



Laser welding examples  
for desktop Compact

## Laser welding in orthodontics



The welding of small parts and appliances in orthodontics demands the same preparation and conditions as general laser welding.

An accurate fit and gap-free preparation of the parts to be joined is essential for the successful welding of, in part, very thick parts (e.g. wires) to extremely thin parts (e.g. bands).

To produce a good laser weld in orthodontics, the parts must be prepared so that they lie flat against one another. In particular, standard industrially produced parts such as the nut on the Herbst hinge or the base of a buccal tube must be prepared with special burs to ensure that they lie flat against bands of different shapes and sizes. Only then is it possible to join these parts directly to one another without using filler material.

If the band and the wire have no more than point contact, or if there is a slight gap between them, a suitable filler material such as remanium® wire  $\varnothing$  0.35 mm is necessary.

Generally speaking, laser welding should always be carried out under a shielding gas atmosphere in order to prevent oxidation in the weld seam. This is essential to give the weld seam the strength it requires. The welding spots must have a metallic luster.

The various components used in orthodontics often have a shiny metallic surface, which may cause the laser beam to be reflected. Because of the elaborate finishing involved, the parts affected are not usually subjected to sandblasting.



In order to achieve the desired welding result nonetheless, it may be necessary to vary the angle at which the laser beam strikes the point of connection. This means that the welding power has to be adapted to the circumstances in question. Normally, the power is increased individually, and the angle selected in such a way that it proceeds from the **thicker to the thinner** part. To smooth the welding seam, widen the diameter from 0.80 mm to 1.20 mm. The welding parameters stay the same.

Various tasks are described in the following step by step. The welding parameters vary from situation to situation.

**The following list gives an overview of the welding examples:**

**P. 4 – Example 1**

Welding a Herbst IV base to maxillary molar bands, mandibular cuspid or bicuspid bands.

**P. 6 – Example 2**

Welding a hyrax® screw with remanium® reinforcement wire onto the maxillary molar and premolar bands.

**P. 8 – Example 3**

Welding a buccal tube to a molar band.

**P. 9 – Example 4**

Welding a double hook to a molar band.

**P. 10 – Example 5**

Repairing a broken labial bow.

**P. 12 – Example 6**

Manufacturing a Crozat appliance with remaloy® wire or remanium® wire.

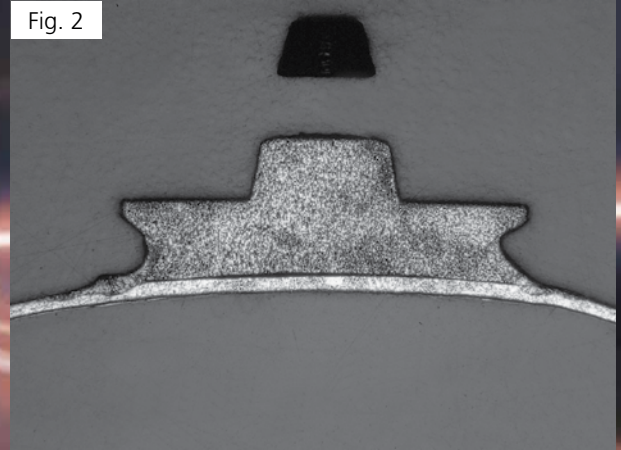
**P. 16 – Welding tables**

for desktop Compact

Area of application: Orthodontics

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## Example 1.



Welding a Herbst IV base (REF 607-115-00) to maxillary molar bands, mandibular cuspid or bicuspid bands.

The underside of the base on the Herbst IV is ground to ensure that it lies flat on the band:

Welding power:	Power:	2300 W - 2400 W
	Pulse duration:	2.0 ms - 4.0 ms
	Diameter:	approx. 0.8 mm

A gap between the band and the base may open up in the area of the buccal fissure. In this area, it is necessary to work with remanium® wire  $\varnothing$  0.35 mm (REF 535-035-00) as a filler material. Alternatively, the band can be bent to a slightly flatter angle.

If the base is welded to the band on the plaster model, the bands should be blocked out with wax from the inside (thickness approx. 1 – 2 mm) at the welding points before making the model.

