



DenckOrtho Bender S

**Distributed by 3DNA Dental
Manufactured by DenckOrtho**

Model: OG-DOS Bender S

Document Type: Instructions for Use (IFU)



Authorized Distributor



1. Pre-Installation Preparation

1.1 Equipment Specifications

Overall Dimensions (L × W × H)

- 540 × 400 × 520 mm (21.3 × 15.7 × 20.5 in)

Weight

- Approximately 50 kg (110 lb.)



Lifting Warning

Use proper lifting technique or two-person handling to avoid injury.

1.2 Installation & Facility Requirements

Load Capacity

- The equipment weight is within the load-bearing capacity of standard office floors and light industrial workspaces.
- No special foundation or structural reinforcement is required.

Electrical & Air Requirements



Electrical Hazard

- Grounded outlet required
- Do NOT connect to unstable or shared power circuits
- **Power Supply:** 220 V / 50 Hz



Compressed Air Warning

- Never exceed rated pressure
- Disconnect air supply before maintenance

Air Supply

- Integrated positive-pressure air pump
- Required operating pressure: **0.6 MPa (87 psi)**

1.3 Environmental & Placement Requirements



Mandatory for Warranty Coverage

(Required to maintain warranty coverage and ensure long-term reliability)

Clearance & Ventilation

- Maintain a minimum clearance of **40 cm (16 in)** on all sides of the equipment to allow proper airflow and heat dissipation.
- Never block ventilation openings

Temperature

- **Operating ambient temperature:** 5–40°C (41–104°F)
- For continuous or long-term operation, ambient temperature below **40°C (104°F)** is strongly recommended.
- If ambient temperature exceeds 40°C, install the equipment in a well-ventilated or air-conditioned environment.

Humidity

- **Relative humidity:** 10%–80%, non-condensing
- Installation area must be free of moisture, condensation, and water vapor.

Environmental Restrictions

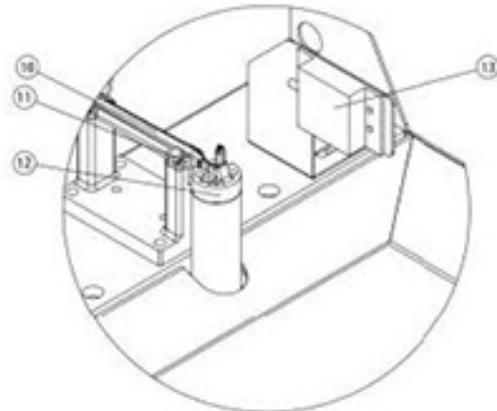
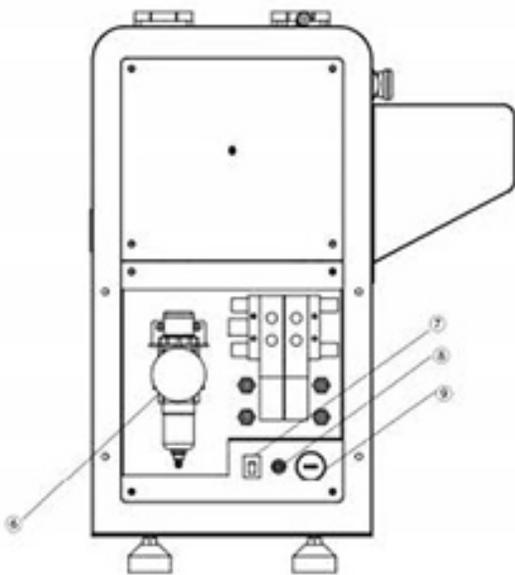
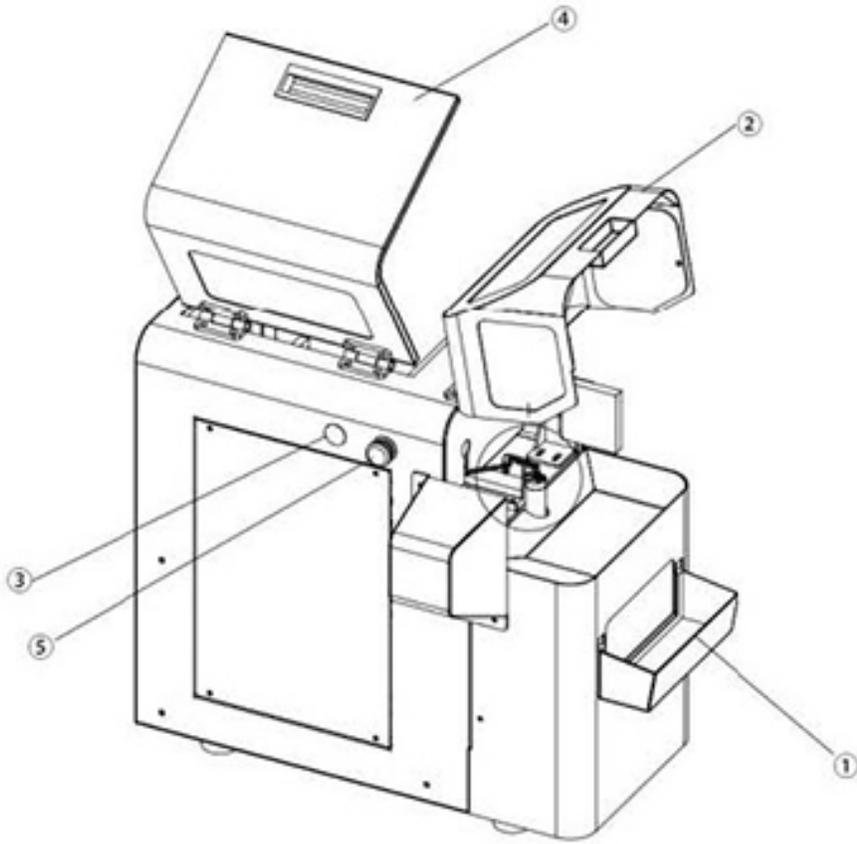


