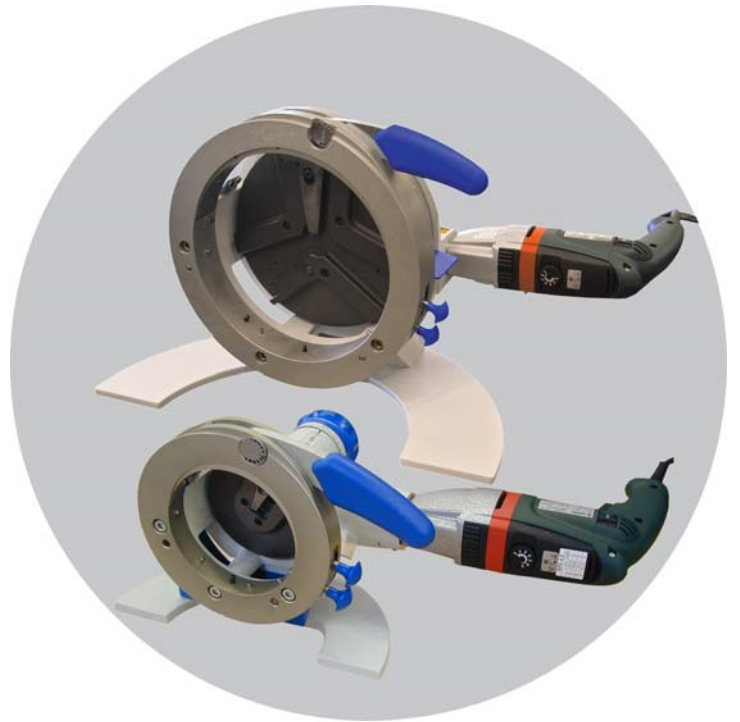


Operating instructions

Tube Squaring Machines

RPG 4.5, RPG 8.6



Code 790 038 762

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

0.2 Further symbols and displays

Symbol	Meaning
Important Note	Notes: Contain particularly important information for comprehension.
	Instruction: You must take notice of this symbol.
1.	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 4.5	Tube Squaring Machine for tubes with an outer diameter of up to 4.5 inches
RPG 8.6	Tube Squaring Machine for tubes with an outer diameter of up to 8.6 inches
MFW	Multifunctional Tool
WH	Tool Holder
QTC®	Quick Tool Change

1 Notes on safety

The Tube Squaring Machine (in the following referred to as RPG) 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 exclusively for machining thin-walled tubes.
- The user will be the only person liable for damages caused by improper use.

1.2 Safety regulations

- Only use the dimensions and materials quoted in these instructions ("Range of applications", see the chapter 3.2, p. 9). 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 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 if the electrical re-start prevention is working.
- Pull out the mains plug before carrying out a tool change or maintenance and repair work.

1.3 Working safely

"Play your part in ensuring safety at work."



- Report any changes in operating performance to the responsible person immediately.
- Carry out all work with an awareness of safety.
- Keep the working area tidy. Untidiness in the working area may cause accidents.
- When working with the RPG, wear protective goggles and safety gloves.
- Tie up long hair (hair-net); do not wear wide clothing.
Attention: Jewelry, 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, 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).
- While working on tubes, keep the protective cover of the machine closed and insert the chip container.
- Read the enclosed safety notes of the driving motor Metabo 1010 Plus carefully.

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.



(RL 2002/96/EC)

