

HWR

EN

Operating Manual INOFlex® VT-Q 021 - VT-Q 040

Compensating 4-jaw through-hole power chuck
with jaw quick-change system



Original Operating Manual in German!
Keep safe for future reference!

Status: August 21, 2025

Issue: A

DE

Betriebsanleitung INOFlex® VT-Q 021 - VT-Q 040
Ausgleichendes 4-Backen-Kraftspannfutter
mit Durchgang und Backenschnellwechsel

IT

Istruzioni per l'uso INOFlex® VT-Q 021 - VT-Q 040
Mandrino a forte serraggio a 4 ganasce di
compensazione con foro passante e sistema di cambio
rapido delle ganasce

FR

Notice d'utilisation INOFlex® VT-Q 021 - VT-Q 040
Mandrin de serrage automatique à 4 mors à
compensation avec passage et changement rapide des
mors

ES

Manual de instrucciones INOFlex® VT-Q 021 - VT-Q 040
Mandril de sujeción compensador de gran apriete de 4
mordazas con orificio pasante y cambio rápido de
mordazas

The following illustration shows the chuck with the embossed data.

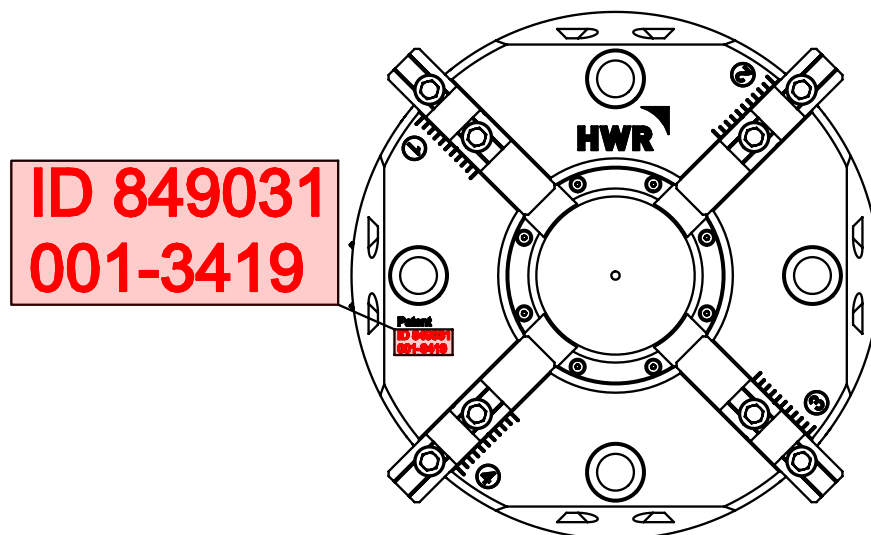


Fig.: Identification number

NOTE

If you have any questions for HWR Spanntechnik GmbH, please have the identification number ready (marked red above). Errors or mistakes in the documentation excepted. Please inform HWR Spanntechnik GmbH of any mistakes in the documentation.

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The copyright to this documentation shall remain with HWR Spanntechnik GmbH.

This documentation is only intended for the operating company and the corresponding staff. It contains instructions and information that may not be reproduced, distributed or transmitted in any form or by any data technology means or used for competitive purposes without prior authorization.

Violations may constitute an offense resulting in appropriate legal action.

This Operating Manual provides detailed information on the installation, operation and maintenance of the INOFlex® chuck. It contains safety instructions that ensure safe use of the INOFlex® chuck. Additional information on the scope of delivery and troubleshooting can be found in this documentation.

This Operating Manual will help you get the most out of your INOFlex® chuck.

Your INOFlex® chuck ensures years of reliable and effective performance if always used properly and maintained in good condition. The documentation provided will help you to do just that.

Keep this Operating Manual and the other documentation (e.g., manufacturer's documentation) safe and always within easy reach in the immediate vicinity of the machine on which the INOFlex® chuck is used. Always observe all the information, notes, instructions and directions contained therein. This helps prevent accidents caused by incorrect operation, retain the full manufacturer's warranty and always have a fully functional INOFlex® chuck.

The manufacturer is always striving to improve its products. The manufacturer reserves the right to make any changes and improvements it deems necessary. However, please note that there is no obligation to retrofit INOFlex® chucks that have already been delivered.

DANGER

Prior to commissioning the INOFlex® chuck, you must have read and understood the Operating Manual and the safety regulations contained therein.

Employees must have received instruction on the features, installation and use of the INOFlex® chuck in accordance with this Operating Manual.

If you have any questions after initial instructions and reading the Operating Manual, please contact the manufacturer.

We wish you and your employees lots of enjoyment and success when using the INOFlex® chuck.

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HWR

Declaration of incorporation of partly completed machinery

in accordance with Machinery Directive 2006/42/EC; Annex II B

Manufacturer:	HWR Spanntechnik GmbH
Authorized representative for the technical documentation:	Henrico Viets (Managing Director)
Designation of the machine:	Compensating 4-jaw through-hole power chuck
Machine number:	VT-Q 021 - VT-Q 040

We hereby declare

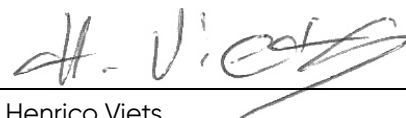
that the aforesaid partly completed machinery is intended for incorporation into another machine. Commissioning is prohibited until the distributor of the completed machine has established that the complete machine complies with the provisions of EC Machinery Directive 2006/42/EC and has issued a Declaration of Conformity in accordance with Annex II, Part A of EC Machinery Directive 2006/42/EC.

that the essential health and safety requirements relating to the design and construction of machinery in accordance with Annex I of EC Machinery Directive 2006/42/EC are complied with in full.

that the "special technical documentation" has been prepared in accordance with Annex VII, Part B.

We undertake to provide national authorities with the special technical documentation for the partly completed machinery in paper form within a reasonable period of time upon justified request.

Oyten, April 25, 2025



Henrico Viets
Managing Director



Matthias Meier
Managing Director

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1 SAFETY

General information

The Operating Manual for your INOFlex® chuck contains important information on installation, operation, maintenance and malfunctions. This information helps you to operate your INOFlex® chuck safely and without risk.

All the safety instructions and liability provisions necessary for handling the INOFlex® chuck properly are contained in this chapter. Instructions on proper use can also be found here.

⚠ CAUTION

It is essential that you read and observe this Operating Manual, and this chapter in particular, prior to using the INOFlex® chuck.

1.1 SCOPE OF THE DOCUMENTATION

In addition to the safety instructions, the Operating Manual contains:

- a general description of the product
- instructions on installation of the INOFlex® chuck
- instructions on operation and utilization of the INOFlex® chuck
- instructions on maintenance and care
- instructions on troubleshooting and fault rectification
- technical data

The technical documentation also includes the following documents:

- an integrated list of spare parts
- a declaration of incorporation

1.2 NOTES OF THE MANUFACTURER

1.2.1 CUSTOMER SERVICE

The contact details of the manufacturer are given on the back cover. If you have any questions or problems, please contact the manufacturer of the chuck immediately.

NOTE

Please have the identification number (ID no.) ready if you have any queries for HWR Spanntechnik GmbH.

1.2.2 WARRANTY AND LIABILITY

In principle, our "General Terms and Conditions of Sale and Delivery" apply. They are available to the operating company at the latest when the contract is concluded. Warranty and liability claims for personal injury and property damage are excluded if they are caused by one or more of the following reasons.

- Improper use of the INOFlex® chuck.
- Improper installation, commissioning, operation and maintenance of the INOFlex® chuck.
- Operation of the INOFlex® chuck if the safety devices of the machine are defective or if the safety and protective devices on the machine are not fitted properly or are not in correct working order.
- Failure to observe the instructions in the documentation regarding
 - Storage
 - Installation
 - Operation (e.g. correct clamping of the workpiece, observing the maximum speed)
 - Maintenance and care
 - Troubleshooting at the INOFlex® chuck
- Unauthorized structural changes to the chuck or the chuck holder of the machine.
- Inadequate monitoring of parts that are subject to wear.
- Improperly performed repairs.
- Disasters caused by foreign bodies and force majeure.

DANGER

Do not make any alterations, additions or conversions to the INOFlex® chuck without the express approval of the manufacturer. All conversions require prior written confirmation from the manufacturer.

WARNING

Only use original spare and wear parts. In the case of externally sourced parts, there is no guarantee that they have been designed and manufactured to withstand the correct levels of stress and to ensure safety.

NOTE

The manufacturer provides full warranty only and exclusively for spare parts ordered from the manufacturer.

1.2.3 INSTRUCTIONS ON HANDLING THE DOCUMENTATION

Keep this Operating Manual and all other documents relating to the INOFlex® chuck safe and always within easy reach in the immediate vicinity of the machine on which the chuck is used.

It is essential that you read this Operating Manual prior to using the chuck for the first time and always observe the safety instructions.

Particularly important passages in this Operating Manual are marked with a symbol.

NOTE

Staff training provided by the manufacturer is regarded merely as the transfer of individual pieces of information. It does not release the operator from their obligation to read this Operating Manual.

1.2.4 EXPLANATION OF PICTOGRAMS

The following symbols are used to designate important passages in this Operating Manual. Observe these instructions carefully and exercise particular caution in these cases.

Marking of safety instructions:

⚠ DANGER

***This note indicates a situation that, if certain rules of conduct are not observed, will result in injury and/or danger of death.
When you see this symbol in the documentation, please take all the necessary safety precautions.***

⚠ WARNING

This note indicates potential material damage, financial losses and legal repercussions (e.g. loss of warranty rights, liability disputes, etc.).

⚠ CAUTION

This note indicates potential material damage to the machine.

NOTE

This note indicates important notes and information on effective, economical and environmentally-friendly handling.

1.3 INTENDED USE**1.3.1 EXCLUSIVE INTENDED USE**

The INOFlex® power chuck VT-Q 021 – VT-Q 040 is intended exclusively for clamping components for mechanical machining in machine tools (see also chapter "7" Technical data [\[...▶ 39\]](#)).

Any other use is considered improper. The manufacturer shall not be liable for any resulting damage.

1.3.2 OBSERVING INSTRUCTIONS AND REGULATIONS

Intended use also includes:

observance of all the instructions in the documentation and in the documentation provided by the manufacturer (if applicable) and compliance with the maintenance and servicing requirements, as well as the intervals specified by the manufacturer.

1.3.3 OBSERVING ACCIDENT PREVENTION REGULATIONS

Comply with the relevant accident prevention regulations and all other generally recognized rules of safety.

1.4 WARNING OF INCORRECT OPERATION AND MISUSE

Correct working order of your INOFlex® chuck was factory tested before delivery.

Nevertheless, there are dangers associated with incorrect operation and misuse:

- for the health and safety of operators, third parties and animals in the vicinity of the machine tool on which the chuck is used,
- for the machine tool, the INOFlex® chuck and other material assets of the operating company,
- for the efficient operation of the machine tool on which the INOFlex® chuck is used.

1.5 INSTRUCTIONS ON SAFE OPERATION

DANGER

Real safety means that you are familiar with all the safety instructions. This concerns the actual type and location of the hazard and, in particular, the relevant safety measures to be taken. Always remain vigilant and be aware of the danger(s).

Malfunctions must be investigated immediately. If necessary, ask the operating staff to call in specialists. Only when the safety of the INOFlex[®] chuck and the machine tool is demonstrated beyond any doubt may operation be resumed.

Operation of the INOFlex[®] chuck may only be started when the operating staff are satisfied that all maintenance work (as described in this Operating Manual) has been performed.

If it is determined during operation that required maintenance measures have not been performed, operation must be stopped immediately.

When operating the INOFlex[®] chuck, observe the permissible room temperatures for machine tool operation (see the operating instructions for the machine tool, if specified).

1.6 OBLIGATIONS

1.6.1 OBLIGATION OF THE OPERATING COMPANY

The operating company shall only allow persons to work with the INOFlex® chuck who

- are familiar with the basic safety and accident prevention regulations and have received instruction on how to operate the INOFlex® chuck,
- have read and understood this Operating Manual, in particular the chapter on safety, and the warning notes and have confirmed this with their signature.

The operating company is responsible for selecting the operating staff. The operating company must pay particular attention to the suitability of the staff who operate a machine tool with the INOFlex® chuck.

The operating company must always make all product documentation available to both operating and maintenance staff.

The operating company must routinely check that operating and maintenance staff go about their work in a safety-conscious manner.

The operating company of a machine tool with the INOFlex® chuck must comply with and observe the following rules and regulations:

- the functional limits and safety regulations specified in the technical instructions.

DANGER

The ultimate responsibility for safety rests with the operating company.