The band must not touch the plaster at the point of welding.

Fig. 3

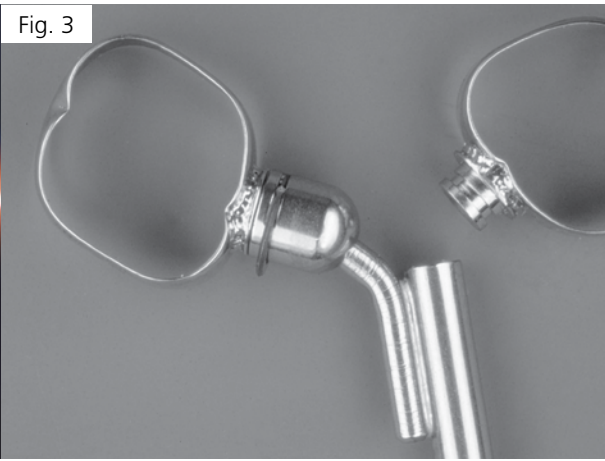
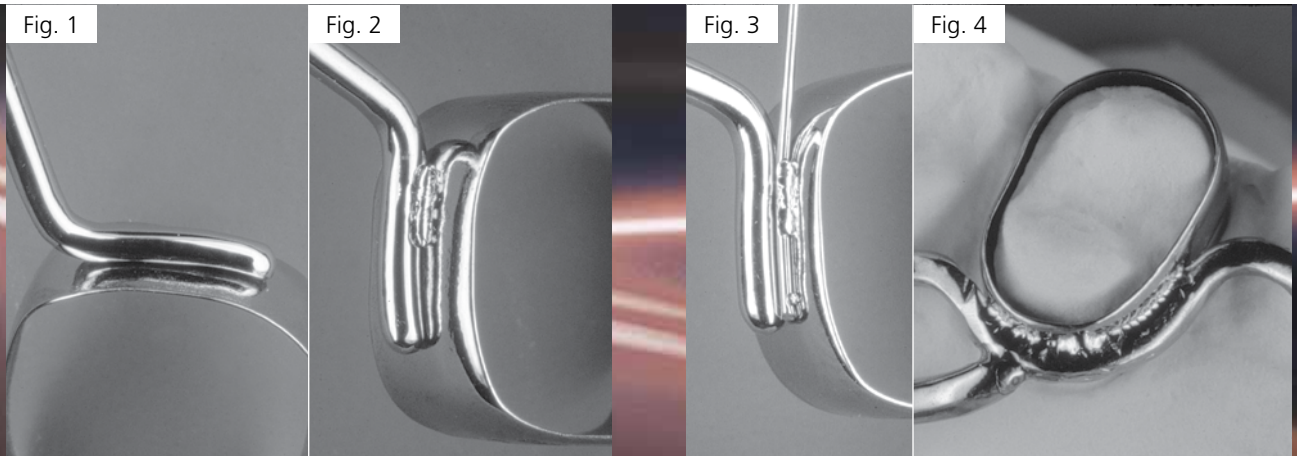


Fig. 4



## Example 2.



Welding a hyrax® screw (e.g. REF602-833-10) with a remanium® reinforcement wire  $\varnothing$  1.00 mm onto the maxillary molar and premolar bands.

The remanium® reinforcement wire  $\varnothing$  1.00 mm is bent along the molar band (Figs. 1+2). It is advisable to grind the wire slightly flat with a grinding tool (see diagram).

Welding power: Power: 2300 W - 2400 W  
Pulse duration: 2.0 ms - 4.0 ms  
Diameter: 0.7 mm - 0.8 mm

Larger gaps can be filled with remanium® wire  $\varnothing$  0.35 mm (REF535-035-00) as filler material. First, the 0.35 mm wire is welded to the band and then to the 1.00 mm wire (Fig. 3).

Welding power: Power: 2300 W - 2400 W  
Pulse duration: 2.0 ms - 4.0 ms  
Diameter: 0.7 mm - 0.8 mm

The retention leg of the hyrax® screw is butt welded to the reinforcing wire (Fig. 4).