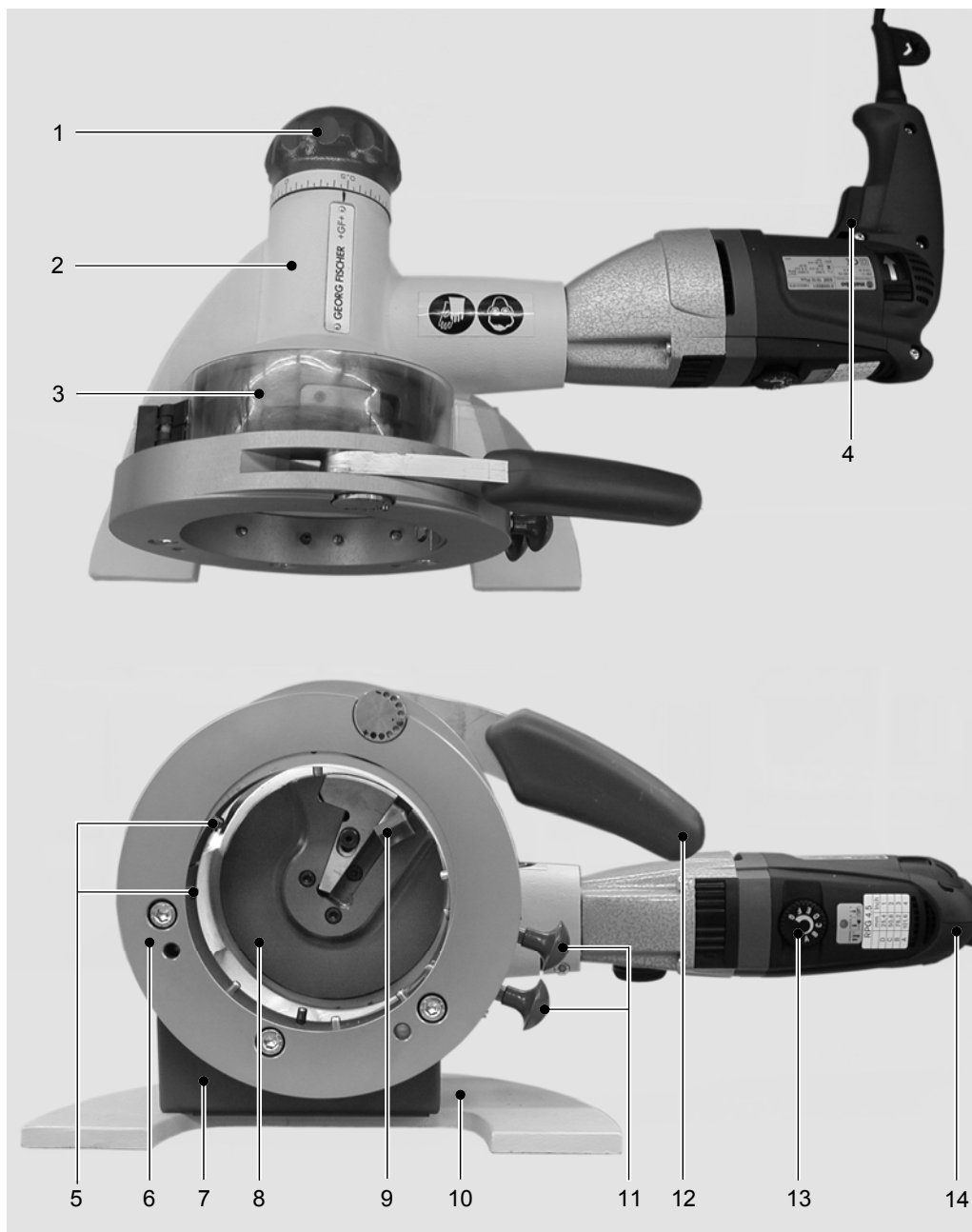
- Electrical (electronic) used devices contain parts which must be handled selectively according to the EU directive. Separate collection and selective treatment is the basis for environment-friendly disposal and the protection of human health.
- Our products that were sold to you after August 13th, 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 RPG 4.5, RPG 8.6



1 Feed handle with adjustable dial

2 Housing

3 Cover

4 ON/OFF switch

5 Stop bolt

6 Clamping unit

7 Chip container

8 Tool support

9 Tool holder with multifunctional tool

10 Base plate

11 Unlock handles

12 Clamping lever

13 Adjusting wheel for pre-setting
the speed

14 Driving motor

2.2 Accessories

2.2.1 Multifunctional tool (MFW)



Included in the standard scope of delivery.

