



# Series 53XX

# BDA

F&S BONDTEC Semiconductor GmbH

User manual 53XX 2.0

F&S BONDTEC Semiconductor GmbH

Industriezeile 49a

5280 Braunau am Inn

Austria

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Reserve technical changes

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# 1) General Information

## 1.1 Applicability of this User Guide

### 1.1.1 Manufacturer's Address

- >> F&S BONDTEC Semiconductor GmbH
- >> Industriezeile 49a
- >> A-5280 Braunau
- >> Austria
- >> Phone: +43-7722-67 05 2 - 8270
- >> Fax: +43-7722-67 05 2 - 8272
- >> Mail: info@fsbondtec.at
- >> http://www.fsbondtec.at



### 1.1.2 Scope of Supply

The scope of supply is:

- >> Bonder
- >> Accessories (as listed on delivery note)
- >> Documentation

### 1.1.3 Nameplate

The nameplate is affixed to the column at the rear right of the bonder. Always quote the serial number in all correspondence relating to service. The serial number appears again on another, separate plate mounted on the right side of the tower.

		<b>Industriezeile 49a A-5280 Braunau</b>	
<b>Typ:</b>		<b>Baujahr:</b>	
<b>Nennspannung:</b>	(V)	<b>Frequenz:</b>	(Hz)
<b>Nennstrom:</b>	(A)		(kVA)
<b>Serien-Nr.:</b>		<b>Auftrags-Nr.:</b>	
		<b>CE</b>	

Figure 1.1. - 1 Nameplate



Figure 1.1. - 2 Serial Number



### 1.1.4 Guarantee, Warranty and Liability

The General Terms and Conditions of Sale and Supply of F&S Bondtec invariably apply. A copy of these General Terms and Conditions is placed at the purchaser's disposal on conclusion of the contract or earlier.

Claims under guarantee or warranty and claims for liability for personal injury or damage to property are inadmissible if one or more of the following is causal:

- >> Utilization of the machine for other than the use as intended by the manufacturer
- >> Incorrect assembly, commissioning, operation or maintenance
- >> Non-compliance with the User Guide
- >> Operation of the machine despite defective or inoperational safety devices or protective facilities
- >> Post-specification structural alterations
- >> Post-specification changes to the drive (power, speed, ...)
- >> Inadequate monitoring of machine components subject to wear
- >> Incorrect repairs
- >> Catastrophes, influence of foreign matter and acts of God
- >> The installation of any programs
- >> Network connection during operation

Alterations, additions to and conversions of the machine undertaken without the prior approval of F&S Bondtec are strictly prohibited.

Conversions always require the manufacturer's prior written consent. Structural alterations undertaken without prior written consent void your F&S Bondtec warranty.

The installation of any software, particularly anti-virus-programs, void your F&S Bondtec warranty and is absolutely forbidden.



#### CAUTION!

*The installation of any software, particularly anti-virus-programs, local- as well as networking executed, can damage the range of functions of the machine and is absolutely forbidden! It is a machine, not a desk-top-PC!*

### 1.1.5 Network Capability

To create backups, the machine can be connected to a network. However, this is not allowed during operation. There are no warranty or warranty for any problems that occur with a connected network.



#### CAUTION!

*The connection to a network during operation can greatly influence the functions of the machine and is therefore strictly prohibited.*



## 1.1.6 Copyright

F&S Bondtec retains full copyright to the documentation package and all its parts. No part of this documentation may be reproduced or distributed in any form or by any means whatsoever without the prior, express, written consent of F&S Bondtec.

## 1.2 Scope of Documentation

The entire documentation consists of:

- >> User Manual (this manual)
- >> Addizional information such as List of recommended spare parts, bond head clearance, diagrams etc.
- >> Please refer also to: <http://www.fsbondtec.at>

## 2) For your Safety

### 2.1 Symbols and Notes on Safety

#### 2.1.1 User Guide

The notational conventions employed to draw the reader’s attention to warnings in this User Guide are as follows:



---

#### **DANGER**

*Failure to comply with this warning may result in serious or fatal injury*



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#### **CAUTION**

*Failure to comply with this warning may result in minor injury or damage to property*



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#### **IMPORTANT**

*Draws attention to tips and useful information that will help extract maximum benefit from the machine*

Each instruction in this User Guide is indicated by an arrowhead:

>> Read right through this User Guide completely and make sure you understand everything before you start to use the machine

#### 2.1.2 Warning labels affixed to the machine

The warning labels are printed on soft PVC film and are abrasion-resistant, non-fading and resistant to water and weathering. The layout of the warning labels is compliant with ISO 3864-2 and ANSI Z535.4.



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#### **IMPORTANT**

*Warning labels in accordance with the configuration are affixed to the machine. Do not remove the adhesive warning labels and immediately replace labels which have become damaged, faded or illegible. Make sure that the symbols are clean and clearly legible at all times.*

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Note the following self adhesive warning labels affixed to the machine:



Unplug from mains electricity supply before opening



Electric shock hazard warning



Moving machinery hazard warning



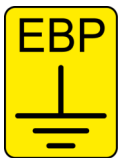
Burn hazard warning



Crush hazard warning



Risk of injury to the hands warning



Personal earthing (Earth-Bonding-Point)



Protective earth plug (PE) symbol 60417-IEC-5019



Safe operation of the machine

Familiarity with and compliance with the operating instructions and the safety instructions are prerequisites for safe operation of the machine.

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## 2.2 CE Declaration of conformity

The machine is CE-compliant. The manufacturer has prepared a CE declaration of conformity for this machine and this declaration is included with the machine documentation as an Appendix.

## 2.3 Manufacturer's designated use

Series 53xx bonders from F&S Bondtec are intended and certified for bonding only and for no other purpose.



### IMPORTANT

*The manufacturer refuses to accept liability for consequential damage due to incompatibility; errors in installation on the part of and modifications to the structural design by the purchaser void the guarantee.*

### Suitable material.

Depending on the model, the machine is designed only for the materials specified in the purchase-order contract.

Other usage or usage above and beyond the scope defined above is not use as intended by the manufacturer. F&S Bondtec refuses to accept liability for damage, injury or loss arising from utilisation of the machine or individual machine components for use other than as intended by the manufacturer.

Use as intended by the manufacturer also includes:

- >> compliance with all notes, warnings and instructions in this User Guide.
- >> compliance with the schedule for all inspection and maintenance work.

## 2.4 Avoiding Misuse

The manufacturer is unaware of any practicable application for which the system could be misused.

## 2.5 Residual Hazards

### Drives.

Loose strands of hair could be caught by or trapped if the machine is operated with the covers removed. Moving machinery hazard.



### DANGER

*Do not work with the machine with long hair hanging loose or when wearing dangling items of jewelry (necklace, chain, etc.). Your hair or jewelry could be trapped in the drive and cause injury.*

### Movable Parts.



### DANGER

*The x-y table (X and Y axes) and substrate holder can cause injury. Crush hazard.*

*The bondhead can cause injury. Crush hazard.*

### Hazardous Substances.

There are no hazardous substances in the machine. Note, however, that the use of hazardous substances might be involved in cleaning (acetone or similar substances).

Always comply with the manufacturer's instructions when handling cleansing agents.



#### **DANGER**

*Take care when handling pure alcohol or acetone. Always follow the manufacturer's instructions. Keep products well away from the eyes and mouth. If products come into contact with eyes/mouth, rinse thoroughly without delay and consult a doctor.*

### Electric shocks .

Voltages at the flame off electrode can peak at 3 kV, with amperages of 30 mA. Electric-shock hazard.



#### **DANGER**

*Do not touch the flame off electrode. Always switch off the machine beforehand and unplug it from the mains electricity supply. Electric-shock hazard.*

*Life-threatening hazard for persons with cardiac pacemakers.*

### Heated Substrate Holder.

The temperature for bonding with gold wire must be >100 °C. The substrate is heated through the substrate carrier.



#### **DANGER**

*The substrate carrier becomes very hot when the heating is in use. Burn hazard.*

## 2.6 Protective Equipment / Personal Protective Gear

Before starting the machine, always make sure that all protective devices are installed and are in full working order.

It is permissible to remove protective devices only:

- >> after the machine has been shut down and
- >> adequately locked to prevent restart.

When shipping subassemblies the purchaser must install the protective devices in the prescribed manner.

The personnel working with the machine do not require personal safety equipment.



#### **DANGER**

*Keep well clear of exposed parts of the bonder rack when the machine is energised. Electric shock hazard.*

*Operate the machine only with all covers and doors closed. Do not remove covers while the machine is in operation. Moving machinery hazard.*

## 2.7 Higher Priority Notes on Safety

### 2.7.1 What to do in an emergency

You can stop the machine at any time, regardless of its operating status by actuating the main switch with EMERGENCY STOP function.



### CAUTION

*Faults must be rectified by trained, qualified personell working in compliance with all safety precautions.*

- >> Actuate the main switch with EMERGENCY STOP function to bring the machinery to an immediate standstill.
- >> Have the fault rectified by authorised personnel.

To restart the bonder after an emergency stop:

- >> Eliminate the fault that led to actuation of the EMERGENCY STOP switch.
- >> Switch on the main switch.

### 2.7.2 User Guide

This User Guide contains important notes on safe operation of the production system and use as intended by the manufacturer. It is, therefore, imperative to read and understand this User Guide in order to work with this production machine.

The User Guide must be kept readily accessible in the immediate vicinity of the machine/plant at all times.

The User Guide is part of the machine and must accompany it if it is sold to a third party.

Compliance with the User Guide at all times and under all circumstances is mandatory.

The documentation for other-vendor parts is an integral part of the User Guide. Compliance with the notes on safety and other information in the documentation for other-vendor parts is also mandatory.

All local and national rules and regulations concerning safety at work, accident prevention and environmental protection applicable at the bonder's place of use must be obtained by the purchaser. Compliance with said rules and regulations is mandatory.





## IMPORTANT

*If printed cards are attached to individual components of this machine, they bear instructions compiled after this User Guide went to press: compliance with these instructions, too, is mandatory.*

*Various machine configurations are available, so the system as delivered may not be exactly as illustrated and described in this User Guide.*

*F&S Bondtec reserves the right to update this User Guide without prior notice and to make technical and content changes at any time.*

### 2.7.3 Personnel Qualifications

Only adequately trained persons who have been familiarised with its use are permitted to work with the machine.

Responsibilities must be clearly defined for installation, commissioning, operation, setup, maintenance and repair.

Permit trainees to work on the machine only under the supervision of an experienced person.

All persons charged with the installation, commissioning, operation and maintenance of the machine are responsible

- >> to read carefully all notes on safety and warnings in this User Guide.
- >> to comply with the regulations relating to work safety and accident prevention.
- >> to comply with all safety instructions and warnings on the machine/plant.

### 2.7.4 Obligations undertaken by the Purchaser

The owner-operator/customer must supplement the User Guide with the following:

- >> National accident-prevention regulations
- >> Hazardous substances ordinance
- >> Instructions for environmental protection
- >> Owner-operator/customer's internal standard operating procedures and safety regulations
- >> Supervisory and reporting obligations providing for special operational circumstances, e.g. as regards work organisation, work practices and personnel

The purchaser is responsible to allow only such persons to work on the machine as

- >> have read and understood all notes on safety and warnings in this User Guide and have confirmed their compliance with this requirement by means of their signature.
- >> are familiar with the applicable work-safety and accident-prevention regulations and have received instruction on using the machine.

Compliance with all safety-related requirements in work practices on the part of the operating personnel must be checked and ascertained at regular intervals.

Personnel responsibilities must be defined for operation, setup, maintenance and repair.

Always check all safety devices and facilities before starting work.

### 2.7.5 Notes on Safety for Operation



## DANGER

*Keep well clear of the working zone of the machine while the equipment is in operation. Moving machinery hazard.*

*Operate the machine only with all covers correctly installed. Do not remove covers while the machine is in*

*operation. Moving machinery hazard.*

*Do not work with the machine with long hair hanging loose or when wearing dangling items of jewellery (necklace etc.). Your hair or jewellery could get caught by the moveable parts of the machine and cause injury.*

*Always return the bondhead to its home position before penetrating the machine's working zone. Moving machinery hazard.*

*The substrate carrier becomes very hot when the heating is in use. Burn hazard. Do not touch the substrate or the substrate support when the heating is on or while the substrate carrier is still hot.*

*Use suitable tools (e.g. tweezers) to change the substrate while heating is on.*

*Do not touch the flame off electrode during operation. High-voltage hazard. (5310 only)*

*Life-threatening hazard for persons with cardiac pacemakers.*

*Take care when handling pure alcohol or acetone. Always follow the manufacturer's instructions. Keep products well away from the eyes and mouth. If products come into contact with eyes/mouth, rinse thoroughly without delay and consult a doctor.*



## CAUTION

*Read through this user guide completely before you put the machine into operation.*

*Do not position the microscope and microscope holder in the working zone of the bondhead. Crash hazard.*

## 2.7.6 Work on the Electrical System



## DANGER

*Work on the electricity supply must always be carried out by a trained, qualified electrician in compliance with the applicable electrotechnical rules and regulations.*

*Keep the electrical components correctly covered at all times. Only authorised persons are permitted to access the electrical components.*

*Always make sure the machine is disconnected from the mains supply and deenergised before work on potentially live components commences.*

## 2.7.7 Notes on Waste Disposal

You must ensure that the machine is disposed of in an environmentally friendly manner and in compliance with all applicable regulations, or contact the manufacturer.

### 3) Technical Data



**IMPORTANT**

*The data quoted here are for the basic model. The specifications might differ from those stated, depending on the version ordered.*

#### 3.1 Ambient conditions

Ambient conditions	
Operating temperature	18 - 24.5 °C
Relative humidity	45% +/- 10% abs., no condensation
Supply voltage	115 - 230 V AC
Voltage frequency	50 - 60 Hz
Installed load	230 W
Noise emission (emission level at the workplace: noise level without extraneous noises and noise returned from room)	< 70 dBA
Vacuum	<300 mbar (Ø 6 mm outside)
Compressed air (oil and water in accordance with DIN ISO 8573-1) Grade 2	min. 4,5 bar (6 bar, Ø4mm outside)
Compressed air (free of oil and water to DIN ISO 8573-1-quality class 2)	optional for 5380: min. 4.5 bar (6 bar, outside Ø 4 mm)

#### 3.2 Other specifications

The substrate types and bonding wires are defined in the Purchase Contract. Other specifications – not detailed above – are also defined in the Sales Contract.



## 4) Model 5310 & 53xx BDA / 5380 Pick and Place

### 4.1 Description of the Bonder

#### 4.1.1 Method of Operation

The bonder 5310 from F&S Bondtec is an ultrasonic ball-wedge bonder for thin gold wires.

The bonder 53xx BDA (Ball Deep Access) from F&S Bondtec can be used as a thin-wire ultrasonic ball-wedge bonder for gold wires when software version 5310 is selected, or as a deep-access wedge-wedge bonder for aluminium and gold wires if software version 5332 is selected. Its outstanding feature is the special design of the bondhead. This design makes the bonder highly versatile in terms of adaptability to material and application. Changing from one bond process to the other is a straightforward process involving merely the quick and easy replacement of the bonding wire and the bond tool. The machine is ready for use as soon as the appropriate bonder software has been started. Another feature of this machine is its ability to bond ribbon wires from 30 to 250 µm width.

Optionally the bonder can be used as a Pick and Place Bonder when software version 5380 is selected.

Designed as a desktop unit, the bonder is fully featured with all components mounted on a base plate. The plate also carries the x-y table is moved by the mechanical manual joystick moves.

The windows-based graphical user interface ensures easy access to a multitude of machine and application parameters. The processes involved in programming are conducted in an interactive dialogue, ensuring reliable operation and a high level of productivity.

The special design of the bondhead and user programmability of all relevant parameters ensure high flexibility in adapting to different materials and applications.

The stereo zoom microscope is ideal for precision adjustment and visual inspection of the bonds, offering magnification of the bond surface and three-dimensional viewing.



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#### IMPORTANT

*The machine configuration is customisable, so the system as delivered may not be exactly as illustrated and described in this User Guide.*

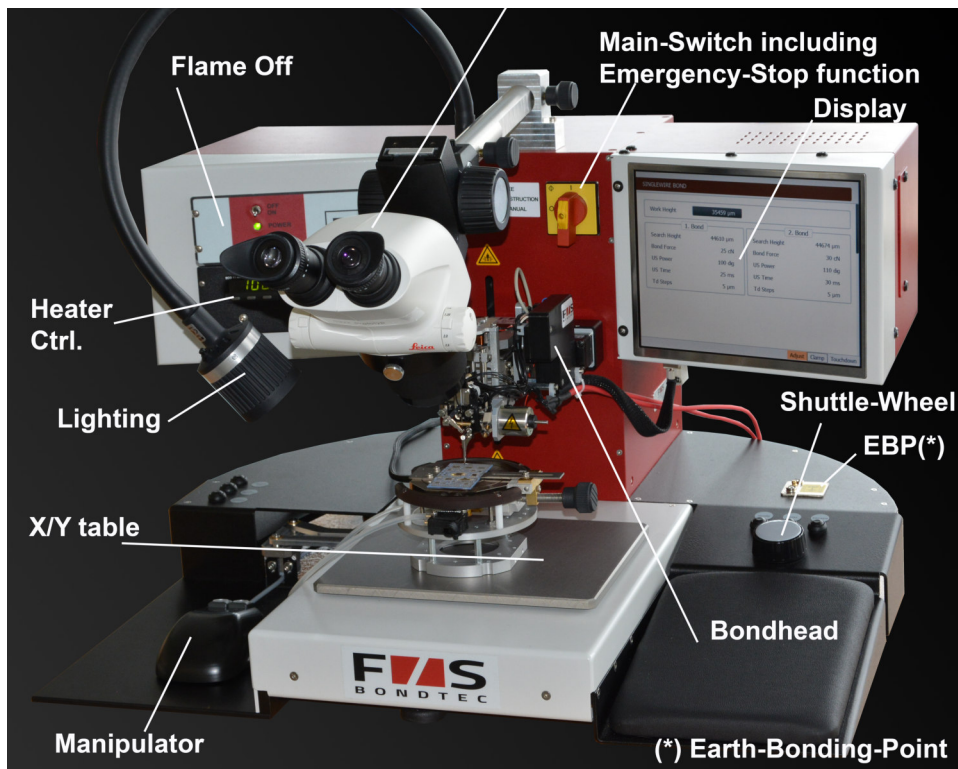


Figure 4.1. - 1 Description of the bonder

#### 4.1.2 The axes of the Positioning System



Figure 4.1. - 1 Working axes

The designations of the working axes are based on the Cartesian system of co-ordinates and are identical to those of the machine's working axes.

- >> X/Y Table: positioning by manual joystick
- >> Y axis: on the bondhead; motor-driven used for loop-motion, cut-motion or tabletear.
- >> Z axis: motor-driven

### 4.2 The Hardware

The machine is controlled by an industrial PC using the Windows 7 operating system. The control electronics are located on cards slotted into the right tower side.

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## 4.3 The Bondhead

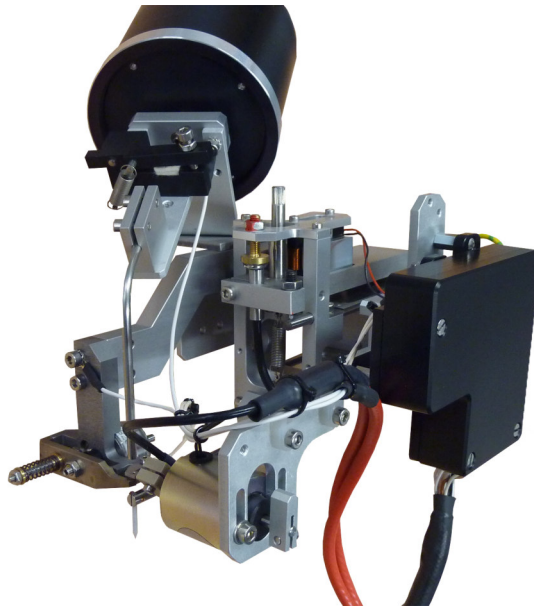


Figure 4.3. - 1 Bondhead

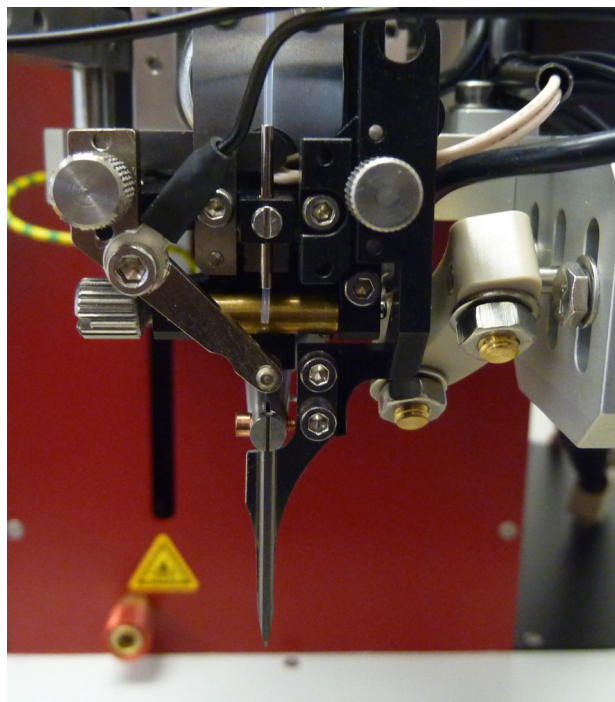


Figure 4.3. - 2 Bondhead 5332

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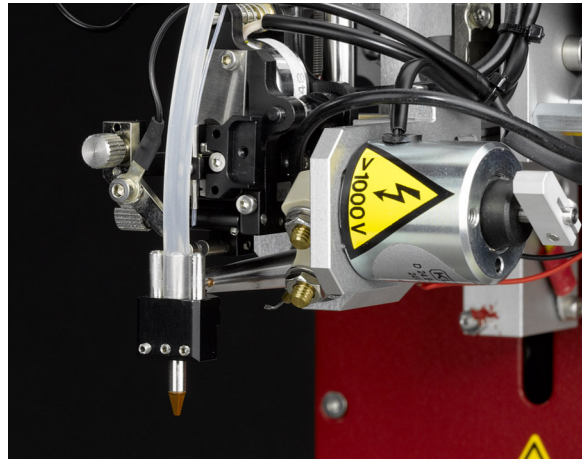


Figure 4.3. - 3 Bondhead 5380

The complete bondhead moves in the Y- and Z direction.

