Traverse V1.0

The universal CNC wire guide for winding machines

Operating Manual

Revision 1.0 • November 2025

Original Operating Manual

The hardware descriptions in this manual revision refer to devices **Traverse V 1.0**.

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1 Using this Manual

This chapter provides information about this manual, the conventions used throughout the manual, and the reference documentation that is available in addition to this manual.

1.1 About this Manual:

This manual describes the functional features and operating principle of your ***Traverse V 1.0 "The universal CNC wire guide for winding machines"*** and provides instructions for installation, setup, start-up, shutdown, operation, maintenance, and troubleshooting.

The layout of this manual is designed to provide quick reference to the sections of interest to the user. To obtain a full understanding of your device, read this manual thoroughly.

This manual also contains safety messages, precautionary statements, and special notices that can prevent personal injury, damage to the device, or loss of data when followed properly.

Note the following:

- The **Traverse** configuration may vary; therefore, not all descriptions necessarily apply to your particular device.
- If some detail applies to only one model or variant, the model or variant is identified by name.
- Illustrations in this manual are provided for basic understanding. They can vary from the actual model of the device or component. However, this does not influence the descriptions. No claims can be derived from the illustrations in this manual.

1.2 Conventions:

This section describes the conventions that are used throughout this manual.

1.2.1 Safety Messages:

The safety messages and precautionary statements in this manual appear as follows:

- Safety messages or precautionary statements that apply to the entire manual and all procedures in this manual are grouped in the Safety chapter.
- Safety messages or precautionary statements that apply to an entire section or multiple procedures in a section appear at the beginning of the section to which they apply.
- Safety messages that apply to only a particular section or procedure appear in the section or procedure to which they apply. They appear different from the main flow of text.

Safety messages are often preceded by an alert symbol and/or alert word. The alert word appears in uppercase letters and bold type.

Make sure that you understand and follow all safety messages presented in this manual.

1.2.2 Special Notices and Informational Notes:

Special notices and informational notes in this manual appear different from the main text flow. They appear in boxes and a note label identifies them. The label text appears in uppercase letters and bold type.

NOTICE Highlights information necessary to prevent damage to the device or invalid test results.

TIP Highlights information of general interest or helpful information that can make a task easier or optimize the device's performance.

1.2.3 Typographical Conventions:

These typographical conventions apply to the descriptions in this manual:

Data Input and Output

- The following appears in **bold** type:
  - Input that you enter by the keyboard or that you select with the mouse
  - Buttons that you click on the screen
  - Commands that you enter by the keyboard
  - Names of, for example, dialog boxes, properties, and parameters

- For brevity, long expressions and paths appear in the condensed form, for example: Click **START > MAIN MENU > NEW BOBBIN**

References and Messages

- References to additional documentation appear *italicized*.
- Messages that appear on the screen are identified by quotation marks.

Viewpoint

If not otherwise stated, the expressions *left* and *right* in this manual always refer to the viewpoint of a person who is facing the device from the front.

Particularly Important Words

Particularly important words in the main flow of text appear in **bold** or *italicized*.

Electronic Manual Version (PDF)

The electronic version (PDF) of the manual contains numerous links that you can click to go to other locations within the manual. These include:

- Table of contents entries
- Index entries
- Cross-references (in red text), for example, to sections and figures

2 Safety

This chapter provides general and specific safety information and informs about the intended use of the device.

2.1 Safety Symbols and Signal Words:

2.1.1 Safety Symbols and Signal Words in This Manual:

This manual contains safety messages to prevent injury to the persons using the device. The safety symbols and signal words in this manual include the following:

Always be aware of the safety information. Do not proceed until you have fully understood the information and consider the consequences of what you are doing.

CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

WARNING Indicates a hazardous situation that, if not avoided, could result in serious injury.

2.1.2 Observing this Manual:

Observe the following:

- Before installing or operating the device, read this manual carefully to become familiar with the winder and this manual. The manual contains important information about user safety as well as the use and care of the device.
- Always keep the manual near the device for quick reference.
- Save this manual and pass it on to any subsequent user.

Read, understand, and comply with all safety messages and precautionary statements presented in this manual.

2.1.3 Safety Symbols on the Device:

The table lists the safety symbols that can appear on the device or labels affixed to the device. Follow the safety notices in this manual to prevent the risk of operator injury or damage to the device.

Symbol	Description
	Indicates a potential hazard. Refer to this manual to avoid the risk of personal injury and/or to prevent damage to the device.
O —	The power supply is off. The Power supply is on
~	Indicates alternating current.
	Indicates a terminal for protective grounding.
	Indicates a terminal for functional grounding

2.2 Intended Use:

The device is designed for use in the manufacture of musical instrument pickup coils.

The device is for use by qualified personnel only.

2.3 Safety Precautions:

2.3.1 General Safety Information:

All users must observe the general safety information presented in this section and all specific safety messages and precautionary statements elsewhere in this manual during all phases of installation, operation, troubleshooting, maintenance, shutdown, and transport of the device.

If the device is used in a manner not specified by **Tonewinder OE**, the protection provided by the device could be impaired. Observe the following:

- Operate the device only within its technical specifications.
- Use only the replacement parts and additional components, options, and peripherals specifically authorized and qualified for the device by **Tonewinder OE**.
- Perform only the procedures that are described in this operating manual and supporting documents for the device. Follow all instructions step by step and use the tools recommended for the procedure.
- Open the enclosure of the device and other components only if specifically instructed to do so in this manual.
- **Tonewinder OE** cannot be held liable for any damage, material or otherwise, resulting from inappropriate or improper device use. If there is any question regarding appropriate usage, contact **Tonewinder OE** before proceeding.

Safety Standard

This device is a Safety Class I instrument (provided with a terminal for protective grounding). The device has been manufactured and tested according to international safety standards.

2.3.2 Qualification of the Personnel:

Observe the information below on the proper qualification of the personnel repairing the device.

Repairs

Only skilled personnel are permitted to repair the device and to establish the electrical connections according to the appropriate regulations**. Tonewinder OE** recommends always having service personnel certified by **Tonewinder OE** perform the repairs.

2.3.4 Electrical Safety Precautions:

WARNING— Electric Shock or Damage to the Device

High voltages are present inside the device that could cause an electric shock or damage to the device.

- Do not make any changes to the electrical or grounding connections.
- If you suspect any kind of electrical damage, disconnect the power cord and contact **Tonewinder OE** Technical Support for assistance.
- Do not open the housing or remove protective panels unless specifically instructed to do so in this manual.
- Do not place liquid reservoirs directly upon the device. Liquid might leak into the device and come into contact with electronic components causing a short circuit.

2.4 Compliance Information:

Tonewinder OE performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the device is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in this manual.

Changes that you make to the device may void compliance with one or more of these EMC and safety standards. Changes to the device include replacing a part or adding components, options, or peripherals not specifically authorized and qualified for the product by **Tonewinder OE**. To ensure continued compliance with EMC and safety standards, replacement parts and additional components, options, and peripherals must be ordered from **Tonewinder OE** or one of its authorized representatives.

The device has been shipped from the manufacturing site in a safe condition.

3 Device Overview

This chapter introduces you to the device and its main components.

3.1 Device Features:

The device comprises the following main features:

- **Easy-to-use universal CNC wire guide for all Pickup winders, fully autonomous, operates without a computer connection.**
- **Start/stop and speed control** for some of the most popular winding machine models on the market (“Mojotone”).
- Winding speed may reach **1500 r.p.m**. Nevertheless, we recommend not exceeding 1,200 r.p.m.
- Compatible with **any wire gauge**. The Traverse has been specially tested with wires from AWG38 to AWG45 with several commercial winders, but it depends on the acceleration rate used by the user. In some commercial models (“Mojotone”), acceleration is controlled by the Traverse.
- Automatic winding is available in **five different winding strategies**: Constant, Table, Pattern, Scatter, and Emulate Mode.
- **The wire tension sensor monitors** the tension wire across the whole winding and automatically holds the process in case of wire breaks or any other issue.
- **Wire tension will be automatically adjusted during winding**, managed by the **ATC device** (Automatic Tension Control).
- All settings and controls are made with the 2.8-inch touchscreen so **there is no need for a PC connection**.
- Traverse has up to **59 memories** for storing your bobbin projects.
- **Software upgrades can be made via Wi-Fi** (Microcontroller and Touchscreen). The touch Screen can also be upgraded with a microSD card.
- Traverse also includes a **Pickup Calculator**, to help you design your windings.
- There is a **library of iconic pickups**, where you can see the essential parameters, including the winding diagram, and you can apply this data to your projects. Available in two modes, constant and scatter.
- The software includes an **Interactive Help**. By clicking on any parameter, you will get a more detailed explanation.

- Traverse incorporates **troubleshooting and maintenance sections.**

3.2 Operating Principle:

The Traverse has been designed to be attached to manual instrument pickup winders., generally guitars and basses but it can be used for other purposes (electric coils, etc.). Its main function is to wind musical instrument pickups, guiding the wire transversally and automatically managing the wire tension with the precision offered by a CNC device, whose advantage is that it provides control at all times:

- Position of the wire that you are winding
- Speed of rotation of the bobbin (Only if attached to "Mojotone" winder)
- Real tension of the wire
- Automatic Wire tension adjustment

In this way, you can program the automatic winding in the way you like the most in order to achieve certain nuances in the sound of the pickup. It can also work semi-automatically (using the knob).

The Traverse can be operated in three different modes, selectable from the basic parameters screen. These operating modes depend on the manual winder to which it is connected:

1. **MOJOTONE MODE:** This mode is used when the Traverse is connected to the well-known red winder or 'Mojotone'. In this case, the Traverse is able to control the start/stop and speed of the winder through the use of control wires between the two devices.

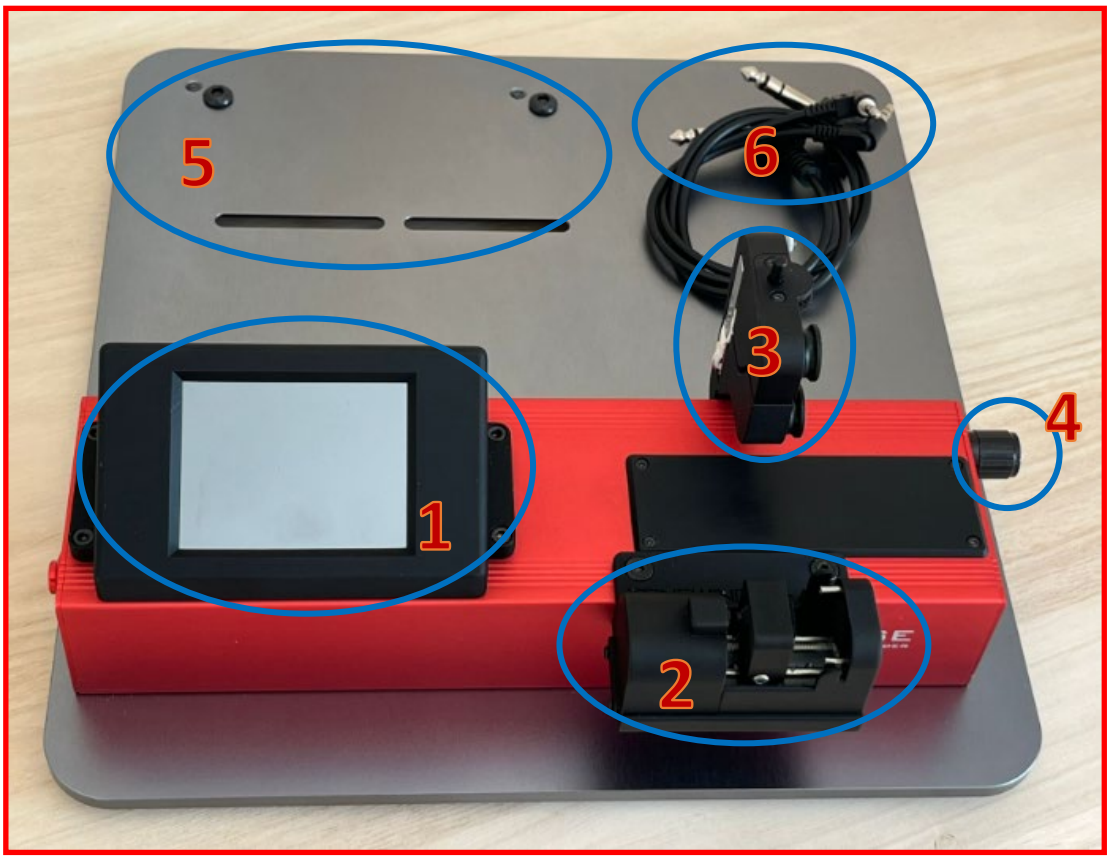
2. **UNIVERSAL MODE:** This mode can be used for all other manual winders on the market (even the red one). Simply indicate the estimated winding time (easily calculated using the RPM) and the trigger wire tension to the Traverse. Once the program has been started on the Traverse, it remains on standby until it detects that the wire tension exceeds this value, in which case it starts the program. If it detects that the tension falls below this value, it stops automatically. All you have to do is control the start and speed from the manual coiler.

3. **WIRE TENSIONER STAND ALONE MODE:** In this mode, only the wire tension is automatically controlled by the Traverse (there is no transverse movement). This mode can be useful for incorporating tension control into existing automatic winders or for performing manual winding while managing the wire tension.

More details on each of these modes will be provided in the following sections.

3.3 External Components:

The following picture shows the components of the **Traverse**, and illustrates how the device operates:

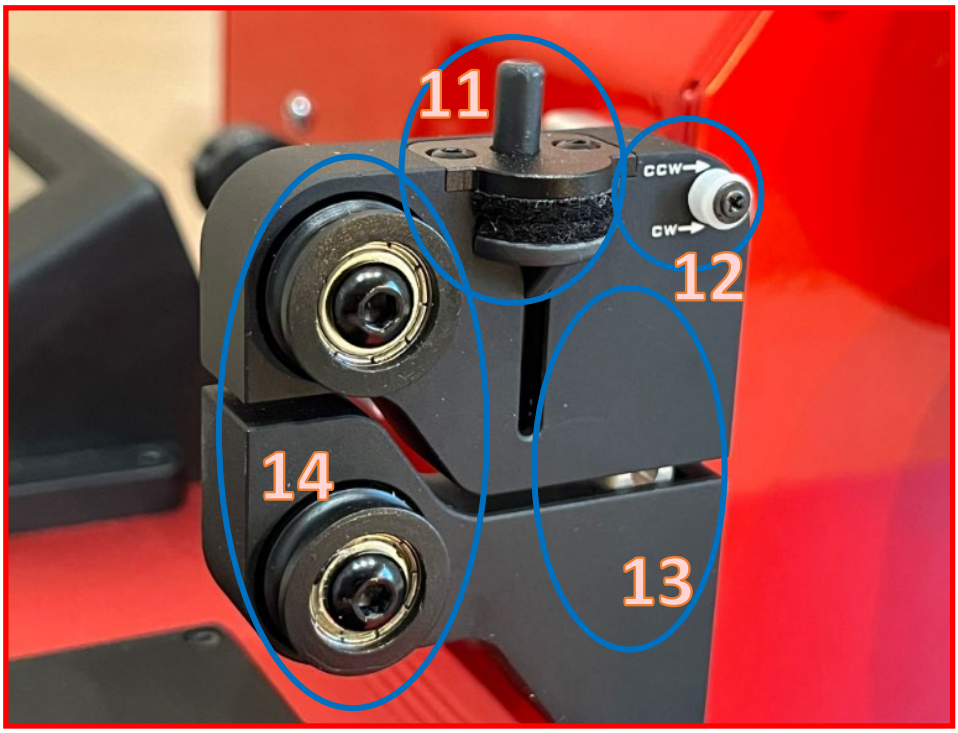


No.	Description	No.	Description
1	Touch screen 2.8”	4	Control knob
2	ATC device (Automatic Tension Control)	5	Grooves and threads for winders
3	Guider arm	6	Control wires (Mojotone)

*Figure 1: Upper view of **Traverse 1.0***

No.	Description	No.	Description
7	Main power switch	9	Mojotone control jacks
8	Main power 24V entrance	10	USB connector

*Figure 2: Left view of **Traverse 1.0***



No.	Description	No.	Description
11	Stabilizer	13	Wire tension Sensor
12	White pulley	14	Guide pulleys

*Figure 3: Guider Arm view of **Traverse 1.0***

No.	Description	No.	Description
14	Knob (for Emulate mode)	15	Serial Number and CE mark

*Figure 4: Right view of **Traverse 1.0***

3.4 Touch Screen Display (HMI):

Traverse 1.0 has a 2,8-inch Nextion Enhanced touchscreen with high sensitivity and precision. A touchscreen pen stick is attached in a convenient holder.

Figure 5: Traverse touchscreen and pen.

3.5 Coils Plate (optional only for “Mojotone” winders):

The cylindrical plate to fix the coils is machined in dark grey aluminum, and is an optional accessory for “Mojotone” winders. It has 2.5 metric threads to house any available coil in the market. It also has a central thread to be able to fix the simple coils, using a fixing piece.

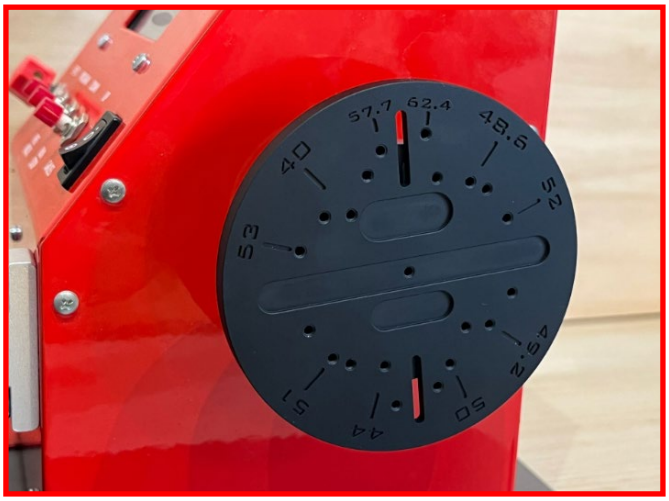


Figure 6: Plate to install the coils (Optional for Mojotone winders)

The support plate is precision machined to incorporate specific cavities that allow for perfect, flush mounting of both the pickup eyelets and the magnet protrusions, ensuring optimal stability and alignment.

