

## Operating instructions

Tube Squaring Machine

**RPG 1.5**



Code 790 037 762

| Machine-no.:

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# 0 About these instructions

To allow quick understanding of these instructions and safe handling of the machine, all the warning messages, notes and symbols used in these instructions are presented here along with their meaning.




## 0.1 Warning messages

In these instructions, warning messages are used to warn you against the dangers of injury or material damage. Always read and observe these warning messages!




This is a warning symbol. It should warn you against dangers of injury.

Follow all instructions which are identified with this safety symbol in order to avoid injuries or death.

Warning symbol	Meaning
 <b>DANGER</b>	Direct danger! Non-observance could result in death or critical injury. ⊙ Restrictions (if applicable). ► Measures to prevent danger.
 <b>WARNING</b>	Possible danger! Non-observance could result in serious injury. ⊙ Restrictions (if applicable). ► Measures to prevent danger.
 <b>ATTENTION</b>	Dangerous situation! Non-observance could result in minor injuries.
<b>ATTENTION</b>	Dangerous situation! Non-observance could result in material damage.

## 0.2 Further symbols and displays

Symbol	Meaning
<b>Important Note</b>	Notes: Contain particularly important information for comprehension.
	Instruction: You must take notice of this symbol.
	Request for action in a sequence of actions: You have to do something here.
▶	Single request for action: You have to do something here.
▷	Conditional request for action: You have to do something here if the specified condition is met.

## 0.3 Abbreviations

Abbr.	Meaning
RPG 1.5	Tube Squaring Machine Type 1.5
MFW	Multifunctional tool
WH	Tool holder
QTC®	Quick Tool Change

# 1 Notes on safety

The Tube Squaring Machine 1.5 (hereinafter referred to as RPG 1.5) is a state-of-the-art machine. Using it for purposes other than those described in this manual may cause injury to the user or to others. The machine or other equipment may also be damaged.

Therefore:

- Always ensure that the machine is in good working condition, and always comply with these notes on safety.
- Keep the complete documentation close by the machine.
- Generally valid regulations for the prevention of accidents must be observed.

## 1.1 Proper use

- Use the RPG 1.5 exclusively for machining thin-walled pipes and welded micro fittings.
- The user will be the only person liable for damages caused by improper use.

## 1.2 Safety regulations

- Only use the dimensions and materials specified in these instructions (see “Range of applications“, chapter 3.2, page 10). Other materials should only be used after consulting the Orbitalum Tools customer service department.
- Read the enclosed safety notes completely and carefully before working with the electric tool Metabo SBE 1010 Plus.
- Only use authentic Orbitalum Tools spare parts and materials.
- Check the RPG 1.5 daily for any externally visible damages or defects. Have any damages or defects repaired immediately.
- Work on the electrical equipment should only be carried out by a qualified electrician.
- Only operate the RPG 1.5 if the electrical restart prevention is working correctly.
- Pull out the mains plug before carrying out a tool change or maintenance and repair work.

### 1.3 Working with safety in mind

"Make your contribution to safety in the workplace."



- Report any deviations from normal operation to the person responsible immediately.
- Always keep safety in mind while working.
- When working with the RPG 1.5, wear protective goggles and safety gloves.
- Tie up long hair (hair-net); do not wear wide clothing.  
**Attention:** Jewellery, loose fitting clothing and ties can be caught in rotating parts!
- Make sure that the work piece has been clamped correctly.
- Turn the machine off at the end of each operating cycle and allow the machine to run a stop.
- Before carrying out a tool change, cleaning, performing any maintenance work, adjustments or repair work on the RPG 1.5, pull out the mains plug and allow the machine to run to a stop.
- Keep hands away from the tools during processing.
- Pay attention to the surroundings. Do not use any electric tools in a damp or wet area. Make sure to have good illumination. Do not work near combustible liquids or gases.
- Do not carry the electric tool holding it at the cable and do not use it to pull the plug out of the socket. Protect the cable against heat, oil and sharp edges (chips).
- Make sure the sight is closed before and during the treatment of pipes.

### 1.4 Waste disposal / environmental protection

- Dispose of chips and used gear lubricant oil according to the regulations.