The bondhead is made up of the following components:

- >> Transducer, which converts the high-frequency signals from the ultrasonic generator into the mechanical vibration necessary for thermosonic welding
- >> Transducer, which converts the high frequency signals of the ultrasonic generator into the mechanical oscillation required for welding
- >> Bonding tool, which transfers the oscillations to the bond position
- >> 5380: Pick-up tool, which picks and places the die
- >> Wire guide, which guides the bonding wire to the tip of the bonding tool.
- >> Touchdown sensor, which detects contact between the bonding tool and the substrate
- >> Boom and rotary solenoid of the flame-off unit
- >> The Wedge-clamp, that functions as a pre-loader to the wire or ribbon to avoid a unthreading from the wedge.
- >> Y-axis for loop movement
- >> Wire clamp, to hold the bonding wire during tear off motion after the destination bond

### 4.3.1 The Transducer

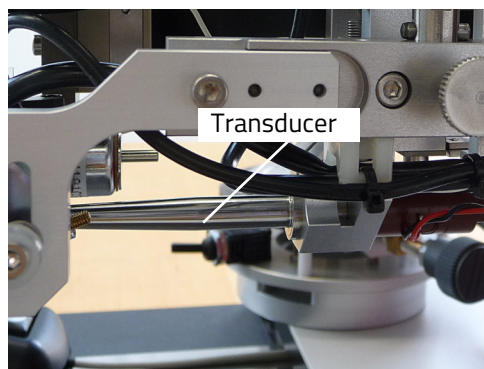


Figure 4.3. - 1 Transducer

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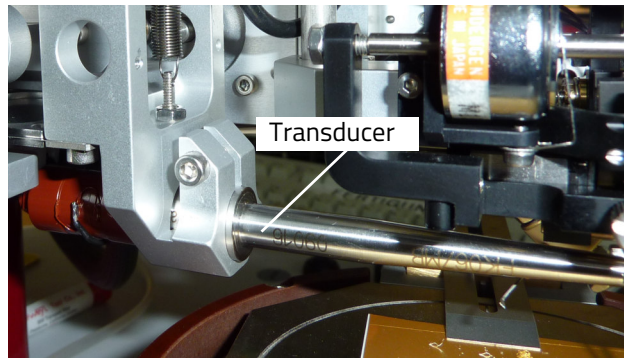


Figure 4.3. - 2 Transducer

The transducer contains the piezos that convert the electrical oscillations generated by the ultrasonic generator into the mechanical vibration necessary for thermosonic welding. The bonding tool transmits these vibrations to the bond point (67 kHz).

The transducer contains the piezos that convert the electrical oscillations generated by the ultrasonic generator into the mechanical vibration necessary for welding. The oscillation is transferred to the bonding position via the bonding tool (100 kHz).

#### 4.3.2 The Touchdown Sensor

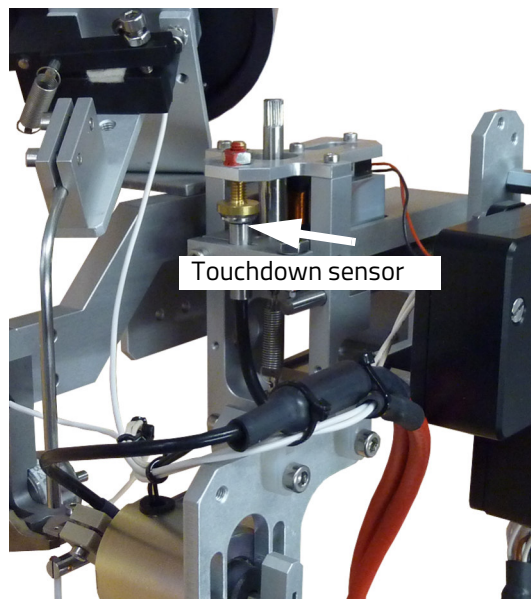


Figure 4.3. - 1 Touchdown sensor

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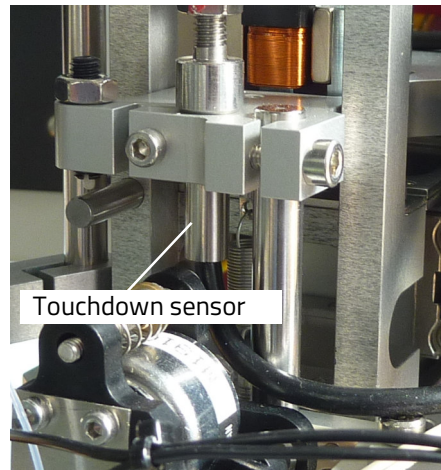


Figure 4.3. - 2 Touchdown sensor

The touch-down sensor detects when the bonding tool contacts the substrate.

### 4.3.3 The Wire clamp

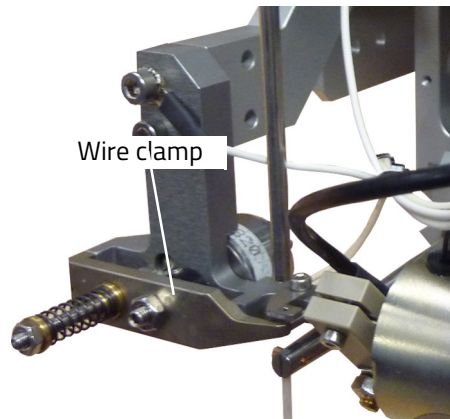


Figure 4.3. - 1 Wire clamp

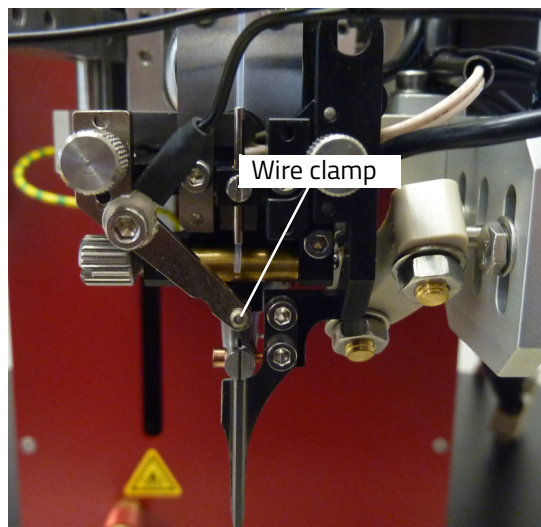


Figure 4.3. - 2 Wire clamp

The wire clamp is used to hold the wire while tearing off the wire after the destination bond. The wire clamp is opened by a solenoid and closed by spring action.

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The wire clamp is used to hold the wire while tearing off the wire after the destination bond. It is opened by a solenoid and closed by spring action.

#### 4.3.4 The Bonding Tool

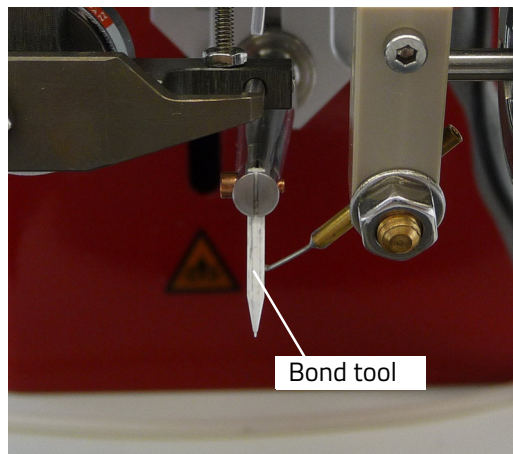


Figure 4.3. - 1 Bonding tool

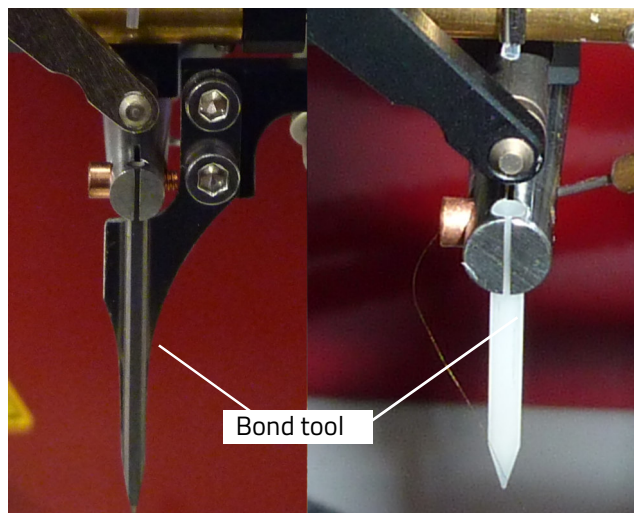


Figure 4.3. - 2 Bonding tool (left wedge, right capillary)

The capillary transfers the oscillation required for the welding to the bonding position. The bonding tool has to be selected to suit the bonding wire and the substrate.

The bonding tool transfers the oscillation required for the welding to the bonding position. The bonding tool has to be selected to suit the bonding wire and the substrate.

A further distinction has to be drawn between bonding tools for aluminium-wire and gold-wire applications. Ultrasonic bonders from F&S Bondtec transmit the vibrations to the bond position primarily by:

- >> a wedge in the case of aluminium wires, and
- >> a wedge with cross groove or a capillary in the case of gold wires

##### Selection of the bonding tool.

The bonding tools recommended for the bonder 53xx Ball Deep Access are as follows:

- >> 5310: Ceramic capillary 16 mm long.
- >> 5332: Wedge  $\frac{3}{4}$ " or 1" long

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### 4.3.5 The Pick-Up Tool

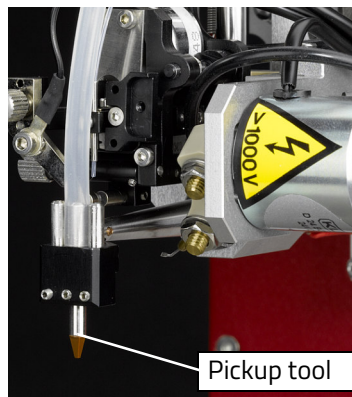


Figure 4.3. - 1 Bonding tool

The tool picks up and places the dies.

### 4.3.6 The Wedge-Clamp

The wedge-clamp does hold the wire right at the tip of the bondtool. It does clamp the wire and will ensure that the wire can not slip back into the tool when moving down towards searchheight of 2nd bond.

It does also fix the wire during Tearoff movement.

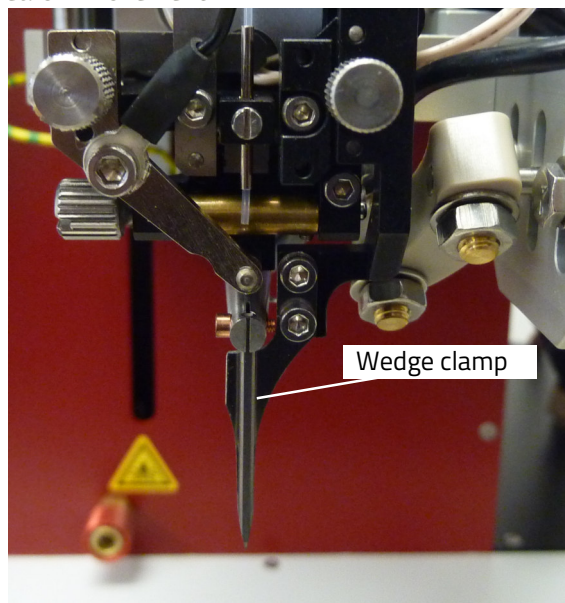


Figure 4.3. - 1 wedge-clamp

There are two different length of wedge clamps available (for tools with 3/4" length and also for 1" length).

If a capillary is used, the wedge-clamp has to be demounted. ([see "Mounting the wedge-clamp" on page 9-97](#)).

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### 4.3.7 The Flame-Off Unit

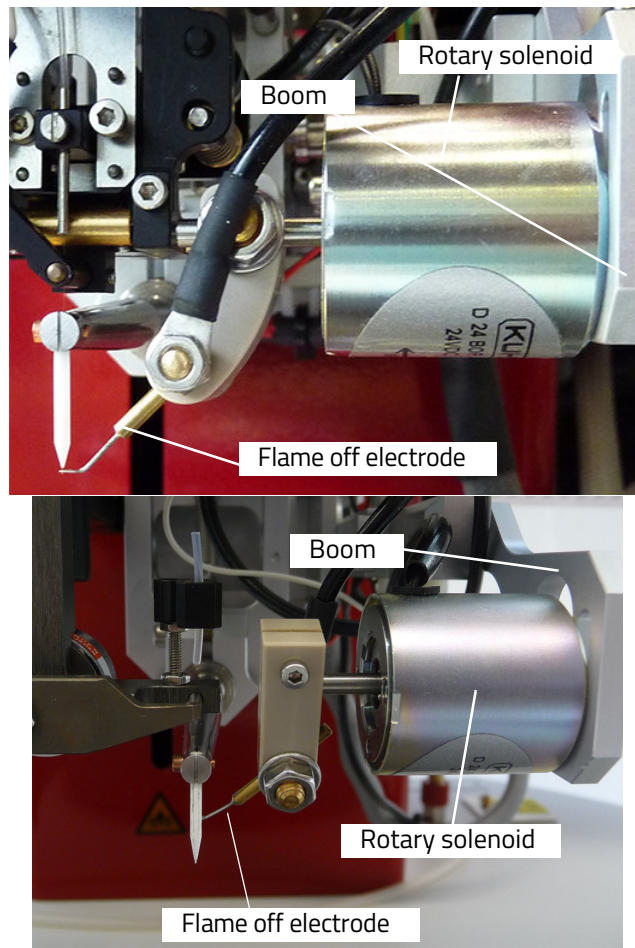


Figure 4.3. - 1 Flame-off unit

The flame-off function and the associated components are active only when software version 5310 has been selected.

The rotary solenoid moves the flame off electrode toward the tip of the wire in order to flame off the wire and form the ball.

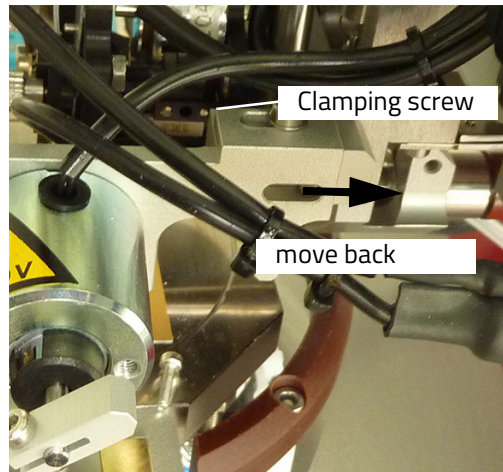


#### IMPORTANT

*Selecting software version 5332 deactivates the flame-off function. The boom that supports the flame-off unit and all the associated components can be moved backwards (out of the way) to facilitate the process of threading in the wire in this mode*

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### Danger

*Switch off the bonder and pull the mains plug before starting work on the flame off electrode. Electric-shock hazard.*

*Life-threatening hazard for persons with cardiac pacemakers.*

*Take great care while working inside the machine.*

*Keep well clear of the working zone of the machine while the equipment is in operation. Moving machinery hazard.*

### 4.3.8 The Bondforce

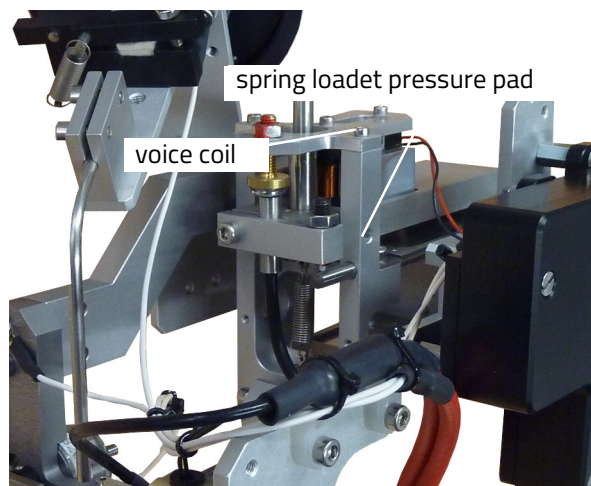


Figure 4.3. - 1 Bondforce

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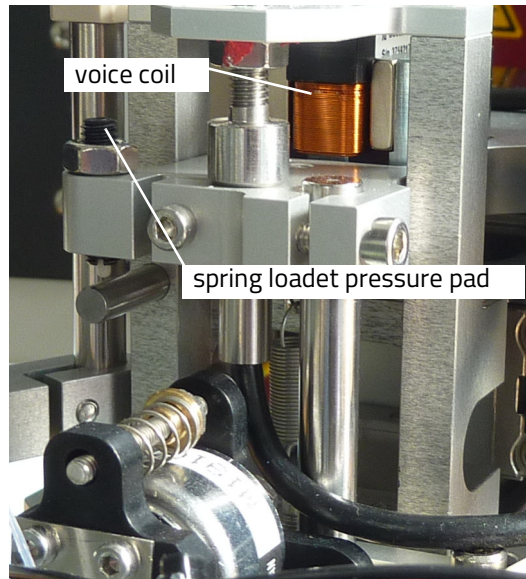


Figure 4.3. - 2 Bondforce

- >> A force, programmable in the software for the first and second bond independently of one another, which can be applied in addition via a voice coil motor.
- >> The spring loadet pressure pad is used to set the tail length. It defines the path of the voice coil motor, and thus the length of the wire, which can be subsequently flamed off.

The bond force required for bonding is set as the sum of the mechanical basic force plus the programmable force. i.e. as the force with which the wire is pressed onto the substrate during bonding.

#### 4.4 The substrate carrier

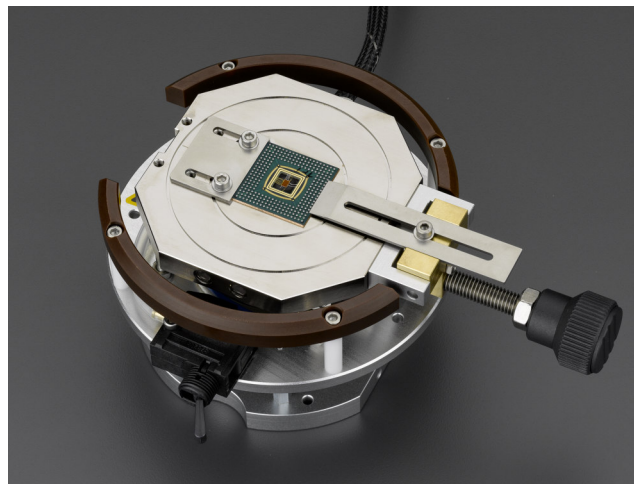


Figure 4.4. - 1 Substrate carrier

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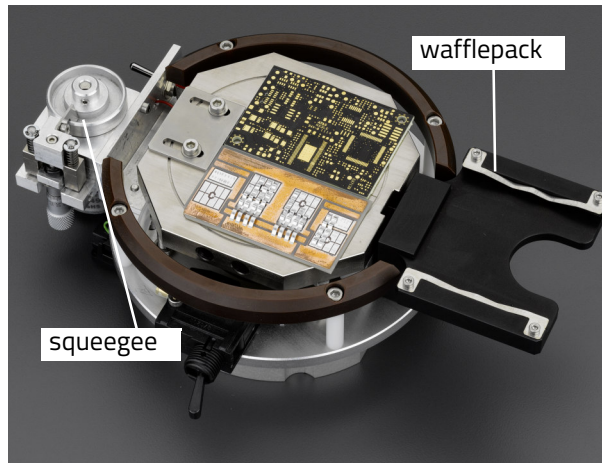


Figure 4.4. - 2 Substrate carrier with wafflepack-adapter

The substrate carrier is placed on the x-y table and is freely accessible from all sides. The clamp and vacuum allows the substrate to be located anywhere on the substrate holder. Over and above the degrees of freedom allowed by the manual joystick, the substrate holder rotates through 360° for initial positioning and it can also be moved horizontally.

The optional 2-inch Wafflepack-support can be easily adapted to the substrate carrier when needed.



**IMPORTANT**

*Chip holders are adapted to the customer-specific application as necessary.*

**4.5 The Flame-Off Unit**

The flame off unit is required to flame off the wire when software version 5310 is selected.

