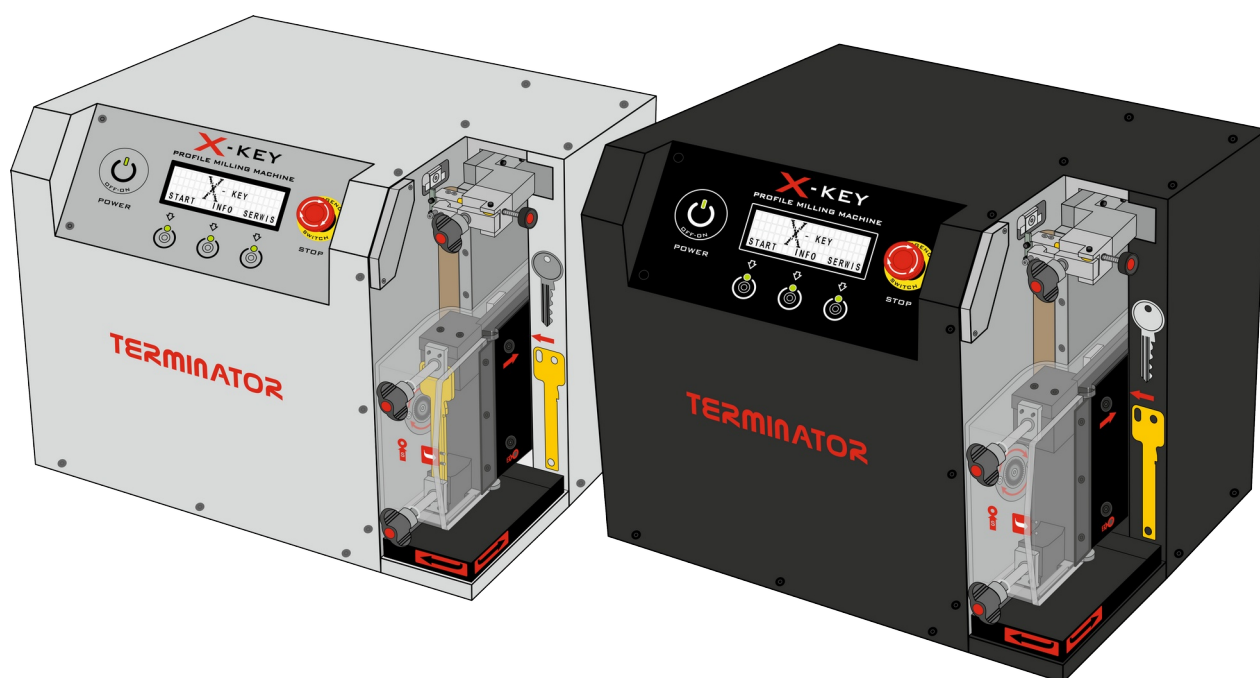


# X-KEY

PROFILE MILLING MACHINE

## TERMINATOR



## INSTRUCTION MANUAL

English language version  
(machine translation)

version 1.9.00

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## 1. GENERAL INFORMATION

### 1.1. INTRODUCTION

The X-KEY Terminator machine is a CNC copying and milling machine for making key profiles. The machine has been designed to ensure the highest comfort and safety at work.

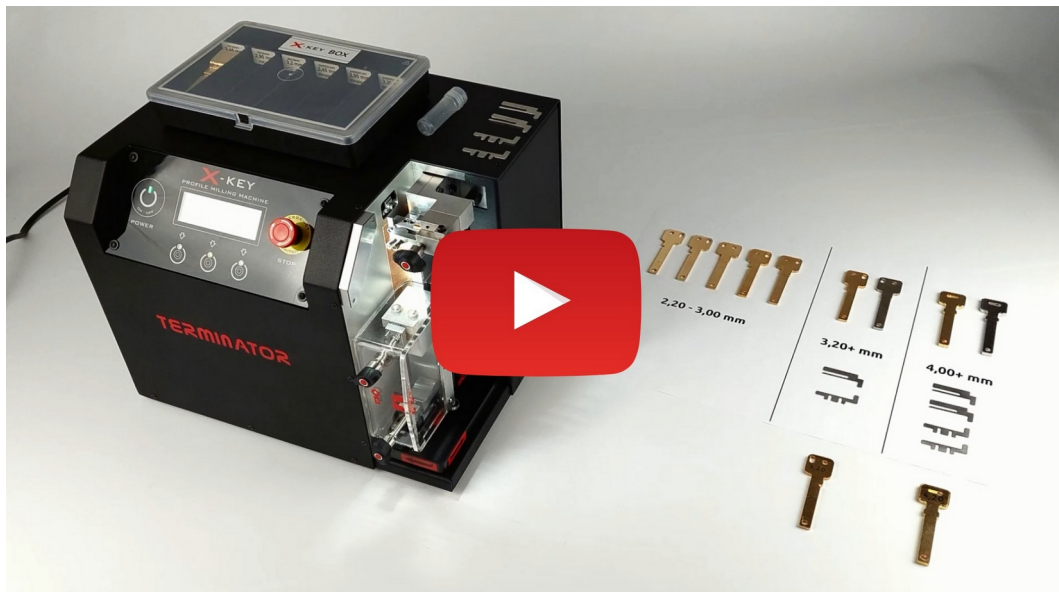
The machine is intended for use by key makers who have the knowledge, experience and appropriate technical facilities available in the form of, among other things, conventional key machines.

The process of installation and use of the device is not complicated, nevertheless it is necessary to get acquainted with the contents of this manual in order to ensure trouble-free and safe operation.

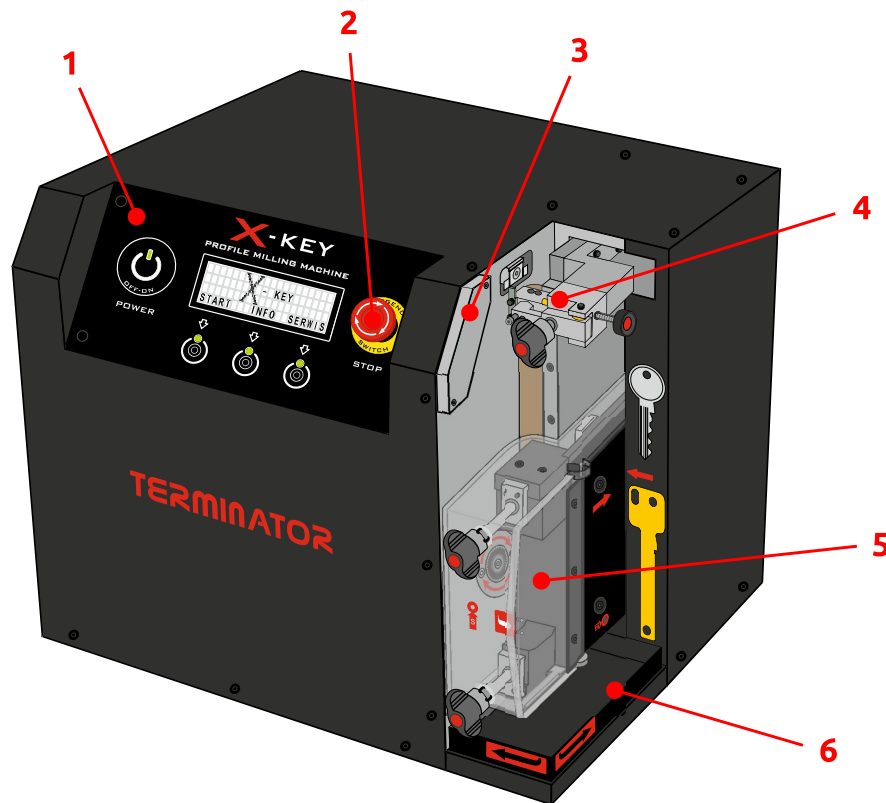
**The device is designed for stationary operation, do not transport the device without the protection of screws Z1 and Z2 due to the risk of damage.**

Many of the steps described in this manual can be viewed in the form of short instructional videos on our website:

[www.x-key.eu](http://www.x-key.eu)



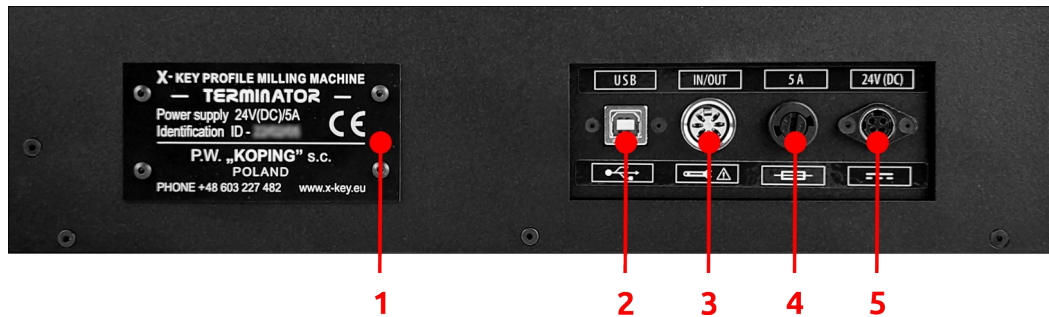
## 1.2. MAIN COMPONENTS OF THE MILLING MACHINE



1. Control panel
2. Emergency stop
3. LED lighting of the work field
4. Key profile scanning unit
5. Milling unit
6. Swarf container
7. Connector panel with fuse (at the back of the device)



### 1.3. COMPONENTS AT THE BACK OF THE DEVICE



1. Nameplate
2. USB communication socket
3. Service interface socket (for manufacturer's use only)
4. Fuse holder
5. Power socket

### 1.4. SECURITY

The machine has been completely constructed to ensure the highest level of operational safety. Before starting work with the milling machine, it is required to thoroughly read the contents of this operating manual, where all permissible actions and prohibitions are described.



**It is absolutely forbidden to touch any moving parts of the milling machine while the scanning or milling unit is in operation.**



**In the event of any hazardous situation, immediately switch off the power supply to the machine by pressing the emergency stop switch located on the control panel (marked EMERGENCY SWITCH).**

No unnecessary objects may be left in the working area of the machine. On the upper part of the machine housing, you can only place the included box with basic tools and raw materials to the left.

### 1.5. TECHNICAL DATA

Dimensions:	345 x 265 x 260 mm (width x depth x height)
Weight:	machine: 16 kg machine with packaging and accessories: 25 kg
Power supply:	machine: 24 V DC, 5 A, 120 W Power supply: 85-264 V AC, 50/60 Hz - Meanwell GST120A24-R7B
Electro-spindle:	power: 70 W Rotational speed: 7200 RPM
Frez:	material HSS, dimensions 20 x 0.3 mm (diameter x thickness)
Movement:	3-axis implemented on linear carriages moved by stepper motors through toothed belts movement range: X axis 30 mm, Y axis 30 mm, Z axis 36 mm
The working environment for the use of the machine:	closed rooms air temperature 15-35° C, humidity: about 50%

### 1.6. CONTENTS OF THE PACKAGE

machine, power supply unit, power cable, USB cable, X-KEY Neo dongle, CD, memory stick, basic operating tools, spare cutter, 25 raw keys, attachment for coarse raw keys

## 2. INITIAL START-UP OF THE MACHINE

### 2.1. UNPACKING AND MOVING THE DEVICE

When unpacking the unit, ensure that there is sufficient space for all items from the box.

All the accessories must be taken out of the packaging first, followed by the machine due to its weight. Removing the polystyrene filler pieces between the accessories and the machine from the box will make it easier to get a good grip on the machine.

Keep the packaging of the machine to ensure that it can be transported safely if necessary.



You can move the machine by gripping the base or, if necessary, the outer casing. **When moving the machine, it is forbidden to grasp the scanning and milling unit components and the control panel.**

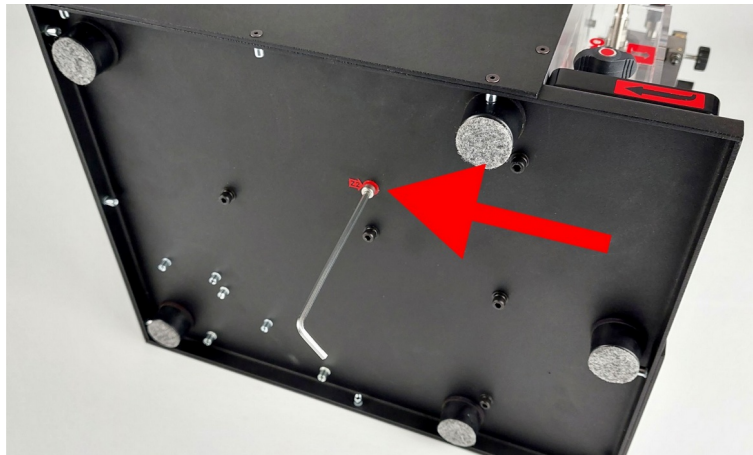


**The machine is secured for transport by means of 2 locking screws Z1 and Z2, which must absolutely be removed before the machine is operated.**

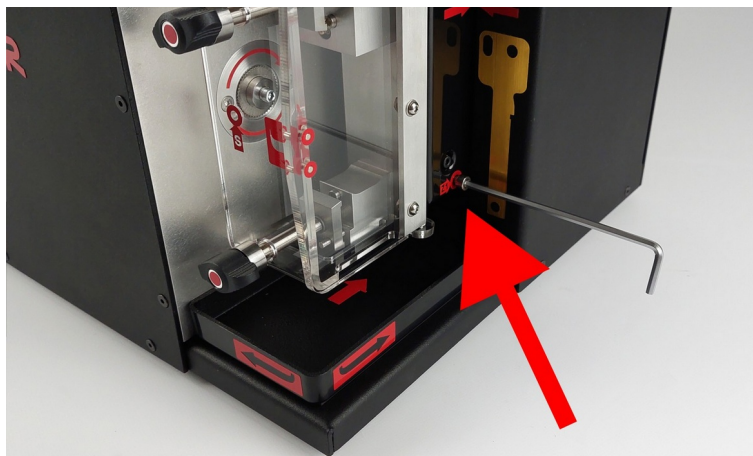
### 2.2. REMOVAL OF PROTECTION Z1 AND Z2

Before starting to remove the safety bolts, allow sufficient space and find a 3 mm Allen spanner in the supplied basic tool kit.

1. Make sure that all cables are unplugged from the machine and that there are no other objects behind the machine. It is recommended to place a soft pad behind the back of the machine.
2. Tilt the machine back and lay it down gently.
3. Unscrew and remove the safety screw marked with the red sticker Z2 from the device.



4. Tilt the machine back onto the base and gently adjust.
5. Unscrew and remove the safety screw marked with the red sticker Z1 from the device.