**Discarded electric tools and accessories contain a large share of valuable raw and synthetic materials which can be recycled.**

**Therefore:**

- Electrical (electronic) devices which are marked with the symbol to the left, may not be disposed of with household waste in accordance to the EU directive 2002/96/EC.
- By actively using the offered return and collection systems, you actively contribute to the reuse, recycling and utilization of electrical (electronic) devices.
- Electrical (electronic) used devices contain parts which must be handled selectively according to the EU directive. Separate collection and selective treatment is the basis for environment-friendly disposal and the protection of human health.



(RL 2002/96/EC)



- Our products that were sold to you after August 13th, 2005 are taken back and treated according to legal standards. These products have to be send free of charge.
- The return of used devices which pose a health or safety risk for human beings due to soiling during use may be refused.
- The legally compliant disposal of electrical (electronic) devices that were placed on the market before August 13th, 2005 are in the responsibility of the end-user.

## **1.5 Further safety regulations**

Observe country-specific regulations, norms and guidelines.

## 2 Construction of the product



### 2.1 Standard



## 2.2 Accessories

### 2.2.1 Standard tool holder (WH) and multifunctional tool (MFW)



Contained in the standard scope of delivery.

Multifunctional tool	Working range (pipe OD)	Characteristics		Code
 MFW-P-2	3.0 – 38.1 mm (0.118 – 1.500 inch)	Multifunctional tool with 2 cutting edges and high-performance coating Futura® Balinit.  Usable for all tool holders.		790 038 314
Standard tool holder	Working range (pipe OD)	Characteristics	Adjustable	Code
 WH12-I	3.0 – 38.1 mm (0.118 – 1.500 inch)	For squaring pipe ends.  Also possible for electropolished pipes up to OD 15 mm (0.590 inch).  Incl. Torx screw.	Yes	790 037 152  <b>Torx screw:</b> 790 086 220

## 2.3 Optional accessories

### 2.3.1 Optional tool holder (WH)

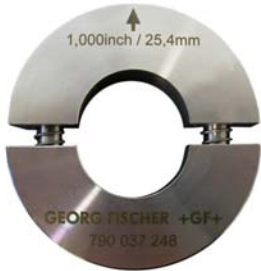
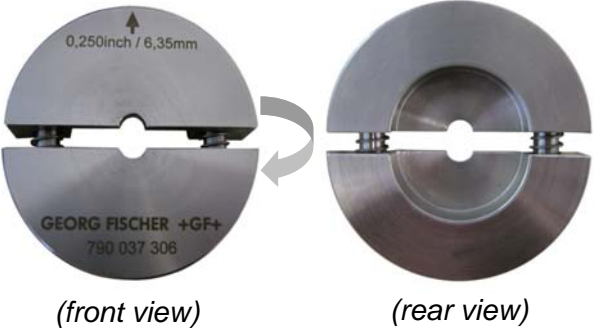
Not contained in the standard scope of delivery.

Optional tool holder	Working range (pipe OD)	Characteristics	Adjustable	Code
 WH12-I	15.0 – 38.1 mm (0.590 – 1.500 inch)	Particularly for facing electropolished pipe ends.  Incl. Torx screw.	Yes	790 037 154  <b>Torx screw:</b> 790 086 220
 WH12-I	3.0 – 30.0 mm (0.118 – 1.180 inch)	Elongated tool holder for the treatment of welded micro fittings.  Incl. Torx screw.	No	790 037 156  <b>Torx screw:</b> 790 086 220

### 2.3.2 Clamping shells

For deformation-free clamping of pipes.  
Not contained in the standard scope of delivery.

