5600Ci

F&S BONDTEC Semiconductor GmbH

User Manual BONDTESTER 3.0

F&S BONDTEC Semiconductor GmbH
Industriezeile 49a
5280 Braunau am Inn
Austria

Table of contents

1) General Information

1.1 Validity of this manual

1.1.1 Manufacturer information

>> 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
>> http://www.fsbondtec.at

1.1.2 Scope of delivery

The scope of delivery includes:

>> Test head
>> Accessories (according to delivery bill)
>> Documentation

1.1.3 Name plate

The name plate is located on the right side of the machine. In addition, the serial number is attached again on the same side of the machine. Please quote this serial number if you have any queries to the manufacturer.

F/S BONDTEC AUSTRIA	Industriezeile 49a A-5280 Braunau
Typ:	Baujahr:
Nennspannung: (V)	Frequenz: (Hz)
Nennstrom: (A)	(kVA)
Serien-Nr.:	Auftrags-Nr.:
	CE

Figure: *Name Plate & Serial Number*

1.2 Warranty and liability

In principle, the F&S BONDTEC General Terms and Conditions of Sale and Delivery shall apply. These are available to the operator at the latest since conclusion of the contract. Warranty and liability claims for personal injury and property damage are excluded if they are attributable to one or more of the following causes:

>> Improper use of the machine
>> Improper assembly, commissioning, operation or maintenance
>> Non-observance of the user manual
>> Operation of the machine with defective or non-functioning safety or protective devices.
>> Subsequent structural modifications
>> Subsequent alteration of the drive conditions (power, speed, ...)
>> Inadequate monitoring of machine parts subject to wear and tear
>> Improperly carried out repairs
>> Catastrophic events, foreign body impact and force majeure
>> Installation of programs of any kind on the machine
>> Network connection during operation

No modifications, additions or conversions may be made to the machine without the approval of F&S BONDTEC.

Modifications require written confirmation in each case. In the case of unauthorized structural modifications, any warranty claim against F&S BONDTEC expires.

The installation of additional software, in particular anti-virus programs, will void any warranty and guarantee claims.

CAUTION!

Installing additional software of any kind, especially anti-virus programs, running locally or over the network, can greatly affect the functionality of the machine and is therefore strictly prohibited!

This is a machine, not a desktop PC!

1.2.1 Network capability

To create data backups, the machine can be connected to a network. However, this is not permitted during operation. There is no warranty or guarantee claim for problems that occur when the network is connected.

CAUTION!

Connection to a network during operation can strongly influence the functionality of the machine and is therefore strictly forbidden!

1.2.2 Copyright

1.3 Scope of the dokumentation

The entire documentation is composed of:

>> User Manual (this manual).
>> For additional information such as recommended spare parts, bond clearance diagrams, etc., see: *http://www.fsbondtec.at*

2) For Your Safety

Read the entire operating manual carefully before initial start-up and keep it in a safe place for later use. Failure to observe the operating instructions can be life-threatening.

2.1 User manual

This user manual contains important information on how to operate the production plant safely and appropriately for the device. Reading and understanding this manual is therefore a prerequisite for working with this production plant.

The user manual must always be available at the place of operation of the machine/plant. The user manual is an integral part of the machine and must be handed over with any resale.

The user manual must always be observed under all circumstances.

The documentation of purchased parts is an integral part of these operating instructions. All safety instructions and other information contained therein must also be observed.

The rules and regulations for accident prevention as well as environmental protection applicable to the place of use must be provided and observed by the operator.

The year from which these operating instructions are valid can be found in the footer of the user manual.

IMPORTANT!

If necessary, observe appendices of individual components of this machine, which were created after the editorial deadline of this manual.

Some illustrations and detailed descriptions in this manual may differ from the actual machine as it is adapted to the customer's requirements.

F&S BONDTEC reserves the right to update this manual without prior notice and to make technical and content-related changes at any time.

2.2 General notes on safe operation

Before reaching into the working area of the machine, move the test head to the home position. Risk of injury!
Take care when handling any cleaning agents! Observe manufacturer's instructions! Do not bring into contact with eyes or mucous membranes! Should this nevertheless happen, rinse immediately with clear water and consult a doctor!

Do not reach into the working area of the machine during operation! Risk of injury!
There is a danger of crushing in the area of the cross table (X and Y axis) and substrate holder!

Only operate the machine when all covers are fitted. Do not remove any covers when the machine is in operation. Risk of injury!
Do not work on the machine with long, freely hanging hair or freely hanging jewelry (chains, etc.). These could get caught on moving parts and drives of the machine and thus cause injuries.

When using a heater, the substrate holder becomes very hot. Danger of burns!
Do not touch the substrate or the substrate support when the heater is switched on or the substrate holder is still hot. Only change the substrate with suitable tools (e.g. tweezers) when the heater is switched on.

Work on the electrical supply may only be carried out by a qualified electrician in accordance with the electrotechnical regulations. Access to the power supply must always be kept locked. Access is only permitted to authorized personnel.
When working on live parts, the machine must be disconnected from the power supply and secured against unintentional reconnection.

2.3 CE Declaration of Conformity

The machine is CE compliant. The manufacturer has drawn up a CE declaration of conformity for this machine, which is enclosed as an appendix to the machine documentation.

2.4 Proper use of the machine

F&S BONDTEC machines are approved exclusively for bonding and bond testing.

IMPORTANT!

For any consequential damages regarding compatibility or errors in the assembly or modification of the construction by the buyer, the warranty claim expires.

Permissible and suitable products and materials.

Depending on the machine type, the machine is only designed for the materials specified in the purchase contract.

Any other use or use that goes beyond this is considered improper use. F&S BONDTEC accepts no liability for damage resulting from improper use of the machine or individual components.

Intended use also includes:

>> observance of all instructions in the user manual.

>> observance of all instructions for other components.

>> the timely performance of all inspection and maintenance work.

2.5 Misuse of the machine

The manufacturer is not aware of any misuse.

2.6 Residual hazards

Drives.

When working with long, open hair, the hair can be wrapped up when the covers are removed. Risk of injury!

Hazardous substances.

The machine does not contain any hazardous substances. However, hazardous substances may be used during cleaning (e.g. acetone).

When handling cleaning agents, the corresponding safety instructions of the manufacturer must be observed!

2.7 Protective equipment / Personal protective equipment

Before each start-up of the machine, all protective devices must be properly attached and functional. Protective devices may only be removed

>> after standstill and

>> after securing against restarting the machine.

When partial components are supplied, the protective devices must be attached by the operator in accordance with the regulations.

Personal protective equipment is not required for working with the machine.

Do not reach into uncovered areas of the electronics when the machine is live. Danger of electric shock!

Only operate the machine when all covers and doors are closed.
Do not remove any covers when the machine is in operation. Risk of injury!

2.8 Parent safety instructions

2.8.1 Behavior in case of emergency

By actuating the main switch with the EMERGENCY STOP function, the machine can be stopped from any operating situation. In order to be able to safely put the tester back into operation, the cause of the fault must first be eliminated by authorized personnel.

2.8.2 Qualification of the personnel

Only trained and instructed personnel may work on the machine.

The responsibilities of the personnel must be clearly defined for assembly, commissioning, operation, setup, maintenance and repair.

Personnel to be trained may only work on the machine under the supervision of an experienced person.

All persons entrusted with the installation, commissioning, operation and maintenance of the machine are obliged to:

>> carefully read all safety and warning instructions in this user manual.

>> observe the regulations on work safety and accident prevention.

>> observe all safety and danger notes on the machine / system.

2.8.3 Notes on disposal

Ensure that the machine is disposed of in an environmentally friendly manner and in accordance with local guidelines, or contact the manufacturer directly if you have any questions about proper disposal.

3) Technical Data

IMPORTANT!

The specifications refer to the base model and may therefore deviate from the specified values depending on the version.

3.1 Dimension and weight

Dimensions and weight

Height	approx. 700 mm
Width	approx. 700 mm
Depth	approx. 650 mm
Weight (Basic equipment)	approx. 75 kg

Free space

Front	freely accessible
Rear	100 mm, for service 500 mm
Lateral	40 mm
Top	100 mm

Required table size

Width With monitor on top With monitor placed sideways	 min. 780 mm min. 1100 mm
Depth	min. 750 mm

3.2 Workspace

Traversing range

X-Axis	102 mm / 4''
Y-Axis	102 mm / 4''
Z-Axis	60 mm
P-Axsis	+/- 360°

3.3 Ambient conditions and connections

Ambient conditions

Ambient temperature ▪ in operating condition ▪ during transport and storage	 +18° C to +24,5° C -10° C to +50° C
Air humidity	45% +/- 10% abs. non condensing
Noise generation (workplace-related emission value: noise level without external noise effects and feedback through the room)	< 70 dBA

Conncetion data

Nominal voltage	90 -260 V AC
Voltage frequency	50 - 60 Hz
Nominal current ▪ at 110 ... 120 V ▪ at 200 ... 240 V	 3.75 A 1.80 A
Power supply	450 W
Compressed air (oil- and water-free according to DIN ISO 8573-1 goods class 2)	min. 4,5 bar (6 bar, Ø 6 mm external)
Vacuum connection	< 300 mbar (Ø 6 mm external)

3.4 Test Head

PH 100i

Measuring range	1 N
Accuracy	0.25 % of the full measuring range
Calibration	automatic / manual (is done by the manufacturer)
Test speed	0.1 ... 10 mm/s

PH 1000i

Measuring range	10 N
Accuracy	0.25 % of the full measuring range
Calibration	automatic / manual (is done by the manufacturer)
Test speed	0.1 ... 10 mm/s

PH 5000i

Measuring range	50 N
Accuracy	0.25 % of the full measuring range
Calibration	automatic / manual (is done by the manufacturer)
Test speed	0.1 ... 10 mm/s

SH 500i

Measuring range	5 N
Accuracy	0.25 % of the full measuring range
Calibration	automatic / manual (is done by the manufacturer)
Test speed	0.1 ... 10 mm/s

SH 5000i

Measuring range	50 N
Accuracy	0.25 % of the full measuring range
Calibration	automatic / manual (is done by the manufacturer)
Test speed	0.1 ... 10 mm/s

3.5 Specifications

The substrate types and bonding wires that can be used are specified in the purchase contract. Other specifications not mentioned above can also be found in the purchase contract.