6. Store the removed safety screws and Allen key in the tool box.

**If the machine is transported again, it must be secured again with screws Z1 and Z2.** The process is similar to disassembly but in reverse order. Please note that screw Z1 is longer than Z2. Before inserting the screw into the hole Z1, manually position the milling unit so that the red arrows on the housing of the machine and the milling unit "meet".

### 2.3. CONNECTING THE POWER SUPPLY AND COMMISSIONING THE MACHINE

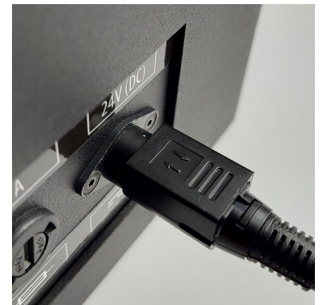
The following conditions must be met before connecting the power supply:

- **The mains socket where the machine is to be connected has an earthing connection (i.e. an additional pin connected to the protective PE conductor).**
- The machine is correctly positioned and adequate space is provided for the operator.
- The machine's emergency stop switch is in the off (depressed) position.
- **Locking screws Z1 and Z2 are removed.**
- There is no key attached to the scanning unit vice.
- The key raw material is not fixed in the milling unit.

Connect the power supply unit to an electrical outlet using the supplied cable, then insert the power supply unit plug into the machine ensuring that the flat side (with the arrow icon) is facing up.

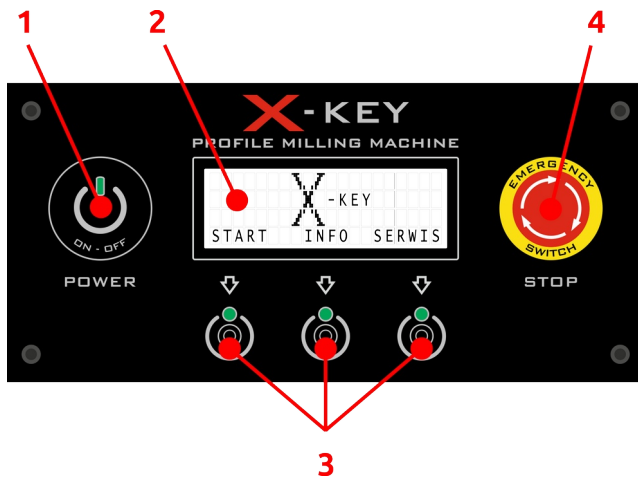
When all the required conditions have been met and the power supply to the machine is connected, the emergency stop switch on the control panel can be unlocked by turning it clockwise (45° clockwise) until it gently slides out and thus engages.

To start the machine, hold down the touch power switch for a longer time (about 1.5s) until you hear a short beep - the machine will start and is ready to use according to the instructions displayed on the control panel.



### 3. USE

#### 3.1. CONTROL PANEL



1. Power touch switch
2. Display
3. Touch buttons for control
4. Emergency stop

Switching on the machine requires holding down the power switch touch field for a longer time (approximately 1.5 seconds). The indicator light above the touch field of the power switch indicates the operating status of the machine and its touch:

- red - machine switched off, standby mode
- green - machine on
- blue colour - signalling when the switch is pressed

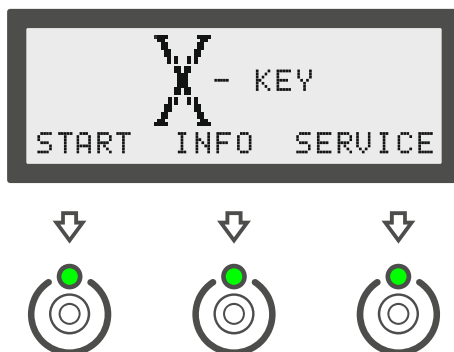
The LCD display shows the machine's current operating status, necessary information and instructions.

The lower line of the LCD display shows the available operation options, which are selected by pressing the appropriate touch field below the display, hereinafter referred to as the control buttons. Each time the control buttons are pressed, the control light above the button turns red and a short beep sounds.

When work is finished, the machine must be switched off using the touch-sensitive power switch (as with switching on, a longer hold of the touch-sensitive field is required).

**Basic control panel operation and language selection:**

1. When the machine is switched on, the display shows a welcome screen with the available options.

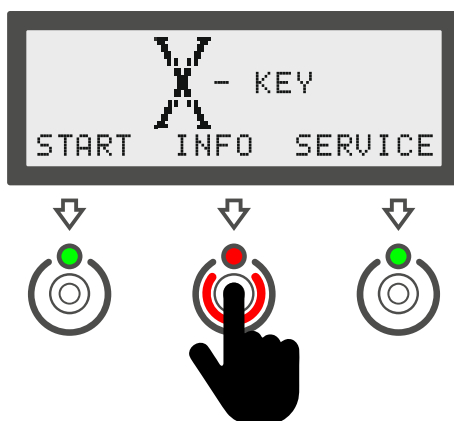


**START** - switching to the mode of copying and milling of key profiles

**INFO** - language selection menu, information about the number of manufactured keys and contact details to the X-KEY service

**SERVICE** - menu of service options and machine settings

2. Press the central control button below the display for the **INFO** option.



3. The display will show the available languages and the options for selecting them.



4. Select your preferred language by pressing the appropriate control button.

Once selected, the machine will remember the option chosen and from then on all messages will be displayed in the selected language.

5. A further screen will appear with the software version of the machine and the options available (the descriptions and illustration below show the English language version):



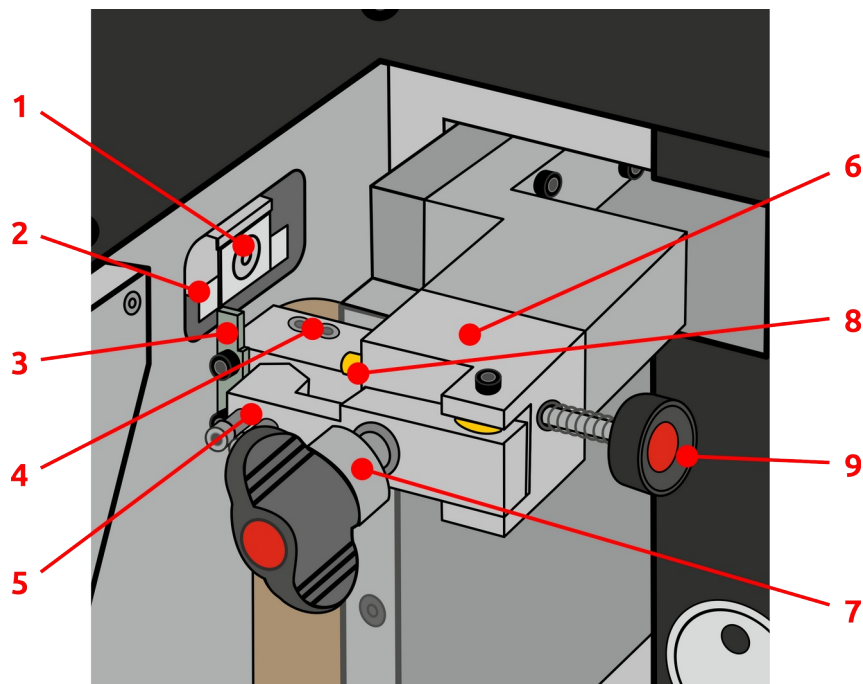
**NEXT** - moving to next screens with information about the total number of manufactured keys and contact details to X-KEY service

**EXIT** - exit to welcome screen

**BACK** - return to previous screen



### 3.2. KEY PROFILE SCANNING UNIT



1. Measuring probe
2. Probe plate
3. Reference item
4. Adjustment screws of the elements that support the correct positioning of the original key in the fixed part of the vice
5. Adjustment screws to assist correct positioning of the original key in the moving part of the vice
6. The vice holding the original key
7. Clamp knob
8. Element indicating the scan range of the key profile
9. Button of the element indicating the scanning range of the key profile



**The probe plate is a precise and delicate element. Special care must be taken not to damage it, e.g. by bending it.**



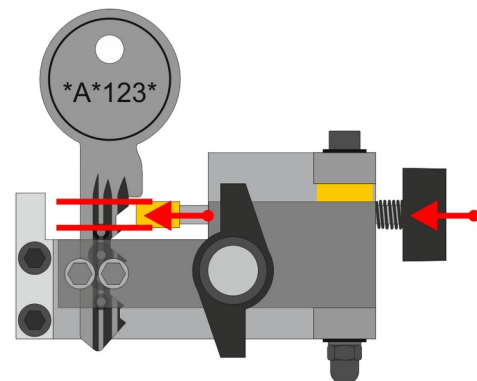
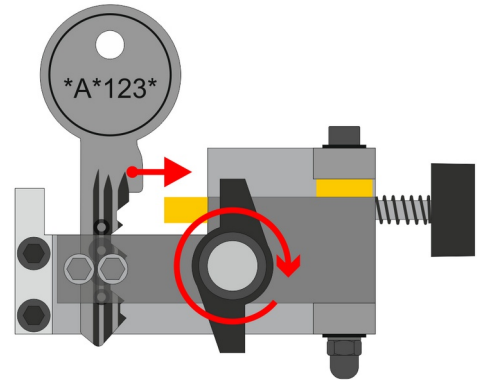
**The original key can only be placed in the scanning unit if the machine prompts you to do so, otherwise it is not advisable!**

### Required conditions for the original key for profile scanning:

- The key should be made of conductive material, i.e. metal, as the scanning process of the key takes place by closing the electrical circuit of the probe through the key.
- The surface of the key to be scanned must be cleaned of any dirt, for this purpose use the brushes included in the kit and extraction gasoline!
- The use of rotating brushes (e.g. metal wire brushes) is not recommended due to the risk of permanent damage to the original key and scratching of the surface to be scanned.
- The key should not have any rings or other loose objects (e.g. key rings) attached to it due to the risk of collision with the scanning unit components.

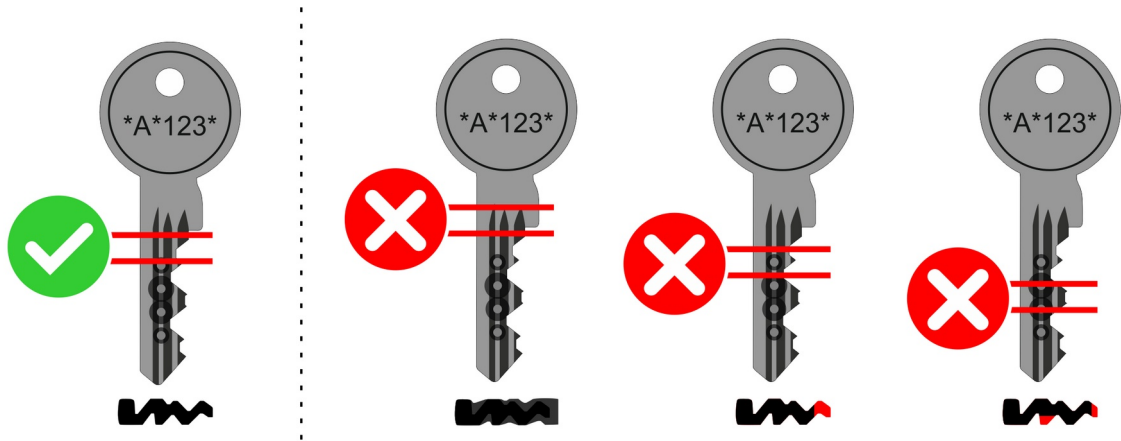
### Fixing of the original key in the vice of the scanning unit:

- In the case of single-sided keys, the top stop (the so-called base) must be on the right-hand side, i.e. at the element indicating the scanning range of the profile (according to the information sticker on the housing).
- The key must be fixed in the correct position by clamping it with the movable part of the vice by tightening the knob with sufficient force, which must be sufficient to hold the original key firmly during scanning and not so large that it could damage the original key or machine components.
- The range of the surface where the key profile will be scanned is determined by the height of the contact element of the measuring probe with the surface of the original key and is 4 mm. The position where the key will be scanned can be determined by extending the element indicating the scanning range of the profile by pressing the button on the right side of the key.

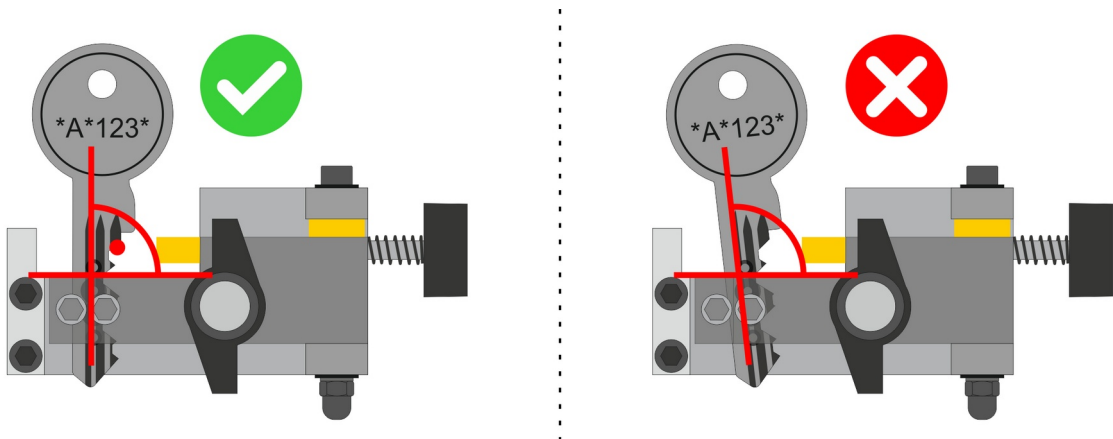


- The section of the key from which the profile is to be scanned should include its full undistorted cross-section in which no notches or holes are present. In the case of one-sided notched keys, this section can be determined by using a calliper and measuring the key from the back (so-called base) to the highest point on the notched side.

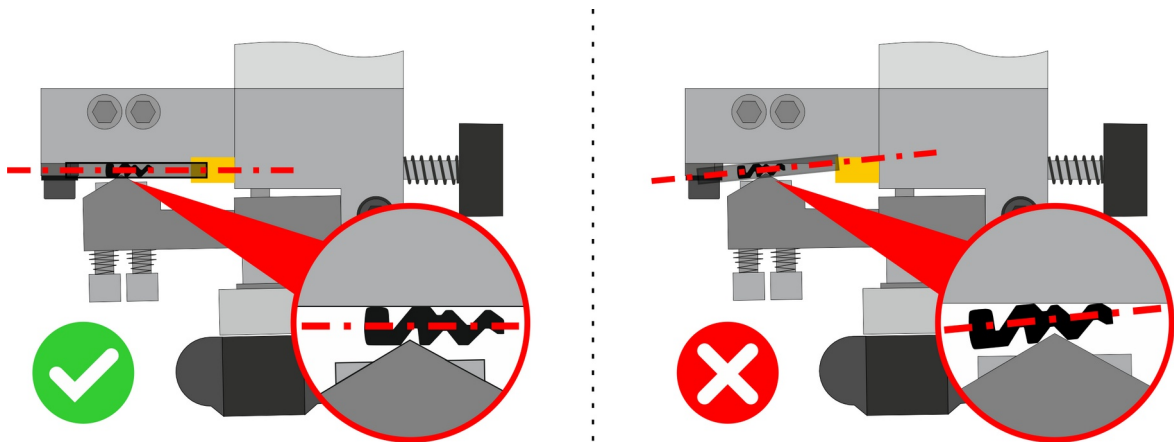
This is usually just below the top stop (the so-called base), which is important for making an exact copy of the key, as this section of the profile is usually the least worn.



