

Graf



Translation of the original  
assembly instructions

INOACOMB flex



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# 1 General information

## 1.1 Information on this installation manual

This installation manual contains important information on how to handle the INOACOMB flex circular comb during installation and adjustment (adjusting the circular comb nipper spacing) as well as on disassembly and disposal.

A basic precondition for safe working is the observance of all safety instructions and working instructions provided in this installation manual.

Furthermore, the local accident prevention regulations and the general safety regulations for the field of application also apply.

Read the installation manual carefully before starting any work. It is an integral part of the product and must be stored safely for future reference.

## 1.2 Copyright protection

All documents are protected in accordance with the German Copyright Act [deutsche Urheberrechtsgesetz - UrhG].

Forwarding and reproduction of these documents, in whole or in part, and utilization of their content is not permitted unless expressly authorized. Violations are punishable and will result in an obligation to pay compensation for damages.

We reserve all rights to exercise industrial property rights.

## 1.3 Notes on use

### 1.3.1 Instructions and system reactions

Work steps to be performed by the operating personnel are shown consecutively. The sequence of steps must be observed. The system reactions to the respective actions are marked with an arrow.

Example:

- ⌚ Work step
- ⇒ Reaction to work step

### 1.3.2 Lists

Lists without a mandatory sequence of steps are shown as a list preceded by a bullet point.

Example:

- Item 1
- Item 2

### 1.3.3 References to chapters/pages

References to particular chapters in which procedures and work steps are described and indicated with arrows.

Example:

See chapter (Symbols used [▶ 7])

## 1.4 Symbols used

Warnings are also highlighted in this installation manual by means of warning symbols.

The following warning and information symbols are used in this installation manual:

Symbol	Meaning
	General warning message
	Danger due to sharp parts or parts with sharp edges
	Warning of possible material damage
	General information and useful advice on handling
	Recyclable material

## 1.5 Warnings

### Minor injuries

	<b>⚠ CAUTION</b>
	<p><b>Personal injury due to...</b></p> <p>Consequences of non-compliance...</p> <ul style="list-style-type: none"><li>• Notes on avoiding dangers</li></ul>

A warning with this danger level indicates a potentially dangerous situation.

If the dangerous situation is not avoided, it may result in minor or moderate injuries.

Follow the instructions in this warning to avoid personal injuries.

### Material damage

	<b>NOTICE</b>
	<p><b>Material damage caused by...</b></p> <p>Consequences of non-compliance...</p> <ul style="list-style-type: none"><li>• Notes on avoiding dangers</li></ul>

A warning with this danger level indicates possible material damage.

If the situation is not avoided, material damage may occur.

Follow the instructions in this warning to avoid material damage.

### Notes and tips

	<b>NOTE</b>
	<p>Note text ...</p>

A note indicates additional information that is important for further processing or which simplifies the described work step.

## 1.6 Liability disclaimer

All information and instructions provided in this installation manual have been compiled by taking into consideration the applicable standards and regulations, our state-of-the-art technology and our many years of experience and knowledge.

We reserve the right to make technical modifications as part of the further development of the circular comb described in this installation manual. No claims may be derived from the data, figures and descriptions provided in this installation manual.

The manufacturer assumes no liability for damage and malfunctions due to:

- Failure to observe this installation manual
- Unintended use
- Use of untrained or insufficiently trained personnel
- Consequential damage due to faulty installation
- Preliminary work not included in the scope of supply and services
- Failure to use original spare parts and accessories
- Technical modifications and changes not agreed with the manufacturer

The manufacturer's General Terms and Conditions and Delivery Terms as well as the applicable statutory regulations when the contract was concluded shall apply.

## 2 Safety

### 2.1 General information

This chapter provides important notes on all safety aspects in order to ensure optimum protection of the operating personnel as well as safe and smooth operation.

	<b>⚠ CAUTION</b>
	<p><b>Danger due to a failure to observe warnings.</b></p> <p>Failure to observe the warnings and working instructions specified in this installation manual can result in danger.</p> <ul style="list-style-type: none"><li>• Observe the warnings and instructions specified here.</li></ul>

### 2.2 Intended use

The circular comb is intended for use on combers.

Any other use or use that exceeds this is considered improper use.

	<b>⚠ CAUTION</b>
	<p><b>Danger due to incorrect use.</b></p> <p>Use of the circular comb in any other way and/or for any other purpose beyond the intended use can lead to dangerous situations.</p> <ul style="list-style-type: none"><li>• Only use the circular comb for its intended purpose.</li><li>• Observe all instructions provided in this installation manual.</li></ul>

No claims of any kind shall be accepted for damage resulting from incorrect use.