Figure 7: Coil plate insertions

This plate also has grooves to accommodate any type of pickup, even 7- and 8-string pickups.

3.6 Wire guide arm + Tension sensor:

The wire guide arm consists of two pieces of anodized aluminum, joined together by a 300gr load cell, this mount is capable of measuring variations of 1 gr in the tension of the wire. In the lower part, it has housed one polyethylene pulleys for the correct guidance of the wire. The upper part houses another pulley and the stabilizer screw, which stabilizes the wire from the ATC to the output pulley, adding residual tension to the wire so that the ATC can perform its function properly.

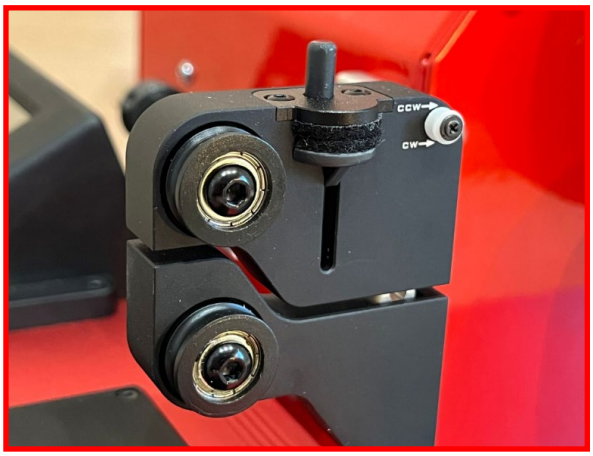


Figure 8: Wire-Guide Assembly.

The wire guidance block is fixed to the transmission of the X-axis motor (Nema 11 stepper motor) directly.

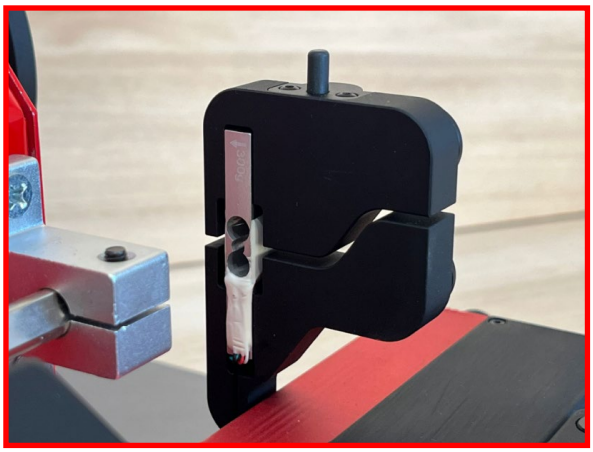


Figure 9: Wire Guide Arm view.

With regard to the output pulley (small white pulley), and if you are using a 'Mojotone' winder, the wire will be placed above the pulley for CCW windings, and below it for CW windings. If you are using another winder, it will depend on how you have positioned the shaft of your winder plate in relation to the output pulley.

Figure 10: Picture of the marking on the pulley

3.7 Software Operation:

Traverse is designed to be operated from the integrated touchscreen display, without using a computer. The software provides complete instrument control.

The latest software version available for Traverse V1.0 units is **2.05**.

Figure 11: Software startup screen

There are two sets of software running inside Tonewinder:

1. The software that runs in the ESP32 microcontroller, which can be upgraded via Wi-Fi or USB cable. The name used for this one is “ESPT_02.05.bin”.
2. The touch screen software can be upgraded via Wi-Fi or micro SD card. The name used for this one is “HMIT_02.05.tft”.

If you are using a Mojotone winder, this software can control the start/stop and winding speed (including acceleration and deceleration ramps) of the winder by simply connecting the cables provided with your Traverse unit.

The very last version of both software packages is available for download on the **Tonewinder** website: http://www.Tonewinder.es.

4 Unpacking

This chapter provides information for unpacking the device and informs you about the scope of delivery.

4.1 Unpacking:

Damaged Packaging, Defective on Arrival

Inspect the shipping container for signs of external damage and, after unpacking, inspect the device for any signs of mechanical damage that might have occurred during shipment.

If you suspect that the device may have been damaged during shipment, immediately notify the incoming carrier and **Tonewinder OE** about the damage. Shipping insurance will compensate for the damage only if reported immediately.

4.2 Scope of Delivery:

Traverse is delivered inside a cardboard box, properly protected to prevent damage during transport.

The guide arm is disassembled to prevent damage and must be properly installed by the user upon receipt of the unit. To install it, simply insert two screws.

The following items are included in the package in addition to the Traverse 1.0 :

Figure 14: Items included in the package.

No.	Name	Function
1	Power supply connector	Supply energy from the power wall socket to the winder. Works with 110vac and 230 vac.
2	4 units M6 Screws	Screws for fixing the 'Mojotone'
3	Touchscreen pen	Handle the touchscreen.
4	Control cables	Cables to control the start/stop and speed of the 'Mojotone' winding machine

Optional accessories for "Mojotone" winders (which must be purchased/ordered separately) include:

Figure 15: Additional accessories for Mojotone winders

No.	Name	Function
1	Plate (for “Mojotone” winders)	To fix it to the winder
2	Screw for single coils	For fixing the single coil to the plate.
3	Thumbscrew for humbucker coils	For fixing the humbucker coil to the plate.
4	Adapter for single coils	Fix the single coils (magnets protruding) to the plate. Two sizes.

5 Installation

This chapter specifies the requirements for the installation site and describes how to set up, install, and configure the device.

5.1 Installing the device:

The device is installed and set up by the buyer and must follow the steps below.

1. Pay attention to the safety guidelines and observe all site requirements. For the safety guidelines when installing the device.
2. Set up the device hardware.
3. Turn on the device.

5.2 Site Requirements:

The operating environment is important to ensure the optimal performance of the device. This section provides important requirements for the installation site. Note the following:

5.3.1 Workbench:

For dimensions and weight of the device, see chapter 9 Specifications.

Provide a sturdy workbench of a height that ensures convenient access to the interior of each device in the system. The workbench must stand in a secure and level position that is free of vibrations. The bench top must be dry and clean.

Allow sufficient free space on the sides and on the rear of the system for electrical connections and proper air circulation. Allow at least 15 cm of clearance on the rear, at least 20 cm of clearance on each side, and at least 30 cm of clearance above the top.

Make sure that the power switch and power cord can be easily reached at any time.

5.3.2 Power Considerations:

The power supply of the device has wide-ranging capability, accepting any line voltage in the range specified for the device.

CAUTION—Electric Shock or Damage to the Device

- Connecting the device to a line voltage higher or lower than specified could result in personal injury or damage to the device. Therefore, connect the device to the specified line voltage only.
- Do not use defective multiple sockets or extension cords, as they could result in personal injury or damage to the device.
- After the power to the device is turned off, the device is still energized as long as the power cord is connected. Repair work on the device while the device is connected to power could lead to personal injury. Therefore, always unplug the power cord before starting repair work inside the device. If you were instructed to remove any covers or panels, do not connect the power cord to the device while the cover or panels are removed.

5.3.3 Power Cord:

The power cords are designed to match the wall socket requirements of the country in which they are used. The end of the power cords that plug into the power socket on the device is identical for all power cords. The end of the power cords that plug into the wall socket is different.

WARNING—Electric Shock or Damage to the Device

- Never use a power cord other than the power cords provided by **Tonewinder OE** for the device.
- Only use a power cord that is designed for the country in which you use the device.
- Do not use defective multiple sockets or extension cords, as they could result in personal injury or damage to the device.
- In case of emergency, it must be possible to reach the power cord easily at any time to disconnect the device from the power line.

5.3.4 Condensation:

NOTICE Condensation in the device can damage the electronics. Therefore, when using, shipping, or storing the device, avoid or minimize conditions that can lead to a build-up of condensation in the device. For example, avoid significant or fast changes in environmental conditions. If you suspect that condensation is present, allow the device to warm up to room temperature. This may take several hours. Wait until the condensation is gone completely before connecting the device to the power line.

5.3.5 Operating Conditions:

When operating the device, make sure that the installation site meets these general environmental and operating conditions:

Temperature

Temperature fluctuations can affect the performance of the device. Avoid locations with significant changes in temperature and strong air drafts. For example, do not place the device in direct sunlight, near heating or cooling sources, or under an air duct.

Humidity

The relative humidity of the operating environment is important for the performance of the device. Operate the device in the specified humidity range, with no condensation.

When the humidity is too high, condensation may occur, causing damage to the electronic components in the device. When the humidity is too low, static electricity may accumulate and discharge, shortening the life of the electronic components.

Vibration

Vibrations may affect the performance of the device. Therefore, the installation site should be free of vibrations. Avoid placing the device in locations where vibrations are caused by other instruments.

5.4 Setting Up the Hardware:

Traverse comes fully tested, calibrated, and ready to use. However, depending on which manual winder you connect it to, you will have to carry out a different installation. First you need to connect the mains cable to the winder, but don't switch it ON. Here are the different possible configurations:

5.4.1 Coupling the Traverse to a 'Mojotone' winder:

If you connect the Traverse to a 'Mojotone' winder, you will have full control from the Traverse touch screen, allowing you to start and stop winding, as well as select the winding speed. Simply set the winding direction on your 'Mojotone' and select a number of turns greater than the number you wish to wind.

To couple the Traverse to your 'Mojotone' winding machine, follow these steps:

- STEP 1: Remove the screws (4xM6) located on the base, which you will use to secure the winder.

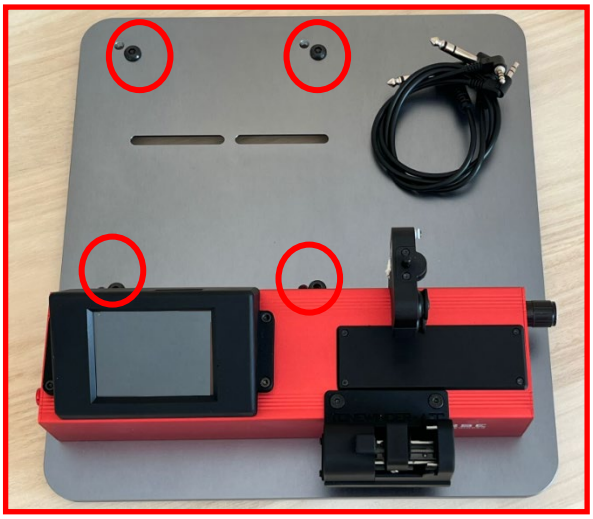


Figure 16: Remove M6 screws.

- STEP 2: Place your winder on top of the aluminum base and secure it using the screws removed in the previous step. Ensure that the plate is perpendicular to the movement of the guide arm. The easiest way

to do this is to use a square resting on 'El Traverse' and check that the plate of your winder is aligned. Then, tight those screws.

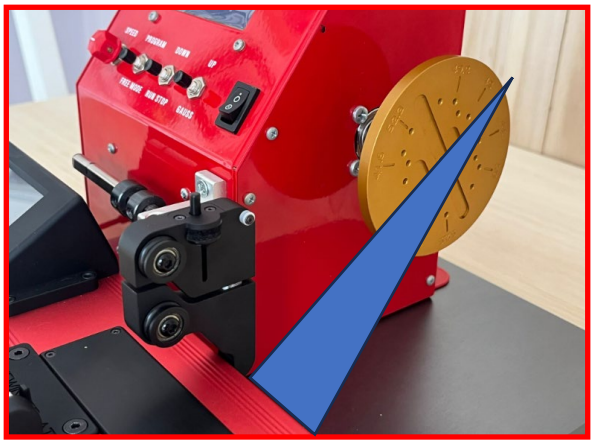


Figure 17: Ensure the orthogonality.

- STEP 3: Connect the control cables, supplied with the Traverse, between your winder (rear part) and the existing inputs on the left side of the Traverse. Be careful not to mix up the control cables.

Figure 18: Mojotone Control cable connections.

- STEP 4: Connect the power splitter cable to the power supply output of your winder. Then connect one output to the winder and the other to the Traverse.
- STEP 5: Switch on both devices. The order in which you switch them on does not matter. Allow the Traverse to complete the initialization process.

- STEP 6: Navigate to the Basic parameters screen (Start>Settings>Basic parameters), and verify that 'Mojotone' mode is configured. You should have a configuration like the one shown below:

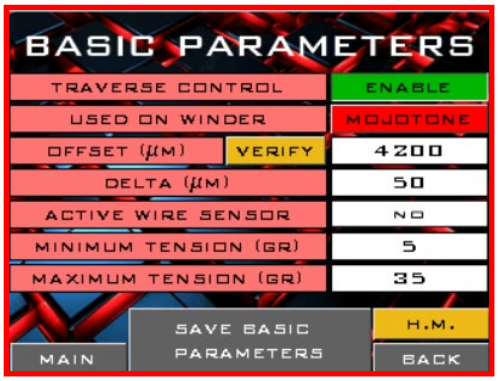


Figure 19: Configuration for "Mojotone" winders.

- STEP 7: The next step is to calibrate the coupling offset. This is the distance from when the arm detects the home sensor and when the winder plate aligns with the output pulley (little white pulley). To do this, press the 'Verify' button and adjust the 'Offset' value so that both elements are aligned. You can use a ruler to check this.

Figure 20: Adjusting the offset.

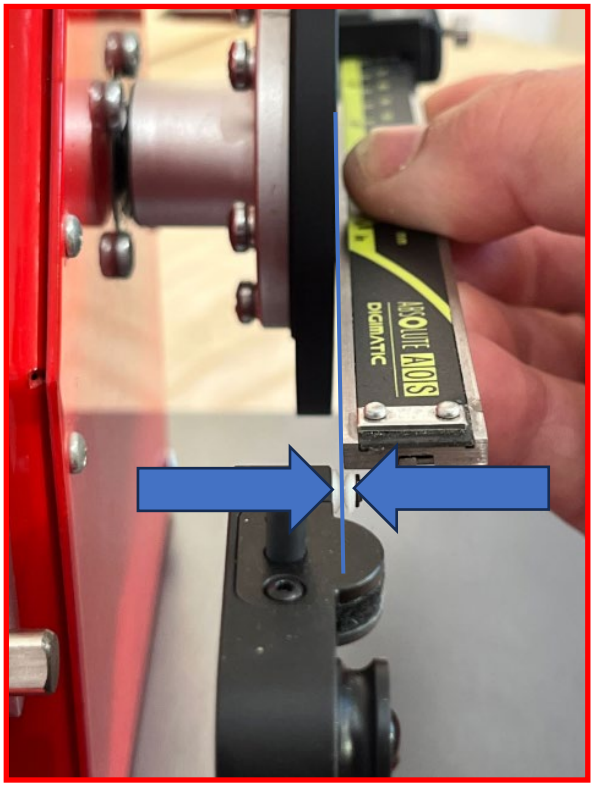


Figure 21: Adjusting offset to align turning plate with the arm wire guide

- STEP 8: Although the Traverse has been calibrated to control the speed of the 'Mojotone' winder, each winder may have a slightly different setting and therefore you can calibrate the winding speeds (in increments of 100 RPM). The procedure for calibrating each speed is detailed below, in the section 6.5.6.2.- Recalibrate Mojotone Speed factor.

At this point, you are ready to start working with the 'Mojotone+Traverse' set.

5.4.2 Coupling the Traverse to other winders ("Universal" mode):

If you connect the Traverse to a 'Universal' winder, you can use the Traverse touch screen to specify the dimensions of the coil and wire, as well as the coiling pattern. You must also enter the number of turn, but this value is informative, as we shall see later on. Once the program has started, the Traverse will remain on standby until the wire tension exceeds the lower threshold, which will happen when you start the program on your winding machine.

Once the winding is complete, the wire tension will fall below this threshold and the Traverse will stop moving.

To couple the Traverse to your “universal” winding machine, follow these steps:

- STEP 1: Remove the screws (4xM6) located on the base, just in case they bother you to fix your winding machine.

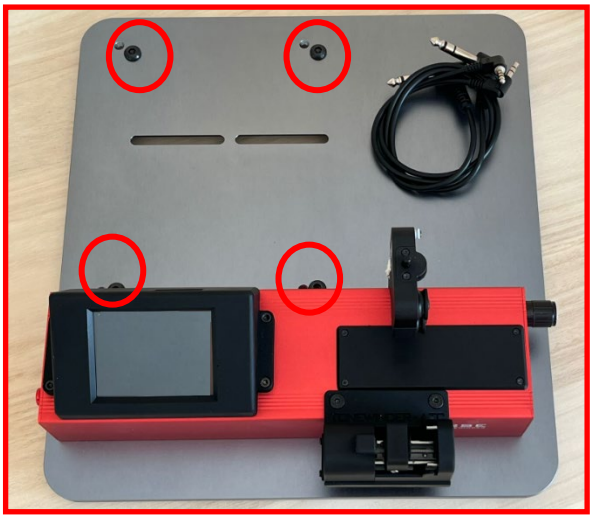


Figure 22: Remove M6 screws.

- STEP 2: Place your “Universal” winding on top of the aluminum base and secure it using the threads and grooves present in the base. If necessary, you can drill new holes in the base (it is only two millimeters thick) to accommodate your winder. The height of the plate on your winder must be exactly level with the center of the output pulley (white small pulley). To achieve this, you can wedge your winder until you get it right.

