MAG-ic Probe WiFi

Electronic Thickness Gauge

Disclaimer:

WARNING !! - This device uses extremely strong NEODYMIUM magnets. These magnets can cause injury or damage if misused. **KEEP AWAY FROM CHILDREN!!. DO NOT OPEN or USE** if you have a pacemaker or other medical condition that may be affected by magnetic fields. The strong magnetic fields can erase computer hard drives, magnetic access and credit cards, Use at your own RISK.
MAG-ic Tech or its owners neither assumes nor accepts any liability for damages resulting from the handling or use of this equipment. With your purchase, the buyer agrees that he/she is responsible for all damages and injuries caused by the use of this product , which include personal injuries , property damages and any other damage whatsoever. The buyer must agree with the terms before using the product.
Pay special attention when using this device to measure finished instruments. The probe tip is fabricated from Plastic and may scratch or leave marks on finished surfaces.
DO NOT DRAG THE PROBE TIP OVER FINISHED SURFACES!! To avoid scratches and marks, you should slightly lift the probe before moving it. A good method is to lift the tip and place a piece of soft cloth under before moving and removing the cloth at the new measuring location.
Some users prefer to use a rice paper or other thin protective paper. You can also calibrate MAG-ic probe with the rice paper inserted between the magnet and the probe. In this way the zero (0.00) value would include the paper thickness and all measurements must be performed with the paper included.
You can also use the OFFSET function in the MAG-ic Probe Software to compensate for a thicker protective cloth if required

MAG-ic Probe Device Overview

MAG-ic Probe uses magnetism to penetrate the material to be measured. A probe is applied to one surface of the plate and a ball is applied to the opposite side. These attract each other so when the probe is moved along the surface of the material, the magnetic ball follows underneath and the MAG-ic Probe tool will measure and display the thickness in both mils (1/1000th inch) and millimeters (mm)
MAG-ic Probe WiFi is the newest variation of the MAG-ic Probe product line. MAG-ic Probe WiFi features wireless communication to any device that has WiFi capability including Smartphones, Computers and Tablets.
The device features -

- All in one construction - less wear & tear
- a USB connection for power and connection to a computer for use with the MAG-ic Probe Software or to a battery for mobile use.

MAG-ic Probe WiFi is supplied with -

- USB Cable
- 1/2” Sphere magnet
- 1/4” x 1/2” cylinder magnet

MAG-ic Probe can measure 0-600mils (0.6”) (0-15mm) using the 1/2” Sphere magnet and 0-420mils (0.42”) (0-10mm) using the 1/4” cylinder. The cylinder is used where access is restricted for example in violins, mandolins and violas. Use the 1/2” sphere wherever possible.