Welding power: Power: 2300 - 2500 W  
Pulse duration: 2.5 ms - 6.0 ms  
Diameter: 0.8 mm

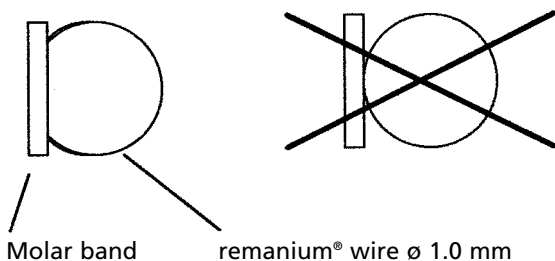


Fig. 5

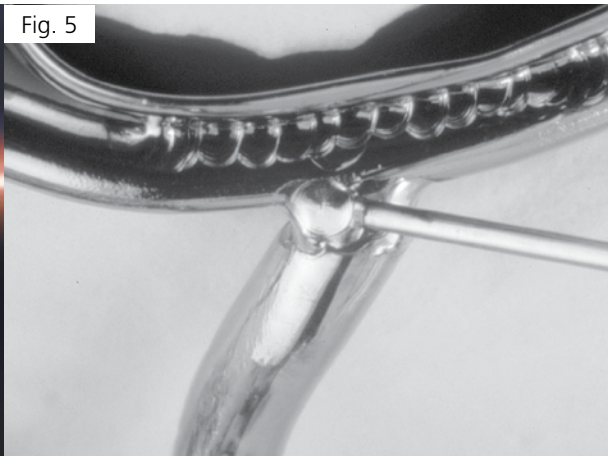
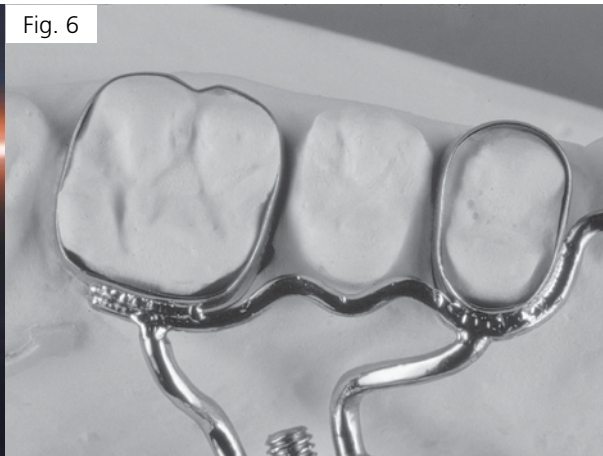


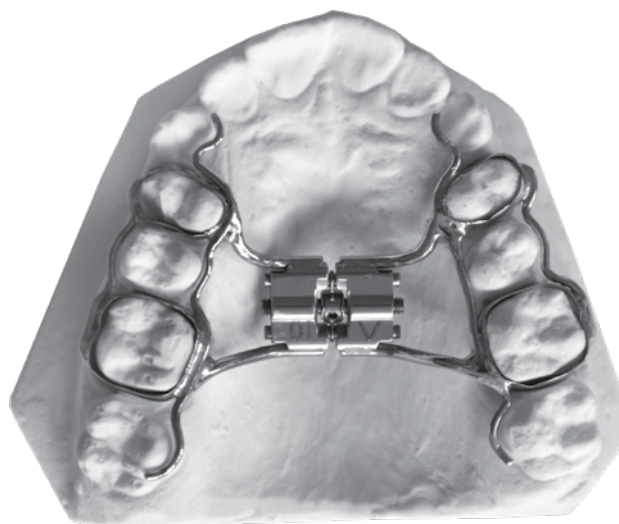
Fig. 6



The weld should then be strengthened with remanium® wire  $\varnothing$  0.35 mm (REF 535-035-00) (Fig. 5).

