



# ULTIMATE CHUCK QUICK JAW CHANGE POWER CHUCK

Complete Your Investment

## Model UC3 Installation Operation and Maintenance Manual

DURO-A RC



### WARNING

Do not attempt to install, operate, or perform maintenance on this product until you have read and completely understood the contents of this manual

**VERSION 7.28.17.**

October 1, 2007

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# 1 About this Operating Manual

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This operating manual describes in detail the use, installation, assembly and maintenance of the power chuck DURO-A RC. The efficiency of the power chuck depends primarily on correct use and careful maintenance. This operating manual serves as the leading document and is provided on delivery of the product. The personnel must have carefully read and understood the operating manual before beginning any work. Observance of all safety instructions and instructions for use in this operating manual is the basic prerequisite for safe work with the power chuck. In addition to the regulations listed here, the local and user-related operating instructions and the professional accident prevention regulations are to be observed.

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## 1.1 Copyright

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This operating manual is protected by copyright and is intended for internal purposes only.

The forwarding of the operating manual to third parties, reproduction by any means - even in part - as well as use and/or communication of the content without the permission of the manufacturer are prohibited (except for internal purposes).

Infringements will lead to claims for compensation. We reserve the right to assert further claims.

## 1.2 Warranty and Liability

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### Standard warranty 1 year

The warranty period begins with delivery of the goods. The pre-condition for the warranty is full payment of the purchase price. The operating manual is to be taken into account in all stages of life of the product.

- Observe transport and storage conditions.
- Observe commissioning instructions.
- Observe maintenance and cleaning instructions.
- No warranty on wear parts and parts which come into contact with work-pieces.
- Claims are excluded which are:
  - due to incorrect handling or the effect /influences of external force (e.g. scratches, dents, distortions etc.);
  - due to visible wear and continual use (scratches etc.);
  - due to incorrect supply of media;
  - due to conversion, repair or other manipulations on the clamping devices insofar as this has not been carried out by personnel authorised by ATS Systems.
- All liability for consequential damage is excluded.

(Incorrect operation or maintenance renders the warranty null and void.)

## 1.3 Conventions of Presentation

### 1.4.1 Text Display

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To improve legibility and comprehension of the text, the following conventions were agreed:

Text type	Marking	Function
Operating instruction	1. 2., etc.	Marks a sequence of actions
	•	Marks an individual operating instruction
	➤	Marks an intermediate result of an operating instruction
	✓	End result of an operating instruction
List	▪	Marks elements of a list
	◦	Marks comments within a list







Contains useful information or further information.

### 1.4.2 Display of Safety and Warning Instructions

Safety and warning instructions are marked by pictograms. The signal word and the colouring show the level of danger.

Observe the safety instructions to prevent personal injury and damage to property.

 <b>DANGER</b>	
	<b>Indicates an imminently dangerous situation</b> which may lead to death or permanent personal injury if not avoided. ➤ List of all measures which must be taken to prevent consequences.
 <b>WARNING</b>	
	<b>Indicates a possible danger</b> which may lead to permanent personal injury or death if not avoided. ➤ List of all measures which must be taken to prevent consequences.

## ⚠ CAUTION



### Indicates a possible danger

which may lead to minor reversible injuries if not prevented.

- List of all measures which must be taken to prevent consequences.

## NOTICE



### Indicates a possible danger

which may lead to damage to property if not avoided.

- List of all measures which must be taken to prevent consequences.

## 2 Safety

---

Safety instructions and safety equipment serve to prevent accidents and damage when working on the power chuck. The safety instructions contain warnings and basic safety instructions. In addition to the safety instructions in this chapter, the following chapters contain action-related warnings. Maximum protection of personnel and the environment from dangers and trouble-free operation is only possible when all safety instructions and warnings in this operating manual are observed.

### 2.1 Intended Use

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The power chuck DURO-A RC is used to clamp regularly and irregularly shaped workpieces. Only metal workpieces may be clamped in the power chuck DURO-A RC. Other materials are only permissible by arrangement with ATS Systems.

To ensure safe clamping of the workpiece with the machining forces which occur, the clamped material must have adequate rigidity for the clamping force and may only be slightly compressible. The clamping force is given in the clamping force diagram (Clamping Force-Speed Diagram [ ] 65).

Depending on the construction size of the power chuck DURO-A RC, the maximum permissible actuating force and speed must be observed (Overview of Construction Sizes [ ] 63).

The power chuck DURO-A RC may be installed in machine tools for cutting and non-cutting processes. The power chuck DURO-A RC may be installed and used both horizontally and vertically. Stationary machining without rotation of the power chuck DURO-A RC is permitted. Locking and unlocking is only permitted with the original safety key.

The DURO-A RC is a power chuck with individually adjustable jaws. Only original base jaws and original one-piece jaws may be used.

Third-party makes may impair the safety of the power chuck DURO-A RC and lead to damage.

The jaws used must comply with the following specifications:

- the jaws must be designed as light as possible;
- the clamping point of the jaws must lie as close as possible to the power chuck;
- the jaws must be adapted to the size (equal or smaller), the weight (equal or lighter) and the rigidity (equal or higher) of the jaws assigned to the power chuck. If the jaws are heavier or larger or if they are less rigid than the jaws assigned to the power chuck, the higher centrifugal force and the higher load of the power chuck must be taken into account. The necessary clamping force and maximum speed must be reduced.

The maximum permissible clamping diameter of the jaws and the limits of the jaws must be observed.

The power chuck DURO-A RC can be used for both wet and dry machining. The permissible usage and environmental conditions must be observed (Environmental and Operational Conditions [ 64]).

## **2.2 Improper Use**

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If the power chuck is operated for a purpose other than the intended use as specified in this operating manual, this is deemed to be improper use.

Any utilisation beyond the scope of the intended use poses risks and is not approved by ATS systems.

Improper use refers to the following:

- use of the power chuck DURO-A RC for suspending loads;
- use of non-OEM parts as replacement parts;
- use of a non-OEM safety key;
- use of defective jaws (e.g. sprockets on base jaw broken off or cracks in the jaws);
- use of welded jaws;
- use of the power chuck DURO-A RC in explosive atmospheres;
- operation with the safety key inserted;
- operation with unlocked jaws;
- operation with modifications not approved by the manufacturer;
- operation outside of the defined operating parameters;
- operation with insufficient maintenance;
- operation without safety equipment;



- clamping of unsuitable materials (compressible materials);
- clamping of unauthorised materials (plastics, rubber, glass or other non-metals) without the approval of ATS Systems;
- clamping of regular workpieces with an asymmetric position of the jaws;
- clamping of workpieces with the safety key inserted;
- clamping of workpieces to long workpieces;
- clamping of workpieces to heavy workpieces;
- eccentric clamping of workpieces (Dangers due to Imbalanced Workpieces [ ] 59]);
- manipulation of the safety key (e.g. removal of the safety spring).

## **2.3 Obligations of the Owner**

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Before all work on and with the power chuck, the operator is to ensure:

- that the operating manual is available to the responsible personnel;
- that the responsible personnel are sufficiently qualified for their work;
  - This applies in particular to assembly, maintenance and repair.
- that the responsible personnel have read and understood the operating manual;
  - ATS systems recommends that this be documented in a suitable form.
- that all safety equipment is correctly mounted and operational;
  - Safety equipment must never be by-passed, manipulated or shut down.
- that the power chuck is in perfect working order;
- that all damaged and defective parts are replaced immediately.