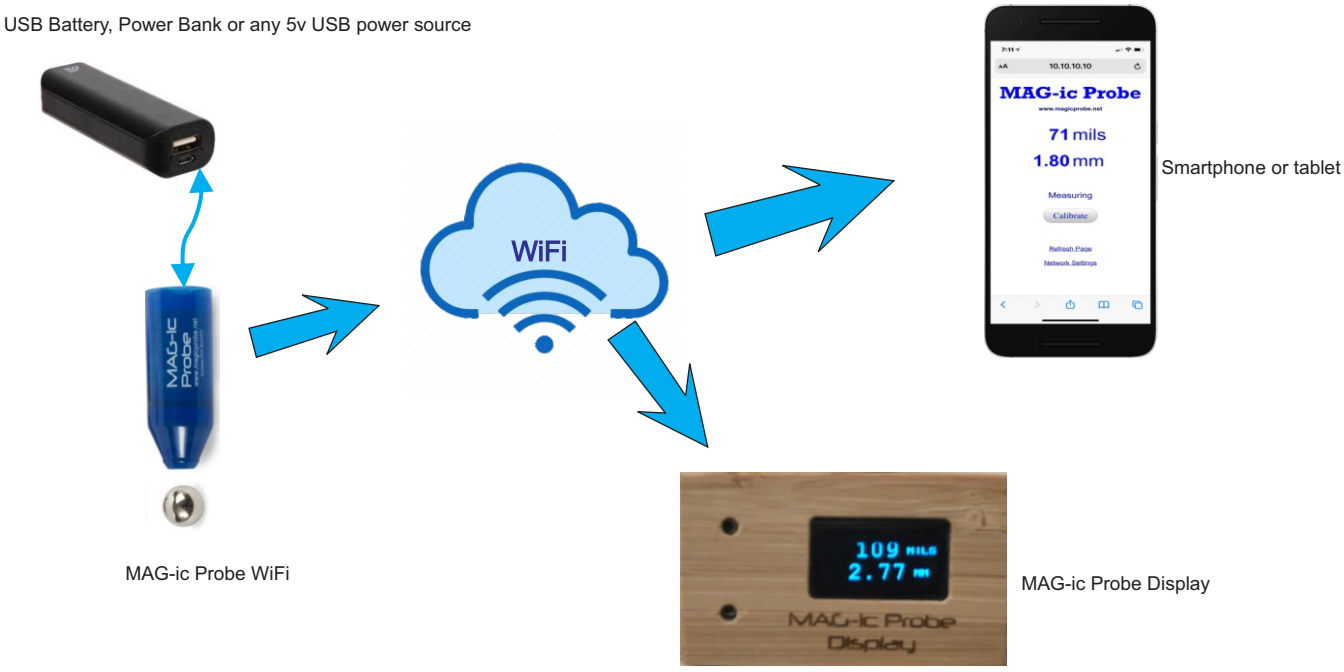
MAG-ic Probe WiFi Options

MAG-ic Probe WiFi has many options for displaying the measurements being made.
The primary design of MAG-ic Probe has always been to connect to a computer and use the MAG-ic Probe Software to save all your measurements and measuring locations to a picture or drawing of your instrument. This allows you to Save and Print the picture with measurements for archiving or comparison to other instruments.

MAG-ic Probe connected to a computer running the MAG-ic Probe Software

However, sometimes you may not need to save the measurements - maybe you just want to take progressive measurements as you are sanding or forming a plate or maybe you are on the road taking some sample measurements of that special instrument you want to duplicate. Or maybe you are just “old school” and want to document everything manually.
In all of these cases, you simply need a display to show you the measurements in real-time. MAG-ic Probe can use WiFi technology to provide those measurements on your **phone or tablet** or if you favor the extremely simple solution then our new **MAG-ic Probe Display** unit will interest you.
See the MAG-ic Probe Display unit at www.magicprobe.net

USB Battery, Power Bank or any 5v USB power source



Smartphone or tablet

MAG-ic Probe WiFi

MAG-ic Probe Display

MAG-ic Probe Sequence of operation.

MAG-ic Probe uses a sensor to measure the magnetic field strength of a target magnet, which varies according to distance from the probe. The signal levels being measured are extremely small and magnets are sensitive to changing temperatures.
Because your work environment may be changing all the time as AC systems turn on and o ffor just daily temperature variations, it is necessary to perform a calibration procedure whenever you start up the MAG-ic Probe. This procedure will try to compensate for changing temperatures to ensure the highest accuracy.
PRO-Tip *- Whenever starting up the probe, power it up and leave it to warm up and acclimatize for about 3 minutes. Then unplug it and start it up again and proceed with the calibration procedure.*

No matter which method of operation you intend to use (MAG-ic Probe Software or simple display), it is important to note that the probe initiates a startup sequence automatically when you apply power. This sequence will continue even if you are not currently watching the output or you delay getting the connection established.
The following is the sequence of startup and the output messages produced -