>> Test tool (pull hook, shear chisel)

>> Calibration tool

4) Model 5600Ci

Figure : *Model 5600Ci*

IMPORTANT!

Some illustrations and detailed descriptions in this manual may differ from the actual machine if the hardware of the machine has been customized.

The following chapters assume basic knowledge in the field of electronics, especially about wire bonding technology.

TIP

On the Internet you can find more information about wire bonding and testing.

4.1 Overview of the Tester

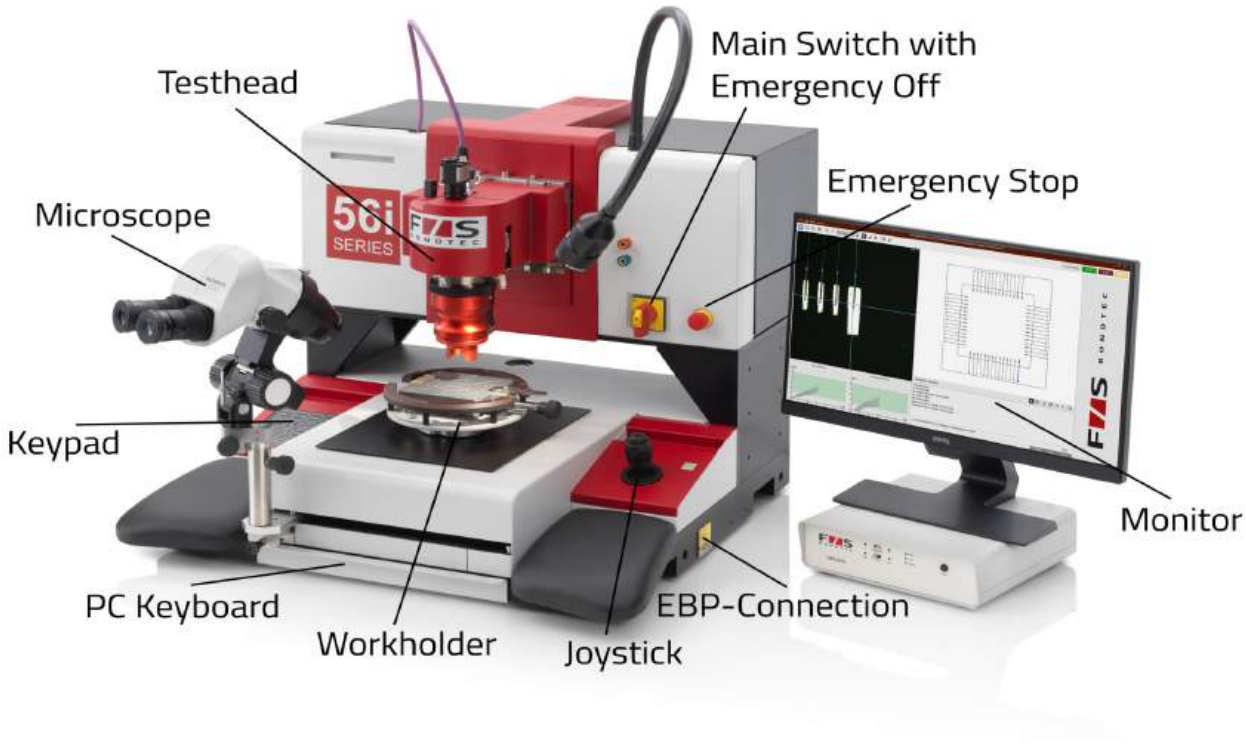


Figure : *Overview of the Tester 5600Ci*

4.2 The operating elements

4.2.1 Main Switch (with Emergency Stop Function)

Serves to switch the machine on/off.

4.2.2 Emergency Stop Button

By pressing the emergency stop button, the drives and actuators (24V) of the machine are stopped immediately. The software as well as the PC remain intact.

4.2.3 Microscope

The microscope is an optical tool and is used for set-up as well as for checking process optimization.

4.2.4 Monitor

All process-relevant information is displayed to the user on the monitor.

4.2.5 Joystick

The joystick can be used to move the axes of the machine.

4.2.6 Keypad

The machine is operated via the keys on the keypad. Process-relevant functions can be started with it.

4.2.7 PC Keyboard / Service Keyboard

Inputs can be made with the PC keyboard.

4.2.8 EBP-Connection

The user can conductively connect to the machine at the EBP terminal to exclude destruction of electronic components caused by electric charge.

4.2.9 Workholder

The workholder is connected to the positioning system of the machine. The product to be processed is fixed to the workholder during the test process.

4.2.10 Test head

The test head contains the components and calibration data required for testing. Together with the motion system, it generates the desired test procedures via a previously defined motion sequence.

Two measuring heads are available:

>> Pull head
>> Shear head

These each consist of a load cell and evaluation electronics.

4.3 The axis of the motion system

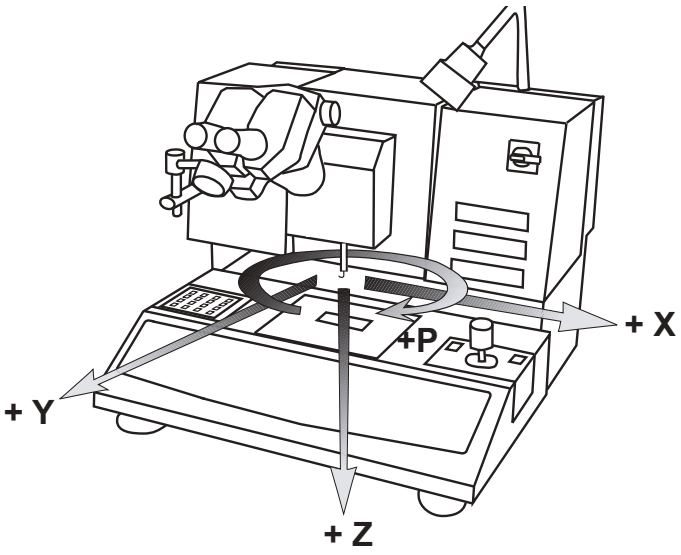


Figure : *Working axes*

The designations of the working axes follow the cartesian coordinate system. Positive coordinates run from left to right (X-axis), from back to front (Y-axis), from top to bottom (Z-axis) and counterclockwise (P-axis).The zero position is thus located at the back, left and top.

4.4 Test head

Terms

Camera	... a live camera video is used when positioning all process-relevant positions.
Head clamp / test head holder	... fixes the test head to the basic machine.
Protection cover	... protects the tool and the tool holder on the measuring head, outside the machine.
Measuring head / Catridge	... includes those components that are needed to record the mechanical properties of a wire connection.
Touchdown Sensor	... detects the placement of the test tool on the component surface.
Load cell	... converts an electrical voltage change, due to elastic deformation, into a force measurement value; the measured values supplied by the sensor are also displayed graphically on the monitor.
Pull hook	... defines the tool used for force absorption during a pull test; the hook is characterized by a specific diameter and length and is adapted to the wire thickness.
Shear chisel	... defines the tool used for force absorption during a shear test; the bit is characterized by a specific edge width and is adapted to the wire geometry.
Test speed	... is the speed which is defined for the test procedure; should be selected in the range of 100-500µm/s.

4.4.1 Pull - Test head

Pull testing is the most widely used method for quality inspection of thin wire bonds. It can be applied as destructive or non-destructive testing.

There are three different cartridges: PH100i, PH1000i; PH5000i. The load cells of the different cartridges are designed for a range of 1N, 10N and 50N. Therefore, measured values up to 5000g can be recorded.

When the measuring head is removed, a protective cover must be fitted. The cover can be positioned by screws on the side and fixed with a rotating mechanism.

Figure : *Pull - Test head*

4.4.2 Shear - Test head

Shear testing is used to check the quality of thick wire bonds or thin wire ball bonds. Thin-wire woven bonds are practically not tested because they are too thin to obtain reproducible measured values. It can be used as a destructive or non-destructive test.

There are two different cartridges: SH500i, SH5000i. The load cells of the different cartridges are designed for a range of 5N and 50N. Therefore, measured values up to 5000g can be recorded.

When the measuring head is removed, a protective cover must also be fitted. The cover can be positioned by screws on the side and fixed with a rotating mechanism.

Figure : *Shear - Test head*

5) Transport and Installation

DANGER!

When transporting and setting up, wear safety gloves and safety shoes.

5.1 Transport / Packaging

The machine is delivered in its original packaging and with transport lock. For any further transport, the transport lock (especially for test heads) must be reattached and all moving parts must be securely fixed.

