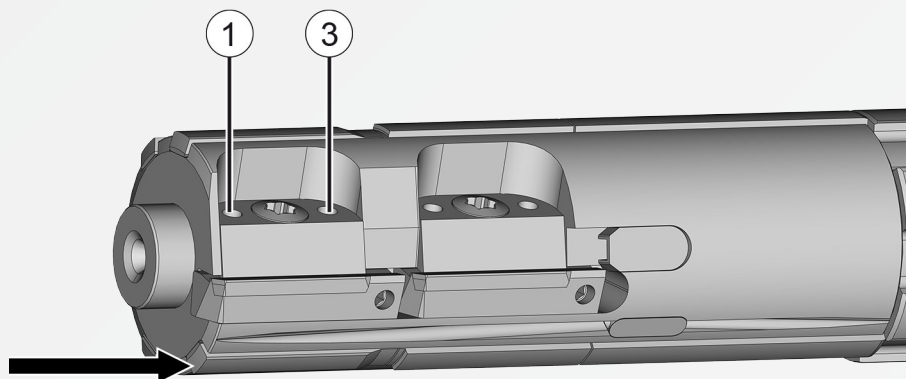


Fig. 8: Side view Reference line

4. Turn the tool against rotational direction until the highest point of the cutting edge is reached. The cutting edge should be 40  $\mu\text{m}$  below the reference line.
  - ▶ If the cutting edge is > 40  $\mu\text{m}$  below the reference line adjust the position of the cutting edge by turning the two radial adjusting screws (1 and 3). Use an SW 1.5 Allen key. If the cutting edge is < 40  $\mu\text{m}$  below the reference line, see chapter „5.5 Pre-setting of new cutting edge“.
  - ✓ Check of pre-setting completed.



## 5.3.2 Setting of axial side clearance of cutting edge

To make the setting of the axial side clearance of the cutting edge, proceed as follows:

1. Place the red cross lines on the upper end of the reference line.

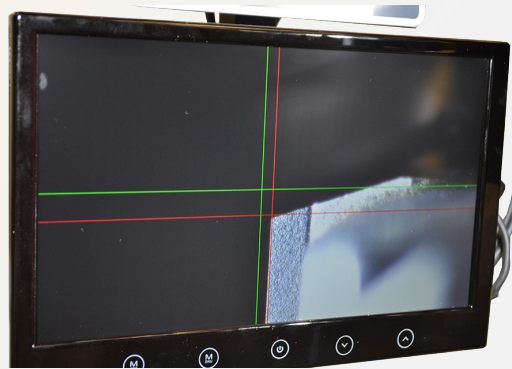


Fig. 9: Red cross lines placed on reference line

2. Calculate the radial adjustment way AW using the following formula:

$$RV = (FL - VB) / 2$$

$$GR = \text{Ø of guiding rails actual}$$

(usually engraved, if not, measure on an absolute measuring instrument)

$$PM = \text{Ø of pre-machining}$$

In this illustration the radial adjustment way is more or less like the distance between the green and the red cross line (approx. 0.1 mm).

3. Turn the tool until the cutting edge on the display appears in focus.
4. Set the cutting edge of the tool by means of the axial adjusting screw (7) to the axial final position. Use an SW 1.5 Allen key. The cutting edge should lie on the intersection of the red vertical and the green horizontal line (see figure 11). By turning the axial adjusting screw (7) to the right the cutting edge moves in upwards and then in downwards direction. The setting of the axial side clearance needs to be made in the upwards direction of the cutting edge.

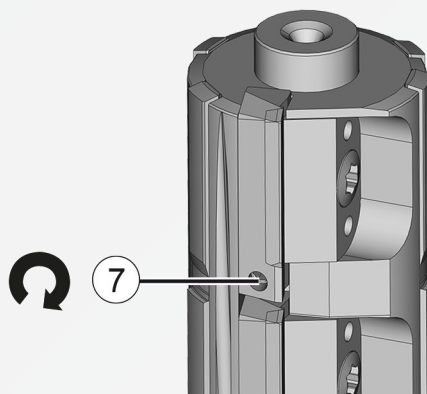


Fig. 10: : Set cutting edge of tool to axial final position



### Important information

Please make sure that the axial side clearance of the cutting edge to the guiding rail is larger than the feed per tooth. We recommend the axial side clearance of  $0.17 \pm 0.02$  mm.