This responsibility cannot be delegated to any other party.

1.6.2 REQUIREMENTS FOR OPERATING / MAINTENANCE STAFF

The operating company shall:

- only allow trained specialists (specializing in metalwork) or CNC lathe operators to work with the INOFlex® chuck,
- clearly define the responsibilities of staff involved with installation, commissioning, operation, maintenance and repair work,
- ensure that staff undergoing training only work with the INOFlex® chuck under the supervision of an experienced specialist (specializing in metalwork) or a CNC lathe operator.

Everyone responsible for operating the INOFlex® chuck shall:

- ensure the safety of third parties, the INOFlex® chuck and the machine tool at all times,
- read the Operating Manual, in particular the chapter on safety, and the warning notes and confirm this with their signature,
- observe the basic regulations concerning occupational health and safety and accident prevention,
- only use the INOFlex® chuck when they are familiar with the specific features of the actual chuck and of the machine tool, including its safety and emergency equipment, and can operate both safely.

Operating staff must devote all their attention to working with the machine tool with the INOFlex® chuck.



It is about your safety and the safety of your colleagues and others in the vicinity of the machine!

1.7 ACCIDENT PREVENTION REGULATIONS

1.7.1 GENERAL

Check the INOFlex® chuck daily for operational safety prior to each use! In addition to the instructions in the documentation, observe the generally applicable local safety and accident prevention regulations.

Any faults that occur and negatively impact safety must be rectified immediately. Damaged parts must be replaced immediately. The machine must not be operated with the INOFlex® chuck until the fault has been rectified.

1.7.2 PROTECTIVE MEASURES PROVIDED BY THE OPERATING COMPANY

Workplace ergonomics

The workplaces for operating staff must be designed in accordance with ergonomic guidelines. Clear access (avoidance of tripping hazards), adequate lighting, etc. (accident prevention regulations, safety of the operator at the workplace) must be ensured by the operating company.

Personal protective measures

Personal protective equipment must be worn in accordance with the guidelines and regulations of the employers' liability insurance association and the company (work clothes, non-slip safety shoes, hairnet, etc.).

Access to the machine

Keep unauthorized persons away from the work area. This can be ensured through the use of self-closing doors, which can only be opened with a key, or similar protective measures.

1.7.3 INSTALLATION AND COMMISSIONING

Make sure that the chuck is properly inserted and secured in the machine tool.

Prior to commissioning the INOFlex® chuck, commissioning staff must ensure that the INOFlex® chuck is in efficient working order by carrying out the specified inspections and test runs!

1.7.4 SAFETY WHEN NOT IN USE

Secure the machine tool with the INOFlex® chuck against unauthorized operation when not in use (e.g. with a padlock at the main switch of the machine tool).

Make sure that children cannot access the INOFlex® chuck or the machine tool.

1.7.5 MAINTENANCE AND REPAIR

Maintenance intervals

Perform all the specified maintenance work on time.

Cleaning agents

Clean all surfaces that come into contact with the product with cleaning agents that comply with the applicable hygiene and health standards.

Tests

Make sure that clamping and rotating parts are in efficient working order prior to each use. Replace defective parts immediately with flawless parts.

After completing maintenance and repair work, make sure that all the components are in efficient working order.

Disposal

Handle and dispose of used substances and materials properly, especially grease and solvents.

2 TECHNICAL DESCRIPTION

2.1 GENERAL

The INOFlex® power chuck VT-Q 021 - VT-Q 040 is intended exclusively for clamping components for mechanical machining in lathes (see also chapter "7" Technical data [...▶ 39]).

The chuck may only be used in accordance with VDI 3106 and in compliance with the operating instructions for the machine tool and this Operating Manual.

NOTE

The chuck is greased at the factory and may need to be re-greased.

2.2 OVERVIEW OF THE INOFLEX® CHUCK

2.2.1 STRUCTURE

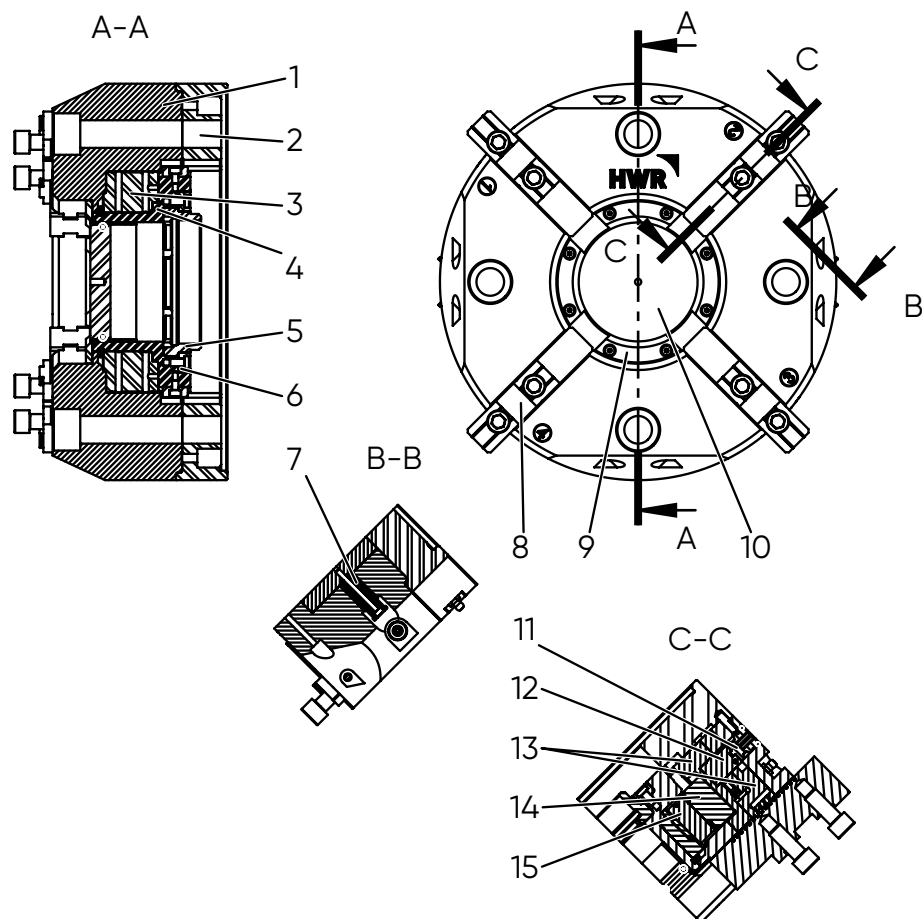


Fig. 2-1: Structure of the INOFlex® power chuck

- | | |
|------------------------|--------------------------------|
| 1 Upper housing | 9 Sealing bush |
| 2 Lower housing | 10 Cover |
| 3 Draw ring | 11 Pivot pin |
| 4 Draw guide | 12 Adjustment pin |
| 5 Groove nut | 13 Tangential slider, complete |
| 6 Retaining ring | 14 Driver |
| 7 Stroke control | 15 Compensation pin |
| 8 Base jaw | |
| Helical toothed module | |

2.2.2 FUNCTIONAL DESCRIPTION

Once the power chuck has been installed in the machine tool by an instructed and trained specialist (specializing in metalwork) or a CNC lathe operator, the same person clamps the workpiece to be machined in the chuck.

The concentric and compensating 4-jaw power chuck enables the clamping of round, square and geometrically irregular parts and is also ideal for workpieces that are sensitive to deformation.

After mounting the INOFlex® power chuck on the machine spindle (if necessary with the aid of an adapter installed by the customer), the clamping force of a hydraulic clamping cylinder is transmitted from the groove nut (3), retaining ring (2) and draw guide (4) via the draw ring (5), compensation pin (6) and driver (7) to the tangential slider (8) and base jaws (1).

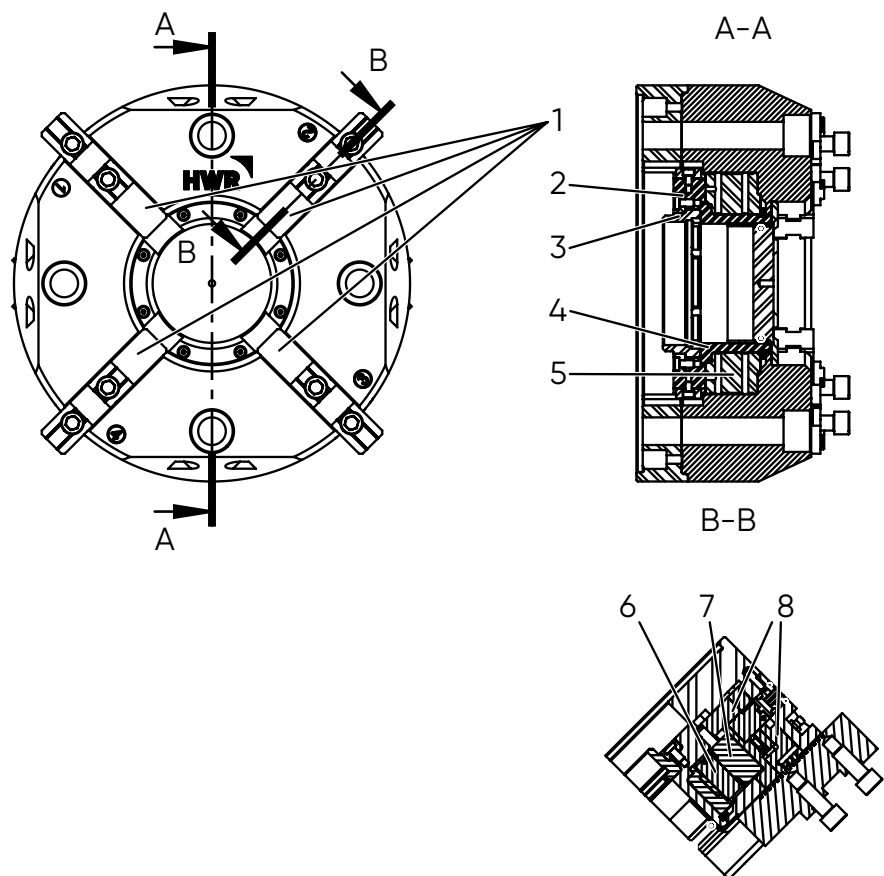


Fig. 2-2: How the INOFlex® power chuck works

3 TRANSPORTATION AND INSTALLATION

3.1 GENERAL

Remain calm and composed during installation work. Avoid stress and stressful situations that could lead to errors or accidents.

Keep all transportation routes and the installation site free of obstructions when performing work.

During installation work, also observe the operating instructions for the machine tool on which the power chuck is installed.

WARNING

Observe the regulations and guidelines of the operating company regarding personal protective equipment (PPE).

3.2 TRANSPORTATION

3.2.1 TRANSPORT TOOLS

Upon delivery, the securely packaged INOFlex® chuck can be transported using the following auxiliary equipment, depending on its weight:

- Crane
- Forklift truck or pallet truck

3.2.2 NOTES ON THE PACKAGING

It is essential that you observe the notes and instructions on the packaging (if available).

3.2.3 PRECAUTIONS FOR TRANSPORTATION

The transportation of heavy INOFlex® chucks, if necessary with auxiliary equipment, should only be carried out by qualified staff.

DANGER



During transportation, there is a risk of the transported components tipping over, moving or falling down. This may result in damage to the chuck or life-threatening injuries.

To prevent damage to the chuck and life-threatening injuries, comply with the following measures:

- The INOFlex® chuck may only be lifted at the designated suspension point or threaded holes.
- When lifting, moving or transporting the chuck, always observe its center of gravity and attachment position.
- Load handling devices and lifting accessories must comply with the provisions of the accident prevention regulations.
- When selecting the load handling devices and lifting accessories, always take into account the weight of the INOFlex® chuck and, if necessary, the length of the lift arm (e.g. crane boom).
- Always cordon off access to transport routes for suspended loads and clearly mark these areas to prevent anyone from entering them.

DANGER



Never walk below or stand underneath suspended loads. Risks of accidents!

3.2.4 CHUCK TRANSPORTATION WITH LIFTING EYE BOLT

The lifting eye bolt (DIN 580) included in the scope of delivery must be used for transportation.

⚠ CAUTION

The lifting eye bolt is marked with the permissible load-carrying capacity.

- Step 1** Screw the lifting eye bolt into the base body of the chuck prior to transportation (see the following illustration). Attach the hoist.