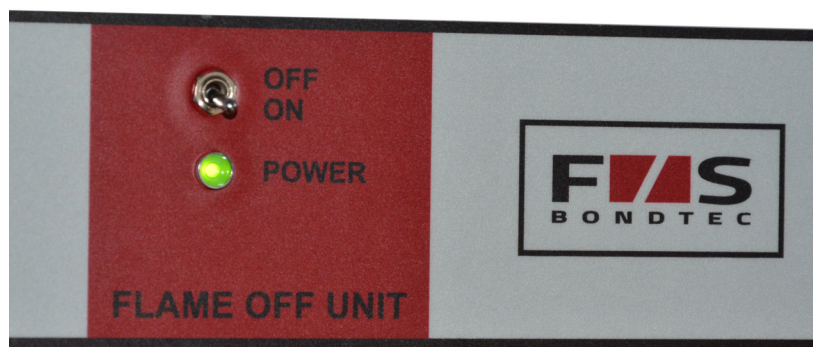


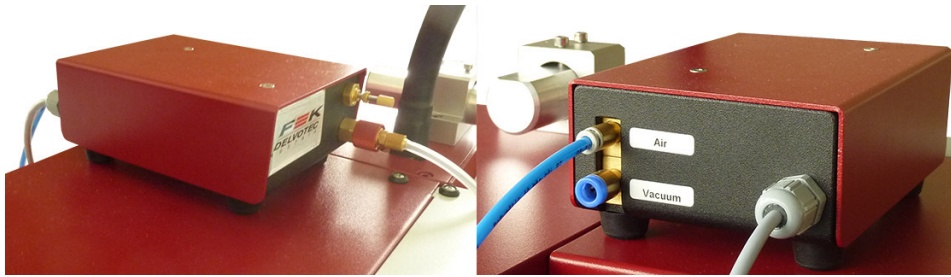
Figure 4.5. - 1 Flame off unit

Time and Current of the high-voltage pulse can be set at the Machine Parameters page.

The flame-off process should create a ball that has a diameter equal to approximately two or three times the diameter at the end of the wire <Querverw\_Blau>(see 8.4 "Adjusting the Flame-Off Unit" on page -74).

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## 4.6 Pick-Up Kit (optional)



*Figure 4.6. - 1 Connection - Pick-Up kit*

Connect compressed air and vacuum on the rear side of the pick-up kit (<Querverw\_Blau>(see 3.1 "Ambient conditions" on page -13)").



## 5) Transport and Installation

### 5.1 Transport / Packaging

Always repack the equipment in this original packaging for subsequent shipment.



#### DANGER

*Make sure the machine is adequately secured for transportation!*

### 5.2 Storage

The preconditions for correct storage are as follows:

- >> The machine must be fully enclosed within an airtight sealed envelope.
- >> Storage only in dry rooms at moderate temperature (max. relative humidity: 70%, no condensation, max. temperature range: 0 - 50°C).
- >> Storage is limited to a maximum of six months.

Although most corrosion-endangered parts are made of non-rusting, chrome-plated or galvanised steel or have a protective paint finish, it is important to check the machine for signs of corrosion if it has been in storage for a prolonged period of time.

It is particularly important to check the condition of all:

- >> screws, bolts and nuts
- >> spindles
- >> guides



#### IMPORTANT

*Please consult F&S Bondtec Customer Services if you discover signs of corrosion on the machine.*

### 5.3 Suitable Operating Location



#### DANGER

*Before the machine is installed, the operator must ensure that the supporting table is of adequate load-bearing capacity.*



#### CAUTION

*Never attempt to operate the bonder and its components with an incorrect voltage setting. The equipment could be damaged*

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The preconditions for correct installation are as follows:

- >> The system must be readily accessible from all sides.
- >> Ensure that no-one can be endangered by the machine when it is in operation.
- >> Use a table of adequate strength for the machine.
- >> The table should, if possible, transmit no vibrations.
- >> The workplace should be in compliance with the latest ergonomic guidelines.
- >> A shockproof socket (to DIN 49441) or a shockproof socket compliant with national requirements must be available in the immediate vicinity of the bonder <Querverw\_Blau>(see 3.1 "Ambient conditions" on page -13).

## 5.4 Preparation Work for Commissioning



### DANGER

*Wear protective gloves and protective footwear at all times when moving and installing*

### 5.4.1 Unpacking the Machine



### CAUTION

*Take care not to damage the equipment when unpacking it.*

- >> Place the machine in position.
- >> Check the shipment and make sure nothing is missing (compare with delivery note).
- >> Remove the securing device

## 5.5 Connecting to power supply



### DANGER

*Keep the electrical and electronic components correctly covered at all times. Only authorised personnel may remove the covers.*

*Always make sure the machine is disconnected from the mains supply and deenergized before work on potentially live components commences, and make sure that the machine is secured in such a way that it cannot be re-energized without your knowledge and consent.*

### 5.5.1 Electrical hazard

Work on the electricity supply must always be carried out by a trained, qualified electrician. Always disconnect the machine from the mains supply before work on potentially live components commences. All electric cables must be professionally routed and connected.

Fittings, length and quality of the cables must be in compliance with locally applicable regulations. Have the electrical wiring checked at regular intervals and have loose and damaged cables replaced immediately.

## 6) Operation

### 6.1 Notes on Safety

#### 6.1.1 Safety at Work

F&S Bondtec machines are state of the art and comply with safety-related rules and regulations.



---

#### **DANGER**

*Use the machine only*

*>> in compliance with the manufacturer's intended use*

*>> in perfect safety-related working order.*

*Incorrect use means risk of injury to the user and others and can cause damage to the machine and property. Have safety-related defects repaired immediately by trained, qualified specialists.*

#### 6.1.2 Operational Hazards



---

#### **DANGER**

*Keep well clear of the working zone of the machine while the equipment is in operation.  
Moving machinery hazard.*

*Operate the machine only with all covers closed. Do not remove covers while the machine is in operation.  
Moving machinery hazard.*

*The substrate carrier becomes very hot when the heating is in use. Burn hazard. Do not touch the substrate or the substrate carrier when the heating is on or while the substrate carrier is still hot.*

*Use suitable tools (e.g. tweezers) to change the substrate while the heating is on.*

*Do not work on the machine at the same time as other persons.*

### 6.1.3 Safety Device



Figure 6.1. - 1 Main switch with emergency stop function

You can stop the machine at any time, regardless of its operating status, by actuating the main switch with EMERGENCY STOP function.



#### CAUTION

*Faults must be rectified by trained, qualified personnel working in compliance with all safety precautions.*

- >> Actuate the EMERGENCY STOP button to bring the machinery to an immediate standstill.
- >> Have the fault rectified by authorised personnel.

To restart the bonder after an emergency stop:

- >> Make sure that the fault which led to actuation of the EMERGENCY STOP switch has been rectified.
- >> Switch on the main switch.

## 6.2 Background Knowledge: Bonding

The bonder 5310 is designed for bonding thin gold wire in the thickness range from 17  $\mu\text{m}$  to 50  $\mu\text{m}$ .

The bonder 53xx Ball Deep Access is designed for bonding thin gold and thin aluminium wire in the thickness range from 17  $\mu\text{m}$  to 50  $\mu\text{m}$ .

5380 (optional):

The manual Pick and Place function is used to pick chips from a waffle pack and place them on a substrate (carrier).

Targeting at the Pick and Place process has to be observed through the microscope.

Viewing the component through the microscope enables visual precise positioning of the bonds.

### 6.2.1 Terms used

#### Workheight.

Height of the Z position at which the x-y table can be moved, or a component changed, without risk of collision.

The bonder 5310 flames off at this height.

If the flame-off function of the bonder 53xx Ball Deep Access is used (bonder software 5310), flame-off takes place at this height.

**Bondweight.**

Programmable bondforce applied during the bonding process.

**Bump bonding.**

Bump bonds are bonds at which the wire is torn off after the source bond .

**Chips.**

Each surface to be bonded is known as a 'chip'.

**Chipheight (5380 only).**

Height at which the pick um point is positioned by means of the manual joystick and as of which speed changes to touchdown search speed.

**Die (5380 only).**

Chips

**Die Collet (5380 only).**

Pick Up Tool

**Home position.**

Position for initialising the Z and Y axis.

**Loop Height.**

Height of the bonding tool above the substrate at which the loop is formed.

**Loop Lenght.**

Distance between the source and destination bond (also known as 1st and 2nd bonds).

**Pick (5380 only).**

Pick up a chip

**Place (5380 only).**

Place a chip

**Shuttlewheel.**

Shuttlewheel to alter positions and parameters

**Security bump.**

A security bump can be set on top of an existing destination bond.

**Search height.**

Height where touchdown search starts and at which the component is precisely positioned underneath the bonding tool.

**Z-Delay.**

Proportion of the loop distance in which Z-axis dwells at loop height while Y-axes is traversing. At the end of Z-Delay the clamp can be closed (see Clamp Flag) and Z-axis traverses down to search height of the 2nd bond.

**Y-LH Pos.**

Defines in which position of Y-axis the Z-axis reaches the maximum loop height.

**Presign.**

Proportion of the loop height that has been approached after the 1st bond and before the actual loop is drawn. In „Loop Mode“ this function has a different effect depending on the setting.

With „Triangle“ Presign is the height after the 1st bond before the axis traverse in direction Y and draw the loop in the process.

With „Rev. Triangle“ Presign is the height after the 1st bond at which the reserve movement begins.

### Substrateheight.

Height from which the touchdown point is searched and at which the placing point is positioned by means of the manual joystick.

### Substrateheight (5380 only).

Height at which the placing point is positioned by means of the manual joystick and as of which speed changes to touchdown search speed.

### Tailheight.

The height at which the tail is formed.

### Taillength.

5330: The length of wire drawn from or fed out of the bonding tool after the destination bond.

5310: Y motion to tear off the wire after making the bump (in bumping mode only).

### TD (touchdown).

The bonding tool gets in contact to the material to be bonded.

### TD speed.

Speed of the bondhead (Z axis during TD search).

### Touchdown threshold.

Sensitivity of the touchdown sensor.

### Transferheight (5380 only).

Transferheight between pick- and place position.

### Unplugging tool.

A suitable tool for cleaning the wire duct of the wedge or capillary.

### US power (source/destination).

The programmable power of the ultrasonic generator for the source or destination bond, resp., selectable from 0 to 255 ("low" and "high" amplitudes).

## 6.2.2 The Bonding Procedure

The illustrations below show, in diagrammatic form, how a wire bond is made.

### Step 1.

>> The operator positions the chip underneath the bonding tool at the first bond position.

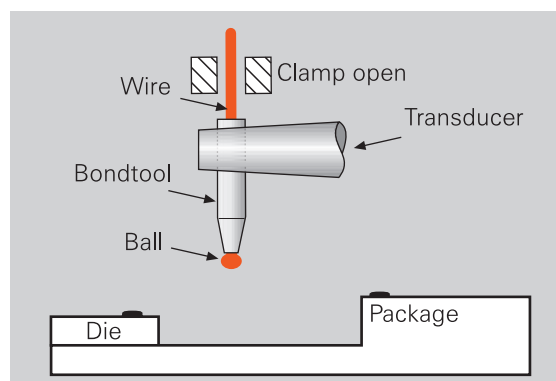


Figure 6.2. - 1 Bonding procedure version Bonder 5310 (capillary) - moving to the first bonding position

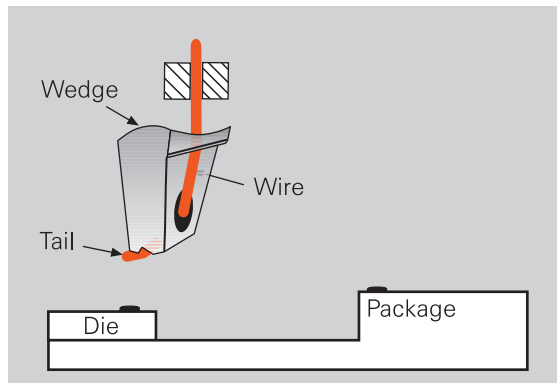


Figure 6.2. - 2 Bonding procedure version 5332 (wedge) - moving to the first bonding position

**Step 2.**

>> The bondhead brings the wire into contact with the substrate, using a defined force. This force makes the wire ready to be bonded to the substrate by the ultrasonic oscillation.

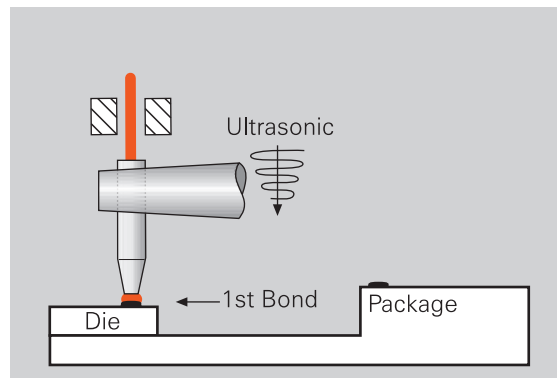


Figure 6.2. - 3 Bonding procedure version Bonder 5310 (capillary) - performing the source bond

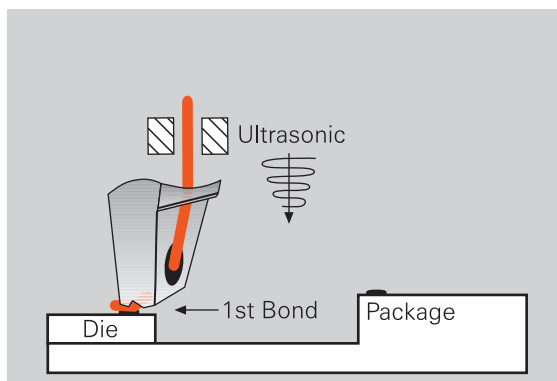


Figure 6.2. - 4 Bonding procedure version 5332 (wedge) - performing the source bond

**Step 3.**

>> The wire despoils automatically as the movement to loop height is executed.

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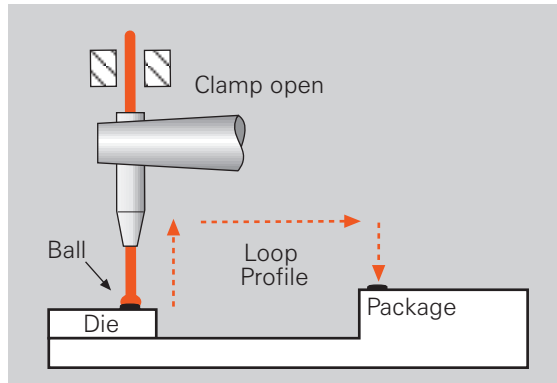


Figure 6.2. - 5 Bonding procedure version Bonder 5310 (capillary) - moving to loopheight

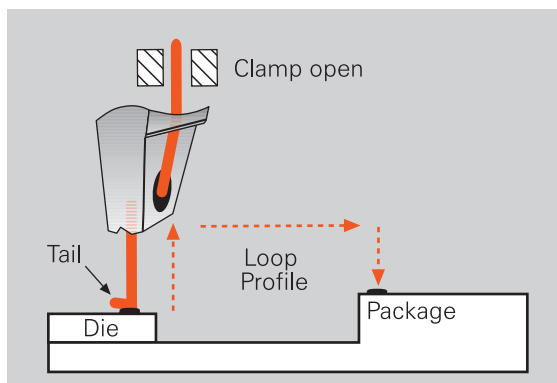


Figure 6.2. - 6 Bonding procedure version 5332 (wedge) - moving to loopheight

**Step 4.**

- >> The manual joystick is then used to pull the substrate to the second bond place (destination-bond position). Tracking this movement, the wire forms the loop.
- >> The Y axis moves the bond head to the second bond position. Tracking this movement, the wire forms the loop.

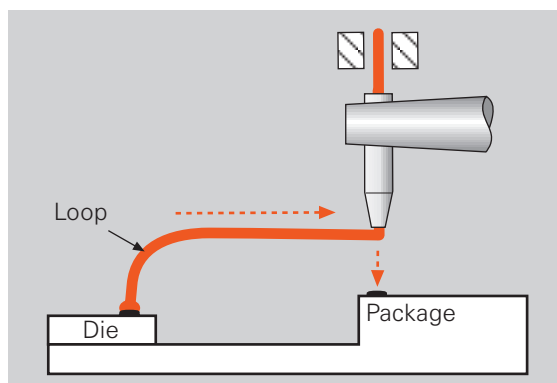


Figure 6.2. - 7 Bonding procedure version Bonder 5310 (capillary) - moving to the second bond position

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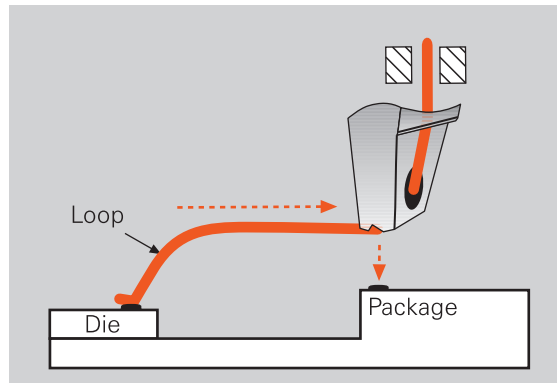


Figure 6.2. - 8 Bonding procedure version 5332 (wedge)- moving to the second bond position

**Step 5.**

>> The operator positions the chip underneath the bonding tool at the second bond position. At this second bond position, the wire is again brought into contact with the substrate with a defined force, and the wire is ultrasonically welded to the surface.

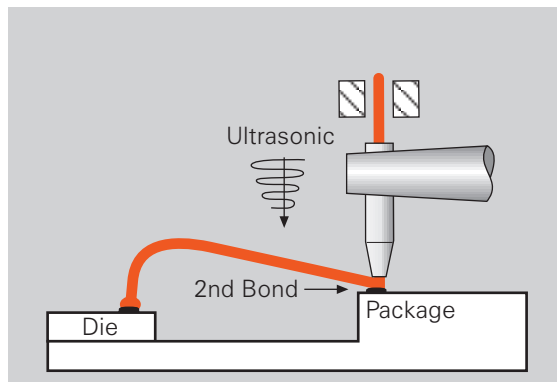


Figure 6.2. - 9 Bonding procedure version Bonder 5310 (capillary) - performing the destination bond

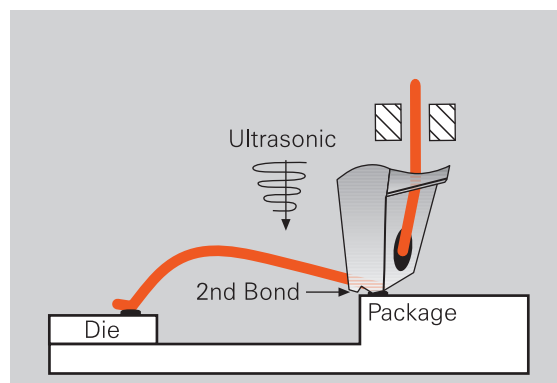


Figure 6.2. - 10 Bonding procedure version 5332 (wedge) - performing the destination bond

**Step 6.**

>> The Z axis moves to tail height with the wire clamp open. The wire clamp closes. The Z axis then moves up and subsequently tears off the wire.  
 >> Capillary: The Z axis moves up with the wire clamp closed and tears off the wire. The bondforce motor raises the transducer to form the tail.

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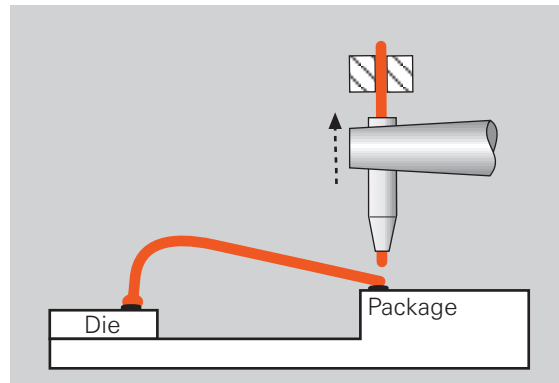


Figure 6.2. - 11 Bonding procedure version Bonder 5310 (capillary) - tearing off the wire

>> Wedge: The movement of the Y and Z axes tears off the bonding wire. The bond head returns to the work height.

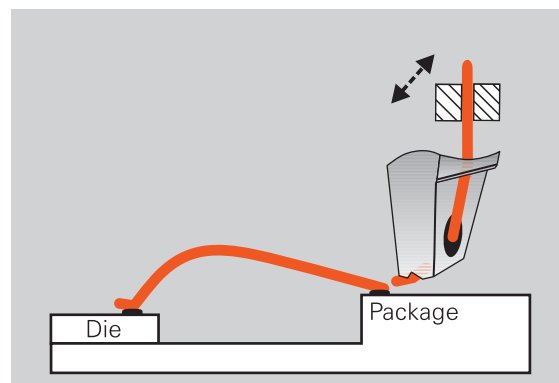


Figure 6.2. - 12 Bonding procedure version 5332 (wedge) - tearing off the wire



**IMPORTANT**

Extensive knowledge and investigations are necessary, in order to ensure that bonds of this nature exhibit the required characteristics. Broadly speaking, there are three groups of parameters, all of which interact:

- >> Speeds, movements, for example
- >> Process parameters, e.g. bondforce, bond time, ultrasonic energy
- >> Application, e.g. properties of the module, bond wire, clamping at workholder

**6.2.3 The pick and place / stamping procedure**

The illustrations below show, in diagrammatic form, how a pick and place process works.