The side clearance between the green and red cross lines shown in the illustration is 0.2 mm.

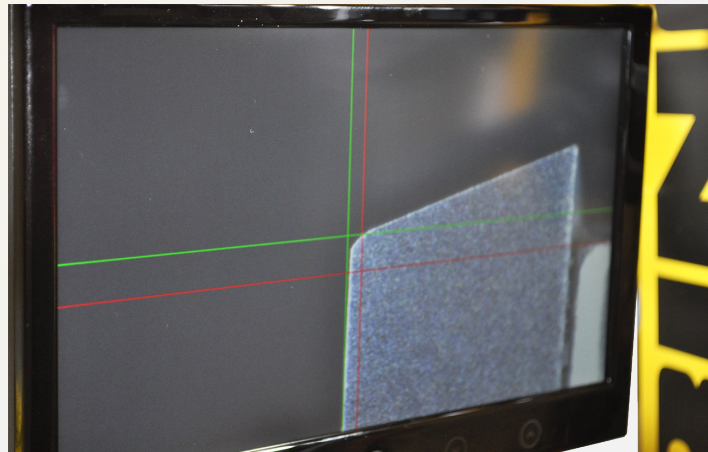


Fig. 11: Axial side clearance of cutting edge

- ✓ The setting of the axial side clearance of the cutting edge is completed.

### 5.3.3 Radial setting of cutting edge (diameter setting)

To make the radial setting of the cutting edge (diameter setting), please proceed as follows:

1. Turn the tool against rotational direction until the measuring probe touches the cutting edge. To identify the highest point of the cutting edge the tool needs to be slightly rotated.

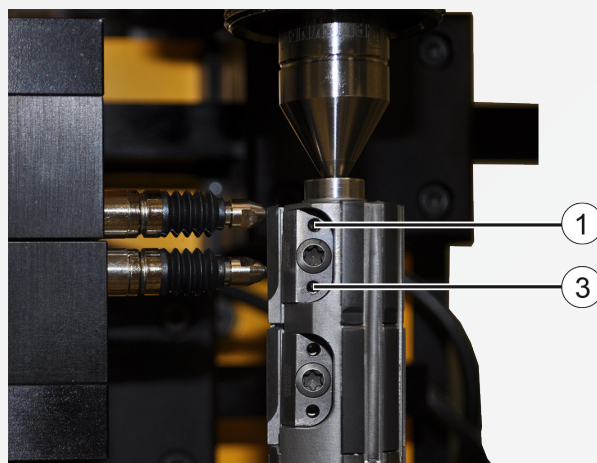


Fig. 12: Apply measuring probe to cutting edge

2. Set the cutting edge to approx.  $-30 \mu\text{m}$  (radial) by turning alternately the upper (1) and the lower radial adjusting screw (3) to the right. Use an SW 1.5 Allen key.



3. Tighten the clamping claw with the provided torque wrench of 1.8 Nm (in accordance with the customer drawing). Use a torque wrench with torque 15 socket wrench.



### Important information

The following two steps (4: Setting diameter and 5. Setting tapering) need to be made alternately and gradually (0.005-0.010 mm) until the required dimension is reached.

4. Set the required radial dimension above the guiding rail (diameter dimension) by turning the upper radial setting screw to the right. Use an SW 1.5 Allen key. We recommend to set the cutting edge in radial position  $0.004 + 0.001$  mm by means of the reference line. If the dimension set is too high, continue with chapter „5.5 Pre-setting of new cutting edge“.

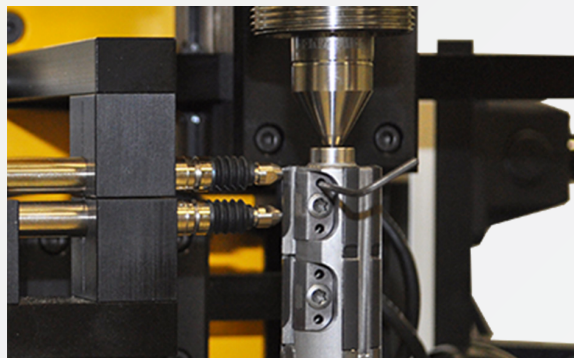


Fig. 13: Set radial dimension (dimension of diameter)

5. Turn the lower radial adjusting screw to the right to set the required tapering. We recommend a tapering of  $0.015 \pm 0.002$  mm. If the dimension set is too high, continue with chapter „5.5 Pre-setting of new cutting edge“.