Machines or test heads should only be shipped in the boxes, cases or crates provided for this purpose.

IMPORTANT!

>> *Pack the microscope with special care during transport! Risk of breakage!*

>> *Do not transport the machine with the monitor attached!*

>> *When transporting the machine on casters, make sure that the feet do not get under the casters!*

5.2 Storage

The following conditions must be met for proper storage:

>> Storage only in dry tempered rooms (max. humidity: 70% non-condensing, max. temperature range: 0 - 50°C).

>> Storage period must not exceed ½ year.

>> Although most of the parts subject to corrosion are made of stainless, chromium-plated or galvanized steels or are provided with a protective paint coating, the tester must be inspected for signs of corrosion after a longer storage period.

5.3 Suitable installation and operating site

The following requirements must be met for the installation of the machine:

>> Select an installation site that is easily accessible from all sides (see "Dimension and weight" at page 10.).

>> Ensure that no one can be endangered by the running machine.

>> In order to work with maximum accuracy, the tester must be placed on a stable, non-vibrating table. Furthermore, the tabletop must be a level surface to allow the tester to be aligned using the adjustable feet.

>> The workplace should be designed according to the latest ergonomic guidelines.

>> Provide a grounded plug (DIN 49441) or a standard national socket, a compressed air connection and a vacuum connection in the immediate vicinity of the machine.

5.4 Preparations for commissioning

CAUTION!

Under no circumstances operate the machine and its components with the wrong voltage. This could damage the equipment.

5.4.1 Unpack the tester

Position the tester at the intended location.

Check delivery for completeness (see delivery bill).

CAUTION!

Make sure that the component is not damaged during unpacking.

IMPORTANT!

Before commissioning, make sure that the wiring is complete.

5.5 Electrical connection

The tester is connected to the mains with a conventional IEC 60320-1 C 13 power cable.

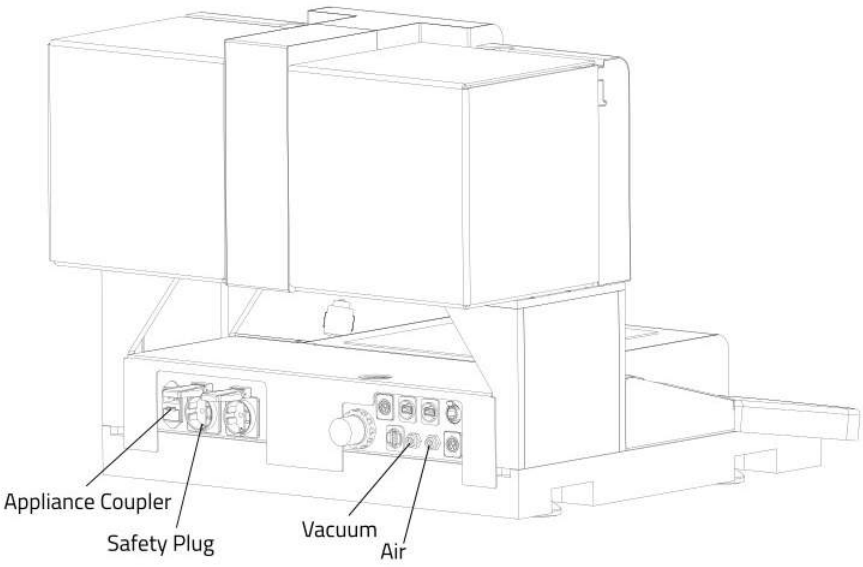


Figure: *Connections*

DANGER!

>> Work on the electrical supply may only be carried out by qualified electricians.

>> When working on live parts, the machine must be disconnected from the power supply. Electrical lines must be laid and mounted properly.

>> Fittings, length and quality of the lines must correspond to the local regulations. The electrical equipment must be checked regularly. Loose and damaged cables must be replaced immediately.

DANGER!

Access to the electronics and power supply must always be kept locked. Opening is only permitted to authorized personnel.

When working on live parts, the machine must be disconnected from the power supply and secured against unintentional reconnection.

5.5.1 Operating voltage

Basically, operation with 2 different mains voltages is possible:

>> 115 V
>> 230 V

The voltage is set ex works to the specifications given in the order and may not be changed by the customer without authorization.

CAUTION!

Under no circumstances operate the machine or other components electrically connected to it with the wrong voltage. This could damage the equipment.

5.6 Vacuum connection

The vacuum hose of the workholder is connected to the vacuum system of the tester.

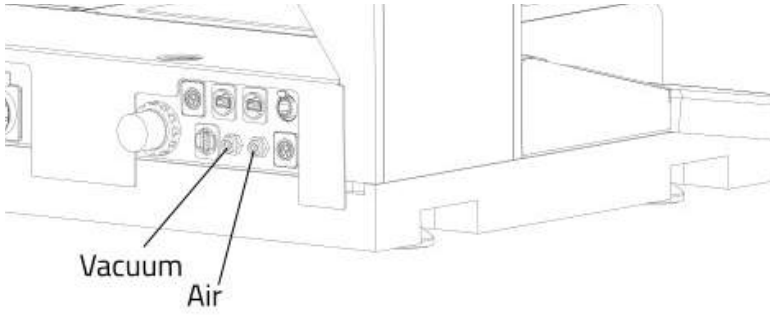


Figure: *Vacuum connection*

Connect the tester to the vacuum network (vacuum / air) through the socket shown in the picture.

6) Basic Knowledge

6.1 Pulltester

In the destructive pull test, the loop is loaded with a hook by a continuously increasing tensile force until it breaks, and the force is recorded at the moment of the break. For meaningful measured values, the pull hook must be adapted to the wire thickness to be measured. Furthermore, the force values depend on the height of the loop. At larger angles, i.e. higher loops, both force components are each smaller than the measured force, at lower loops and smaller angles they are larger than the measured force. This means that at lower loops, lower values are measured than the bond can actually withstand and the bond quality is consequently better than the measured values would suggest. Conversely, higher loops are shown to be better than they really are. The problem can be easily corrected due to a correction factor for the measured pull force. The pulltester from F&S BONDTEC automatically carries out the above-mentioned correction.

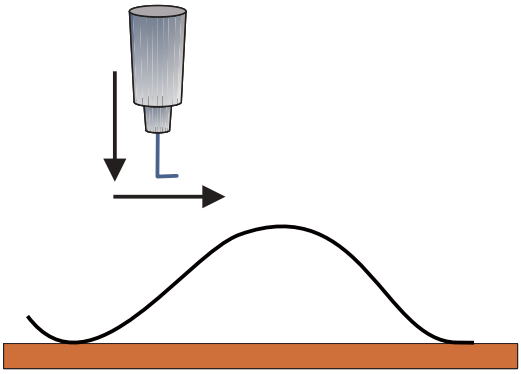


Figure: *Pulltest - Pullstart operation*

6.1.1 Process parameters

Height from Chip.

This value corresponds to the test height in µm. This means that the distance between the deepest chip surface and the pull hook is specified.

TIP

The smaller the distance to the chip surface, the longer the test process will take. By means of the force/ displacement diagram, it can be determined whether an excessively long idle distance is being covered.

Pullpoint.

This value corresponds to the test point between source and destination bond and is given as a percentage.

Disk Hook Y.

This value corresponds to the hook distance in µm. This means that the horizontal distance between the pull hook and the wire is defined. This parameter includes half the hook diameter and half the wire diameter.

6.2 Sheartester

In the shear test, a shear chisel is placed laterally against the bond foot/chip and the shear force is measured at the moment of breakage. The width of the shear chisel must be adapted to the wire geometry to be measured.

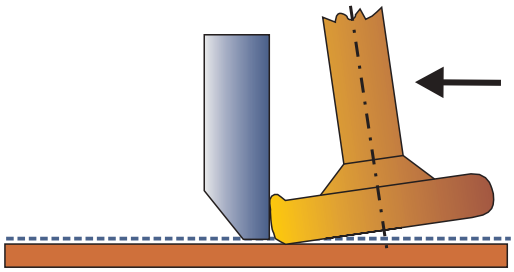


Figure: *Shear test - Travel in X direction*

6.2.1 Process parameters

Max Test Travel.

This value corresponds to the maximum distance that may be covered during a test procedure if no fallback (which would lead to a test abort) is detected.

Min Test Travel.

This value corresponds to the minimum distance that must be covered during a test operation, even though a fallback (which would lead to a test abort) has been detected.

Shearheight.

This value corresponds to the test height in µm. This means that the distance between the chip surface and the shear tool is determined. This also determines the point of attack of the shear tool at the bond base.

7) Basic Functions

IMPORTANT!

In order to be able to use the machine safely and in accordance with its intended purpose, make sure that you have read and understood the chapter „Basic Functions“ beforehand.

Before each start-up, make sure that the machine is in a perfect, operationally safe condition and that all safety precautions are observed!

After switching on the main switch, the operating system boots and you will find a standard Windows TM interface.

The F&S BONDTEC Bondtester application can then be started from the desktop by double-clicking on it.

Subsequently, there is a query as to which user type would like to operate the machine. The operator must enter a user name and password so that the application can start.

After confirming the question "Do you want to move Home?" the (Z/P/X/Y) axes of the machine reference. After asking whether the last loaded program should be opened, the familiar tester user interface appears.