**Step 1.**

>> The operator positions the chip underneath the pick-up tool at the first pick up position.

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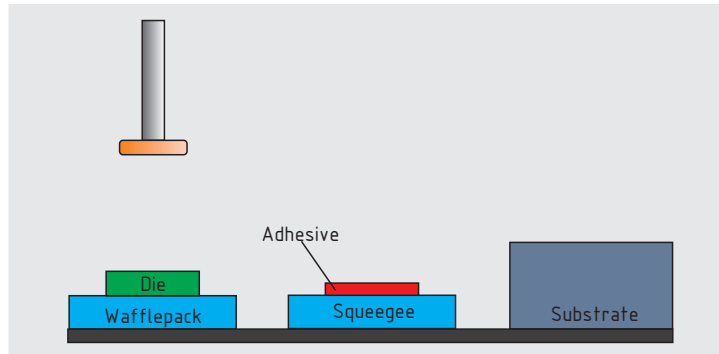


Figure 6.2. - 1 Diebonding procedure - moving to the pick-up position

**Step 2.**

>> The bondhead moves to the programmed ramp height.

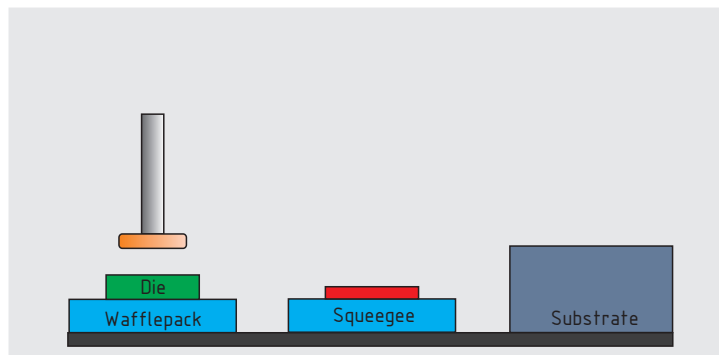


Figure 6.2. - 2 Diebonding procedure - move to ramp height

**Step 3.**

>> The head moves with programmed speed, force and overtravel down to pick up the die.

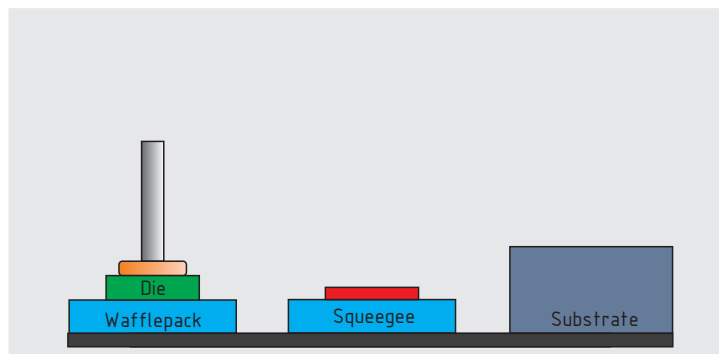


Figure 6.2. - 3 Diebonding procedure - pick up

**Step 4.**

>> The head moves with picked up die to transfer height.

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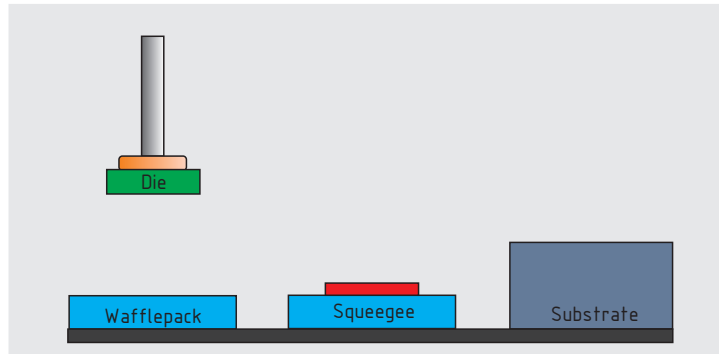


Figure 6.2. - 4 Diebonding procedure - moving to transferheight

**Step 5.**

>> The operator positions the squeegee underneath the pick-up tool.

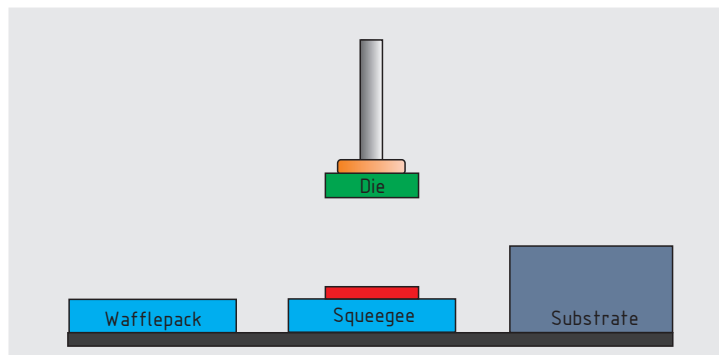


Figure 6.2. - 5 Diebonding procedure - moving to the pick-up position

**Step 6.**

>> The bondhead moves to the programmed ramp height (switch the squeegee off).

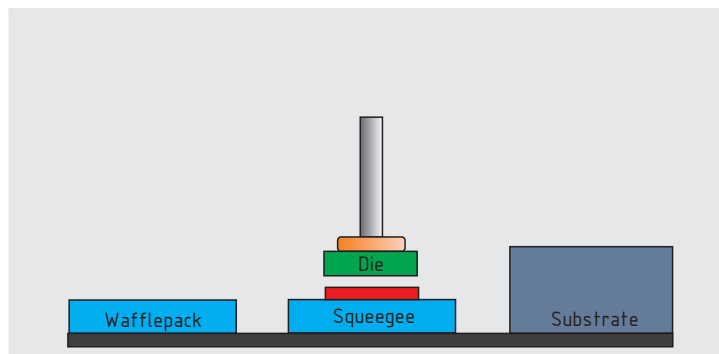


Figure 6.2. - 6 Diebonding procedure - move to ramp height

**Step 7.**

>> The head moves with programmed speed, force and dip delay down to dip height to dip the die into adhesive.

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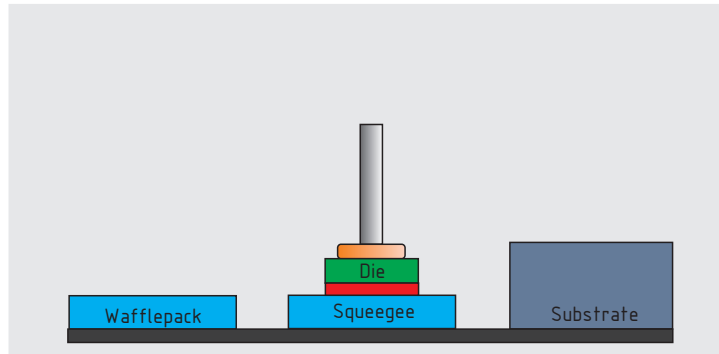


Figure 6.2. - 7 Diebonding procedure - dip

**Step 8.**

>> The head moves with dipped die to transfer height (switch the squeegee on).

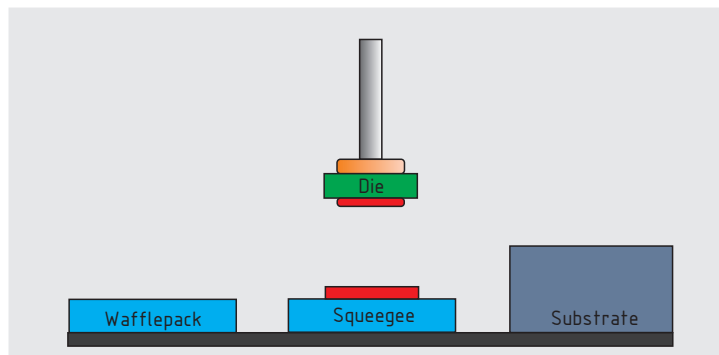


Figure 6.2. - 8 Diebonding procedure - moving to transferheight

**Step 9.**

>> The operator positions the substrate underneath the bonding tool at the placing position.

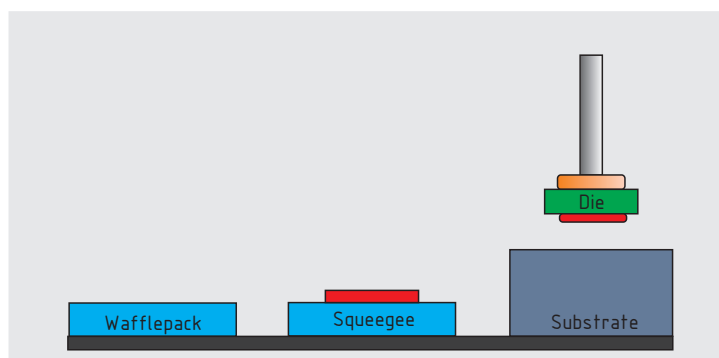


Figure 6.2. - 9 Diebonding procedure - moving to substrate

**Step 10.**

>> The Z axis moves down to ramp height.

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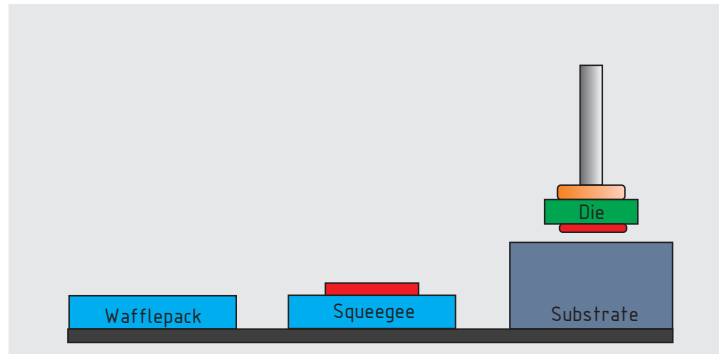


Figure 6.2. - 10 Diebonding procedure - move to ramp height

**Step 11.**

>> The head moves with programmed speed, force and overtravel down to place height, to place the die.

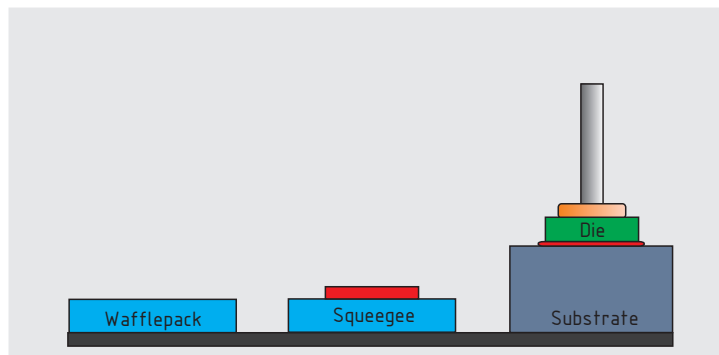


Figure 6.2. - 11 Diebonding procedure - place die

**Step 12.**

>> The bond head moves back up to workheight.

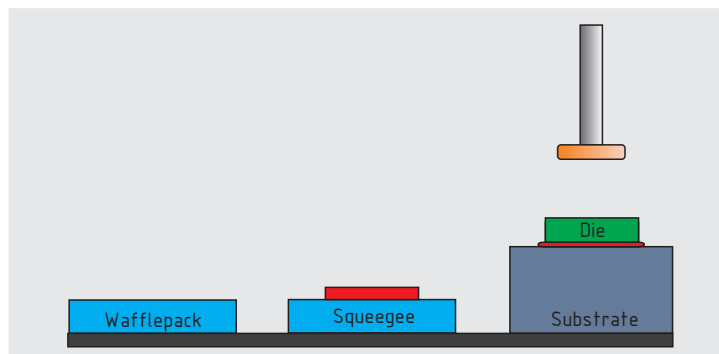


Figure 6.2. - 12 Diebonding procedure - move to workheight



**IMPORTANT**

*Extensive knowledge and investigations are necessary, in order to ensure that bonds of this nature exhibit the required characteristics. Broadly speaking, there are three groups of parameters, all of which interact:*

>> *Speeds, movements, for example*

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>> Process parameters, e.g. bondforce, bond time

>> Application, e.g. adhesive, tools, chipsize

If the dipping process is disabled, steps 5 to 8 are not applicable.

## 6.3 Software Reference



### IMPORTANT

*This section describes all menus and their parameters. Read this section carefully and familiarise yourself with its content before you start bonding.*

The screen shown below appears after starting the bonder. Select a bond head to start the corresponding software.

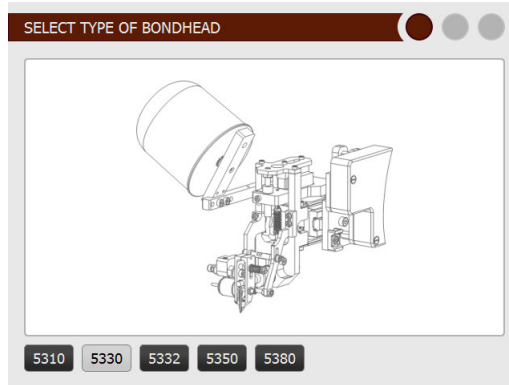


Figure 6.3. - 1 Selecting the bonder software

>> Select the software version.

After starting the software, it is possible to load an existing program or to create a new one.

Once the program has started, the axis must be moved to the home position (initialisation position).

>> Press the "Home" button to move the axis to the initialisation position.

### 6.3.1 Main screen

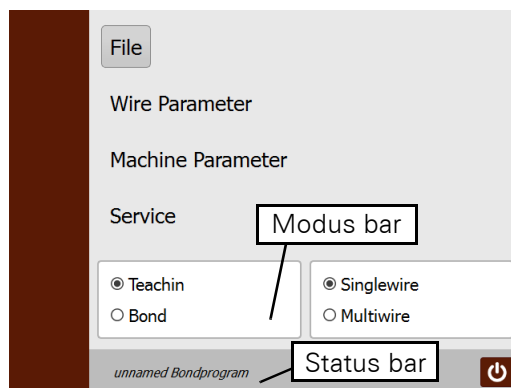


Figure 6.3. - 1 Main Screen

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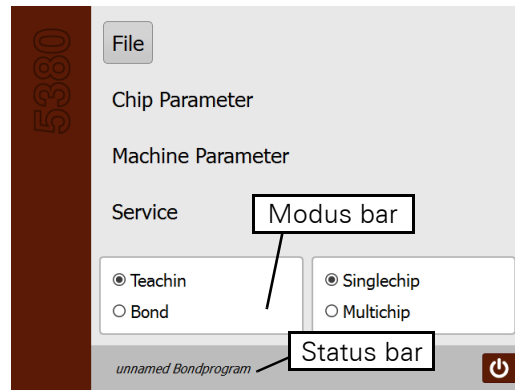


Figure 6.3. - 2 Main Screen 5380

The menus accessible in the main screen are as follows:

- >> File
- >> Wire Parameter
- >> Chip Parameter (5380)
- >> Machine Parameters
- >> Service
- >> Shut Down

**Modus bar.**

In the modus bar the way of working can be chosen. The name of the currently loaded bond program is displayed at the left-hand side of the status bar.

- >> Teach in/ Bond:
  - >> Teach In: This is a "Dummy Mode" where all parameters and the bond weight are used and all movements are performed, but without triggering the ultrasonic
  - >> Bond: The wires are trained (and bonded) with the ultrasonic turned on.
- >> Singlewire / Multiwire:
  - >> Selection if one or more wires should be trained.

**6.3.2 File**

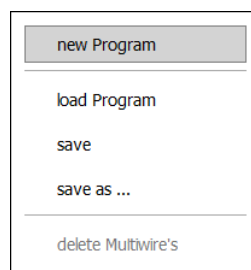


Figure 6.3. - 1 'File' main menu

- >> New Program: Enter new settings
- >> Load Program: Load existing settings from the library
- >> Save / Save as: Save the current settings in the library
- >> Delete Multiwires: delete multiwire list.

**New Program.**

Creates new settings. There is a choice between cloning them from the current program or resetting all values to defaults.



### IMPORTANT

Entries you made beforehand are lost if you did not already save them before you finish creating a new program (by clicking on the OK button).

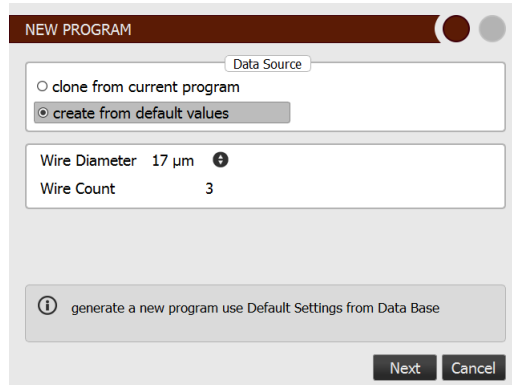


Figure 6.3. - 2 File > New Program

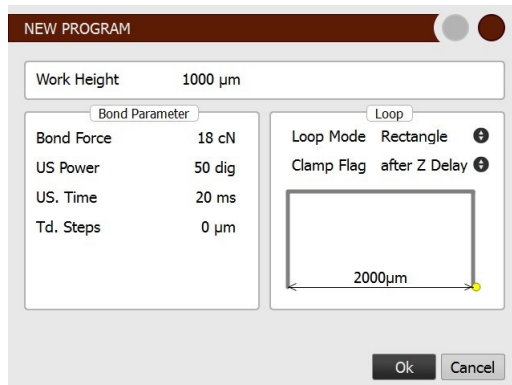


Figure 6.3. - 3 File > New Program2

### Load Program.

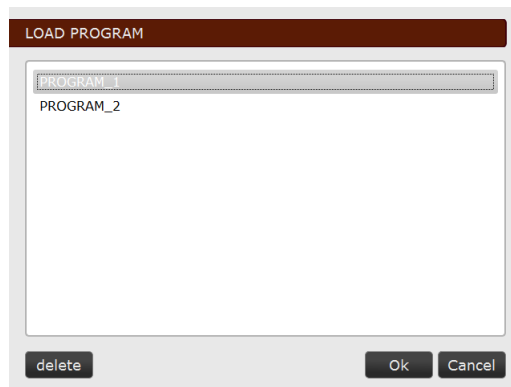


Figure 6.3. - 4 File > Load

Load existing settings from the library.

>> Select a bond program and click on "OK" to confirm. Click on "Cancel" if you do not want to proceed.



>> „delete“ allows to remove existing bond programs from the library.

**Save / Save as.**

Save a copy of the currently active program in the program library.

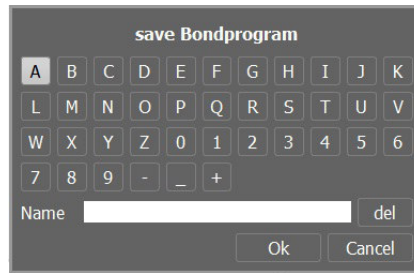


Figure 6.3. - 5 File > Save / Save as

If you make a mistake, use the „del“ button to undo your most recent entry.

The name of the current bond program appears in the status bar.

**Delete Multiwires.**

The multiwire list can be deleted in order to create a new program where the same parameters but different number and shape of wires are used.



Figure 6.3. - 6 File > delete multiwire

When you open "Wire Parameter" afterward you are asked to create a new multiwire list.

At this new list all the heights and coordinates have to be stored again then.