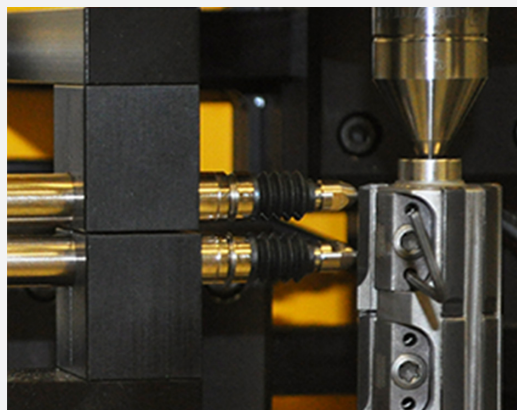


Fig. 14: Set tapering

- ✓ The radial setting of the cutting edge (diameter setting) is completed.



## 5.3.4 Inspection of axial side clearance of cutting edge

To check the axial side clearance of the cutting edge, proceed as follows:

1. Turn the tool until the reference line is in focus on the display. Place the red cross lines again on the upper end of the reference line, if required.

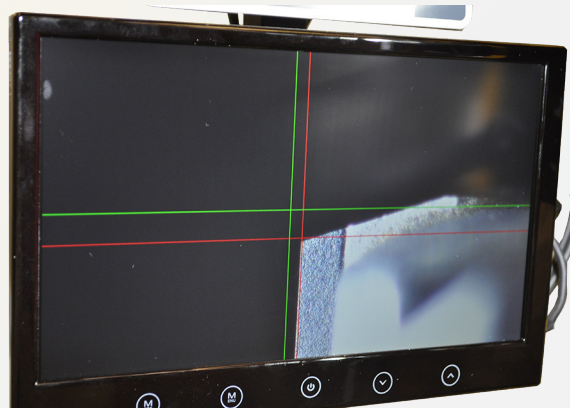


Fig. 15: Place red cross lines on reference line

2. Turn the tool until the cutting edge on the display appears in focus.
3. Check if the cutting edge is placed in required final axial position. The cutting side should be on the intersection of the red vertical line and the green horizontal line (see figure 16).

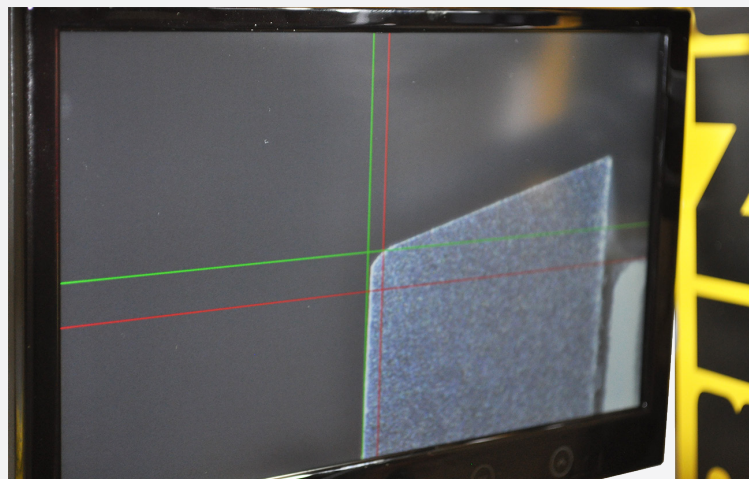


Fig. 16: Check final axial position of cutting edge

- ▶ If the axial side clearance of the cutting edge has changed, go to chapter „5.6 Pre-setting of new cutting edge“.
- ✓ Inspection of the axial side clearance of the cutting edge is completed.