These risks shall be borne solely by the operator.

## 2.3 Foreseeable misuse

This circular comb may only be installed and operated as intended within the limits specified in the technical data.

Do not install the circular comb if it is defective or is no longer in its original condition.

## 2.4 Basic safety instructions

The circular comb was built in accordance with the latest state of the art.

Dangers and negative impacts can still occur when using the circular comb:

- For the installation personnel and
- For the machine itself into which the circular comb is installed.

Knowledge of the safety and user instructions in this manual forms the basis for safe handling and smooth operation of the circular comb.

	<b>NOTE</b>
	Always keep this installation manual at the installation site of the circular comb. The installation manual must be freely accessible to the relevant personnel.

## 2.5 Particular dangers

### 2.5.1 Danger of cutting

	<b>⚠ CAUTION</b>
<p><b>Risk of cuts from the sharp comb tips.</b></p> <p>When handling the circular comb, cuts may occur.</p> <ul style="list-style-type: none"><li>Handle the circular comb carefully.</li><li>Wear personal protective equipment (PPE), such as protective gloves.</li></ul>	

### 2.5.2 Material damage

	<b>NOTICE</b>
<p><b>Danger of material damage resulting from incorrect assembly.</b></p> <p>Improper installation of the circular comb may result in material damage.</p> <ul style="list-style-type: none"><li>Observe all instructions provided in this installation manual.</li></ul>	

## 2.6 Personnel requirements

### 2.6.1 Personnel qualifications

	<b>NOTICE</b>
	<p>Danger of material damage resulting from unqualified personnel.</p> <p>Improper installation of the circular comb may result in material damage.</p> <ul style="list-style-type: none"><li>• Have all activities performed only by qualified personnel.</li></ul>

The following qualifications are defined in this installation manual:

#### Qualified personnel

have the necessary technical training, knowledge and experience, as well as knowledge of the pertinent regulations, to perform the work assigned to them and to independently recognize and prevent potential dangers.

# 3 Technical description

## 3.1 Product overview

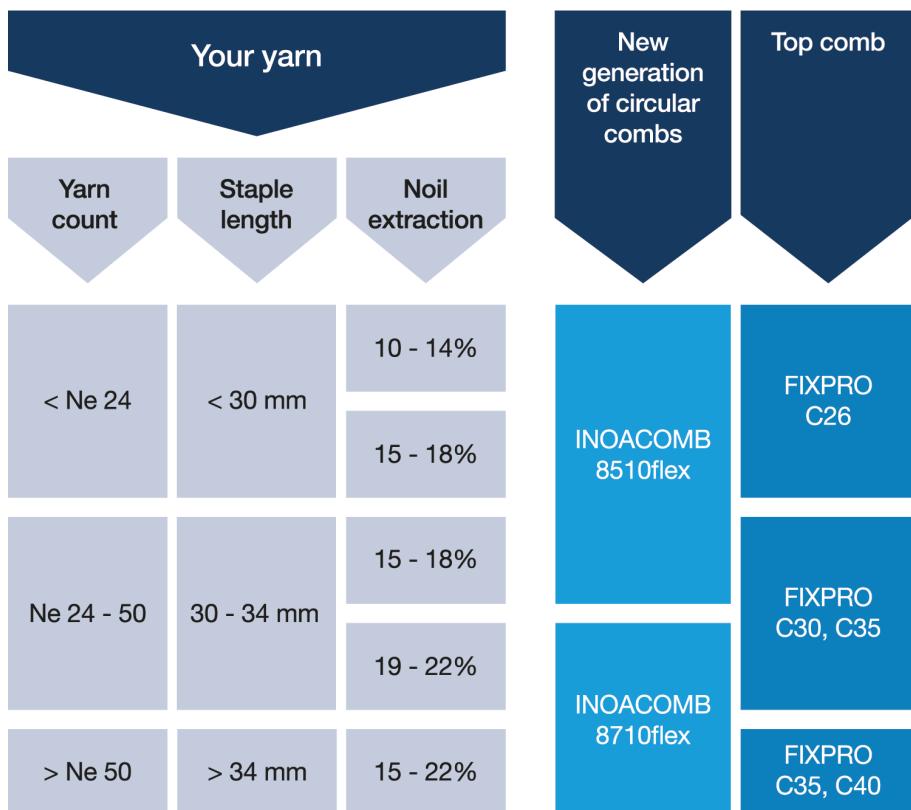
### INOACOMB flex



- Shaft diameter of the combing shaft: 30 mm
- Comb surface: 120°
- Height adjustment: Continuous up to 0.4 mm
- Fitting material: Cutty Sharp
- Surface finish: Needle finish
- Lightweight comb: Low vibration



## 3.2 Selection graphic



Comb type	Cover plate colour	Section	Number of teeth
INOACOMB 8510 flex	Red	5	37,400
INOACOMB 8710 flex	Gold	6	42,000

### 3.3 Functional description

The INOACOMB flex is an integral circular comb with a 120° fitting surface that was developed for modern combing machine systems. The comb's maximum cycling rate is 550 rpm.