**6.3.3 Wire Parameter**



**IMPORTANT**

*The following parameter are not available for 5310 without Y-axis: Looplenght, Reverselength, Taillength, Savebump Displacement.*

*The Y-movement is done by the operator using the manipulator.*

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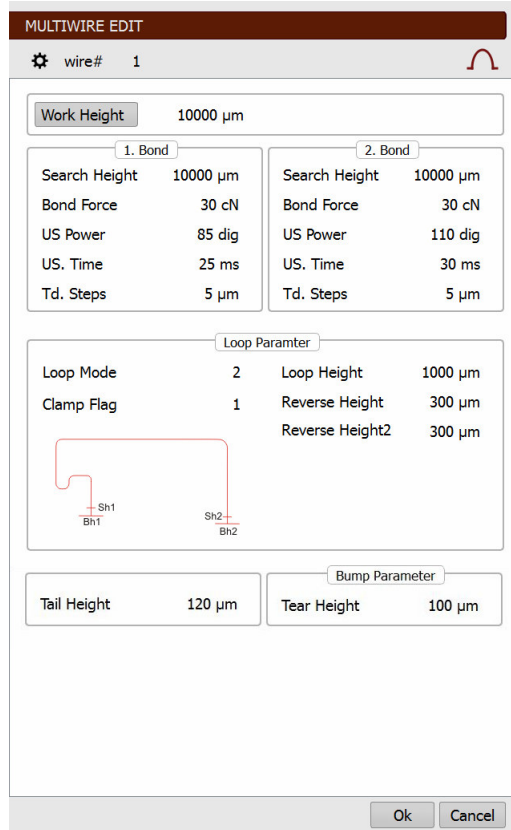


Figure 6.3. - 1 Main menu - learn wire

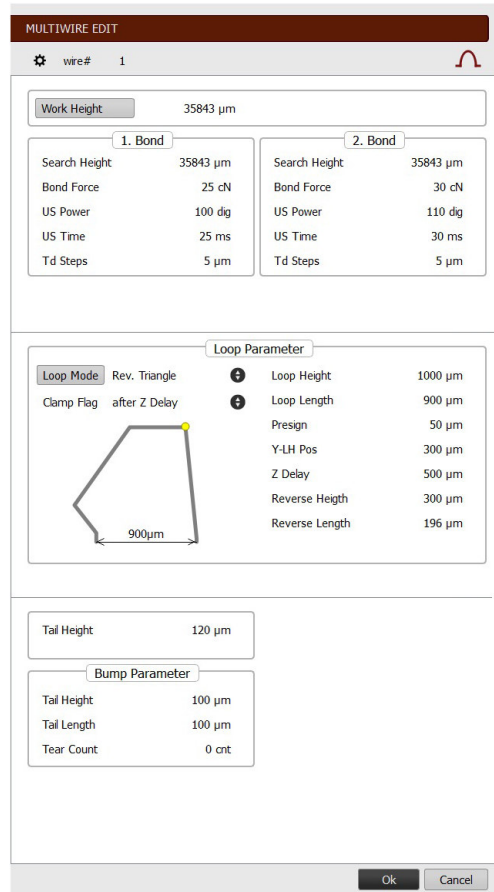


Figure 6.3. - 2 Main menu - learn wire 5310

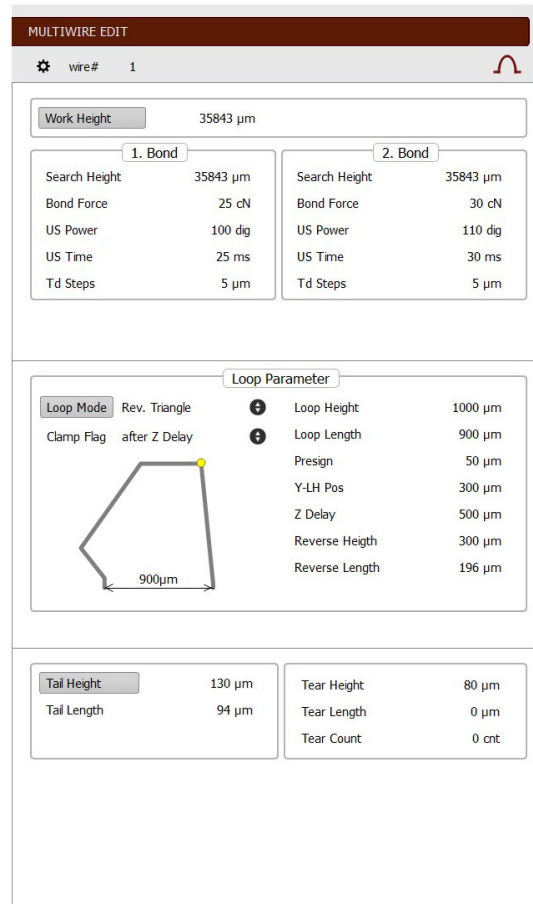


Figure 6.3. - 3 Main menu - learn wire 5332

Use Multi Wire Mode and bond a wire with parameter teaching.

Parameter (Learn Wire)	Description / Value range, unit
Workheight	Height at which the x-y table can be moved, or a component changed, without risk of collision. Flame-off height; position of the Z axis µm
Workheight	Height at which the x-y table can be moved, or a component changed, without risk of collision. When software version 5310 is in use: flame-off height; position of the Z axis µm
Searchheight	Height before initiating touchdown search. µm
1. Bondforce / 2. Bondforce	Programmed bondforce applied during the bonding process. 0 ... 1800 g or cN (lower values correspond to a lower load).
1. US Power / 2. US Power	Ultrasonic power for the corresponding bond; the correct power setting depends on wire thickness and bond material. 0 ... 255 digit
1. US Time / 2. US Time	US-time for the corresponding bond. ms

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Parameter (Learn Wire)	Description / Value range, unit
1. TD Steps / 2. TD Steps	Additional over-drive steps after touchdown has been detected, to ensure that the wire can be deformed in the bonding process. Default: approx. 0.5 of wire diameter. 0 ... 500 µm
Wire Number	Wire index in program.
Wire Name	Name of the active Wire. By pressing the „Enter“-Button on „Wire Name“ a window for naming the wire appears.
Loop Parameter	Loop mode and Loop parameters can be set.



**IMPORTANT**

*Parameter modifications are only stored by pressing the „Enter“-Button!*

*Pushing only the shuttlewheel, merely confirms the modified parameter for the current bond!*

- >> With the „edit“-button, Stitchbonds (5332) or Save Bumps (5310) can be added. Also wires can be renamed, inserted or deleted.
- >> By selecting software mode 5310, bumps and Save Bumps can also be made.

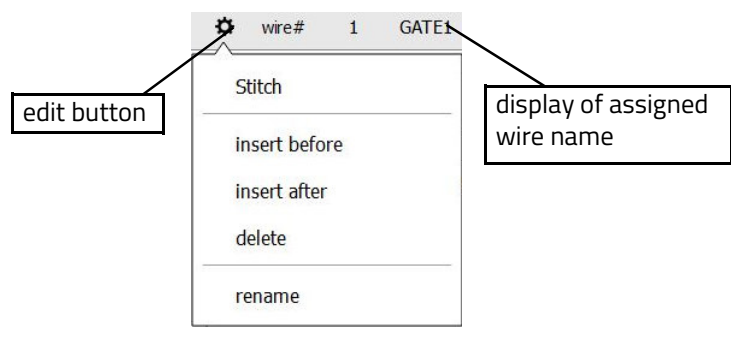


Figure 6.3 - 4 edit wires 5332

Parameter (edit button)	Description / Value range, unit
Add Stitch	Add a stitch bond
insert before	Insert a chain bond before the current loop
insert after	Insert a chain bond after the current loop
delete	Detete the current wire
rename	Rename the current wire

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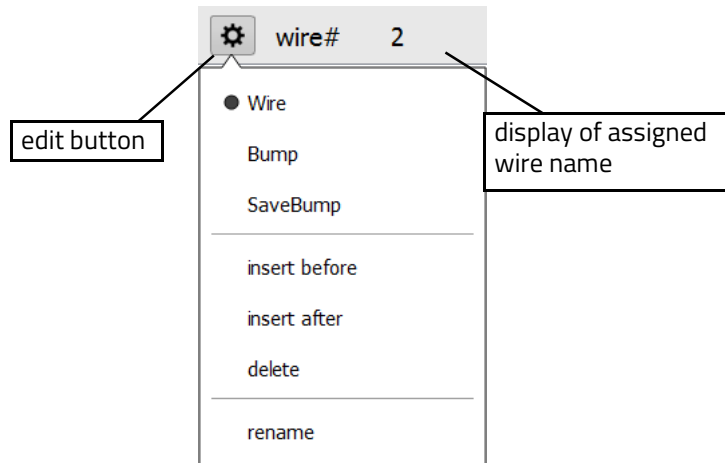


Figure 6.3. - 5 edit wires 5310

Parameter (edit button)	Description / Value range, unit
Wire	Defines the current bond connection as wire
Bump	Defines the current bond connection as Bump bond
SaveBump	Defines the current bond connection as Save Bump
insert before	Insert a bond before the current loop
insert after	Insert a bond after the current loop
delete	Detete the current wire
rename	Rename the current wire

Moving the cursor up will close the „edit“ page.



**IMPORTANT**

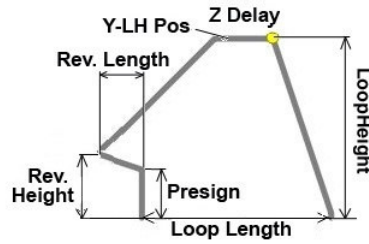
Select 'Teachin' at the Modus bar (in the Main Menu) to teach or verify the programmed positions and heights without bonding real wires.

The „Teach Mode“ is only activated if „Wire Parameter“ was opened via the selection in the main menu!

All parameters and the bond weight are used and all movements are executed, but without triggering the ultrasonic! Creating or deleting wires is also possible! If „Wire Parameter“ was opened via the „bond“-button, creating or deleting wires is not available!

Loop Parameters.





Clamp Flag	Clamp parameter after Z-Delay: Clamp closes at loopheight at Search Height: Clamp closes at searchheight 2 after Bond: Clamp closes after the destination bond at bond height
Loop Mode	Selection of the loop movement (Rectangular, Triangle, Rev. Triangle)
Reverse Height	Bonding tool height above the substrate at which the reverse move is done. µm
Reverse Length	Specifies the distance of reverse movement, before the loop is drawn. cnt/µm
Loop Height	Bonding tool height above the substrate at which the loop is formed. µm
Loop Length	Distance between the source and destination bond (also known as 1st and 2nd bonds) cnt/µm
Presign	Proportion of the loop height that has been approached after the 1st bond and before the actual loop is drawn. In „Loop Mode“ this function has a different effect depending on the setting.  With „Triangle“ Presign is the height after the 1st bond, before the axis traverse in direction Y and draw the loop in the process.  With „Rev. Triangle“ Z-Presign is the height after the 1st bond at which the reverse movement begins. This height has an effect depending on how intensely the wire is bent during the reverse movement. This value could also be programmed higher than „Reverse Height“ µm
Y-LH Pos	Defines in which position of Y-axis the Z-axis reaches the maximum loop height. µm
Z-Delay	Proportion of the loop distance in which Z-axis dwells at loop height while Y-axes is traversing. At the end of Z-Delay the clamp can be closed (see Clamp Flag) and Z-axis traverses down to TD-Ramp of the 2nd bond. µm

Rectangle .

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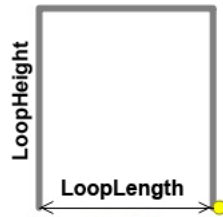


Figure 6.3. - 6 Rectangle

Rectangular Loop (default); programmable loop height and loop length

**Triangle.**

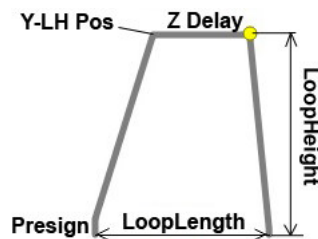


Figure 6.3. - 7 Triangle

Triangle Loop; simultaneous movement of Z and Y axes.

**Reverse Triangle.**

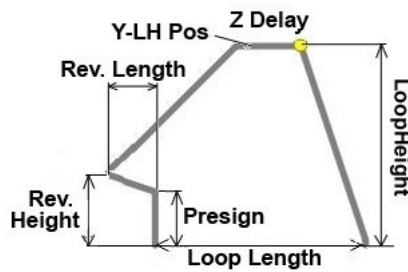


Figure 6.3. - 8 Reverse Triangle

Reverse Triangle; simultaneous movement of Z- and Y axes with reverse motion.

**6.3.4 Tear/Tail Bump Parameter**

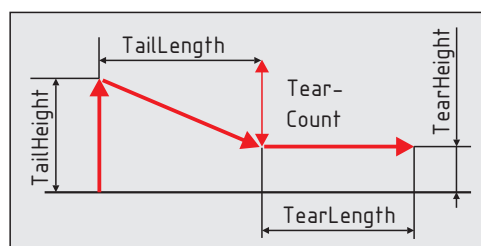


Figure 6.3. - 1 Table Tear

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Parameter (Tear/Cut Parameters)	Description / Value range, unit
Tail height	Height above destination bond, where wire clamp gets closed µm
Bonder 5332	
Tail Height	Height above destination bond µm
Tail Length	Y-movement to tailheight to form the tail length. counts/µm
Tear Height	Height above destination bond at which the wire is torn off. µm
Tear Length	Y-movement to tear the wire at the tear height. counts/µm
Tear Count	Number of vertical movements between „Tear Height“ and „Tail Height“ to weaken the wire before the tear length movement. counts
Bonder 5310	
Tail Height	Height above destination bond, where wire clamp gets closed µm
Bump Parameter	
Tail Length	Y-movement to tailheight, to tear the wire in a controlled manner. counts/µm
Tear Motion	worth for the Y-movement to tear the wire above the bump µm
Tear Count	Number of vertical movements reckons out Tail Height and Tear Motion cnt



**IMPORTANT**

*Pressing the enter key will store parameter changes permanently, whilst pressing the shuttle wheel will store the change just temporary*

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### 6.3.5 Chip Parameter (5380)

<b>Work Height</b> 10000 µm			
<b>Pick</b>			
Y Position	400 µm	Td. Steps	14 µm
Pickup Height	20000 µm	Pickup Force	100 cN
Ramp Height	40 µm	US Power	12 dig
		Pickup Delay	40 ms
<b>Dip</b>			
<input checked="" type="checkbox"/> <b>Enable</b>			
Y Position	400 µm	Td. Steps	15 µm
Dip Height	20000 µm	Dip Force	100 cN
Ramp Height	40 µm	Dip Delay	40 ms
<b>Place</b>			
Y Position	0 µm	Td. Steps	8 µm
Place Height	25000 µm	Place Force	199 cN
Ramp Height	20 µm	US Power	102 dig
		Place Delay	107 ms

Figure 6.3. - 1 Main menu - Chip Parameter



#### IMPORTANT

Select 'Teachin' at the Modus bar (in the Main Menu) to teach or verify the programmed positions and heights without bonding real wires.  
 The 'Teach Mode' is only activated if 'Chip Parameter' was opened via shuttle wheel selection in the main menu!  
 All parameters and the bond weight are used and all movements are executed, but without triggering the ultrasonic!  
 Creating or deleting chips is also possible!  
 If the 'Chip Parameter' dialogue was opened via the 'bond' button, this option is not available!

Parameter (Learn Wire)	Description / Value range, unit
Work height	Height at which the x-y table can be moved, or a component changed, without risk of collision. µm
Pick	
Y Position	Y position of the pickup tool when picking up the chip. µm
Pickup height	Height at which the search for the touchdown commences and at which the chip is precisely positioned underneath the pickup tool. µm

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Parameter (Learn Wire)	Description / Value range, unit
Ramp height	Z position above the currently detected touchdown height. µm
TD steps	Additional over-drive steps after touchdown has been detected. µm
Pickup Force	Programmed bondforce applied during the pick-up process. 0 ... 500g/cN (lower values correspond to a lower load)
US Power	Ultrasonic power for the corresponding chip; the correct power setting depends on chip. 0 ... 255
Pickup Delay	Retention Time while picking up the die ms
Dip	
Enable	Activate and deactivate a dipping step
Y Position	Y position of the pickup tool when dipping µm
Dip height	Height at which the search for the touchdown commences and at which the dip point is precisely positioned using the manipulator µm
Ramp height	Z position above the currently detected touchdown height µm
TD Steps	Additional over-drive steps after touchdown has been detected 0 ... 500µm
Dip Force	Programmed force applied during the dipping process. Additional over-drive steps after touchdown has been detected cN
Dip Delay	Retention Time while dipping the die ms
Place	
Y Position	Y position of the pickup tool when placing up the chip. µm
Place height	Height at which the search for the touchdown commences and at which the place point is precisely positioned underneath the pickup tool. µm
Ramp height	Z position above the currently detected touchdown height. µm
TD steps	Additional over-drive steps after touchdown has been detected. µm
Place Force	Programmed bondforce applied during the place process. 0 ... 500g/cN (lower values correspond to a lower load)
US Power	Ultrasonic power for the corresponding chip; the correct power setting depends on chip. 0 ... 255

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Parameter (Learn Wire)	Description / Value range, unit
Place Delay	Retention Time while placing the chip ms
Blow off Delay	Retention Time of Blow off after placing the chip ms

### 6.3.6 Use Teach- or Bond Mode

#### Single Wire Edit.

>> Open "Wire Parameters" by using the shuttle wheel

Changes can be made but will not cause any movement

>> To store, press "OK" or "Enter".

>> To quit, press "Cancel" or "Escape".

#### Single Wire Teach-in.

>> Select "Teach In" at Modus bar (Main Menu)

>> Push "Bond" button to activate Teach Mode

Wire can be trained using the shuttle wheel. The movements are performed, except touchdown movement, vacuum and blow-off.

>> To store, press "Enter".

>> To quit, press "Escape".

>> To leave the window, press "Home".

#### Single Wire Bond.

ä Select "Bond" at Modus bar (Main Menu)

ä Push "Bond" button to activate Bond Mode

Bonding is performed actively. All movements are performed, touchdown is determined; vacuum and blow-off are active.

Parameters can be changed by shuttle wheel.

>> To store, press "Enter".

>> To quit, press "Escape".

>> To leave the window, press "Home".



### 6.3.7 Machine Parameters

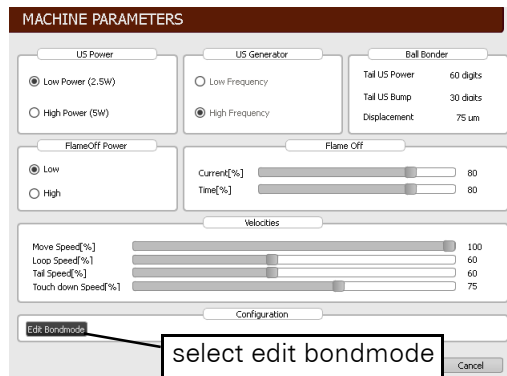


Figure 6.3. - 1 'Machine Parameters' menu 5310

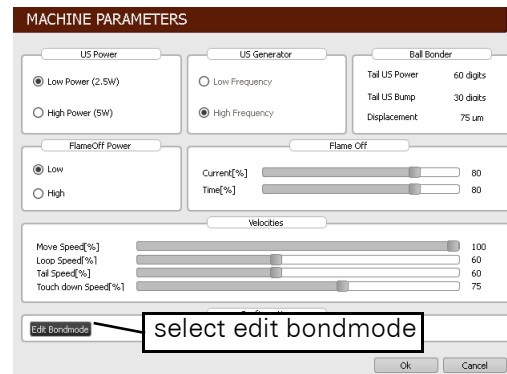


Figure 6.3. - 2 „Machine Parameters“ menu 5332/80

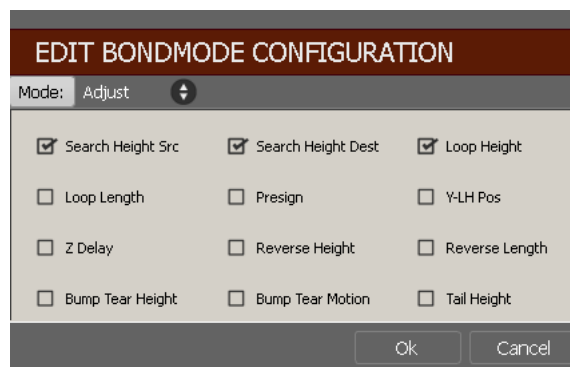


Figure 6.3. - 3 Edit Bondmode Configuration

Select „Edith Bondemode“ at the machine parameters-menu to open a new window. There you can switch between Adjust Mode and Production Mode. Tag the positions where you want to stop your machine, this is individual adjustable.

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Parameter (Machine Parameters)	Description / Value range, unit
US-Power	
Low Power / High Power	Ultrasonic power: Programmed power of the ultrasonic energy needed for the source bond and the destination bond. The correct power setting depends on wire thickness and bond material. "Low" and "high" levels
US-Generator	
Low Frequency / High Frequency	Frequency tuning for a 60 kHz transducer or a 100 kHz transducer. The exact resonance frequency is preset at the factory by F&S Bondtec. "Low" and "high" levels
Ball Bonder (only when software 5310 is in use)	
Tail US Power	Ultrasonic power applied when creating the tail by lifting the transducer. 0 ... 255 digits
Bump US Power	Ultrasonic power on Bump bond. 0 ... 255 digits
Savebump Displacement	Y Displacement for Savebump -1000 ... +1000µm
Flame off	Adjustments for Flame off (only 5310) (<Querverw_Blau>(see 8.4 "Adjusting the Flame-Off Unit" on page -74)
Velocities	
Move Speed	Speed of movement between workheight and search height. 30...100 %
Loop Speed	Speed of Z-movement during the loop as a percentage of maximum speed. No influence on quality 30...100 %
Tail Speed	Speed of movement while the tail is built. No influence on quality 30...100 %
TD Speed	Speed between search height and touchdown. Important The value has to be matched to the thickness of the wire. 30...100 %

### 6.3.8 Service



Figure 6.3. - 1 "Service" main menu

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- >> Bondforce Calibration: (password protected)
- >> Digital I/O's
- >> HardwareTest
- >> Get Version

**Bondforce Calibration (password protected).**

Access only for F&S Bondtec service personnel and authorized service.

**Digital I/O's.**

Terminal	Logical	Status
IN24_EFO_FAULT	Efo Fault	<input type="radio"/>
LIMIT_Z_MINUS	Z Axis Home	<input checked="" type="radio"/>
LIMIT_Z_PLUS	Z Axis Limit	<input checked="" type="radio"/>
LIMIT_Y_MINUS	Y Axis Home	<input type="radio"/>
LIMIT_Y_PLUS	Y Axis Limit	<input checked="" type="radio"/>
FUSE_24V_Z	Fuse Z Blown	<input checked="" type="radio"/>
FUSE_24V_Y	Fuse Y Blown	<input checked="" type="radio"/>
FUSE_24V_H	Fuse Head Blown	<input checked="" type="radio"/>
FUSE_24V_IO	Fuse IO Blown	<input checked="" type="radio"/>
OUT24_EFO_FIRE	efo Fire	<input type="checkbox"/>
OUT24_VACUUM	vacuum	<input type="checkbox"/>
OUT24_AIR	air	<input type="checkbox"/>
OUT24_FEED	feed	<input type="checkbox"/>

Figure 6.3. - 2 Service > Digital I/O's

Display of input and output signals.