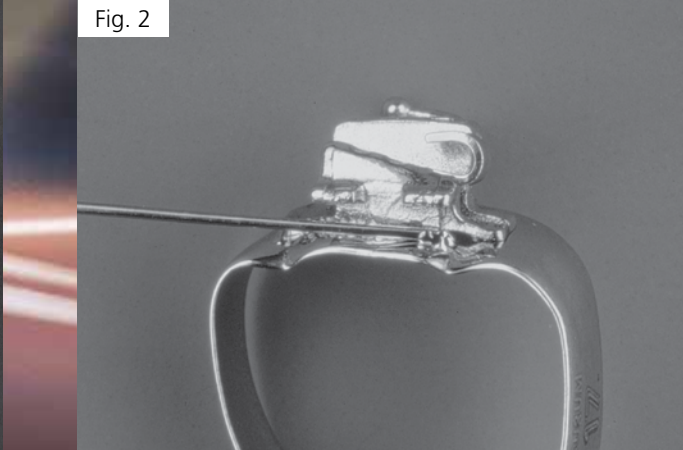
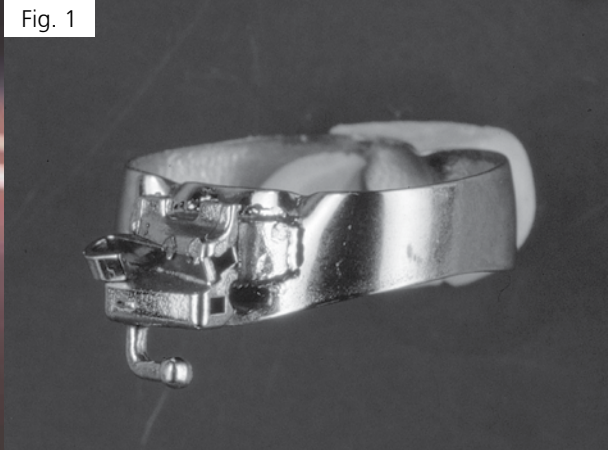
Welding power:      Power:            2300 - 2500 W  
                                 Pulse duration: 2.0 ms - 6.0 ms  
                                 Diameter:        0.8 mm

If welding is carried out on the plaster model, the bands should be blocked out with wax from the inside (thickness approx. 1-2 mm) at the welding points before making the model. Before the actual welding operation, the wax is removed with a steam cleaner to prevent direct contact between the bands and the plaster (Fig. 6).



Completed hyrax® appliance.

## Example 3.



### Welding a buccal tube to a molar band.

Welding power:      Power:      2300 - 2400 W  
                                 Pulse duration: 2.0 ms - 4.0 ms  
                                 Diameter:      0.7 mm – 0.8 mm

remanium® wire  $\varnothing$  0.35 mm (REF 535-035-00) is used as a filler material to bridge a larger gap on the buccal fissure.



## Example 4.

Fig. 1



Welding a double hook to a molar band.

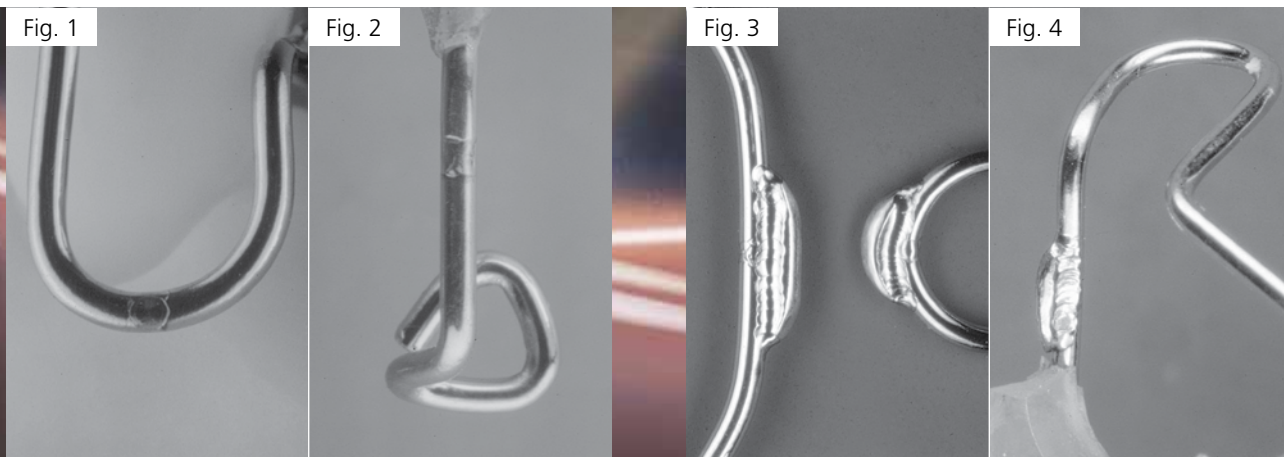
Welding power:      Power:      2300 - 2400 W

                                 Pulse duration: 2.0 ms - 4.0 ms

                                 Diameter:      0.7 mm – 0.8 mm

remanium® wire  $\varnothing$  0.35 mm (REF 535-035-00) is used as a filler material to bridge a larger gap on the buccal fissure.