- The profile notches (grooves) of the key to be scanned must be in a perpendicular position relative to the scanning unit vice, normally the correct position is determined by pressing the key into the profile groove through the locking element of the movable part of the scanning unit vice. If this is not the case, a different profile groove has to be selected or the position has to be corrected manually.

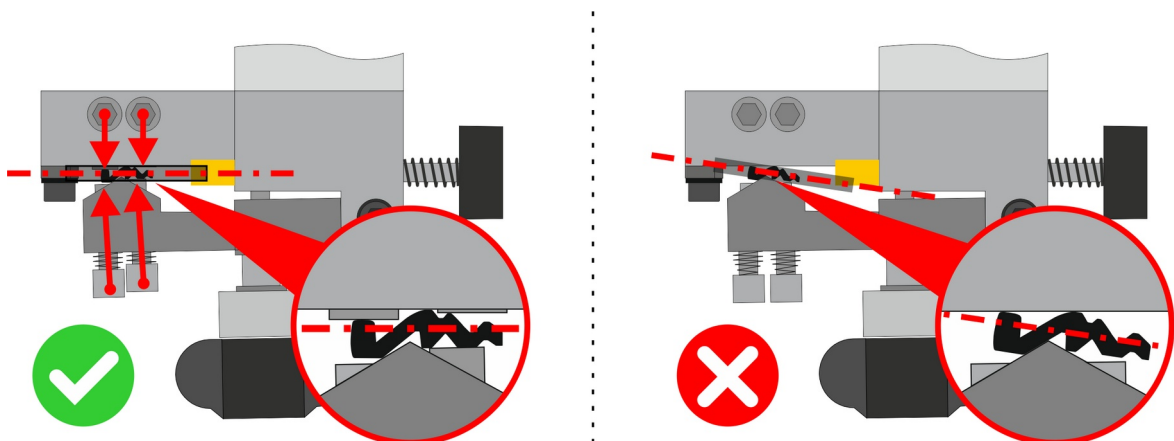


- The head of the key (and thus the cross-sectional axis of its profile) must be positioned parallel to the fixed (stationary) plane of the scanning unit's vice. For this purpose, the correct profile groove of the key to be scanned must be selected, which will hold the key in the correct position when the vice knob is tightened.



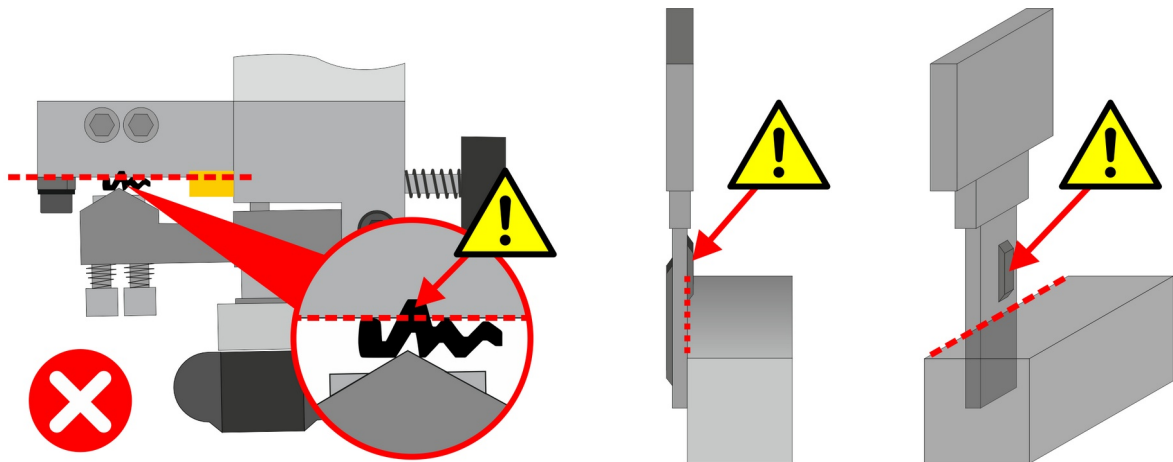
- In the case of non-standard keys, for which it is not possible to obtain the correct position in relation to the vice, it is necessary to use adjustment screws in the vice, which will allow the key to be locked in the correct position using additional support points.

To adjust these screws, use a 3 mm Allen spanner from the supplied tool kit. Additional elements which fix the position of the key in the fixed (immovable) part of the vice can be moved out by tightening the screws in its upper part. The screws in the movable part of the vice directly create additional support points with their ends, so they should be tightened gently in order not to damage the original key profile.

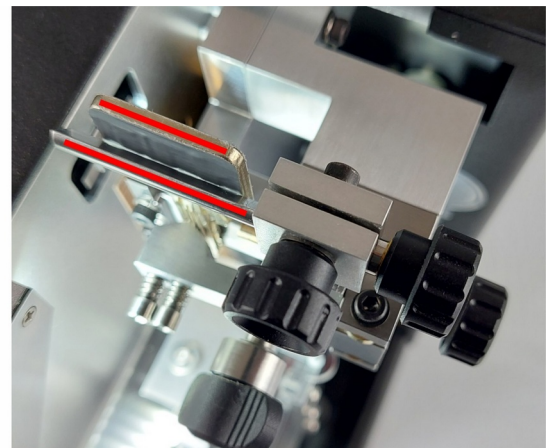


- The protruding parts of the key profile must not project beyond the contact surface of the key with the fixed (immovable) part of the scanning unit's imager.

**Failure to do so will result in damage to the probe plate (plate) and other parts of the milling machine.**

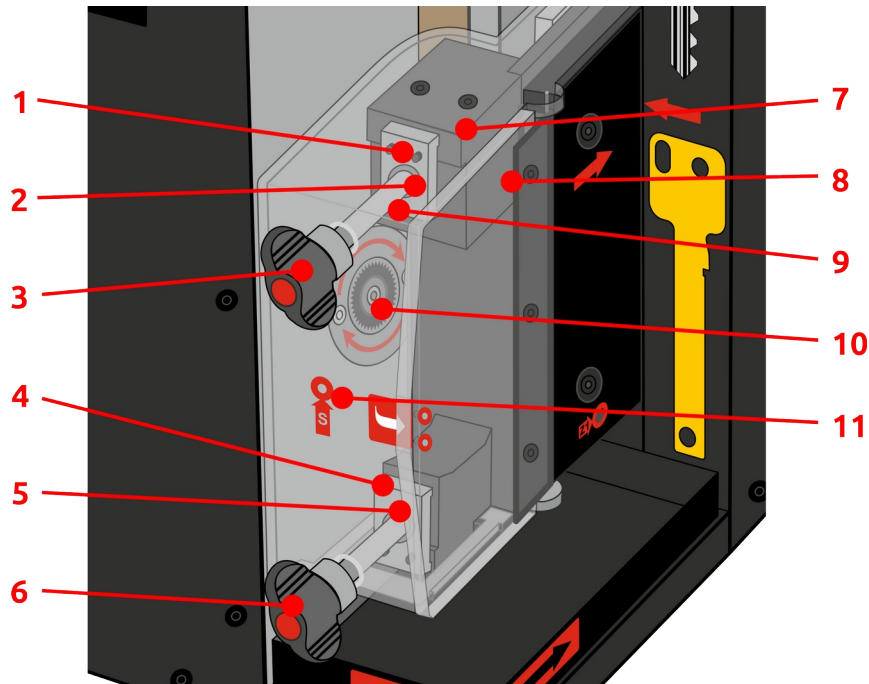


- An optional accessory is available that makes it easier to determine the correct position of the original key relative to the head. It works by attaching a special semicircular gauge to the head of the spanner, which allows the correct position to be determined more quickly and reliably.



**After completing the profile scanning process, when the machine displays a message that the original key has been removed from the key scanning unit, the knob on the moving part of the vice has to be loosened, the key has to be ejected upwards and, if any adjustment screws have been used in the vice, the position of the key has to be returned to its initial position where the additional support points are not ejected.**

### 3.3. MILLING UNIT



1. Upper clamp for clamping the raw material of the spanner
2. Fixing element for the position of the upper part of the raw key in the socket
3. Upper clamp knob
4. Lower clamping pressure on the raw material of the spanner
5. Fixing element for the position of the lower part of the raw key in the socket
6. Lower clamp knob
7. Milling cavity protector
8. Milling cavity cover door
9. Socket key presence detector
10. Cutter with assembly parts
11. Service bore for electro-spindle locking pin when replacing cutter

### Information about the cutter:

The dedicated X-KEY cutter allows the production of up to 100 key profiles. This number depends on the thickness of the key raw materials to be machined, the material from which they are made, and the shape of the profile, which determines the amount of material collected during machining.

The information about the number of keys made since the last cutter change is displayed each time the user enters the key profile copying and milling mode.

If the recommended number of keys made by the cutter is exceeded, a message will be displayed indicating that the cutter needs to be replaced. It is recommended to replace the cutter with a new one and to calibrate the cutter immediately in order to maintain the quality of the key profiles.

If a pick has any damage (e.g. chipped or broken teeth), it must be replaced immediately.

It may happen, especially when mainly thick key raw materials are manufactured (i.e. above 3.00 mm), that the machine generates undesirable noises and vibrations during the machining of the key raw material, which usually means the end of life of the cutter. In spite of the fact that fewer key profiles than 100 have been manufactured, it is also recommended in this case to immediately carry out the process of replacing the cutter with a new one.

**For information on the process of changing the cutter and calibrating the milling machine, please refer to chapter: 4.3 Changing the cutter and calibrating the milling machine.**



**The key raw material may only be placed in the milling unit if the machine displays the message to do so, otherwise it is forbidden!**

It is not permissible to leave a raw spanner in the milling bay after machining has been completed or if other operations than the automatic milling process are being performed. In spite of many mechanical and electronic safeguards such an operation may lead to damage to the milling cutter and other machine parts.



**Raw keys with a thickness of more than 3.00 mm can only be clamped in the milling bay using thick key washers!**

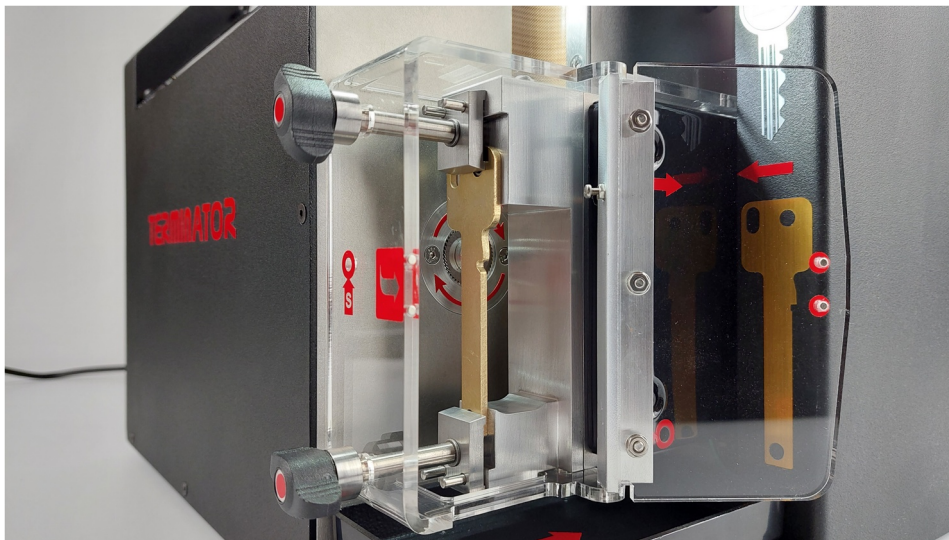


### The process of fixing the key in the milling unit:

1. Open the milling slot cover door by pulling it back behind the protruding edge indicated by the red arrow.
2. If necessary, clean the interior of the milling bay with a brush to remove any remaining swarf from the previous machining process.
3. Loosen the clamps holding the bottom and top of the raw spanner material by turning the knob so that there is adequate space for the raw material to slide between the clamps and the spanner positioning elements.
4. The position of the raw key in the milling slot is shown by an information sticker on the machine housing. Note the location of the circular locating holes at the top and bottom of the raw material.

In the case of raw materials for single-sided keys, the upper stop (so-called base) should be oriented to the right - towards the milling slot cover door.

5. Insert the raw material of the key into the milling bay and slide the holes at the top and bottom of the raw material onto the positioning elements of the raw material of the key. During this operation take care not to hook the key presence sensor, it can only be pressed by the correctly placed raw material.
6. Secure the spanner in the milling bay by tightening the clamping knobs with a force sufficient for stable milling of the profile.



A very high force must not be applied, because of the risk of permanent deformation of the raw material and possible damage to the clamping elements of the milling unit. The use of too low a force will result in undesirable noises and vibrations during machining as well as in an incorrect key profile - in this case the milling process must be absolutely stopped and started again on a new raw material with the correct force used for the clamping knobs.

At the end of the machining process, when the machine displays the message that the key raw material has been removed, loosen the clamping clamps by unscrewing their knobs and remove the machined key raw material from the milling bay.