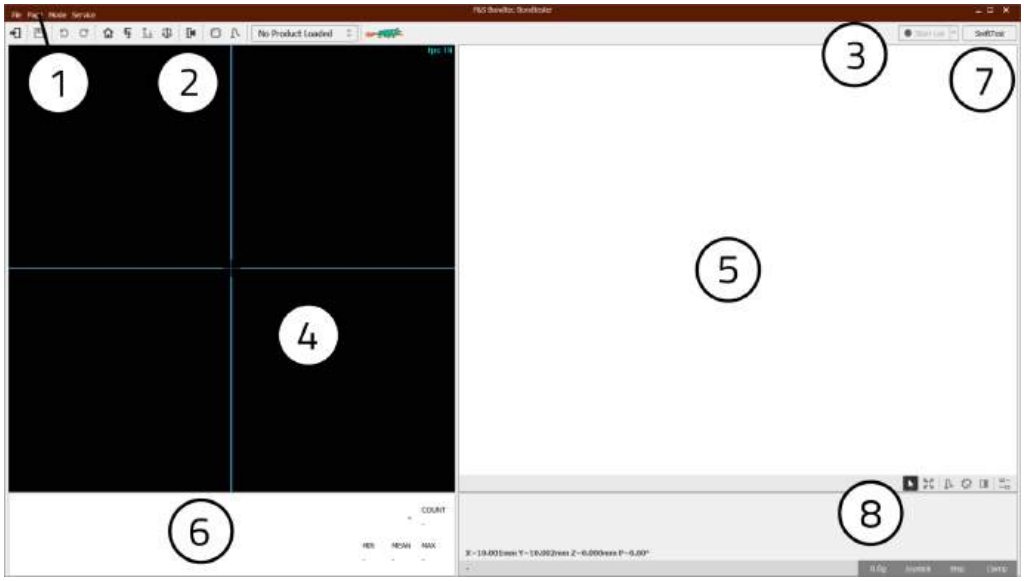


Figure: *User interface*

7.1 Overview of the main functions

User interface

1	Main Menu
2	Main Tool Bar
3	Create a Product
4	Live Camera
5	Plot Program
6	Test Results
7	Swift Test
8	Plot Program Toolbar

7.1.1 Main Menu

File.

Load & save files, close application.

Page.

Contains program-specific and global machine parameters. Only values are entered in the <Page> menu. However, automatic movements are never executed or actuators controlled in it.

This menu tab also contains the product settings *Lot Field Description* and *Grade Code Description*.

Mode.

The <Mode> menu item contains functions for setting up and calibrating the machine. User-guided automatic actions and movements are executed.

Service.

Provides those data and files that assist F&S Customer Service in processing inquiries, regarding the machine and its function.

7.1.2 Main Toolbar

This contains buttons to quickly access the most important functions of the tester.

Test Technique:

In the *Test Technique mode* it is possible to switch between the individual test types. The test types must be created beforehand under <Mode><New Test Technique>. A distinction is made between:

>> destructive Pulltest
>> non-destructive Pulltest
>> destructive Sheartest
>> non-destructive Sheartest

If, for example, a <destructive pull test> is selected although a shear cartridge has been mounted on the test head, a request to change the cartridge is issued. If this request is not followed, no further tests can be performed. This is only possible again when the test technique matches the cartridge again.

Tool Offset Z:

This defines the height difference resulting from a cartridge change. The reason for this is slight height deviations between a shear cartridge and a pull cartridge. Therefore, the <Tool Offset Z> must be updated after each change. This can either be done manually by clicking on the <Tool Offset Z> button

or it is done automatically after the first adjustment.

TIP

After each tool change, the height difference should also be updated, because deviations can occur between the tools in the same way.

7.1.3 Create a Product

The measured values are only created in the database when a new or existing product is opened and can be analyzed for later evaluations.

For a product to be created, <Start Lot> or <Continue Excisting Lot> must be executed under the selection arrow.

IMPORTANT!

This operation is possible only after product properties have been defined under <Page><Lot Field Description>, as well as fraction codes under <Page><Grade Code Description>.

7.1.4 Live Camera

Shows the component surface and may contain additional graphical overlays depending on the situation.

7.1.5 Plot Program

Graphical representation of a currently used Multiwire test program.

7.1.6 Test Results

The force curve during a test procedure is displayed graphically.

In addition, a rough statistical evaluation of the tests performed is shown.

7.1.7 Swift-Test

With this button, the operator can switch to <Swift Test Mode> at any time. In this mode, individual tests can be carried out quickly and easily without having to create a new program.

Measured values are not written to the database in this mode, but a PDF evaluation is obtained.

7.1.8 Plot Program Toolbar

This toolbar contains buttons that interact with the elements displayed in <Plot Program>.

7.2 Simple actions

Manual movement of the axes.

By means of the <joystick> key on the keypad, joystick operation can be activated / deactivated.

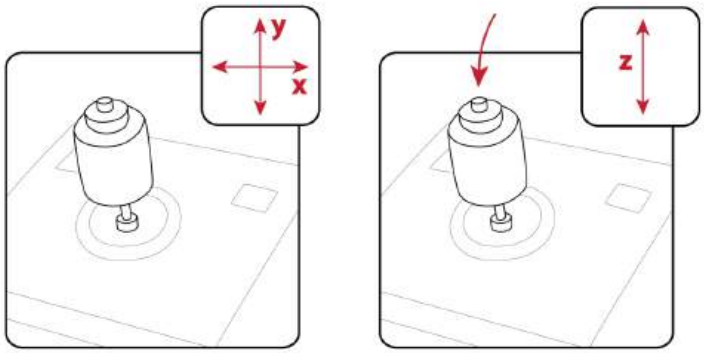


Figure: *Joystick Illustration*

All axes are automatically moved to the home position by pressing

or <Home> on the keypad.

Under <Page><Global Program Settings> in the tab <Main> the direction X/Y and in the tab <Tuning> the speed of the joystick movement can be selected.

Wirefeed / Flameoff.

In *Swift Test mode* and in *Manual Test mode*, the lower Z-axis limit is approached when the <Wirefeed/Flameoff> key is pressed. This parameter is requested when the test mode is opened.

Device Clamp.

If the machine has a vacuum-assisted component clamping, the vacuum on the component holder can be activated / deactivated by means of the <Vacuum> key or

in order to fix a component to the component holder.

Tare Force Sensor.

The force sensor can be tared with the <Tare> button.

Take care that the tool is free-standing. The force display in the lower right corner is then set to zero.

7.3 Frequently used operation

Many subwindows have a toolbar, in which the following icons are often present:

go back one object (also possible with <Page Backward>)

move one object forward (also possible with <Page Forward>)

insert object

delete object

more functions

Figure: *Position input*

In the position input window, the joystick is active and thus the desired position can also be approached with it. With <Store Trace> (keypad), the currently moved position is permanently taught.

TIP

By simultaneously pressing the Ctrl+Shift and Cursor keys on the PC keyboard, the XY axes can be moved at fine pitch intervals in <micron steps>.

The <UP> and <DOWN> arrow keys can be used to move the cursor, and <LEFT> and <RIGHT> can be used to jump between tabs.

Dialogs that are used to create repetitions may contain the tabs <Abs> and <Rel>.

>> <Abs> stands for absolute positions. This allows two values (e.g. first and last repeat point) to be taught.

>> <Rel> stands for relative distance. Herewith, if known, the distance to the next repetition in XY directions can be entered.

7.4 Create a test program

With <File> <New> <Automatic> or <Manual> the <New Automatic Test> or the <New Manual Test> dialog is started. These dialogs guide the user through the required basic settings in three pages before actually creating a test program.

For manual testing, the dialog consists of the <Test Definition> <Height> and <Test Parameter> tabs. The parameters are taken from the database, depending on the cartridge used.

For the automatic test, the dialog consists of the tabs <Test Definition> <Light and Camera> and <Height>.

The global light and camera parameters set here are used by the operator to orientate himself on the component via the image recorded by the camera and displayed on the monitor.

Change Cartridge.

Change Cartridge opens a new dialog that provides step-by-step instructions for the operator to change the cartridge.

>> Bondtester moves the axes to a safe position for change.
>> Operator must disassemble cartridge and press "next
>> Operator should mount the desired cartridge
>> Short waiting time until Bondtester initializes the new cartridge
>> Afterwards the change is completed and the new cartridge is displayed in the "New Test" dialog.

Workheight.

Workheight is the height at which the XY table can be moved without collision.

>> with Workheight1 over the entire component holder,
>> for Workheight2 within a single component

Joystick Limit.

Defines the lowest Z-position, which can be approached manually with the joystick. This limit is used, for example, when focusing the camera, but can usually be left at the same height as Workheight 2.

Max Z Position.

Defines the lowest position that can be automatically approached with the Z axis.

7.5 Further process parameters

In addition to the parameters set in the Learn Sample dialog, further influencing process parameters can be defined under <Page><GlobalSettings><Test Behaivor>.

Use Random Sampling.

If this function is activated, a number of modules specified by the operator will be tested randomly.

Constant Lot Size.

If this function is activated, the open perpendicular is automatically closed again after a number of program cycles specified by the operator.

Loopheight Measurement.

This setting is only possible for the pull test.

Under <Mode> you can specify how often the chip height should be updated, which is subsequently used as a reference for the loop height calculation.

>> *DontMeasure* means that the chip height is not measured during the process run. (default setting)
>> *AllChips* means that the heights of all programmed chips are updated during the process.
>> *1 Chip/ Module* means that one chip height per module is measured.
>> *1 Chip/ Carrier* means that one chip height of the first chip is remeasured per module, per test program, regardless of the number of modules.