The circular comb is designed for combing shaft diameters of 30 mm. The height adjustment is 0.40 mm. In addition, inclined positions of the nippers of up to 0.15 mm can be accommodated. The INOACOMB flex is a comb with a continuously variable, ergonomic height-adjustment function.

#### Symbol Meaning

	Better IPI values and fewer cleaner cuts achieved through the precision height adjustment, combined with the unique Graf fitting.
	Significantly reduced production costs thanks to constant process parameters across all combing points. This improves the yield.
	Lowest total costs thanks to up to 50% longer fitting service life due to the extra wear-resistant CUTTYSHARP alloy.
	The perfect alignment between comb and nipper is ensured throughout the service life of the comb. While the comb is installed, the height can be easily adjusted and readjusted.
	The highest throughput and yield is achieved through the special tooth design of the fitting and protruding tooth surfaces, which is all made possible by the needle finish process.
	Consistently high production rates and yarn quality thanks to the low-vibration circular combing system with the INOACOMB flex counterweight.

The height of the comb and consequently the distance between the circular comb and the nippers can be changed by turning the adjustment screws in the middle of the comb. See the following diagram with marked adjustment screws.



#### Technical data

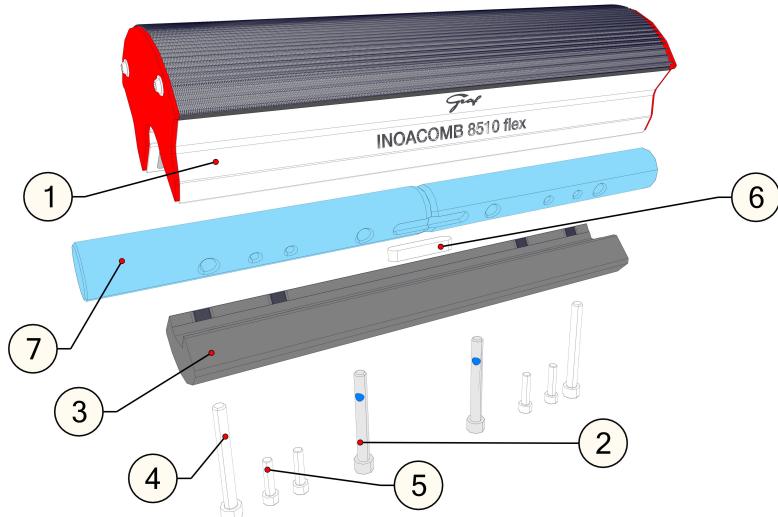
Adjustment travel	0.40 mm
Angle adjustment	0.15 mm
Sensitivity	0.50 mm for each turn of the adjustment screw Height for each screw scale step is 0.065 mm

## 3.4 Complete overview

There are both combers that have a split combing shaft and those with a continuous shaft. Be sure to pay special attention to the coupling point during installation. See the following chapters.

### 3.4.1 Coupling point for split combing shafts

In general, combing point 4.



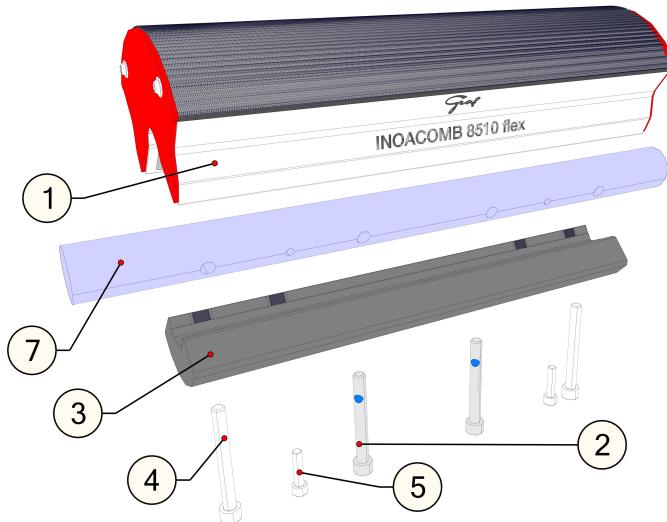
For the coupling point, use the special balancing weight for coupling points, mounted with 2 additional fixing screws (5) and wedge (6) to stiffen the coupling point.