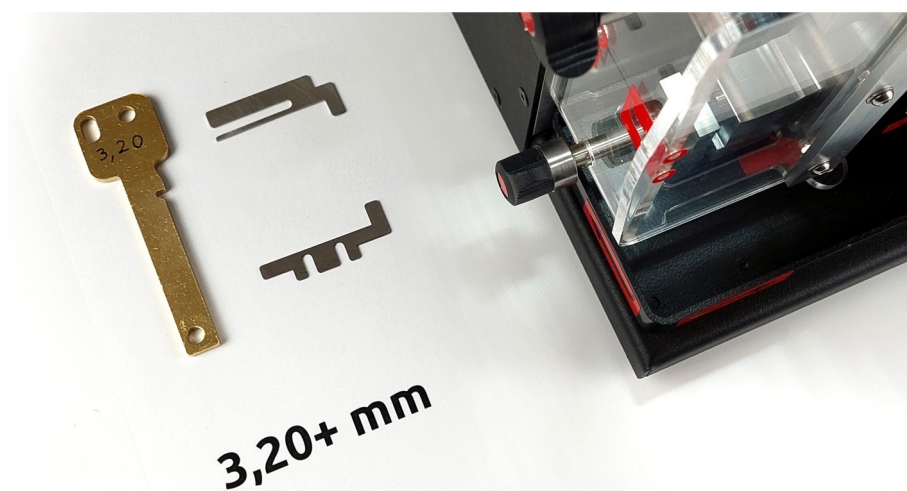


### Fixing of raw keys thicker than 3.00 mm

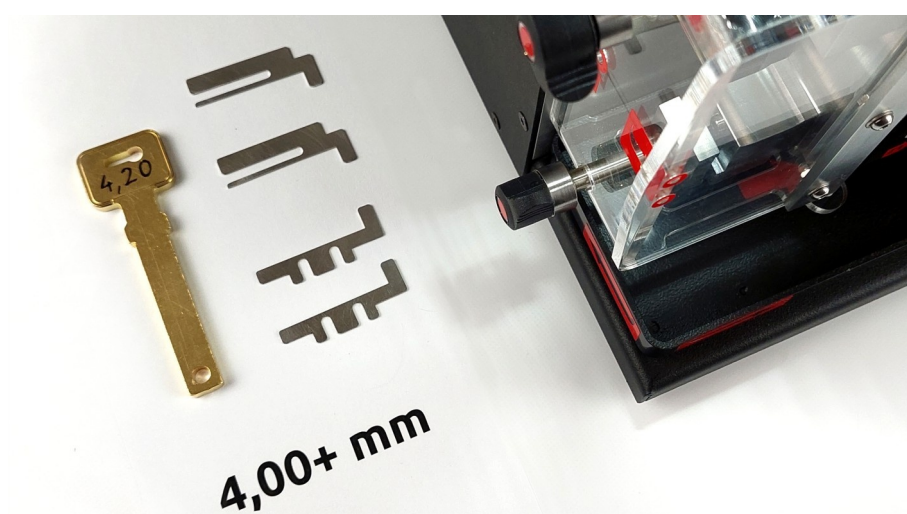
The process is not fundamentally different from that of clamping standard raw materials, but it **is absolutely necessary to seat the attachments for coarse key raw materials in the milling cavity before inserting the raw material for processing**. These attachments are standard equipment added to the machine and are located in the basic tool box.



Failure to comply with the described rule of use will result in permanent damage to the guidance of the clamping clamps pressing the raw material of the spanner.



For key raw materials over 3.20 mm thick, one set of spacers is used - one washer for the top and one washer for the bottom.



For key raw materials over 4.00 mm thick, two sets of spacers are used - two washers for the top and two washers for the bottom.

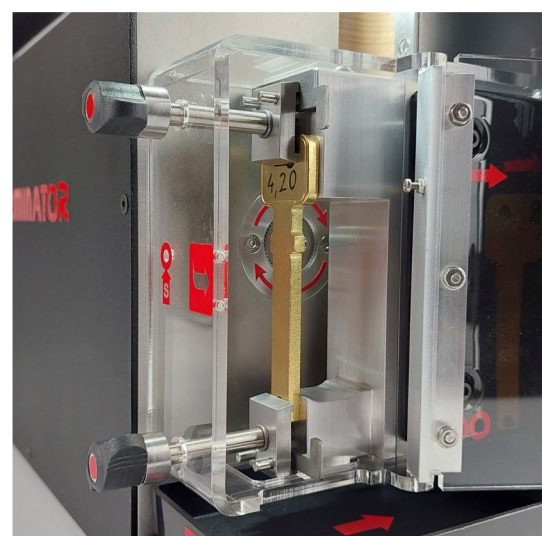
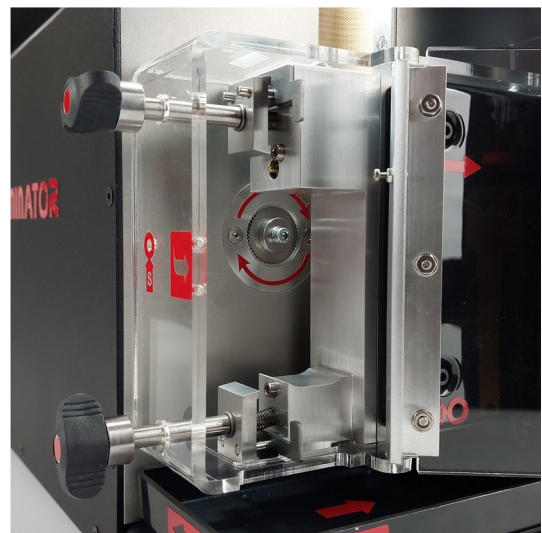
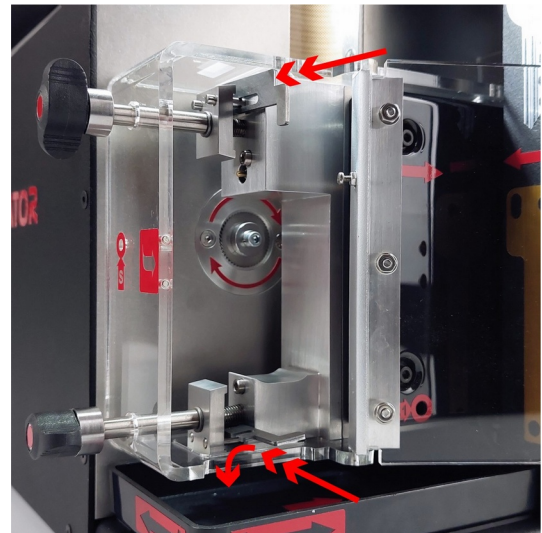
### Assembly process for thick key raw materials:

1. Open the milling slot cover door by pulling it back behind the protruding edge indicated by the red arrow.
2. If necessary, clean the interior of the milling bay with a brush to remove any remaining swarf from the previous machining process.
3. Loosen the clamping clamps for the lower and upper key raw through their knobs, so that there is sufficient space to insert the washers between the clamps and the milling seat surface where the clamps rest.
4. Due to the shape of the bottom washer, the bottom clamp must be withdrawn until the guide pins are flush with the clamp surface.
5. Insert the required number of shims in the correct position, depending on the thickness of the raw material of the key to be machined - see the attached pictures.
6. Fix the key raw according to the described process for fixing the key in the milling unit.

After working with coarse raw materials, the shims should be removed from the milling slot and secured in the basic tool box.



**Working with standard spanner raw materials (i.e. up to and including 3.00 mm thick) and wearing shims for thick spanner raw materials will cause permanent damage to the guidance of the spanner raw material clamps.**



### 3.4. MAKING A COPY OF THE KEY PROFILE



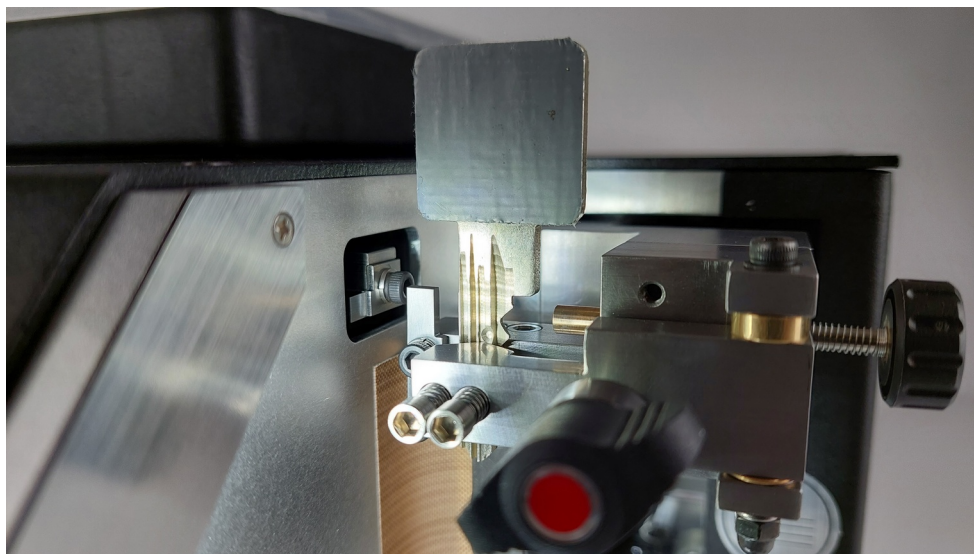
Before starting the process of making a copy of the key profile, it is essential that you familiarise yourself with the information on the construction of the machine and the operation of its various components which is contained in the previous chapters of this manual.

1. Once the machine has been switched on, enter the copy and mill key profile mode.

If this is the first time the machine has been started, an automatic start-up process of the milling machine will be carried out after switching on the power, during which the LCD display will show information about the process in progress.

The machine will show on the LCD display the number of keys made since the last cutter change.

2. Proceed to the next step by pressing the **NEXT** button.
3. The machine will show the two available operating modes on the LCD display:
  - scanning the key profile (measurement),
  - reading data from a computer via USB - this option will be described in the following sections of the manual.
4. Select the **SCAN** mode of operation - scanning the key profile. The device will carry out an automatic process of basing the milling machine, during which the LCD display will show information about the ongoing process.
5. In accordance with the message shown on the LCD display, place the original key in the scanning unit following the information in chapter 3.2 Key profile scanning unit chapter of this manual.



6. Proceed to the next step by pressing the **NEXT** button - the machine will carry out an automatic process of scanning the key profile for both sides, during which the LCD display will show information about the scan (measurement) in progress.

It may happen that the process is interrupted by the machine and a message about the need to clear the key again is displayed. In such a situation, the original key should be removed from the scanning unit and then the operation should be confirmed with the appropriate button - failure to perform this operation will prevent further operation. After the original key profile has been thoroughly cleaned again, the scanning process should be resumed in accordance with the instructions on the LCD display.

7. When the scanning process is successfully completed, a message will be displayed on the LCD informing you of this.

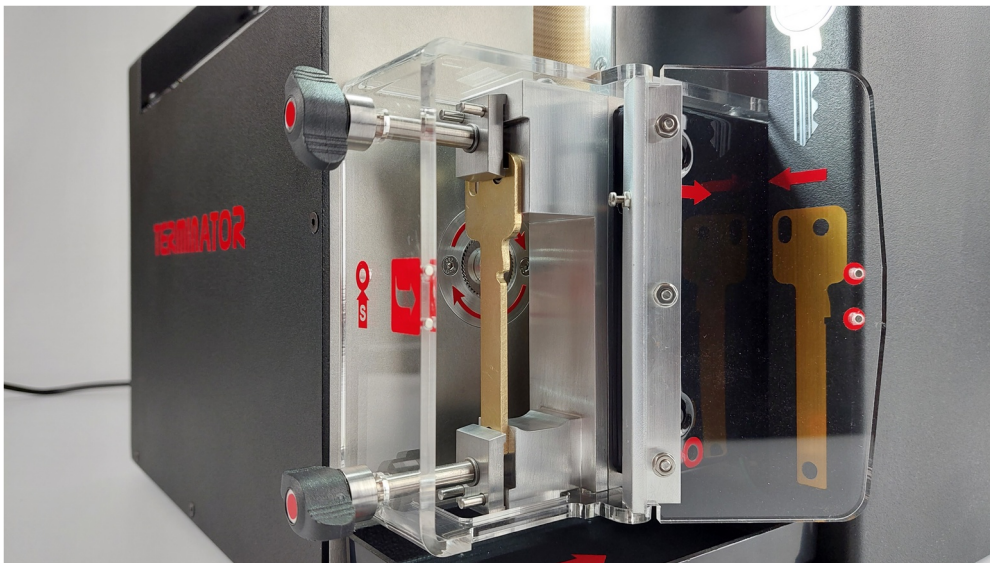
According to the on-screen instructions, the original key must be removed from the scanning unit - failing to do so will prevent you from proceeding to the next stage of copying.

The next step is to choose a further action from the options available:

- **COPY / NEXT** - select this option to proceed to the next stage of copying,
  - **EXIT** - returns you to the welcome screen,
  - **SAVE / USB** - this option will be described in the following sections of the manual.
8. When the **COPY / NEXT** option is selected, information about the thickness and width of the scanned key profile will be displayed, along with the options available for further action:
- **SET** - when this option is selected, you go to the next menu screens where you can once again go to the USB storage and modify the following processing parameters:
    - increase or decrease the thickness of the profile to be machined and information on the thickness after modification,
    - selection of copy mode - fine (recommended) or fast (reduced milling resolution),
    - a choice of key type - short (most 5 ratchet spanners) or long (mainly 6-7 ratchet spanners),
  - **STANDARD** - this option is selected to proceed to the next stage of copying using the default settings of the milling process (thickness of the profile unchanged, making an exact copy, short key type),
  - **EXIT** - deletes the scanned key profile from the machine memory and returns to the welcome screen



9. When the key profile milling settings are selected, the following information is presented on the LCD display:
- the first line - the type of key automatically recognised by the machine (notched or drilled) and the default status of the groove countersinking function (this function has been described in more detail in chapter [3.5 Groove countersink function](#) chapter of these instructions)
  - second line - command to install the key raw material in the milling unit  
(this operation must be carried out in accordance with chapter [3.3 Milling unit](#) chapter of these instructions)
  - third row - minimum recommended thickness of key raw material
  - fourth line - available options for further action described below:
    - **START** - start of the milling process,
    - **RETURN** - takes you to the previous screen,
    - **CHANGE** - toggles the milling mode between notched and drilled key types and toggles the groove countersinking function on ('+' sign) or off ('-' sign), i.e. no groove countersinking.



10. Once the milling process has started, the machine will first measure the raw material of the key placed in the milling slot, informing you of this with a message on the LCD display.

11. After the measurement is completed, the information about the dimensions of the measured key raw material and the thickness of the original key profile is displayed for 3 seconds (this time is indicated by a continuous beep). During this time the following on-screen options are available:

- **NEXT** - Forced immediate transition to the actual milling process
- **STOP** - stops the current process so that the user can calmly examine the measured values and possibly decide to stop the milling process e.g. if the wrong key material has been clamped

(while the process is stopped by pressing the **STOP** button it is forbidden to replace the raw material with another one, such operation can be performed only after the current milling process is stopped by pressing the **BREAK** button)

- **BREAK** - interrupts the milling process and returns to the previous menu

If no selection is made during the indication of the available options, immediately after the measurement of the raw material the machine automatically proceeds to the actual milling process.

**Pressing the **BREAK** button will immediately interrupt the milling process and return to the previous menu. Key raw material that has been at least partially milled is not reusable and reworking is prohibited!**

Opening the door of the milling slot guard during raw key processing will cause the machine to stop and a message will be displayed. During this time, it is forbidden to carry out any activity within the milling or scanning unit, as this may cause damage to the machine. Having first ascertained that there are no objections to continuing with the machine, it is permissible to close the milling bay cover and continue with the machining process by pressing the **NEXT** button.