- **MAG-ic Probe**
- **Connecting WiFi...** (The WiFi radio is turning On)
- **Webservice at 10.10.10.10** (MAG-ic Probe can be found at 10.10.10.10)
- **Attach Ball** (MAG-ic Probe waits for you to attach the target magnet)
- **Please Wait 8,7,6,5,4,3,2,1 -** (Wait while the probe reads the magnet strength)
- **Remove Ball -** (Remove the magnet at least 12” from the probe)
- **Please Wait 8,7,6,5,4,3,2,1 -** (Wait while the probe calibrates)
- **Big Ball Detected** (Successfully detects the size of the magnet found)
- **Calibration Complete-** (Calibration sequence completed)
- **Attach Ball, Measurement Mode-** (Attach the ball to the probe)
- **Out of Range !** (Will display this until the magnet is in range again)
- **0.00mm / 000Mils** (Displays the live measurement or 0.00)

It helps to be aware of the above sequence because if you delay in getting the Serial COM port connected or the Wi-Fi link established, you may miss some of the starting messages and then it may be difficult to know the current step in the sequence.

PRO-Tip *- Always power up the probe WITHOUT any target magnet attached. By leaving the magnet off, the sequence will stop at the ATTACH BALL step above. This will allow you time to complete the connections. Once you have the connection complete, you can attach the target magnet and proceed with the calibration sequence.*

Using MAG-ic Probe WiFi with a computer and MAG-ic Probe Software

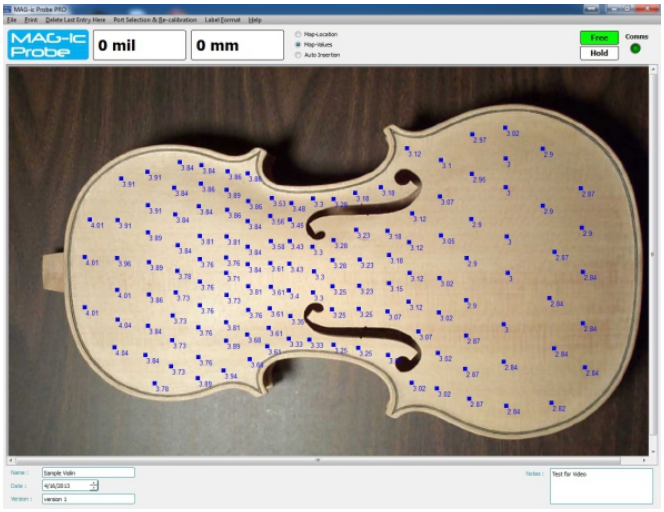
MAG-ic Probe Software

MAG-ic Probe WiFi uses a sophisticated companion software that provides many useful features that allow you to measure, document and visualize the object you are measuring.
There are 2 versions of the software available to download at www.magicprobe.net

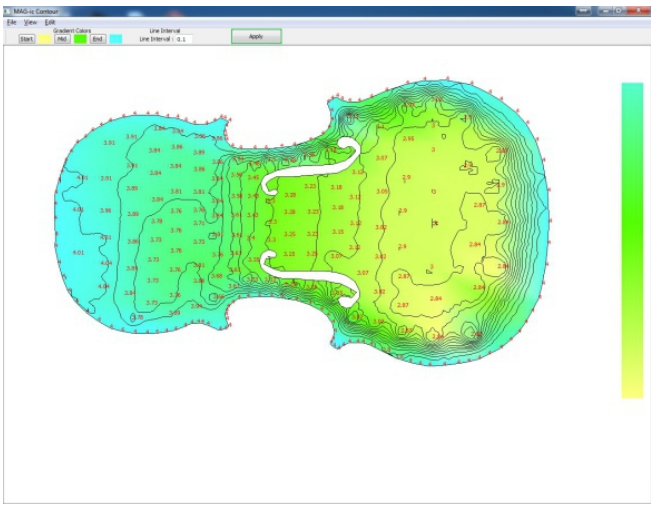
Please watch the demonstration videos on the MAG-ic Probe Software page of the website.

MAG-ic Probe Lite Software allows you to upload a picture of the instrument or object you are measuring and record your measurements and measuring locations directly to the picture. This can then be printed or saved for future reference or comparison.

MAG-ic Probe PRO Software will allow you to take this a step further and actually produce a color contour map of the surface you measured. This is a unique way to visualize the surface contour and is ideal to compare different instruments at a glance. Many use this feature to document the progress of an instrument as the surface goes though stages of fabrication.