**Hardware Test.**

**MACHINE TEST**

**Motor Positions**  
 Position Y: 1000µm  
 Position Z: 1000µm

**BondForce**  
 enable  
 value: 1970 digits/60.1 grams

**Touchdown Sensor**  
 Sensor Value: 19934

**Dac 1**  
 value: 0

**Ultrasonic Generator**  
 Us Power: 0digits  
 Time: 0ms

**TD Threshold**  
 value: 300

Figure 6.3. - 3 Service > Hardware Test

- >> Motor Position: use the shuttle wheel to move the axis
- >> Touchdown Sensor: to check the Touchdown-Sensor
- >> Ultrasonic Generator: Allows testing the ultrasonic generator
  - >> Bond: creates an ultrasonic test pulse of programmed duration and power.
  - >> On: enables the ultrasonic permanently with programmed power.
  - >> Off: turns the ultrasonic off.
- >> Bondweight: to check the bondweight
  - >> Enable: Activates or deactivates the bondweight.
  - >> Value: Bondweight setting; higher value cause a higher bond weight.
- >> Dac1: Output current for the rotary solenoid of the flame-off-unit.
- >> TD-Treshhold: sensitivity of TD detection

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**Get Version.**

Shows the version numbers of all software modules used.

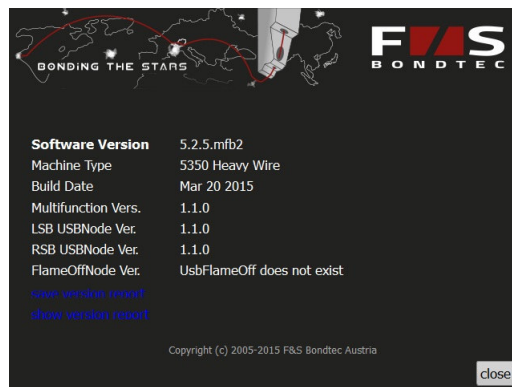


Figure 6.3. - 4 Get version 5310

**6.3.9 Shut Down**

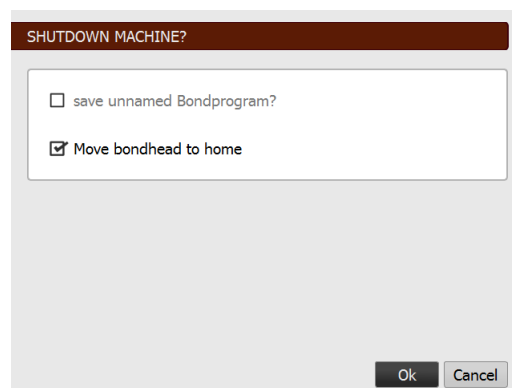


Figure 6.3. - 1 Shutdown dialog

Shuts down the bonder software as a preliminary to switching off the bonder without loss of data.

- >> Save the current bond program before executing the 'Shut Down' command  
There is also a choice to move the bond head to the "home" position.
- >> Use the shuttle wheel to select "OK" and then press the shuttle wheel to exit the program. You can also abort the process by selecting "Cancel" (e.g. if you decide you want to save the bonding program before exiting).



**IMPORTANT**

*Wait until the operating system has shut down before you switch off the bonder.*

- >> Actuate the main switch.

## 6.4 Preparing to Bond

Numerous parameters can be set and they are dependent on:

- >> The thickness of the bonding wire.
- >> The material
- >> The surface characteristics of the substrate
- >> The geometric aspects of the bonding application.

Bear in mind, too, that the bonding parameters influence each other. Increasing ultrasonic power, for example, may mean a shorter ultrasonic duration.

Consequently, there are no hard-and-fast rules for achieving optimum bond quality. Instead, the optimum parameter settings must be found by trial and error. Bear in mind, however, that all parameters can be fine-tuned while bonding production is in progress, and in this way you can maintain optimum bond quality at all times.

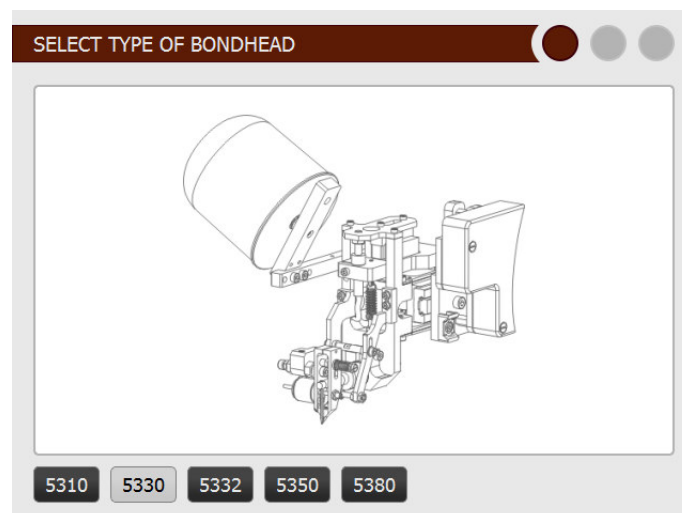
Before starting the bonder after installation, repair, or a prolonged outage, always check that the machine is in perfect operating condition and check the settings of the individual components

### 6.4.1 Changing the Bonder Version

#### Changing the bonder software.

The bonder 53xx Ball Deep Access from F&S Bondtec can be operated as a ball-wedge bonder or a wedge-wedge bonder, so this model has two versions of the software. You have to start the version that matches the selected bonder-hardware configuration. For the purposes of this description, the procedure is presumed to start with the bonder switched on and a bond program loaded.

- >> Use "File" > "Save" to save the current bond program.
- >> Select "Shut Down" and confirm your selection at the prompt in order to shut down the bonder software. Use the shuttle wheel to shut down
- >> Switch off the bonder at the main switch, then wait approximately 3 seconds and switch the bonder on again. Wait until the bonder software has completed its boot procedure and the screen offering you a choice of software versions appears



- >> Choose which version of bonder software you want to run. Use the shuttle wheel to do so
- >> Once the bonder software has started, press the "Home" button on the manual joystick. The axis will move to the initialisation position.

#### Changing the bonder hardware.

- >> Change the bonding tool (5310 - capillary, 5332 - wedge) <Querverw\_Blau>(see 9.4.7 "Replacing the Bonding Tool" on page -82).
- >> Change the bonding wire or the wire spool
- >> Mount or demount the wedge-clamp, if necessary. <Querverw\_Blau>(see 9.4.5 "Cleaning the wire clamp" on

page -82)

- >> Switch the heater on or off, as appropriate (see 8.3 "Adjusting heating" on page -73).
- >> Switch the flame off unit on or off, as appropriate (see 8.4 "Adjusting the Flame-Off Unit" on page -74).
- >> Move the flame off unit (see 8.2.4 "Moving the Flame-Off Unit clear" on page -72).



### IMPORTANT

*Once you have changed the bonder software and hardware, you can create a new bond program or load an existing program from the database library*

## 6.5 Changing the Wire Spool



### CAUTION

*Carefully avoid touching the bonding wire and all wire-carrying components. Even the minute greasy deposits left by the tip of a finger can cause poor bond quality.*

### 6.5.1 Replacing the Wire Spool



### IMPORTANT

*Use only 2" wire spools recommended by F&S Bondtec.*

*If you change the wire diameter you also have to install the appropriate bonding tool.*

#### Removing the wire spool.

- >> Pull the hood off the spool carrier.
- >> Loosen the screw securing the spool carrier and remove the clamping washer.
- >> Remove the magnetic clamping washer from the spool carrier.
- >> If the spool is not empty (e.g. if you are changing to a different wire thickness), cut off the wire at the spool and pull the remaining length of wire out of the wire guide.
- >> Remove the wire spool.

#### Installing the wire spool.

- >> Place the wire spool on the carrier.
- >> Install the clamping washer and retighten the securing screw.
- >> Install the magnetic clamping washer on the spool carrier.
- >> Pass the wire through the feeder duct of the spool carrier until the end of the wire emerges at the bottom of the feeder duct.

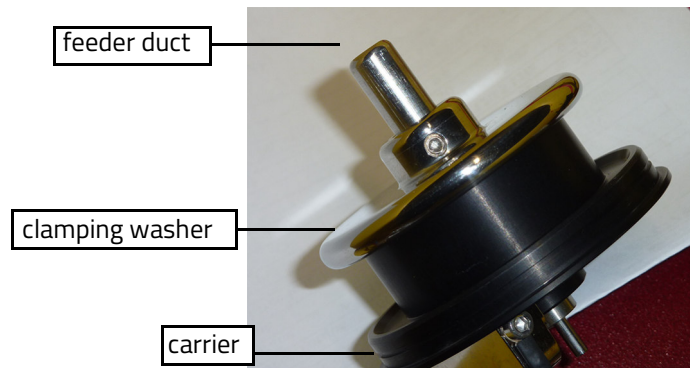
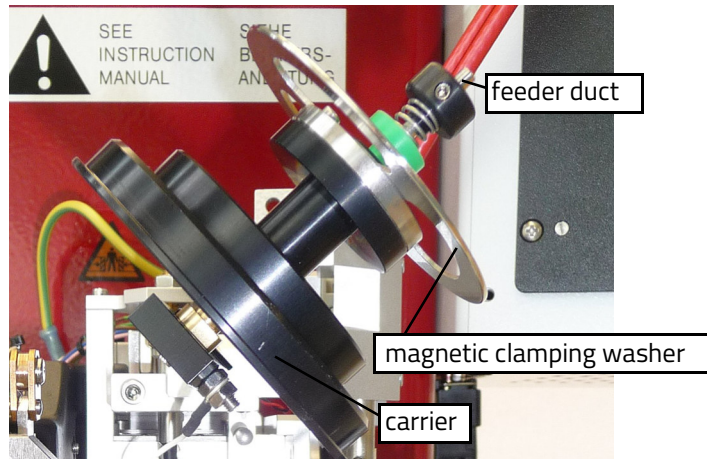


Figure 6.5. - 1 Feeder duct in spool carrier



**IMPORTANT**

*You can use compressed air to help inserting the wire. Spray filtered compressed air into the feeder duct from above.*

- >> 5310 / 5330: Re-install the hood over the spool carrier. Take care not to trap the bonding wire between hood and carrier.

**6.5.2 Cleaning the Wire Guide**

Clean the wire guide every month.



**CAUTION**

*Never use abrasives or scouring powder to clean the wire guide or wire clamp. Pure alcohol or acetone are the most suitable cleansers.*

- >> Dip a pipe-cleaner in pure alcohol or acetone.
- >> Pull the pipe-cleaner repeatedly through the feeder duct and the wire guide tube.
- >> Pull the pipe-cleaner repeatedly through the feeder duct.

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- >> Pull a dry pipe-cleaner repeatedly through the feeder duct and the wire guide tubes.
- >> Pull a dry pipe-cleaner repeatedly through the feeder duct.

### 6.5.3 Cleaning the Wire Clamp

Check the wire clamp for deposits every month and clean as necessary. It is not necessary to remove the wire clamp for this purpose. Use a piece of lint-free paper dipped in pure alcohol for cleaning



#### CAUTION

*Never use abrasives or scouring powder to clean the wire guide or wire clamp. Pure alcohol or acetone are the most suitable cleansers.*

*Take care when handling pure alcohol or acetone. Always follow the manufacturer's instructions. Keep well away from eyes and mouth. If products come into contact with eyes/mouth, rinse thoroughly without delay and consult a physician.*

- >> Press the "clamp" button to open the wire clamp.
- >> Dip a piece of clean, lint-free paper in pure alcohol or acetone.
- >> Pull the paper repeatedly back and forth between the jaws of the clamp.
- >> Slip a piece of clean, dry, lint-free paper between the jaws of the clamp and close the clamp.
- >> Gently draw the paper out of the clamp.
- >> Repeat the entire procedure several times.

### 6.5.4 Threading in the Wire

- >> Feed the end of the wire into the intake of the feed duct.

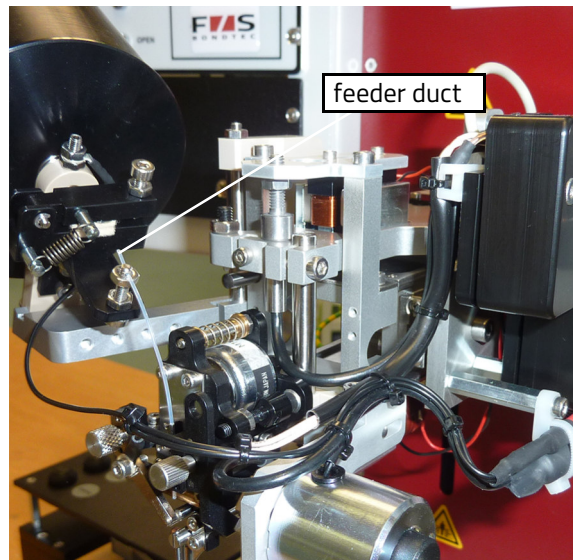


Figure 6.5. - 1 Wire guide



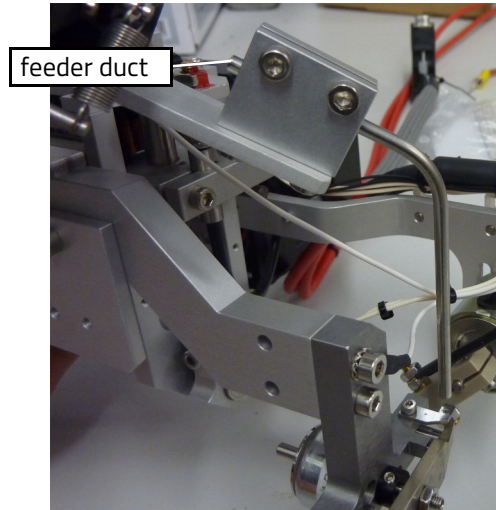


Figure 6.5. - 2 Wire guide

- >> Make sure the end of the wire is still straight. Cut off the wire's end if necessary.
- >> Press the "clamp" button to open the wire clamp.
- >> The clamp guide can easily be pushed back to its magnetic hold. This makes it easy to thread the wire.

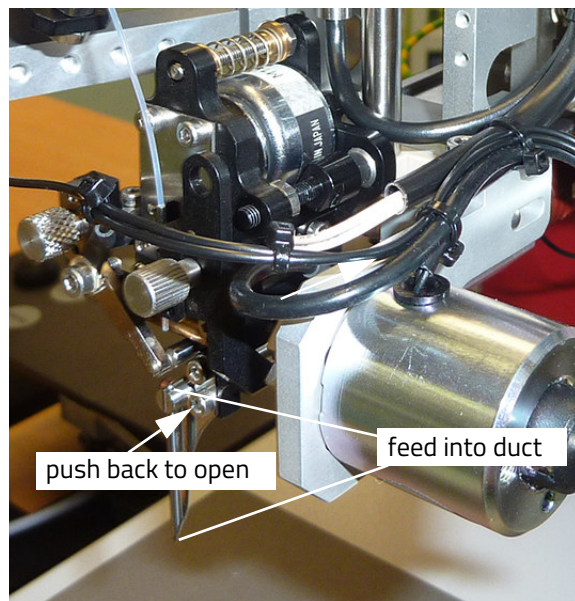


Figure 6.5. - 3 clamp guide

- >> Pass the wire through the open wire clamp. Then, using tweezers, feed the wire into the bond tool until the end of the wire emerges at the bottom of the bond tool. Unwind a few centimetres of wire to ensure that the wire is not stuck.
- >> Pass the wire through the wire guide above the wire clamp and through the open wire clamp. Then, using tweezers, feed the wire into the bond tool until the end of the wire emerges at the bottom of the bond tool. Unwind a few centimetres of wire to ensure that the wire is not stuck and travels freely.
- >> Press "wire clamp" to close the wire clamp.
- >> Press the clamp guide lightly back into the basic position.
- >> Cut the wire to the tail length.

1  
2  
3  
4  
5  
6  
7  
8  
9

## 7) Error Messages

### 7.1 Structure of error messages

Error messages appear in a superimposed window. The error is accompanied by a plain-text message detailing the error.

Details about the cause of an Error message can be saved as a txt file.

Message can be sent to F&S for analysis

Example.



Figure 7.1. - 1 Error message



#### CAUTION

*Faults must be rectified by trained, qualified personnel working in compliance with all safety precautions.*



#### IMPORTANT

*Contact F&S Bondtec service if an error message is displayed durable. Make a note of the error code of the error message displayed or send the duly completed form for fault description to F&S Bondtec.*

### 7.2 Form for Fault Description

Were you unable to rectify the fault?

If so, please complete this form and send it to our Service department:

Fax: +43-7722-67052-8272

Email: [service@fsbondtec.at](mailto:service@fsbondtec.at)



#### IMPORTANT

*Copy this page before you fill in the blanks, so that you will have a blank form in case you need one in future.*

Type	Serial number
Software version	Bond material
Special equipment	
Your name	Company
Phone	Fax
E-mail	
Description of error	
How often did the error occur?	
What has already been undertaken to rectify the error?	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

## 8) Adjustments

### 8.1 Notes on safety for adjustments



#### DANGER

*Do not open the case unless the machine is disconnected from the electricity supply.*

*Switch off the bonder and pull the mains plug before starting work on the flame off electrode. Electric-shock hazard.*

*Life-threatening hazard for persons with cardiac pacemakers.*

*Keep well clear of exposed parts of the machine when the machine is energized. Electric shock hazard.*

*The power supply unit might carry residual voltage after the bonder has been switched off. After switching off the machine wait at least 30 seconds before opening the case of the bonder. Electric shock hazard.*

*Work on the electricity supply must always be carried out by a trained, qualified electrician in compliance with the applicable electrotechnical rules and regulations.*

*Keep the electrical components correctly covered at all times. Only authorised persons are permitted to access the electrical components.*

*Always make sure the machine is disconnected from the mains supply and deenergized before work on potentially live components commences, and make sure that the machine is secured in such a way that it cannot be re-energized without your knowledge and consent.*

*The halogen bulb reaches very high temperatures and cools only very slowly. Wait for the defective bulb to cool before changing the bulb - burn hazard.*



#### CAUTION

*Read this section completely before you start working with the bonder for the first time.*

*Keep the machine clean at all times. Do not use cleansing agents or lubricants not expressly recommended by F&S Bondtec.*

*F&S Bondtec recommends having the machine serviced every 2,000 operating hours approximately, or every 2 years at the latest.*

*Always save the current program with 'File > Save' before starting to make adjustments to the bonder.*

### 8.2 Adjustments at the Bondhead

#### 8.2.1 Adjusting the wire clamp

##### Adjusting the gap.

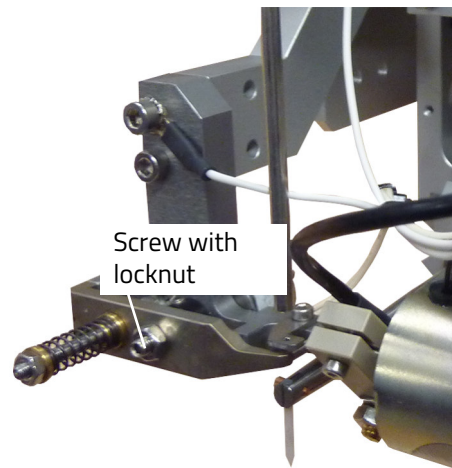


Figure 8.2. - 1 Screw with locknut of the wire clamp

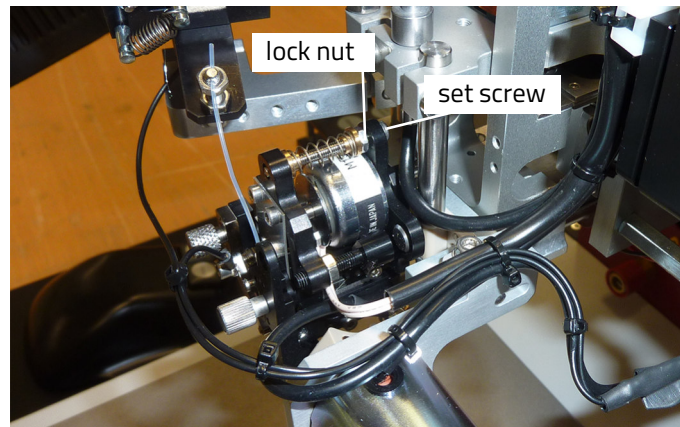
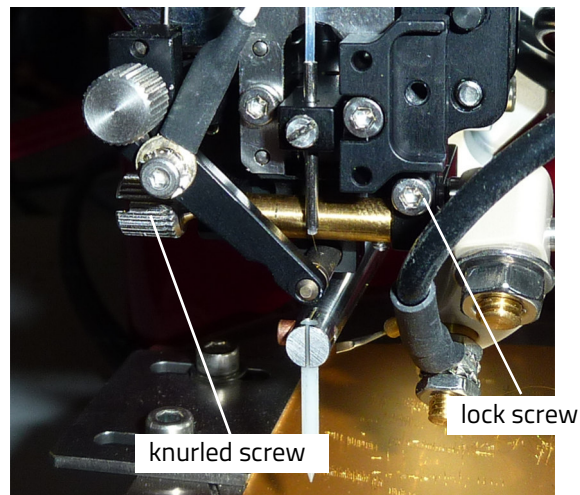


Figure 8.2. - 2 Screw with locknut of the wire clamp

- >> Loosen the locknuts of the screws.
- >> Open the wire clamp by pressing the Clamp-Button.
- >> Loosen the lock nut
- >> Set the gap at the clamp to approx 0,1 - 0,2 mm by turning the set screw.
- >> Retighten the locknut of the screw.
- >> Retighten the lock nut.
- >> Close the wire clamp by pushing the Clamp-Button.
- >> Adjust the Wedge clamp afterward <Querverw\_Blau>(see 9.4.8 "Mount/Remove/Adjust the Wedge-Clamp" on page -83)

**Adjust the wedge-clamp.**

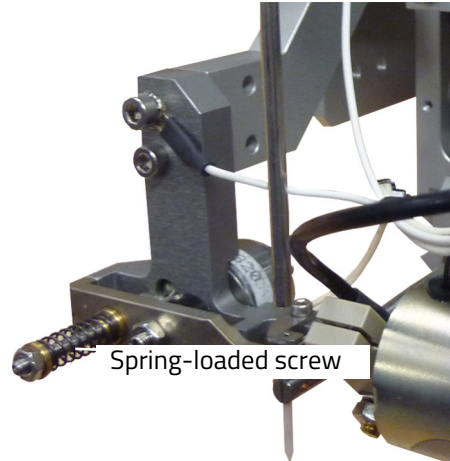


*Figure 8.2. - 3 Adjust wedge clamp*

- >> Loosen the lock screw
- >> Set the gap with the knurled screw
- >> Retighten the lock screw.