12. When the milling process is complete, a message will be displayed on the LCD informing you of this.

In accordance with the instruction on the screen, remove the raw key from the milling slot and close the cover door - failure to perform this operation will prevent proceeding to the next stage of copying. Confirm the operation by pressing the **NEXT** button.

13. The machine will display a message asking whether to make another copy of the key, below is a description of the available action options:

- **YES** - the machine will return to the stage where a new key material must be fitted
- **NO** - terminates the process and returns to the welcome screen.

**The raw material of the key with the milled profile is further processed on conventional key machines with due care and accuracy in the making of the key copy. Below are some tips and tricks that will make it easier to make a key copy:**

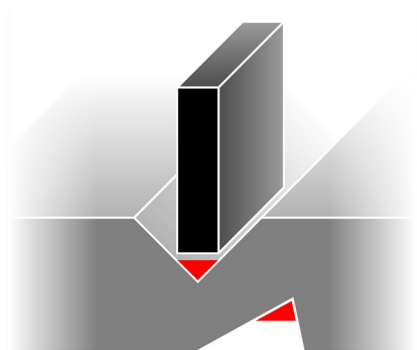
- Shorten the raw material of the spanner by cutting off the unmilled end of the spanner with the locating hole (e.g. using a hand-held metal saw) to a dimension depending on the type of spanner:
  - in the case of keys with an upper limitation (so-called base), the profile length measured from the upper limitation (so-called base) should be 2-3mm longer than the length of the working part of the original key,
  - In the case of keys without an upper limit (so-called base), which rest against the tip in the lock, the length of the key's raw material profile should be 2-3mm longer than the length of the working part of the original key,

(after shortening the raw key, smooth the cut edge, e.g. with a file or grinder, so that the raw key is correctly positioned in the jaws of the conventional machine),

- The tip of the key shall be brought into the correct shape to match the shape of the original as closely as possible,
- pay attention to the thickness of the upper stop (so-called base) in the original key, if its thickness in the raw key is too high in relation to the original it should be reduced to the correct dimension (e.g. by means of a file or milling machine).

### 3.5. GROOVE COUNTERSINK FUNCTION

In cases where the original key profile was made at the factory by a set of angle milling cutters cutting triangular grooves, it is not possible to perfectly scan and make a key profile with a tool that is finished with a flat surface. The situation described is illustrated in the following figure:



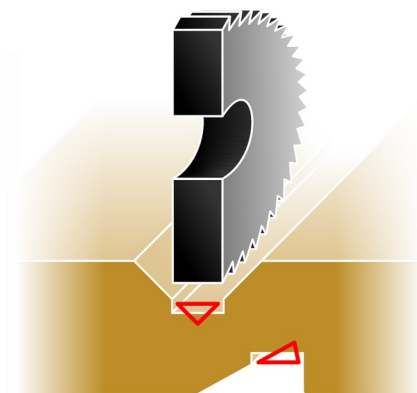
grey - enlarged section of the key

black colour - flat tip tool

red - area that cannot be scanned or milled with a flat tip tool

The X-KEY Terminator machine scans the key with a probe plate only 0.25 mm thick, while the cutter itself is 0.30 mm thick.

The solution to this problem is the groove countersinking function, which analyses the scanned key profile looking for areas where the probe insert (plate) was not able to measure properly and, in the process of creating the key profile, countersinks these areas. This allows it to produce a copy of the key profile that will fit even the most accurate locks. The following illustration shows the milling of a key profile with the groove countersinking function activated:



gold - enlarged section of the key's raw material

colour black - ball nose cutter

red - area that could not be scanned



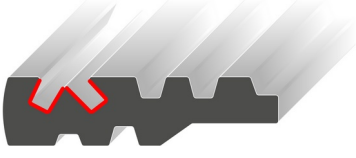


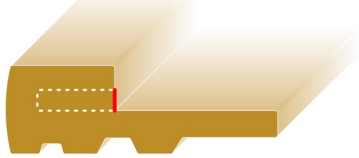
It should be noted that the groove countersinking function has the effect of reducing the thickness of the profile within its area of operation, thus causing a mechanical weakening of the key profile. Therefore, the machine has the possibility to adjust the operating parameters of this function, which are set by default to optimal values for the execution of most key profiles (it is recommended not to change these values).



### 3.6. SPECIFIC CASES OF KEY PROFILES

Some key profiles have a particular profile shape that is impossible to scan and mill using a tool that is perpendicular to the cross section of the key (i.e. like the probe and cutter of the X-KEY Terminator machine).

Below are some examples of key profiles, which require additional processing after the standard profile milling process. The red line indicates the groove shapes to which special attention should be paid, i.e. how they look in the original profile in comparison with the profile made on the X-KEY Terminator machine. The difference results from the scanning and milling process, which is illustrated by the scanning process of the key profile, where it can be seen which areas of the profile are not accessible for measurement by the probe.

Original key profile	Key profile scanning process	Manufactured key profile
		
		
		

In such cases the produced key profile requires additional processing on other machines so that the shape of the key profile corresponds to the original. The white dotted line on the illustrations of the key profiles shows the areas which have to be milled additionally. A vertical milling machine with the appropriate cutter can be used for this purpose. Please take particular care to ensure that the additional machining is carried out accurately as, in extreme cases, it is possible to block the cylinder by using an incorrectly manufactured key.

### 3.7. CLEANING AND MAINTENANCE

- The machine and its place of work must be kept clean and tidy in accordance with generally accepted safety rules.
- The swarf caused by milling the raw material should be removed regularly from the container under the milling slot, while the swarf remaining on the milling unit components should be gently removed with the brush supplied.
- The following must not be used to clean the machine: compressed air, wet objects (e.g. rags, cloths, etc.).
- The only liquid cleaning agent that can be used to clean the machine, accessories, original keys and raw materials is white spirit.
- The elements of the scanning unit - especially the measuring probe and the reference element - must be kept very clean. To clean these components, use the brush from the supplied set, or in the case of heavy soiling, you can additionally moisten it with extraction gasoline.
- The use of preparations that reduce electrical resistance (e.g. electrical contact spray) on any machine components, key originals to be scanned and key raw materials to be processed is prohibited.
- Lubrication of any machine component is not included and is prohibited.
- It is forbidden to remove the machine casing, dismantle parts and carry out other activities outside the scope of normal use and maintenance as described in this manual.



**Failure to comply with the machine instructions and the prohibitions listed therein will result in immediate loss of the warranty and may cause permanent damage to the machine and accessories.**

## 4. SERVICE FUNCTIONS

The service functions are accessed by pressing the **SERVICE** button when the machine displays the welcome (start) screen. Upon entering the service menu, the LCD display will show the currently selected function and the available action options for the buttons:

- **NEXT** - switching to the next service function (after reaching the last menu item, it is returned to the beginning of the menu)
- **EXIT** - leaving the service menu and returning to the welcome screen
- **ACCEPT** - entry to the selected service function

In the following subsections, the individual service functions are described in detail, namely:

- 1) Basic parameters of key processing
- 2) Additional key processing parameters
- 3) Changing the cutter and calibrating the milling machine
- 4) Advanced settings
- 5) Test plate

### 4.1. BASIC PARAMETERS OF KEY PROCESSING

Parameter values are changed by pressing the appropriate button for decreasing or increasing. Pressing the **ACCEPT** button saves the values and moves to the next option. After going through all available options of a given service function, you will return to the main service menu.

Options available:

- Thickness correction: + thicker - thinner  
Manual setting of additional thickness correction of performed key profiles. Default value is 0.
- Symmetry correction: +right -left  
Manually set the offset correction between the left and right sides of the key profile for all keys performed. Default value is 0.
- Correction of the notched key base  
Manual setting of the milling correction of the notch key base (so-called key bottom). Default value is 0.

- **Maximum groove countersinking**

Sets the maximum value for the groove countersinking function. The default value is 0.148 mm and is optimal for most keys.

- **Percentage regrooving**

Sets the operating range of the groove countersinking function. The default value is 30% and is optimal for most keys.

- **Groove width correction**

Manual adjustment of the width correction of the key profile grooves.

**It is advisable to manually correct this parameter because of the non-linear wear of the cutter and the resulting change in its thickness.** If no additional correction is made, the grooves in the next key profiles produced will become narrower as the cutter wears down, and thus each subsequent key will enter the lock cylinder more and more tightly.

Below is a summary of the optimum correction values if we mainly make keys in thicknesses from 2.45 to 2.90 mm.

<b>Number of spanners made after milling cutter replacement</b>	<b>Correction value groove width</b>
15-20	+0.031 mm
30-35	+0.063 mm
45-50	+0.094 mm

For a larger number of milling cutters after milling cutter replacement the correction value does not have to be increased any more, because of the negligible change of the milling cutter thickness during the subsequent milling process.

If mainly thicker keys are milled (i.e. with a thickness of more than 3.00 mm), it is advisable to make the correction sooner, i.e. in the lower ranges of the above-mentioned values for the number of keys made.

Remember to reset the groove width correction value to zero (i.e. set to 0.000 mm) before changing the cutter and calibrating the milling machine.

## 4.2. ADDITIONAL KEY PROCESSING PARAMETERS

Parameter values are changed by pressing the appropriate button for decreasing or increasing. Pressing the **ACCEPT** button saves the values and moves to the next option. After going through all available options of a given service function, you will return to the main service menu.

Options available:

- Correction of the displayed thickness of the original key  
This parameter does not affect the processing of the key profile. The value is set at the factory and can be adjusted if necessary.
- Correction of the displayed key raw material thickness  
Manual setting of the correction value of the key raw material thickness measured with the cutter before machining. During the milling cutter change and calibration process, this value is reset to zero and the machine automatically sets the correct key raw material thickness value.
- Correction of the displayed width of the original key  
This parameter does not affect the processing of the key profile. The value is set at the factory and can be adjusted if necessary.
- Width symmetry of the pre-drilled key  
Manually set the machining correction for the drill key. Default value is 0.
- **Short drilling key feed**  
Manual adjustment of the milling limitation of the sides of the drilled key at the upper limits (the so-called key base). **The default value is 0.563 mm and is optimal for keys between 2.45 and 2.90 mm thick**, for thicker keys this value should be lowered to avoid unnecessary cutting of the upper limits (so-called key base).
- Milling thickness correction  
Manual setting of the milling allowance for each 1mm of material collected. This parameter is important for the machine mechanics to produce an accurate key profile. The default value is +0.008 mm / 1 mm and is optimal.

### 4.3. CHANGING THE CUTTER AND CALIBRATING THE MILLING MACHINE

This service function is used to carry out the milling cutter replacement process and calibration of the milling machine, which occurs automatically each time this process is successfully completed.

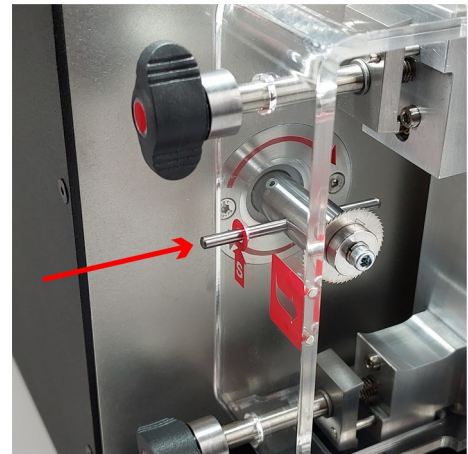
You will need the following tools (included with the machine in the tool box) and materials to perform the operation:

- New X-KEY cutter
- key raw material 2.45 mm thick  
(recommended use of raw material with stamped number 1)
- locking pin diameter 3 mm
- Allen spanner 2.5 mm
- brushes

Activating this function first will result in an automatic baseline process, during which the LCD display will show information about the ongoing process.

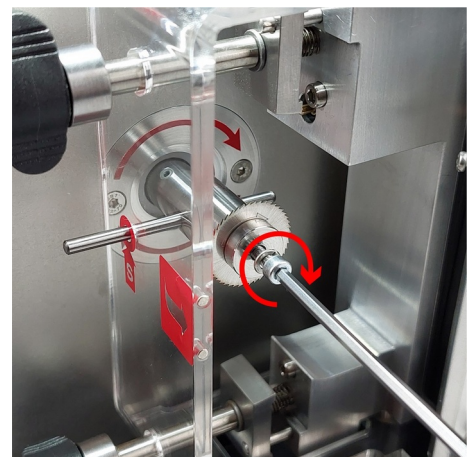
Once the basing process is complete, the machine will move the milling unit to the service position and display a message asking you to attach a new cutter. At this point, carry out the following steps:

1. Insert the locking pin into the milling socket cover at the point marked with the red 'S' sticker, and then insert further into the through hole located in the spindle (the spindle may need to be manually rotated to obtain the correct position). A properly seated locking pin should pass completely through the hole in the spindle and extend beyond the outer contour of the milling socket so that it is supported.



2. **ATTENTION: The screw holding the pick has a "LEFT" thread, to unscrew it, turn the Allen key clockwise (clockwise).**

Loosen the screw holding the cutter and its clamping element with a 2.5 mm Allen spanner. After loosening the screw and pulling it out together with the clamping element, carefully slide the cutter out of the spindle retainer. Dispose of the used cutter.

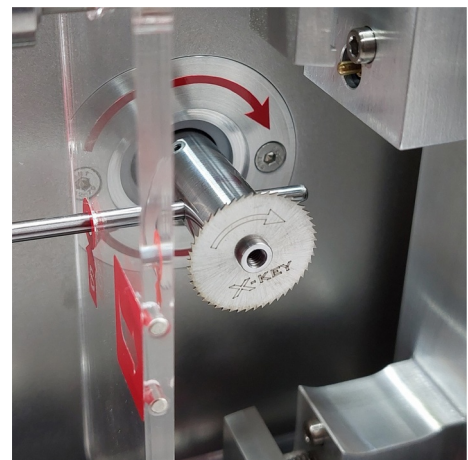


3. Clean with a brush the parts removed from the machine (screw with spring washer and clamping element) and the end of the spindle where the cutter is inserted.



4. Slide the new X-KEY gently onto the spindle locking element. Pay attention to its correct orientation and direction of the teeth - the direction of the arrows engraved on the cutter must correspond to the red arrows located in the depth of the milling slot (the cutter turns clockwise and its teeth must be oriented this way).

Before proceeding, make sure that the cutter is properly seated on the spindle retainer and that its back side is fully flush with the spindle.



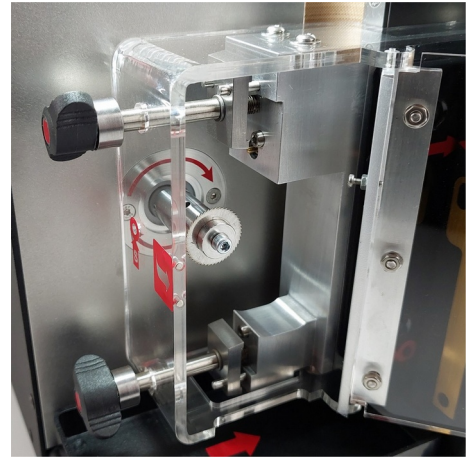
5. Screw the bolt with the spring washer and the clamping set back in place by turning to the left (counterclockwise). To tighten the screw, use a force that will lock the new cutter and clamping element in position (this is the force you achieve by exerting medium pressure on the short part of the Allen key used for this operation). Too much force must not be used, so as not to damage the milling machine components.