MAG-ic Probe Lite



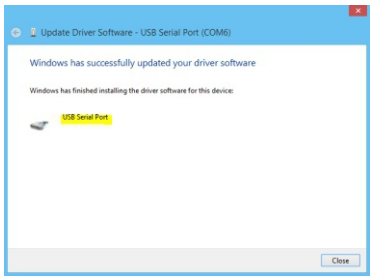
MAG-ic Probe PRO

In order to use MAG-ic Probe with a computer and the MAG-ic Probe software, the probe MUST be connected to the computer USB port and the correct COM port number must be identified by the following sequence.

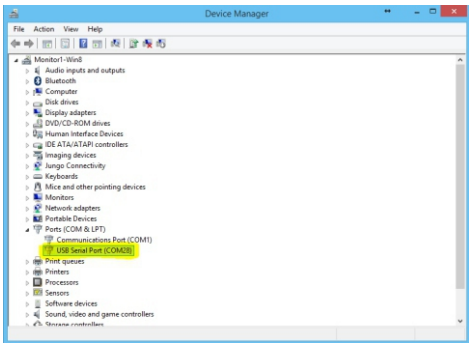
USB Serial Connection

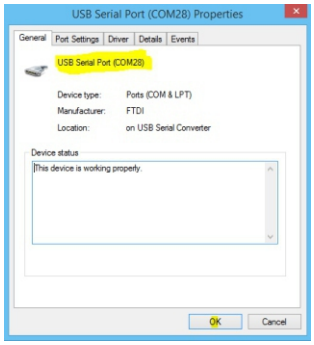
MAG-ic Probe WiFi uses a common USB driver to communicate with your computer. This driver should be automatically installed by most Operating Systems.

When first connecting MAG-ic Probe WiFi to your computer, play close attention to the monitor. You may hear a Windows Sound and possibly a window similar to the one on the right. If it says the driver is successfully installed, record the ComPort # as this is the number you will need in the MAG-ic Probe Software.
Other wise Open the ***Control Panel*** and click on ***Device Manager.***
In the Device Manager, click on the small triangle next to PORTS (COM & LPT).

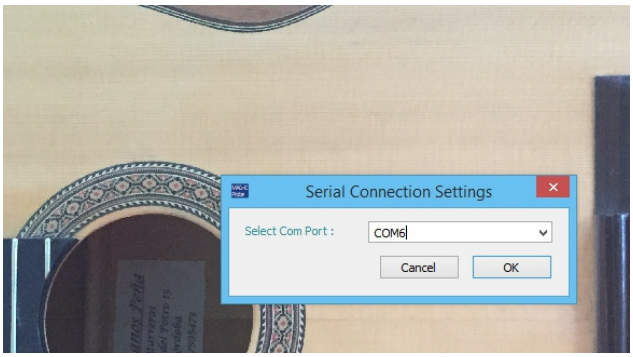


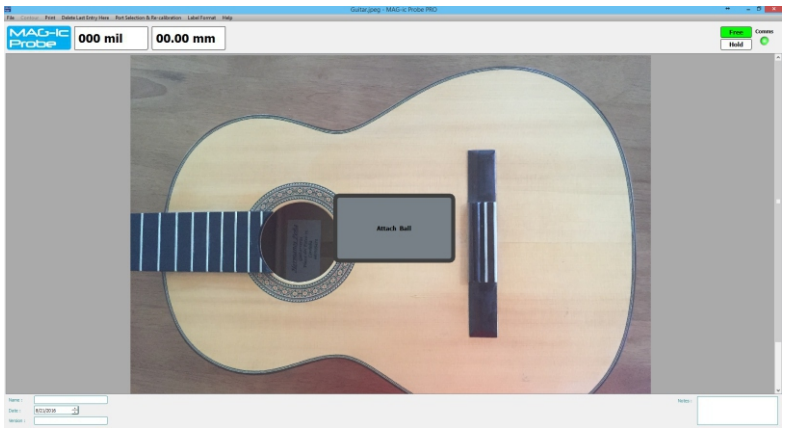
This will list the Serial Ports currently installed on your PC. Look for the ***USB Serial Port (COM #)*** and note the port number. If you double-click this line, you should see a similar properties window to the far-right window.