*Please refer to our current product catalogue for a selection of clamping shell dimensions with code numbers.*

Standard clamping shells	Optional clamping shells
	
<p><b>For pipes</b> Outer diameter: 3.00 – 38.10 mm (0.118 – 1.500 inch)</p>	<p><b>For welded micro fittings</b> Outer diameter: 3.00 – 12.7 mm (0.118 – 0.500 inch) with notch (see rear view)</p>

## 3 Characteristics and range of applications

### 3.1 Characteristics

The RPG 1.5 is suitable for squaring pipe ends/welded micro fittings made of metallic materials. It has the following characteristics:

- Pipe end preparation for welds conforming to standards
- Tool holding system QTC® (Quick Tool Change):  
Rapid locking for fixing the tool holder to the tool support
- Only one multifunctional tool is necessary for:
  - different pipe wall thicknesses (up to 3 mm/0.118 inch)
  - different pipe materials (exclusively ferritic materials)
- Multifunctional tool:
  - cutting geometry adapted to application
  - multi-cutting tool
  - only one screw is needed to fix and secure the tools
  - tool coating TiN
- Machine:
  - hand-operated
- Drive:
  - twistable/detachable
  - speed-controlled electric motor with speed stabilisation
  - restart protection to prevent the machine from starting in an uncontrolled way after it has been re-connected to the electric mains or after the voltage supply has been re-established after a power failure
- Quick clamping system for pipes with adjusting facility
- Quick change system for clamping shells
- Forward feed with scale ring:
  - total: 10 mm (0.393 inch)
  - per revolution: 9 mm (0.354 inch)
  - per pitch line: 0.1 mm (0.004 inch)
- A simply adjustable sight and/or chip guard allows clean working

## 3.2 Range of applications

Working range	Outer diameter	[mm]	[inch]
	min.	3.00	0.125
max.	38.10	1.500	

The maximum workable wall thickness is 3 mm/0.118 inch.

- Pipe materials**
- High-alloy steels (high-grade steel, material no. 1.40... – 1.45... according to DIN 17 455 and DIN 17 456)
  - Non-alloy and low-alloy steels
  - Aluminum
  - Others on request

## 4 Technical data

### 4.1 Rating

Dimensions (with drive)	400 x 350 x 160 mm 15.75 x 13.78 x 6.30 inch
Total weight (without clamping shells)	4.7 kg 10.4 lbs
Power	1010 W
Mains supply	230 V; 50 – 60 Hz
Speed (max. idling speed)	146 – 885 min <sup>-1</sup>
Noise level at the workplace <sup>*)</sup>	Idle running approx. 82 dB (A)
Vibration level according to EN 28662, Part 1	2.5 m/s <sup>2</sup>

<sup>\*)</sup> The noise level measurement was carried out under normal operating conditions according to EN 23741.

## 5 Commissioning

### Checking the scope of delivery

- ▶ Check all parts of the delivery for completeness and transportation damage.
- ▶ Report any missing parts or transportation damage to your supplier immediately.

### 5.1 Scope of delivery

- 1 Tube Squaring Machine RPG 1.5
- 1 Durable storage and shipping case
- 1 Tool holder (Code 790 037 152) with multifunctional tool (Code 790 038 314)
- 1 Tool set
- 1 Operating instructions with spare parts list

Subject to alterations



### 5.2 Transportation

The RPG 1.5 is a portable machine. Special transportation aids are not required (for safe transportation, hold the machine as shown in the left-hand illustration).



**DANGER**

#### **Danger of death by electric shock and restart of the machine**

During transport, the ON/OFF switch could be actuated inadvertently so that the machine is started.

- ▶ Cut off the power supply before carrying out the transport or changing the workplace and allow the machine to run a stop.

### 5.3 Connection requirements

The mains supply must meet the following requirements:

- 1-phase alternating current 230 V, 50/60 Hz, protection class II
- Mains fuse at least 10 A



## 6 Operation



### Danger of death by electric shock

Unintentional operation of the ON/OFF switch!

- ▶ Pull out the mains plug before carrying out any adjustment, repair and maintenance work or changing the tool and allow the machine to run a stop at the end of each running cycle.

### Danger of injury

Rotating tool support!

- ⊙ Do **not** reach into the tool support while machining, keep wide clothing away from the work area.
- ▶ Only operate the machine after the pipe has been clamped in and the sight has been closed.

### 6.1 Mounting the RPG 1.5 on the basic plate

1. Place the basic plate on a stable base and put on the RPG 1.5.
2. Use the Allen key (SW4x150) to fasten the machine to the basic plate.