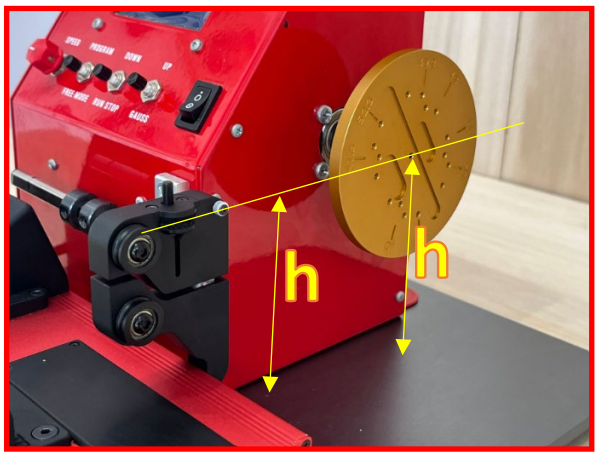


Figure 23: Align the centers Plate/Output pulley.

NOTE: You can place your winder directly on the base without shimming it, but bear in mind that the ends furthest from the coils you are using must not exceed the height of the output pulley. Otherwise, the wire may come off the pulley when it's winding.

- STEP 3: Ensure that the plate is perpendicular to the movement of the guide arm. The easiest way to do this is to use a square resting on 'The Traverse' and check that the plate of your winder is aligned. Then, tight those screws.

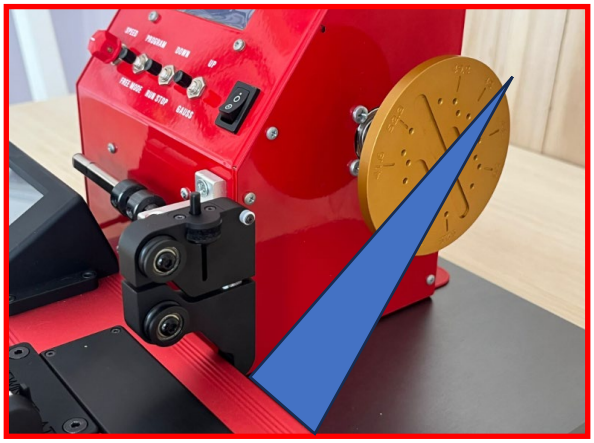


Figure 23: Ensure the orthogonality.

- STEP 4: Connect the power splitter cable to the power supply output of your winder. Then connect one output to the winder and the other to the Traverse.
- STEP 5: Switch on both devices. Allow Traverse to complete the initialization process.
- STEP 6: Navigate to the Basic parameters screen (Start>Settings>Basic parameters) and verify that 'Universal' mode is configured in the field "Used on Winder". You should have a configuration like the one shown below:

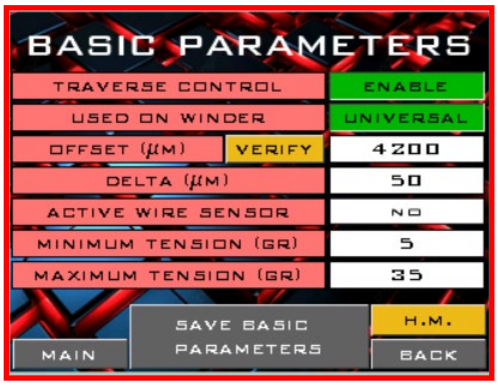


Figure 24: Configuration for "Universal" winders.

- STEP 7: The next step is to calibrate the coupling offset. This is the distance from when the arm detects the home sensor and when the winder plate aligns with the output pulley (little white pulley). To do this, press the 'Verify' button and adjust the 'Offset' value so that both elements are aligned. You can use a ruler to check this.

Figure 25: Adjusting the offset.

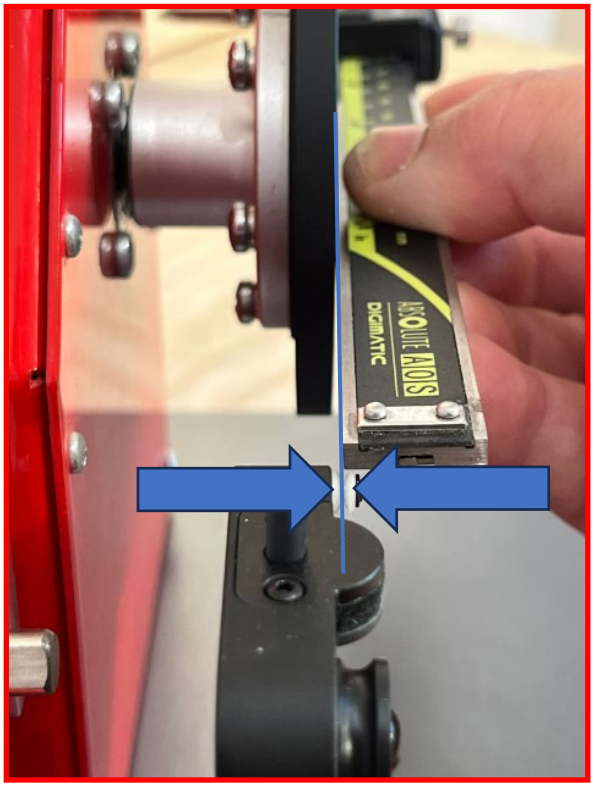


Figure 26: Adjusting offset to align turning plate with the arm wire guide

At this point, you are ready to start working with the 'Other winder (Universal)+Traverse' set.

5.4.3 Coupling the Traverse like as "Wire Tensioner" stand alone:

This configuration will be used to connect the Traverse to a winding machine that already has transverse wire movement or when you want to perform manual wire guidance, but controlling the wire tension at all times.

To couple the Traverse as a "Wire Tensioner Stand Alone", follow these steps:

- STEP 1: Secure the Traverse in front of your winder.
- STEP 2: Connect the power supply cable to the Traverse.

- STEP 3: Switch on both devices. Allow Traverse to complete the initialization process.
- STEP 4: Navigate to the Basic parameters screen (Start>Settings>Basic parameters) and verify that 'Disable' mode is configured in the field "Traverse Control". You should have a configuration like the one shown below:

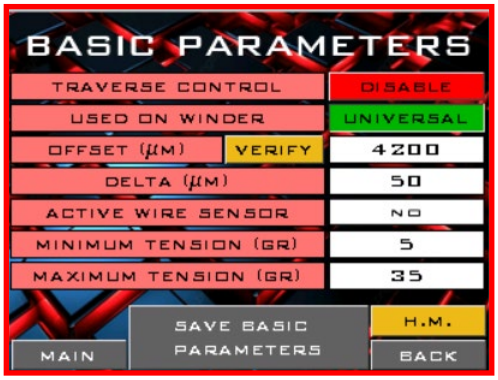


Figure 27: Configuration for "Wire Tensioner Stand Alone".

At this point, you are ready to start working with the Traverse as "Wire Tensioner Stand Alone".

5.5 Turning On Traverse:

1. Turn on the device with its main power switch.

2. Wait until the device completes the following sequence of events after power-up:

   ♦*Self-test diagnostics*

   The device runs a series of internal tests. During these self-diagnostics, all of the main components are checked. When testing is complete and has been successful, **Traverse** continues moving the axis X, to find the home position, and then the ATC motor.

Figure 28: Start-up screen

If an error is detected during the self-test, the device is not ready for work. For further information, see chapter 8 Troubleshooting.

If the Traverse initializes correctly, it will automatically jump to the startup screen, where you can see which software versions are installed on your unit.

Figure 29: Start-up screen after initialization process

♦*Homing motor X*

In the **homing** state, the device moves the axis X to find the home position.

♦*Homing motor Z (ATC)*

In the **homing** state, the device moves the axis Z to find the home position.

6 Operation

This chapter describes the elements of device control and provides information for routine operation and for shutdown.

6.1 Introduction to this Chapter:

The information in this chapter assumes that the initial setup of the device has been completed. If this is not the case, refer to the instructions in Chapter 5 before proceeding.

6.2 Touch Screen Display:

The role of the keys depends on the screen presented. These keys are called *general* keys.

General Soft Key Functions

Depending on the screen, general soft key functions are available:

Soft key	Description
Back	To come back to the previous screen
Main	To go directly to the Main Menu
Reset	To reset the device, and come back to the initial screen

6.3 Terminology:

Please find below a concise description of the parameters utilized in the **Traverse** software, along with their recommended values. A warning message will be displayed if any parameter exceeds these predefined limits. For further assistance, you can access the contextual help screen by simply tapping on the corresponding parameter icon.

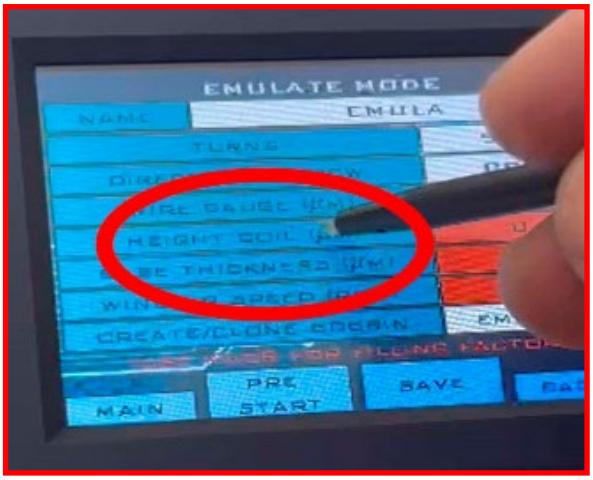


Figure 30: Contextual help access

Parameter	Description	Range
Offset	Distance between “Home position” and “Zero position”	<10,000 um
Home position	Home reference to axis X	n.a.
Zero position	Position that aligns the Wire Guide Arm with the plate	n.a.
Delta	Distance, measured from the limits of the height of the bobbin, where the wire won’t be winded, to avoid overload of wire.	<1,000 um Typically 50/70 um
Filling factor	This Is the ratio of the total conductor cross-section to the area of the core window (see Appendix 1)	[10, 100] %
Constant mode	Mode where the filling factor is constant during all the coil	n.a.
Table mode	Mode where you can fix up to 6 segments with different filling factor	n.a.
Pattern mode	Mode where you can fix a Pattern up to 6 segments with different filling factor, and repeat them until the end.	n.a.
Scatter mode	Mode where the winding of the bobbin is done under “semi-random” conditions.	n.a.
Emulate mode	Mode where you can modify the filling factor during the bobbin, using the external potentiometer.	n.a.
Manual mode	Mode where you need to distribute the wire manually, during the winding.	n.a.
CW	The direction of rotation of the plate clockwise (informative)	n.a.
CCW	The direction of rotation of the plate counterclockwise (informative)	n.a.
Wire Gauge	Gauge of the wire that you are using	[20,200] µm
Height Coil	Free height of the bobbin	[1,000, 30,000] µm
Base Thickness	Thickness of the base of the bobbin, which leans on the plate	[700, 5,000] µm
Turns per layer	(TPL) is the number of turns that **Traverse** will wind in each direction. It is proportional to Filling Factor, Height and wire gauge	n.a.
Winding speed	Speed used to winder the bobbin	[50, 1500] rpm

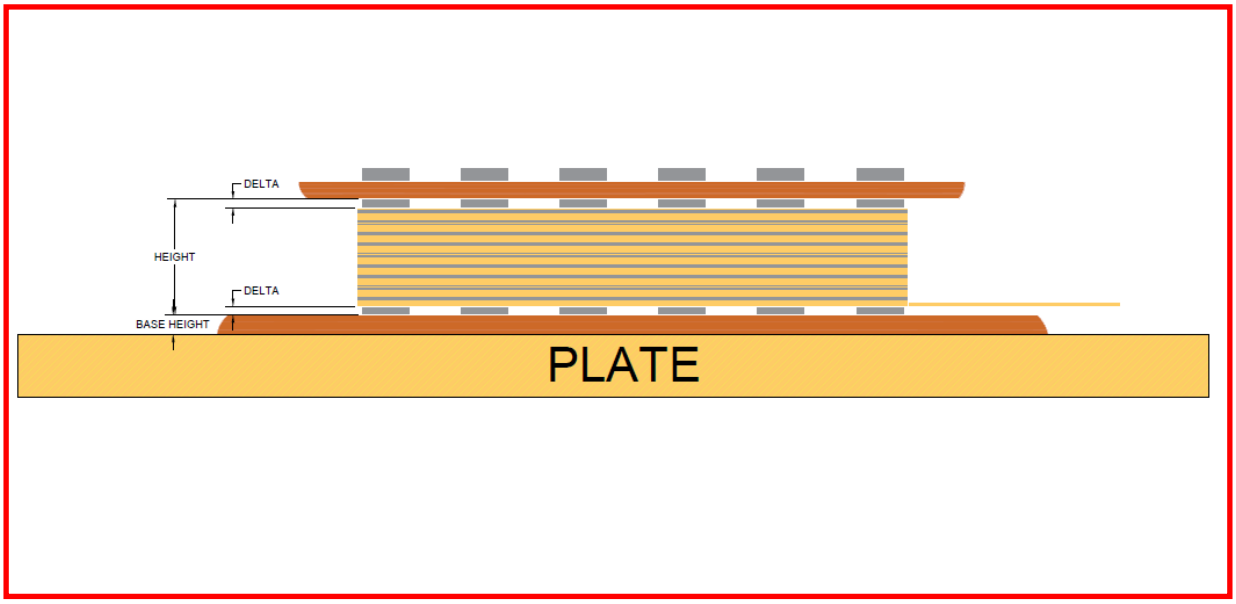


Figure 31: Basic Parameters screen

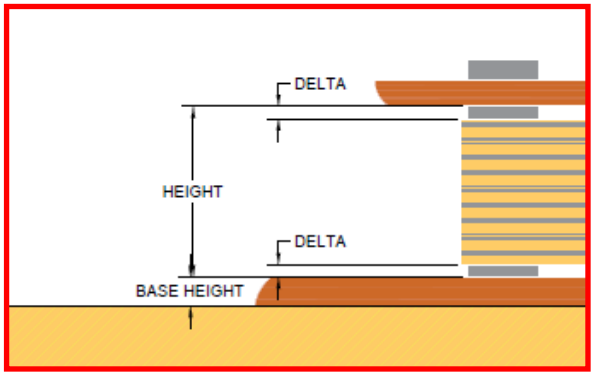


Figure 32: Basic Parameters screen

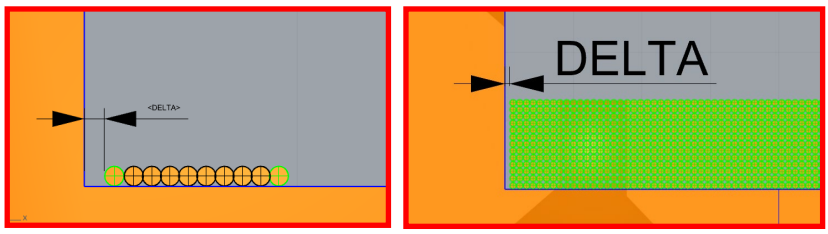


Figure 33: Basic Parameters screen

6.3.1 Interactive help:

Clicking with the stick pen on the parameter name you will see a comprehensive description of the selected parameter/variable.

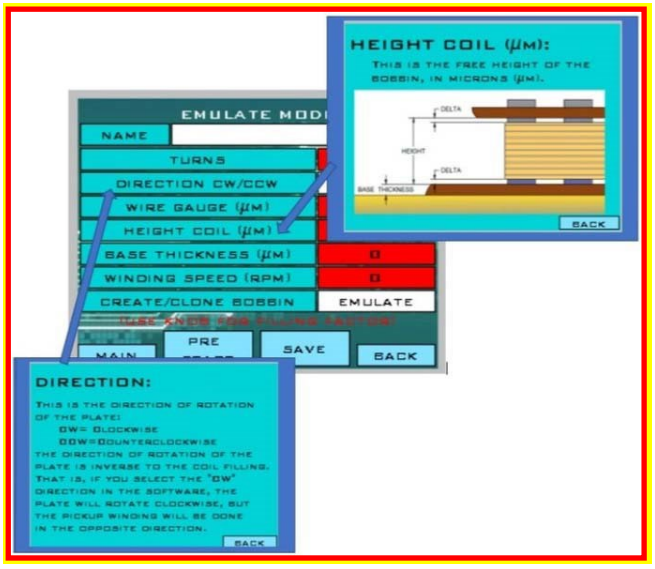


Figure 34: Interactive Help Screens

6.4 Preparing Traverse for Operation:

This section gives information on any additional steps that are required to prepare the device for operation and wind up a bobbin.

6.4.1 Verify “Offset Position”:

Before Operating the Device for the First Time, you should verify the “**Offset Position**”. The “**Offset Position**” is the distance the arm has to move from the point it detects the home position (reference point) until the small white pulley is aligned with the plate of your winder.

This parameter is very important as it is essential that the windings are centered on the coil. The "offset position" is calibrated at the factory, but it is recommended to check it when starting to work with the winder.

Prepare the device for the first-time operation, follow the next steps to verify that the “**Offset position**” is set properly:

1. Switch ON **Traverse** and navigate to the "**BASIC PARAMETERS**" screen (**Main Menu>Settings>Basic Parameters**). Click on the "**Verify**" button.