## 2.4 Qualification of Operating and Specialist Personnel

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### Trained personnel

Trained personnel has been instructed in correct handling and possible dangers when using the power chuck. In particular, the personnel must have been instructed in the safety equipment.

### Qualified personnel

Personnel without experience of handling a power chuck are exposed to increased risks of injury in the event of incorrect conduct, especially during assembly and maintenance work, due to the clamping movements and forces.

Therefore, the power chuck may only be assembled, maintained and serviced by persons who have received special training or instruction for this purpose or who have extensive experience. The qualified personnel must be able to read and understand the displays and to act accordingly. The qualified personnel must have read and understood this operating manual.

In particular, qualified personnel are:

- mechanics

Work on the mechanical equipment may only be carried out by a trained mechanic or by personnel under the direction and supervision of a trained mechanic. Work on gas, pneumatic and hydraulic equipment may only be carried out by trained mechanics trained for this purpose.

- electricians

Work on the electrical equipment may only be carried out by a qualified electrician or by personnel under the direction and supervision of a qualified electrician in accordance with the electrical regulations.

## 2.5 Personal Protective Equipment Power Chuck

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When working on and with the power chuck DURO-A RC, personal protective equipment must be worn. The owner is responsible for providing personal protective equipment.

- Personal protective equipment must be in perfect condition when carrying out work. Defective safety equipment is to be replaced immediately.
- Observe information on personal protective equipment posted in the working area.
- During **rotational operation** of the power chuck DURO-A RC, **no** protective gloves are to be worn! Hand protection is only to be worn during transport, assembly and maintenance and as long as the machine and the power chuck DURO-A RC are at a standstill.



Wear protective gloves



Wear safety goggles



Wear safety shoes

## 2.6 General Dangers

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When using the device there is a special potential of residual risks

- during assembly and set-up work,
- during operation and
- during maintenance and service work.

This potential risk cannot be completely eliminated considering the functional availability of the operating manual. Therefore, all individual regulations of this operating manual are to be observed.

### 2.6.1 Dangers due to Flying Parts

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During operation, the connection between the clamped workpiece and the power chuck DURO-A RC may become loose due to mechanical failure (e.g. due to defective parts) or incorrect operation (e.g. excessive speed). The workpiece may then fly out and cause serious crushing and impact injuries.

To prevent cutting and crushing injuries, ensure perfect functioning of the power chuck DURO-A RC before each operation. Also ensure that unauthorised persons cannot rotate the power chuck DURO-A RC unintentionally.

## **2.6.2 Skin Irritation due to Operating Materials**

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The lubricant consists of substances which may lead to skin irritations in the event of frequent skin contact.

In order to minimise the risk of skin irritations, wear long work clothing and avoid contact with the lubricant. Also observe the safety data sheet of the lubricant and wear safety goggles and protective gloves during maintenance work when handling lubricants.

## **2.6.3 Eye Injuries due to Sharp Chips**

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Sharp metal chips may be produced during machining of metal. During operation or when cleaning the power chuck DURO-A RC, sharp metal chips may be stirred up and cause eye injuries and cuts.

To prevent eye injuries and cuts, wear personal protective equipment during operation and cleaning work.

## **2.6.4 Risk of Burns due to Hot Surfaces**

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The power chuck DURO-A RC may heat up during operation.

To prevent burns, do not touch the power chuck DURO-A RC after machining and allow to cool down before carrying out assembly and maintenance work.

## **2.6.5 Dangers due to Imbalanced Workpieces**

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With rotating spindles, clamping of imbalanced workpieces generates a centrifugal force which affects smooth running of the power chuck DURO-A RC. The power chuck DURO-A RC has a balance quality of 6.3. Residual risks may occur due to insufficient rotational balance. This applies in particular in the case of:

- high speeds;
- when clamping asymmetrical workpieces;
- when using different top jaws or
- for all asymmetries of the power chuck DURO-A RC.

Imbalanced workpieces endanger the personnel, the power chuck DURO-A RC and the machine.

In order to compensate for unwanted imbalances and to prevent resulting damage, the symmetrical mass adjustment must be restored and the power chuck DURO-A RC dynamically balanced.

## **2.6.6 Dangers due to Power Failure**

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An unexpected power failure during operation may lead to immediate failure of the clamping force of the power chuck. The workpiece may then fly out and cause serious crushing and impact injuries.

To prevent workpieces flying out, ensure perfect functioning of the power supply before each operation. In addition, the operator and the machine manufacturer must ensure by means of effective safety equipment that the clamping force is maintained until the machine comes to a standstill and the workpiece remains tightly clamped.

## **2.6.7 Procedure in the Event of Danger and Accidents**

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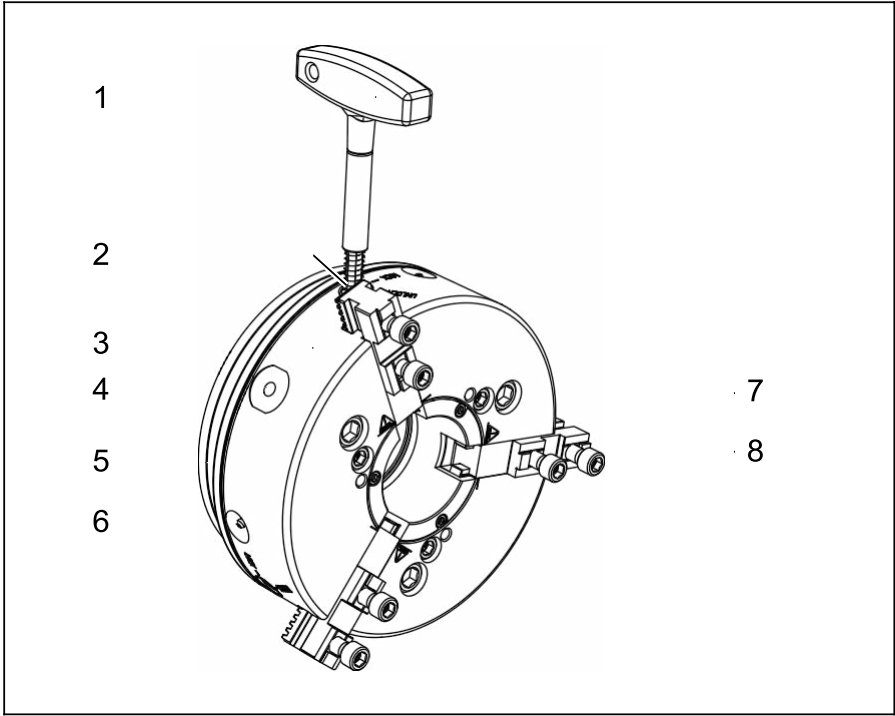
In the event of danger and accidents, it must be ensured that first aid measures can be taken immediately.

1. Shut the machine down immediately via the Emergency-Stop button.
2. Remove the person involved from the danger zone and sit or lay the person down.
3. Call a doctor.
  - Do not make any changes to the accident site.
4. Administer first aid.
  - Stop any bleeding.
  - Cool burns.
5. Report all accidents to a superior.