### 6.2 Machining pipes with OD 3.0 – 38.1 mm (0.118 – 1.5 inch)

#### 6.2.1 Preparation

#### Specifying dimensions

1. Specify the pipe dimension to be processed.
2. Select the standard tool holder, the multifunctional tool and the clamping shells (for tool accessories, see chapter 2.2, p. 7).

### 6.2.2 Mounting the multifunctional tool (MFW) and the tool holder (WH)

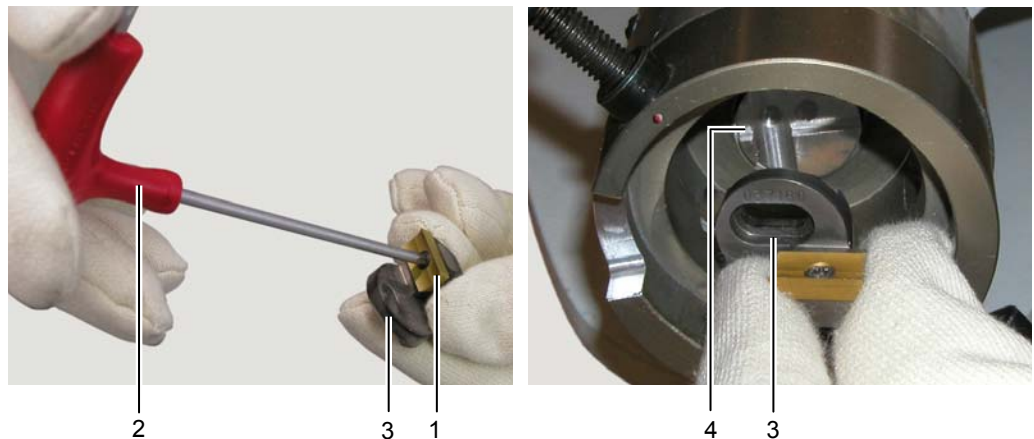


#### Danger of injury

Sharp cutting edges!

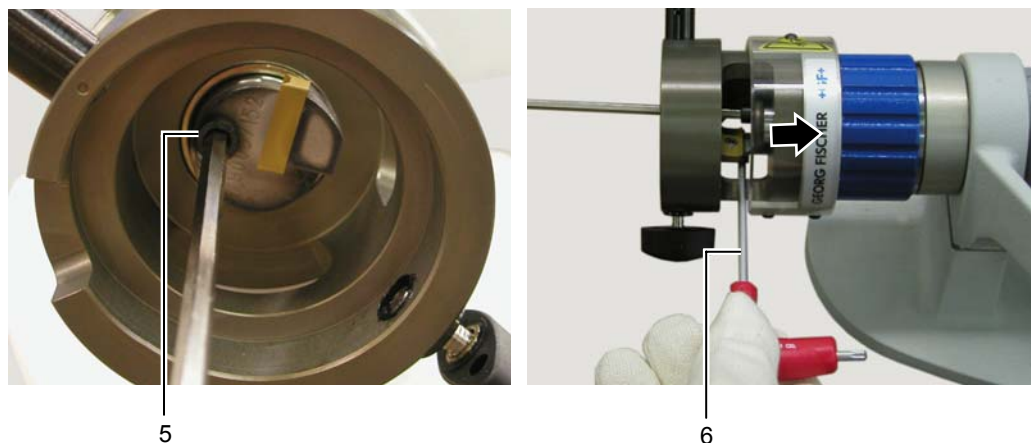
- ⊙ Do **not** touch the cutting edges when mounting the multifunctional tool.
- ▶ Wear safety gloves.

1. Screw the multifunctional tool (1) onto the tool holder (3) using the Torx screwdriver (2).
2. Insert the tool holder (3) with multifunctional tool from the front into the guiding groove (4) and position it according to the outer pipe diameter.