Item Name	Article no.	Qty	
1 Circular comb INOACOMB 8510 flex INOACOMB 8710 flex	50108510H/ 50108710H	1	
2 Adjustment screw	005043498	2	
3 INOACOMB flex counterweight for coupling point	005032358	1	Not included in the comb
4 Fastening screw of circular comb	M8x65	2	Not included in the comb
5 Fastening screw of counterweight	M6x25	4	Not included in the comb
6 Key	8x7x45	1	Not included in the comb
7 Shaft of the comber	Ø30		Not included in the comb

Quantities each refer to one combing point.

### 3.4.2 Other positions

Combing point 1-3, 5-8 or non-split combing shaft



Item	Name	Article no.	Qty	
1	Circular comb INOACOMB 8510 flex INOACOMB 8710 flex	50108510H/ 50108710H	1	
2	Adjustment screw with vibration protection	005043498	2	
3	INOACOMB flex counterweight of remaining combing points	005032366	1	Not included in the comb
4	Fastening screw of circular comb	M8x65	2	Not included in the comb
5	Fastening screw of counterweight	M6x25	2	Not included in the comb
7	Shaft of the combber	Ø30		Not included in the comb

Quantities each refer to one combing point.

# 4 Unpacking

## 4.1 Safety instructions

	<b>⚠ CAUTION</b>
	<p><b>Risk of cuts from the sharp comb tips.</b></p> <p>When handling the circular comb, cuts may occur.</p> <ul style="list-style-type: none"><li>• Handle the circular comb carefully.</li><li>• Wear protective gloves.</li></ul>
	<b>NOTICE</b>
	<p><b>Risk of material damage due to improper handling!</b></p> <p>Improper handling can damage the fitting and the circular comb.</p> <ul style="list-style-type: none"><li>• Never place the circular comb directly on the fitting.</li></ul>

## 4.2 Scope of supply and transport inspection

The standard INOACOMB flex is supplied with the following components:

- INOACOMB flex circular comb
- Adjustment screws
- Installation manual

Accessories (not included in the scope of delivery) include:

- INOACOMB flex counterweight for coupling points (with keyway)
- INOACOMB flex counterweight for remaining combing points (not suitable for coupling point)

	<h2><b>NOTICE</b></h2> <p><b>Material damage caused by use of incorrect counterweights.</b></p> <p>When using the "INOACOMB flex counterweights for the remaining combing points" (005032366) at coupling point position 4, there is a risk of material damage to the comb and comber.</p> <p>Using INOACOMB flex counterweights not designed by Graf can cause material damage to the comb and comber. This applies to all combing points.</p> <ul style="list-style-type: none"><li>• Make sure that the correct "INOACOMB flex counterweight for coupling point" (005032358) is used at the coupling point.</li><li>• It is technically possible to use an "INOACOMB flex counterweight for coupling point" (005032358) at the other combing points.</li><li>• Make sure that the correct counterweight is used for each of the remaining positions.</li></ul>
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	<h2><b>NOTE</b></h2> <p>Inspect the entire delivery for completeness and visible signs of damage. Report an incomplete or damaged delivery to the supplier/dealer immediately.</p>
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## 4.3 Rust protection

The circular comb is packed in airtight packaging. An anti-corrosion agent is applied to the circular comb. If the airtight packaging is damaged or opened, the fitting may corrode when it is not in use.

	<b>NOTICE</b>
	<p><b>Risk of fitting corrosion.</b></p> <p>Contact with moisture in the environment may cause fitting corrosion.</p> <ul style="list-style-type: none"><li>• Start operating the circular comb no later than 48 hours after opening the protective packaging.</li><li>• If a comb is removed from the comb, the comb must be protected from moisture and stored in a cool place.</li></ul>

# 5 Assembly

## 5.1 Safety instructions

### 5.1.1 Danger of cutting

	<b>⚠ CAUTION</b>
	<p><b>Risk of cuts from the sharp comb tips.</b></p> <p>When handling the circular comb, cuts may occur.</p> <ul style="list-style-type: none"><li>Handle the circular comb carefully.</li></ul>