### 3 Product Description

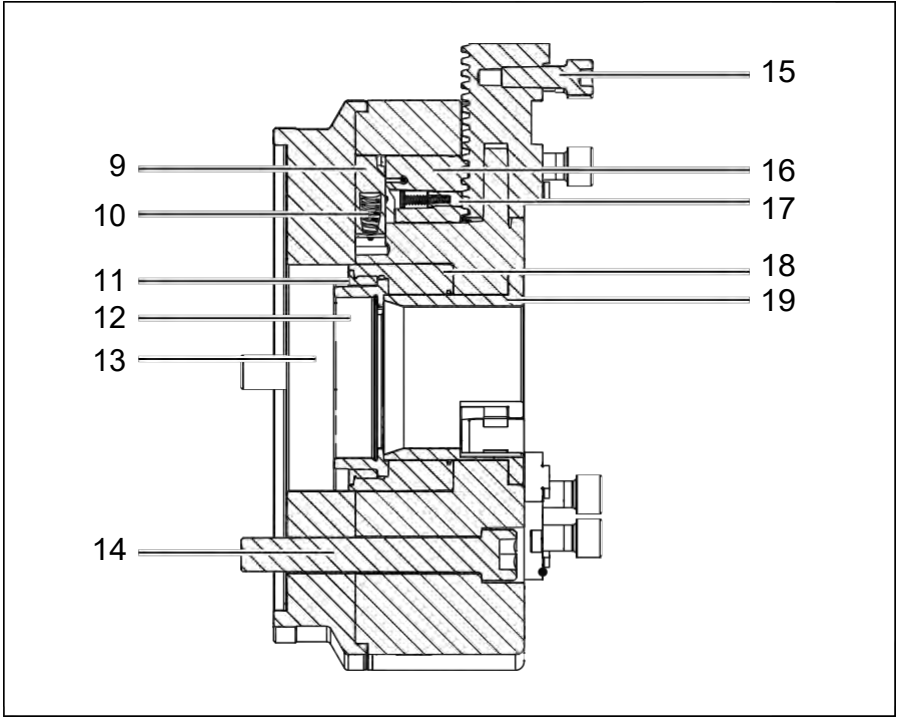
#### 3.1 About this Power Chuck

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1	Safety key	2	Turning bolt
3	Basic body	4	Thread for crane lugs
5	Flange	6	Lubricating nipple
7	Chuck fixing screws	8	Base jaws

**Cross-section**



9	Pusher	10	Pressure spring
11	Stop disk	12	Threaded ring
13	Flange	14	Chuck fixing screws
15	Jaw fixing screws	16	Wedge bar
17	Jaw retaining pin	18	Piston
19	Protective bushing		

The DURO-A RC is a power chuck with adjustable jaws (8), which is used to clamp regularly and irregularly shaped workpieces.

It is only possible to assemble and disassemble the jaws (8) when the wedge bar (16) is unlocked. The wedge bar (16) is locked and unlocked via the safety key (1) included in the delivery. The jaws (8) are individually inserted and can be locked and unlocked independently of each other.

The power chuck is attached to the machine spindle via a cylindrical holder on the machine spindle. In the case of conical holders, an intermediate disk is required. The actuating force is generated via a clamping cylinder (electric, hydraulic or pneumatic).

The power chuck consists of a base body (3), piston (18), wedge bars (16), driver, pusher (9), stop disk (11), flange (13), pressure spring (10), threaded ring (12), bolt and conical lubricating nipple.

The piston is connected to the draw tube of the clamping cylinder via a threaded ring (12). The piston is connected via an angled bar and a groove with three wedge bars (16). Due to the axial movement of the piston, the wedge bars (16) are moved and the attached jaws (8) carry out a radial stroke.

## 3.2 Technical Specifications

### 3.2.1 Overview of Construction Sizes

ID no.:	183100	183101	183104	183106	183107
Size / outer Ø	180	180	215	215	260
Jaw stroke	6.8	6.8	7.4	7.4	8.2
Chuck height	83.9	83.9	95.9	113.9	108.5
Connection dimension	ZA 140	ZA 170	ZA 170	KK8	ZA 170
Piston stroke	20	20	25	25	28
Pass	53	53	66	66	81
Connection thread	M60x1.5	M60x1.5	M75x1.5	M75x1.5	M90x1.5
Max. actuating force	32	32	47	47	63
Max. total clamping force	61	61	100	100	135
Max. speed	6,300	6,300	6,000	6,000	4,700
Moment of inertia [kg*m <sup>2</sup> ]	0.056	0.056	0.14	0.15	0.32
Weight without jaws	12.74	13.5	21.2	24	34.7



ID no.:	183108	183111	183112	183114	183115
Size / outer Ø	260	315	315	400	400
Jaw stroke	8.2	8.8	8.8	9.4	9.4
Chuck height	108.5	117.7	117.7	125.7	125.7
Connection dimension	ZA 220	ZA220	ZA 300	ZA 300	ZA 380
Piston stroke	28	28	28	30	30
Pass	81	104	104	128	128
Connection thread	M90x1.5	M110x2	M110x2	M138x2	M138x2
Max. actuating force	63	90	90	120	120
Max. total clamping force	135	180	180	240	240
Max. speed	4,700	4,000	4,000	3,500	3,500
Moment of inertia [kg*m <sup>2</sup> ]	0.33	0.8	0.84	2.3	2.4
Weight without jaws	34.8	57.5	60	104	108

### **3.2.2 Environmental and Operational Conditions**

The power chuck is designed for the following environmental and operating conditions:

Ambient medium	Air and non-aggressive gases
Place of use	Interior
Relative humidity (at +40 °C)	< 100% Use in very humid conditions leads to faster corrosion and may reduce the useful life
Potentially explosive environments	No
Ambient temperature at place of operation	+5 °C to +60 °C
Ambient temperature for storage	+5 °C to +60 °C
Dry and wet machining	Wet machining permitted with cooling lubricants

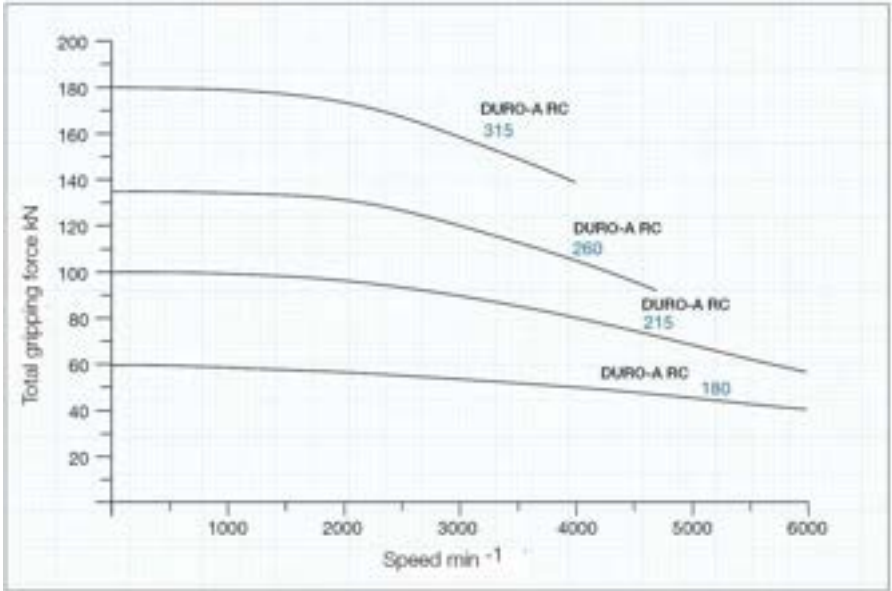
Pollution of the environment caused by the machine itself is permitted. However, perfect operation of the power chuck must be ensured and checked regularly. With each jaw and tool change, the power chuck must be cleaned of coarse dirt with a broom or brush. Cleaning with compressed air is not permitted.