If your computer does not automatically install the driver, you will need to install the driver manually. In that case, please disconnect the MAG-ic Probe from your computer.
Navigate to **http://www.ftdichip.com/Drivers/VCP.htm** and download the VCP Drivers for your operating system. It is best to use the Setup Executable from that page. There are also installation guides available from that page to assist you with proper installation and diagnosing problems.
Install the driver package as per the instructions on the FTDI Website. Once the drivers are successfully installed, Connect the MAG-ic Probe WiFi to your computer USB port and you should hear the computer beep and proceed as above.
Once you have the correct COM Port # you can proceed to open the ***MAG-ic Probe Software*** you downloaded from the previous section.
In the software, select ***Port Selection & Re-Calibration*** from the Top Bar and select ***Serial Port***.
Select or Type in the ***Com Port #*** from above and click ***OK***. If successful, the green “Comms” light in the top-right should light us and the calibration messages should start appearing in the grey box at the center of the screen. If nothing appears, try attaching the magnet to the probe or removing it.





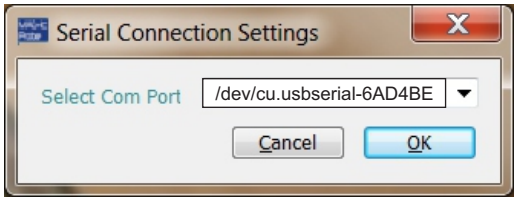
MAC Serial Connection

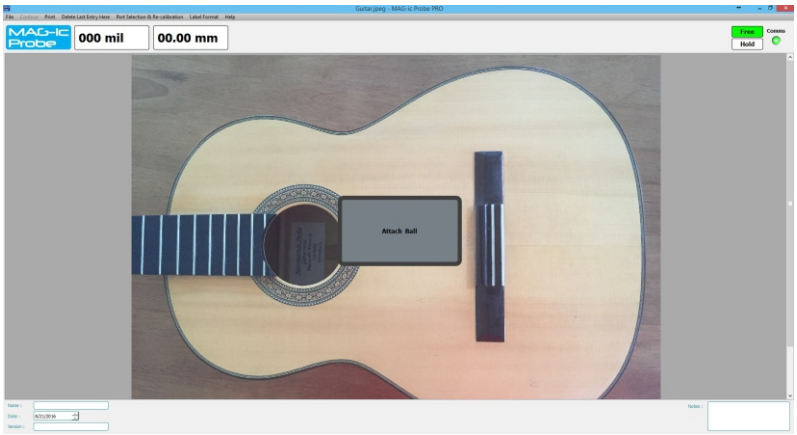
Please Note - The MAC software is provided for use but as Apple handle serial ports differently to Windows computers, succesful connections can be tricky with different MAC versions. If you have problems try a different USB port or try a powered USB Hub. The USB Drivers required and be found at ***https://ftdichip.com/drivers/vcp-drivers/*** and a troubleshooting document can be found at
NOTE- The current MAG-ic Probe Software is not compatible with MAC OS newer than 10.14.

The below is provided for some basic assistance
MAC OSX does not easily list the available serial ports to the user or applications in the way that Windows does. One method to find the Serial Port number is to use the ***TERMINAL*** application.
If the device is installed properly, you will see entries in the /dev directory:
/dev/cu.usbserial-xxxxxxxx
/dev/tty.usbserial-xxxxxxxx
where xxxxxxxx is a serial number of some kind. /dev can be accessed through the Terminal application. The Terminal application can be launched
by selecting Go > Applications > Utilities > Terminal. Type the following lines in the Terminal window to produce the file list:
cd /dev
ls-l

If in the list, you find usbSerial ports similar to the format above, please note or copy the entire string for example ***/dev/cu.usbserial-6AD4BE***

In the MAG-ic Probe Software, click on ***Port Selection and Recalibration*** and select ***Serial Port.*** Select or type the entire line from above. If successful, the green light in the top right should light up and the calibration messages will appear in the center of the screen.