3. Tighten the screw (5) of the tool holder with the Allen key.

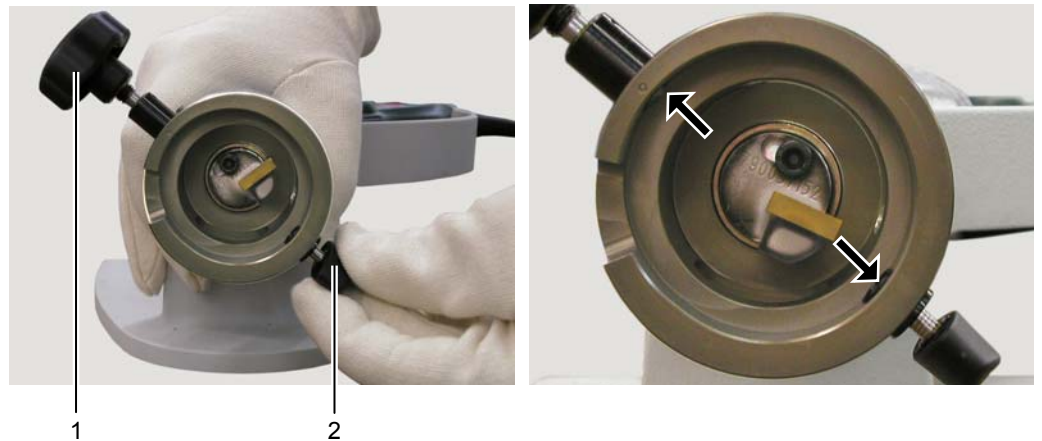
**Note** **If the tool holder is twisting during fitting:** Move the sight back with one hand and hold it. Simultaneously, the tool holder can be held through the opened sight by means of the Torx screwdriver (6).



4. Remove the screwdriver, close the opened sight, if necessary.
- The mounting of the tool holder with multifunctional tool is now completed.

### 6.2.3 Inserting and replacing standard clamping shells

1. Select the appropriate set of clamping shells according to the pipe dimension (see chapter 2.3.2, p. 8).
2. Turn out the clamping grasp (1) until it is running freely (end of locking grasp must be flush with the inside of the housing).
3. Turn out the locking grasp of the clamping shells (2) until it is running freely (end of locking grasp must be flush with the inside of the housing).



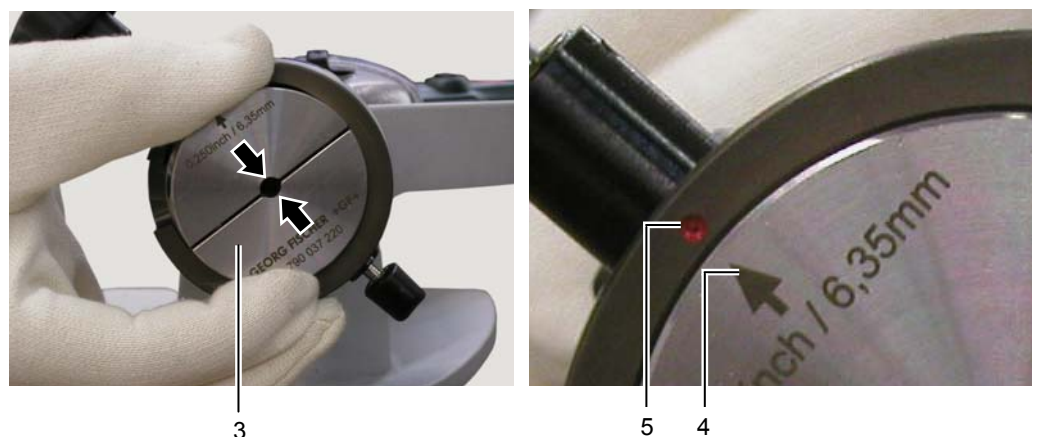
#### Removing clamping shells

If an already mounted set of clamping shells is to be replaced, it can now be removed by compressing it.

#### Inserting clamping shells

4. Compress the set of clamping shells (3) slightly and insert it into the housing:
  - The inscription on the clamping shells must point to the operator.
  - The arrowhead (4) on the clamping shell must be positioned at the point (5) on the housing.

The clamping shell is correctly inserted if it has engaged.  
If the clamping shell does not engage, readjustment is possible by slightly turning the clamping shell.



5. Fix the clamping shell by means of the clamping shell locking grasp (6).



6

The set of clamping shells has now been inserted correctly.

#### 6.2.4 Mounting the pipe

1. Insert the pipe to be machined into the machine allowing it to have sufficient distance to the multifunctional tool.
2. To clamp the pipe fast, turn the clamping grasp (1) clockwise to the limit stop.