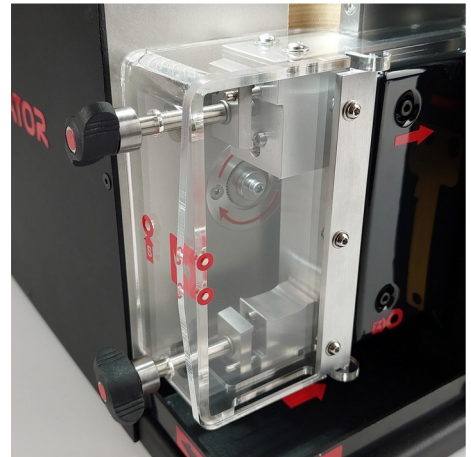
6. Remove the locking pin from the machine and ensure that all steps have been carried out correctly and that no workpiece is left in the milling bay. Only then can you close the milling bay cover.

**ATTENTION:** Leaving the locking pin in the service hole or spindle is not permitted and will damage the unit.

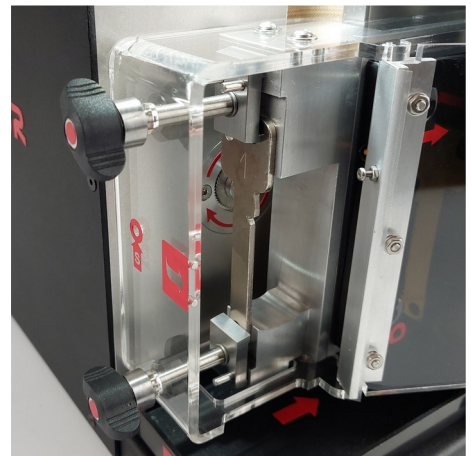


7. Close the milling slot cover door and press the **NEXT** button - the machine will bring the milling unit to the rest position and display a message instructing to insert a new 2.45 mm thick key raw material into the milling slot.

For this process it is recommended to use the raw material of the spanner marked with a stamped number 1 on the head. These are selected raw materials, the use of which allows the calibration process to be carried out correctly. If we do not have the recommended raw material available, we have to choose from among the available raw materials a one-sided, notched key with a thickness as close as possible to the 2.45 mm value.

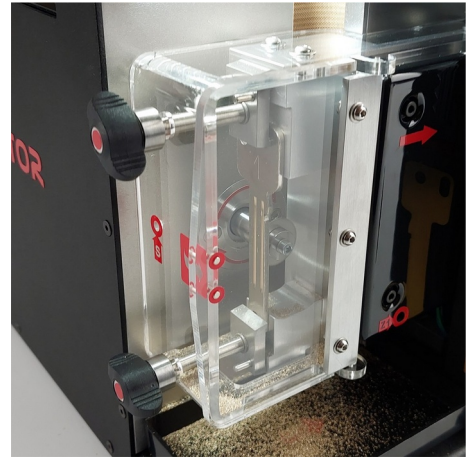


8. Insert the new key raw material following the information in chapter [3.3 Milling unit](#) of these instructions.



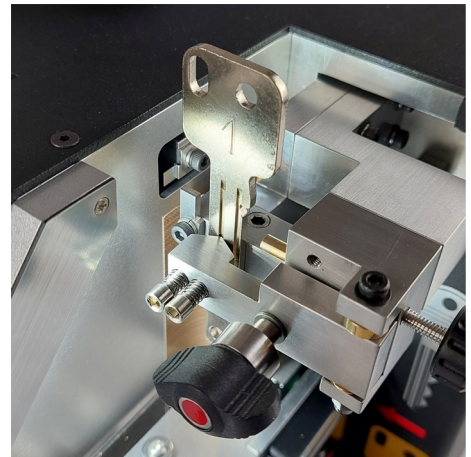


9. After inserting the appropriate raw key into the milling unit, press the **NEXT** button - the machine will measure the raw material and then carry out a control milling process, during which the LCD display will indicate the process in progress.



10. When the control milling is finished, the machine will display a message instructing to transfer the raw material to the measuring vice, at which point the following steps should be taken:

1. The raw material of the key with the check milling performed should be taken out of the milling unit and thoroughly cleaned with a brush from any swarf and dirt.
2. Place the cleaned key raw material in the scanning unit according to the following guidelines:
  - the upper stop (the so-called base) is pointing to the right - towards the element indicating the scanning range
  - the locating element for the movable part of the scanning unit vice should be in the left milling groove of the inspection
  - the optimal position of the raw material in height is determined by a single short cut of about 3 mm between the control milling grooves, this cut must be below the top plane of the moving part of the vice (the raw material must not be placed too low either, i.e. the top stop must be above the scanning range of the profile)
3. Press the **NEXT** button - the machine will perform a control measurement, during which the LCD display will indicate the process in progress.



11. At the end of the control measurement, a summary will be displayed with information about the measured values of the calibration parameters and the acceptable range of these values for the correct functioning of the machine (referred to as the standard):
- parameter **a)** - value defining the difference between the dimensions of the grooves cut
  - parameter **b)** - value determining the position of the measuring probe and the pick in relation to each other
  - parameter **c)** - definition of the milling cutter thickness difference from the nominal value: '+' thicker cutter, '-' thinner cutter

**The data collected by the machine during the calibration process corrects the milling machine's operating parameters programmatically to produce accurate copies of the key profile.**

In the event that the value of any of the parameters is outside the norm, the machine will display a message with the potential cause and a suggested solution to the problem. It is possible to skip the warning and complete the calibration, but this action is strongly not recommended due to the reduction in accuracy of the key profiles performed.

12. Press the **NEXT** button - the machine will save the data collected during the calibration process and will display a message that the process has been successfully completed and will ask you to remove the key from the scanning unit.
13. Press the **END** button - the machine will display a welcome screen and is ready for further operation.

### 4.4. ADVANCED SETTINGS

This service function is only available to the manufacturer or an authorised service centre and has been protected by a PIN code against unauthorised use.

### 4.5. TEST PLATE

Activating this function will carry out an automatic basing process and probe check - during these operations the machine will present information about the current operation on the LCD display.

At the end of the test a summary will be displayed with information about the value of the measuring probe deviation and the acceptable range of this value for the correct functioning of the machine (called the standard).

If the measured value exceeds the standard, the measuring probe and the reference element must be thoroughly cleaned according to the principles described in chapter [3.7 Cleaning and maintenance](#). Then repeat the test process by pressing the 'repeat' key.

It may happen that in spite of repeated cleaning of the scanning unit's elements, a test on the measuring plate gives a result which exceeds the acceptable standard - in this case please contact service or the manufacturer in order to solve the problem.

## 5. X-KEY NEO SOFTWARE

### 5.1. DESCRIPTION OF THE PROGRAMME

X-KEY Neo is a computer program for the MS Windows operating system, extending the functionality of the X-KEY Terminator milling machine by two-way communication with the machine via USB port, visualisation of scanned keys, saving, reading, editing and correcting profiles. Available functions are dependent on the licence variant.

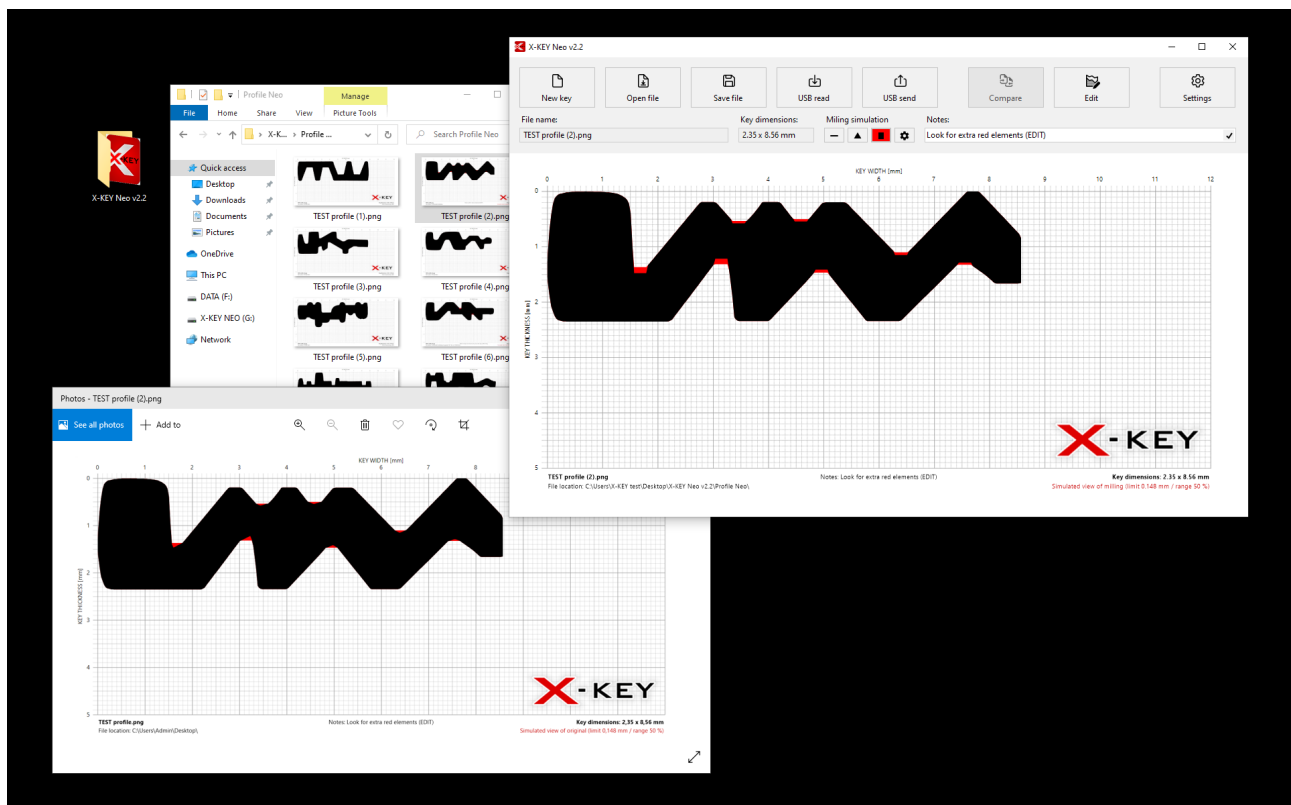
It is a portable program, which means that no wizard installation is required - just copy the program directory to a convenient location. It is not possible to run the program from CD due to lack of possibility to save configuration files, but the program can be used from USB flash drive.

In the 'X-KEY Neo' programme directory you will find:

- X-KEY Neo' application
- directory 'LIB' - libraries and configuration file (this directory should not be deleted or modified)
- directory 'Profiles Neo' - sample files with key profiles

For X-KEY Neo to work, it is required to use a USB dongle, which must be plugged into the computer at all times while the application is running.

The programme saves key profiles as PNG graphic files, which enables to display thumbnails with preview in Windows explorer and to view the key profile in any graphic browser (the free demo version has a limited preview).



## 5.2. MINIMUM HARDWARE AND SYSTEM REQUIREMENTS:

- Operating system MS Windows version 7 SP1 or later
- 2 free USB ports  
(one for connecting the milling machine, the other for the program security dongle)
- Screen resolution at least 1280×768
- .NET Framework version 4.5  
minimum(available as standard for Windows 8, 10 and 11)
- USB driver - FTDI CDM v2.10.00 WHQL Certified or higher  
(usually installed automatically by Windows when the machine is connected)

## 5.3. LICENCE VARIANTS AND FUNCTIONALITY

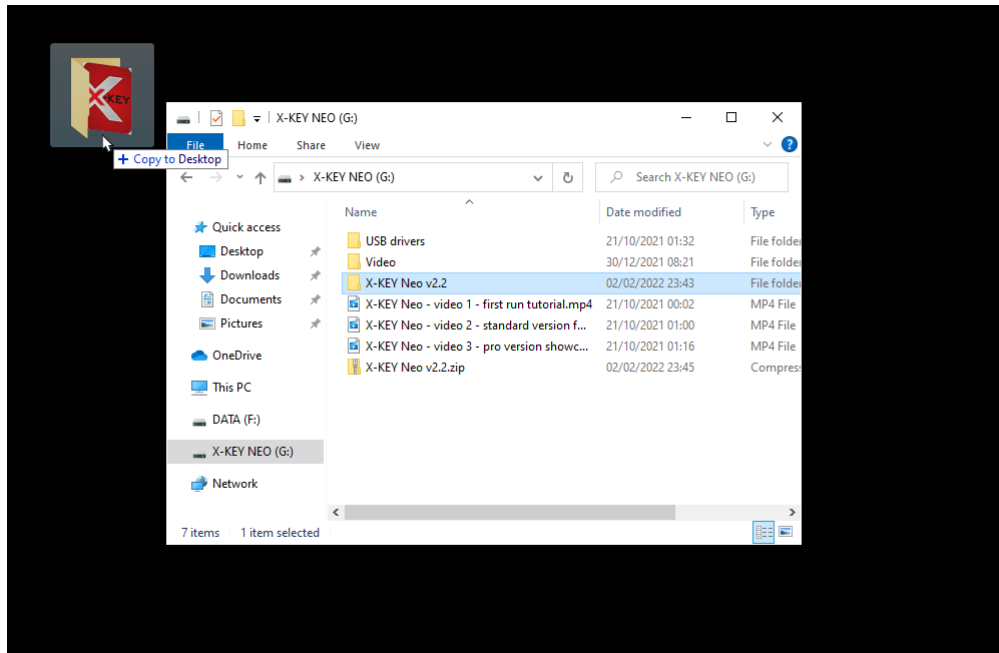
Each new machine comes with a USB dongle with a free DEMO licence. It is possible to purchase a higher-end licence at any time - please contact the manufacturer or an authorised distributor.

Each USB dongle has a unique serial number to which the corresponding user licence is assigned. When upgrading to a newer software version, the USB dongle data is updated.