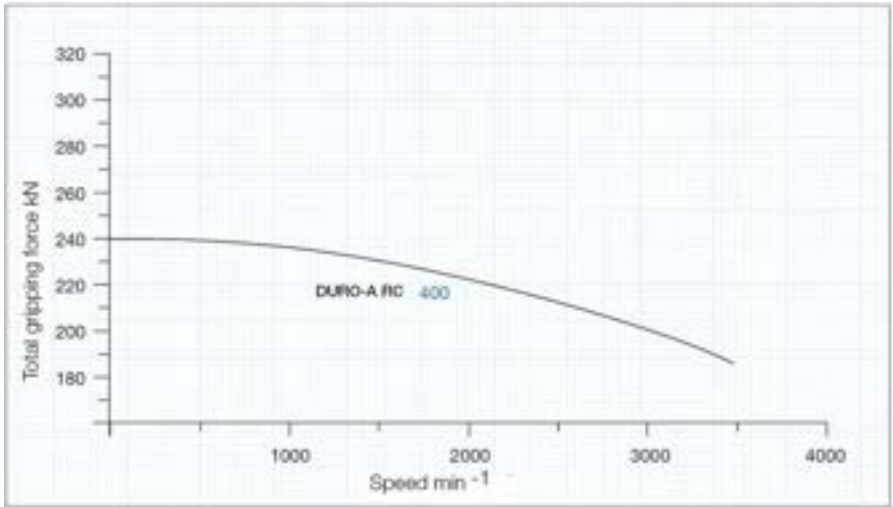
### 3.2.3 Clamping Force-Speed Diagram

The reduction in clamping force is experimentally determined with the jaw assigned to the power chuck. It is largely independent of the initial clamping force at a speed = 0.



Total clamping force kN – speed min.<sup>-1</sup>





### 3.2.4 Permissible Operating Materials


The following grease is authorised for the power chuck DURO-A RC:

- Grease F80



A different lubricant to the one specified may reduce the clamping force by more than 50 %.

## 4 Transport

<b>⚠ WARNING</b>	
	<p><b>Crushing injuries in the event of unsecured transport of the power chuck.</b></p> <p>Falling of the power chuck.</p> <ul style="list-style-type: none"> <li>➤ Use suitable hoisting gear and slings.</li> <li>➤ Wear personal protective equipment.</li> <li>➤ Do not remain under suspended loads.</li> </ul>

## 4.1 Personal Protective Equipment Power Chuck

---

When working on and with the power chuck DURO-A RC, personal protective equipment must be worn. The owner is responsible for providing personal protective equipment.

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- Personal protective equipment must be in perfect condition when carrying out work. Defective safety equipment is to be replaced immediately.
- Observe information on personal protective equipment posted in the working area.
- During **rotational operation** of the power chuck DURO-A RC, **no** protective gloves are to be worn! Hand protection is only to be worn during transport, assembly and maintenance and as long as the machine and the power chuck DURO-A RC are at a standstill.



Wear protective gloves



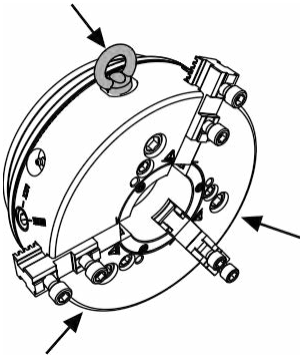
Wear safety goggles



Wear safety shoes

## 4.2 Tapped Holes for Transport Purposes

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## 5 Assembly

### **WARNING**



#### **Injuries due to insufficient securing on assembly, incorrect tightening torque of the screws.**

Crushing due to falling of the power chuck.

- Use tapped holes for transport purposes.
- Wear personal protective equipment.
- Observe tightening torque of the screws.

### **WARNING**



#### **Crushing injuries and cuts due to start-up during set-up work.**

Flying parts may cause serious injuries.

- Disconnect the power supply before assembly.
- Protect the machine against being re-started.
- Wear personal protective equipment.

### 5.1 Personal Protective Equipment Power Chuck

When working on and with the power chuck DURO-A RC, personal protective equipment must be worn. The owner is responsible for providing personal protective equipment.

- Personal protective equipment must be in perfect condition when carrying out work. Defective safety equipment is to be replaced immediately.
- Observe information on personal protective equipment posted in the working area.
- During **rotational operation** of the power chuck DURO-A RC, **no** protective gloves are to be worn! Hand protection is only to be worn during transport, assembly and maintenance and as long as the machine and the power chuck DURO-A RC are at a standstill.



Wear protective gloves



Wear safety goggles



Wear safety shoes

## 5.2 Assembly on Intermediate Disk

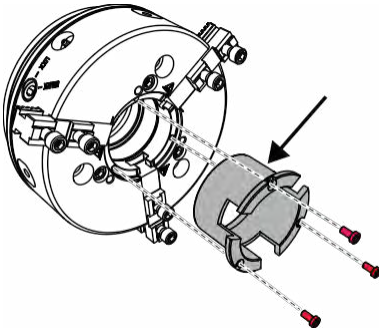
Assembly of an intermediate disk is only necessary with conical holders.

- Intermediate disk cleaned.
  - Power chuck cleaned.
1. Mount the power chuck on the intermediate disk in the correct position.
  2. Fix the intermediate disk to the power chuck with the fixing screws.
  3. Check radial and axial run-out of the power chuck on the check collar and align if necessary.
  4. Check the jaw stroke with the capacitive proximity switch and re-adjust if necessary.
  5. Check the device for correct operation.
  6. Tighten the fixing screws with the correct tightening torque (Checking the Tightness of Screw Connections [ ] 86]).
- ✓ The intermediate disk is assembled.

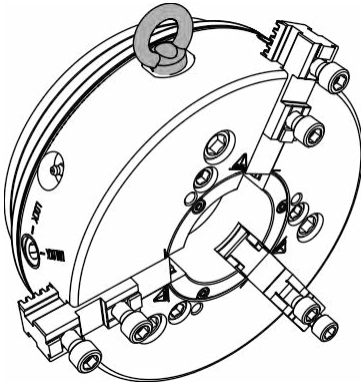
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## 5.3 Assembly on Machine Spindle

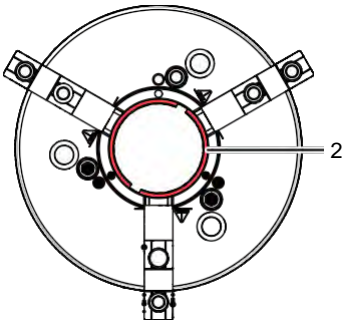
- The machine is switched off and protected against being switched on again.
  - The machine spindle or intermediate disk is cleaned.
  - The cylinder or intermediate disk is checked for radial and axial run-out.
1. Disassemble the protective bushing.