## 5.4 Angle adjustment of module Alignment adapter

### Requirement

- ☑ Dial gauge + stand
- ☑ SW 4 Allen key (or SW 5 at module Ø 100 mm)

To adjust the angle of module Alignment adapter, proceed as follows:

1. Clamp the tool into the machine spindle and adjust the angle. Position the dial gauge with stand at the concentricity check points (CCP) above the cutting edge (see arrowhead).

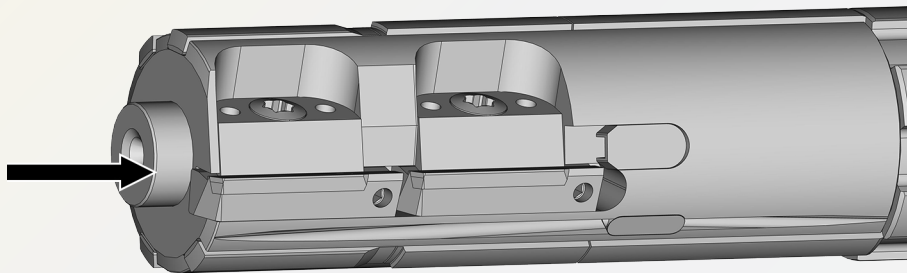


Fig. 17: Concentricity check points (CCP)



### Important information in a different document

The right approach can be found in the „Assembly and setting instructions for module 6x6 and 4x4 alignment adapter“.

- ✓ The right approach can be found in the „Assembly and setting instructions for module 6x6 and 4x4 alignment adapter“.





## 5.5 Mounting new cutting edge

### Requirement

- ☑ Gühring EV-800 adjusting unit (or equivalent adjusting unit)
- ☑ Drawing of tool (Customer drawing)
- ☑ SW 1.5 Allen key
- ☑ New cutting edge
- ☑ Torque wrench (T15)

To mount a new cutting edge, proceed as follows:

1. Turn the two radial adjusting screws (1 and 3) completely to the left to relieve the strains from the cutting edge and to set the threaded key adjustment completely inwards. Use an SW 1.5 Allen key.

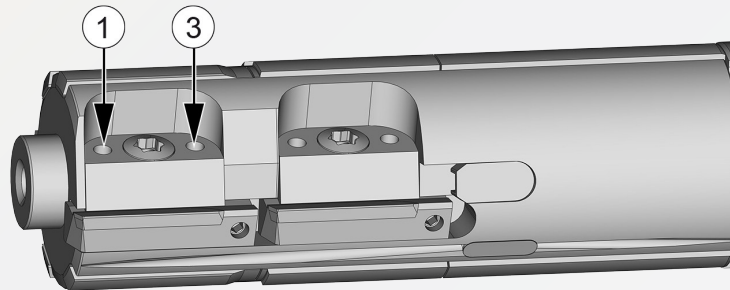


Fig. 18: Turn radial adjusting screws completely to left

2. Loosen the torque clamping screw (2) by turning it to the left and turn it out completely. Use a torque wrench (T15).

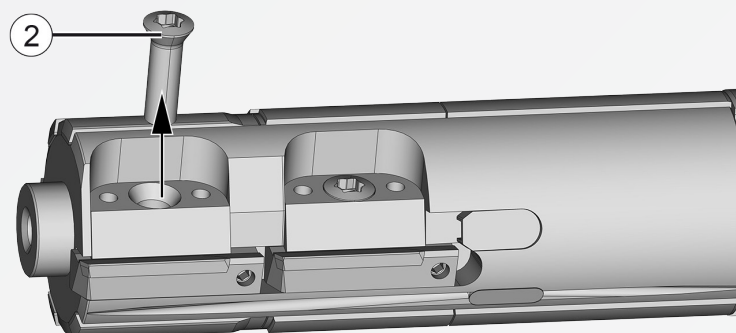


Fig. 19: Loosen torque clamping screw



3. Now the torque clamping screw, the clamping claw (4) and the cutting edge (5) can be removed with the axial adjusting screw (7).