### 5.1.2 Risk of material damage

	<b>NOTICE</b>
	<p><b>Danger of material damage resulting from incorrect assembly.</b></p> <p>Improper installation of the circular comb may result in material damage.</p> <ul style="list-style-type: none"><li>Follow all steps to install and adjust the distance of the circular comb to the nipper of the comber (nipper).</li><li>Observe the safety instructions and guidelines of the machine manufacturer.</li></ul>

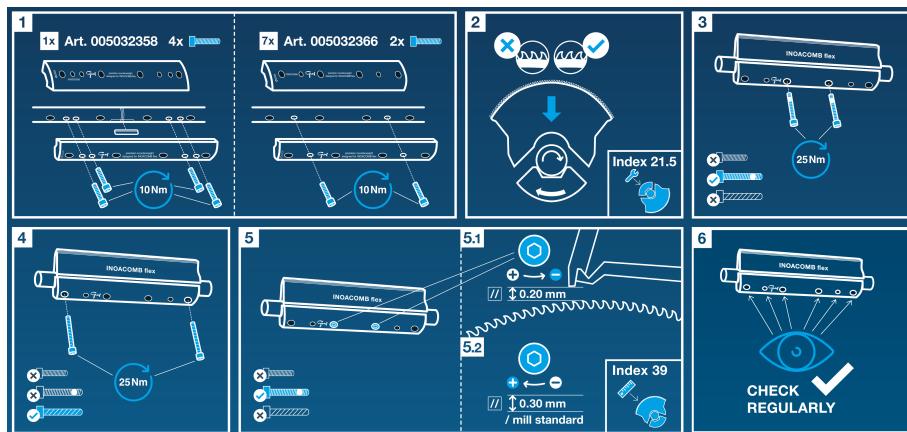
	<p><b>NOTICE</b></p> <p><b>Danger of material damage in case of frequent re-installation.</b></p> <p>If the unit is installed too often, it will be subject to wear and tear.</p> <ul style="list-style-type: none"><li>• Install adjustment screws with vibration protection (item 2) a maximum of five times, then order replacement screws from Graf and replace them. These screws are available from Graf (005043498).</li></ul>
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## 5.2 Personnel qualifications

Assembly may only be carried out by personnel who

- are authorized to do so based on their training and qualifications.
- are assigned to do so by the machine operator.

## 5.3 Assembly procedure



If the combing machine will be equipped with an INOACOMB flex for the first time, the counterweight must be installed first. This does not apply to any repeat installations, provided that the correct counterweight for the INOACOMB flex has already been fitted. This is what makes the mounting procedure different depending on the situation. The operating instructions for the combing machine must be followed. The installation manual for the INOACOMB flex are intended as a supplement to the operating instructions for the comber.

### 5.3.1 INOACOMB flex installation

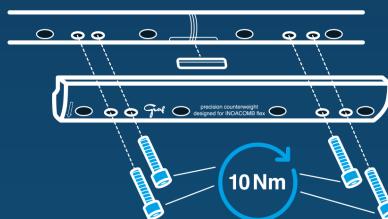
Perform the initial installation as follows:

- ➊ Unpack the circular comb (see Unpacking [▶ 20]).
- ➋ Disconnect the comber from the mains and secure it (refer to the operating instructions for the comber).
- ➌ Check counterweight, refit if necessary (refer to Installing the counterweight [▶ 26]).
- ➍ Pre-assemble the circular comb (refer to Pre-assembling the circular comb [▶ 28]).
- ➎ Measure distance from the circular comb to the nippers (refer to Measuring and setting the distance [▶ 30]).
- ➏ Adjust the distance (refer to Measuring and setting the distance [▶ 30]).
- ➐ Check the distance (refer to Checking the installation [▶ 34]).

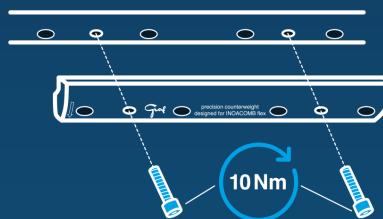
### 5.3.2 Installing the counterweight

1

1x Art. 005032358 4x



7x Art. 005032366 2x



The weight of the INOACOMB flex circular comb is less than the weight of conventional combs thanks to the lightweight design of the INOACOMB flex. The right counterweights must be used to achieve optimum performance of the machine (reduced vibrations). In addition, the INOACOMB flex counterweights have been developed to absorb the torsional forces of the shaft that put a load on the comb.