Do NOT install the equipment in environments with:

- Excessive vibration or mechanical shock
- High-frequency emission sources (e.g., ultrasonic equipment)
- Open flames, heat sources, or flammable/explosive materials
- Corrosive gases or liquids
- Airborne oil mist, steam, or heavy dust
- Floating metal particles or conductive debris
- Strong electromagnetic interference (EMI)

Recommended Installation Environment

- Clean, dry locations with stable, level surfaces
- Areas free from high heat-generating machinery
- Environments without dust, oil mist, metal particles, or steam
- Locations with minimal electromagnetic noise



2. Equipment Controls & Components

No. Component Name

- 1 Receiving Basket
- 2 Front Safety Hatch
- 3 Run Indicator Light
- 4 Side Safety Hatch
- 5  **Emergency Stop Button**
- 6 Air Pressure Gauge
- 7 Main Power Switch
- 8 DC Power Connector
- 9 USB Jog Dial
- 10 Steel Wire Bending Seat
- 11 Elbow
- 12 Cutter
- 13 Camera Light Board



Emergency Stop

Activating the Emergency Stop immediately halts all motion.

3. Equipment Installation & Commissioning

3.1 Initial Equipment Setup



Start-Up Safety Checklist

1. Connect the air pump to the equipment.
 2. Verify air pressure is within **0.4–0.6 MPa (58–87 psi)**.
 3. Confirm the wire-bending seat head is properly aligned and visible.
 4. **Ensure all front and side safety covers are fully closed.**
 5. Verify the emergency stop button is released.
 6. Connect the USB extension cable between the equipment and the control computer.
 7. Power ON the equipment.
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4. Steel Wire Straightening

4.1 Wire Installation

1. Power **OFF** the equipment.
2. Feed the steel wire through the support, clamp head, and bending seat.
3. Pull out additional wire to confirm no scratches, bends, or kinks are present.

4.2 Straightening Standard

- Straightening is performed using the wheel straightener.
 - Manually pull out **25 cm (10 in)** of wire.
 - Place a straight ruler along the wire.
 - If the angle deviation between both ends on the same plane is within $\pm 10^\circ$, straightening is acceptable.
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5. Device & Software Connection

1. Power **ON** the equipment and confirm the power indicator light is illuminated.
 2. Connect the USB cable between the device and computer.
 3. Power **ON** the computer.
 4. Launch **SofterClear™** software for online debugging.
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6. Software Configuration (SofterClear™)

6.1 Initial Settings

- **Bending Point Distance (Default):**
 - Small: 2.0 mm (0.08 in)
 - Medium: 2.5 mm (0.10 in)
 - Large: 3.0 mm (0.12 in)
 - **Motor Pulse Ratio:** Default
 - **Communication Settings:** Default
 - **Wire Version / Brand:** Version 3.1 (select correct wire type)
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7. Standard Part Level Adjustment



Precision Adjustment Warning

Improper calibration may cause mechanical collision or tool damage.

7.1 Standard Parts

- I-Left Fold Square
- I-Right Fold Square
- I-II Combination Part
(All parts are 15 mm / 0.6 in in length)

7.2 Qualification Criteria

1. Produce **10 test parts**.
2. Measure the average height difference between the tail end and reference plane.
3. If deviation is within **± 0.5 mm (± 0.02 in)**, the part is qualified.