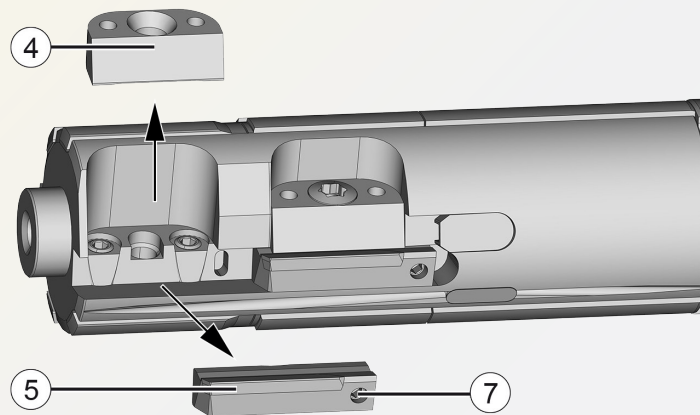


Fig. 20: Remove torque clamping screw, clamping claw and cutting edge with the axial adjusting screw

4. Clean the ground plate, the clamping claw and the torque clamping screw.  
Dispose the defective cutting edge in an environmentally sound manner.
5. Insert a new cutting edge (5) with the axial adjusting screw (7).

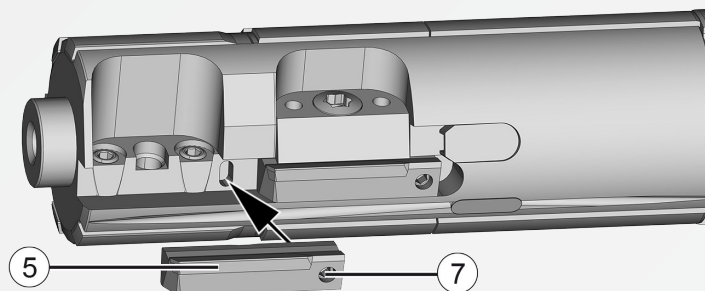


Fig. 21: Insert new cutting edge with axial adjusting screw

6. Fasten the cutting edge with the clamping claw (4) and the torque clamping screw (2).  
Apply it only slightly. Use a torque wrench (T15).

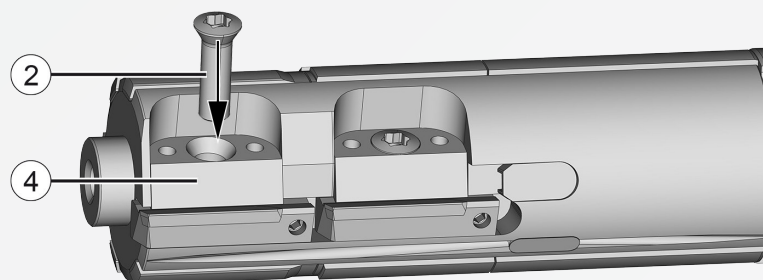


Fig. 22: Fasten cutting edge

- ✓ Mounting of new cutting edge completed.



## 5.6 Pre-setting a new cutting edge

### Requirement

- ☑ Gühring EV-800 adjusting unit (or equivalent adjusting unit)
- ☑ Drawing of tool (customer drawing)
- ☑ SW 1.5 Allen key
- ☑ Torque wrench (T15)

The following procedure describes the pre-setting of a new cutting edge. If the cutting edge needs to be pre-set again because it has been set large, turn both radial adjusting screws completely to the left to relieve the strains from the cutting edge and to set the threaded key adjustment completely inwards. Loosen the torque clamping screw by turning it to the left and push the cutting edge completely inwards. Now slightly re-insert the torque clamping screw.

1. Clamp the tool with the HSK holder between tips into the adjusting unit.
2. Set the cutting edge of the tool by means of the axial adjusting screw (7) to the lowest axial position. By turning the axial adjusting screw (7) to the right, the cutting edge first moves in upwards then in downwards direction.

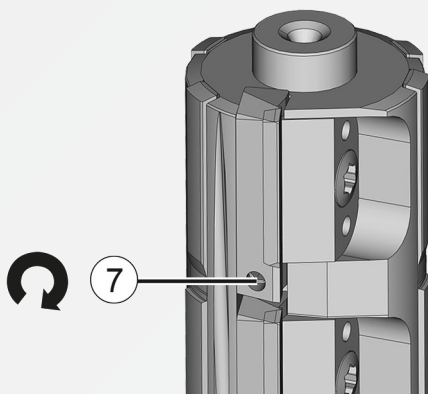


Fig. 23: Set cutting edge of tool to lowest axial position



3. Position both measuring probes (for diameter and tapering) at a distance of 10 and 11 mm or in accordance with the drawing provided.