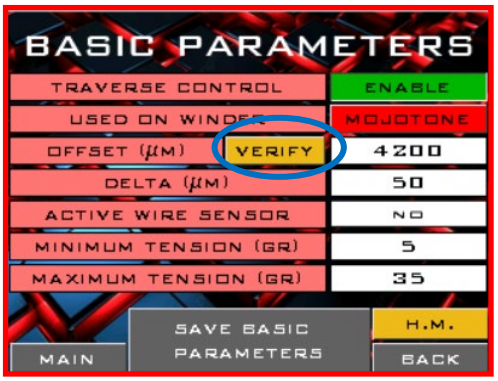


Figure 35: Basic Parameters screen

2. The screen for checking and calibrating this parameter will be opened:

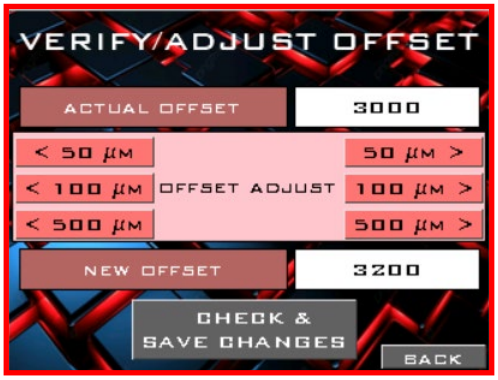


Figure 36: Verify/Adjust Offset Position screen

3. By pressing the "**Check & Save Changes**" button, the arm will move to the left until it reaches the home position, then it will move back to the right, traveling the distance indicated in the "**Actual Offset**" field.

4. At this point you should check, using a ruler resting fully on the plate of your winder, that the small white pulley on the guide arm is aligned with the plate.

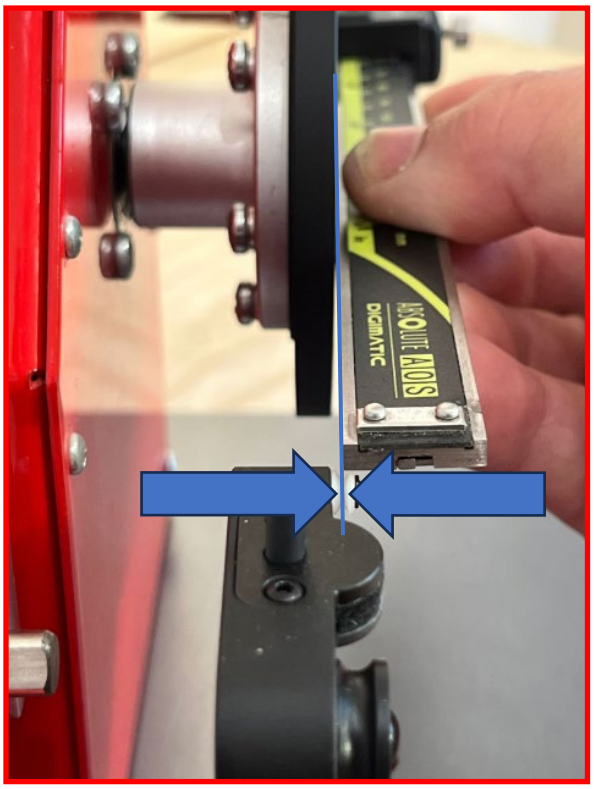


Figure 37: Adjusting offset to align turning plate with wire guide

5. If the center of the pulley coincides perfectly with the ruler, you can go back to the start (just by pressing the "**back**" button) to start working with the Traverse. If not, continue to the next step.

NOTE: This is a suitable enough setting to start working with **Traverse**, but during the first windings you will be able to adjust this parameter to its final value (See Constant Mode).

6. If the center of the pulley is misaligned with the ruler, use the partial movement buttons to increase or decrease this value, and press "Check & Save Changes" again. You can repeat this process as many times as you like until you are sure that the value obtained is good. Then press the “BACK” key to return.

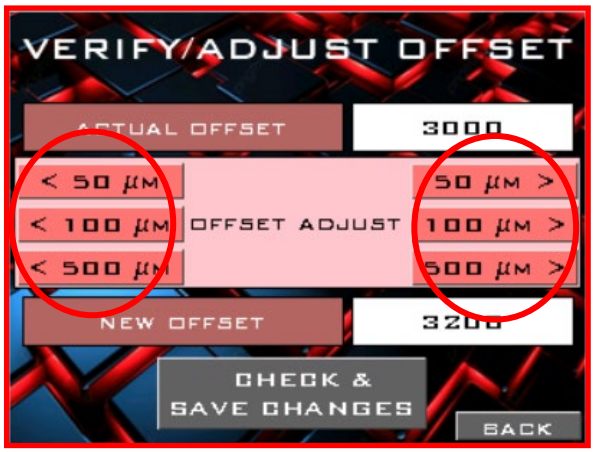


Figure 38: Partial movements buttons

NOTE: This is a suitable enough setting to start working with **Traverse**, but during the first windings you will be able to adjust this parameter to its final value (See Constant Mode).

6.4.2 Setting up the wire:

Before Operating **Traverse** *for each bobbin, setting up the wire.*

Prepare **Traverse** for winding a bobbin, follow the next steps to set up the wire properly (You may find your own way to do this):

1. Fix the pickup to the plate firmly and make sure it rests completely flat against the plate (using the fixing screws), then fix the wire with adhesive tape to the winding plate having in mind to let distance enough to later make the soldering or necessary connections (If it is not already soldered to the pickup), but avoiding to intercept the wire trajectory from the white pulley to the pickup.

2. Open the Stabilizer by pressing the pin and place the wire between the felt pads, placing the wire up to the black upper pulley:

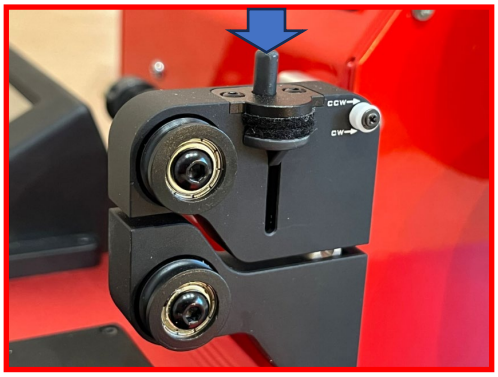


Figure 39: Press the pin and allocate the wire.

3. Release the pin and ensure that the wire is trapped between the two felt pads.

4. Go over the top of the first black pulley and place the wire between the black pulley at the bottom, as shown in figure 40:

Figure 40: Press the pin and allocate the wire.

5. Then, place the wire on the output pulley (small white pulley). For clockwise (CW) windings, place the wire under the output pulley. For counter-clockwise (CCW) windings, place the wire over the output pulley:

Figure 41: Wire layout for CW and CCW windings.

6. Finally, place the wire into the ATC according to these pictures. Both of them are valid:

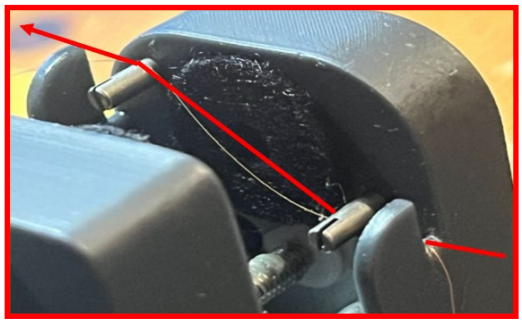


Figure 42: Wire routing on the ATC (First way).

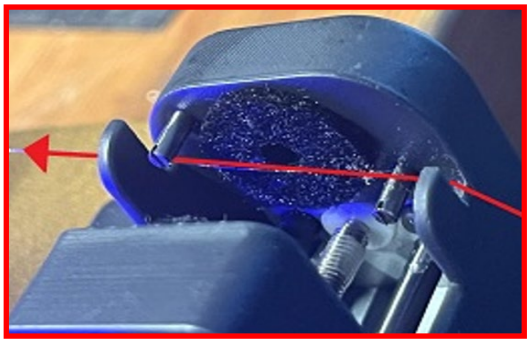


Figure 43: Wire routing on the ATC (Second way).

7. Below you will find the correct wire layout (for CW windings):

Figure 44: Wire layout for CW windings. Right side view.

NOTE: Please keep in mind that the direction of rotation of the plate is inverse to the coil filling. That is, if you select the "**CW"** direction in your winder, the plate will rotate clockwise, but the pickup winding will be done in the opposite direction.

6.5 Operating with Traverse ("Mojotone" and "Universal" setup):

NOTE: This section only applies when you have configured the machine to work in "Mojotone" and "Universal" modes. If you have configured your Traverse as a 'Wire Tensioner Stand Alone', go to chapter 6.6.- Operating with Traverse as 'Wire Tensioner Stand Alone'.

Operating **Traverse** under these modes is very simple. Everything is managed through the program loaded on the ESP32 microcontroller and the Nextion touch screen (or HMI, Human Machine Interface), without the need to be connected to a PC.

Figure 45: Initial screen

After switching ON the winder, pushing **"START"**, the "**MAIN MENU"** is shown. The options you can select are:

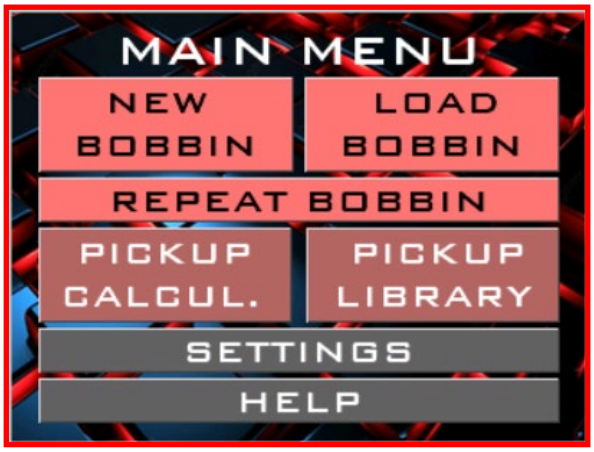


*Figure 46: "**MAIN MENU**" screen*

Next, we will review "**MAIN MENU**" options.

6.5.1 Create a "NEW BOBBIN":

You can create a new bobbin from scratch. There are four automatic winding modes:

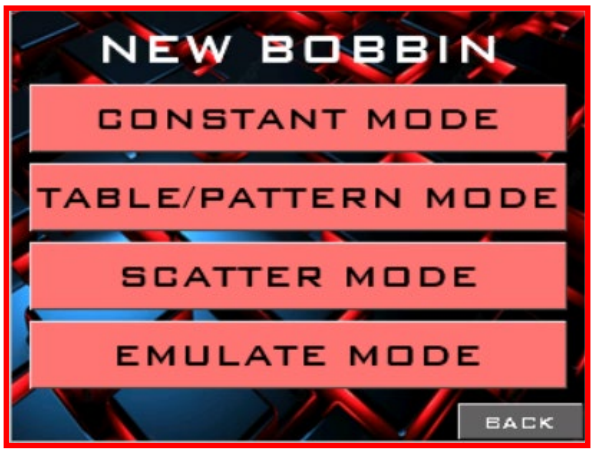


*Figure 47: "**NEW BOBBIN**" screen.*

6.5.1.1 Constant mode:

This is the simplest winding mode. The entire winding is done using a single filling factor (the filling factor is the percentage of wire filling at the coil height. A 100% means that, at each turn, the wire is placed next to the previous one in such a way that the entire height of the coil is covered by wire, and 50% means that only wire is placed in 50% of the height of the coil).

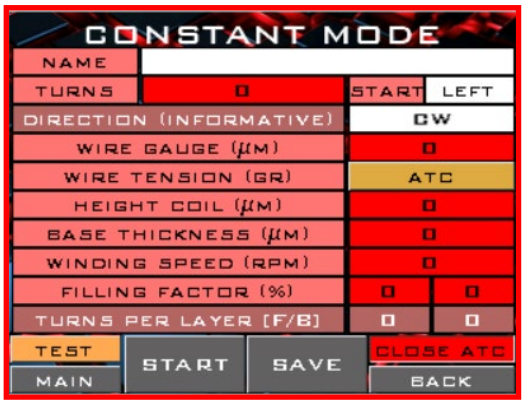


*Figure 48: "**CONSTANT MODE**" screen.*

Select, eventually a name (only needed if you want to save it), the total number of turns, the winding direction (this parameter is only informative, since you have to select the winding direction in your winder), wire diameter (values are in microns, **µm**), the wire tension (in **grams**), the coil height **(µm)** and base thickness **(µm)** , winding speed (**Traverse** may reach 1500 rpm but normal winding speed is about 800/1000 rpm), and Filling Factor.

With regard to the number of turns, if you have selected **'Mojotone'** mode, Traverse will use them to calculate the winding time, based on the factory speed calibration. At the factory, we have performed an average calibration for each winding speed (in increments of 100 RPM), but unfortunately each 'Mojotone' unit has a slightly different setting, which each user must check/calibrate when connecting their winder.
If you are working in **'Universal'** mode, the number of turns is semi-informative, since as long as there is tension on the wire, the Traverse will not stop, even if they have been exceeded.

If a parameter is set out of the "normal" range, the winder could still be started but the parameter field will be turned red. (In this case, not all required specifications may be met). But you can launch the winding program even if there is a red flag.

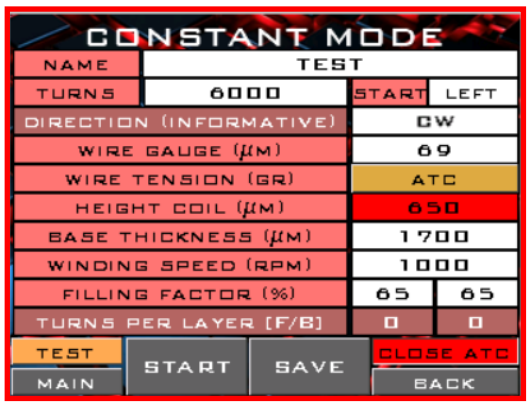


Figure 49: Field warning

NOTE: Remember that you can open an interactive help screen in each parameter, by just clicking in the name parameter field.

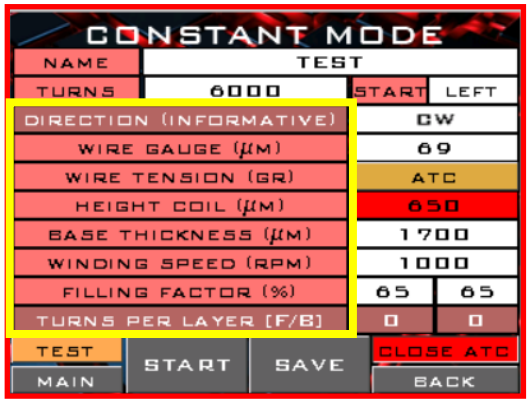


Figure 50: Interactive help in each parameter field.

The "**Turns per Layer**" field is only calculated if you click on the field. This parameter depends on the Filling Factor, wire diameter, and coil height.

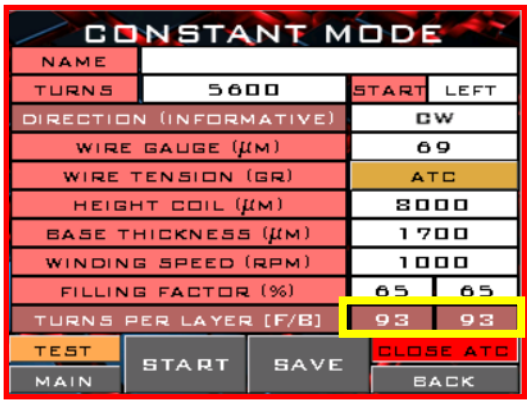


*Figure 51: "**Turns per Layer**" update*

Any time you may store the coil parameters by clicking "**SAVE**", "**SAVE BOBBIN**" screen will then be shown, there you may choose in wich one of the available memory positions you wish to save the parameters by clicking on it. In case there were already saved parameters there, they would be erased and overwriten.

*Figure 52: "**SAVE BOBBIN (page 1)**" screen*

NOTE: There are up to 59 memory slots, spread over five different pages. In the first 23 memory slots you can save (and load) standard files and Clonearray files (we will see in further chapter), but in the remaining memory slots you can only save standard files.

Once the coil parameters are saved, pressing "**BACK**" will return you to the previous "**CONSTANT MODE**" screen.

Before proceeding, you can visually check that the size parameters are correct by clicking the "TEST" button:

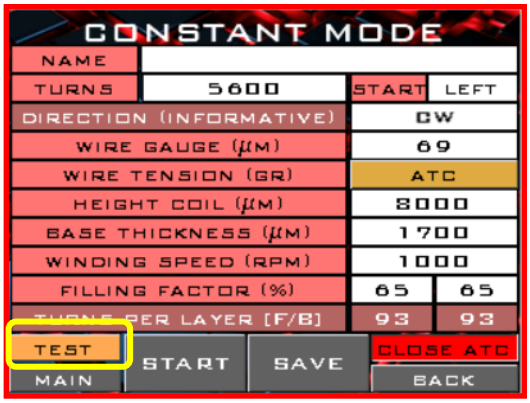


*Figure 53: press the "**TEST**" button.*

and the following screen will appear on your display:

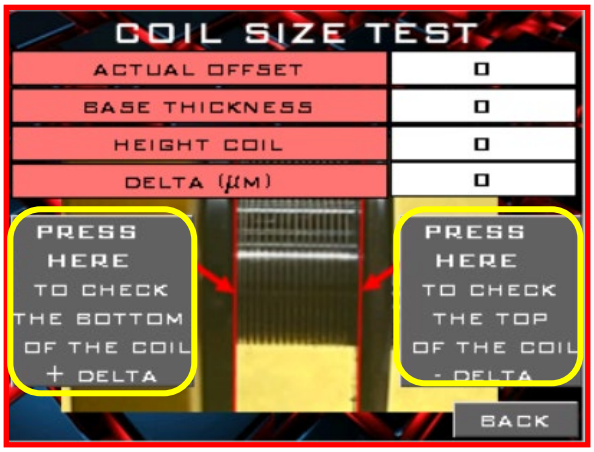


*Figure 54: "**COIL SIZE TEST**" screen*

By pressing either button, the arm will move to that position, and you can visually verify that it is correct or not (it is only a visual check). When you have finished verifying the initial and final winding positions, you can go back by pressing “BACK”.

You will need to select the target tension at which you want to wind the bobbin (Traverse sets default values). To access the tension settings, press the "ATC" button.