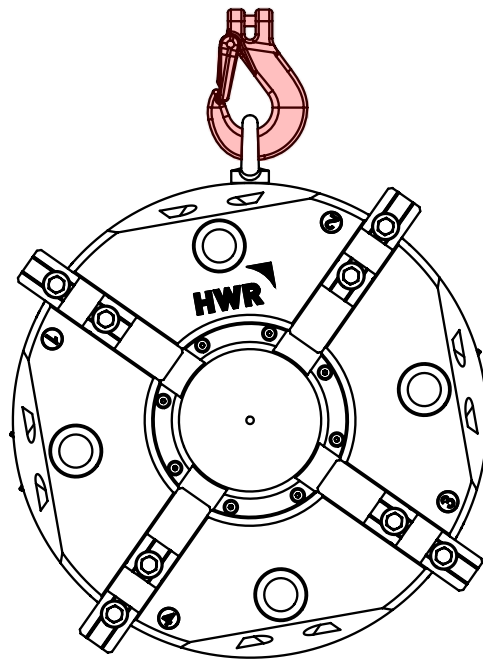


Fig. 3-1: Transportation with lifting eye bolt

- Step 2** During transportation, observe the precautions described in section 3.2.3 [[...](#) [15](#)].

⚠ WARNING

Do not remove the hoist and the lifting eye bolt until the chuck has been securely installed in the machine tool.

3.2.5 TESTS AFTER TRANSPORTATION / RECEIPT OF THE CHUCK

Check the condition (transport damage) of the INOFlex® chuck immediately upon receipt.

Notify the carrier and the manufacturer of the chuck (HWR Spanntechnik GmbH) of any transport damage found. The address and telephone number can be found on the inside of the title page.

⚠ WARNING

Any damage caused during transportation of the chuck must be repaired properly and fully prior to commissioning.

3.3 INSTALLATION

⚠ WARNING

The INOFlex® chuck may only be installed by trained and instructed staff who have also received training and instruction to enable them to operate the machine tool.

3.3.1 SPACE REQUIREMENTS

The freedom of movement required for installation of the INOFlex® chuck corresponds to the space required by the machine tool operator (see the relevant operating instructions for the machine tool).

3.3.2 MEASURES PRIOR TO INSTALLATION

NOTE

The chuck can be installed on the machine spindle of the machine tool with an adapter plate and corresponding adapter.

- Step 1** Clean the mounting surfaces of the machine spindle and, when using an adapter plate, also its centering mount and contact surfaces. There must be no dirt or chips on the relevant surfaces. The adapter plate, if present, must be in full contact with the machine spindle. Also make sure that all the holes are deburred and clean.
- Step 2** Use a dial gauge to check concentricity and runout of the mounting surfaces (machine spindle and adapter plate, if applicable) for the chuck.

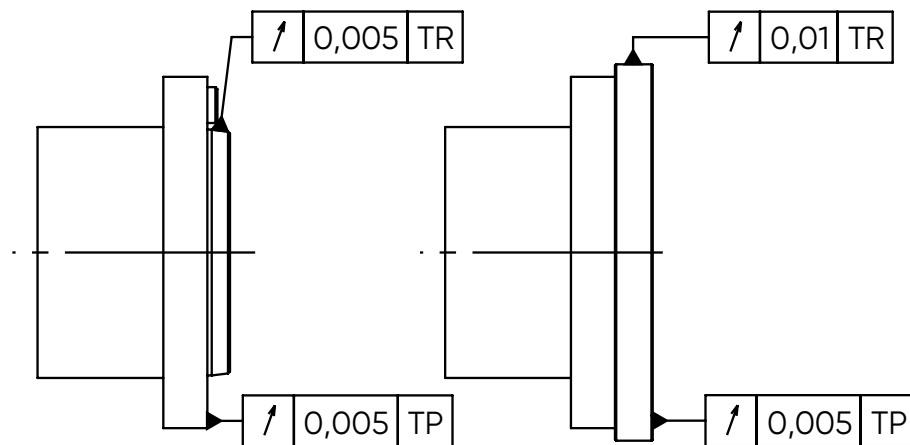


Fig. 3-2: Checking concentricity and runout

- Step 3** Check the maximum tensile force of the clamping cylinder. It must not exceed the maximum draw pull of the chuck. If necessary, the hydraulic pressure of the clamping cylinder must be limited!

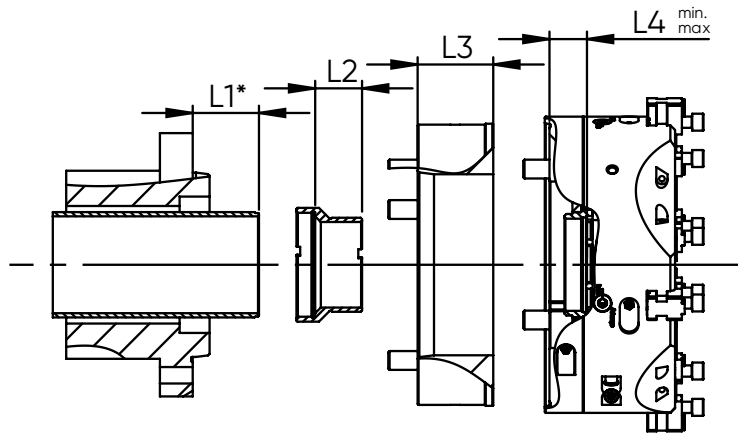
⚠ WARNING

The maximum tensile force of the clamping cylinder must not exceed the maximum draw pull of the chuck under any circumstances. Risks of accidents!

- Step 4** Check the fatigue strength of self-made connecting parts.
- Step 5** Calculations for the adapter:
 Determine the intermediate size: $X = L3 + L4 \text{ max.}$
 Check the adapter size: $X = L1 + L2$

NOTE

**The following illustration is an example (here with draw tube outside the spindle and with external thread).
 $L2 = L4 \text{ max.} + L3 - L1 + 0.3 \text{ mm (max.} + 0.5 \text{ mm)}$
 For all other constellations, please contact the manufacturer.**



*) Cylinder in front position

Fig. 3-3: Determining the adapter length

3.3.3 INSTALLATION OF THE CHUCK

NOTE

The chuck can be installed on the machine spindle of the machine tool with an adapter plate and corresponding adapter.

- Step 1** Check that the measures prior to installation have been performed (see section 3.3.2 [... ▶ 18]).
- Step 2** Place the draw tube (2) in the front position and screw the adapter (3) onto the draw tube after applying copper paste to the thread to prevent rust/seizures.
- Step 3** Fasten the adapter plate (4) to the spindle (if the chuck is not screwed directly to the spindle) and check concentricity and runout as shown in Fig. 3-2 [... ▶ 18]
- Step 4** Remove the sealing bush (1) from the chuck to ensure that the groove nut (5) can be subsequently screwed on (see step 7).
- Step 5** Use the hoist to carefully and slowly guide the clean chuck (hanging on the lifting eye bolt) in front of the adapter plate or the machine spindle.

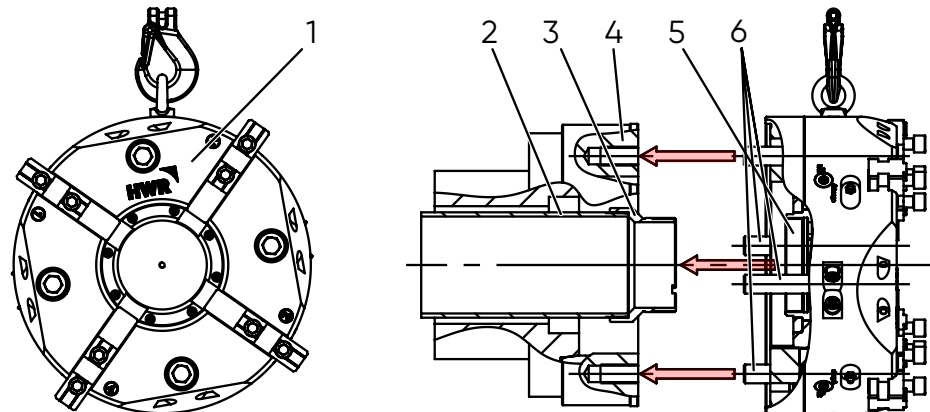


Fig. 3-4: Installation of the chuck

- Step 7** Install the supplied fixing screws (6) - preferably strength class 12.9 - and the groove nut (5) and tighten everything slightly (alternately).
- Step 8** Remove the hoist and the lifting eye bolt.
- Step 9** Set the clamping cylinder to the lowest pressure level and actuate the cylinder to "Chuck closed".
- Step 10** Check concentricity and runout of the chuck
Depending on the size of the chuck, the following tolerances must be observed:

VT-Q	021	026 - 031	040
Concentricity tolerance [mm]	0.02	0.03	0.05
Runout tolerance [mm]	0.02	0.03	0.05

Table 3-1: Concentricity and runout tolerance

- Step 11** Align the chuck with the outer diameter by gently tapping it with a plastic hammer, if necessary.

- Step 12** Tighten the groove nut (5) using the supplied chuck key (8) along with an extension and a ratchet handle or a T-handle. Then tighten the fixing screws (6) using a torque wrench (7) (alternately).

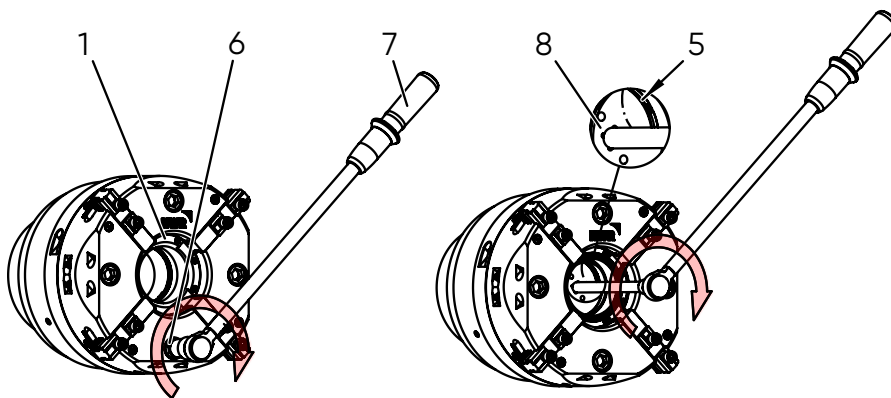


Fig. 3-5: Tightening the screws to the correct torque

NOTE

Observe the maximum tightening torques for the fixing screws (see Table 7-9 [... 50]).

⚠ WARNING

The chuck body must be free of tension.

- Step 13** Check the concentricity and runout of the chuck again according to table 3-1.

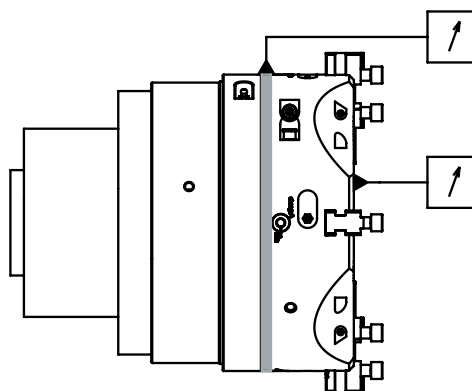


Fig. 3-6: Tightening the screws to the correct torque

3.4 CHANGING THE CLAMPING JAWS**3.4.1** GENERAL

Depending on the workpiece being machined, soft or hard top jaws can be used.

NOTE

The manufacturer recommends the use of original clamping jaws from HWR Spanntechnik GmbH.

The manufacturer shall assume no warranty for parts supplied by third parties.

⚠ WARNING

Should you nevertheless wish to use clamping jaws from other manufacturers, always consult the chuck manufacturer HWR Spanntechnik GmbH first. Note that you must also carry out a calculation in accordance with the VDI 3106 guideline to determine the maximum permissible speed and necessary clamping force.

⚠ CAUTION

The surfaces of the INOFlex® chuck may become hot during operation. Allow the INOFlex® chuck to cool down after use to avoid burns.



3.4.2 REMOVING THE BASE JAW

⚠ CAUTION

The INOFlex® power chuck must be fully open when changing the base jaws.

Step 1 Insert the adjustment key (1) into the pivot pin (2) as demonstrated by the red arrow ①.

NOTE

Make sure that the adjustment key (1) is inserted fully into the pivot pin (2).

Step 2 Turn the adjustment key (1) from the "lock" position to the "change" position, as demonstrated by the red arrow ②. A low spring force must be overcome and maintained throughout the entire base jaw change process.

NOTE

The direction of rotation for jaws 1 and 3 (clockwise) is opposite to jaws 2 and 4 (counterclockwise).

Step 3 Remove the base jaw (3) from the upper part of the housing (4). As demonstrated by the red arrow ③.

NOTE

A noticeable ratcheting of the base jaw (3) can be felt.