DEMO	IMAGE / STANDARD	PRO
receiving and sending data to the machine  reading and writing of scanned profiles to PNG files with limited preview	receiving and sending data to the machine  reading and writing of scanned profiles to <b>PNG files with full preview</b>  <b>visualisation of key profiles and preview of simulation of the groove countersinking algorithm</b>	receiving and sending data to the machine  reading and writing of scanned profiles to <b>PNG files with full preview</b>  <b>visualisation of key profiles and preview of simulation of the groove countersinking algorithm</b>  <b>editing and correction of scanned profiles</b>

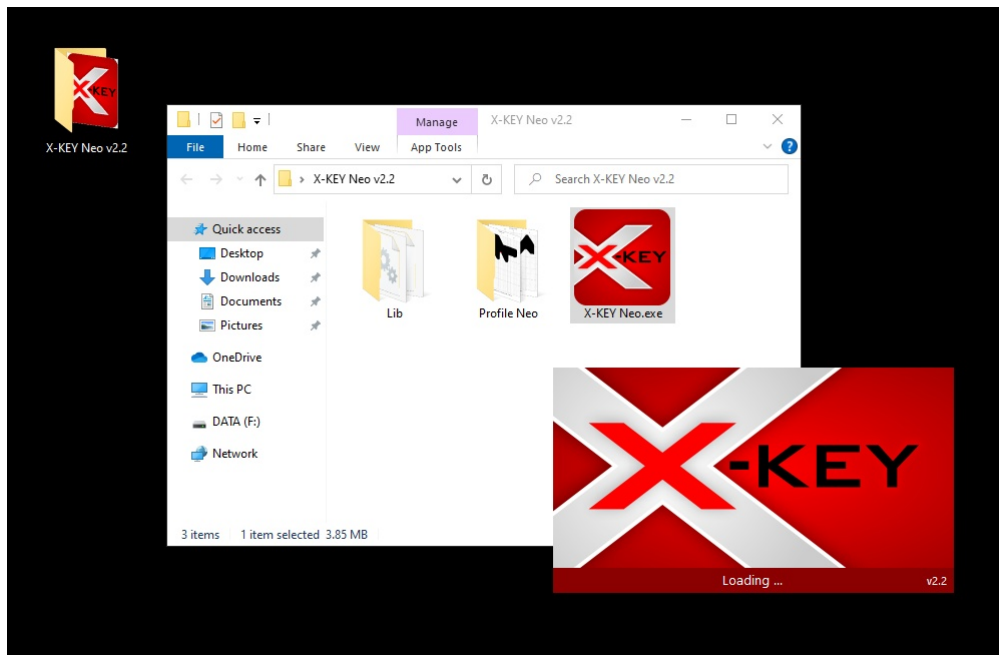
## 5.4. INSTALLATION

1. Insert the carrier with X-KEY Neo program into your computer (choice of DVD or USB flash drive) or download the current version of the program from: [www.x-key.eu](http://www.x-key.eu)
2. The program does not require installation using the wizard. It is a portable program, so you need to copy the whole folder named 'X-KEY Neo' to a convenient location (usually the desktop) or you can use a USB flash drive (it is not possible to run the program from a CD because the configuration files cannot be saved).

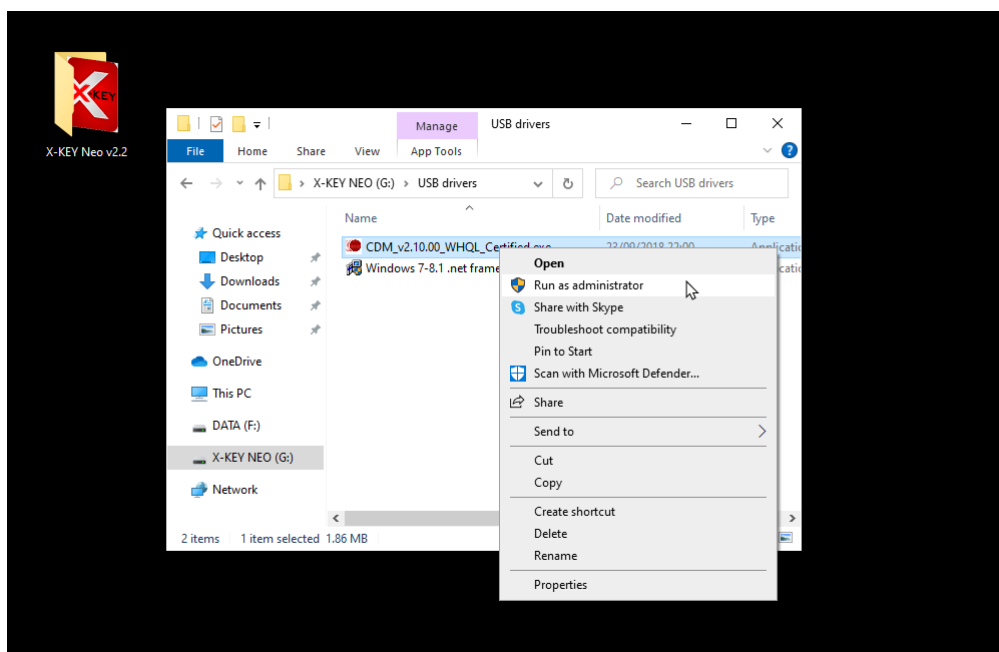


3. Insert the USB dongle into your computer.
4. Connect the USB cable between the computer and the milling machine.
5. Enter the copied program directory.

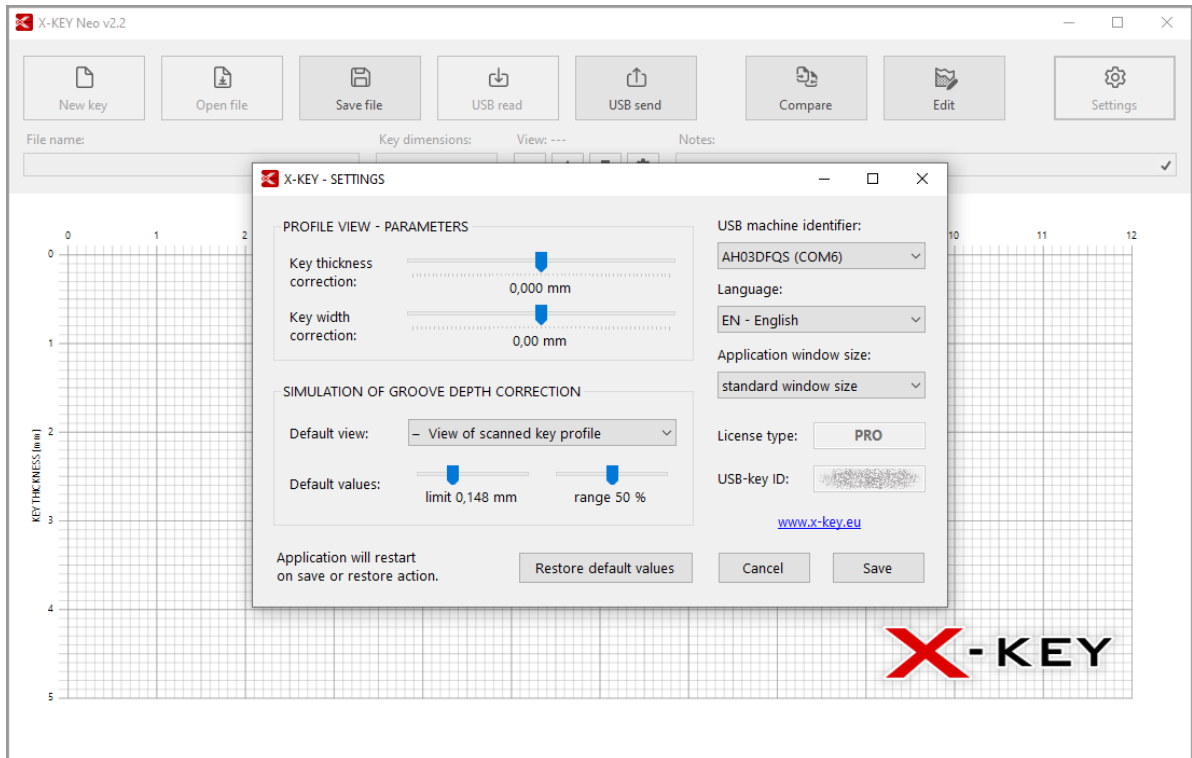
## 6. Start the 'X-KEY Neo' application.



7. The first launch of the application usually takes a few seconds and during this time the startup screen is displayed (so called 'Splash Screen' with the words 'Loading ...'). Then the startup screen should disappear and the application will be launched.
8. If after a longer time the boot screen does not disappear or there is an error message about a missing 'FTD2XX\_NET.dll' library, close the application and install the USB driver yourself from the included CD or USB flash drive. The driver installer file is called 'CDM\_v2.10.00\_WHQL\_Certified.exe' and is located in the 'USB Drivers' directory. Depending on your system configuration, you may need to run the installer with administrator privileges.



9. When you run the program for the first time, an additional window with settings will be displayed, where you can choose the options you want (later these options can be freely changed by entering the settings). If a machine connected by USB cable has been recognised by the programme, its ID will be displayed together with the COM port number.



If you have many devices connected to your computer, it may happen that the program selects the wrong device - then you should manually select the right device from the list and save the settings.

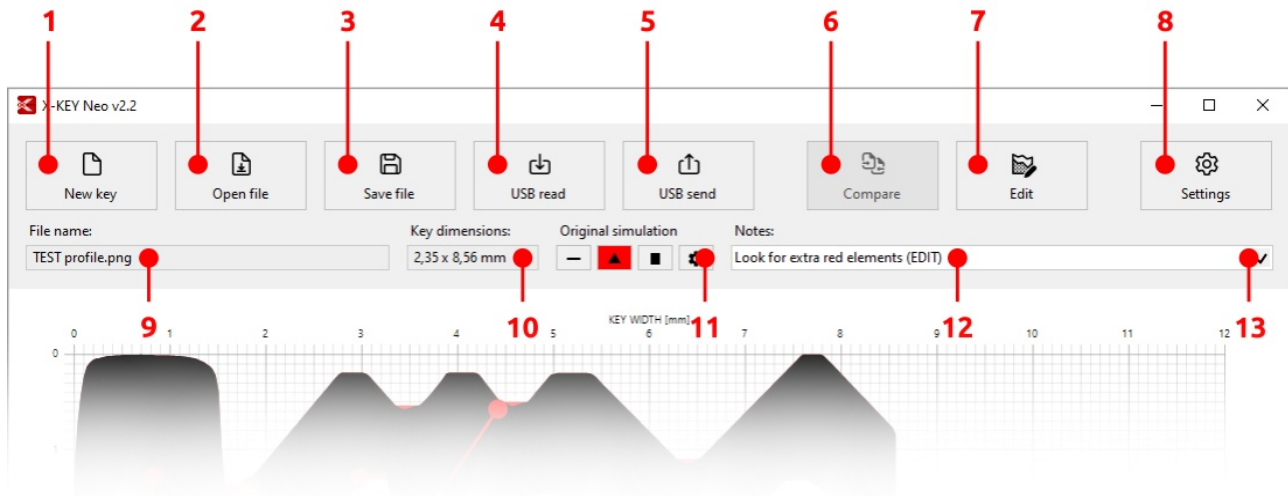
If the machine is not recognised when the program is started, the settings window will appear every time the program is started until the configuration with the machine ID is saved.

10. After saving the settings and automatically restarting, the programme is ready to use.

On subsequent program runs where the correct configuration has already been saved (i.e. with machine ID), the settings dialog will not be automatically displayed.

## 5.5. OPERATING BASICS

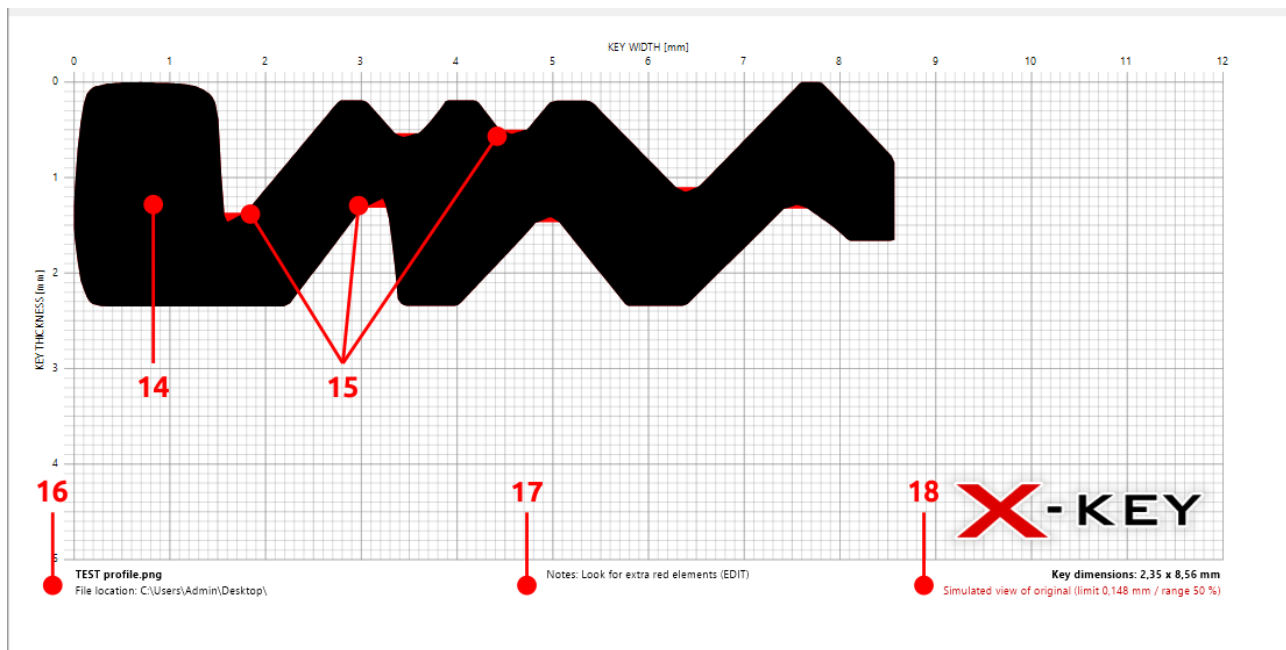
### Description of the program window



1. New key - closes the current key profile preview and clears the program window
2. Open file - opens a previously saved key profile
3. Save file - saves the currently displayed key profile
4. USB reading - receiving key profile data from the machine
5. USB upload - sending key profile data to the machine
6. Compare - compares the read key profiles (function currently not available)
7. Edit - switches the program to the key profile editing mode
8. Settings - opens the settings dialog box
9. File name - current file name or information that the profile has not yet been saved as a file
10. Key dimensions - thickness x width in unit [mm]
11. Key view mode switches
  - original view
  - preview of simulated view of original key
  - preview of simulated view of milled key with active groove countersinking function
  - setting the temporary values for the groove countersinking function
12. Notes - a field to enter your annotations regarding the given key profile
13. Button to confirm the entered notes, optionally you can use the 'ENTER' key on your computer keyboard



## Programme window description - continued



14. Correct preview of the key profile
15. Overview of the simulation of the groove countersinking algorithm - areas displayed in red
16. Name and location of the profile key file
17. Preview of the entered notes of the key profile
18. Preview of key dimensions and currently set view mode

## Reading and writing files

X-KEY Neo saves the key profile as a single PNG image file for easy viewing of file contents in any image viewer and for viewing thumbnails with preview in Windows.