This step is not necessary if the correct INOACOMB flex counterweight has already been installed. You can continue pre-assembling the comb (refer to chapter Pre-assembling the circular comb [▶ 28]). The counterweights displayed in the diagram apply on the left for the coupling point (005032358) and on the right for the remaining comb positions (005032366).

Replace the counterweights as follows:

- ⇒ Disconnect the comber from the mains and secure it (refer to the operating instructions for the comber).
- ⇒ Set the machine to index 24 or the position specified by the machine manufacturer.
- ⇒ If installed, remove the different counterweight by loosening the fastening screws.
- ⇒ Before installing the counterweight at the coupling position, clean the contact surfaces on the shaft.



#### NOTE

We recommend that the INOACOMB flex counterweights interlock with the combing shaft. This may cause slight marks on the shaft surface.

- ⦿ Note the different counterweights between the coupling point (combing point 4) and the others: combing point 4 has the key as well as two additional fastening screws.
- ⦿ Fit the key in the shaft at the coupling position.
- ⦿ Make sure that the counterweight is aligned properly: the direction of the arrow on the counterweight must match the machine's direction of rotation.
- ⦿ Install the counterweight with the counterweight fastening screws.
- ⦿ Tighten the fastening screws for the counterweight using a torque spanner to 10 Nm. Four screws must be tightened at the coupling position. The required torques and preloads of the screws must be observed to ensure safe operation.
- ⦿ Make sure that the holes for the comb fastening screws and the adjustment screws are free of dirt or similar. In case of deviating hole positions or other geometric differences, contact Graf Technical Support.



<b>i</b>	<b>NOTE</b>
More detailed information is provided in the operating instructions provided by the machine manufacturer.	



## NOTICE

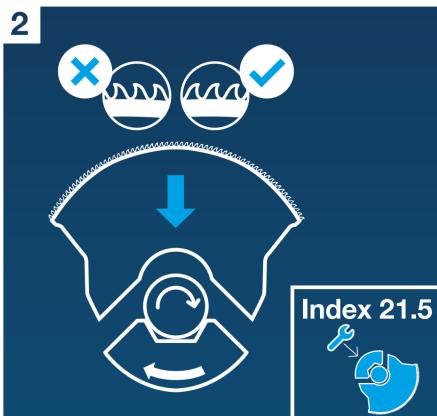
### Material damage in case of incorrectly installed counterweights.

If the counterweights are not installed properly, various types of material damage to the machine may occur.

- Make sure that the fastening screws are properly tightened.
- Make sure that the INOACOMB flex "counterweight for coupling" with the key and four fastening screws is used at the coupling point.
- Make sure that the counterweight is aligned properly (observe the direction of the arrow).

### 5.3.3 Pre-assembling the circular comb

- ⇒ Pre-assemble the circular comb.



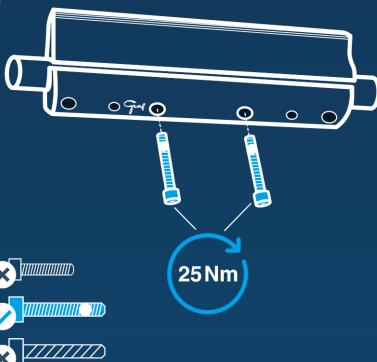
- ⇒ Disconnect the comber from the mains and secure it (refer to the operating instructions of the comber).
- ⇒ Set the machine to index 21.5 or the position specified by the machine manufacturer (installation position for the comb).
- ⇒ Before installing the comb, clean the contact points on the shaft.
- ⇒ Attach the comb to the shaft.

⇒ The circular comb brush holds the comb in position. Check that the comb is sufficiently fixed.

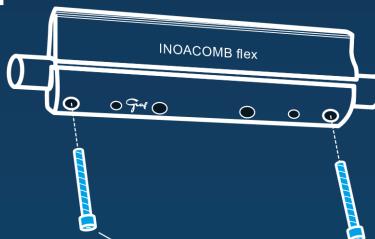
- Make sure that the comb is aligned according to the direction of rotation (refer to the illustration, teeth in the direction of rotation).

<b>i</b>	<b>NOTE</b>
Incorrect positioning causes vibrations and may lead to machine and property damage.	

3



4



- From the position of the nippers, insert both adjustment screws (in the middle) and both fastening screws (outside) through the shaft and the counterweight into the comb body.
- As indicated in Figure 3, screw in the adjustment screws alternately until the "block" (inner surface of the comb touches the shaft) is reached. You will feel the contact with the "block" when screwing it in. If in doubt, tighten to a maximum of 25 Nm.
- Tighten the fastening screws (outside) using a torque spanner to 25 Nm as shown in Figure 4.