8) Swift-Test and Manuel-Test Mode

8.1 Swift-Test Mode

With the <Swift Test> button, which is visible in the user interface of the *Start and Auto*, the operator can switch to the <Swift Test mode> at any time. Thereby, one can perform manually, individual test procedures quickly and easily without creating a new program.

After the start comes a query for safety heights, which must be specified by the operator. The <Store Trace> keypad key is used to store the upper, lower and joystick Z-axis limits. After that the *Swift-Test User Interface* appears.

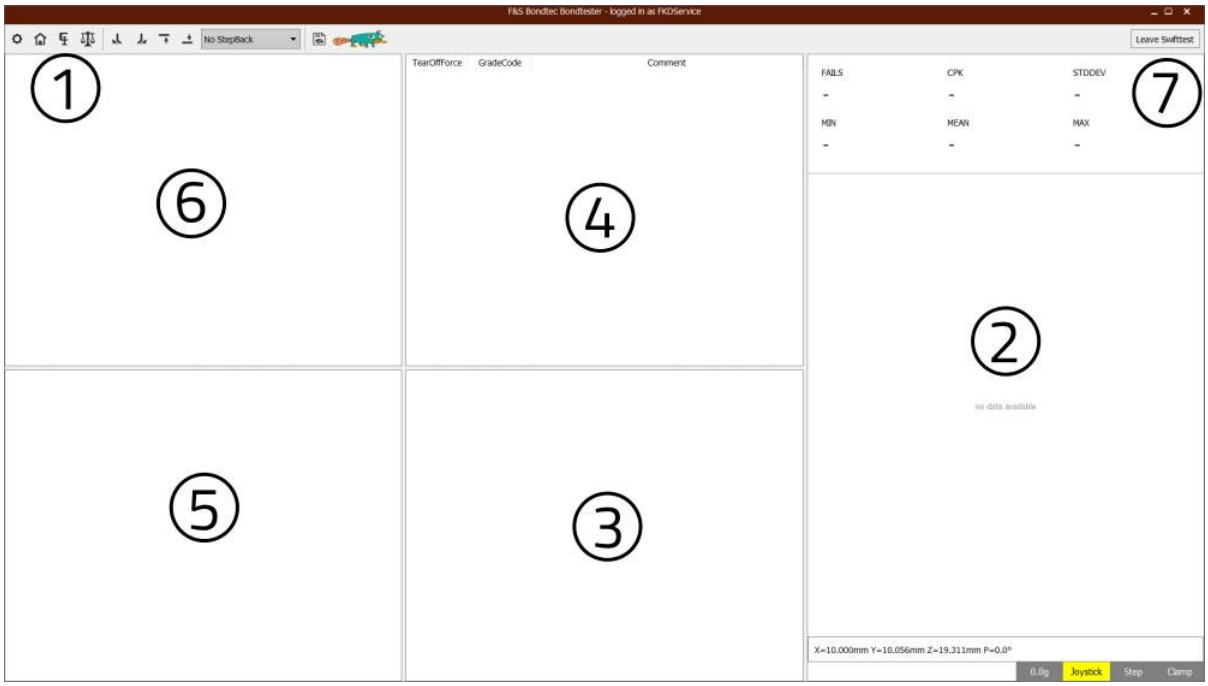


Figure: *Swift-Test User Interface*

1	Main Tool Bar
2	Test Results
3	Force/Displacement Diagram
4	Measurement Series
5	Pie Chart
6	Gaussian Bell Curve
7	Exit the Swift-Test

8.1.1 Main Tool Bar

The <parameter> button

opens the "Swift Test Settings" dialog. This is split into 3 pages that are used to change process settings. These are the test type, test parameters, security levels and grade codes.

The <Rotate Hook Right/Left> buttons

can be used to rotate the P-axis and therefore the test tool 90° to the right or left.

The <Move to Upper/Lower Limit> buttons

automatically move the Z-axis to the previously mentioned limit positions. These movements are also possible with the <Enter> (Upper Limit) and <Flameoff/Wirefeed> (Lower Limit) keypad buttons.

In the Main Tool Bar, there is also a selection window that can be used to specify the movement to the home position at the end of a test process. The following options are available:

>> *NoStepBack* : All axes remain at the detected fallback position.

>> *StepBack* : All axes move back to the starting position (position of the test start)

>> *StepBack Rotate+* : All axes move back to the initial position (position of the test start). The P axis rotates in a positive direction.

>> *StepBack Rotate-* :All axes move back to the home position (position of the test start). The P axis rotates in a negative direction.

The <Report> button

can be used to generate a PDF evaluation of the previously created measurement series.

8.2 Manual-Test Mode

The *Manual Test Mode* has a similar structure as the *Automatic Test Mode* or the *Swift Test Mode*. The main difference is that the results of the *Manual Test Mode* are recorded in the database and can therefore be analyzed later. Thus it is obligatory to create a product here.

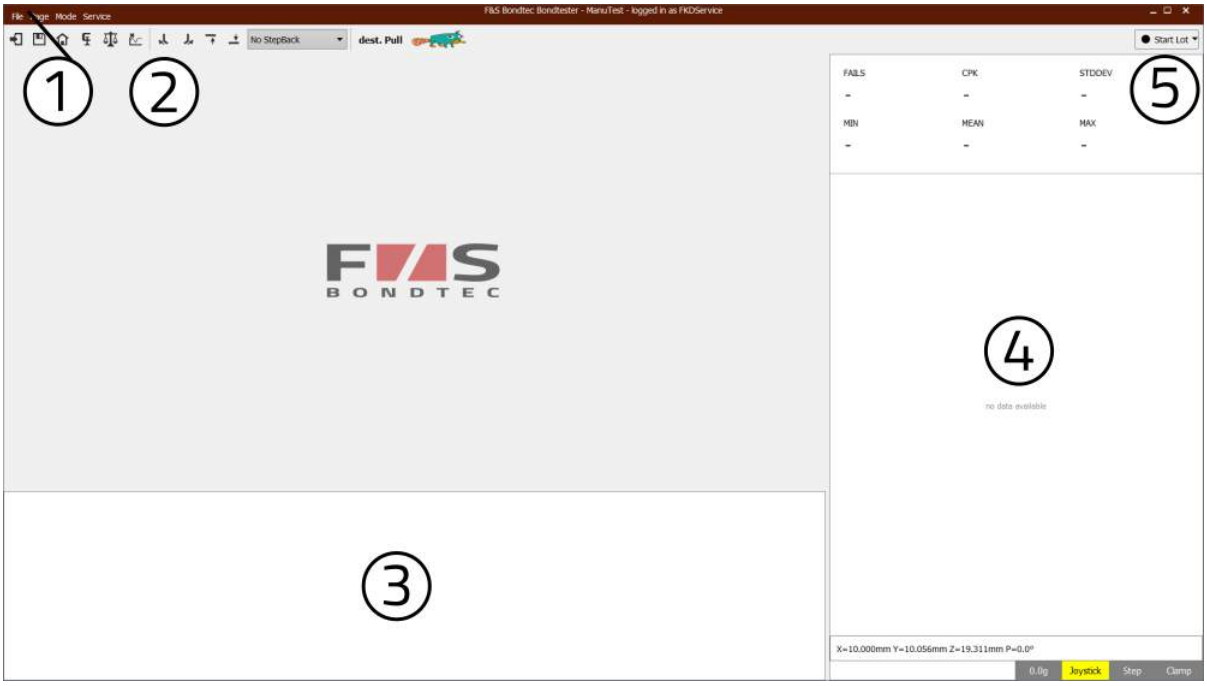


Figure: *Manual-Test Mode user interface*

1	Main Menu
2	Main Tool Bar
3	Force/Displacement Diagram
4	Test Results
5	Create a Product

The *Main Menu* has the same structure as that of the *Automatic-Test Mode*, with the difference that certain functions cannot be accessed.

The Main Tool Bar is similar to the tool bar of the *Swift-Test*.

The <Clear Force Chart Data> button

clears all force/displacement charts from the last tests.

A new product is created with *Lot Field Description* and in the *Global Settings* the predefined test parameters can be changed.

9) Process Optimization

A decisive factor for the function of a test sequence is the way in which the test tool moves to the next test position. This process is defined with the <Feed In> parameter set.

Another important point for the sequence are the force values to be adhered to and the abort criterion, which is defined in the <Test Specs> settings. In Europe, the DVS data sheet 2811 is often used as a guideline.

9.1 Feed in

Mode.

This can be used to specify the type of positioning of the pullhook. The following are available for selection:

>> *Standard*: the pullhook travels the path to the test position, positioned at right angles to the wire.

>> *Rotate Pos/Neg*: The pullhook is positioned parallel to the wire at the test position and rotates under the wire with positive or negative rotation.

>> *Feed + Rotate Pos/Neg*: The pull hook is positioned parallel to the wire and travels to the test position with a positive or negative rotation.

Offset.

Corresponds to the distance from the approach position to the test position.

Invert Hook Side.

Inverts the position of the test tool to the opposite side of the wire.

9.2 Test Specs

Testload.

In a destructive test, all values that were evaluated with a smaller value than the *test load* are marked FAIL.

In a non-destructive test, the test is aborted when the set force is reached and evaluated as successful. If the *test load* is not reached and a *fallback* is detected early, the test is marked FAIL.

LSL.

This parameter represents the *Lower Spec. Limits* and is used to calculate the CPK.

Fallback.

If during a test the highest measured force value drops to the specified percentage value, the test is terminated.