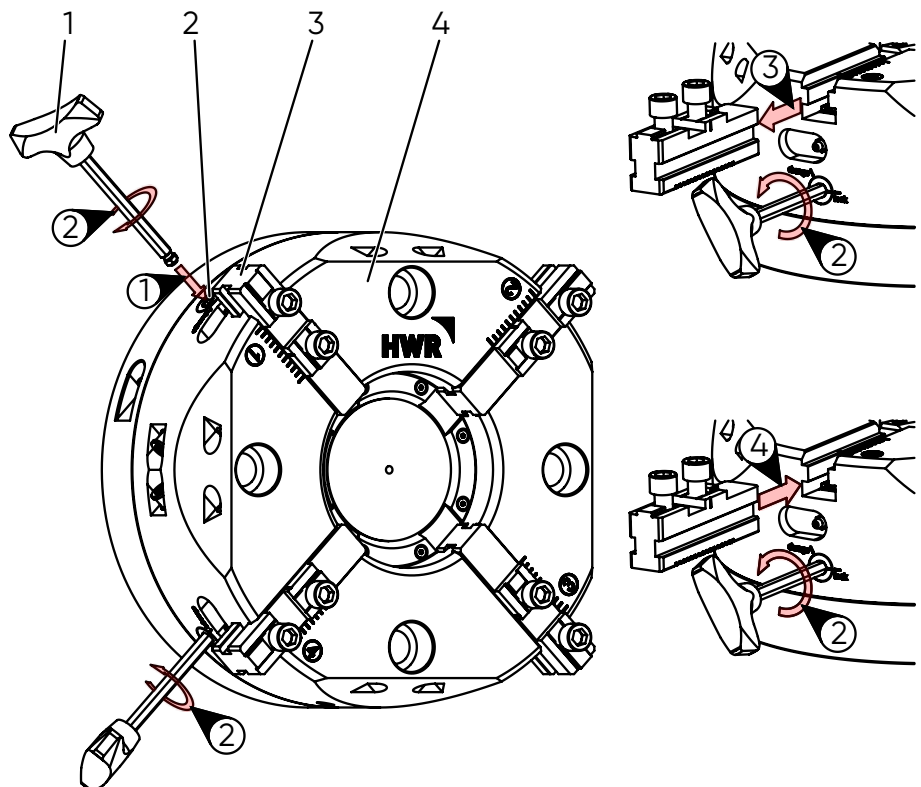


Fig. 3-7: Changing the base jaws

⚠ DANGER

Risk of injury when changing the base jaws. Make sure that the adjustment key (1) is in the "change" position to avoid hand injuries.

3.4.3 INSERTING THE BASE JAW

⚠ CAUTION

Make sure that the INOFlex® power chuck is fully open when changing the base jaws.

⚠ CAUTION

Make sure that the serration and the guide surfaces are clean and that the base jaw numbers match the signed jaw numbers on the INOFlex® chuck.

Step 1 Coat the serration and the guide surfaces of the base jaws being inserted with lubricating grease.

⚠ CAUTION

Only use OKS 265 lubricating grease from HWR Spanntechnik GmbH (or other lubricating greases approved by HWR).

Step 2 Insert the adjustment key (1) into the pivot pin (2) as demonstrated by the red arrow ①.

NOTE

Make sure that the adjustment key (1) is inserted fully into the pivot pin (2).

Step 3 Turn the adjustment key (1) from the "lock" position to the "change" position, as demonstrated by the red arrow ②. A low spring force must be overcome and maintained throughout the entire base jaw change process.

NOTE

The direction of rotation for jaws 1 and 3 (clockwise) is opposite to jaws 2 and 4 (counterclockwise).

Step 4 Take the new base jaw (3) and insert it into the upper part of the housing (4) as demonstrated by the red arrow ④. Set the desired base jaw position.

NOTE

A noticeable ratcheting of the base jaw (3) can be felt.

⚠ CAUTION

The base jaw can only be securely locked in the usable area, and the adjustment key (1) can be removed in the "lock" position.

⚠ DANGER

Never operate the INOFlex® power chuck with the adjustment key (1) inserted.

3.4.4 INSTALLING THE TOP JAWS

Step 1 Place the clamping jaw (2) in the tongue and groove of the base jaw (3) and install two cylinder head screws (1), each of strength class 12.9.

⚠ WARNING

Make sure that the tongue and groove is clean and that the clamping jaw number matches the base jaw number. Ensure a sufficient screw-in depth (min. 1.25 x thread diameter).

Step 2 Tighten the screws (1) using a torque wrench.

NOTE

Observe the maximum tightening torques for the fixing screws (see Table 7-9 [... ▶ 50]).

⚠ WARNING

Two fixing screws must be used to install the top jaws.

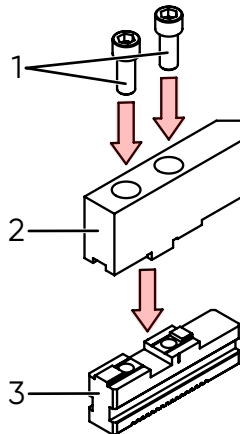


Fig. 3-8: Installing the top jaws

3.5 FUNCTIONAL TEST

After installing the chuck, its efficient working order must be checked prior to commissioning. Particular attention must be paid to the clamping force:

- Correct clamping of the chuck must be checked by actuating (opening and closing) the clamping cylinder (see section 5.2.6 [... ▶ 30]).
- To check correct installation on the machine spindle, the jaw stroke must be checked (see section 5.2.7 [... ▶ 31]).
- If necessary, calculate the permissible speed in accordance with the VDI 3106 guideline.
- Measure the clamping force with a suitable clamping force gauge using two jaws (1/2 total clamping force) or four jaws.

4 OPERATION

4.1 GENERAL

This chapter provides information on how to operate the INOFlex® chuck.

⚠ WARNING

Observe the regulations and guidelines of the operating company (e.g. regarding personal protective equipment (PPE)).

⚠ WARNING

Also observe the operating instructions for the machine tool on which the chuck is installed.

4.2 PREPARATIONS

- Step 1** Check that the chuck has been installed properly on the machine tool.
- Step 2** Make sure that a functional test has been performed (see section 3.5 [...▶ 25]).

4.3 CLAMPING THE WORKPIECE

⚠ WARNING

Prior to turning on the machine and before operating the chuck, make sure that the machine tool is in efficient working order.

⚠ DANGER

If the maximum speed of the lathe is higher than the maximum permissible speed of the chuck, a speed limiter must be installed in the machine.

It is absolutely essential that the chuck is not operated at an excessive speed and thus at an excessive centrifugal force. Otherwise, there is a risk of the workpiece being insufficiently clamped.

Step 1 Place the workpiece in the chuck with both hands and clamp it by pressing the foot switch.

Step 2 Check the two stroke controls (1) to ensure that the workpiece is clamped securely. (see section 4.3.1 [... ▶ 28])

⚠ DANGER

NOBODY other than the trained specialist involved should be present at the machine during the clamping process.

⚠ DANGER

An insecurely clamped workpiece increases the risk of being injured by ejection of the workpiece.

⚠ WARNING



Risk of becoming trapped

There is a risk of your hands becoming trapped when clamping the workpiece.

⚠ DANGER

Make sure that both pairs of jaws clamp the component. Never clamp workpieces and proceed to work with only three jaws.

Step 3 Once the workpiece has been clamped correctly, commence operation of the machine in accordance with the operating instructions for the machine tool. Do not exceed the permissible speed.

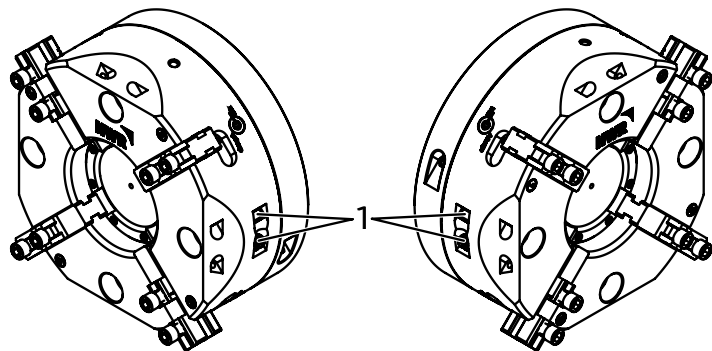


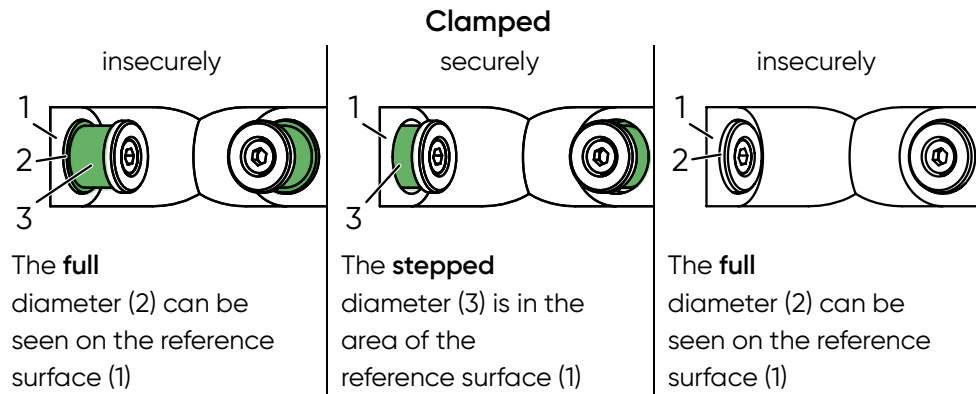
Fig. 4-1: Position of the stroke controls

⚠ DANGER

***Do not clamp workpieces outside the chuck diameter.
(Maximum clamping diameter = chuck diameter)***

4.3.1 STROKE CONTROL

When the workpiece is clamped, the reference surface must be in the area of the stepped (colored green) diameter, as shown in Fig. 4-2. This eliminates the possibility of the base jaw abutting before the workpiece is clamped securely.



- 1 Reference surface
- 2 Full diameter
- 3 Stepped diameter / Secure clamping area (colored green)

4.4 ROUTINE TASKS DURING OPERATION

- Carry out a routine visual inspection for contamination. If necessary, stop operation and clean the chuck / machine (see chapter "5" Maintenance [...▶ 29]).
- Also observe the operating instructions for the machine tool.

5 MAINTENANCE

5.1 GENERAL

To ensure trouble-free operation, the INOFlex® chuck and the machine tool require routine maintenance and care. This includes a functional test and a visual inspection for damage and wear.

⚠ WARNING

Also observe the operating instructions for the machine tool on which the chuck is installed.

Have the materials required for cleaning the chuck ready.

5.2 MAINTENANCE

5.2.1 MAINTENANCE INTERVALS

Perform all the specified maintenance work on time.

5.2.2 TESTS

The load-bearing and moving parts must be checked to ensure that they are in efficient working order prior to each use. Replace defective parts immediately with flawless parts.

⚠ WARNING

Repair and replacement work on the INOFlex® chuck may only be performed by trained and instructed staff who have also received training and instruction to enable them to operate the machine tool.

After completing maintenance and repair work, make sure all the safety devices of the machine are in efficient working order. Protective enclosures and protective covers must be installed correctly.

5.2.3 LUBRICANTS

Only use OKS 265 lubricating grease from HWR Spanntechnik GmbH (or other lubricating greases approved by HWR).

⚠ WARNING

In contact with skin, lubricant may cause skin irritation. Always wear suitable protective gloves.

⚠ WARNING

Observe the safety instructions on the grease cartridge and the grease data sheet.

5.2.4 SAFETY INSTRUCTIONS

Prior to starting maintenance and care work, always turn off the machine tool and secure the machine against unintentional reconnection (see the operating instructions for the machine tool).

5.2.5 MAINTENANCE SCHEDULE

Prior to each use of the chuck			
Visual inspection to ensure optimum condition and efficient working order			
Table 5-1: Maintenance work prior to each use			
During operation			
Routine visual inspection for contamination			
Table 5-2: Maintenance work during operation			
After each use of the machine			
Manual cleaning			
Table 5-3: Maintenance work after each use			
VT-Q	021	026 - 031	040
Measurement of the clamping force with a suitable clamping force gauge: using two jaws (1/2 total clamping force) or four jaws	All 2000 clamping strokes	All 1000 clamping strokes	All 1000 clamping strokes
Checking the base jaw stroke	All 2000 clamping strokes	All 1000 clamping strokes	All 1000 clamping strokes
Table 5-4: Maintenance work after clamping strokes			

⚠ DANGER

The chuck must be provided with sufficient lubricating grease. Otherwise, there will be a loss of clamping force. Risks of accidents!