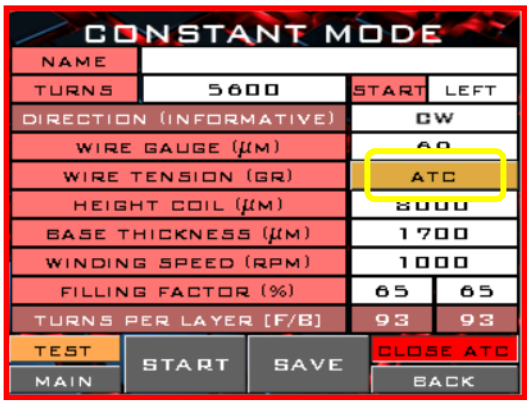


*Figure 55: Press the "**ATC**"* button to set the wire tension.

Setting both fields with the same value means that tension will remain constant during the whole run. You can make a ramp up or ramp down just by increasing or decreasing the final tension value:

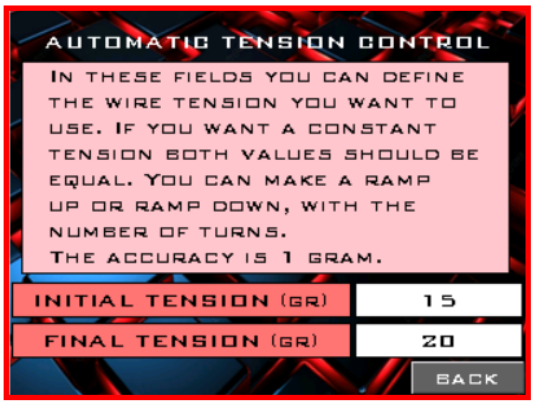


Figure 56: Initial and final tension value.

Once you have set the voltage values you can go back.

The “Close ATC”/“Open ATC” key allows you to close/open the ATC system to secure the wire in the ATC. If you do not operate it, it will close automatically when you start the winding process.

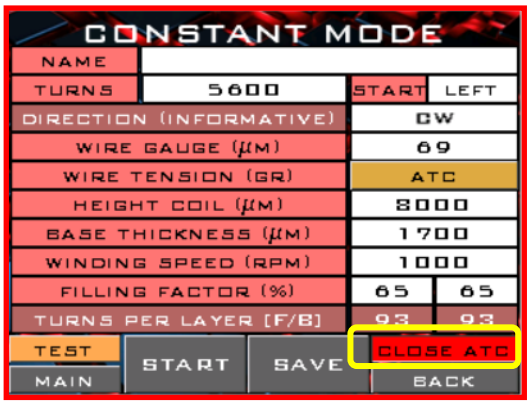


Figure 57: "Close/Open ATC" key

When you select the "**START**" button, the process of winding the pickup starts, and the Traverse will perform a verification of the home position.

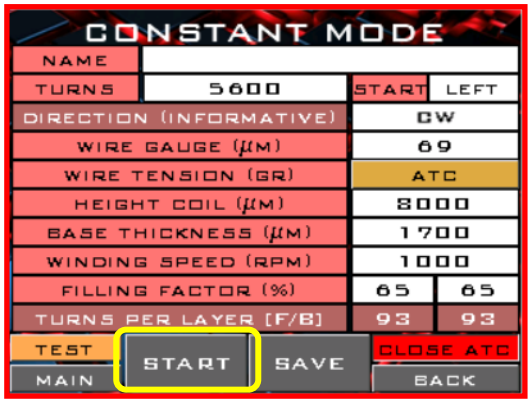


*Figure 58: Press "**Start**" to start winding*

Once the homing has been finished, the **Traverse** will start the winding.

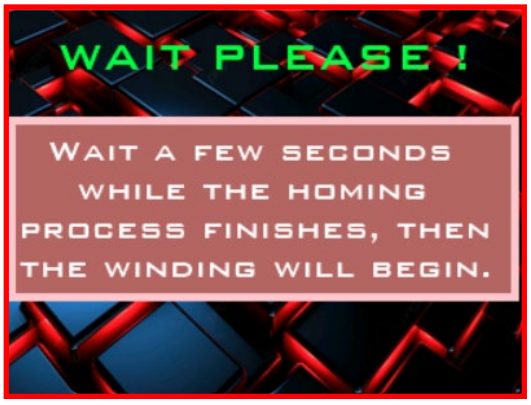


Figure 59: Homing before start the run.

The instrument will start winding under controlled acceleration until the selected winding speed is reached. During winding, the following real-time winding information is displayed on the screen:

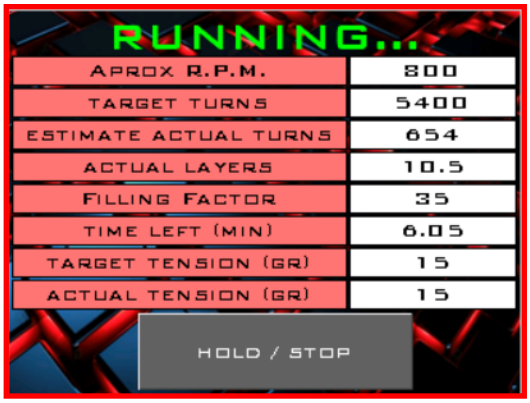


Figure 60: "RUNNING" screen

All those parameters are being updated in real time while winding. The tension at which the wire is working is all time monitored and shown (and adjusted by the ATC). If the "**WIRE TENSION SENSOR**" is activated (can be deactivated in "**BASIC PARAMETERS**" screen), and the wire tension falls below the setting lower limit (**default 5gr)** or max. limit (**default 35 gr**), the winder "understands" there is an issue with the wire (i.e wire broken) and automatically holds the winding process, showing the following screen:

*Figure 61: Screen "**AUTO HOLD**" (tension sensor)*

Under this holding state, you may check if there is any issue. If you wish, you may disable the wire sensor (this will deactivate the automatic hold when one of the limits is reached, but the tension value will continue to be shown). If you disable here the "**WIRE SENSOR"**, this selection will be stored also in "**BASIC PARAMETERS**", so you will have to activate it again in case you want it active for successive windings.

If the reason for the hold can be solved, you may continue winding by cliking "**CONTINUE**", otherwise you may abort the winding by clicking "**STOP**". In this case this screen will be shown:

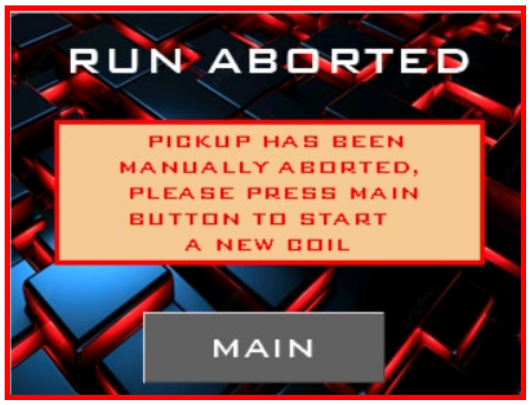


*Figure 62: "**RUN ABORTED"** screen*

At any time during the winding process, you may hold the winding by clicking "**HOLD/STOP"**, the Traverse will quickly decelerate and hold, and winded turns and layers are shown on the screen.

*Figure 63: "**MANUAL HOLD"** screen*

Also, if you think the coil that is winding have an unwanted left or right bias, you can correct it by increasing or decreasing the "OFFSET" value in 100 um increments. When "CONTINUE" is pressed, the new "OFFSET" value will be permanently stored in the "BASIC PARAMETERS". This is the fine "OFFSET" adjustment.

Clicking "**STOP**" at this stage will abort the winding process. By clicking "**CONTINUE**" the winding will continue at the same stage it was held. **Traverse** always ends the bobbins with the wire next to the bottom base of the pickup.

Once the winding is completed, the "**RUN COMPLETED SUCCESSFULLY"** screen is shown, then you can return to "**MAIN MENU"** screen.

*Figure 64: "**RUN COMPLETED**"* screen

Also, if you release the winding from library preset, a button will appear in the lower part to return to the diagram of the pickup that you selected.

6.5.1.2 Table/Pattern mode:

With this mode in fact you have a double mode. First you have the TABLE MODE, in which you have up to six winding blocks to fill a coil, where you can select the number of turns and the filling factor you want in each block. In this case, the total number of turns will be the sum of the turns in each block, so the "TOTAL TURNS (PATTERN)" field will not apply, and it will remain at zero.

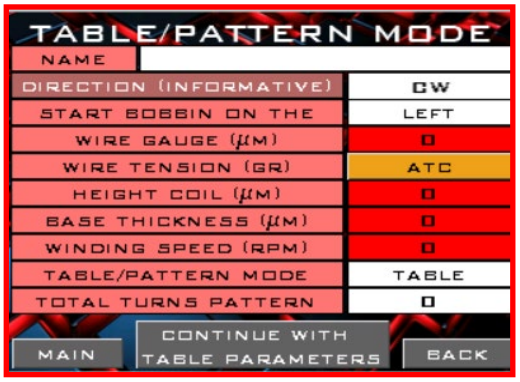


*Figure 65: "**TABLE/PATTERN MODE**"* screen

In each one of the blocks you must select the number of turns you want to make and the desired filling factor. To update the TPL of the block click on the value field:

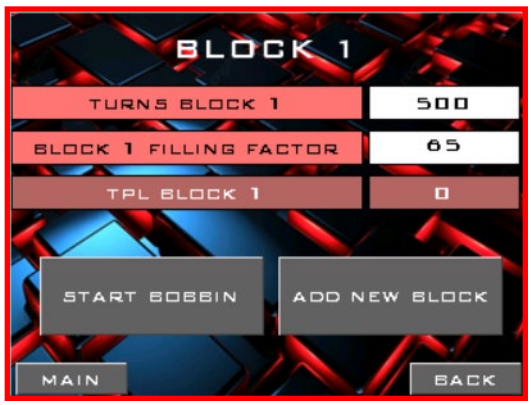


*Figure 66: "**BLOCK PARAMETERS"** screen*

At this point, we can add a new block (up to a maximum of six) or start with the winding. Once we have completed the desired sections, and before starting the winding process, the system shows a screen with the total number of selected blocks and the total number of blocks to be made. In this case the number of cycles will be equal to 1.

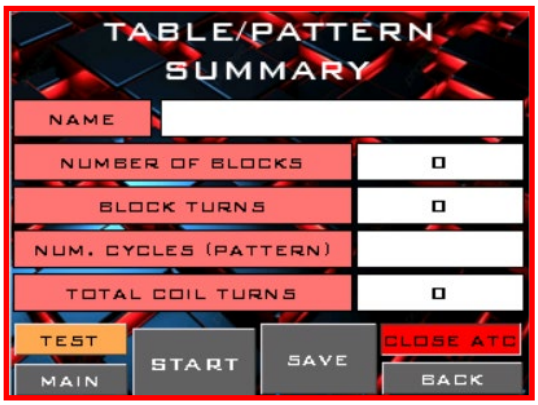


*Figure 53: "**TABLE SUMMARY"** screen*

Winding is identical to "**CONSTANT MODE**" from this point on.

By clicking on the TABLE/PATTERN MODE (right field), you can change to this new mode, or PATTERN MODE. With this new mode you can define a filling pattern of up to 6 blocks (different filling factor in each of them), which will be repeated until completing the turns selected in the "Total Turns PATTERN" (only available in Pattern mode). In each block, you can define the filling factor and the number of turns of this block.

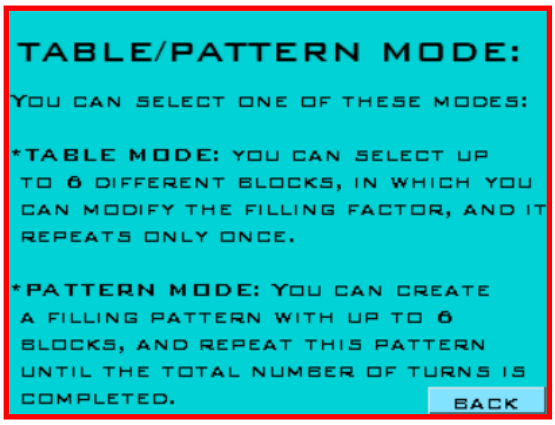


Figure 67: "TABLE/PATTERN MODE" help page.

The winding summary page will display the relevant information on the number of blocks, and the number of total cycles (this value will be 1 if Table mode is selected).

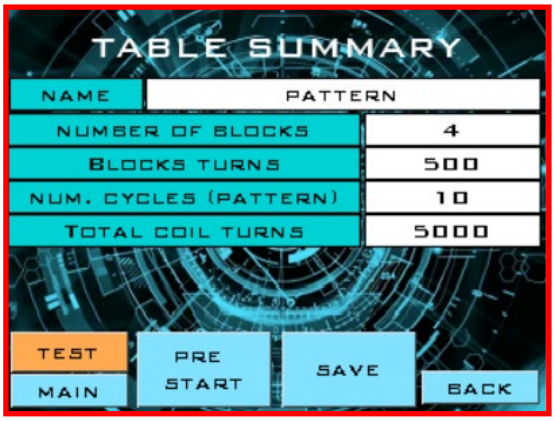


Figure 68: "TABLE/PATTERN SUMMARY" page.

6.5.1.3 Scatter mode:

In this mode you may wind the pickup randomly or disorderly, randomly modifying the filling factor every certain number of turns. This mode is configured on two screens. In the first of them, the general parameters of the coil and winding are fixed:

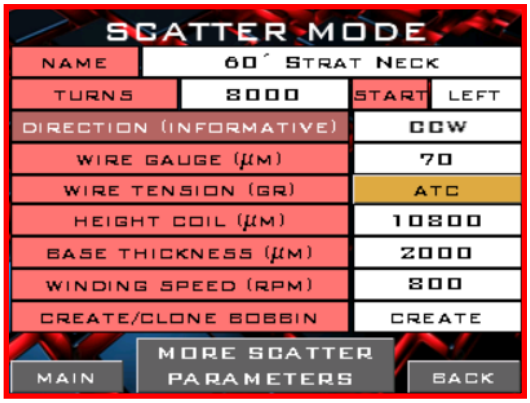


*Figure 69: "**SCATTER MODE**"* screen

Also, in this mode, it is possible to save in normal mode (only the basic parameters of the pickup are saved), but it is also possible to make a Clone-array type save (in addition to the basic parameters, the position of the arm is saved so that it can be reproduced exactly later). Saving clone-array files is explained in a little further on.

To create a new bobbin from scratch you must select ”CREATE” in the “CREATE/CLONE BOBBIN”. “CLONE” is selected when you want to clone your bobbin after winding it.

In the second screen ("**SCATTER PARAMETERS**") you will set the particular Scatter parameters. You have to choose the max and min Filling Factor and also the turns interval between changes (i.e each 50 turns the FF will be set ramdomly inside the limits previously selected). You may see the **TPL** of every stage by clicking the **TPL** field.

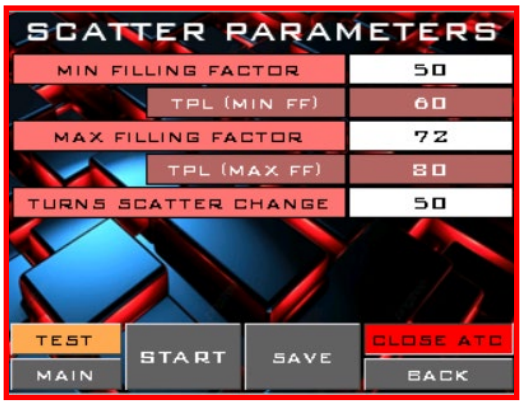


*Figure 70: "**SCATTER PARAMETERS"** screen*

Saving and winding processes are the same as for " **CONSTANT MODE"** from this point.

Clicking "**SAVE"** here will store only the coil parameters, but if your intention is to later **clone** the bobbin once made, then you need to go step by step the following process:

1. Make a reset to initialize the winder to make sure there is no spurious data in the ram memory, then select **"NEW BOBBIN"** in **"MAIN MENU"**, and **"SCATTER MODE"** in **"NEW BOBBIN".**
2. Wind the pickup, using the basic parameters as appropriate.
3. Once the coil is finished, press "**REPEAT BOBBIN**" in the **"MAIN MENU"**.
4. Modify the "**CREATE/CLONE BOBBIN**" field to display "**CLONE**".
5. Set a name for the bobbin.
6. Press "**SAVE**" to save the coil made. At this time the system will save both the general parameters and the data for the reproduction of the coil. (**NOTE:** Remember that this kind of file only can be saved in the 23rd first memory slots)
7. Once the saving is done, we can Load and replicate this coil as many times as desired.

NOTE: In this mode, **Traverse** will finish the coil by making the last laps next to the base of the coil.

6.5.1.4 Emulate mode:

In this mode, you can manually vary the filling factor at any time, by activating a potentiometer (Factor knob). It also allows you to save these parameters during winding so that you can clone the winding pickup later as many times as you want:

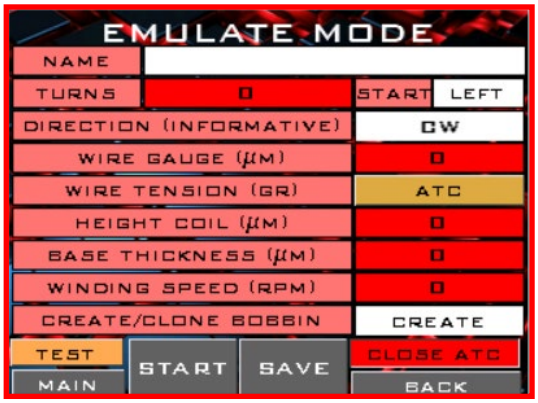


*Figure 71: "**EMULATE MODE**" screen*

In this mode, we have to turn the potentiometer to vary the **Filling Factor** while winding.