The saved key profile file shows the image displayed at the bottom of X-KEY Neo, so a preview is saved with the currently selected view mode.

We suggest saving files with a name according to the following scheme:

[manufacturer name] [model or series] [additional information]. png

e.g. *PRODUCER Model123 edited. png*

Key profile files can be opened in X-KEY Neo in several ways:

- using the 'open file' button in the main application window,
- by dragging the PNG file onto the application file or its shortcut (e.g. on the desktop),
- by dragging the PNG file onto the open application window.

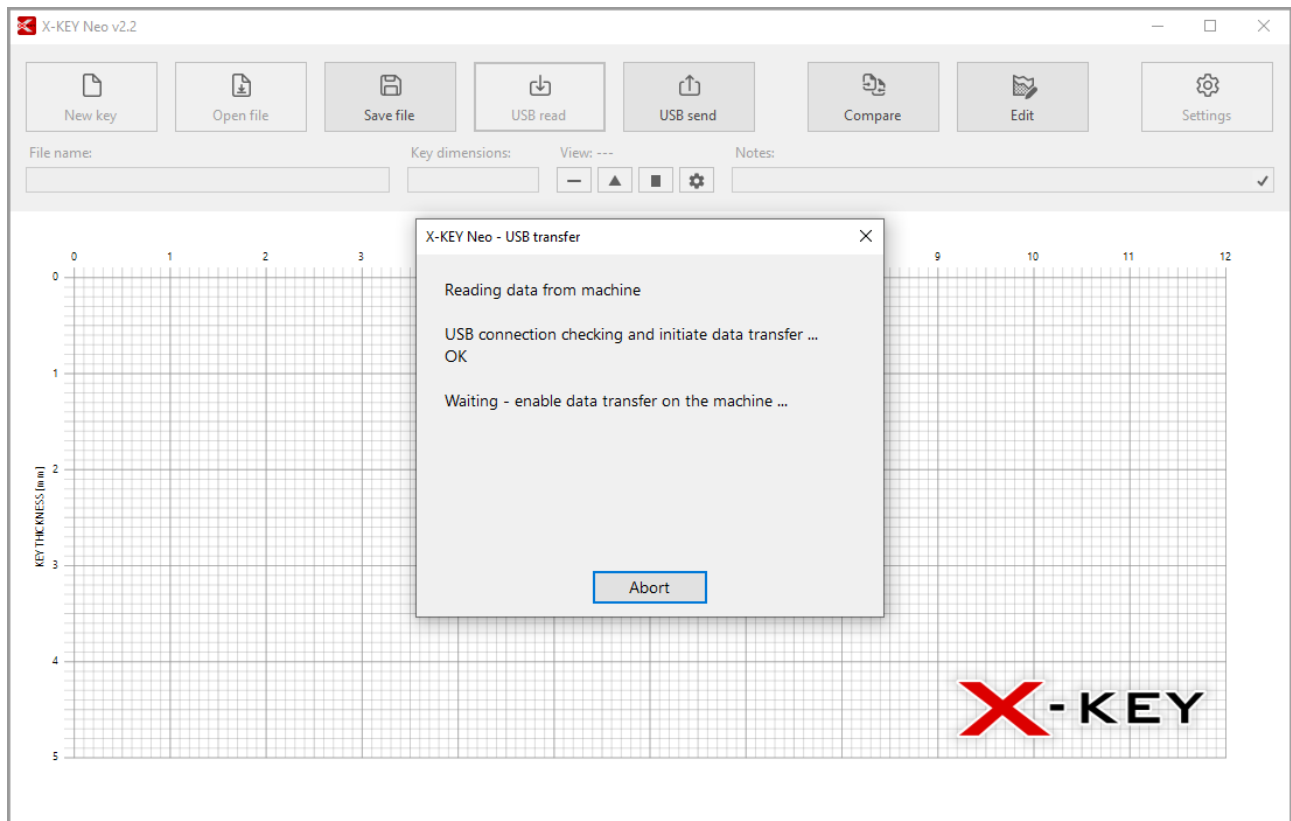
## Receipt of key profile data from the machine

1. Start the X-KEY Neo program.

If the program was already running and you were working on a different key profile, save it so you don't lose it, then click the 'New key' button.

2. Click the 'USB reading' button.

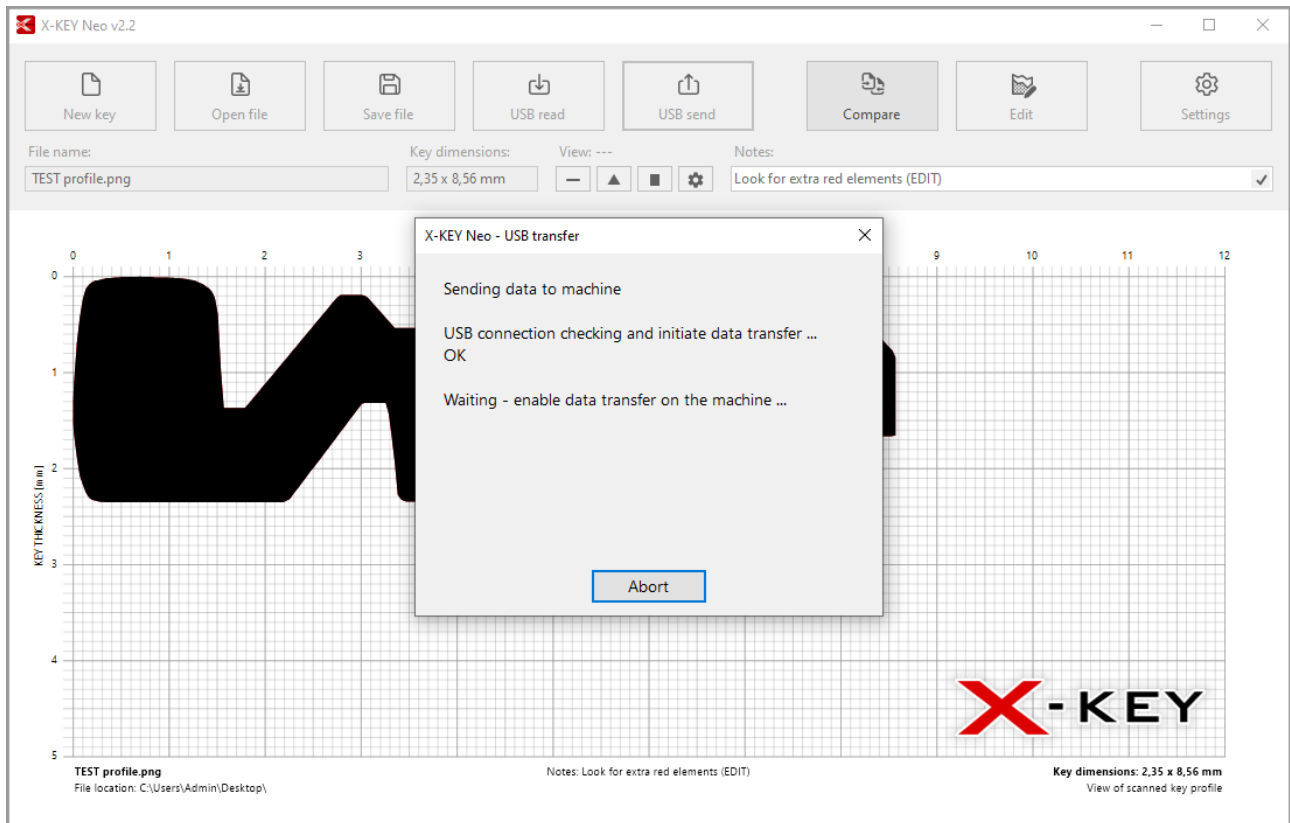
3. A dialog box will open with information about the current status of the data transmission and any errors (e.g. unconnected machine).



4. Scan the key profile on the machine in the same way as the copy process. When scanning is complete, click the **SAVE USB** button on the machine instead of going into copy mode.
5. The machine will display a message about waiting for the USB transmission.
6. If all the previous steps have been performed correctly, the machine will send the data to the computer and proceed to the next stage of copying where we can make a copy of the key profile.
7. After correct data reception, the transmission dialog box will automatically close and the scanned key profile will be displayed.
8. Save the key profile using the 'Save file' option.

## Sending key profile data to the machine

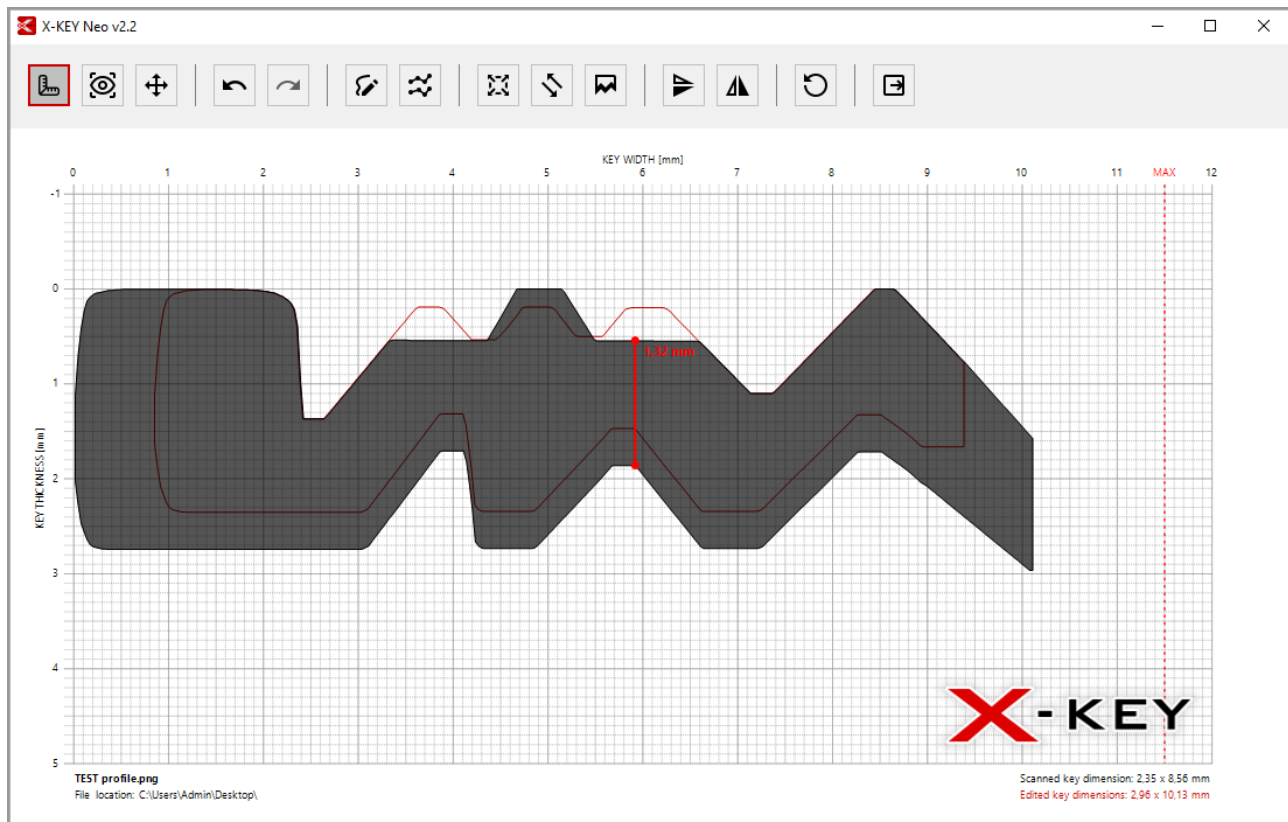
1. Start the X-KEY Neo program.
2. Open the profile file of the key you wish to transfer to the machine.
3. Click the 'USB upload' button.
4. A dialog box will open with information about the current status of the data transmission and any errors (e.g. unconnected machine).



5. Turn on the machine, press **START** on the start screen, confirm the message about the number of keys made and select **USB** mode (file reading).
6. The machine will display a message about waiting for the USB transmission.
7. If all the previous steps have been performed correctly, the machine will receive the data and proceed to the next stage, where the subsequent processes are performed in the same way as when copying the key profile after scanning it.

## Edit key profile

Before entering the key editing mode, it is a good idea to save the original key profile as a backup in case you need it. Once the editing process is complete, the original key profile data in the program is replaced by the modified key profile data.



Description of the editing mode window:

- The available tools are displayed in the upper part of the window. The currently selected tool is marked with a red outline and, when you move the mouse pointer over the preview area, the cursor changes shape corresponding to the mode of operation in that profile area.
- In the preview window, the modified key profile is displayed in dark grey, while the original key profile is displayed as a red outline.
- In the preview window there is a dashed red line marked 'MAX' - the width of the modified key profile must not exceed this line.
- At the bottom of the window is information about the name and location of the file and the dimensions of the key before and after modification.

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Description of the individual functions of the editing mode:

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Ruler	Measuring the distance between two points with a ruler - click the left mouse button to mark the start point and while holding down the mouse button move to the end point, the current distance value is displayed all the time.
Preview of original	Disables or enables the preview of the unmodified key profile (marked with a red outline in the preview window).
Move preview of original	Allows you to move the preview of the unmodified key profile to make it easier to modify the original especially after changing the key profile size.
Back	Undoes the last operation you performed.
Renew	Causes the operation to be re-executed after undo.
Handwritten modification	Similar to operations known from MS Paint, i.e. pencil and eraser. It allows hand-drawing on parts of the profile or deleting selected areas. The current mode of operation depends on the position of the mouse pointer relative to the profile area and is represented by the cursor graphic.
Modify by line	Allows you to delete or add an area by means of a straight line. The current mode of operation depends on the position of the mouse pointer relative to the profile area and is represented by the cursor graphic.

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**Resize**

Allows to change the size of the key profile by moving the given part of the profile in a certain direction. The current mode of operation depends on the position of the mouse pointer relative to the profile area and is represented by the cursor graphic.

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**Tilt**

Allows you to correct the inclination of the key profile or to move one side of the key relative to the other from a specific location.

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**Create negative**

Creates a negative of the selected side of the key profile. This function is useful, for example, when creating attachments for the correct positioning of non-standard keys in the vice of standard key machines.

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**Flip up and down**

Creates a mirror image of the profile with respect to the horizontal axis. Can be used, for example, when the original key is reversed in the measuring vice.

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**Flip left-right**

Creates a mirror image of the profile with respect to the vertical axis. Can be used, for example, when the original key is reversed in the measuring vice.

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**Restore**

Returns the key profile to its initial state, i.e. without modification.

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**End of edition**

Exits edit mode and updates the key profile in the main program window.

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