5.2.6 CHECKING THE CLAMPING FORCE

The clamping force of the chuck must be checked routinely in accordance with the maintenance schedule. Use a suitable gauge to measure the clamping force using two jaws (1/2 total clamping force) or four jaws.

NOTE

The total clamping force results from the sum of the clamping forces of each base jaw.

⚠ WARNING

The clamping force achieved may alter after prolonged operation of the chuck.

Procedure when the clamping force is exceeded

An increase in the measured clamping force - compared to the value specified in section 7.9 [... 40] - does not represent a malfunction of the chuck. If the clamping force is more than 10% above the value specified in section 7.9 [... 40], the operating company must record and use a new characteristic curve for the ratio between the draw pull and the clamping force (template in section 9.1 [... 54]).

In this case, the maximum draw pull of the chuck must be reduced to ensure that the maximum clamping force specified in section 7.9 [\[...▶ 47\]](#) is not exceeded.

Procedure when the clamping force is too low

If the clamping force is more than 15% below the value specified in section 7.9 [\[...▶ 47\]](#), the chuck must be re-lubricated (see section 5.3 [\[...▶ 32\]](#)).

If the desired total clamping force is not achieved even after lubricating all the grease nipples, the chuck must be disassembled and cleaned fully (see section 5.4 [\[...▶ 33\]](#)).

If the total clamping force is not achieved even after cleaning the chuck fully, including re-lubrication of the chuck, the chuck must be sent to the manufacturer for inspection.

5.2.7 CHECKING THE BASE JAW STROKE

The stroke of the base jaws must be checked routinely in accordance with the maintenance schedule. The values specified in the technical data (section 7.9 [\[...▶ 47\]](#)) serve as a reference in this case.

If the measured stroke per base jaw does not match the value specified in the table, the chuck must be dismantled and cleaned fully (see section 5.4 [\[...▶ 33\]](#)).

If the required stroke per base jaw is not achieved even after cleaning the chuck fully, the chuck must be sent to the manufacturer for inspection.

5.3 LUBRICATION

⚠ WARNING

To maintain the required clamping force, the chuck MUST be re-lubricated at routine intervals (for the maintenance schedule, see Table 5-4 [... 30]).

⚠ CAUTION

Only use OKS 265 lubricating grease from HWR Spanntechnik GmbH (or other lubricating greases approved by HWR).

⚠ CAUTION

The base jaws of the chuck must be fully open during lubrication.

Lubricate all the grease nipples (1) with the grease gun. Roughly five strokes of the grease gun per grease nipple are sufficient.

⚠ WARNING

Not enough / Too much grease causes a loss of clamping force and increases the risk of accidents.

⚠ WARNING

In contact with skin, lubricant may cause skin irritation. Always wear suitable protective gloves.

⚠ WARNING

Observe the safety instructions on the grease cartridge and the grease data sheet.

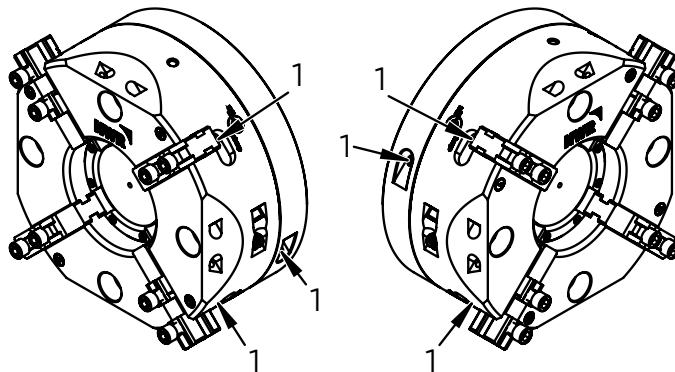


Fig. 4-2: Grease nipples

5.4 DISASSEMBLING / CLEANING / INSTALLING THE CHUCK

To ensure the clamping force, the chuck must be disassembled, cleaned and then re-lubricated at routine intervals.

NOTE

For the maintenance schedule, see Table 5-4 [...▶ 30].

Disassembly and cleaning

- Step 1** Place the chuck with the jaw side on a workbench.
- Step 2** Remove the parallel pins (10).
- Step 3** Remove the fixing screws (11).
- Step 4** Press off the lower part (8) by inserting the fixing screws (11) into the threaded holes (9).
- Step 5** Remove the stroke control (3) by loosening the respective fixing screw. The pins are detached from the parallel slider and can be removed.
- Step 6** Remove the parallel pins (4) and remove the pivot pins (2).
- Step 7** Lift the inner parts out of the chuck body (1) by lifting them over the groove nut (7).
- Step 8** Now separate all parts from each other and place them down individually. To do so, also loosen the screws that connect the retaining ring (6) to the groove nut (7) and remove the circlip (5).

⚠ WARNING

The circlip (5) must be replaced with a new ring after each removal.

⚠ WARNING

The fixing screws of the retaining ring (6) must be replaced after each removal.

NOTE

Pay careful attention to the position and installation of parts when placing them down. This facilitates subsequent assembly.

- Step 9** Clean all the parts thoroughly. Use cold cleaner/petroleum if necessary.
- Step 10** Check all the components. Replace damaged parts prior to re-using the chuck.

NOTE

If you have any questions or concerns, do not hesitate to contact the chuck manufacturer HWR Spanntechnik GmbH.

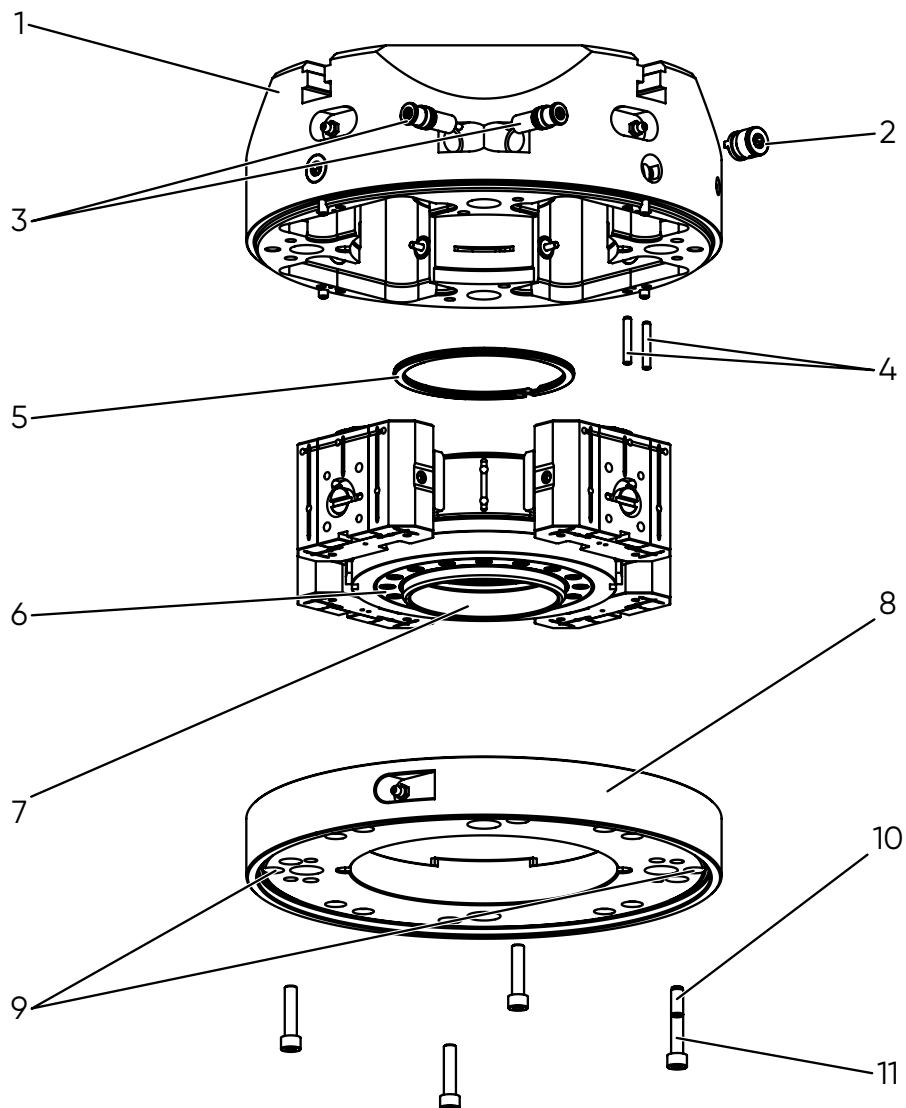


Fig. 4-2: Stroke control

Assembly

NOTE

The internal mechanisms of the chuck can be inserted using an auxiliary tool. Please contact the chuck manufacturer HWR Spanntechnik GmbH for more information.

⚠ WARNING

There are marking points on the base jaws, the tangential sliders and the upper part of the housing for arranging the components in the chuck.

- Step 1** Assemble the chuck in reverse order to disassembly. During assembly, pre-lubricate all the sliding and guide surfaces with OKS 265 lubricating grease from HWR Spanntechnik GmbH (or other lubricating greases approved by HWR).
- Step 2** After assembly, lubricate the chuck with lubricating grease from HWR Spanntechnik GmbH via the six grease nipples (see section 5.3 [...▶ 32]).
- Step 3** Measure the clamping force with a suitable clamping force gauge:
- using two jaws (1/2 total clamping force) or
 - using four jaws

⚠ WARNING

The clamping force may, as a result of lubricating, be below the specified values during initial measurements.

5.5 WORKING AFTER A LONGER PERIOD OF INACTIVITY

Technical maintenance staff must carry out the following tasks prior to each use:

after a longer period of inactivity
Visual inspection to ensure optimum condition and efficient working order of the chuck
Thorough cleaning of the chuck
Table 5-5: After a longer period of inactivity

5.6 DISPOSAL

Have the chuck removed properly and disassembled into its individual components by a trained specialist.

Handle and dispose of the substances and materials used, in particular grease and solvents, properly and in accordance with national regulations.

6 FAULTS

6.1 GENERAL

This chapter provides information on how to proceed in the event of a fault.

6.2 IN THE EVENT OF A FAULT

Step 1 Prior to starting troubleshooting, always turn off the machine tool and secure the machine against unintentional reconnection (see the operating instructions for the machine tool).

Step 2 Remedy the fault.

WARNING

Repair and replacement work on the INOFlex® chuck may only be performed by trained and instructed staff who have also received training and instruction to enable them to operate the machine tool. Prior to re-using the chuck or re-starting the machine, the person responsible for the machine must ensure that

- ***the repair work has been completed fully,***
- ***the chuck is installed securely in the machine tool,***
- ***the entire machine is in a safe condition.***

With regard to repair work, also observe the safety instructions in chapter "1" Safety [...> 1] of this Operating Manual and also the operating instructions for the machine tool.

Step 3 Restart operation of the machine tool.

WARNING

When re-using the chuck and the machine back, observe chapter "4" Operation [...> 26] of this Operating Manual and also the operating instructions for the machine tool.

6.3 POSSIBLE CAUSES OF ERRORS AND HOW TO REMEDY THEM

Error	Cause	Remedy
Only three jaws are in contact with the component.	The first pair of jaws to engage impedes compensation.	Pay attention to the contour during insertion to avoid tilting the component.
Jaw(s) jammed in the guide rail	Base jaw deformed, contact surface, top jaw not flat, dirty or damaged	Check top jaws, clean them, replace them if necessary.
	Base jaw deformed, tightening torque of fixing screws too high	Observe the specified tightening torque.
	Base jaw deformed	Replace the base jaw.
	Non-original jaw(s) used.	Use original jaws.
Jaws cannot be changed.	Draw tube adapter too short.	Replace the draw tube adapter.
	Draw tube / Draw bar broken.	Replace the draw tube / draw bar.
Concentricity error	Top jaws not turned or ground properly.	Turn or grind the top jaws again.
	Jaw inserted in the wrong guide rail.	Insert the jaw into the guide rail with the appropriate marking.
	Base jaws dirty or damaged.	Clean or replace the base jaws.
	Fixing screws of the top jaws too short or too long or over-stretched	Check screw-in depth, replace screws, observe tightening torque.
	Overhang of the top jaws too large	Change the top jaws or the clamping method.
	Chuck damaged or worn	Send the chuck to the manufacturer (HWR Spanntechnik GmbH) for inspection.
Strong vibration of the machine spindle	Imbalance due to workpiece or top jaws	Change / rework the top jaws or add weight to the chuck body.
	Imbalance at: - Machine spindle - Drive - Chuck flange	Check concentricity in stages on various components. Align, balance or replace components.
	Imbalance due to collision	Send the chuck to the manufacturer (HWR Spanntechnik GmbH) for inspection and repair.