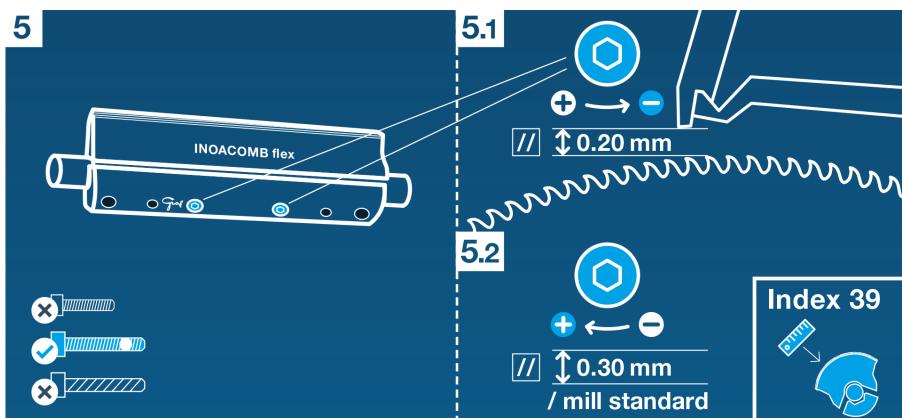
## NOTICE

### Damage due to the use of unsuitable components.

Any components that are not specially designed for the INOACOMB flex may be unsuitable. Using them may damage the comb.

- Only use components specially designed for the INOACOMB flex, such as the M8x0.5 adjustment screw with the anti-vibration coating (refer to chapter Selection graphic [▶ 15]).

### 5.3.4 Measuring and setting the distance





## NOTICE

### Material damage due to incorrect distance.

If the distance between the circular comb and the nippers is too small or negative, this may damage the comb and the comber.

- Before changing the index, make sure that the comb is tightened sufficiently using the adjustment screws.
- Make sure that the distance between the round comb and the nippers does not decrease below 0.1 mm after adjustment.



## NOTICE

### Material damage in case of improper installation.

If, when adjusting the height, the fastening screws are also turned and loosened and not just the adjustment screws, there is a risk of material damage.

- Only turn and loosen the adjustment screws.

Measure the distance of the circular comb to the combing nippers as follows:

- ⇒ Set the machine to index 39 or the position specified by the machine manufacturer.
- ⇒ It is best to work in pairs:
  - ⇒ Operator 1 stands in front of the machine and is responsible for measuring the circular comb nipper spacing.
  - ⇒ Operator 2 kneels behind the machine and is responsible for adjusting the height of the comb.

By slowly turning the two adjustment screws (centre), the distance between the circular comb and the nippers can be set (refer to Figure 5). The first step, however, is to set the distance between the circular comb and the nippers to 0.1 mm less than the desired distance. Afterwards, set the desired distance by tightening the adjustment screws (centre) (refer to adjustment example in the information box). This is carried out in order to eliminate backlash in the screws.

- ⇒ Measure the nipper spacing with a feeler gauge:
  - ⇒ Due to the comb design, the nipper spacing must be measured on the left and right on the middle of the fitting circumference. This is the highest point of the comb on index 39.
- ⇒ Adjust the height using the two adjustment screws (centre):
  - ⇒ Turn the adjustment screw anticlockwise (loosen the screw): The distance between the nippers is reduced.
  - ⇒ Turn the adjustment screw clockwise (tighten the screw): The distance between the nippers increases.
  - ⇒ The directions for increasing and decreasing the nipper spacing (+/-) are indicated on the counterweight.
  - ⇒ One turn of the adjustment screw shifts the distance between the round comb and the nippers by 0.5 mm. A scale is engraved in the counterweight. One scale line corresponds to 0.065 mm.
- ⇒ Use the feeler gauge to ensure that the required circular comb nipper spacing is achieved on the left and right (see operating instructions of the comber):  
The circular comb nipper spacing recommended by Graf is 0.3 mm.

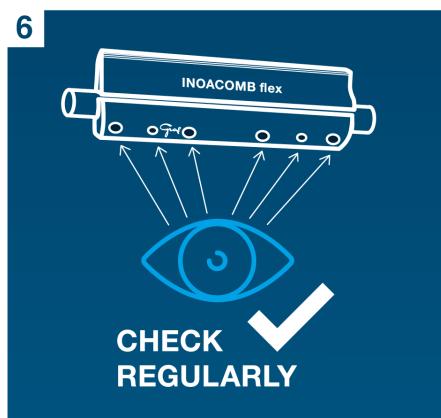
**NOTE**

Set the comb 0.1 mm closer than the required distance and then tighten again to the required level.