Fig. 24: Position measuring probe

4. Move both measuring probes towards the reference line. The reference line is the first guiding rail behind the cutting edge in rotational direction (see arrowhead, fig. 25). Apply the measuring probespecific pre-stressing to the reference line then zero set both measuring probes.



### Important information

For the Gühring EV-800 measuring probes the specific pre-stressing is 150 µm, as the inductive probes provide the most accurate measuring results. Due to the special geometry of the measuring probes cutting outbreaks can be prevented also at this pre-stressing force.

The pre-stressing force for PCD tools on other adjusting units should not exceed 40 µm, as sensitive cutting edges or guiding rails could outbreak.

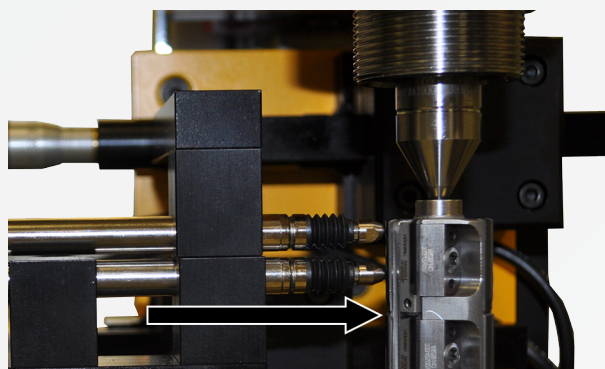


Fig. 25: Move measuring probes towards reference line

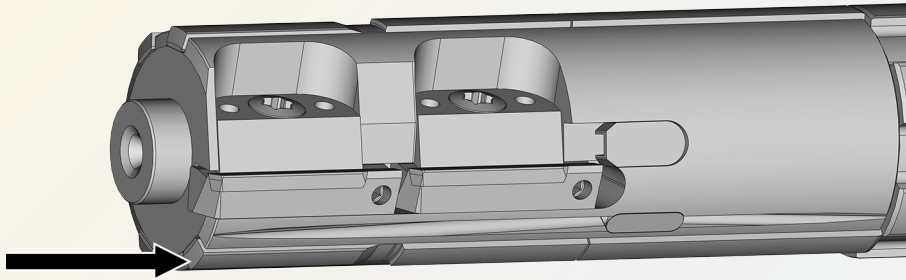


Fig. 26: Side view Reference line

5. Turn the tool contrary to the cutting direction until the measuring probe touches the cutting edge of the tool. To identify the highest point of the cutting edge the tool needs to be slightly rotated.

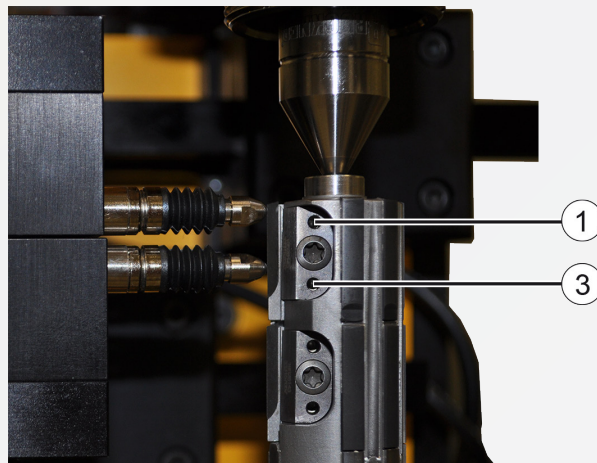


Fig. 27: Apply measuring probe to cutting edge

6. Set the cutting edge to approx.  $-40\mu\text{m}$  (radial) by turning the upper (1) and the lower radial adjusting screw (3) alternately to the right. Use an SW 1.5 Allen key.  
✓ Pre-setting of a new cutting edge completed.

**Now start with chapter „5.3 Setting a mounted cutting edge“.**