Table 6-1: Possible causes of errors and how to remedy them

Error	Cause	Remedy
Chuck does not close	No hydraulic pressure	Check the hydraulic system.
	Clamping cylinder does not extend	Check the travel control on the cylinder.
Loss of clamping force	Short jaw stroke with a large number of identical workpieces Insufficient lubricating film	To build up the lubricating film and to achieve the full clamping force, actuate the chuck several times at full stroke without a workpiece.
	Insufficient lubricant for lubrication	Lubricate the chuck. Check the lubricant, change it if necessary.
	Contaminated chuck	Dismantle, clean and lubricate the chuck.
	Chuck not in efficient working order	Check all the components, replace damaged components with original components, send the chuck to the manufacturer (HWR Spanntechnik GmbH) for inspection and repair if necessary.
	Clamping cylinder leaking	Repair the clamping cylinder.
	Hydraulic system not generating any pressure	Repair the hydraulic system.
Adjustment key cannot be removed.	Jaws are not interlocked in the wedge bar.	Check the jaw position and correct it if necessary.
Adjustment key cannot be turned	Piston not in the front position	Move the piston all the way forward. The adapter may be too short.
Table 6-1: Possible causes of errors and how to remedy them [continued]		

7 TECHNICAL DATA

7.1 GENERAL

All the essential technical data for the INOFlex® power chuck can be found in this chapter. The data is organized as tables and structured according to individual sizes.

7.2 GENERAL PRODUCT DATA

Service life	25,000 operating hours
Clampable workpieces	Commercially available steels, cast metals, non-ferrous metals and plastics
Table 7-1: General product data	

7.3 OPERATING RESOURCES

Lubricating grease	OKS 265 (or other lubricating greases approved by HWR)
Table 7-2: Operating resources	

NOTE

OKS 265 lubricating grease (or other lubricating grease approved by HWR) can be obtained from HWR Spanntechnik GmbH.

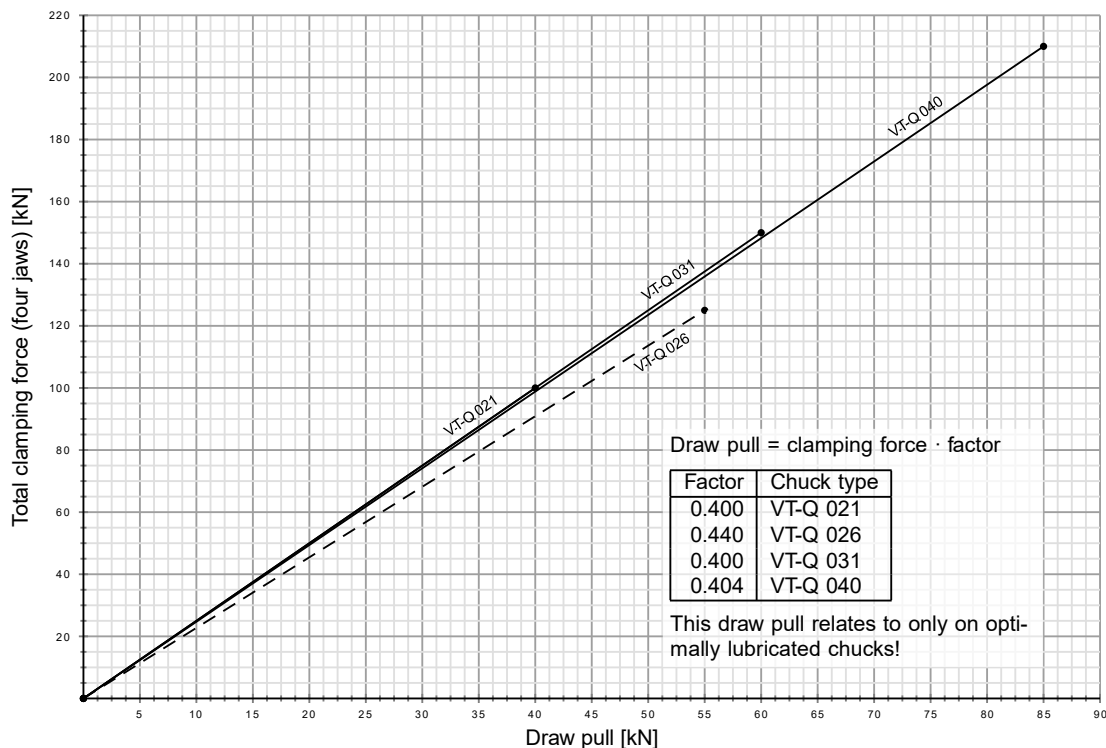
7.4 AMBIENT CONDITIONS

Operation	For temperature range, see the operating instructions for the tools if necessary
Storage	No temperature restrictions
Relative humidity	5-85%
Installation site of the machine tool	Level, firm surface
Table 7-3: Ambient conditions	

7.5 OTHER DOCUMENTS

Spare parts list
Declaration of incorporation
Declaration of knowledge of instructed staff
Table 7 3: Other documents

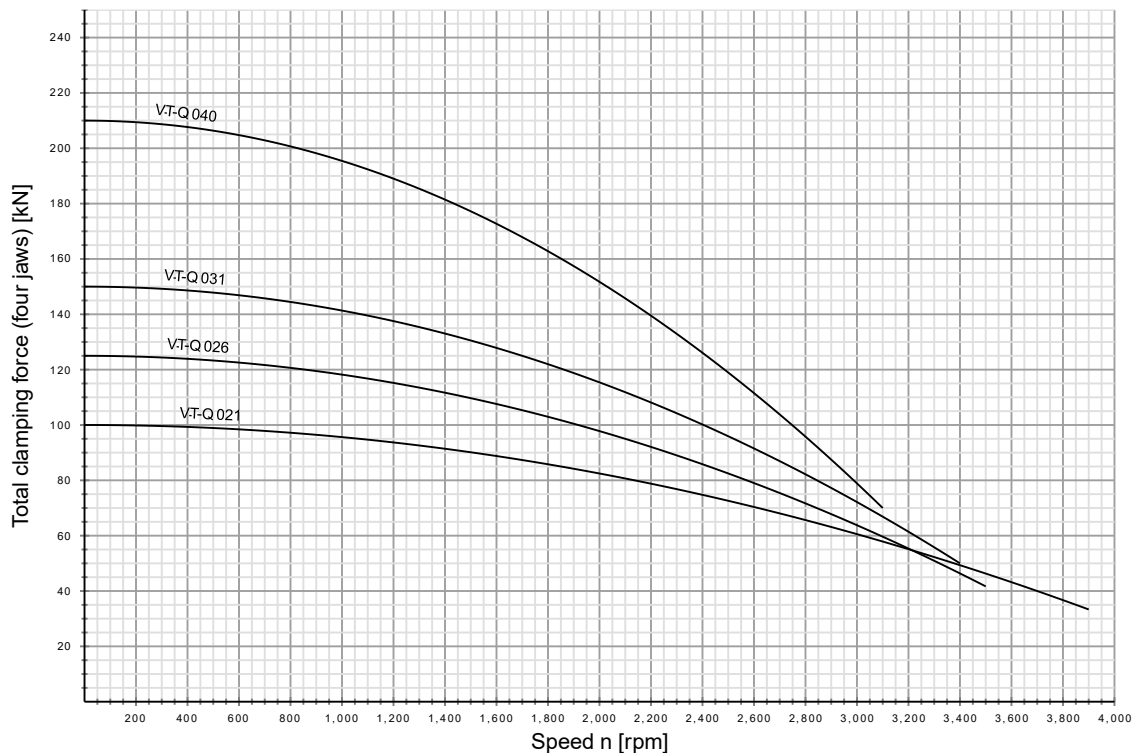
7.6 CLAMPING FORCE / DRAW PULL DIAGRAM



⚠ WARNING

The diagrams apply to chucks in the as-delivered state. The clamping force curve may have to be re-recorded (see section 5.2.6 [... 30]).

7.7 CLAMPING FORCE / SPEED DIAGRAM



7.8 CALCULATING THE CLAMPING FORCE AND SPEED

The basis for calculating the clamping force and speed is VDI 3106. More detailed explanations can be found in standards VDI 3106, DIN EN 1550 and DIN 6386.

Legend					
F_C	Total centrifugal force	[N]	M_{cAB}	Centrifugal torque of top jaws	[kg·m]
F_{Sp}	Effective clamping force	[N]	M_{cGB}	Centrifugal torque of base jaws	[kg·m]
F_{Spmin}	Minimum required clamping force	[N]	n	Speed	[rpm]
F_{Sp0}	Initial clamping force	[N]	r_s	Center of gravity radius	[m]
F_{SpZ}	Machining force	[N]	r_{sAB}	Center of gravity radius of top jaw	[m]
m_{AB}	Weight of one top jaw	[kg]	S_{Sp}	Safety factor for clamping force	[-]
m_B	Weight of clamping jaw set	[kg]	S_Z	Safety factor for cutting	[-]
M_c	Centrifugal torque	[kg·m]	$\sum S$	Max. clamping force of chuck	[N]
Table 7-4: Formula symbols used					

7.8.1 CALCULATING THE CLAMPING FORCE

When the chuck is actuated while stationary, the jaws exert radial forces on the workpiece. This is referred to as the initial clamping force F_{Sp0} . During machining, the chuck is under the influence of speed, and the jaws generate an additional centrifugal force F_C due to their weight.

Depending on the clamping situation, the centrifugal force F_C can cause the effective clamping force F_{Sp} on the workpiece to:

- **decrease (-)**, in case of external clamping (clamping from the outside inwards) or
- **increase (+)**, in case of internal clamping (clamping from the inside outwards)

$$F_{Sp} = F_{Sp0} \mp F_C \text{ [N]} \quad (1)$$



DANGER

The speed must not fall below the calculated speed.



DANGER

The required minimum clamping force must not be undercut.

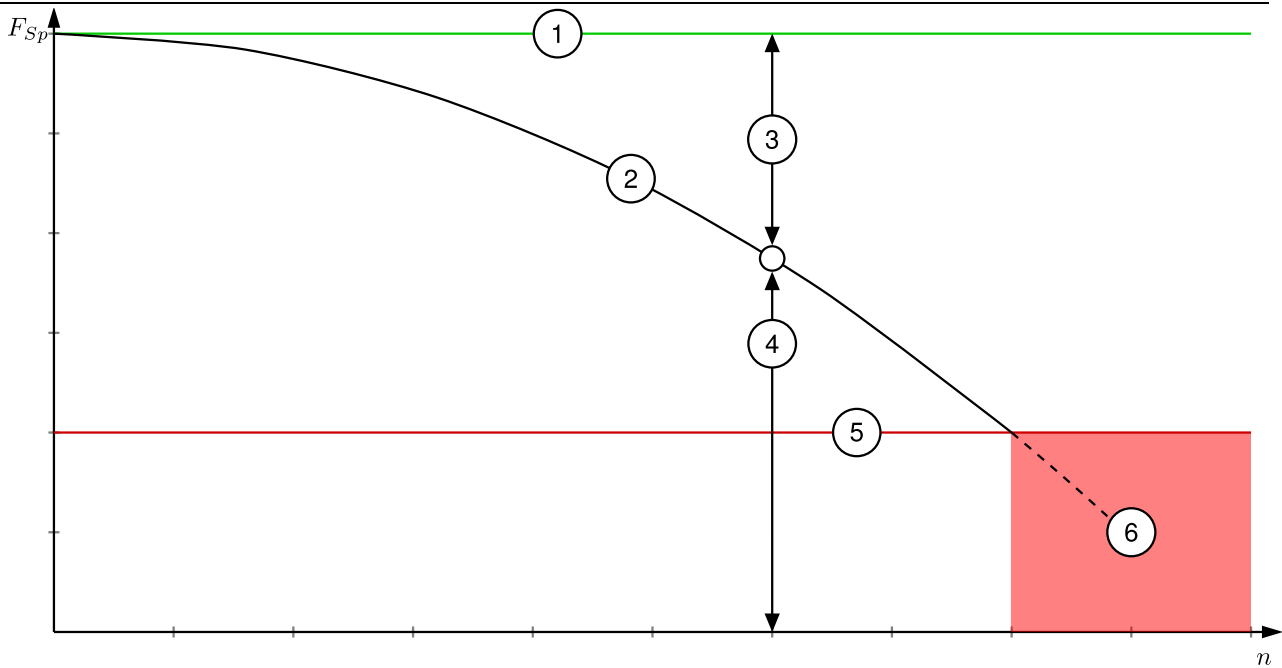


Fig. 7-1: Clamping force-speed diagram

1 Initial clamping force (stationary 0rpm) F_{Sp0}	4 Effective clamping force F_{Sp}
2 Clamping force-speed curve	5 Required minimum clamping force F_{Spmin}
3 Centrifugal force F_C	6 Workpiece is released in an uncontrolled manner

Table 7-5: Legend for total centrifugal force diagram

Cutting forces F_{SpZ} act on the workpiece during the machining process. The required effective clamping force F_{Sp} is a product of the effective machining force F_{SpZ} and the safety factor S_Z .