Clicking "**SAVE"** here will store only the coil parameters, but if you intend to later **clone** the bobbin once made, then you need to go step by step the following process:

8. Make a reset to initialize the winder to make sure there is no spurious data in the ram memory, then select **"NEW BOBBIN"** in **"MAIN MENU"**, and **"EMULATE MODE"** in **"NEW BOBBIN".**
9. Wind the pickup, acting on the potentiometer to modify the filling factor as appropriate.
10. Once the coil is finished, press "**REPEAT BOBBIN**" in the **"MAIN MENU"**.
11. Modify the "**CREATE/CLONE BOBBIN**" field to display "**CLONE**".
12. Set a name for the bobbin.
13. Press "**SAVE**" to save the coil made. At this time the system will save both the general parameters and the data for the reproduction of the coil. (**NOTE:** Remember that this kind of file only can be saved in the 23rd first memory slots).
14. Once the saving is done, we can Load and replicate this coil as many times as desired.

6.5.2 Pickup Library Section:

In this section, you have access to a library of some of the most famous pickups of all time. To access this library, inside the "MAIN MENU", click on the button “PICKUP LIBRARY”:

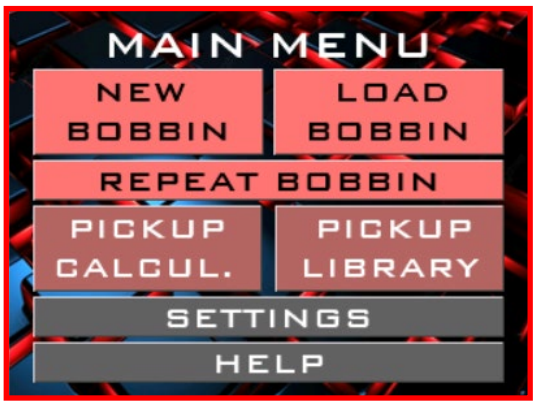


*Figure 72: "**PICKUP LIBRARY"** access*

NOTE: All the information in this section is a compilation of the most popular pickups and is intended to be helpful. It is possible that some specifications or dimensions may not exactly match the original. If you are going to use the presets in this section, you should check the coil and wire diameter before using them.

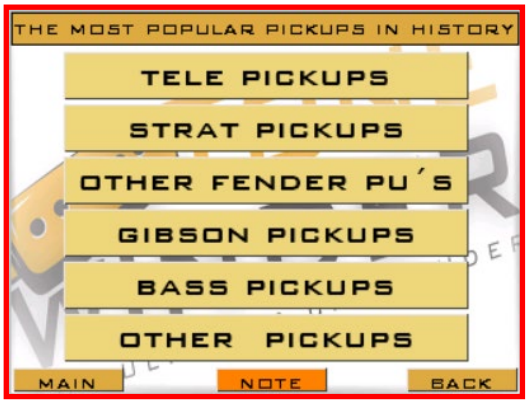


*Figure 73: "**ICONIC PICKUPS WIZARD"** screen*

This library has different categories, depending on the pickup you want to make. For example, if you go to the "STRAT PICKUPS" section:

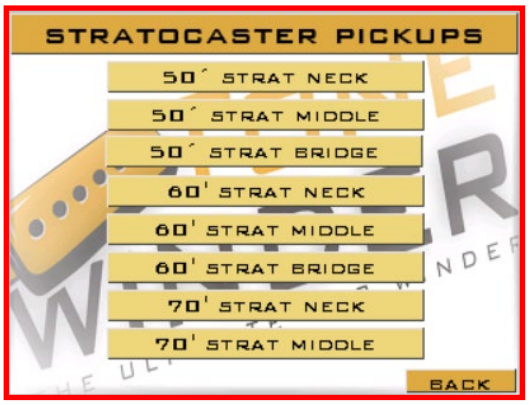


*Figure 74: "**STRATOCASTER PICKUPS**"* menu

If you select one of the pickups, for example, "60' STRAT NECK", a new screen will appear with a picture of this pickup and its basic construction parameters:

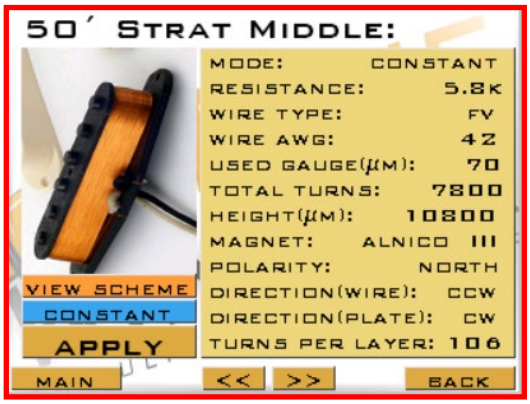


*Figure 75: "**50' STRAT MIDDLE**"* screen

You can use this preset in two winding modes, Constant and Scatter. Select the mode by pressing the blue “Constant” key.

In addition, we will have access to a useful construction diagram (by clicking “VIEW SCHEME”), which will indicate the direction of rotation of the wire and the plate, as well as the distribution of the pick-up output cables.

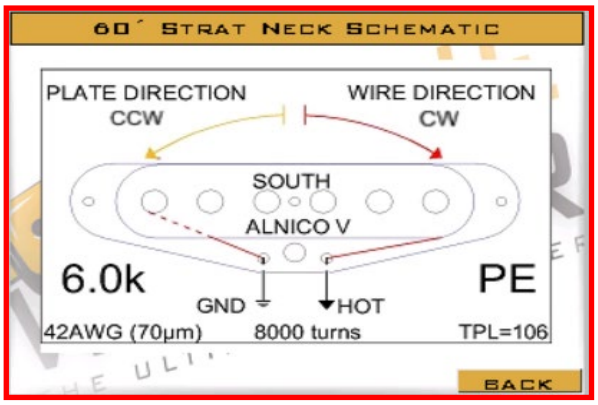


*Figure 76: "**60' STRAT NECK SCHEMATIC**"* screen

This information is also available for humbucker pickups, such as the famous PAF:

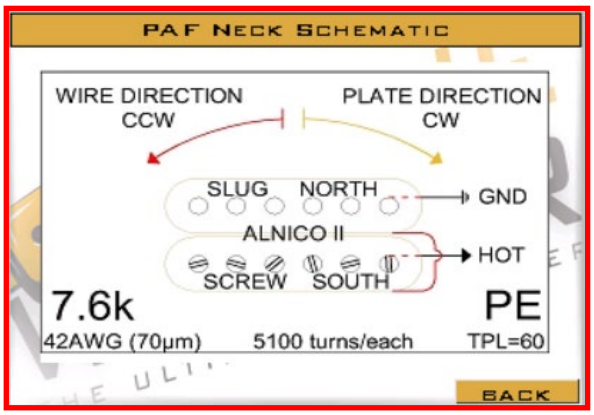


*Figure 77: "**PAF NECK SCHEMATIC**"* screen

You also can apply the basic parameters of these pickups on a real winding project (only in **Constant mode or Scatter mode**), just by clicking on the "APPLY" button.

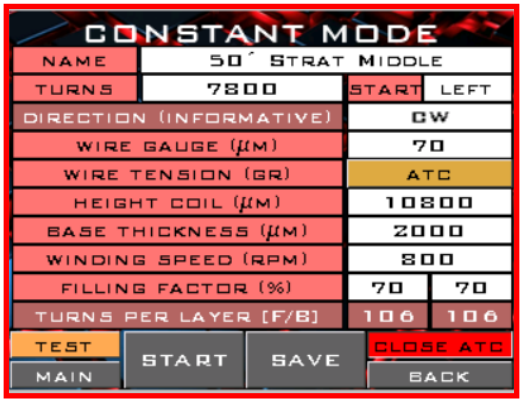


Figure 78: Applying pickup parameters

If you desire to apply all these parameters in another winding mode, you must copy them manually.

Once all the basic parameters have been copied, you will be able to wind the pickup in the normal way, and even save this pickup in one of the available memories.

6.5.3 Load Bobbin:

In this menu you can load the parameters of both a coil stored in memory by "**DEFAULT**", and a previously saved coil:

*Figure 79: "**LOAD BOBBIN"** screen*

There is space to store up to 59 new coils, spread out over 5 pages. Once the data is saved, it remains stored in the SPIFFS memory of the ESP32. Via Wi-Fi, you can download these memories to a PC, to later reload them in **Traverse**. This applies to both simple files and also clone mode files previously stored using the **Scatter** mode and **Emulate** mode. (**NOTE:** Remember that this kind of file only can be saved in the 23rd first memory slots).

6.5.4 Repeat Bobbin:

By choosing this option you may repeat the last winded coil (This option can not be used if the last winding was made in **Clone Mode**).

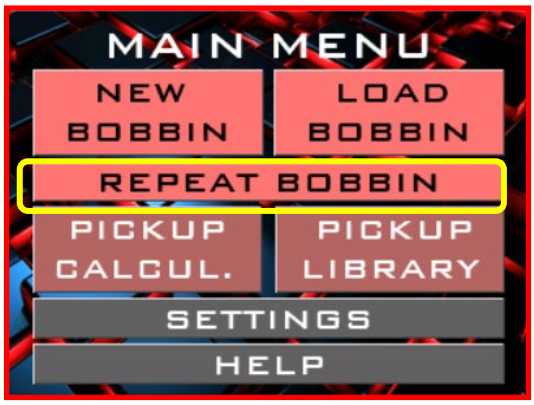


*Figure 80: "**REPEAT BOBBIN**"* button

You may also use **SAVE** from this screen.

6.5.5 Pickup Calculator:

In this new software version, a pickup calculator has been implemented which allows you to calculate very accurately the number of turns needed to achieve a given pickup resistance, taking into account the geometry of the bobbin, the type of wire used and the winding conditions. It also calculates the outer dimensions of the coil to avoid exceeding the physical limits of the coil.

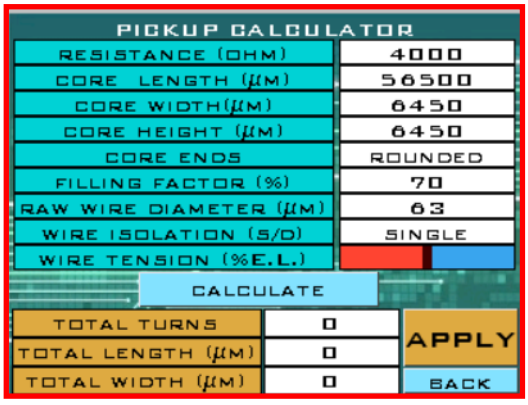


*Figure 81: "**PICKUP CALCULATOR**"* screen

By entering the internal measurements of the bobbin, the geometry at the ends, the type of wire used, the filling factor, and the percentage of tension of the wire with respect to its elastic limit, the program returns the estimated

number of turns to achieve this resistance, as well as the external measurements of the winding once it is finished.

NOTE: note that this value depends on other factors such as the internal dimensions of the bobbin core, the type of wire used, the winding strategy and the filling factor of the bobbin. For this reason, this calculation should be understood as a guideline value.

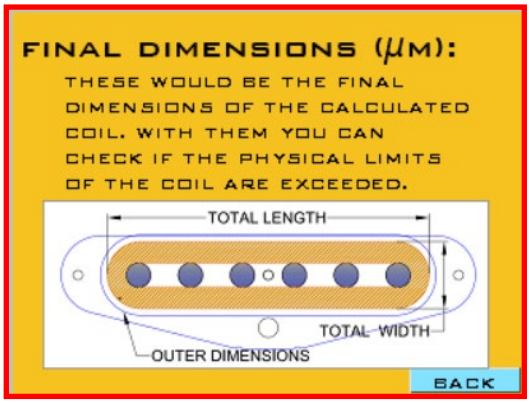


Figure 82: Final dimension diagram

Once this value is calculated you can apply it to a real winding program (only constant mode) by just clicking on the "**APPLY**" button.

Also, remember that you can access the interactive help for each parameter just by clicking on the parameter name field.

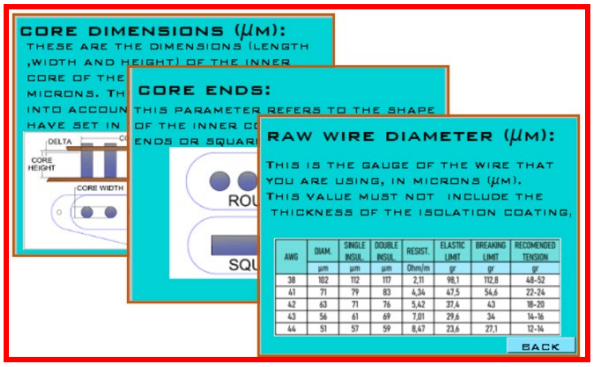


Figure 83: Some interactive help screens

6.5.6 Settings:

In this section you can adjust the main parameters of the winder, update the ESP32 microcontroller and touchscreen software, through a Wi-Fi network, and reset the device.

*Figure 84: "**SETTINGS**" screen*

6.5.6.1 Basic Parameters:

In the Basic parameters screen you have these parameters:

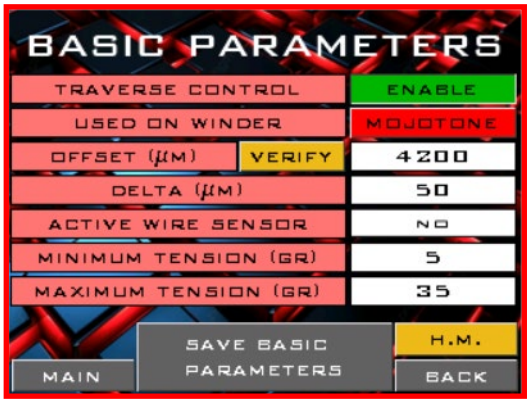


*Figure 85: "**BASIC PARAMETERS**" screen*

- **Traverse Control**: allows you to enable or disable the traverse movement. It must be disable if you want to use the Traverse as "Stand Alone" (only the wire tension system will work).
- **Used on Winder**: Is used to setup the Traverse to couple to a Mojotone winder or other winders ("Universal").
- **Offset**: the distance, in microns, from the home position (initial set point of the X motor position) to the plane of support of the coil on the plate

is aligned with the small white pulley of the guide arm. To verify or recalibrate this value see section 6.4.1 Verify "Offset Position".

- **Delta**: it is the distance, in microns, where you do not want to have wire, stuck to the limits of the height of the coil, to avoid piling up the wire in the changes of direction of the winding and the overload in the wings of the coil, avoiding pickup deformations. The default value is 60 um
- **Active Wire Sensor**: From here you can activate/deactivate the wire tension sensor.(Only auto hold system. Wire tension monitoring will be still performed)
- **Minimum tension**: Threshold for the auto stop low level. The default value is 5 grams.
- **Maximum tension**: Threshold for the auto stop high level. The default value is 35 grams.
- **H.M. (hidden menu**): Allows you to calibrate the displacement of the arm after a software update (see FC_14) and also to recalibrate the Mojotone Speed factors.

Once you have set or modified any parameter you must click on "**SAVE BASIC PARAMETERS"** to permanently store it.

6.5.6.2 Recalibrate Mojotone Speed Factors:

If you are a owner of a Mojotone winding machine, you will already know that you do not actually know what speed you are winding at when using this machine in manual mode, as its speed control ranges from 0 to 60, with a theoretical maximum speed of 1800 RPM.

You may think that the setting is linear and that if you are winding at a speed of '30', you are actually winding at 900 RPM, but nothing could be further from the truth. The Mojotone winding machine has a non-linear (quadratic) speed setting. If you want to wind at 900 RPM you should select 9 or 10 as a speed.

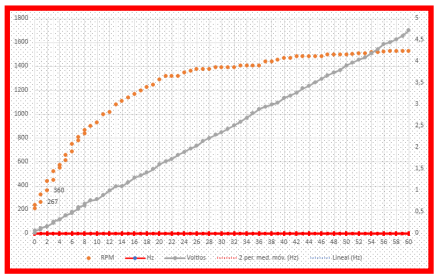


Figure 86: Mojotone speed Dial distribution

From Traverse, by connecting your Mojotone winding machine with the control cables, you will not only control the start and stop of the winding, but you will also be able to select the actual winding speed.

To achieve this, and after testing several Mojotone winding machines, an average calibration of the winding speeds has been carried out. However, we know that not all winding machines work exactly the same (very similar), which is why we have created a section to recalibrate these values depending on the winding machine to which it is connected.

The speeds at which you can work with a Mojotone attached range from 330 RPM to 1500 RPM, in increments of 100 RPM. This means you can select 800 RPM or 900 RPM, but not 850 RPM. If you choose 850 RPM, the software will automatically change it to the next higher speed.

We recommend that you only recalibrate the speeds you are going to work with, and do not waste your time calibrating each and every speed. For example, if you are only going to work with 800, 900 and 1000 RPM, just spend your time calibrating these three speeds and leave the others as they are.

We also recommend, given that the efficiency of the Mojotone winding motor depends on its temperature, that before calibrating, you warm it up by running it at maximum speed for 10,000 or 15,000 revolutions.

For example, to calibrate 800 RPM, access the hidden menu (within Basic Parameters) and use the password '2024' to access it:

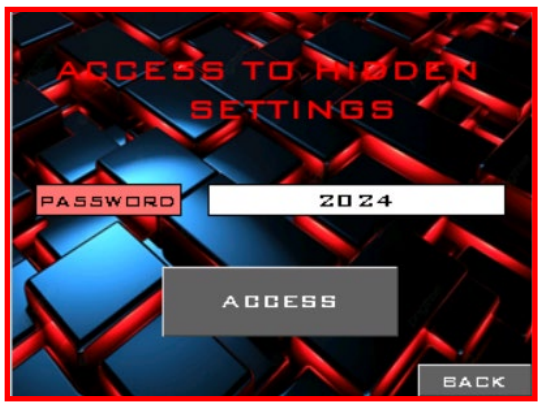


Figure 87: Hidden Menu Password.