7.3 Adjustment

- If parts are not flat:
 - Adjust left and right height parameters of the bending head in SofterClear™.
 - Repeat testing until flatness criteria are met.
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8. Bending Coefficient Calibration

8.1 Hardware Setup

- Install the camera and light board in their designated positions.
- Secure camera and light board before operation
- Connect the camera network cable and USB interface to the computer.

8.2 Software Setup

1. Launch **VisionGroup-AL**, then **SofterClear™**.
2. In VisionGroup-AL:
 - Navigate to *Settings* → enter password **123456**
 - Configure Camera, TCP/IP, and IO Output
 - Successful connection is indicated when the status changes from gray to yellow
3. Verify the bending head is visible in the selected camera group.

8.3 Network Verification

- In SofterClear™, open the calibration process.
 - Confirm network communication.
 - If communication fails, verify IP address, port, and camera address settings.
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9. Camera Calibration

9.1 Pre-Calibration Steps



Automatic Motion Hazard

Equipment will move during calibration.
Keep hands clear of moving components.

1. Click **Step I Calibration Action** to initiate bending.
2. Observe the bent workpiece in VisionGroup-AL.
3. Define detection zones:
 - **Red:** Non-detection area
 - **White:** Detection area
4. Save settings.
5. Enable **Continuous Detection**.
6. Exit calibration mode in SofterClear™.

9.2 Calibration Parameters

I-Type Calibration

- Initial mechanical angle: $\pm 20^\circ$
- If deviation exceeds 3° , reduce the initial angle
- End angle: $\pm 30^\circ$, increment 1°

Rough Calibration

- Start angle: $\pm 32^\circ$
- End angle: $\pm 105^\circ$
- Increment: 2°
- Maximum workpiece angle: 90°
- Software will automatically terminate when complete

II-Type Calibration

- Start angle: $\pm 90^\circ$
- End angle: $\pm 130^\circ$
- Increment: 2°
- Maximum workpiece angle: 150°

10. U-Database Calibration

10.1 Supported Specifications

Wire Diameter

3.5 mm (0.14 in)

4.0 mm (0.16 in)

4.5 mm (0.18 in)

5.0 mm (0.20 in)

10.2 Calibration Procedure

1. Navigate to *Settings* → *Other Settings* → *Hyperbolic Database*.
2. Verify U-data parameters:
 - Length compensation
 - Rotation compensation
 - Line segments
 - Bending angle
3. Select Left/Right U-Type I standard part.
4. Modify U inner diameter and compile.
5. Start bending and measure results.
6. Adjust:
 - Rotation compensation for flatness
 - Segment distance and angle for diameter accuracy
7. Reload standard parts after each parameter change.
8. Repeat until flatness and diameter meet specifications.

11. Post-Calibration



Mandatory Action

- Remove the camera and light board after calibration to prevent interference during production.

12. Normal Operation



Safety Interlock Warning

- Do NOT open safety covers during operation
 - Automatic motion may occur without warning
1. Open **SofterClear™** → **Lip-Side Wire Bending**.
 2. Confirm serial communication is active.
 3. Design or import required parts (e.g., Harley retainer, large retainer, welded versions).
 4. Select wire → select part → click **Edit** → start automatic bending.
 5. **Do NOT open safety covers during operation.**

13. Troubleshooting

Issue	Corrective Action
Equipment powers on but does not move	Check air supply; verify wire installation
Large bending deviation	Re-check wire straightening
Cutting failure	Inspect blade; replace if wear indicator is gray
Camera connection failure	Verify network, power, and security dongle
Communication timeout	Check USB cable; reset emergency stop
Emergency stop activated	System pauses immediately; upon release, self-tests and returns to standby
Consumable wear warning	Monitor in software; replace components promptly

14. Tool & Component Replacement

Power OFF and depressurize system before servicing

14.1 Tool Replacement

1. Ensure equipment is in standby mode.
2. Open **Tool Change Process**.
3. Tool will rise automatically.
4. Remove old tool, clean slot, install new tool.
5. Tighten screws and close process window.

14.2 Elbow Replacement

1. Power OFF the equipment.
2. Remove mounting screws.
3. Replace elbow and tighten securely.
4. Perform full equipment calibration.

14.3 Bending Seat Replacement

1. Remove wire and seat screws.
 2. Remove old seat and clean slot.
 3. Enter tool change mode.
 4. Install new bending seat.
 5. Ensure zero-gap contact between seat head and tool.
 6. Tighten screws.
 7. Thread wire and cut a test piece.
 8. Perform full calibration.
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Support & Technical Assistance

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