The fluctuations in the machining process are taken into account via the safety factors.

- Fluctuations in the cutting forces during the machining process are taken into account in accordance with VDI 3106 with $S_Z \geq 1,5$.
- Fluctuations in the clamping force during the machining process are taken into account in accordance with VDI 3106 with $S_{Sp} \geq 1,5$.

$$F_{Sp0} = S_{Sp} \cdot (S_Z \cdot F_{SpZ} \mp F_C) \text{ [N]} \quad (2)$$

(+) External clamping

(-) Internal clamping

⚠ WARNING

For reasons of safety, the calculated clamping force must not exceed the maximum total clamping force $\sum S_{max}$ engraved on the chuck.

The total centrifugal force F_C that acts on rotating clamping jaws depends on the following parameters:

- **Weight of the clamping jaw set m_B** , sum of the weight of all clamping jaws (base jaw and top jaw)
- **Center of gravity radius r_s** , distance between the rotary axis of the chuck and the center of gravity of the clamping jaw (base jaw and top jaw)
- **Speed n** during the machining process

$$F_C = \sum(m_B \cdot r_s) \cdot \left(\frac{\pi \cdot n}{30}\right)^2 = \sum M_c \cdot \left(\frac{\pi \cdot n}{30}\right)^2 \quad [\text{N}] \quad (3)$$

The product of weight m_B and center of gravity radius r_s is also referred to as centrifugal torque. $M_c = m_B \cdot r_s \quad [\text{kg} \cdot \text{m}]$ (4)

The given speed in rpm must be specified in the formula.

⚠ WARNING

For reasons of safety, standard DIN EN 1550 stipulates that the centrifugal force must not exceed 67% of the initial force.

For chucks with split jaws consisting of a base jaw and a top jaw, where the radial position of the jaws changes by the amount of jaw stroke, the centrifugal torque M_c can be calculated as the sum of the individual centrifugal torques of the base jaw M_{cGB} in section 7.9.1 [... ▶ 50] and the top jaw M_{cAB} .

$$M_c = M_{cGB} + M_{cAB} \quad [\text{kg} \cdot \text{m}]$$

Center of gravity of the top jaw

The general formula applies for calculation of the center of gravity:

$$r_s = \frac{\sum(A_i \cdot r_{i1})}{\sum A_i} \quad (5)$$

Two cases are considered as examples:

Rectangular weight reduction

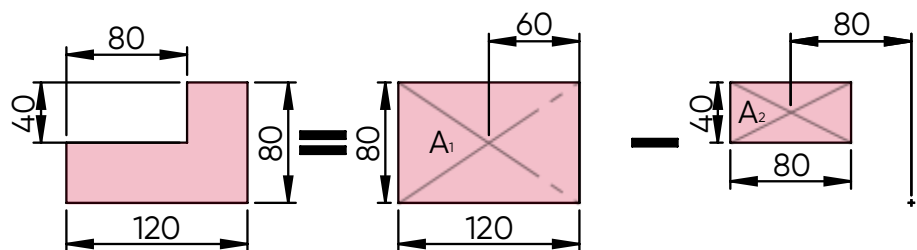


Fig. 7-2: Rectangular weight reduction

$$r_s = \frac{120 \cdot 80 \cdot \left(\frac{120}{2}\right) - 80 \cdot 40 \cdot \left(120 - \frac{80}{2}\right)}{120 \cdot 80 - 80 \cdot 40} = 50 \text{ mm}$$

Inclined weight reduction

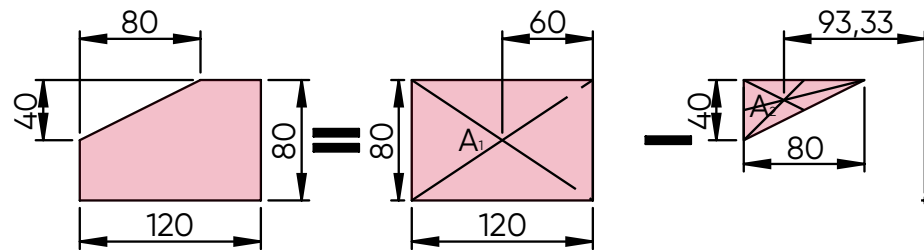


Fig. 7-3: Inclined weight reduction

$$r_s = \frac{120 \cdot 80 \cdot \left(\frac{120}{2}\right) - \frac{80 \cdot 40}{2} \cdot \left(120 - \frac{80}{3}\right)}{120 \cdot 80 - \frac{80 \cdot 40}{2}} = 53,333 \text{ mm}$$

Calculation example: Determination of the required initial clamping force at a given speed

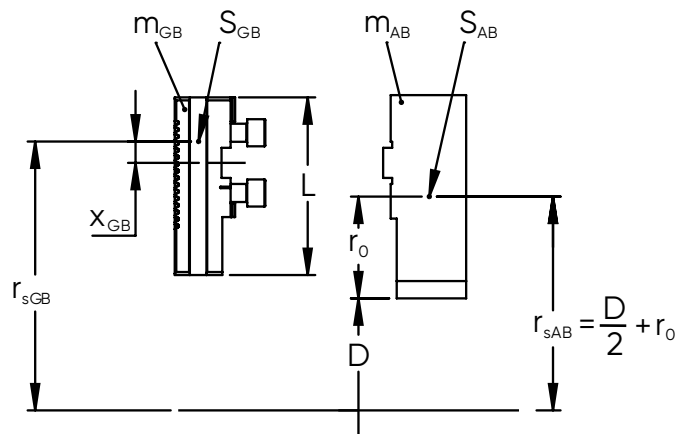


Fig. 7-4: CON

A component is to be clamped and machined using an INOFlex® VT-Q 031. The following data is known about the cutting process:

- External clamping (clamping from the outside inwards)*
- Machining force $F_{spZ} = 2800 \text{ N}^*$
- Maximum speed for machining $n_{\max} = 1000 \text{ min}^{-1}$
- Maximum total clamping force $\sum S = 150 \text{ kN}$ (section 7.9 [... 47])
- Dimensions of one top jaw $m_{AB} = 0,9 \text{ kg}^*$
- Center of gravity radius $r_{sAB} = 0,125 \text{ m}^*$
- Dimensions of one top jaw $m_{GB} = 0,744 \text{ kg}$ (section 7.9.1 [... 50])*
- Center of gravity radius $r_{sGB} = 0,135 \text{ m}^*$
- Safety factor $S_Z = 1,5$ (in accordance with VDI 3106)
- Safety factor $S_{sp} = 1,5$ (in accordance with VDI 3106)

* Application-specific

NOTE

The jaw fastening T-nuts and the jaw fixing screws are not included in the calculation.

The first step is to determine the centrifugal torques of the top jaw and the base jaw.

Determination of the centrifugal torque of the top jaws

$$M_{cAB} = m_{AB} \cdot r_{sAB}$$

$$M_{cAB} = 0,9 \text{ kg} \cdot 0,125 \rightarrow \mathbf{M_{cAB} = 0,1125 \text{ kg} \cdot \text{m}}$$

Determination of the centrifugal torque of the base jaws of the INOFlex®

$$M_{cGB} = m_{GB} \cdot r_{sGB}$$

$$M_{cGB} = 0,744 \text{ kg} \cdot 0,135 \rightarrow \mathbf{M_{cGB} = 0,10044 \text{ kg} \cdot \text{m}}$$

Determination of the total centrifugal torque

$$M_c = M_{cGB} + M_{cAB}$$

$$M_c = 0,1125 \text{ kg} \cdot \text{m} + 0,10044 \rightarrow \mathbf{M_c = 0,21294 \text{ kg} \cdot \text{m}}$$

The INOFlex® is a 4-jaw chuck, meaning the value must be multiplied by four.

$$\sum M_c = 4 \cdot 0,21294 \rightarrow \mathbf{\sum M_c = 0,85176 \text{ kg} \cdot \text{m}}$$

The centrifugal force can be determined using the formula:

$$F_c = \sum M_c \cdot \left(\frac{\pi \cdot n}{30} \right)^2$$

$$F_c = 0,85176 \cdot \left(\frac{\pi \cdot 1000}{30} \right)^2 \rightarrow \mathbf{F_c = 9340 \text{ N}}$$

The required effective clamping force is calculated using the machining force:

$$F_{Sp0} = S_{Sp} \cdot (S_Z \cdot F_{SpZ} - F_c)$$

$$F_{Sp0} = 1,5 \cdot (1,5 \cdot 2800 + 9340) \rightarrow \mathbf{F_{Sp0} = 20310 \text{ N}}$$

7.8.2 CALCULATING THE SPEED

The maximum permissible speed n_{zul} can be calculated using the following formula:

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\left(\frac{F_{Sp0}}{S_{Sp}} \mp S_Z \cdot F_{SpZ}\right) \cdot \frac{1}{\sum M_c}} \text{ [rpm]} \quad (6)$$

(-) External clamping

(+) Internal clamping

⚠ WARNING

For reasons of safety, the calculated speed must not exceed the maximum speed n_{max} engraved on the chuck

Calculation example: Determination of the permissible speed for a given initial clamping force

A component is to be clamped and machined using an INOFlex® VT-Q 031. The following data is known about the cutting process:

- External clamping (clamping from the outside inwards)*
- Initial clamping force $F_{Sp0}=60000 \text{ N}^*$
- Total centrifugal torque $\sum M_c=0,85176 \text{ kg}\cdot\text{m}^*$
- Machining force $F_{SpZ}=2800 \text{ N}^*$
- Maximum total clamping force $\sum S=150 \text{ kN}$ (section 7.9 [... 47])
- Safety factor $S_Z=1,5$ (in accordance with VDI 3106)
- Safety factor $S_{Sp}=1,5$ (in accordance with VDI 3106)

* Application-specific

NOTE

The jaw fastening T-nuts and the jaw fixing screws are not included in the calculation.

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\left(\frac{F_{Sp0}}{S_{Sp}} - S_Z \cdot F_{SpZ}\right) \cdot \frac{1}{\sum M_c}}$$

$$n_{zul} = \frac{30}{\pi} \cdot \sqrt{\left(\frac{60000}{1,5} - 1,5 \cdot 2800\right) \cdot \frac{1}{0,85176}} \rightarrow n_{zul} = 1957 \text{ min}^{-1}$$

The calculated speed is $n_{zul}=1957 \text{ min}^{-1}$ lower than the maximum permissible speed of the INOFlex® VT-S 031 $n_{max}=3400 \text{ min}^{-1}$ (section 7.9 [... 47]).

The calculated speed is permissible and may be used.

7.9 TECHNICAL DATA

Type ID no.		VT-Q 021 849021	VT-Q 026 849026	VT-Q 031 849031	VT-Q 040 849040
Diameter	mm	218	264	315	400
Through-hole	mm	52	72	91	111
Stroke per jaw	mm	5.5	5.5	5.5	6.2
Compensation per jaw	mm	4.4	4.4	4.4	5
Piston stroke	mm	24	24	24	27
Max. draw pull	kN	40	55	60	85
Max. clamping force	kN	100	125	150	210
Max. speed *	rpm	3900	3500	3400	3100
Weight (without top jaws)	kg	26.2	36	61.2	119
Moment of inertia	kg · m ²	0.18	0.39	0.9	2.8
Standard soft top jaw	–	UC20	UC20	UC32	UC32
Standard hard gripper jaw	–	UY20	UY20	UY32	UY32

Table 7-6: Technical data

* Balance quality in accordance with DIN ISO 1940-1: G 6.3 (not lubricated)

NOTE

The specified data on the maximum clamping force applies to chucks in the as-delivered state. The clamping force may alter. Please observe section 5.2.6. [...]