<Querverw\_Blau>(see 9.4.8 "Mount/Remove/Adjust the Wedge-Clamp" on page -83)

Adjusting clamp pressure.



*Figure 8.2. - 4 Spring-loaded screw of the wire clamp*



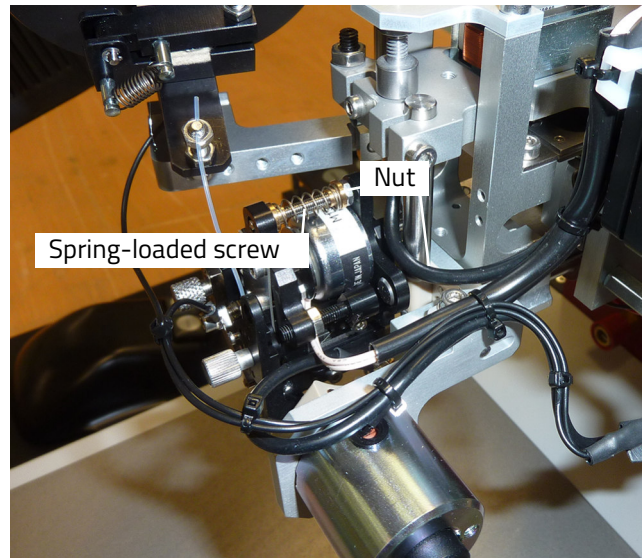


Figure 8.2. - 5 Spring-loaded screw of the wire clamp

- >> Adjust the clamp pressure by rotating the nut.
- >> Use a spring scale to check the clamp pressure. Guidelines value: 100 g. clamp pressure; if necessary correct by rotating the spring-loaded screw.



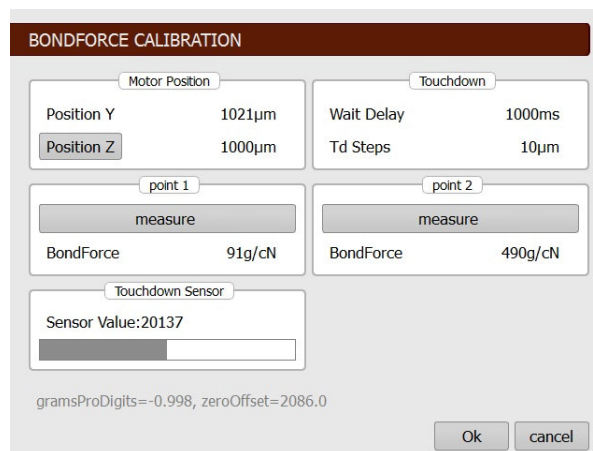
### IMPORTANT

Clamp pressure has to be adjusted to suit the wire diameter.

A change of the by F & S set setting is usually only required when using 50 micron wire or when the wire slips through the closed wire clamp.

## 8.2.2 Calibrate the Bondforce

(Password protected)



BONDFORCE CALIBRATION	
Motor Position	
Position Y	1021µm
Position Z	1000µm
Touchdown	
Wait Delay	1000ms
Td Steps	10µm
point 1	
measure	
BondForce	91g/cN
point 2	
measure	
BondForce	490g/cN
Touchdown Sensor	
Sensor Value:20137	
gramsProDigits=-0.998, zeroOffset=2086.0	
Ok cancel	

Figure 8.2. - 1 Bondweight calibration



## IMPORTANT

*The mechanical basic force is preset by F&S Bondtec: do not tamper with this setting. Consult F&S Bondtec Service if you have any questions. If, however, the bondforce does have to be set to suit the wire diameter and the surface to be bonded, step through the procedure by following the instructions below. Guideline value: equivalent of wire diameter in grams.*

When you calibrate the two fixed points "point 1" and "point 2" you can use a spring scale or a digital measurement unit. Use the spring scale to measure the bondforce at the transducer tip.

The digital measurement unit must be placed below the bondtool so that the machine can do a touchdown during bondweight calibration.

- >> Call up "Service" > "Bondweight Calibration" and run bondweight calibration for fixed point 1 and point 2 <Quer-  
verw\_Blau>(see "Bondforce Calibration (password protected)" on page -58).
- >> set Wait delay and TD steps before you perform the calibration

### Calibrate with measure unit.

- >> put the cursor on "measure" (point 1)
- >> press the shuttle wheel down to perform a touchdown
- >> insert the measured value with shuttle wheel
- >> click on BondForce Button and enter the measured value.
- >> press the shuttle wheel to exit point 1 calibration
- >> repeat same procedure at point 2
- >> press OK to store calibration

### Calibrate with Spring Scale.

- >> put the cursor to "BondForce" at point 1 and measure the force at tip of transducer (use a spring scale to measure)
- >> insert the measured value with shuttle wheel
- >> press the shuttle wheel to exit point 1 calibration
- >> repeat same procedure at point 2
- >> press OK to store calibration

## 8.2.3 Adjusting the Touchdown Sensor



## IMPORTANT

*The touchdown sensor is preset by F&S Bondtec: do not tamper with this setting. Consult F&S Bondtec Service if you have any questions.  
The sensor is usually mounted flush with the upper edge of the holder.*



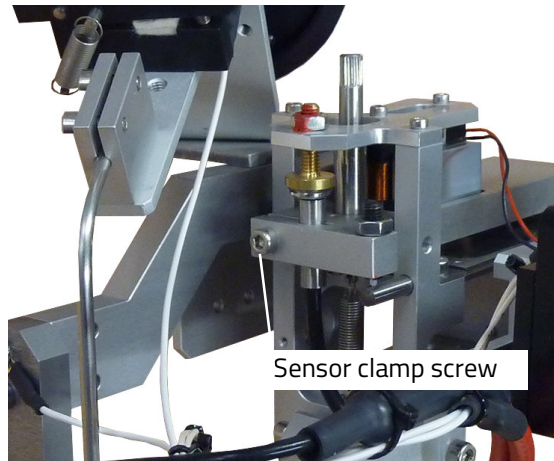


Figure 8.2. - 1 Sensor clamp screw on the touchdown sensor

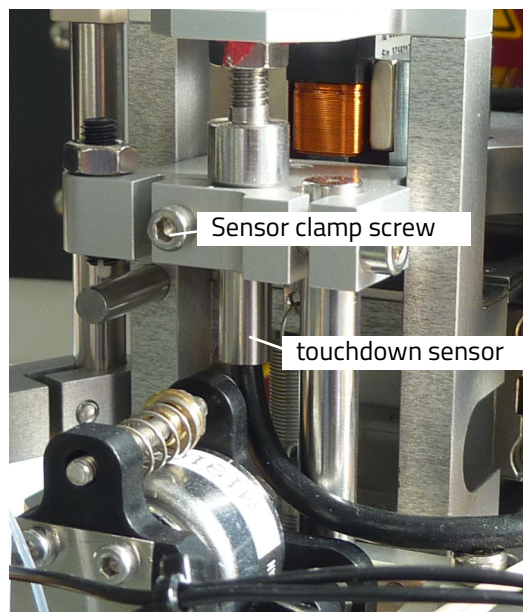


Figure 8.2. - 2 Sensor clamp screw on the touchdown sensor

## 8.2.4 Moving the Flame-Off Unit clear



### IMPORTANT

Selecting software version 5332 deactivates the flame-off function. The boom that supports the flame-off unit and all the associated components have to be positioned at the rear position, out of the way to facilitate the process of threading in the wire in this mode.

- >> Switch off the flame off unit
- >> Loosen the lock screw securing the boom.
- >> Move the boom to the rear position and retight the lock screw to secure it in this position.

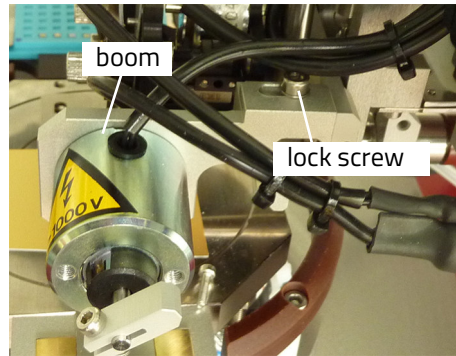


Figure 8.2. - 1 Socket-head screw securing the boom of the flame-off unit

### 8.3 Adjusting heating



Figure 8.3. - 1 Heating

The temperature for bonding with gold wire must be  $>100\text{ }^{\circ}\text{C}$ . The substrate is heated through the substrate carrier.



#### DANGER

*The substrate carrier becomes very hot when the heating is in use. Burn hazard. Do not touch the substrate or the substrate support when the heating is on or while the substrate carrier is still hot.*

*Use suitable tools (e.g. tweezers) to change the substrate while the heating is on.*

#### ON/OFF control.

Switch on the heater only when required for bonding, in order to avoid the risk of injury by burns. Make sure the heating is switched off for all other activities, such as threading in the bonding wire and cleaning the wire clamp.



#### IMPORTANT

*After changing the substrate always wait a few minutes before continuing with the bonding process, so that the substrate has time to heat up to temperature at the bond position.*

#### Temperature.

The optimum bond temperature depends on substrate, wire diameter, and other parameters of the bonding applica-

tion, and must be optimised by trial and error. It is usually in the range between 100 and 200 °C.

Switch on the heater and use the buttons to select the temperature. The temperature can be checked on the display.

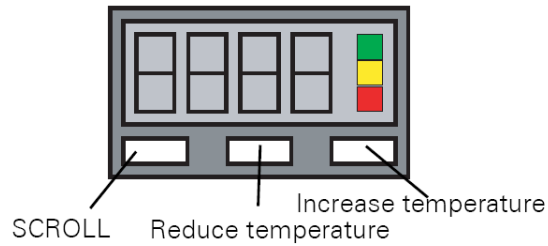


Figure 8.3. - 2 Temperature setting

#### Meanings of the LEDs on the heater controller.

- >> GREEN:
  - >> OFF: Measured value < setpoint
  - >> ON: Measured value = setpoint
  - >> Flashing: Measured value > setpoint
- >> YELLOW:
  - >> OFF: Normal operation
  - >> ON: Parameter setting
- >> RED:
  - >> Flashing: Only for active alarm

### 8.3.1 Adjusting the temperature

- >> Switch on the heating

Use the SCROLL button to browse the parameters one by one.

When you select a parameter (parameter name appears on the display), wait 1.5 seconds for the value to appear.

The "Reduce temperature" and "Increase temperature" buttons are for setting the temperature.

#### Parameter.

The parameters that are displayed and can be adjusted are as follows:

- >> PROC: Temperature measured value (process value) (view-only)
- >> SP: Temperature setpoint (mean value between min. and max. input values)

## 8.4 Adjusting the Flame-Off Unit

The flame off unit is needed to flame off the wire when software version 5310 is selected.

NFO means negative flame off.

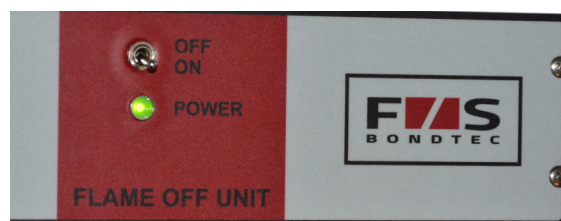


Figure 8.4. - 1 Flame off unit

You must adjust the ball size and intensity of the high-voltage pulse at the flame off configuration. After flame-off a ball approximately two or three times the diameter of the wire should have formed at the end of the wire.



## IMPORTANT

*This ball, moreover, should not be directly on the tip of the capillary, as this would cause premature wear of the capillary.*

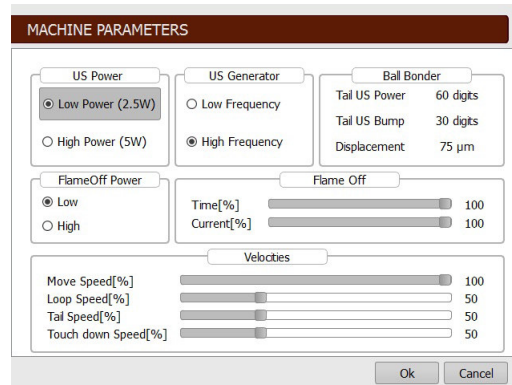


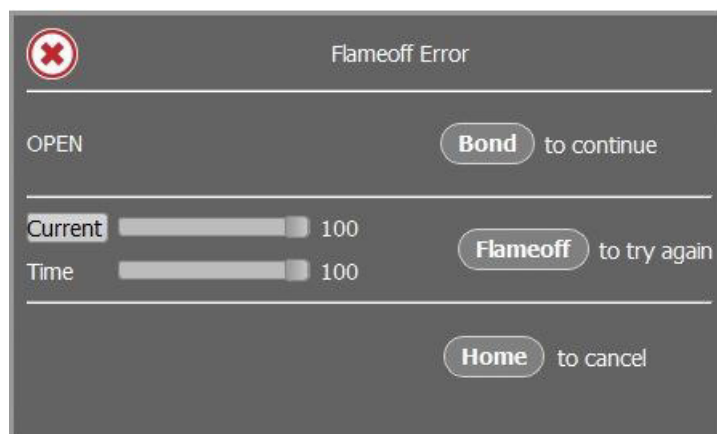
Figure 8.4. - 2 adjust Flame off

- >> Low/High: Switch on double capacity of high-voltage pulse. Wire diameter:
  - >> Low: from 17,5µ to 25µ
  - >> High: 50µ
- >> Time/current configuration:
  - >> Time: Set the duration of the high-voltage pulse. This is used for modifying the size of the ball (Adaptation to the wire diameter)
  - >> Current: Set the intensity of the high-voltage pulse. This is used for modifying the size of the ball. (Adaptation to the wire diameter)

### 8.4.1 Flame Off State

The flame off state, is like a errormessage, displayed in a pop up window.

- >> EFO parameter can be altered at the state message.
- >> to continue without flame off, press bond.
- >> to flame off, press flame off.
- >> to get back in the workheight, press Home.



- >> Current: Set the intensity of the high-voltage pulse.
- >> Time: Set the duration of the high-voltage pulse. This is used for modifying the size of the ball.
- >> State:
  - >> Flame off error OFF: Flame off unit is turned off
  - >> Flame off error OPEN: No flame-off; Signifies, that the distance between flame-off electrode and wire is too wide
  - >> Flame off error SHORT: Short-circuit; Signifies that the wire does touch the EFO wand (no gap).

### 8.4.2 Connecting the Flame-Off Unit

The cables must be connected at the rear of the machine.

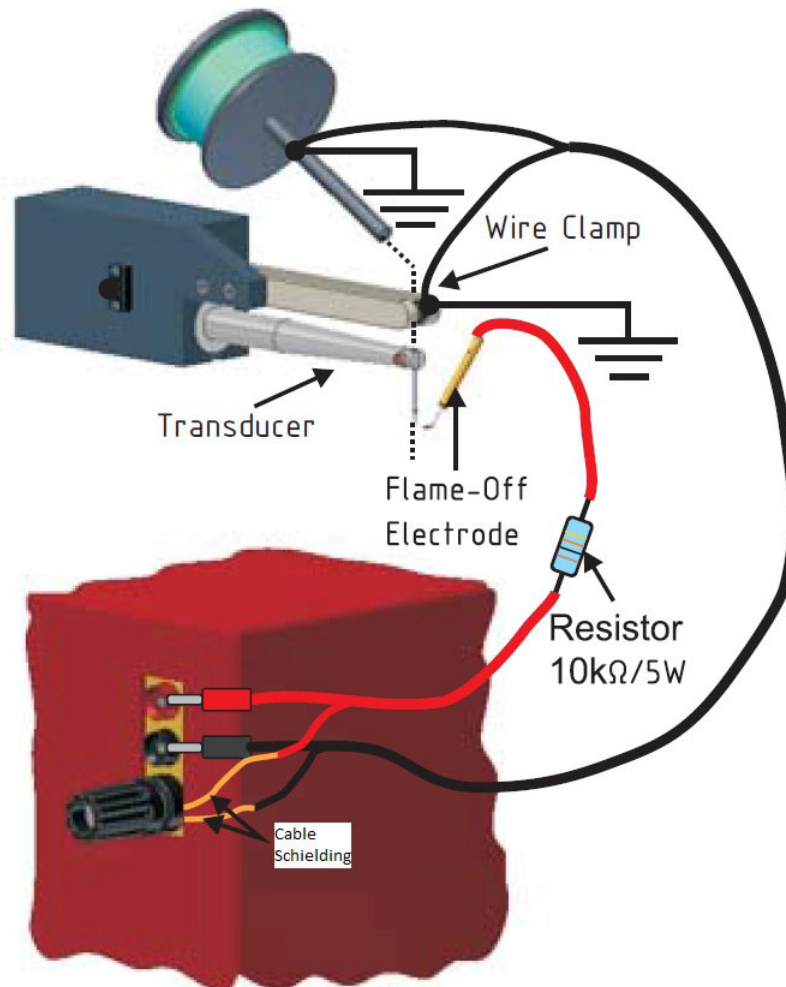


Figure 8.4. - 1 Flame Off - Graphic

### 8.4.3 Selecting supply voltage / Replacing fuses

The range is set to the voltage specified in the contract before the machine is dispatched from the factory. There is no need to change this setting unless the line voltage of the mains supply changes (see user manual of machine)



#### DANGER

*Make sure the flame-off unit is disconnected from the mains supply before you start to change the line-voltage setting.*

- >> Unplug cables.
- >> Remove the rear cover by loosening the screws.

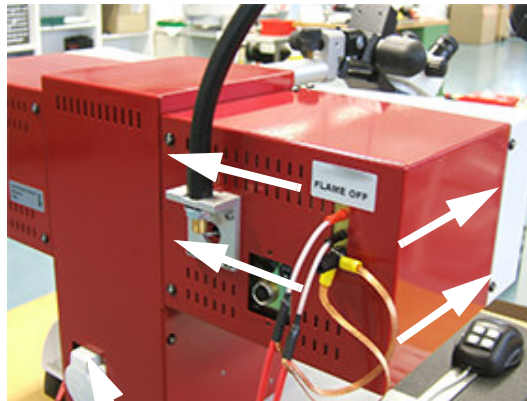


Figure 8.4. - 1 Remove cover

- >> At the inside of the Flame-off unit there are the voltage selector and the fuse carriage located.

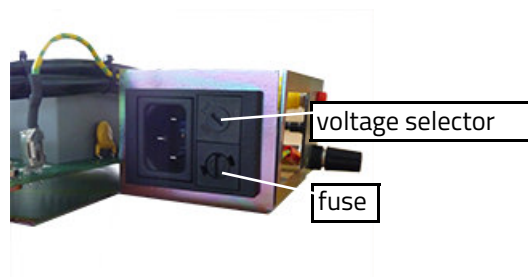


Figure 8.4. - 2 Voltage selector

- >> Adjust the voltage selector switch to the appropriate voltage and replace the fuse if required.
  - >> 230V: Fuse 100mA slow-blow, 5x20mm
  - >> 110V: Fuse 200mA slow-blow 5x20mm
- >> Install the cover and connect the cables.

## 8.5 Preparing to use Ribbon Wire

The wire spool bracket has to be turned and installed in a different way before the machine can be used to bond ribbon wire.

The bonder 53xx Ball Deep Access has the ability to bond ribbon wires from 30 to 250  $\mu$ m width.

- >> Remove the wire spool <Querverw\_Blau>(see "Removing the wire spool" on page -61).
- >> Remove the mounting bracket. To do so, remove the two socket-head screws.