For example, to set the circular comb nipper spacing to 0.3 mm, set to approximately 0.2 mm and then tighten again to 0.3 mm.



### 5.3.5 Checking the installation



To complete the installation:

- ➲ Make sure that both fastening screws (outside) are tightened to 25 Nm.
- ➲ Make sure that the counterweight fastening screws are tightened to 10 Nm.
- ➲ Make sure that the counterweight as well as the comb are aligned at all positions according to the direction of rotation (refer to the tooth directions and the marking on the counterweight).
- ➲ Measure the distance between the circular comb and the combing nippers again. Adjust again if necessary (refer to Measuring and setting the distance [▶ 30]).
  - ⇒ It is not necessary to secure the comb with clamps or screws, etc. to adjust the height.
- ➲ Make sure that the correct counterweights for INOACOMB are installed in the right place.

## 6 Commissioning, maintenance, service

The Graf circular comb does not require a running-in stage due to the Needle Finish treatment. The comb can be operated at full capacity after installation. The service life of the circular comb is 2–4 years, depending on production output and processing material. The circular comb must be replaced at the latest when the required textile quality is no longer achieved despite correct settings.

- ☛ Check the distance between the circular comb nippers and the tightening torque of the fastening screws after 1 week and readjust if necessary.
- ☛ Afterwards, regularly check every 3 months to ensure safe operation, as well as performance in terms of Noil and IPI over the service life of the comb.
- ☛ If there is a deviation from the nominal setting of the **circular comb nipper spacing**, readjust the actual dimension of the circular comb. Refer to chapter Measuring and setting the distance [▶ 30].



### NOTICE

#### Material damage due to settling behaviour of the combing system

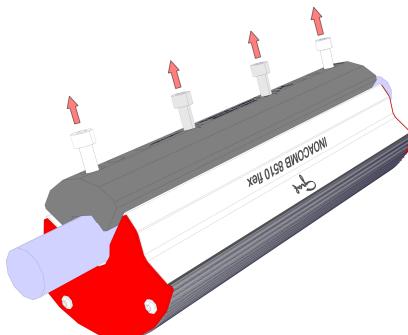
The distance between the circular comb and the nippers must be checked at the specified intervals in order to avoid collisions between the circular comb and the nippers.

- Test 1 week after installation
- Regular inspection at least every 3 months

# 7 Disassembly and disposal

## 7.1 Disassembly

	<b>NOTICE</b>
	<p><b>Danger of material damage in case of frequent re-installation.</b></p> <p>If the unit is installed too often, the anti-vibration protection of the screw will wear out. Any number of adjustments can be made without removing the comb from the comber and without having to replace the screws.</p> <ul style="list-style-type: none"><li>• Fit adjustment screws with vibration protection (item 2, 005043498) a maximum of five times, then change the screw. These screws are available from Graf.</li></ul>



For disassembly:

- ➲ Index 21.5 or move the unit to the machine manufacturer's position with combing shaft.
- ➲ Loosen the adjustment and fastening screws.
- ➲ Remove the circular comb from the comber.

## 7.2 Disposal

To correctly dispose of the metals after disassembly, send them for recycling or scrapping. When installing, dispose of the packaging, i.e. the cardboard box and protective film, separately.

Materials used in the product:

- Steel
- Aluminium

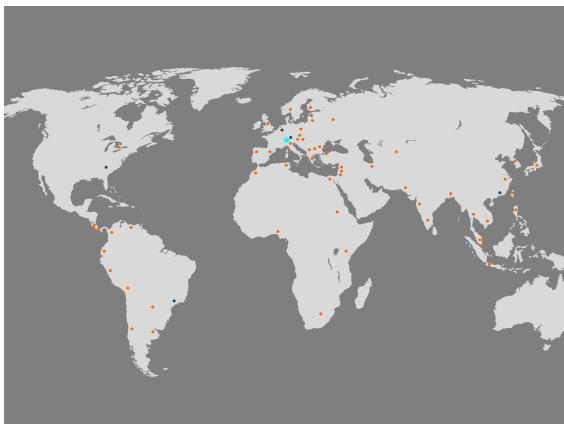
Materials used in the packaging:

- Corrugated cardboard and paper
- PE protective film



The packaging materials can be recycled. Dispose of packaging materials that are no longer required in accordance with the applicable local regulations.

Graf



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