## Example 5.



### Repairing a broken labial bow.

First the fracture is butt welded.

Welding power:      Power:          2300 - 2500 W  
                                 Pulse duration: 2.0 ms - 6.0 ms  
                                 Diameter:      0.7 mm – 0.8 mm

Following this, a short piece of spring-hard remanium® wire  $\varnothing$  0.70 mm (REF 524-070-00) is welded on as a double reinforcement parallel to the activation direction.

This way, the spring effect of the labial bow remains intact, allowing it to be activated.

Welding power:      Power:          2300 W - 2500 W  
                                 Pulse duration: 2.0 ms - 4.0 ms  
                                 Diameter:      0.7 mm

For smoothing:      Power:          2200 W – 2400 W  
                                 Pulse duration: 2.0 ms - 6.0 ms  
                                 Diameter:      1.0 mm – 1.2 mm

Fig. 5



Fig. 6



The remanium® wire welded on as reinforcement is then slightly rounded off with a rubber polisher.

## Example 6.



Manufacturing a Crozat appliance  
remaloy® wires  $\varnothing$  0.70 mm – 1.50 mm,  
remanium® wires  $\varnothing$  0.70 mm – 1.50 mm.

To make curved Crozat appliances, it is possible to use either remaloy® wires or remanium® wires. In their unannealed state, remaloy® wires can be bent easily into shape. If greater strengths are required, remanium® wires with graded strengths can be used. Because of the small area affected by heat, remanium® wires achieve up to 80% of their original strength values after laser welding.

When bending and waxing the individual wire elements into place, it must be ensured that they have good surface contact at the welding points and that no gaps exist.

Fig. 3

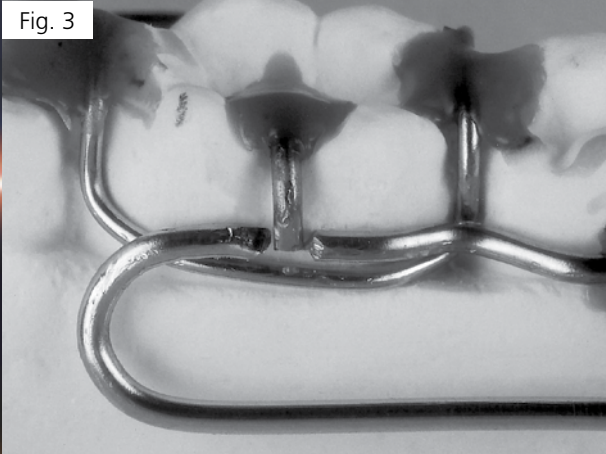
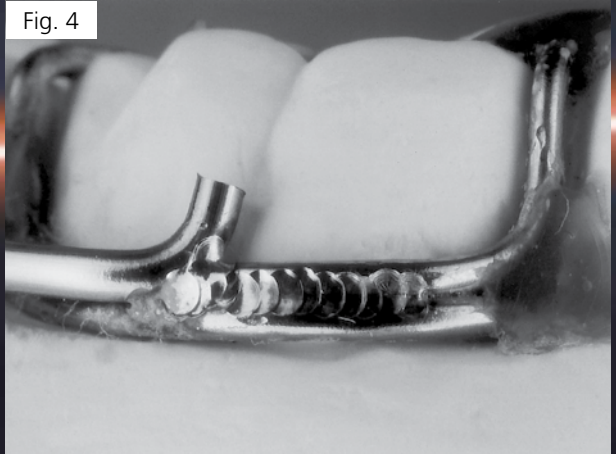


Fig. 4



**Incorrect!**

The gap between the individual wire elements is too wide.