Testspeed .

The speed at which the axes move during a test procedure.

10) Automatic-Test Mode

The "*Automatic-Test Mode*" works similar to the "*Manual-Test Mode*". However, it is possible to program several wires and then process them automatically.

An *Automatic-Test* program has chips in addition to wires.

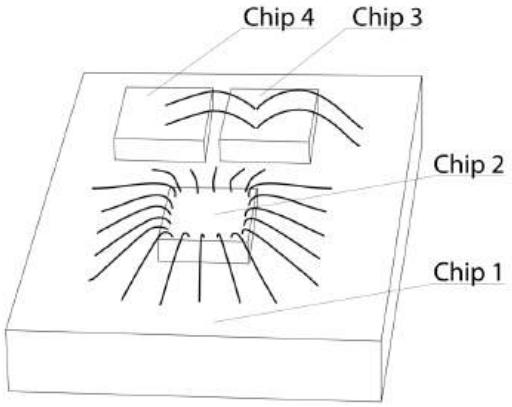


Figure: *Chips*

Chips.

A chip is a flat surface with a defined position and height.

The position of a chip is defined by adjustment points.

Chip #0.

The Chip#0 (substrate) has a special position. This Chip#0 is used to define the position of the substrate in the working area of the tester.

All chips from Chip#1 onwards are located on the substrate Chip#0. It is not possible to test on Chip#0. The offset of Chip#0 also shifts the search positions of all other chips.

Modules.

Modules simplify the processing of several identical components on one carrier. The sum of all chips starting from Chip#1 and all test samples results in Module #1. Module #1 represents a template for all other modules. Therefore, if a change is made to test samples or chips, it will take effect on all modules. All modules are located on the carrier Chip#0.

Differences to the Manual Test Mode.

In contrast to the *Manual-Test* program, all samples are assigned to chips on which altitude, light and camera settings are stored.

10.1 Create chips with “Learn Chip”

With <Mode><Learn Chip> or

the dialog *Learn Chips* is called.

The <Light & Camera> tab contains light and camera settings. Here, the setting can be selected so that the structure of the surface is clearly visible to the human eye.

Then, in the <Training> tab, define the number of reference points at <Adjustment>. Adjustment:

>> fix coords

>> 1 Point

>> 2 Points

With <fix coords> it is assumed that the respective chip is located on chip#0 and therefore also moves together with chip#0.

If <1 Point> or <2 Points> is selected for Adjustment, the position of the respective chip is defined by one or two Adjust points. To do this, you must move to a significant structure with the joystick and then save this position with <Store Trace>.

Diagonal Tolerance serves as a safety check during automatic image search. It ensures that a similar, adjacent pattern is not mistakenly detected by Pattern Recognition. This tolerance can be set individually by the operator.

The ChipHeight can be measured in <Learn Chip>. The P-axis remains in its initial position. If it is not possible due to a cramped design, this process can be performed after the wires have been created with <Mode> <Measure ChipHeight>.

TIP

When using 2 reference points, these should ideally be selected at diagonally opposite corners.

10.2 Create test points with “Learn Sample”

The Learn Sample function can be called up via <Mode><Learn Sample> or via

By default, the Learn Sample dialog is structured in two pages, Bonds and Sample, for pull testing and two sample pages for shear testing. The number of samples can be increased or decreased at any time using the <Add/Remove Sample> function under

This also changes the number of bonds in the first tab.

To teach in the test position, the chip must first be defined in the bond tab (pull test) or in the sample tab (shear test). Then place the cursor on Bond Position X or Y and set the crosshairs to the desired test position with the joystick.

By pressing the <Store Trace> key, the XY coordinates are taken over.

CAUTION!

In the pull test, the test position is not approached, but the source and destination bond is approached. The test position is then calculated.

The test parameters can now be set in the *Sample* tab. Only when the <Do Pulltest/Sheartest> query is activated, the test is subsequently also carried out in the *Start Lot*, for example.

The <Simulate> button simulates the positioning and the direction of movement of the test tool in the live video.

With the <Try> button the selected sample can be tested immediately.

TIP

Beforehand, activate the step mode with the <Step> keypad key and perform the test sequence in individual steps.

10.3 Duplicate Modules

10.3.1 Repeat Module

With the function <Mode><Repeat Module> a module can be duplicated.

Starting from Module#2 the Repeat Position can be taught in with <Store Trace> as well as the rotation. The first adjustpoint of Chip#1 is always used as a reference for Repeat Module. If this is not available (fixed Coords) the first chip with an adjustpoint is searched.

Module#1 cannot be manipulated.

10.3.2 Module Matrix

The Module Matrix can be used if the components are divided into exact rows and columns. In contrast to Repeat Module, the repeat points do not have to be saved individually.

Under <Mode><Module Matrix> the function can be called. The 1st adjust point from the first chip with adjust points is always used as repeat point.

If the distances are known, these can be entered in the tab <Rel>.

In the <Abs> tab, positions can be approached as usual with the joystick and accepted with <Store Trace>. First set up and save the *First Row, First Column* position.

Then set up *Last Row, Last Column* to avoid positioning errors as far as possible.

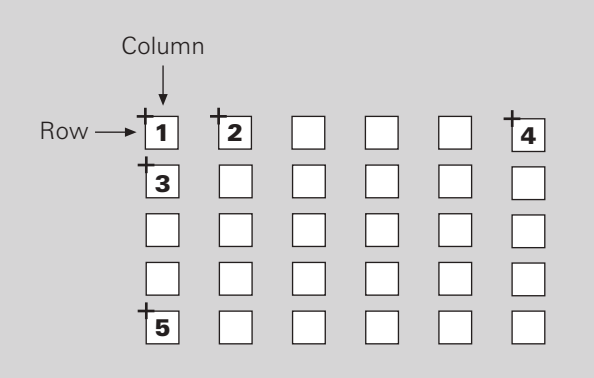


Figure: *Modul Matrix*

1 Original
2 First Column
3 First Row
4 Last Column
5 Last Row

TIP

Modules can only be duplicated if the entire component is repeated several times. If only individual areas or chips on a component are identical, it is better to work with copies. See Copy Paste.

10.4 Normalize Program

With *Normalize Program*, all chip and test positions are shifted after an adjust operation as if the program had been trained at this position. The state of the first programmed component can be restored.

This is necessary if you want to change the PRU positions of an already finished program.

IMPORTANT!

Position changes at <Learn Sample> are possible if <Adjust> was performed before.

10.5 Move Program

This function is useful when you have made changes to the component holder etc..

It can be reached under <Mode> <Move Program XY>. Here the whole program can be moved by an offset. Teach in as usual with <Store Trace> and confirm with OK.

IMPORTANT!

In order to adopt the current XY position of the component, it may be necessary to first perform <Adjust> and then <Normalize>.

Afterwards, <Page Forward><Page Backward> can be used to select the chip that is to be used for the measurement. With <Store Trace> this chip is measured again.

After confirmation with OK, all heights are recalculated.

10.6 Change test program with Plot Program (Show Program)

In the *Plot Program* window the generated test program is visualized abstractly. It serves the user for orientation and for complex changes of the program data.

If Show Modules is switched on, all modules are displayed, otherwise only Module#1.

The mouse wheel can be used to zoom into the display. With the mouse wheel pressed, the zoomed display can be moved with the mouse.

With the function <Reset Zoom> the test program is fitted into the window.

Reset Zoom 

Show Mdoules 

Move Bondhead To.

With the <Move Bondhead to> function, the active wire is displayed in blue.

If you click on another wire, the machine moves to this wire and activates it.

If you click on a chip, the machine moves to the first adjustment point of this chip.

Select Samples.

In <Select Samples> mode, wire segments can be selected with the left mouse button.

Invert Loop Selection .

The Invert Loop function inverts the selection.

Select Chips.

<Select Chips> works like <Select Samples>, but with chips. When a chip is selected, all samples sitting on this chip are also selected.

TIP

Ctrl + mouse click: add/exclude

Ctrl + mouse drag: Invert selection in rectangle

Ctrl + Shift + mouse drag: Select (no matter if it is already selected)

10.6.1 Change wire groups

The function is useful when you want to change a parameter on several wires.

To do this, activate the <Select Samples> mode in Plot program.

Then select wire segments to be changed with the right mouse button and call <Edit Test Parameter>.

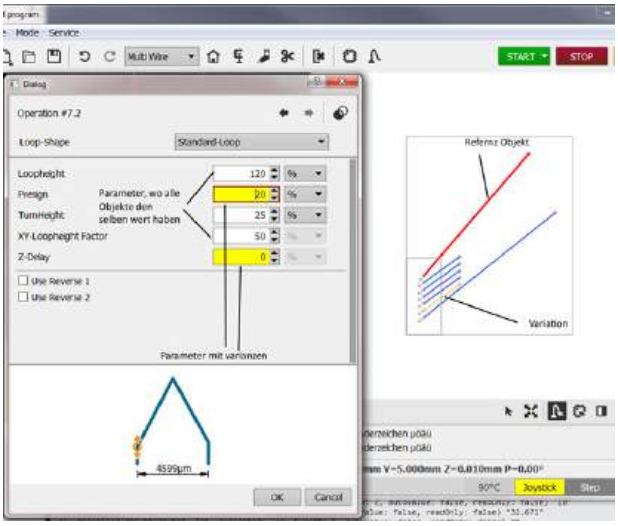


Figure: *Dialog Edit Wire*

Wire segments whose parameters differ from the reference are marked in red. The reference object can be changed by clicking on another wire segment or using the <Left> and <Right> arrow keys in the dialog box.