#### Mounting the pipe

#### Checking the pipe for correct clamping

The pipe has been clamped correctly and may be processed if it is no longer possible to turn or move the pipe.



1

#### Removing the pipe

3. To remove the pipe, turn the clamping grasp (1) anticlockwise to the limit stop.

### 6.2.5 Determining the speed

The following table serves to determine the cutting speed recommended by Orbitalum Tools and, thus, the number of revolutions (applies to stainless steels such as e.g. 1.4435; 316L).

**Standard values for the speed (n)**

Outer diameter (Pipe OD)		Adjusting wheel (1) for presetting the speed [level A – G]	Speed n (1/min)
[mm]	[inch]		
3.175	0.125	C	381
6.350	0.250	B	235
12.700	0.500	A	145
38.100	1.500	A	145

The table is based on a cutting speed of approx. 3 – 17 m/min with high-alloy steel.

**Note** The machining behaviour can be influenced by altering the speed.

### 6.2.6 Setting the speed

**Increasing/reducing the number of revolutions**

- ▶ Set the adjusting wheel (1) for presetting the speed to the desired level (A – G); “A” corresponds to the lowest and “G” to the highest speed.



### 6.2.7 Machining the pipe



#### Hot and sharp-edged chips

Danger of injuries on eyes and hands.

- ▶ Always wear protective goggles while working.
- ▶ Only remove chips wearing safety gloves.

#### ATTENTION Tool damage

A pipe which has not been sawn off square may damage the tool (MFW) if the distance between the cutting edge and the pipe end is too short.

- ▶ Before switching the RPG 1.5 on, make sure that there is sufficient distance between the cutting edge (MFW) and the pipe end.

#### Switching the RPG 1.5 on

1. Connect the RPG 1.5 (for connection requirements, see chapter 5.3, p. 12).
2. Set the recommended speed (see chapter 6.2.5, p. 17).
3. Press the ON/OFF switch (1).

The machine starts running.



**Note** If the tool chatters after starting up, the cutting speed is too high.

- ▶ Reduce the speed (see chapter 6.2.6, p. 17).

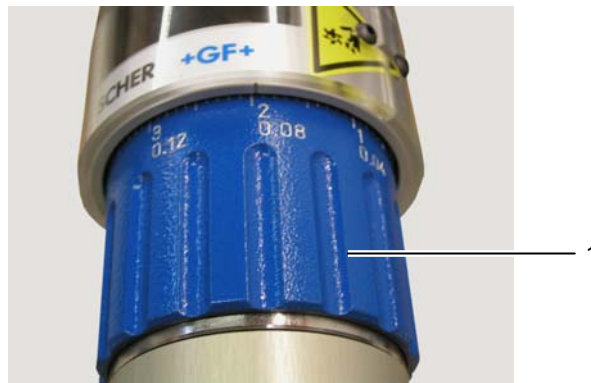


**Note Forward feed with scale ring (1):**

- Each pitch line corresponds to an advance of 0.1 mm.
- When cutting, do not exceed a chip thickness of 0.05 mm. By exceeding the load-limiting device (square nut, code 790 037 118) can be cut (see problem solving, chapter 8.1, p. 23).

**Advancing the tool**

4. Move the tool towards the pipe by means of the forward feed (1) until the tool contacts the pipe.
5. When the cutting edge of the tool is cutting along the entire circumference of the pipe:
  - ▷ Go on advancing the tool with constant pressure until the desired machining result is achieved.

**Switching the RPG 1.5 off**

6. Press the ON/OFF switch.  
The machine comes to a stop.
7. The pipe may now be removed (see chapter 6.2.4, p. 16).

## 6.3 Processing welded micro fittings

### 6.3.1 Preparation

#### Specifying dimensions

1. Specify the micro fitting dimension to be processed.
2. Select the elongated tool holder, the multifunctional tool and the clamping shells (for tool accessories, see chapter 2.3, p. 7).

### 6.3.2 Mounting the multifunctional tool (MFW) and the elongated tool holder (WH)



**WARNING**

#### Danger of injury

Sharp cutting edges!