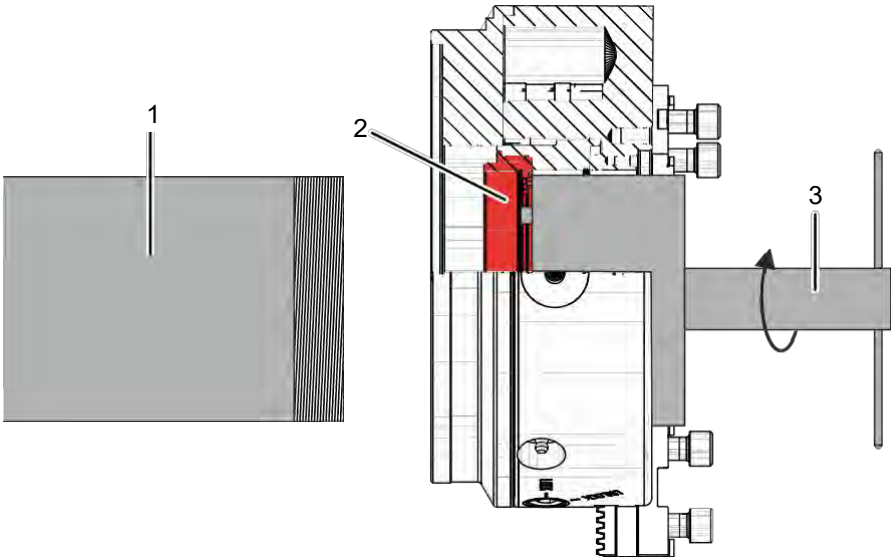
2. Move the draw tube into front position.
3. Move the piston of the power chuck to rear position.
4. Screw the crane lug into the power chuck.



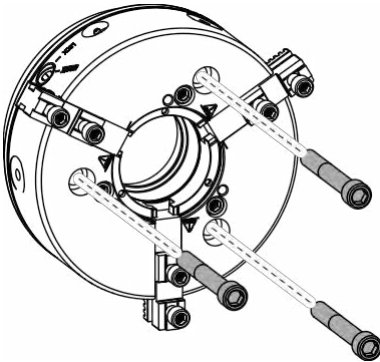
5. Correctly attach the load-bearing equipment to the crane lug.
6. Position the power chuck on the machine spindle.



7. Screw the threaded ring (2) of the power chuck onto the draw tube (1) as far as it will go with the assembly tool (3) provided.
  - It must be easy to turn the threaded ring (2). Otherwise, readjust the height of the crane.



8. Move the draw tube back and screw the power chuck onto the machine spindle with three chuck fixing screws (provisionally 5 Nm).






9. Remove the load-bearing equipment from the crane lug and the crane lug from the power chuck.
10. Check radial and axial run-out of the power chuck on the check collar and align if necessary.
11. Check the jaw stroke with the capacitive proximity switch and re-adjust if necessary.
12. Check the device for correct operation.



13. Tighten the three chuck fixing screws on the machine spindle with the permissible tightening torque (Checking the Tightness of Screw Connections [ ] 86]).
14. Re-assemble the protective bushing.
  - ✓ Power chuck is mounted on the machine spindle.

## 6 Operation

<b>⚠ CAUTION</b>	
	<p><b>Danger of crushing when clamping the power chuck.</b> Trapping of fingers.</p> <ul style="list-style-type: none"> <li>➤ Do not hold fingers between the jaws when clamping the power chuck.</li> </ul>
<b>⚠ CAUTION</b>	
	<p><b>Risk of burns due to hot surfaces.</b> Burns on hands.</p> <ul style="list-style-type: none"> <li>➤ Do not touch the power chuck when in operation.</li> <li>➤ Allow the power chuck to cool down before carrying out necessary work.</li> <li>➤ Wear personal protective equipment.</li> </ul>
<b>⚠ CAUTION</b>	
	<p><b>Skin irritations due to contact with lubricants.</b> The constituents of the lubricant may cause irritations in the event of contact with the skin.</p> <ul style="list-style-type: none"> <li>➤ When handling the power chuck, wear safety goggles, long work clothes and gloves.</li> <li>➤ Avoid skin contact with lubricants.</li> </ul>

## 6.1 Personal Protective Equipment Power Chuck

When working on and with the power chuck DURO-A RC, personal protective equipment must be worn. The owner is responsible for providing personal protective equipment. EN

- Personal protective equipment must be in perfect condition when carrying out work. Defective safety equipment is to be replaced immediately.
- Observe information on personal protective equipment posted in the working area.
- During **rotational operation** of the power chuck DURO-A RC, **no** protective gloves are to be worn! Hand protection is only to be worn during transport, assembly and maintenance and as long as the machine and the power chuck DURO-A RC are at a standstill.



Wear protective gloves

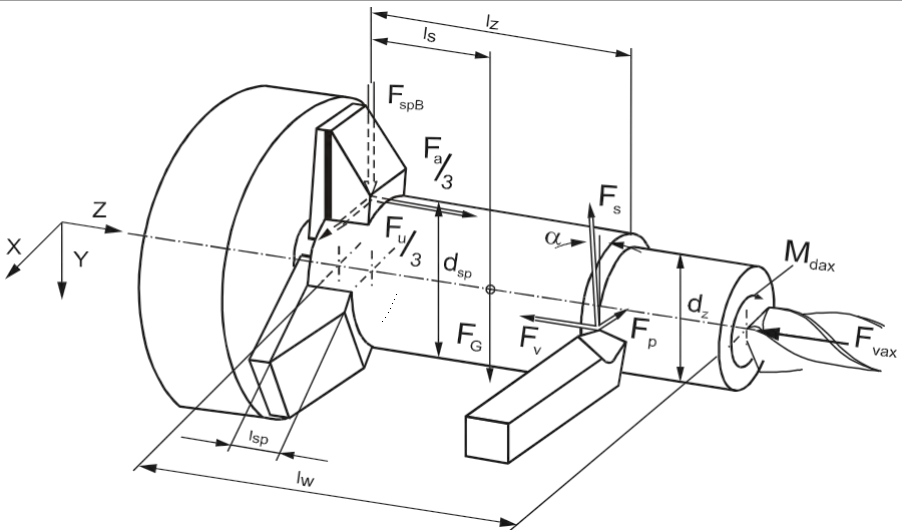


Wear safety goggles



Wear safety shoes

## 6.2 Basic Principles



## 6.2.1 Determining the Clamping Force

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The clamping force  $F_{sp}$  of a power chuck is the sum of all forces which have a radial effect on the workpiece. The clamping force applied before beginning material removal with a stationary chuck is  $F_{sp0}$ . The clamping force  $F_{sp}$  available for the material removal process is on the one hand the initial static clamping force  $F_{sp0}$  available increased or reduced by the centrifugal force  $F_c$  of the jaws.

$$F_{sp} = F_{sp0} \pm F_c \quad [N] \quad (1)$$

The clamping force  $F_{sp}$  available for the material removal process results from the clamping force  $F_{spz}$  necessary for the material removal process multiplied by the safety factor  $S_z \geq 1.5$ , the size of which comprises the accuracy of the influence parameters such as load, clamping coefficient etc.

$$F_{sp} = F_{spz} \cdot S_z \quad [N] \quad (2)$$

With the static initial clamping force  $F_{sp0}$ , a safety factor  $S_{sp} \geq 1.5$  is to be taken into account, so that the static clamping force  $F_{sp0}$  results in:

$$F_{sp0} = S_{sp} \cdot (F_{sp} \pm F_c) \quad [N] \quad (3)$$

The (-) sign applies to clamping from the outside in.

The (+) applies to clamping from the inside out.