⚠ DANGER

*Do not clamp workpieces outside the chuck diameter.
(Maximum clamping diameter = chuck diameter)*

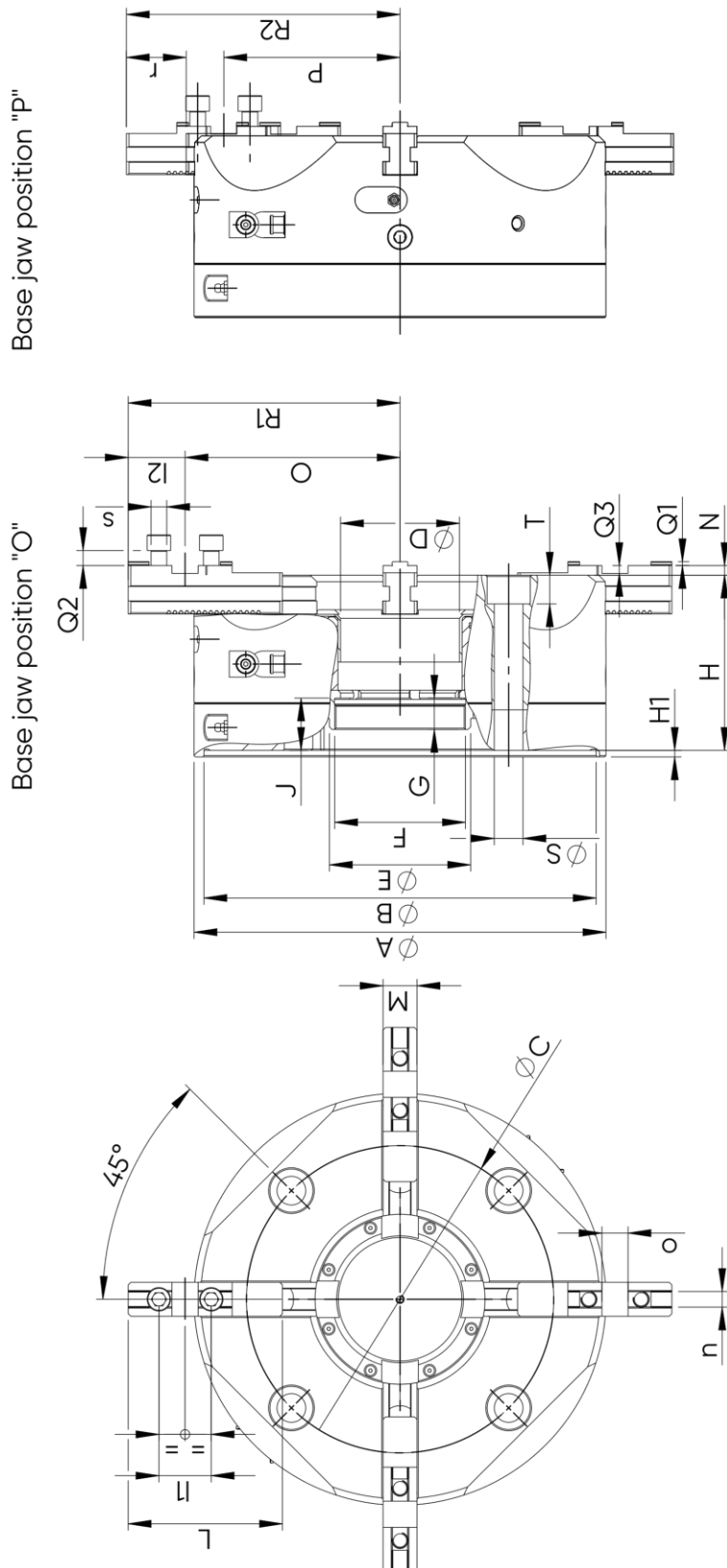


Fig. 4-2: VT-Q series [technical details subject to change]

Type VT-Q		021	026	031	040
	E	mm			
	B H6	mm	264	315	400
	C	mm	220	300	380
	D	mm	171.4	235	330.2
	R	mm	72	91	111
	R	mm	92	108	142
	F	mm	M85x2	M100x2	M125x2
	G	mm	20	24	30
	H	mm	119.5	134	154
	H1	mm	5	5	6
Min./Max.	J	mm	10 / 34	16 / 40	296 / 56.6
	L	mm	98	118	140
	M	mm	24	26	32
	N	mm	7.3	7.3	7.5
Min./Max.	O	mm	100.6 / 137.2	118.7 / 164.4	155.7 / 210.6
Min./Max.	B	mm	67.3 / 103.9	89.1 / 134.8	98.5 / 153.4
	Q1	mm	2.5	3	3
	Q2	mm	11	11	11
	Q3	mm	4.5	6	6
Chuck open	R1	mm	169.7	207.9	250.6
Chuck open	R2	mm	169.4	209.3	253.4
	S	mm	16.5	22	26
	T	mm	20.5	22	26.6
	I1	mm	40	40	40
	I2	mm	32.5	43.5	40
	n f7	mm	10	12	12
	o H7	mm	20	20	20
Base jaw tooth pitch	-	mm	4.573	4.573	4.573
Base jaw offset	r	mm	36.6	45.7	54.9
Base jaw offset	Teeth	-	8	10	12
	s	mm	M8 x 22	M12 x 30	M12 x 30

Table 7-7: Connection dimensions

7.9.1 BASE JAWS

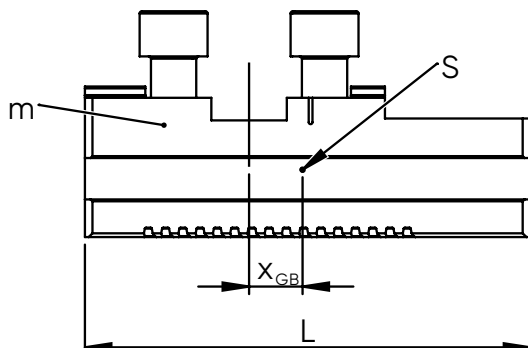


Fig. 7-5: Center of gravity of base jaw

Type VT-Q		021	026	031	040
Base jaw		UGB20	UGB26	UGB32	UGB40
m	kg	0.37	0.46	0.75	1.2
L	mm	88	98	118	140
X _{GB}	mm	11	15.9	12.4	26.2

Table 7-8: Base jaws

7.10 MAXIMUM TIGHTENING TORQUES FOR FIXING SCREWS

Strength class	Standard	Thread								
		M5	M6	M8	M10	M12	M14	M16	M20	M24
		Max. tightening torque [Nm]								
12.9	ISO 4762	10	16	30	50	70	105	150	220	450
10.9	ISO 4792	8	12	25	40	58	88	125	180	350

Table 7-9: Maximum tightening torques for fixing screws

8 SPARE PARTS

8.1 GENERAL INFORMATION

Spare parts may be required for the maintenance and repair of the INOFlex® chuck.

This chapter provides information on what you must have ready when ordering spare parts from the chuck manufacturer HWR Spanntechnik GmbH.

8.2 BASIC INFORMATION ON ORDERING SPARE PARTS

- Size: e.g. INOFlex® VT-S 026
- Identification number (ID no.)
- Designation of the spare part
- Order quantity

8.3 ORDERING SPARE PARTS BY E-MAIL

NOTE

Observe the minimum information (see section 8.2 "Basic information on ordering spare parts").

- Step 1** Look for the required spare part in Fig. 8-1 [... ▶ 52].
- Step 2** Include the minimum order information in the e-mail (see section 8.2 [... ▶ 51]).
- Step 3** Send the order to HWR Spanntechnik GmbH, stating your company address.

NOTE

The e-mail address can be found on the inside of the title page of this Operating Manual. (info@hwr.de)

8.4 SPARE PARTS

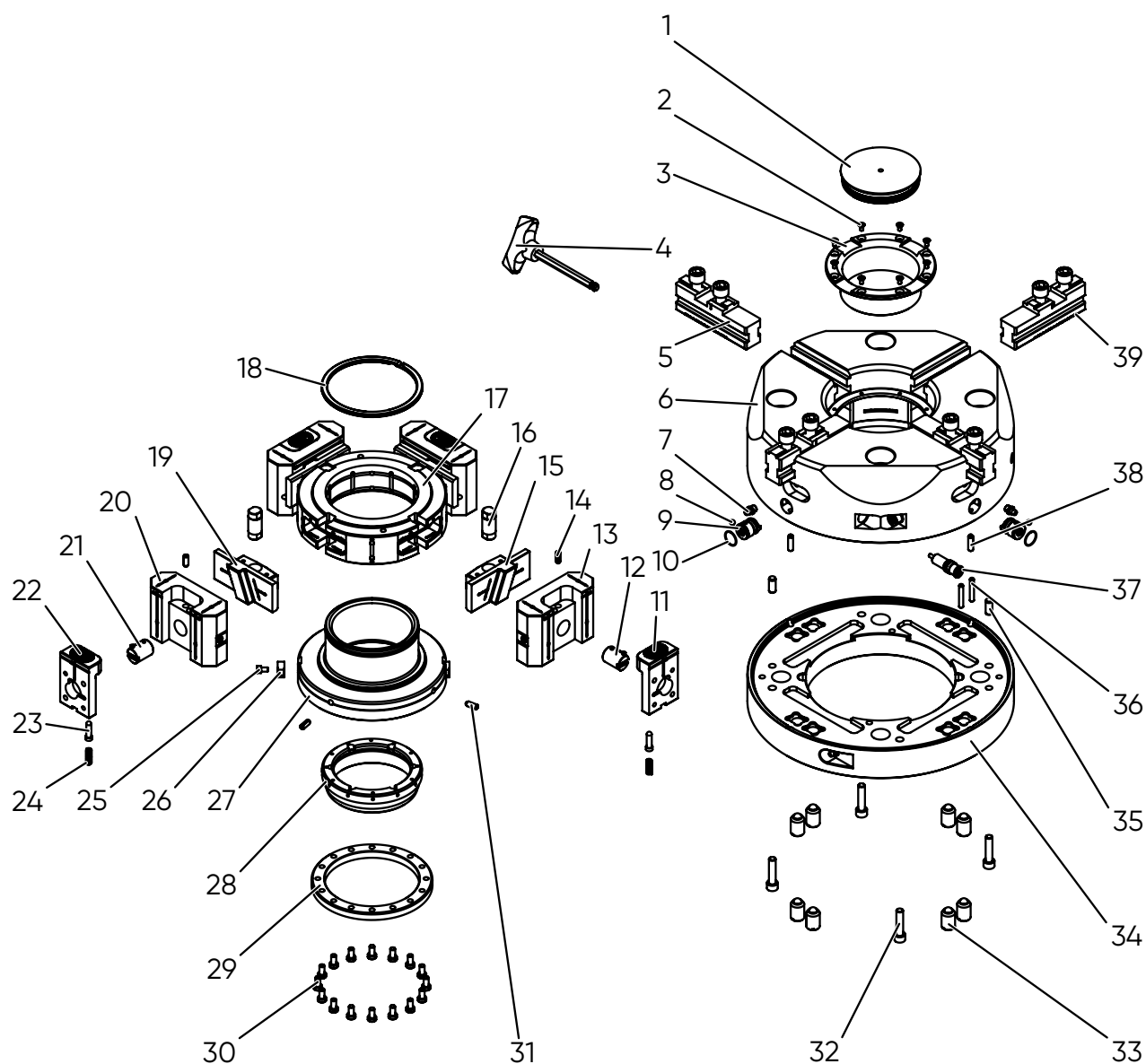


Fig. 8-1: Installing the top jaws

Pos.	Designation	Quantity	Note VT-Q...
1	Cover	1	
2	Countersunk head screw	4	VT-Q 021
	Countersunk head screw	8	VT-Q 026 to VT-Q 040
3	Sealing bush	1	
4	Adjustment key	1	
5	Base jaw 2 / 4	2	
6	Upper part of the housing	1	
7	Grease nipples	6	
8	Ball	4	
9	Pivot pin	4	
10	O-ring	4	
11	Quick-change slider 2	2	
12	Adjustment pin 2	2	
13	Tangential slider 2	2	
14	Spring-loaded pressure piece	4	
15	Driver 2	2	
16	Compensation pin	4	
17	Draw ring	1	
18	Circlip	1	
19	Driver 1	2	
20	Tangential slider 1	2	
21	Adjustment pin 1	2	
22	Quick-change slider 1	2	
23	Locking pin	4	
24	Pressure spring	4	
25	Cylinder head screw (for parallel key)	2	
26	Parallel key	2	
27	Draw guide	1	
28	Groove nut	1	
29	Retaining ring	1	
30	Cylinder head screw (for retaining ring)	16	
31	Spring-loaded pressure piece	4	
32	Cylinder head screw	4	
33	Spring-loaded pressure piece	8	
34	Lower part of the housing	1	
35	Parallel pin	2	
36	Parallel pin	8	
37	Travel control pin	4	
38	Spring-loaded pressure piece	4	
39	Base jaw 1 / 3	2	
Table 7 3: Other documents			

9 NOTES

9.1 CLAMPING FORCE / DRAW PULL DIAGRAM (TEMPLATES)