- ⊘ Do **not** touch the cutting edges when mounting the multifunctional tool.
- ▶ Wear safety gloves.

- ▶ Screw the multifunctional tool onto the elongated tool holder using the Torx screwdriver.

Carry out the further working steps described in chapter 6.2.2, p. 14.

### 6.3.3 Inserting and replacing optional clamping shells



**WARNING**

#### Danger of being injured by sharp cutting edges.

**Bruised fingers.**

**Material damage.**

The elongated tool holder has been designed specifically for welded micro fittings and has a shifted feed path. Wrong insertion of the clamping shell may lead to injuries of the operator or to a tool damage.

- ⊘ Do **not** insert the clamping shells the wrong way round (the inscription on the clamping shells must point to the operator).
- ▶ Before switching the RPG 1.5 on, make sure that the sight is closed.
- ▶ Wear safety gloves.

1. Select the appropriate set of clamping shells for welded micro fittings (with notch) according to the pipe dimension (see chapter 2.3.2, p. 8).

Carry out the further working steps described in chapter 6.2.3, p. 15.



**6.3.4 Mounting the micro fitting**

Carry out the working steps described in chapter 6.2.4, p. 16.

**6.3.5 Determining the speed**

The speed is determined as described in chapter 6.2.5, p. 17.

**6.3.6 Setting the speed**

For setting the speed, see chapter 6.2.6, p. 17.

**6.3.7 Machining the micro fitting**

Carry out the working steps described in chapter 6.2.7, p. 18.

## 7 Maintenance

The Tube Squaring Machine RPG 1.5 is designed for a long service life and low maintenance.

Please follow the maintenance instructions below.



**DANGER**

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### **Danger of death by electric shock**

- ▶ Pull the mains plug before carrying out any maintenance work and allow the machine to come to a stop.
- 

<b>Time / Interval</b>	<b>Activity</b>
Before starting work	▶ Check the pipe clamping if the pipe is already mounted in the machine.
At each cleaning	▶ Clean the clamping shells and the housing/tool support.
At each tool change	▶ Clean the tool support and the multifunctional tool.

## 8 What to do if ...?

### 8.1 Problem solving

In the following table you will find possible causes for faults and the appropriate remedies.

Fault	Possible cause	Remedy
The tool (multifunctional tool) is catching during machining.	Too much forward feed.	<ul style="list-style-type: none"> <li>▶ Dismount the tool holder and remove the pipe from the machine.</li> <li>▶ Remove the chip using side-cutting pliers and file off the shoulder.</li> <li>▶ Feed carefully for further machining.</li> </ul>
	Multifunctional tool or tool holder is loose.	<ul style="list-style-type: none"> <li>▶ Tighten the multifunctional tool or tool holder.</li> </ul>
The motor of the RPG is not running. (Electronics signal light of the motor lights up).	Restart prevention has been activated.	<ul style="list-style-type: none"> <li>▶ Turn the RPG off and back on again.</li> </ul>
The tool tends to vibrate. <sup>7</sup>	Cutting speed is too high.	<ul style="list-style-type: none"> <li>▶ Set the number of revolutions (cutting speed) according to the table.</li> </ul>
High level of vibration.	Axial or radial play in the components.	<ul style="list-style-type: none"> <li>▶ Check the machine for zero backlash.</li> </ul>
	Multifunctional tool is loose.	<ul style="list-style-type: none"> <li>▶ Check the multifunctional tool for tightness.</li> </ul>
The machined pipe is rough or shows too much burr.	Multifunctional tool is blunt.	<ul style="list-style-type: none"> <li>▶ Replace the multifunctional tool.</li> </ul>
Tool does not turn, although engine runs.	Load-limiting device (adapter) mechanically cut.	<ul style="list-style-type: none"> <li>▶ Change square nut Metabo 1010 (code 790 037 118, see spare parts list, p. 4/5, Item No. 6).</li> </ul>

### 8.2 Servicing/customer service

For ordering spare parts, see the separate spare parts list. For problem solving, please contact your competent branch office directly.

Please give the following details:

- Machine type: **RPG 1.5**
- Machine number: *(see the identification plate)*

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