## 6.2.2 Determination of the Speed

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The formulae (1), (2) and (3) when clamping from the outside in result in:

$$F_{sp} = \frac{F_{sp0}}{S_{sp}} - F_c \quad [N] \quad (4)$$

whereby the centrifugal force  $F_c$  depends on the sum of all masses of the jaws  $m_B$ , the radius of the centre of gravity  $r_s$  and the speed  $n$ . This results in the following formula:

$$F_c = (m_B \cdot r_s) \cdot \left(\frac{\pi n}{30}\right)^2 \quad [N] \quad (5)$$

The expression  $m_B \cdot r_s$  is referred to as the centrifugal force  $M_c$ .

$$M_c = m_B \cdot r_s \quad [mkg] \quad (6)$$

In the case of collet chucks with base and top jaws, where the top jaws AB are moved to change the clamping range and the base jaws approximately maintain their radial position, the following applies:

$$M_c = M_{cGB} + M_{cAB} \quad [\text{mkg}] \quad (7)$$

$M_{cGB}$  is to be taken from the table:

Chuck size	180	215	260	315	400
Centrifugal force $M_{cGB}$ per base jaw [mkg]	0.0151	0.0306	0.0637	0.1158	0.1628

$M_{cAB}$  is to be taken from the following formula:

$$M_{cAB} = m_{AB} \cdot r_{sAB} \quad [\text{mkg}] \quad (8)$$

### 6.2.3 Permissible Speed

To determine the permissible speed for a certain machining task, the following formula applies:

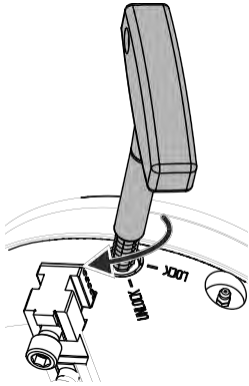
$$n_{zul} = \frac{60}{\pi} \sqrt{\frac{P_{max}}{D \cdot L}} \quad [\text{min}^{-1}] \quad (9)$$

The max. speed  $n_{max}$  of the power chuck must not be exceeded, even if the calculated permissible speed  $n_{zul}$  is higher.

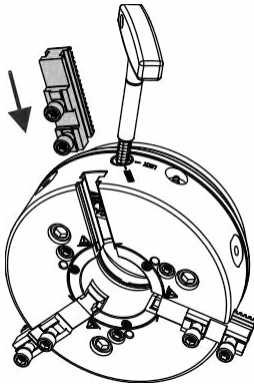
### 6.3 Inserting Jaws

The jaws of the power chuck are individually inserted and unlocked. Repeat the following instructions for each jaw.

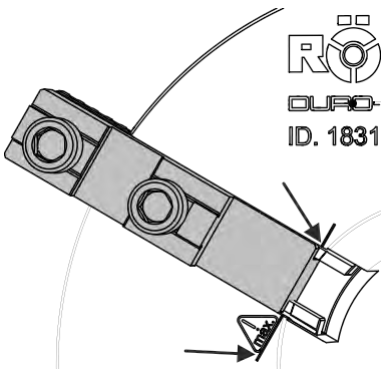
- Power chuck cleaned.
  - Guide lubricated with brush.
  - Jaws are intact.
1. Move piston into front position.
  2. Insert the safety key into the relevant turning bolt until the pressure point is reached.
  3. To unlock the wedge bar, turn the safety key clockwise to UNLOCK.
    - The wedge bar moves in.
    - The wedge bar is unlocked.



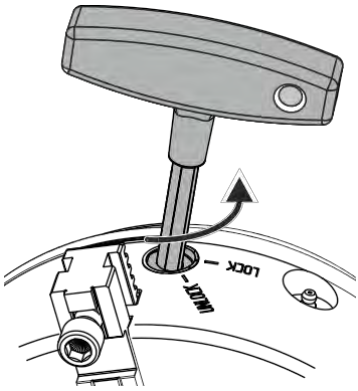
4. Insert the jaw into the guide of the wedge bar. Observe the labelling of the jaws and wedge bars. (jaw 1 in wedge bar 1, jaw 2 in wedge bar 2, jaw 3 in wedge bar 3.)



5. Push the jaw into the required position until the spring bolt perceptibly locks into the tooth space.
  - **The jaws must not be positioned beyond the marking.**



6. To lock the jaw, turn the safety key counter-clockwise to LOCK.

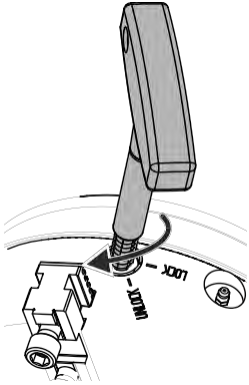


- 7. Remove the safety key.
  - The safety key cannot be removed as long as the jaw is not safely locked.
- 8. Repeat for all jaws.
  - ✓ The jaws are inserted.

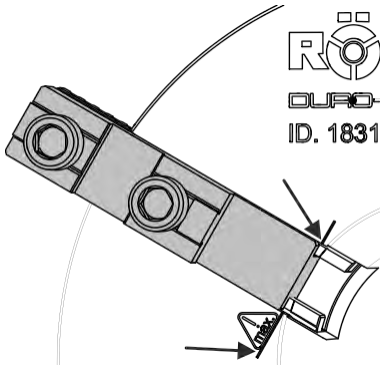
## 6.4 Adjusting Jaws

The jaws of the power chuck are individually adjusted and unlocked. Repeat the following instructions for each jaw.

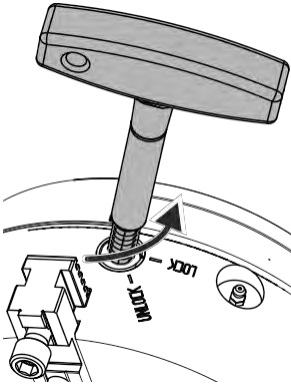
1. Move piston into front position.
2. Insert the safety key into the relevant turning bolt until the pressure point is reached.
3. To unlock the jaw, turn the safety key clockwise to UNLOCK.
  - The wedge bar moves in.
  - The jaw is unlocked.



4. Move the jaw to the required position until the spring bolt perceptibly locks.
  - **The jaws must not be positioned beyond the marking.**



5. To lock the jaw, turn the safety key counter-clockwise to LOCK.



6. Remove the safety key.
  - The safety key cannot be removed as long as the jaw is not safely locked.
7. Repeat for all jaws.
  - ✓ The jaws are misaligned.

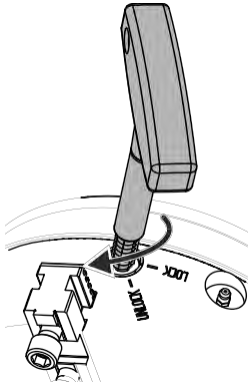
## 6.5 Replacing Jaws

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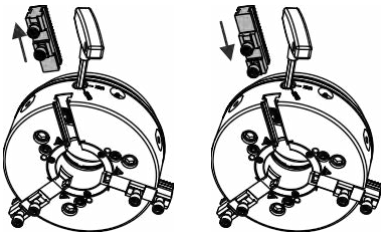
The jaws of the power chuck are individually replaced and unlocked. Repeat the following instructions for each jaw.

- The guide must be lubricated with a brush every time the jaws are replaced.
  - Jaws are intact.
1. Move piston into front position.
  2. Insert the safety key into the relevant turning bolt until the pressure point is reached.
  3. To unlock the jaw, turn the safety key clockwise to UNLOCK.
    - The wedge bar moves in.
    - The jaw is unlocked.