If you select <Isolate blue Operations>

while the cursor is on one of the yellow fields, all yellow wires will be removed from the selection.

If you change a parameter, it will be applied to all selected wire segments after confirming with OK.

10.6.2 Copy Paste

<Copy Paste> allows copying of whole chips or only single wires.

In contrast to <Repeat Group> the offset of each copy must be taught individually. In addition, copies can also be rotated.

In <Select Wire / Chip> mode,

any objects can be selected, then <right mouse button> <Copy Paste>. If only a part of a sample (e.g. only the first bond) is selected, <Copy Paste> completes the selection on the whole sample to leave no orphaned bonds.

The first step is to define the position that will be used for copying. This position can be either a chip adjust point or a sample end point. By means of <Next> and <Previous> buttons an optimal point can be selected.

Then the copies can be taught in individually with <Store Trace>. With the <Rotate> button the copy can be rotated and then confirm with OK.

10.6.3 Repeat Group

Multiple samples are duplicated automatically. Unlike <Repeat Sample>, only a single XY offset can be defined for all bond positions. Well suited is <Repeat Group> to duplicate repeating sample sequences.

In <Select Wire> mode,

select one or more wires, then <right mouse button> select <Repeat Group>.

The first step is to define the sample whose position is used for duplication. By means of the <Next> and <Previous> buttons an optimal point can be selected and confirmed with <Continue>.

At <Repeat Count> the desired number of copies must be specified. Set the cursor to <First X Position>, position first repeat with the joystick and accept with <Store Trace>. Under <Last X Position>, correct the last repetition with the joystick and accept with <Store Trace>.

Confirm with OK.

TIP

If the distance is evident from a bond plan, you can also enter the offset in the <Rel> tab.

10.6.4 Move Selected

Here you can select a partial area which you want to move. To do this, select wires or individual bond points in *Select Wire mode*, then select <Move Selected> with the right mouse button. Teach new position with <Store Trace> and confirm with OK.

10.6.5 Repeat Sample

Ideally suited for duplicating a single sample. Use <Repeat Sample> to define a separate XY offset for each bond position.

To do this, click on a sample in the <Move Bondhead to> mode

and then select <Repeat Sample> with <right mouse button> or <Mode> <Repeat Sample>. Specify number of repetitions with <Repeat Count> and train the first repetition with <Store Trace>. Correct exactly at the last repetition and also enter the value with <Store Trace>.

Confirm with OK.

10.7 New Test Technique

Under <Mode><New Test Technique> a new test type can be created. With the <Change Cartridge> button it is possible to switch between Pull and Sheartest.

Thus it is possible to use the same program for several test types.

Detailed information on "Change Catridge" and "Tool Offset Z" can be found in Chapter 7 "Basic Functions" (“Overview of the main functions” at page 23 and “Create a test program” at page 26).

10.8 Production operation

10.8.1 Create / Continue Lot

The test program can be run at any time using the <Bond> keypad key. It should be noted, however, that with this procedure the test results are not written to the database for later analysis.

This is not the case until you create a new product using the <Start Lot> button or you select <Continue Lot> from the drop down menu of the button.

With <Continue Lot>, a product that has already been created is continued and the measurement data can be analyzed together with the previously measured product data at a later time.

The prerequisite for creating a new product with the <Start Lot> button is that the *Lot Field Description* and the *Grade Code Description* for the new lot have been created. Both settings can be found under <Page>.

Grade Code Description.

This dialog can be used to declare the break behavior of the individual tests. However, a distinction must be made between pull and shear tests.

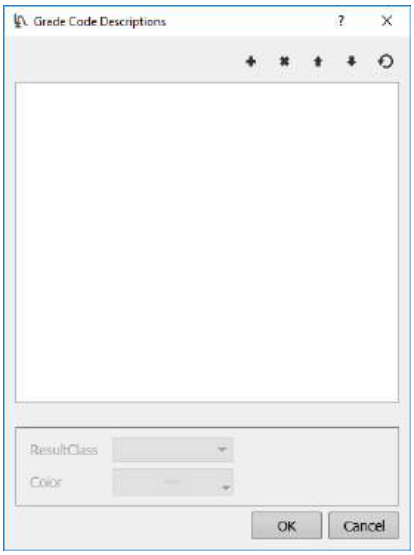


Figure: *Grade Code Description Dialog*

The buttons

can be used to define a new break code at any time.

The sequence of the individual grade codes can be defined at any time using the buttons.

Each break code can have its own color and class, which indicates the behavior of the test procedure. The following are available for selection:

>> *correct*: The measurement has been performed correctly
>> *incorrect*: The measurement failed, e.g. due to a damaged tool.
>> *missing*: The test could not be performed, e.g. because the wire was missing.

With the button <Load Default> the default break codes are loaded automatically from the pull and shear test respectively.

Lot Field Description.

The Lot Field Descriptions are used to identify the product under test and should therefore represent unique properties of the product (e.g. SN, Lot No., Wire, User, etc.).

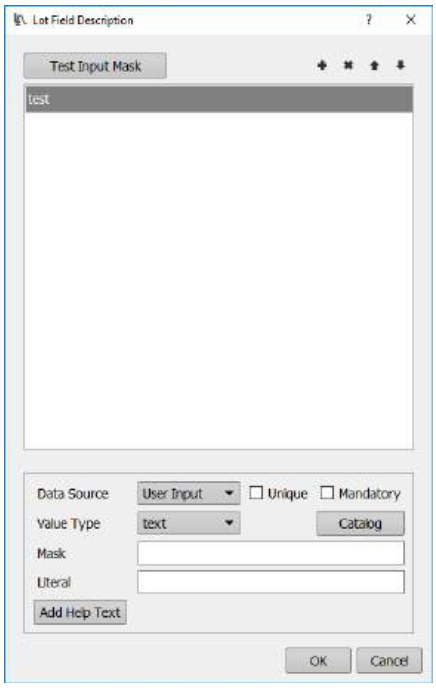


Figure: *Lot Field Description Dialog*

In the *Lot Field Description* dialog it can be determined which entries are to be made before the product is created and by setting Unique only a single entry of the same product properties is possible. By setting the check mark "Mandatory" a later input is forced. With the "Variable-Type" the following types are to be selected:

>> String: Character string (e.g. company name)

>> Number: Number

>> Numeric: Number sequence

>> Bool: True/False, Yes/No

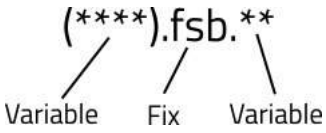
>> Date: Date

>> Masked: An input mask can be defined for sequential designations (such as batch number). An output mask is defined in the "Mask" field. The following characters must be used for this:

- >> 0 - Numeric (0-9)
- >> 9 - Numeric (0-9) or space (" ")
- >> # - Numeric (0-9) or space (" ") or ("+") or ("-")
- >> L - Alpha (a-Z)
- >> ? - Alpha (a-Z) or space(" ")
- >> A - Alphanumeric (0-9 and a-Z)
- >> a - Alphanumeric (0-9 and a-Z) and space(" ")
- >> & - All printable characters
- >> H - Hex Digits (0-9 and A-F)
- >> X - Hex Digits (0-9 and A-F) or space(" ")
- >> > - Forces upper case letters (A-Z)
- >> < - Forces lower case letters (a-z)

The "Literal" field is used to define where subsequent text entry is allowed. An underbar ("_") is used as a placeholder for this.

Example:



>> If the character " * " should be defined as a number for later input:

>> Mask: (0000).fsb.00
>> Literal: (_ _ _ _).fsb._ _

>> If the character " * " should be defined as a letter for later input:

>> Mask: (LLLL).fsb.LL
>> Literal: (_ _ _ _).fsb._ _

>> If the character " * " should be defined as a number for later input:

>> Mask: (LLLL).fsb.00
>> Literal: (_ _ _ _).fsb._ _

The <Help Text> button can be used to declare a help text for the operator for later testing.

In addition, the <Catalog> button can be used to specify a selection window that will be used by the operator for later input selection.

With <Test Input Mask> the preset properties can be tested.

10.8.2 Automatically run test program

By clicking <Start>

on the monitor, the automatic processing can be started.

In the drop down menu of the <Start> button it is also possible to select whether to start from the first sample or from any selected sample.

Afterwards, the "Manual Adjust Window" appears for each adjustment point. There the part can be set up with the joystick and confirmed with <Adjust>.

After the adjust process the program is tested.

TIP

It is possible to activate the Step Mode at any time. This allows the machine to be stopped without interrupting the process.

The process can be interrupted and stopped by clicking <Stop>.

10.8.3 Reset Alignment

With <Mode> <Reset Alignment> or by the symbol

the adjustment data from the last adjust process are discarded. A new adjustment can then be carried out.

10.9 Working in Single Step Mode (Step Mode)

In *Step Mode*, the test sequence is carried out in individual steps so that the process can be analyzed and observed in detail. The *Step Mode* can be activated and deactivated at any time with the <Step> key. If *Step Mode* is activated, the automatic motion sequence is interrupted immediately.

TIP

You can activate this function in the automatic test mode at any time.

10.10 Quality monitoring

Force / Displacement diagram.

Shows the force curve depending on the distance traveled for each individual test operation and facilitates the assessment of the test quality by means of the graphical information display.

10.11 Pattern recognition

The pattern recognition software is used to automatically search for adjustment points.