Two-sided tool bit with high-performance Balinit® Futura protective coating against tool wear. Usable for all tool holders of the RPG series.

Article	Code
MFW-P-2	790 038 314
Torx screw	790 086 220

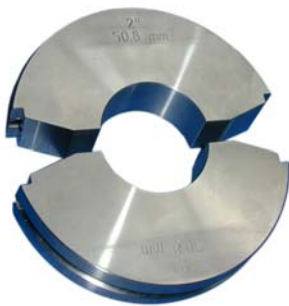


2.2.2 Tool Holder (WH)

Article	Code
MFW-P-2	790 038 320

2.2.3 Clamping shells

Not contained in the standard scope of delivery. Other dimensions are available upon request.



For RPG machine:	Tube OD		Code
	[mm]	[inch]	
RPG 4.5	25.40	1.000	790 038 051
RPG 4.5	31.75	1.250	790 038 052
RPG 4.5	38.10	1.500	790 038 053
RPG 4.5	50.80	2.000	790 038 054
RPG 4.5	63.50	2.500	790 038 055
RPG 4.5	76.20	3.000	790 038 056
RPG 4.5	88.90	3.500	790 038 057
RPG 4.5	101.60	4.000	790 038 058
RPG 4.5	114.30	4.500	790 038 059
RPG 8.6	101.60	4.000	790 039 252
RPG 8.6	114.30	4.500	790 039 256
RPG 8.6	141.30	5.563	790 039 257
RPG 8.6	152.40	6.000	790 039 253
RPG 8.6	168.30	6.625	790 039 254
RPG 8.6	219.10	8.625	790 039 255

3 Characteristics and range of applications

3.1 Characteristics

The RPG is suitable for squaring tube ends 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 tube wall thicknesses (up to 3 mm)
 - Different tube 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 stabilization
 - 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 tubes with adjusting facility
- Quick change system for clamping shells
- Advance:
 - Total: 15 mm
 - Per revolution: 3 mm
- Dial with zero position
- The cover and the chip container guarantee clean working

3.2 Range of applications

Work area	Machine type	Outer diameter OD	
		[mm]	[inch]
	RPG 4.5	25.4 – 114.3	1 – 4,5
	RPG 8.6	50.8 – 219.1	2 – 8.6

The maximum workable wall thickness is 3 mm.

- Tube 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

Rating	RPG 4.5	RPG 8.6
Dimensions (with drive)	525 x 256 x 226 mm 20.7 x 10 x 8.9 inch	630 x 390 x 340 mm 24.8 x 15.4 x 13.4 inch
Total weight (without clamping shells)	10.2 kg 22.5 lbs	20.5 kg 45.2 lbs
Output	1.35 1010 W	1.35 HP 1010 W
Mains supply	200 - 240 V, 50/60 Hz EU 100 - 120 V, 50/60 Hz EU	200 - 240 V, 50/60 Hz EU 100 - 120 V, 50/60 Hz EU
Speed (max. idling speed)	8 – 52 rpm	7 - 18 rpm
Noise level at the workplace ^{*)}	Idle running approx. 83 dB (A)	Idle running approx. 83 dB (A)
Vibration level according to EN 28662, Part 1	2.5 m/s ²	2.5 m/s ²

^{*)} 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 (housing with driving unit)
- 1 Transportation case
- 1 Tool holder (Code 790 038 320) with multifunctional tool (Code 790 038 314)
- 1 Tool set
- 1 Set of operating instructions and 1 spare parts list

Subject to alterations



5.2 Transportation

The RPG is a portable machine. Special transportation aids are not required (see the illustration).



DANGER

Danger of death caused by electric shock and restart of the machine

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

- ▶ Cut off the power supply before carrying out the transportation or a workplace change.
 - ▶ Do not hold the machine at the clamping frame during transportation.
-

5.3 Connection requirements

The mains supply must meet the following requirements:

- 1-phase alternating current 200 - 240 V, 50/60 Hz EU or 100 - 120 V, 50/60 Hz EU, protection class II
- Mains fuse at least 10 A

6 Operation

Note As the usage of both versions of the tube squaring machine is identical, the pictures shown in this chapter solely represent the essential working steps using the RPG 4.5 version.