When prepared correctly, the wires can be welded directly to one another.

Welding power: Power: 2300 - 2500 W

Pulse duration: 2.0 ms - 6.0 ms

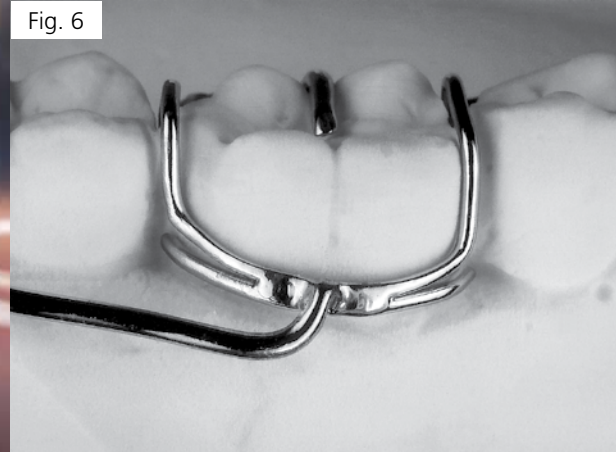
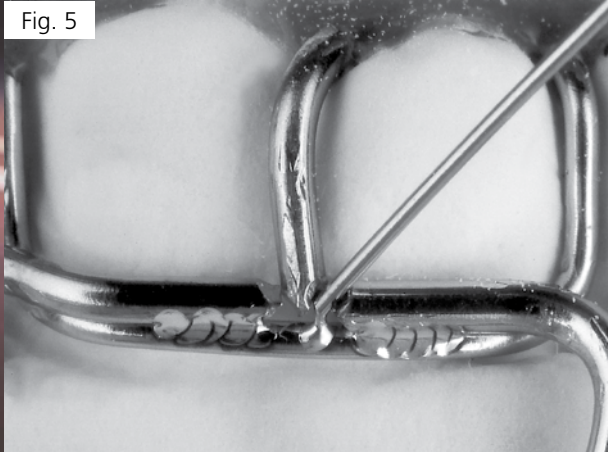
Diameter: 0.7 mm - 0.8 mm

For smoothing: Power: 2200 W - 2400 W

Pulse duration: 2.0 ms - 4.0 ms

Diameter: 1.0 mm - 1.2 mm

## Example 6.



If a gap still remains, remanium® wire  $\varnothing$  0.35 mm (REF 535-035-00) can be used as a filler material.

Welding power:      Power:      2300 - 2500 W  
                                 Pulse duration: 2.0 ms - 4.0 ms  
                                 Diameter:      0.7 mm – 0.8 mm

This is dripped from the tip into the gap to form a weld bead.

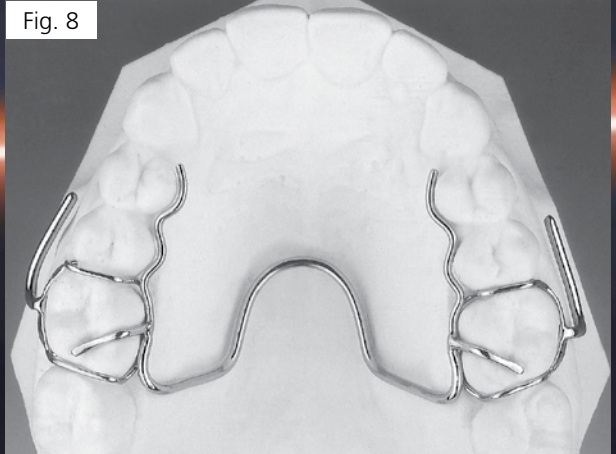
Welded Jackson clasp on the plaster model (Fig. 6).

The welding point can still be smoothed with a soft power setting.

Fig. 7



Fig. 8



Welding power:      Power:      2300 - 2500 W  
                         Pulse duration: 2.0 ms - 4.0 ms  
                         Diameter:      0.7 mm – 0.8 mm

Completed laser welded Crozat appliance.