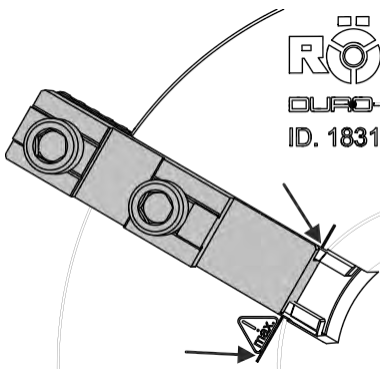


4. Pull the jaw out of the guide.
5. Lubricate the guide with a brush.

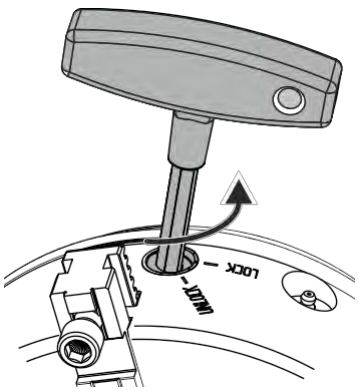


6. Insert the new jaw into the guide of the wedge bar. Observe the labelling of the jaws and wedge bars. (jaw 1 in wedge bar 1, jaw 2 in wedge bar 2, jaw 3 in wedge bar 3.)
7. Push the jaw into the required position until the spring bolt perceptibly locks into the tooth space.

➤ **The jaws must not be positioned beyond the marking.**



8. To lock the jaw, turn the safety key counter-clockwise to LOCK.


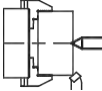
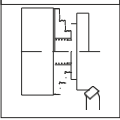
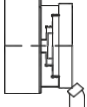
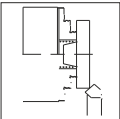
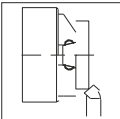


9. Remove the safety key.
  - The safety key cannot be removed as long as the jaw is not safely locked.
10. Repeat for all jaws.
  - ✓ The jaws are replaced.

**6.6 Clamping the Workpiece**

1. Fully open the power chuck.
  - The jaws move to the outermost position.
2. Position the workpiece.
3. Close the power chuck.
  - The jaws fix the workpiece.
  - ✓ The workpiece is clamped.

Incorrect	Correct
<p>Clamping length too short, projection length too long</p>	<p>Additional support via point or bezel</p>
<p>Clamping Ø too large</p>	<p>Insert larger chuck</p>

Incorrect	Correct
<p>Workpiece too heavy and jaw step too short</p> 	<p>Support via point or bezel</p> 
<p>Clamping <math>\varnothing</math> too small</p> 	<p>Clamping on largest possible clamping <math>\varnothing</math></p> 
<p>Workpieces with cast iron or forged gradients</p> 	<p>Clamping with oscillating inserts</p> 

## 7 Maintenance

### 7.1 Personal Protective Equipment Power Chuck

When working on and with the power chuck DURO-A RC, personal protective equipment must be worn. The owner is responsible for providing personal protective equipment.

- Personal protective equipment must be in perfect condition when carrying out work. Defective safety equipment is to be replaced immediately.
- Observe information on personal protective equipment posted in the working area.
- During **rotational operation** of the power chuck DURO-A RC, **no** protective gloves are to be worn! Hand protection is only to be worn during transport, assembly and maintenance and as long as the machine and the power chuck DURO-A RC are at a standstill.



Wear protective gloves



Wear safety goggles





Wear safety shoes

## 7.2 Maintenance Interval

The regular maintenance work is described in the following:

Activity	Interval
Lubricate conical lubricating nipple.	Approx. every 20 hrs. depending on conditions of use and use of coolant after 8 hrs. or at the latest after 10,000 clamping cycles.
Lubricate jaw guide.	With each jaw replacement or at the latest after 2,500 clamping cycles.
Check clamping force with clamping force measurement system F-Senso Chuck.	After 30,000 clamping cycles or after 3 months depending on the conditions of use.
Visually inspect wear parts.	Weekly
Check tightness of screw connec- tions.	Weekly
Visually inspect jaw screws.	Weekly
Replace jaw screws.	Annually
Inspection of the power chuck.	Annually

## 7.3 Maintenance Work

 <b>CAUTION</b>	
	<p><b>Skin irritations due to contact with lubricants.</b></p> <p>The constituents of the lubricant may cause irritations in the event of contact with the skin.</p> <ul style="list-style-type: none"><li>➤ When handling the power chuck, wear safety goggles, long work clothes and gloves.</li><li>➤ Avoid skin contact with lubricants.</li></ul>

### 7.3.1 Lubricating Conical Lubricating Nipples

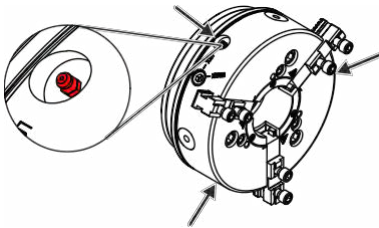
Construction size	Quantity of grease [strokes per lubricating nipple]
180	2
210	2
260	2
315	3
400	4

Recommended grease gun	ID no.:
ATS Systems grease gun	11138900

Recommended grease K05	ID no.: 11139101
0.1 kg	630869
0.25 kg	304345
0.5 kg	308555
1.0 kg	028975
5 kg	318310
25 kg	658047

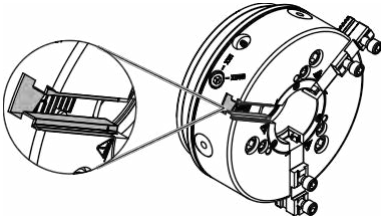


1. Press grease 80 into the conical lubricating nipple with the grease gun (for grease quantity, see table).
  2. Move through the complete stroke several times.
    - The grease is distributed.
    - After 400 clamping cycles, move through the complete stroke again several times.
- ✓ The power chuck is lubricated.

### 7.3.2 Lubricating Jaw Guides

Recommended grease F80	ID no.:
0.1 kg	630869
0.25 kg	304345
0.5 kg	308555
1.0 kg	028975
5 kg	318310
25 kg	658047

EN



1. Lubricate the jaw guides with grease 80 using a brush.
2. Move through the complete stroke several times.
  - The grease is distributed.
  - After 400 clamping cycles, move through the complete stroke again several times.
  - ✓ The jaw guides are lubricated.

### 7.3.3 Checking the Clamping Force

- Check clamping force with clamping force measurement system.

Recommended clamping force measurement system	ID no.:
F-Senso Chuck	179800

### **7.3.4 Checking the Tightness of Screw Connections**

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If screws are replaced or undone, incorrect replacement or attachment may lead to dangers for persons and objects. For this reason, for all fixing screws, the screw recommended by the manufacturer of the screw must be used and the tightening torque applied in accordance with the screw quality.

#### **Tightening torque in Nm**

<b>Quality</b>	<b>M5</b>	<b>M6</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M14</b>	<b>M16</b>	<b>M18</b>	<b>M20</b>	<b>M22</b>	<b>M24</b>
8.8	5.9	10.1	24.6	48	84	133	206	295	415	567	714
10.9	8.6	14.9	36.1	71	123	195	302	421	592	807	1,017
12.9	10	17.4	42.2	83	144	229	354	492	692	945	1,190

### **7.3.5 Inspection of the Power Chuck**

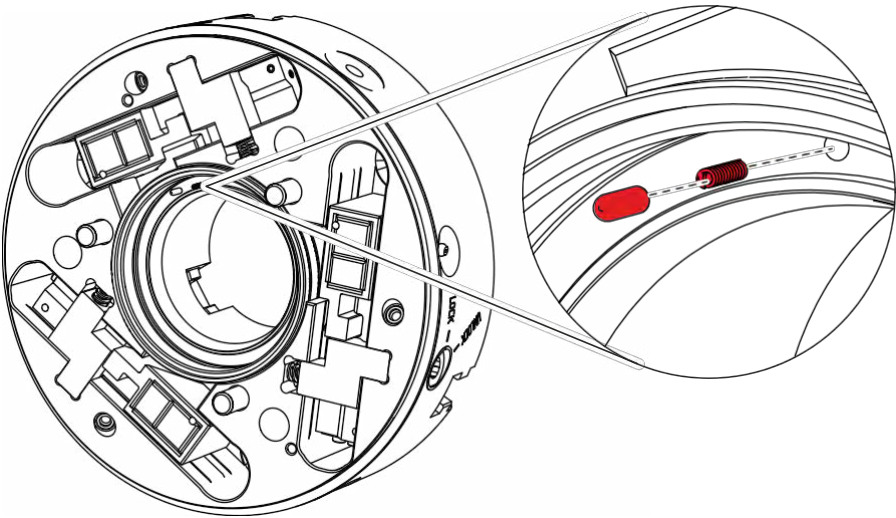
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For inspection, the power chuck must be completely dismantled, cleaned and re-assembled. Worn or damaged components must be replaced during the inspection.