DANGER

Danger of death by electric shock

Danger of injury after having actuated the ON/OFF switch unintentionally.

- ▶ Pull out the mains plug before performing any adjustments or repair and maintenance work.

Danger of injury by rotating tool support

- ▶ Do not reach into the tool support while processing, keep wide clothing away from the work area.
 - ▶ Only operate the machine after the tube has been clamped in, the cover has been closed, and the chip container has been inserted.
-

6.1 Fitting the multifunctional tool (MFW) and the tool holder (WH)



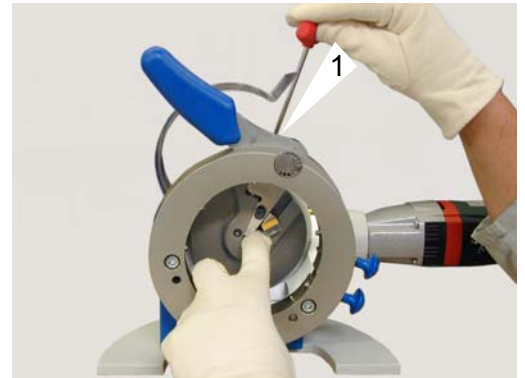
WARNING

Danger of injury

Sharp cutting edges!

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

1. Screw the multifunctional tool (MFW) onto the tool holder using a Torx screwdriver.
2. Insert the tool holder with fitted MFW laterally into the guiding groove and position it.
3. Press the tool holder against the bearing surface of the tool support and, at the same time, tighten the screw using the Allan key (1).



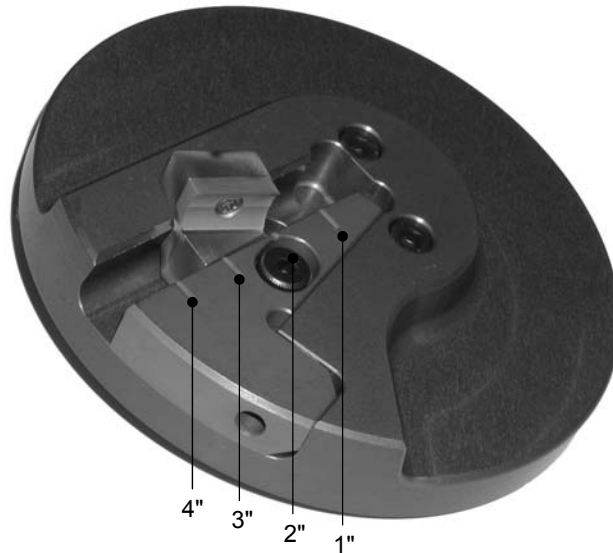
WARNING

Danger of injury by projecting tool holder

Danger of squashing hands; damage to the machine.

- ⊘ The tool holder with fitted MFW **must not** project over the edge of the tool support.
- ▶ Before switching on the tube squaring machine RPG, make sure that the distance between the MFW and the housing is sufficient.
- ▶ Close the cover before switching the RPG on.