Once you access the hidden menu, you have the option to calibrate the arm offset (see FC_016) and the option to recalibrate the Mojotone speed control coefficients. Select the second option:

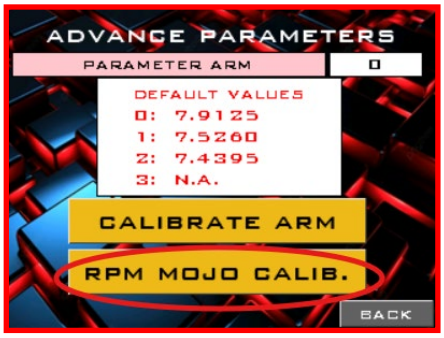


Figure 88: Mojotone calibration factors.

The steps for calibration are:

1. Select the speed (800 RPM) you want to calibrate using the arrows at the top.

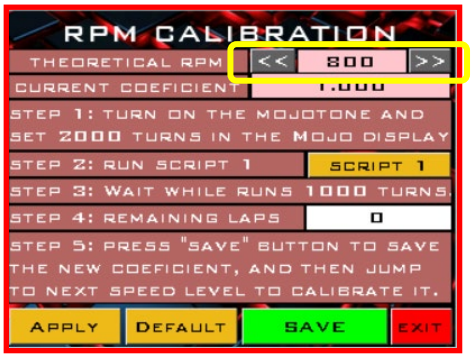


Figure 88: Mojotone calibration factors.

2. Be sure that the control cables are properly installed.

Figure 89: Mojotone Control cable connections.

3. Turn on the Mojotone winder and set it to 2000 turns (direction is irrelevant). Save in the first preset, so you will have 2000 tuns every time that you reset the counter.

Figure 90: Select 2000 turns.

4. Run the "**Script 1"** and let the system finish the run. The Traverse will instruct the mojotone winder to make 1000 turns at that speed.
5. Once the run is finished you have to enter the remaining turns of the Mojotone winder in the field of the Traverse. For example:

Figure 90: remaining turn in the Mojotone winder

6. **If the error is below 3% (between 970 and 1030)**, the field will turn to green, and means that this speed is already calibrated. Press "Save" to save this value. Then you can press "Exit" or calibrate another speed.

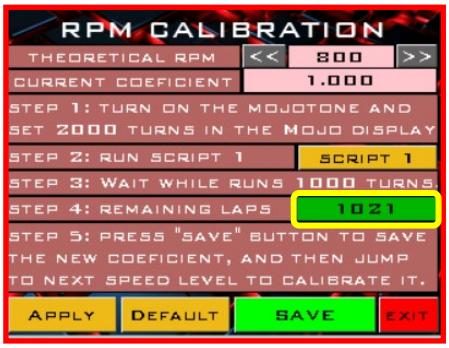


Figure 91: Field turns to green if error is below 3%.

7. If the error is above 3% (for example 954), the field will turn to red, and means the speed factor needs to be corrected by pressing “SAVE” button.

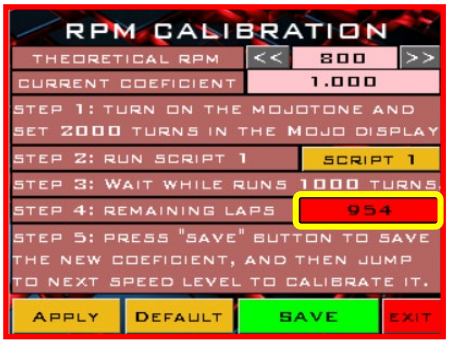


Figure 92: Field turns to red if error is above 3%.

8. As soon as you press save, the Traverse will correct the coeficient of this speed:

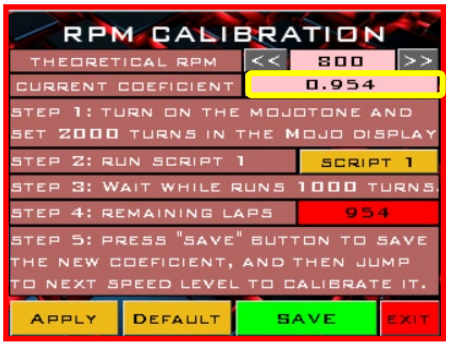


Figure 93: New coefficient for 800 RPM.

9. At this point you may repeat the process until the remaining laps field turns to green. You will often need two or three iterations to calibrate each speed.

10. Once you have finished calibrating the coefficients, exit by pressing EXIT. The coefficient values are stored in the microcontroller's memory, so if you update the software normally (without using the flasher), these values should remain unchanged.

6.5.6.3 Software Update (and Upload/Download files):

From the "**SETTINGS**" screen you can also update the microcontroller software via Wi-Fi 2.5G network (No 5G compatibility). To do this, press on the button "**Soft. Update**"and the following screen will shown up :

*Figure 94: "**WI-FI CONNECTION"** screen*

Pressing on each of the fields will open the keyboard to be able to enter both, the name of the ***Wi-Fi*** to which you want to connect and the access password. Be aware of case discrimination.

*Figure 95: **QWERTY** keyboard screen*

Once the fields have been properly filled in, by pressing the "**CONNECT**" button the device will show the next screen where you can open the communication to connect with the **Wi-Fi** network, showing you the IP address that you have to write in your browser to connect with **Traverse**.

If the winder cannot connect with the router in 25 seconds, it will return to "**SETTINGS"** screen. If this happens, please check the **SSID** name, **password,** and also distance to the router.

When the next screen shows up, **Traverse** has managed to establish a connection with the router and show up on the screen the **IP** address that

we have to use in the browser of our PC to establish a connection with the **Traverse** web server.

*Figure 96: "**SOFTWARE UPDATE**" screen*

Note: It is possible that under certain circumstances (especially distance from **Traverse** to the transmitter of the **Wi-fi** network) **Traverse** does not connect to the network. If the problem persists, it is recommended to move the device closer to the **Wi-Fi** transmitter, and if this is not possible,

WARNING— Electric Shock or Damage to the Device

High voltages are present inside the device that could cause an electric shock or damage to the device.

you can temporarily remove the top cover of the equipment, removing the four screws from the corners, during the update process.

Once we have typed in the IP address in our browser, and "**enter**" is pressed,

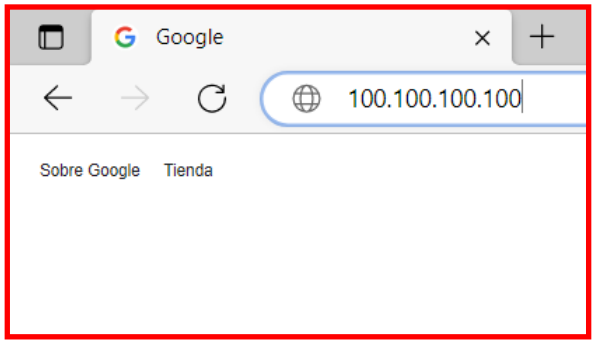


Figure 97: IP address in your navigator

Then, we have to push the connection button in the **Traverse** screen.

Figure 98: Press Connection button

Next screen will be shown.

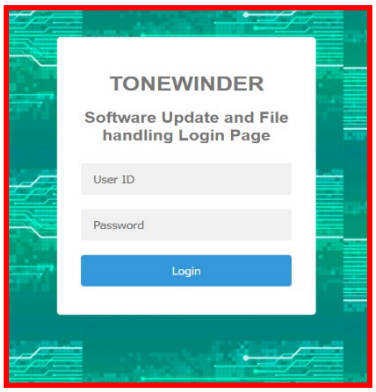


Figure 99: **Tonewinder** *Access screen*

This is the access screen to the **Tonewinder** web server menu. In the "**User ID**" field we must type: **admin** (all lowercase), in the "**password**" field we should type: **tonewinder** (all lowercase). This "*password*" does not provide security on the internet, so it must be used exclusively in a private environment. Once you enter "U**ser ID**" and "**Password**" we will access the screen **Tonewinder Server**

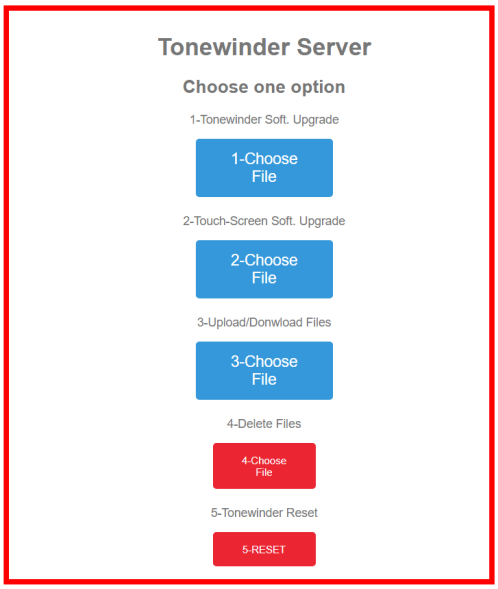


Figure 100: **Tonewinder** *server*

Tonewinder Server Options Menu:

1. **Update Microcontroller software.**
2. **Update Touchscreen software**
3. **Upload/Download files from/to a PC.**
4. **Erase files from Tonewinder memory.**
5. **Reset Tonewinder.**

By selecting "1. **Tonewinder Soft. Upgrade"**, we must make sure to choose one of the files with **.bin** extension. This step is crucial because in case of uploading a wrong file **Traverse** would be inoperative. You can download the latest version compatible with your **Traverse** on http://www.Tonewinder.es.

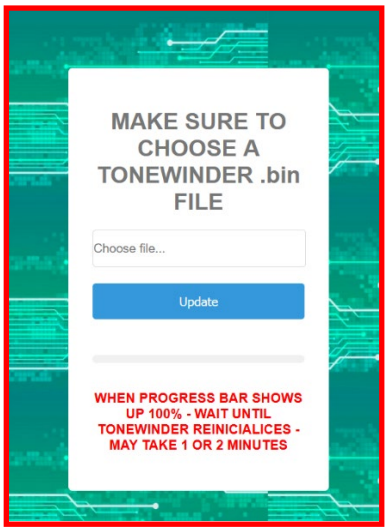


Figure 101: Select a software update

Once the file is selected, press the "**UPDATE"** button. The blue Progress bar will advance. Once 100% is complete, we wait for **Traverse** to reboot (it may take less than a few minutes).

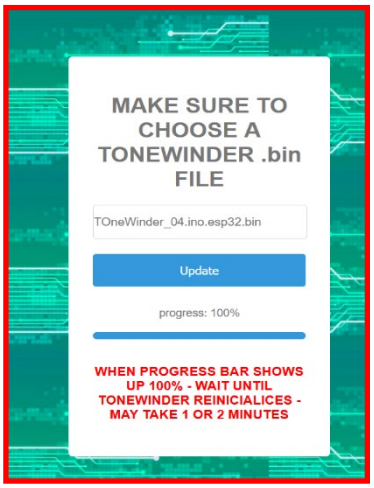


Figure 102: New software updated

Selecting the option 2 you can upload the touchscreen software (tft file extension) with the same way than the microcontroller. It will take about 18/20 minutes

If we select “**3- Upload / Download Files”** the screen will appear that will allow us to download the files from **Tonewinder** to the download folder on our PC by selecting the file and pressing "**enter**", the download will start.

Figure 102: File list overview

After files **1-59.txt** and **CloneArrayxx.txt** are downloaded, it is recommended to move them from the downloads folder to a folder identified with the file name, such as "**PAF 2022-11-21**".

Through “**Upload file**” we can upload files previously downloaded to the PC back to **Tonewinder**. When selecting the files we will see the progress monitor advance and through the "**Refresh**" button we will see the list of files updated.

It is important to decide in advance where we want to locate the files uploaded to **Tonewinder**. If we want to store the file in a free memory position or in one already occupied, in this case, the old file will be deleted.

If our file “**1.txt”** that we have named “**Tele 2022-22-17”** we rename it as “**3.txt”**, once uploaded to **Tonewinder** will be shown as : “**Tele 2022-22-17”** , in the memory position 3.

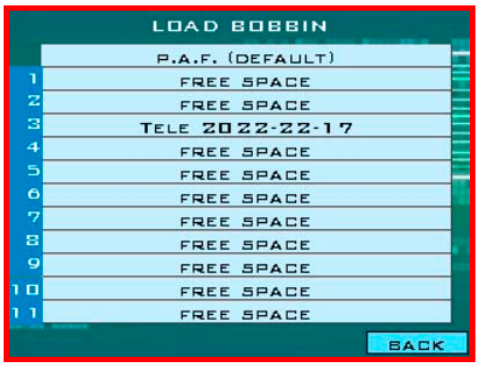


*Figure 104: "**LOAD BOBBIN**" screen*

If the file we are uploading is a **CLONE file (i.e. 1.txt)**, then we need to upload also the corresponding **CloneArra1.txt** to same memory position (as we have renamed "**1.txt"** to "**3.txt"** we have to rename "**CloneArray1.txt"** to "**CloneArray3.txt**" and then upload it to **Tonewinder**.

The option "**4- Delete Files"** give us the posibility to delete files from the **Tonewinder** memory.

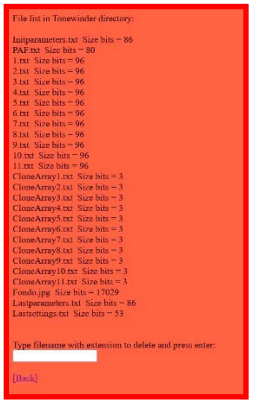


Figure 105: Delete File Overview

To delete a file we have to write the full name including the extension and then press "**enter**". If the file has been properly erased, a confirmation screen will be shown.

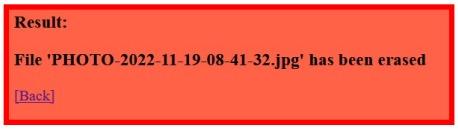


Figure 106: Message after deleting a file

We can only delete user files, or files that we have previously uploaded to memory. System files cannot be erased with this tool.

Option **5- RESET**. Reinitialices **Tonewinder** and disconect it from the router.

NOTE: IT IS IMPORTANT TO CLOSE ALL BROWSER SCREENS UPON COMPLETION.

6.5.6.4 Backup/Restore the software:

This procedure describes the process followed to make a Mirror_Copy of your Traverse processor, store it on a Windows OS-based PC, and upload it back to a Tonewinder.

This Mirror_Copy of your Tonewinder processor contains a copy of the memory including the current software version, plus all the custom programs, basic settings, and calibration data as OFFSET VALUE or GAUSSMETER CALIBRATION DATA.

Note: HMI touchscreen software is not copied.

You can make a copy of all your files and software to be able to upload it again in case of file corruption, accidental deletion of important files, or transfer of your preferred files to another Tonewinder.

- **Installing the files in your HD:**
  1. Download the "**ESP Flash Tools**" from our website, www.tonewinder.es.
  2. Extract all the files to a temporary folder on your hard disk.

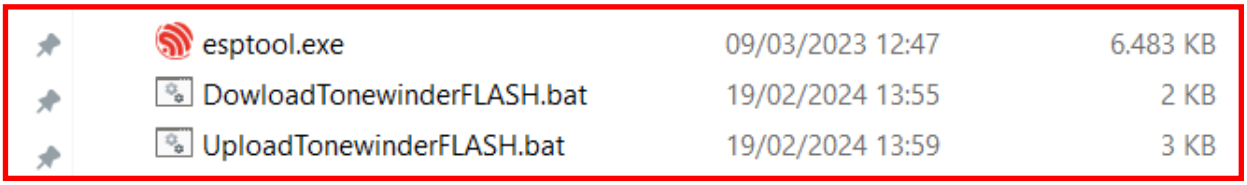


Figure 107: ESP32 Memory flashing files

- **Create/Backup a Mirror Copy of your Tonewinder Memory (DownloadTonewinderFLASH. Bat file):**

1. Switch OFF the Tonerwinder and disconnect it from the mains.
2. Connect a USB cable between the Tonewinder rear USB slot and one of your Windows PC USB connectors. Take note of the COM number of this connection.
    - *If you do not know it, please go to Windows Configuration Bluetooth and Devices, Devices, then connect your USB cable between Tonewinder and your PC USB sockets, you should see a message showing "USB-Serial CH340 (COMx)". Take note of the COM number to write it in the next step.*
3. Make sure the files **esptool.exe** and **DownloadTonewinderFLASH.bat** , are present in the directory.
4. Execute the file DowloadTonewinderFLASH.bat (by double-clicking on the file) and follow the steps suggested on the screen.
   You will be asked to press “ENTER” several times and to enter the COM number of your USB connection. For example: COM5
5. If no errors are shown on the screen, the process will end and a new file will be created in the current directory : **tonewinderMemory_FLASH.bin**

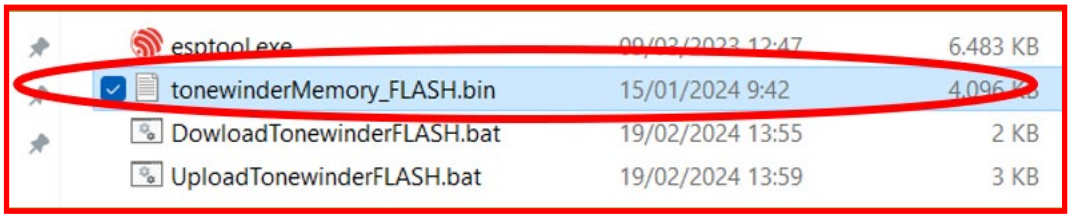


Figure 108: ESP32 Memory flashing files

6. This file is a binary copy of your Tonewinder memory, that you can store to be used later for backup or to clone your Tonewinder memory to other Tonewinder units.
7. Remember to disconnect the USB cable before switching On the Tonewinder again.