It replaces manual adjustment via the joystick. In the process, models are taught in the <Learn Chip>, which are then used during processing.

Pattern recognition can be activated in <Learn Chip> mode. To do this, <Use Pattern Recognition> is set. Two dashed rectangles will then appear in the live video, along with several new buttons.

The inner of the two rectangles is the area where the model will be learned. This area can be clicked, moved and resized with the mouse.

With the button <pen>

any contour can be dragged with the mouse, which can be edited using the

can be reset to a rectangular area.

The outer rectangle is the search area in which the model is searched. The size of this rectangle can also be changed with the mouse.

If you save an adjustment point using <Store Trace>, a model is created in addition to the coordinate.

TIP

The selected area should have as clear contours as possible; ideally, this should already be taken into account when selecting the position.

To ensure accurate manual positioning of the crosshairs by the operator, the adjustment points should be selected so that the crosshairs run along a clearly visible corner. The model area should be shifted in such a way that a structure actually occurs only once in the search area.

10.11.1 Image capture

The camera and light settings are defined in the "Capture" tab.

The camera settings must be selected so that the contrast of the structure to be searched for stands out as well as possible from the background. These settings are different for each substrate, so you can never make a rule of thumb here.

TIP

For some surfaces the saturation channel sometimes works better.

(e.g.: gold coatings on white substrate).

10.11.2 Model creation

In the <Model> tab, you can choose between *Contour* or *Grayscale* as the method.

While *Contour* searches for edges in the image, *Grayscale* compares the distribution of the various shades of gray in the selected image section.

With *Downscale* the image resolution can be adjusted. For coarse structures, a larger downscale can be used to make the image intentionally blurred, which can be helpful in such cases.

Contour has two additional parameters. *Min Contrast* defines the minimum threshold for a detected edge. *Min Length* filters out shorter contour pieces.

TIP

Contours should be clear and continuous, many small, short structures, which do not really form a continuous structure, are not well suited for a stable automatism. However, if there is only one structure in the search window, because it is a lone adjustment point, it can work quite well with short lines.

10.11.3 Control search

In the <Search> tab, the minimum search quality and the search range of the contour can be changed. The pattern recognition searches for the set structure in this tab and points out possible alternative finds.

TIP

Make sure that, if possible, only one contour is detected and that no alternative detections are found. If this is unavoidable, make sure that the <Min Score> set is significantly higher than the score achieved with the alternative finds.

11) Calibration

All calibrations listed here are performed by F&S BONDTEC during commissioning. Changes should only be made by the user after consultation with F&S Service!

IMPORTANT!

All calibrations are permanently written to the memory unit of the test head only after closing the software.

11.1 Camera Convex Compensation

This compensation is used to establish a relationship of camera pixels to the axis system. The *camera convex compensation* usually only has to be done in large time intervals. It is absolutely necessary if you screw an extender lens onto the camera or use a different zoom level - but this should not be done without a service technician.

Under <Mode><Camera Convex Comp> the function can be started.

Follow the wizard accordingly and place the crosshairs, which are now in the upper left corner of the live video, at a significant point. For this purpose, a position that can be clearly identified by the operator should be selected and approached. Small, bright reflections on the component or a previously bonded wire are particularly suitable for this.

Subsequently, change to step 2 with <Next>. There, the crosshairs, which are located in the lower right corner of the camera image, must again be exactly aligned with the previously selected structure.

The positions are saved in each case with <Store Trace>.

11.2 Weight Calibration

IMPORTANT!

Calibration of the measuring head may only be performed by the F&S BONDTEC service department and authorized persons (process owners).

It is recommended to calibrate the measuring head once a year.

>> To calibrate the pull head, a suitable calibration hook and the suitable calibration weight are required.

>> To calibrate the shear head, the appropriate calibration kit is required.

Calibration of the instrument can be performed by using <Mode><Weight Calibration>. This calibration is an internal guideline for setting the test equipment. It is advantageous to use a measuring standard whose exact weight must be specified. First of all, a zero adjustment is carried out, and care should be taken that the measuring sensor is not loaded. If this condition is fulfilled, the calibration can be continued with "Continue". In the second section, the sensor must be loaded with the standard and then the calibration can be confirmed with "OK". Thus, the internal test of this test equipment is performed using a two-point system.

11.3 Tool Calibration

IMPORTANT!

After each hook change or when the pull hook is bent, a hook calibration must be performed.

A hook calibration can be selected under <Mode><Tool Calibration>. After that a new dialog opens, which should serve as a step by step guide for the operator.

The calibration should always be performed with the help of the microscope.

1. A window opens, in which the hook type must be defined. With <Next> the axes are brought to the initial position and the tip of the hook points towards 6.00 at the end.
2. The tip of the hook must be brought with the joystick directly over the substrate, to a prominent point. A corner point of a structure or a bright point on the substrate can be used for this purpose.
3. In the next steps, the tool hook rotates once around its own axis and the tip must be brought to the same prominent point again and again.
4. Finally, the crosshairs of the camera optics must be positioned on the same prominent point so that the camera offset can be taught.

11.4 Loopheight Calibration

IMPORTANT!

Calibration may only be performed by the F&S BONDTEC service department and authorized persons (process owners). A suitable calibration hook is required to perform the calibration.

The calibration hook is brought directly under a fixed, stable fixture and with <Next> the Z-axis moves upwards. The recorded force values can be used to calculate the spring constant.

12) Adjustment work on the Test Head

12.1 Safety instructions for the adjustment work

DANGER!

>> Only open the housing when the machine is disconnected from the power supply.

>> Disconnect the power plug before changing fuses.

>> Do not reach into uncovered parts of the machine when the machine is electrically live. Danger of electric shock!

>> Residual voltages may be present in the power supply unit even after the machine has been switched off. After switching off the machine, wait 30 seconds before opening the machine housing. Danger of electric shock!

>> Work on the electrical supply may only be carried out by a qualified electrician in accordance with the electrotechnical regulations.

>> Access to the power supply must always be kept locked. Access is only allowed to authorized personnel.

>> When working on electrically live parts, the machine must be disconnected from the power supply and secured against unintentional reconnection.

CAUTION!

Read this chapter completely before starting up the machine.

Always keep the machine clean. Do not use any cleaning agents or lubricants that have not been expressly recommended by F&S BONDTEC.

F&S BONDTEC recommends having a service performed after approximately 7,000 hours, but no later than after two years.

IMPORTANT!

Save loaded programs with <File ><Save> before adjustment work is carried out on the machine.

12.2 Adjust frame height

The machine can process very high components. For this purpose, the machine frame can be raised by up to 60 mm for the use of tall components, thus enabling a wider range of uses.

Figure: *Adjusting the frame height - Allen screws*

IMPORTANT!

At least two people are required to perform the following steps.

>> Remove any components placed on the substrate holder.

>> Move the test head to the home position and switch off the machine.

>> Remove the six hexagon socket screws from the left and right machine frames.

>> Raise the entire portal superstructure evenly on both sides to the desired height and reattach the removed hexagon socket screws.

IMPORTANT!

It must be ensured that after adjusting the frame height, the test tool can touch down on the substrate surface after approx. 55000 cts.

12.3 Change test tool

IMPORTANT!

Only use test tools that correspond to the measuring head.

Figure: *Change the test tool of the pull tester*

Figure: *Change the test tool of the shear tester*

>> Loosening the corresponding screw
>> Removing the test tool
>> Inserting the new test tool
>> Tightening the screws
>> Set tare

IMPORTANT

Pulltester only: After changing the hook, the 'Tool Comp' function must be performed and the Tool Offset Z must be measured again.

12.4 Change measuring head

12.4.1 Remove masuring head

CAUTION!

Remove the hook from the measuring head when changing the measuring head.

>> Loosen hexagon head screw with Allen key
>> Remove the measuring head from the centering bolts

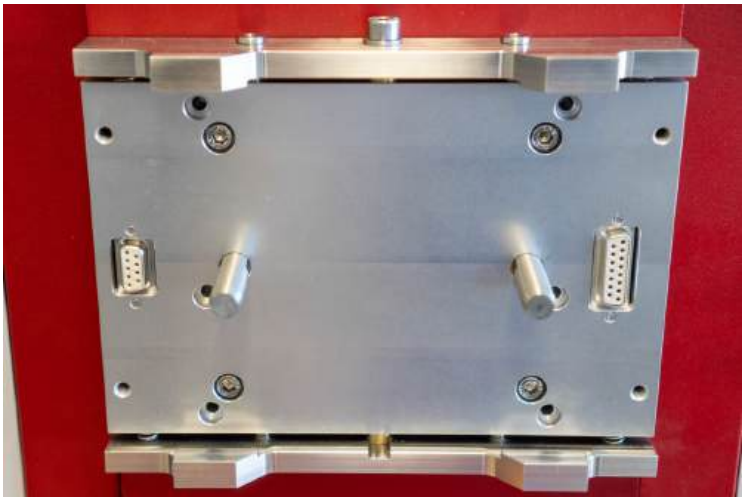


Figure: *Change measuring head*

12.4.2 Attach measuring head

>> Push the measuring head onto the centering bolt as far as it will go.
>> Tighten hexagon head screw with Allen key
>> Reconnect compressed air hose

12.5 Change measurement unit

>> Disconnect the compressed air hose at the measuring head adapter
>> Loosen the union nut while holding the measuring unit to prevent it from falling down
>> Replace the measuring unit and retighten the union nut