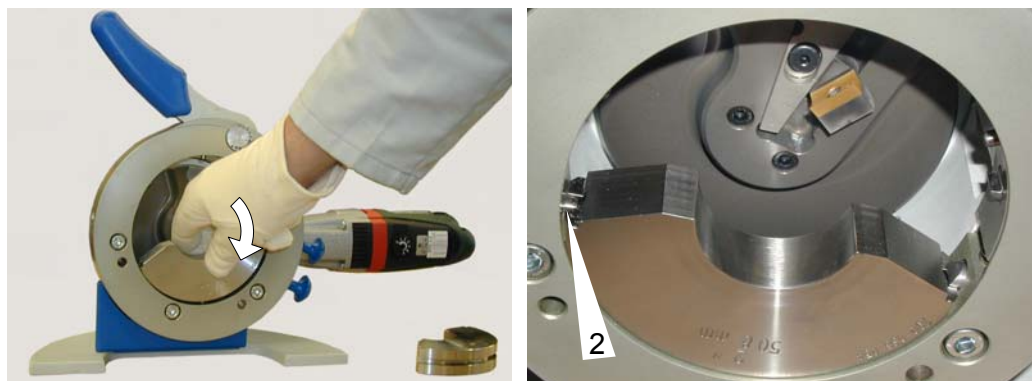
Note To facilitate the adjustment process, the tool support of the RPG 4.5 has been provided with 4 visible marks for 1", 2", 3" and 4" tubes (see the illustration below). At the RPG 8.6 there are 5 visible marks for 4", 5", 6", 7" and 8" tubes.



6.2 Inserting/replacing the clamping shells

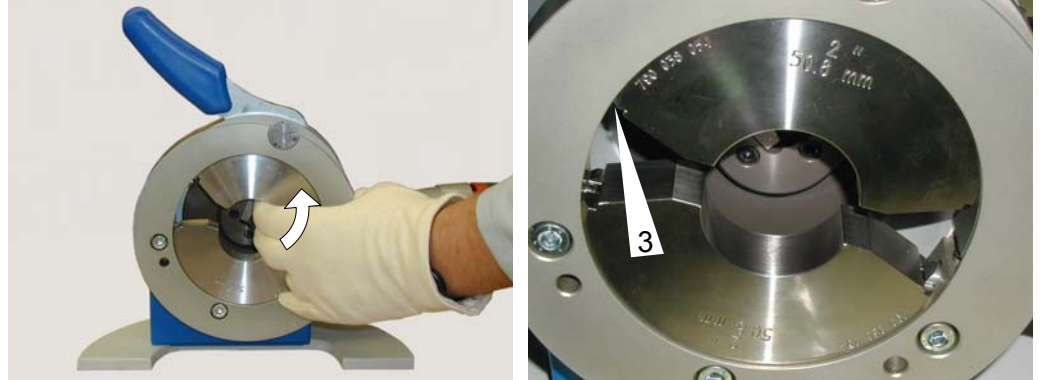
Inserting the lower clamping shell

1. Select the clamping shells according to the tube diameter.
2. Move the clamping lever to the open-position.
3. Place the lower clamping shell at the stop bolt (2).
4. Swivel the clamping shell around the stop bolt in the direction of the arrow until the unlock handle locks into place.



Inserting the upper clamping shell

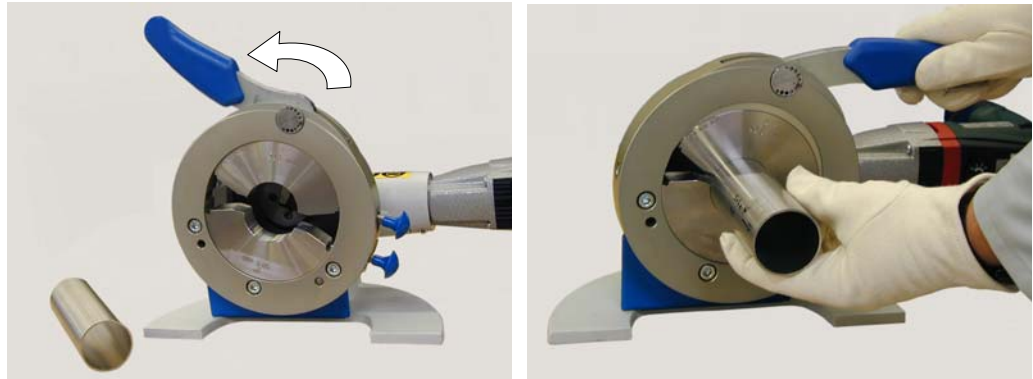
5. Place the upper clamping shell at the stop bolt (3).
6. Swivel the clamping shell around the stop bolt in the direction of the arrow until the unlock handle locks into place.