#### **Disassembly and dismantling of the power chuck**

1. Move piston of the power chuck into front position.
2. Remove jaws (1-3) from the guides (Replacing Jaws [ ] 79).
3. Screw the crane lug into the power chuck.
4. Correctly attach the load-bearing equipment to the crane lug.
5. Unscrew the threaded ring of the power chuck from the draw tube with the assembly tool provided.
6. Undo the three chuck fixing screws.
7. Turn the power chuck over with a crane and set down at the cleaning area.
8. Unscrew crane lug.

- 9. Undo fixing screws on the flange.
- 10. Remove flange from behind.
- 11. Remove the threaded ring and the stop disk out of the power chuck from the rear of the chuck. Observe the bolt, as it can fall out of the power chuck due to the spring force.



- 12. Remove bolt and pressure spring from the power chuck.
- 13. Remove pusher.
- 14. Remove wedge bars (1-3) from the power chuck from behind.
- 15. Remove the jaw bolts from the wedge bar with circlip pliers.
- 16. Remove drivers (1-3) from the power chuck.
- 17. Pull the piston out of the power chuck from behind.
- 18. Remove O-ring from the piston.
- 19. Remove the cylindrical pin and turn the turning bolt outwards.
- 20. Unscrew the conical lubricating nipple from the power chuck.
  - The power chuck is dismantled.



## Replacement of wear parts

1. Check the dismantled power chuck for wear and damage.
2. Replace worn and damaged parts with OEM replacement parts.
  - ✓ Wear parts are replaced.

## Cleaning the power chuck

- Thoroughly clean the dismantled power chuck with a broom, brush or cleaning cloth and free of grease residue, dirt and abrasion.
  - ✓ The power chuck is cleaned.

Cleaning with compressed air or a high-pressure cleaner is not permitted.

## Assembly of the power chuck

The power chuck is assembled in reverse order.

# 8 Cleaning the Device

## CAUTION



### **Skin irritations due to contact with lubricants.**

The constituents of the lubricant may cause irritations in the event of contact with the skin.

- When handling the power chuck, wear safety goggles, long work clothes and gloves.
- Avoid skin contact with lubricants.

The power chuck must be cleaned with a broom or brush before each assembly and every time a jaw and workpiece is replaced.

Cleaning with compressed air or a high-pressure cleaner is not permitted.

## 8.1 Personal Protective Equipment Power Chuck

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When working on and with the power chuck DURO-A RC, personal protective equipment must be worn. The owner is responsible for providing personal protective equipment.

EN

- Personal protective equipment must be in perfect condition when carrying out work. Defective safety equipment is to be replaced immediately.
- Observe information on personal protective equipment posted in the working area.
- During **rotational operation** of the power chuck DURO-A RC, **no** protective gloves are to be worn! Hand protection is only to be worn during transport, assembly and maintenance and as long as the machine and the power chuck DURO-A RC are at a standstill.



Wear protective gloves



Wear safety goggles



Wear safety shoes

## 9 Storage

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If the power chuck is not in use, the power chuck is to be stored in a dry, protected place in accordance with the storage temperature (Environmental and Operational Conditions [ ] 64]).



In the event of long periods of storage, the lubrication must be checked before assembly. If the viscosity of the lubricant is incorrect, the power chuck must be cleaned and re-lubricated.

## 10 Troubleshooting

<b>Fault</b>	<b>Possible cause</b>	<b>Measure</b>
The safety key cannot be removed.	The jaws are not intermeshed in the wedge bar.	Check jaw position and correct if necessary.
The safety key cannot be turned.	Piston not in front position.	Move piston completely forwards. The adapter may be too short.
The power chuck runs with an imbalance.	The jaws are not in the same position.	Check jaw position and correct if necessary. Count the teeth or measure the distance between the jaws
The tensile force is not reached.	The cylinder is incorrectly adjusted.	Check settings and correct if necessary.
The jaws cannot be replaced.	The wedge bar is soiled. The draw bar is broken.	Clean the wedge bar as far as possible. Contact the Service department of ATS Systems  Replace draw bar. Contact the Service department of ATS Systems.
The workpiece cannot be inserted.	The workpiece diameter is greater than the clamping diameter of the power chuck.	Use a larger power chuck.

## 11 Disposal

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After final disassembly, the materials must be disposed of in an environmentally sound way in accordance with the valid regulations.

- Metals

Metals must be recycled. They must be disposed of in accordance with the valid regulations and the applicable local provisions. Obtain relevant information from the authorities.

- Plastics

They must be disposed of in accordance with the valid regulations and the applicable local provisions. Obtain relevant information from the authorities.

- Rubber (e.g. O-rings)

They must be disposed of in accordance with the valid regulations and the applicable local provisions. Obtain relevant information from the authorities.

# THE ULTIMATE CHUCK™

## By ATS Systems (800) 423-4651

### Recommended Operation, Lubrication & Maintenance For Models UC3

1. Read the Installation, Operation and Maintenance Manual.
2. Do not exceed RPM rating marked on the chuck or safe speed for the top jaw configuration or for the application, whichever is less. The maximum rated speed is only valid for maximum drawbar pull using the standard hard jaws model GUA designed for the chuck. For all other conditions speed must be reduced. Failure to do so may have catastrophic consequences. (See manual)
3. Do not use top jaws of excessive weight, height, or extended beyond the outside diameter of the chuck. See Manual for more specific guidelines.
4. Insure top jaw mounting bolts are grade 12.9, in new condition and the proper length for a minimum thread engagement of two times the thread diameter.
5. Inside end of base jaw must never be extended outward beyond the witness line or "SAFE" zone marked on face of chuck. (See manual)
6. Set jaw adjustment to grip the part as close to the start of the jaw stroke as possible, especially when chucking irregular castings, forgings, etc. As you chuck each part, observe that adequate jaw stroke remains to grip the part.
7. Use only ATS Systems' KO5 grease (Part #1113-9101). Grease chuck every 24 hours of operation, two shots of KO5 per grease fitting with the chuck in the full "open-jaws out" position.
8. At the start of each shift and after every 50 clamping cycles, actuate the chuck full stroke 5-10 times without gripping a workpiece to internally redistribute grease throughout the chuck.
9. Clean jaw guide ways when changing jaws, or at least once per shift if no jaw change is required, and lightly coat sliding jaw surfaces with KO5.
10. Do not exceed the maximum allowable drawbar pull.
11. Test chuck and record grip force at least once per month. If baseline grip force decreases more than 15%, the chuck should be disassembled, cleaned, and all internal parts coated with a film of KO5.
12. Never remove your hand from the jaw changing wrench - it could fly out if the chuck is rotated. Never actuate the chuck with the wrench inserted - severe internal chuck damage will occur.