# Welding table for desktop Compact

Area of application: Orthodontics



Exam- ple no.	Task
1	Manufacturing a Herbst appliance
2	Manufacturing a palatal expansion appliance   <div style="text-align: right;"> <u>Step 1</u>  <u>Step 2</u>                      Step 3                 </div>
	Welding a Quad Helix to bands
	Manufacturing an individual gap retainer
	Welding a lingual/palatal arch to bands
	Welding a lingual/palatal sheath to a band
6	Manufacturing a Crozat appliance   <div style="text-align: right;"> <u>Step 1</u>                      or Step 1  <u>Step 2</u> </div>
	Manufacturing a Nance appliance



	Recommended materials and application	Welding parameters		
		Power W	Pulse duration ms	Diameter Ø
	Herbst I, Herbst VI or Herbst TS hinge Molar bands upper/lower Premolar bands upper/lower	2300 W – 2500 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	hyrax® screws Molar bands upper and premolar bands upper remanium® wire, spring hard Ø 0.90 mm or 1.00 mm			
	Wire Ø 1.00 mm on band	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	Retention leg on wire Ø 1.00 mm	2300 W – 2500 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	Quad Helix, pre-formed Molar bands upper/lower	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	remanium® wire Ø 0.80 mm Molar bands upper	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	Orthorama® lingual/palatal arch remaloy® wire Ø 0.90 mm remanium® wire, spring hard Ø 0.35 mm Molar bands upper	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	Lingual/palatal sheaths Molar bands	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	remaloy® wire Ø 0.70 – 1.50 mm	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	remanium® wire Ø 0.70 – 1.50 mm	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.80 mm
	remaloy® wire Ø 0.90 mm on upper molar bands remanium® wire Ø 0.90 mm	2300 W – 2400 W	2.0 ms – 4.0 ms 2.0 ms – 4.0 ms	approx. 0.80 mm approx. 0.80 mm

# Welding table for desktop Compact

Area of application: Orthodontics



Exam- ple no.	Task	
	Welding a hook for elastics to a face bow or a lip bumper	Step 1 Step 2
	Welding a stop to a round or rectangular arch, stainless steel	
	Welding a hook for elastics to a round or rectangular arch	
	Welding a cross tube on a round or square arch, stainless steel	
	Welding a round tube to an Adams clasp for holding a face bow	
	Manufacturing a customized bonded retainer Manufacturing a customized lingual retainer	
	Manufacturing a customized hook on a prewelded or bonded bracket/buccal tube	
	Manufacturing a Kahn spur on a facebow	Step 1 Step 2
	Manufacturing a spike for the bonding technique Spikes on lingual bow	Step 1 Step 2
	Welding a customized spring to a labial bow	
	Welding a hook for elastics to a face mask	Step 1 Step 2
	Welding a stop to a round or rectangular arch, stainless steel	Step 1 Step 2

	Recommended materials and application	Welding parameters		
		Power W	Pulse duration ms	Diameter Ø
	Ball retainer clasp 0.70 mm	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Stop tube, slotted on round arch	2300 W – 2400 W	2.0 ms – 4.0 ms	approx. 0.8 mm
	on rectangular arch	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Pre-formed hook or ball retainer clasp Ø 0.70 mm on round arch	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	on rectangular arch	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Cross tube on round arch	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	on rectangular arch	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Tubes – stainless steel e.g. Ø 1.20 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remaloy® wire Ø 0.70 mm Mesh base, small	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Ball retainer clasp Ø 0.70 mm	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.90 mm – end to end	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.90 mm Mesh base	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Lingual bow and remanium® wire Ø 0.90 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire, Ø 0.35 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.70 mm, spring hard	2300 W – 2400 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Ball retainer clasp Ø 0.90 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Serrated housing nut	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm

# Welding table for desktop Compact

Area of application: Orthodontics



Example no.	Task	
	Welding an additional retention to an expansion screw for improved anchoring in acrylic	
	Welding of a wire to an expansion screw, e.g. as a spring	Step 1 Step 2 or Step 2
	Manufacturing an acrylic-free expansion appliance for upper or lower jaw	
5	Repairing a labial bow, an Adams clasp, etc.	Step 1 Step 2
	Manufacturing a stop on facebow / lip bumper	
	Welding a post hook on round or rectangular arch, upper and lower jaw, stainless steel	
	Repairing a hyrax® screw with broken retention leg	Step 1 Step 2 or Step 2
3	Welding a buccal tube to a molar band	
4	Welding a double hook to a molar band	
	Modifying a palatal bar, Orthorama® system	
	Modifying two traction screws (Geller system)	