**Replacing the clamping shells**

7. To replace the clamping shells, pull at the unlock handles.
8. Remove the upper and lower clamping shell.

6.3 Clamping the tube

1. Open the clamping shells by shifting the clamping lever.
2. Insert the tube allowing it to have distance to the tool.
3. Clamp the tube in by means of the clamping lever.






6.3.1 Possibilities of adjustment with clamping lever (Offsetting tube tolerances)

The RPG offers the possibility to offset tube tolerances (deviations from nominal size) by means of an adjusting bolt (adjusting wheel) at the clamping lever. The adjusting bolt has 3 visible marks; the factory's setting or neutral position respectively is marked by **•**.

► *Example:*

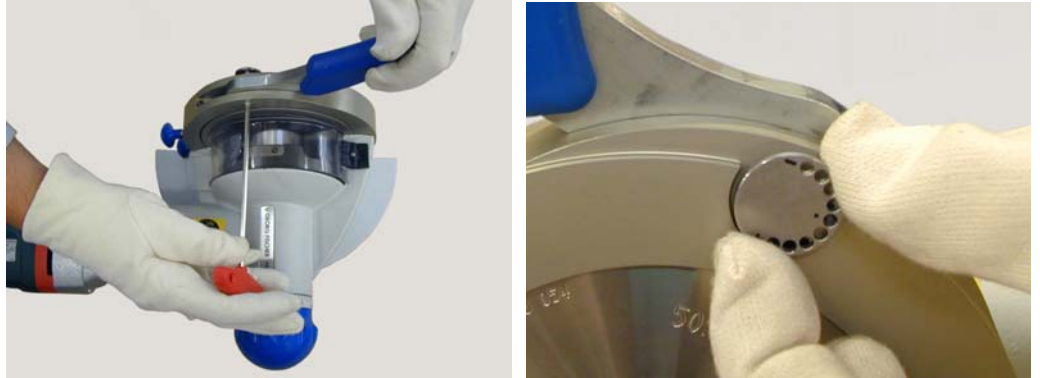
A tube with an outer diameter of 51 mm is to be processed with the clamping shell set of 50.8 mm. As a consequence, it is not possible to move the clamping lever right to the stop. Therefore, the adjusting bolt has to be set towards **+**. Now, the tube clamping is correct.

All adjustment possibilities are shown in the following table:

	Tube has exactly the nominal size	Tube size smaller than nominal size	Tube size larger than nominal size
Position of clamping lever	The adjustment of the clamping lever is correct.	The clamping lever sits on the clamping frame (tube not clamped).	It is not possible to turn the clamping lever.
Re-adjustment required towards:	•	-	+
Result (position of adjusting bolt)			

Shifting the adjusting bolt

1. Loosen the clamping lever and remove the tube, if necessary.
2. Loosen the hexagon socket screw of the adjusting bolt using the Allan key.
3. Turn the adjusting bolt towards **+** or **-**.



4. Allow the pin to engage into the adjusting bolt and re-tighten the hexagon socket screw.
5. Now, the tube can be clamped in.

6.4 Setting the number of revolutions

Note The cutting speed recommended by Orbitalum Tools, and thus the number of revolutions, can be determined in the chapter 6.4.2.

6.4.1 Increasing/reducing the number of revolutions

- ▶ Set the adjusting wheel for presetting the speed to the desired level (RPG 4.5: A – D, RPG 8.6: B – D); “A” corresponds to the lowest, and “D” to the highest number of revolutions.



6.4.2 Determining the number of revolutions

Take the recommended cutting speed from the table below.