- **Upload/Recover a Mirror Copy to your Tonewinder Memory (UploadTonewinderFLASH):**

1. **WARNING. By following this procedure all existing files in Tonewinder will be overwritten**
2. Switch OFF the Tonerwinder and disconnect it from mains.
3. Connect a USB cable between the Tonewinder rear USB slot and one of your Windows PC USB connectors. Take note of the COM number of this connection.

    - *If you do not know it, please go to Windows Configuration Bluetooth and Devices, Devices, then connect your USB cable between Tonewinder and your PC USB sockets, you should see a message showing "USB-Serial CH340 (COMx)". Take note of the COM number to write it in the next step.*

4. Make sure the files **esptool.exe**, **tonewinderMemory_FLASH.bin,** and **UploadTonewinderFLASH.bat**, are present in the same directory.
5. Execute the file UploadTonewinderFLASH.bat (by double-clicking on the file) and follow the steps suggested on the screen.
   You will be asked to press “ENTER” several times and to enter the COM number of your USB connection. For example: COM5
6. If no errors are shown on the screen, the process will end and your Tonewinder will be updated with the content of the file: **tonewinderMemory_FLASH.bin**
7. Remember to disconnect the USB cable before switching On the Tonewinder again.

6.5.6.5 Touch Screen Software Update:

The touchscreen software update can be performed using the webserver (see section 6.5.6.3) or using a **microSD** card (**max 32Gb**)through the slit located under the screen.

Download the updated version of the **Nextion software** program in the download section of http://tonewinder.es.

NOTE: the downloaded file is compressed (zip), and you must decompress it before use it. The extension of this file is .tft.

Copy the program to an empty **microSD** card. With **Tonewinder** turned off, insert the **microSD** card into the ready-made socket under the display (**Contacts facing to you**). Make sure the card has been adjusted correctly (you will feel a soft resistance when the card is seated, making a final click). Then operate the **Tonewinder** power switch.

The guide arm will be moved first to the starting position and then to the zero position. This movement is normal.

The update screen should show the progress of the program load and, after a few seconds, the screen will show the successfully updated status.

Remove the **microSD** card by pushing it lightly and then remove it completely.

NOTE: if you receive this message (see below), your microSD card must be formatted as FAT32 (fast), only under Windows OS. If this error persists, please read FC_12.

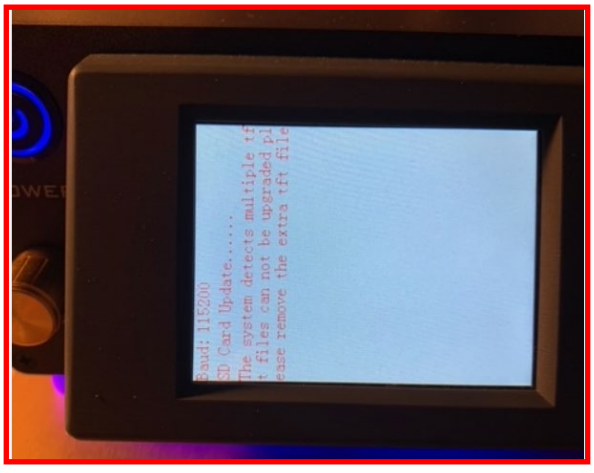


Figure 109: error during the upload.

6.5.7 Help:

Within this section, you have access to different submenus related to different operating problems during winding, such as:

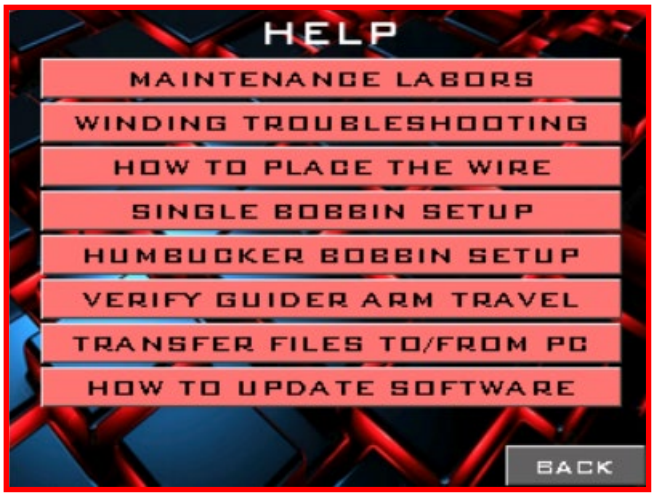


*Figure 110: "**HELP**" screen*

- **MAINTENANCE:**This section describes all the maintenance work that you need to carry out on your unit to ensure its correct operation. All these works are also covered in section *"7.1 Routine and Preventive Maintenance"* of this operating manual.

*Figure 111: "**Maintenance**" screen*

By clicking on each button you have access to the maintenance works of each period, including descriptive pictures.

*Figure 112: "**Weekly Maintenance**" screen*

- **CORRECT WIRE POSITION:** The path of the wire on the winder is shown.

Figure 113: Correct wire position scheme

- **WIRE TENSION ISSUES:** you should visit this section when you are having problems with wire tension during winding. These problems can be no tension on the screen, too little tension, or too much tension.

Figure 114: Wire Tension Issues

In each of these fields, you will find a list of possible causes of why you are facing this problem. For example, here you have a list of possible reasons for a wire tension too high

Figure 115: Wire Tension Issues

- **WIRE BREAKAGE ISSUES:** you should visit this section when you are facing problems of wire breakages during winding.

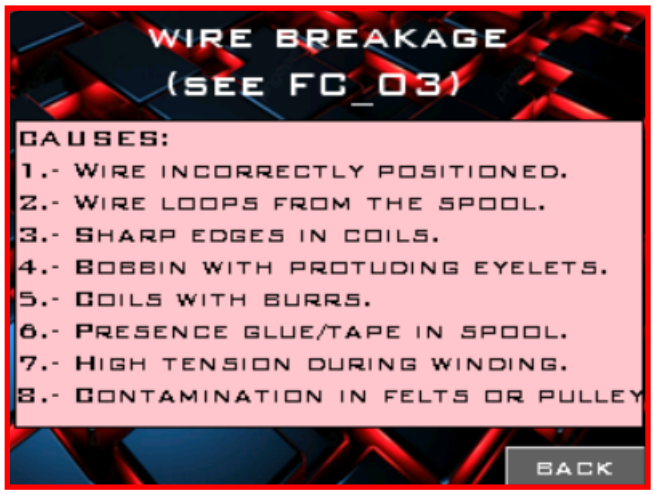


Figure 116: Wire Tension Issues

A factory communication on possible causes of wire breakage during winding is also available on our website http://www.Tonewinder.es.

- **ODD SHAPED COIL:** You should visit this section if your coil shape is not uniform or has any of the following finishes:.

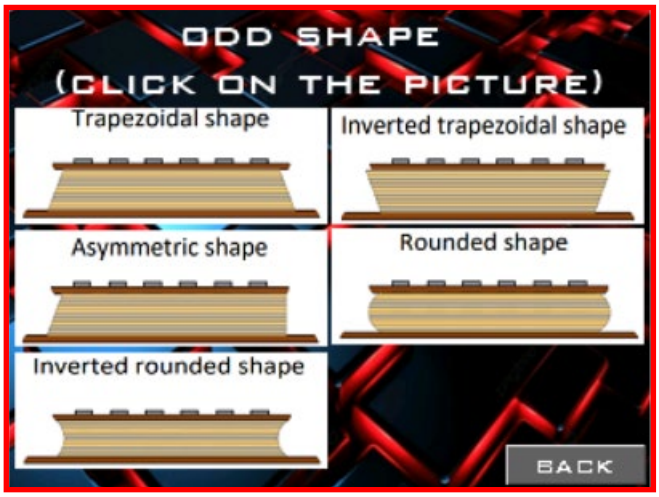


Figure 117: Odd shape coil

By clicking on any of the drawings will take you to another screen which will explain the reasons why you may have got this shape and what you need to do to correct it and get a normal shape.

Figure 118: Inverted Trapezoidal shape

- **RELATED TO CLONE:** you should visit this section when you are having problems to clone a pickup.

- **OTHER ISSUES:** If you are facing another kind of issues you can contact us at info@tonewinder.es.

6.6 Operating with Traverse as "Wire Tensioner Stand Alone":

NOTE: This section only applies when you have configured the machine to work in "Traverse Control Disabled" mode. If you have configured your Traverse as a 'Traverse control Enable (For Mojotone and Universal winders), go to chapter 6.5.- Operating with Traverse (Mojotone and Universal winders).

Operating **Traverse** under this mode is quite simple. In this mode, only the wire tension is automatically controlled by the Traverse (there is no transverse movement). This mode can be useful for incorporating tension control into existing automatic winders or for performing manual winding while managing the wire tension.

To work with this mode, you must disable the cross-control option:

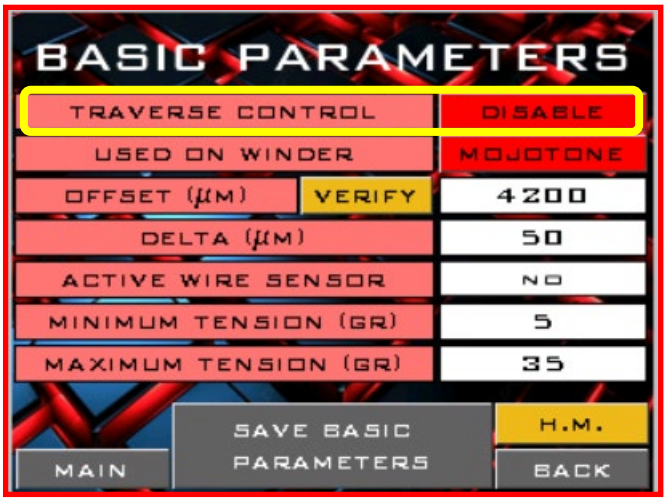


Figure 119: Disable the traverse control

The options in this mode are more limited than in the other modes:

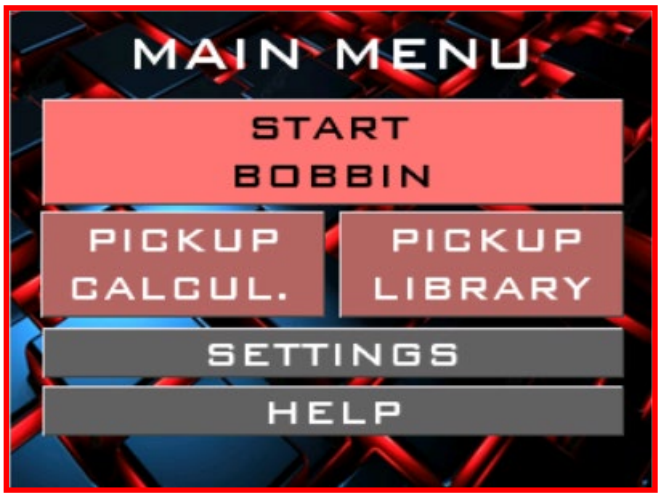


Figure 120: Main menu screen

To start working with the traverse in this mode, simply press 'Start Bobbin'. Once you enter the start screen, select the ATC working values and an estimate of how long the run will take, in seconds.

Figure 121: Start bobbin screen

Once we press 'START', the Traverse moves into the running position, managing only the thread tension.

Figure 122: Start bobbin screen

7 Maintenance and Service

This chapter describes the routine maintenance and the service procedures that the user may perform.

7.1 Routine and Preventive Maintenance:

Tonewinder is designed to be trouble-free if properly maintained.

7.1.1 Weekly maintenance:

Lubricate felt discs in wire guide arm and ATC with oil.

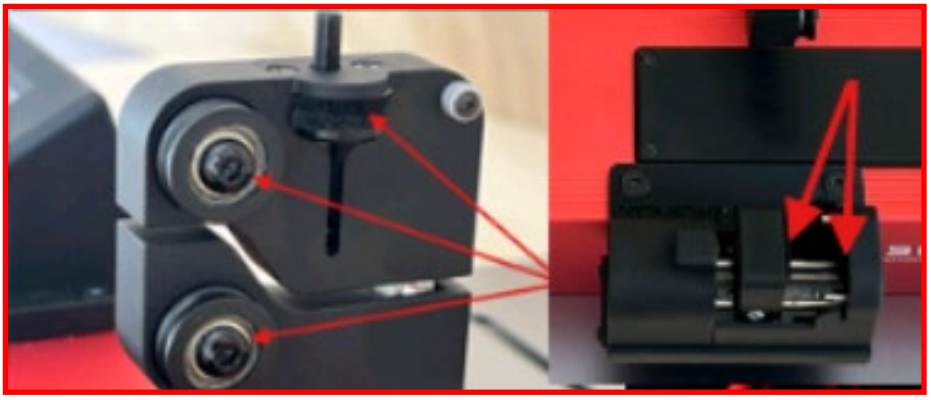


Figure 123: Lubricating wire tension felts

7.1.2 Monthly maintenance:

Clean and lubricate rods and screw of the ATC with oil.

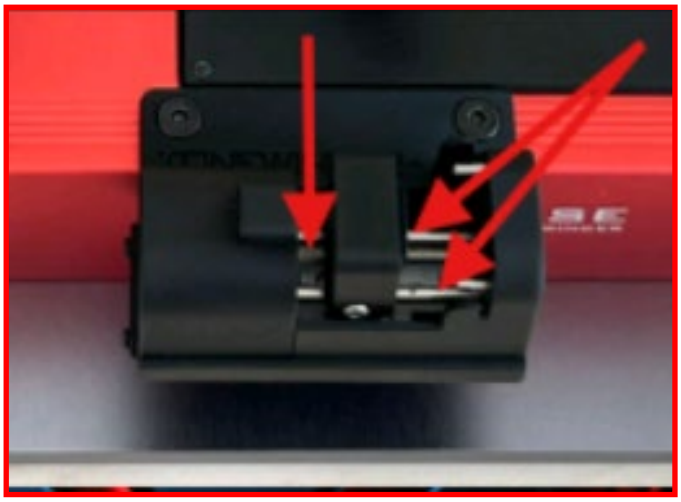


Figure 124: Lubricating pulleys

7.1.3 Yearly maintenance:

Clean and grease the guide arm screw, then move it back and forth several times. Lubricate motor bearings with oil.

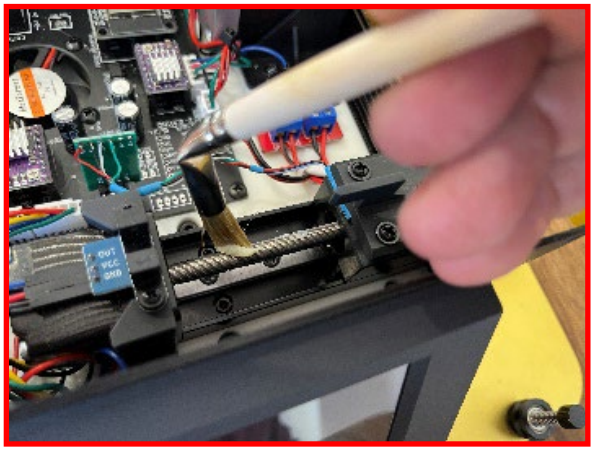


Figure 125: Lubricating wire arm guider screw with grease

8 Specifications

This chapter provides the physical and performance specifications, including information about the materials used in **Traverse**.

8.1 Physical Specifications:

The physical specifications of the device are specified as follows:

Type	Specification
Device type	Traverse V1.0
Microcontroller	ESP 32 Wroom Wi-Fi 240Ghz 512 Kb de SRAM
Motor X Driver	TMC2226
StepMotor X	Nema 11 with transmission (Resolution 0,0075mm)
Motor Z driver (ATC)	TMC2226
StepMotor Z	Stepmotor 250 mA
Working Voltages	5vdc and 24vdc
Tension Sensor	Max 300 gr
Tension gauge accuracy	1 gr
Touch Screen	*Nextion 2.8“ Enhanced*
Max power	*100w*
Range of use	Indoor use only
Ambient temperature	15 – 35 °C
Ambient humidity	12 - 80% relative humidity (non-condensing)
Power requirements	100 – 240 V AC; 50/60 Hz, 100 VA
Overvoltage category	II
Emission sound pressure level	<70 dB(A), typically 54 dB(A)
Dimensions (Height x width x depth)	110x225x238 mm
Weight	Approx. 1.5 kg

8.2 Appendix 1:

About **Filling Factor**

In addition to other factors such as wire quality, wire insulation coating, magnets, and many others, also the filling factor (**Filling Factor**) is a parameter of great importance when characterizing the sound of our pickups. One of the determining factors of the sound that an inductive-type transducer can generate is its distributed capacitance. This intrinsic characteristic of any coil is due, to some extent, to the way in which the wire loops of the coil are distributed along the width of the coil, which can be, among others, a winding of loops located contiguously with each other, without leaving any space between them (FF of 100%) or, a winding spacing the turns to each other (an FF of 20% means putting only two turns of wire in the place where ten of them would fit contiguously, without space in between)

We must keep in mind that lowering the filling factor increases the space between turns in the same layer, and therefore reduces the distributed capacitance in this precise layer, but a standard guitar pickup has several tens or hundreds of layers that overlap and also produce distributed capacity. By increasing the space between loops, we leave space available for subsequent layers of loops to settle in that place. This means that an increase in the spacing between loops does not necessarily have the effect of a directly proportional reduction of distributed capacitance.

The increase in distributed capacity decreases the ability of our transducer to generate high frequencies, and therefore also reduces the number of harmonics (their intensity) of our transducer and causes the dominant tone of the transducer to be lower. That is why playing with the value of the filling factor allows us to vary the tone of our sound, allowing us to print that unique personal stamp we are looking for.

Figure 126: Filling Factor 20%

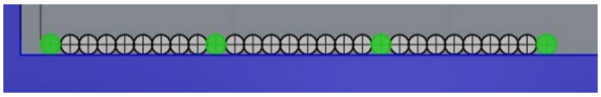


Figure 127: Filling Factor 100%

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