	Recommended materials and application	Welding parameters		
		Power W	Pulse duration ms	Diameter Ø
	remanium® wire Ø 0.90 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.80 mm – end to end	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.80 mm – planar	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	hyrax® screw, mini Molar bands, upper/lower jaw	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.70 mm – end to end	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Doubling with wire Ø 0.70 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Stop tube Ø 1.15 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Ball retainer clasp Ø 0.70 mm On round arch, upper and lower jaw	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	On rectangular arch, upper and lower jaw	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	End to end	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Reinforce with wire Ø 0.35 mm	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Weld in a planar manner	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Molar band, upper/lower jaw Buccal tube	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Molar band, upper/lower jaw Lingual /palatal hook	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	remanium® wire Ø 0.50 mm, spring hard	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm
	Traction screw	2300 W – 2500 W	2.0 ms – 6.0 ms	approx. 0.8 mm

## Accessories for laser technology.



### remaloy® straight wire

round, $\varnothing$ 0.70 mm / 28, length each 380 mm	REF 528-070-00	10 pieces
round, $\varnothing$ 0.80 mm / 31, length each 380 mm	REF 528-080-00	10 pieces
round, $\varnothing$ 0.90 mm / 36, length each 380 mm	REF 528-090-00	10 pieces
round, $\varnothing$ 1.00 mm / 39, length each 380 mm	REF 528-100-00	10 pieces
round, $\varnothing$ 1.10 mm / 43, length each 380 mm	REF 528-110-00	10 pieces
round, $\varnothing$ 1.20 mm / 47, length each 380 mm	REF 528-120-00	10 pieces
round, $\varnothing$ 1.30 mm / 51, length each 380 mm	REF 528-130-00	10 pieces
round, $\varnothing$ 1.50 mm / 59, length each 380 mm	REF 528-150-00	10 pieces
half round, $\varnothing$ 1.50 x 0.75 mm / 59 x 30, length each 380 mm	REF 528-155-00	10 pieces
half round, $\varnothing$ 1.75 x 0.90 mm / 69 x 36, length each 380 mm	REF 528-158-00	10 pieces
rectangular rounded, $\varnothing$ 1.92 x 0.90 mm / 76 x 36, length each 380 mm	REF 528-159-00	10 pieces

### CoCr welding wire

$\varnothing$ 0,25 mm / 10, length 2 m	REF 528-215-10	1 piece
$\varnothing$ 0.35 mm / 14, length 2 m	REF 528-210-10	1 piece
$\varnothing$ 0.50 mm / 20, length 2 m	REF 528-200-10	1 piece

### NiCr welding wire

$\varnothing$ 0.50 mm / 20, length 2 m	REF 528-220-00	1 piece
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rematitan® wire		
ø 0.40 mm / 16, length 2 m	REF 528-039-50	1 piece
rematitan® wire on coils, ø 0.70 mm / 28, length 2 m	REF 528-040-50	1 piece
rematitan® straight wire, ø 1.00 mm / 39, length each 100 mm	REF 528-041-00	10 pieces
rematitan® straight wire, ø 1.20 mm / 47, length each 100 mm	REF 528-042-00	10 pieces
rematitan® straight wire, ø 1.50 mm / 59, length each 50 mm	REF 528-050-00	1 piece
rematitan® straight wire, ø rolled 0.5 x 1.5 mm / 20 x 59, length each 100 mm	REF 528-043-00	10 pieces
Titanium disc holder	REF 090-525-00	1 piece
Titanium disc	REF 090-526-00	5 pieces
Electrically adjustable stand	REF 090-574-00	1 piece
Argon fitting for laser	REF 090-404-00	1 assortment
Armrest cushion	REF 090-513-10	2 pieces

➔ Further accessories for laser technology can be found in the current Prosthetics catalog.

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Date of information: 2023-07  
Subject to modifications