**Standard values
for the revolutions
per minute (n)**

Machine type	Tube OD		Adjusting wheel for presetting the speed [Level]	High-alloy steel [n (1/min)]
	[mm]	[inch]		
RPG 4.5	25.4	1.0	D	31
RPG 4.5	38.1	1.5	C	23
RPG 4.5	50.8	2.0	C	23
RPG 4.5	63.5	2.5	B	14
RPG 4.5	76.2	3.0	B	14
RPG 4.5	88.9	3.5	A	9
RPG 4.5	101.6	4.0	A	9
RPG 4.5	114.3	4.5	A	9
RPG 8.6	50.8	2.0	E	18
RPG 8.6	101.6	4.0	D	15
RPG 8.6	114.3	4.5	D	15
RPG 8.6	141.3	5.6	C	11
RPG 8.6	152.4	6.0	C	11
RPG 8.6	168.3	6.6	C	11
RPG 8.6	219.1	8.6	B	7

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

Note The higher the cutting speed, the higher the attrition of the multifunctional tool.

6.5 Switching the RPG on

Attention Tool damage

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

- ▶ Before switching the RPG on, make sure that there is sufficient distance between the cutting edge and the tube end.

Switching the RPG on

1. Connect the RPG (for connection requirements, see the chapter 5.3, p. 11).
2. Press the ON/OFF switch.

The RPG starts up.

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

- ▶ Reduce the number of revolutions (see the chapter 6.4.1, p. 17).

6.6 Processing the tube



WARNING

Hot and sharp-edged chips

Danger of injury to eyes and hands.

- ▶ Always work wearing safety goggles.
- ▶ Only remove chips wearing safety gloves.

Note When cutting, do not exceed a chip thickness of 0.05 mm. By exceeding the load-limiting device (adapter, code 790 038 126) can be cut (see problem solving, chapter 8.1, p. 21).

1. Move the tool towards the tube by means of the feed handle until the tool touches the tube.

If the cutting edge of the tool is cutting into the entire circumference of the tube:

2. Guide the tool further with the same amount of pressure.

Note The dial can be set to zero in accordance with the marking on the housing. Each division mark corresponds to a feed motion of 0.05 mm.

6.7 Switching the RPG off

Press the ON/OFF switch.

- ▶ The RPG comes to a stop.

7 Maintenance



DANGER

Danger of death by electric shock

- ▶ Pull out the mains plug before performing any maintenance work.

Time	Activity
Before starting work	▶ Check the tube clamping if the tube is already mounted in the machine.
At each cleaning	▶ Clean the clamping shells and the tool supports for the multifunctional tool.
At each tool change	▶ Clean the tool support and the multifunctional tool. ▶ Remove any dirt from the bearing surface of the tool holder.

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 feed.	<ul style="list-style-type: none"> ▶ Dismount the tool holder and remove the tube from the machine. ▶ Remove the chip using side-cutting pliers and file off the shoulder. ▶ Feed carefully for further machining.
	Multifunctional tool is loose.	<ul style="list-style-type: none"> ▶ Tighten the multifunctional tool.
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"> ▶ Turn the RPG off and back on again.
Tool tends to vibrate.	Cutting speed is too high.	<ul style="list-style-type: none"> ▶ Set the number of revolutions (cutting speed) according to the table.
High level of vibration.	Axial or radial play in the components.	<ul style="list-style-type: none"> ▶ Check the machine for zero backlash.
	Multifunctional tool is loose.	<ul style="list-style-type: none"> ▶ Check the multifunctional tool for tightness.
The machined tube is rough.	Multifunctional tool is blunt.	<ul style="list-style-type: none"> ▶ Replace the multifunctional tool.
The clamping unit does not clamp correctly, or the eccentric lever has too much/too less play.	Attrition/abrasion, or the tube diameter slightly deviates from the dimensions actually intended.	<ul style="list-style-type: none"> ▶ Offset by adjusting with the adjusting device.
Tool does not turn, although engine runs.	Load-limiting device (adapter) mechanically cut.	<ul style="list-style-type: none"> ▶ Change adapter (code 790 038 126, see spare parts list, p. 6/7, Item No. 9).

8.2 Servicing/customer service

For ordering spare parts, see the separate spare parts list.

For problem solving, please contact your branch office directly.

Please give the following details:

- Machine type: **RPG 4.5** and/or **RPG 8.6**
- Machine number: *(see the identification plate)*

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