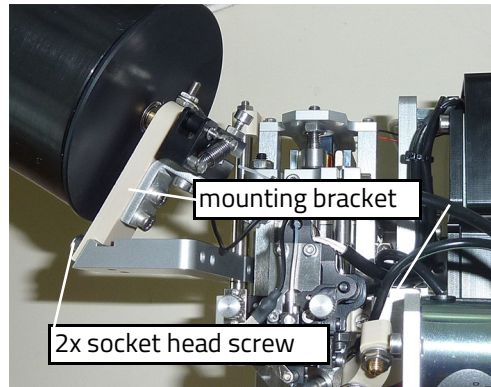


Figure 8.5. - 1 Remove the mounting bracket

>> Reattach the wire-spool carrier to the other boreholes.

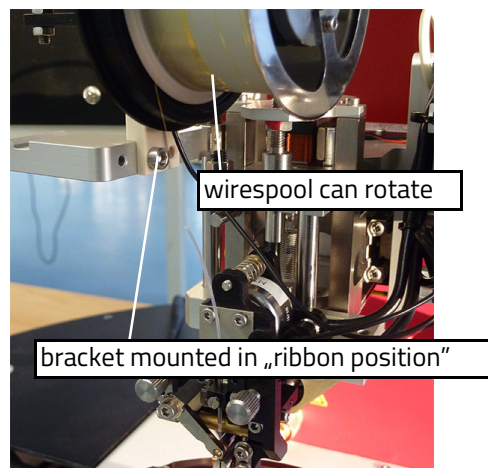


Figure 8.5. - 2 Mount the bracket

>> Install the wire spool <Querverw\_Blau>(see "Installing the wire spool" on page -61).

## 8.6 Preparing to use pick and place

- >> Demount the wedge-clamp, or move the flame off unit if necessary.
- >> Insert the tool adapter into the transducer from below.

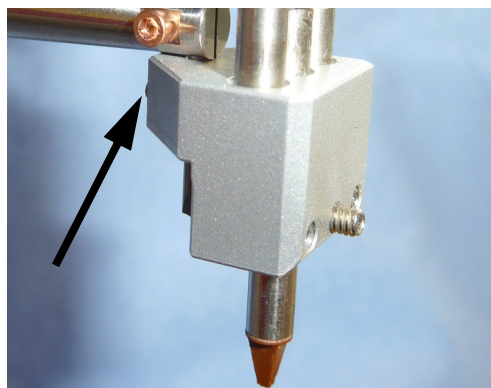


Figure 8.6. - 1 Mounting the tool adapter

- >> Align the tool adapter in such a way that the top edge of the tool adapter is flush with the lower side of the transducer.
- >> Use a torque wrench to tighten the clamping screw (18 Ncm).
- >> Connect the vacuum and compressed air to the rear side of Pick Up Kit <Querverw\_Blau>(see 3.1 "Ambient conditions" on page -13)

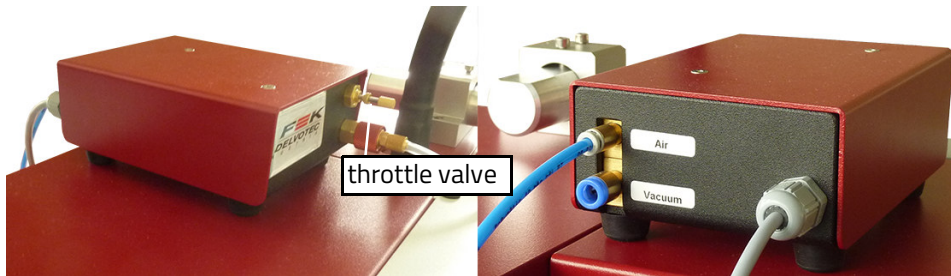


Figure 8.6. - 2 Pick-Up Kit

Use the throttle valve to adjust the blow-off pressure.



## 9) Maintenance

### 9.1 Notes on Safety for Maintenance



#### DANGER

*Do not open the case unless the machine is disconnected from the electricity supply.*

*Keep well clear of exposed parts of the machine when the machine is energized. Electric shock hazard.*

*The power supply unit might carry residual voltage after the bonder has been switched off. After switching off the machine wait at least 30 seconds before opening the case of the bonder. Electric shock hazard.*

*Work on the electricity supply must always be carried out by a trained, qualified electrician in compliance with the applicable electrotechnical rules and regulations.*

*Keep the electrical components correctly covered at all times. Only authorised persons are permitted to access the electrical components.*

*Always make sure the machine is disconnected from the mains supply and deenergized before work on potentially live components commences, and make sure that the machine is secured in such a way that it cannot be re-energized without your knowledge and consent.*

*The halogen bulb reaches very high temperatures and cools only very slowly. Wait for the defective bulb to cool before changing the bulb - burn hazard.*

*Switch off the bonder and pull the mains plug before starting work on the flame off electrode. Electric-shock hazard.*

*Life-threatening hazard for persons with cardiac pacemakers.*

### 9.2 Cleaning the Machine

>> Clean the machine and check it for damage. Use a lint-free cloth dipped in pure alcohol or acetone for cleaning.



#### DANGER

*Take care when handling pure alcohol or acetone. Always follow the manufacturer's instructions. Keep products well away from the eyes and mouth. If products come into contact with eyes/mouth, rinse thoroughly without delay and consult a doctor.*



#### IMPORTANT

*Make sure that the agents used to clean the machine are disposed of in an environmentally friendly manner, particularly if solvents or other chemical agents are used.*

## 9.3 Movable Parts and Drive Belts



### IMPORTANT

*Regularly lubricate movable parts (bearings, shafts, rails) with Gleitmo 585M from Fuchs Lubritech GmbH. Available through F&S Bondtec.*

*Only use resin and acid-free oil or grease for lubrication.*

## 9.4 Maintenance Work on the Bondhead



### DANGER

*Take care when handling pure alcohol or acetone. Always follow the manufacturer's instructions. Keep products well away from the eyes and mouth. If products come into contact with eyes/mouth, rinse thoroughly without delay and consult a doctor.*

### 9.4.1 Cleaning the Bonding Tool

- >> Remove the bonding tool and clean it in accordance with the manufacturer's specifications – in an ultrasonic bath if possible <Querverw\_Blau>(see 9.4.7 "Replacing the Bonding Tool" on page -82).
- >> Blow compressed air into the bonding tool to dry the wire duct.
- >> Reinstall the bonding tool <Querverw\_Blau>(see 9.4.7 "Replacing the Bonding Tool" on page -82).



### IMPORTANT

*Alternatively, you can use an unplugging tool to clean the wire duct without removing the bonding tool beforehand.*

### 9.4.2 Cleaning the Pick-Up Tool

- >> Remove the tool and clean it in accordance with the manufacturer's specifications – in an ultrasonic bath if possible .
- >> Blow compressed air into the pick-up tool to dry it.
- >> Reinstall the tool <Querverw\_Blau>(see 9.4.10 "Changing the Pick-Up Tool" on page -87)

### 9.4.3 Replacing the transducer



### DANGER

*Switch off the bonder before changing the transducer!*

- >> Switch off the bonder
- >> Remove all cable ties along the full length of the transducer cable.
- >> Disconnect the transducer wires from their terminals.

- >> Remove the bonding tool <Querverw\_Blau>(see 9.4.7 "Replacing the Bonding Tool" on page -82), .
- >> Release the transducer clamp screw and remove the transducer from its holder.
- >> Position the new transducer in the transducer holder and clamp it in position.
- >> Align the front flange of the transducer in such a way that the bonding tool is in its as-delivered position.
- >> Ensure that the transducer is seated in its holder in such a way that the bonding tool sides are perfectly vertical. Check with a precision square on the mounting plate and, using backlight, check against each side of the bonding tool.
- >> Retighten the transducer clamp screw to 60 Ncm.
- >> Reconnect the transducer wires to their terminals.
- >> Reinstall cable ties to hold the cables in place.

#### Adjusting the bonding tool.

Ensure that the bonding tool is perfectly vertical. If necessary slacken the transducer clamping screw, correct the angle and retighten the clamping screw to 60Ncm.

The frequency setting at the inbuilt Ultrasonic Generator has to be adjusted to the new resonance frequency of the transducer.

#### **9.4.4 Cleaning the wire guide**

<Querverw\_Blau>(see 6.5.2 "Cleaning the Wire Guide" on page -62)

#### **9.4.5 Cleaning the wire clamp**

<Querverw\_Blau>(see 6.5.3 "Cleaning the Wire Clamp" on page -63)

#### **9.4.6 Replacing the wire clamp**



#### **CAUTION**

*Switch off the machine before removing or installing the wire clamp. Throughout the procedure described below, take great care to ensure that the fragile wire clamp is not damaged.*

The wire clamp is always supplied complete with solenoid.

- >> Cut open all cable ties along the full length of the solenoid's connecting cable.
- >> Make sufficient notes to ensure that the wires are reconnected in the original configuration and disconnect the solenoid wires from their terminals.
- >> Loosen the two clamp securing screws and remove the complete wire clamp.
- >> Place the new wire clamp assembly in position and tighten the two securing screws.
- >> Reconnect the solenoid connecting wires to the adapter board.
- >> Adjust clamp pressure <Querverw\_Blau>(see "Adjusting the gap" on page -67).
- >> Reinstall cable ties to hold the cables in place.

#### **9.4.7 Replacing the Bonding Tool**

- >> Use an Allen key 1.3 mm to loosen the copper clamp screw. Pull the bonding tool down and clear of the transducer.
- >> Use an Allen key 0,9 mm to loosen the copper colored clamping screw. Pull the bonding tool down and clear of the transducer.

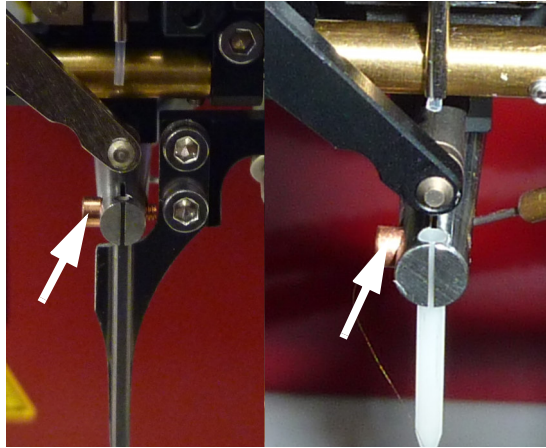


Figure 9.4. - 1 Clamp screw securing the bonding tool

- >> Insert the new bonding tool into the transducer from below.
- >> Align the bonding tool in such a way that the top edge of the bonding tool is flush with the top of the transducer.
- >> Use a torque wrench to retighten the clamping screw to 18 Ncm.



### CAUTION

*Be sure to install the copper coloured clamp screw as otherwise the transducer will not function correctly.*

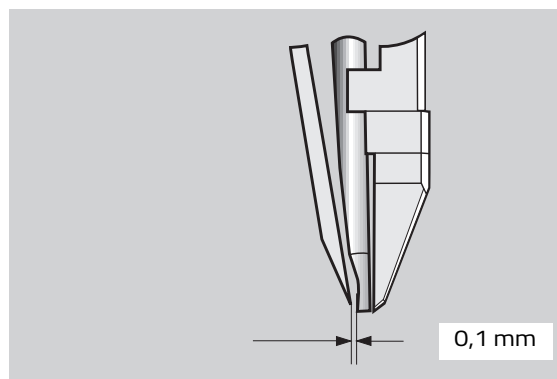


### IMPORTANT

*Replace the clamping screw every fourth time the bonding tool is changed.*

>>

Figure 9.4. - 2



## 9.4.8 Mount/Remove/Adjust the Wedge-Clamp

Depending on whether or not your application uses a wedge, the wedge-clamp has to be either mounted or removed.

### Mounting the wedge-clamp .

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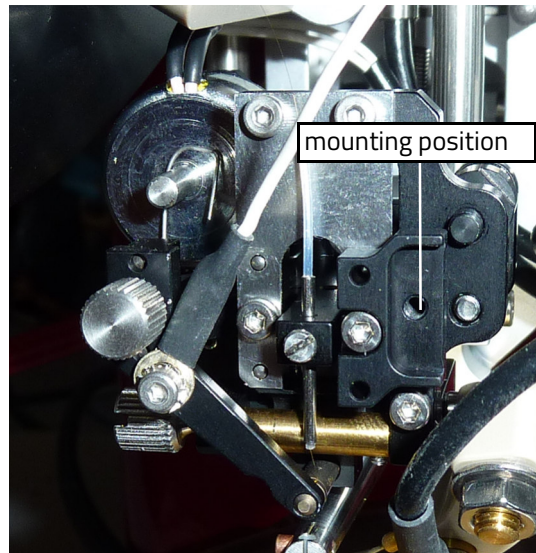


Figure 9.4. - 1 mounting the wedge-clamp

>> Slide in the bracket into the counter piece.

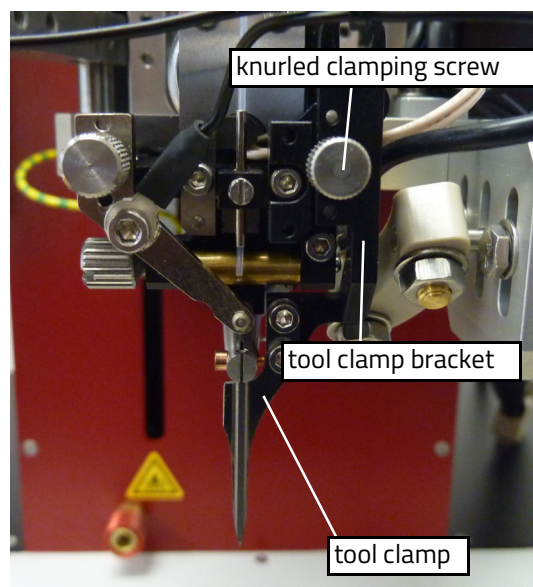


Figure 9.4. - 2 mounting the wedge-clamp

>> Fasten the knurled screw.

Adjust the wedge-clamp .

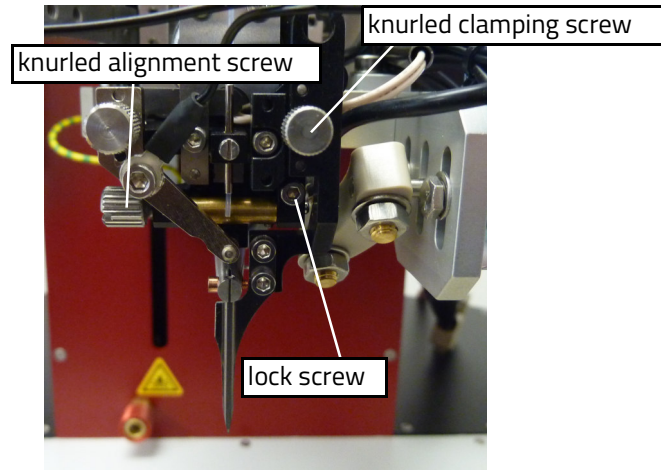


Figure 9.4. - 3 Adjust the wedge-clamp

- >> Loosen the lock screw
- >> Turn the knurled screw, until the appropriate distance to the wedge is reached. When wedge-clamp is opened, the distance should be the triple wire diameter. In closes position the wedge-clamp should press gently to the bonding tool.

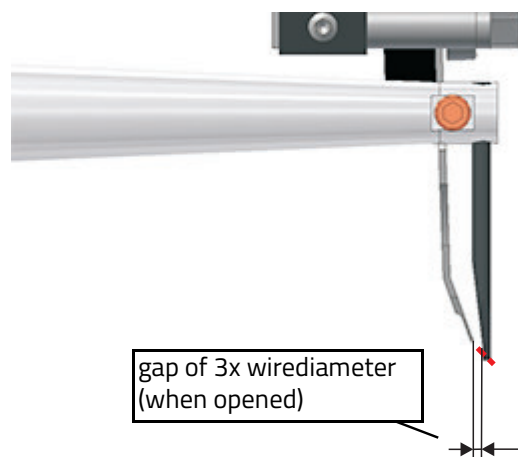


Figure 9.4. - 4 Distance wedge-clamp

- >> Retighten the lock screw.
- Remove the wedge-clamp .**
- >> Loosen the knurled clamping screw and remove the entire tool clamp bracket
  - >> Tighten the knurled clamping screw.

#### 9.4.9 Replacing the flame off electrode



#### **DANGER**

*Switch off the bonder and pull the mains plug before starting work on the flame off electrode. Electric-shock hazard.*

*Life-threatening hazard for persons with cardiac pacemakers.*



The flame off electrode is a wear part and is due for replacement when deposits or notching are detectable, accompanied by diminished bond quality.

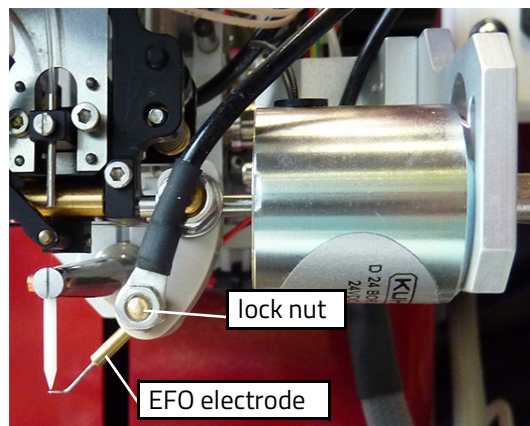
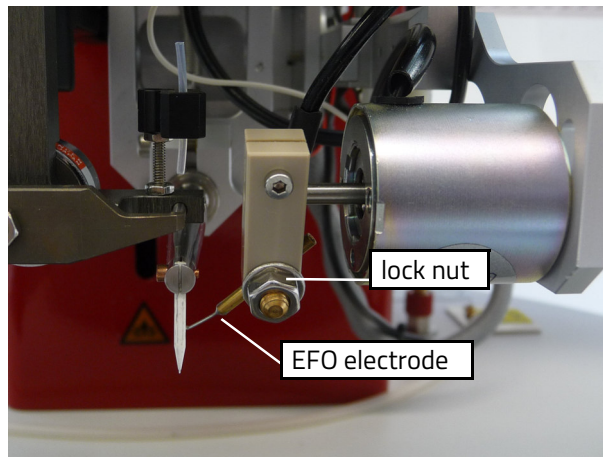


Figure 9.4. - 1 Securing screw of the flame off electrode

- >> Loosen nut securing the flame off electrode and remove the old flame-off electrode
- >> Slip the new flame off electrode into position and install the securing screw, but do not fully tighten.
- >> Adjust the flame off electrode in the holder until the gap between the top of the electrode and the capillary is 0.1 - 0.2 mm.

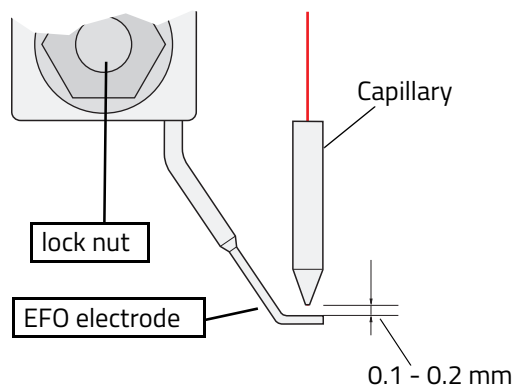


Figure 9.4. - 2 Status with transducer lowered

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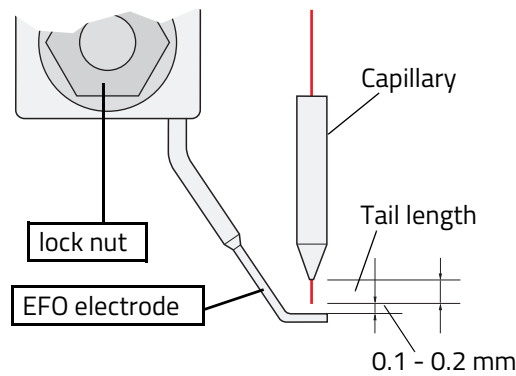


Figure 9.4. - 3 Status with transducer raised

>> Tighten the lock nut to secure EFO electrode position.



### CAUTION

After flame off the ball which forms at the end of the wire should be 0.1-0.2 mm clear of the tip of the capillary.

## 9.4.10 Changing the Pick-Up Tool

The tool adapter is designed for three different tool-diameters.

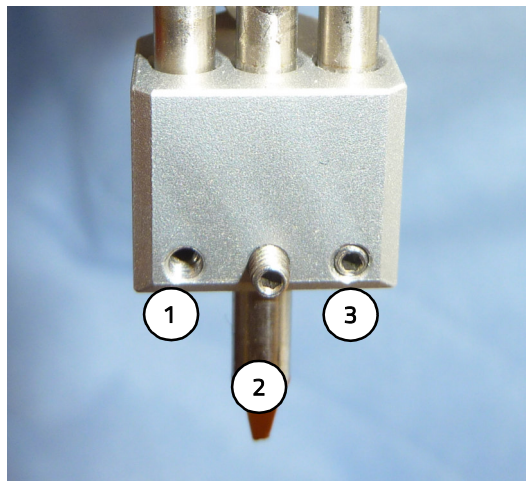


Figure 9.4. - 1 Pick up tool - diameter

- >> 1: Collet for  $\varnothing 3\text{mm}$
- >> 2: Collet for  $\varnothing 3,17\text{mm}$  (1/8 inch)
- >> 3: Collet for  $\varnothing 1,58\text{mm}$  (1/16 inch)

Connect the vacuum tube to the used collet.