Calibration - a Word about understanding magnetics

MAG-ic Probe uses magnets and magnetic sensors to measure the thickness of any non-ferrous materials. This technique is very effective because magnetic fields can penetrate these materials with no attenuation or deformation.
However, as with most technologies, some tolerance and knowledge is required for achieving the best results.

- Magnetic fields generated by permanent magnets are very strong at the magnet surface, but deteriorate very rapidly in a non-linear manner as the distance increases.
- Magnetic fields vary with temperature, even fractions of a degree will have an effect.
- Magnetic sensors also vary their output with temperature and suffer from internal fluctuations.
- Friction of the magnet on the material surface may cause it to not be centered on the probe tip when moving the probe across the measured object.
- Dust and surface anomalies may cause the probe to be o ffperpendicular with regards to the external magnet.
- Magnetic fields are affected by metallic objects and even the Earths magnetic field can influence your measurements.

Considering the above, and following the usage recommendations will enable you to get the most out of your MAG-ic Probe. MAG-ic Probe is supplied with 2 magnets. The ½" ball provides the strongest magnetic field and thus the highest resolution, and should always be your first choice. The smaller magnet should only be used when access to the inside of a finished instrument is limited due to small f-holes etc, for example violins and mandolins.

IMPORTANT - MAGNETS
MAG-ic Probe uses extremely strong Neodymium magnets. These magnets are brittle and can chip if mishandled. Each MAG-ic Probe is carefully calibrated to the magnets supplied with it. a Large chip may affect the accuracy of the device. The biggest cause of magnets chipping is when the 2 supplied magnets are allowed to SNAP together or to steel objects. Please handle carefully. Best practice is to leave the magnets in the storage case and when a magnets is required, hold the other magnet in place with 1 hand and use the tip of the MAG-ic Probe to extract the required magnet from the storage case. Use the same method to replace the magnet.

On startup, MAG-ic Probe provides a calibration sequence to detect the magnet size and to compensate for small variations in field measurement tolerances like temperature and location. This initial calibration is suitable for most quick measurements, for example when you are making a few measurements during shaping or sanding and then re-measuring periodically. This basic calibration can and should be repeated often if conditions change, by repeating the Initial Calibration sequence below.

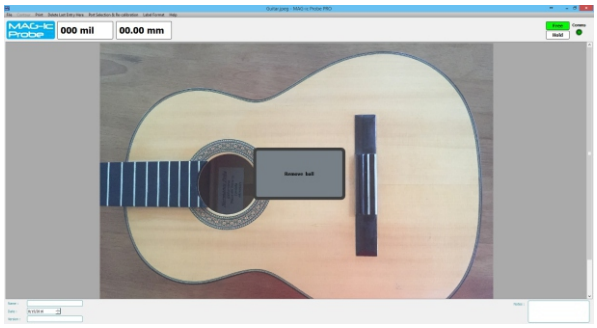
For more prolonged measuring and contour mapping sessions, see the ***Advanced Calibration*** section.

Initial Calibration Sequence

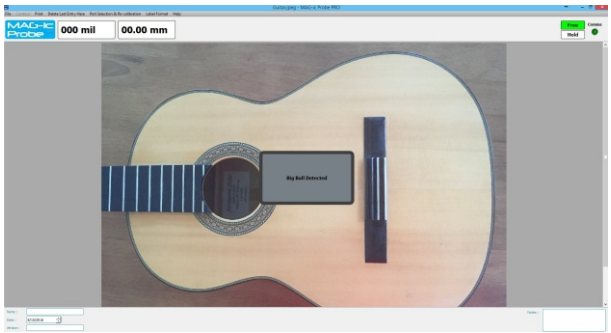
Once you have established the correct COM port number and have typed that into the Serial Connection Settings box, you are now ready to do some measuring using the MAG-ic Probe Software. Note that the COM port information should not change and once you have it entered you can simply follow the steps below.

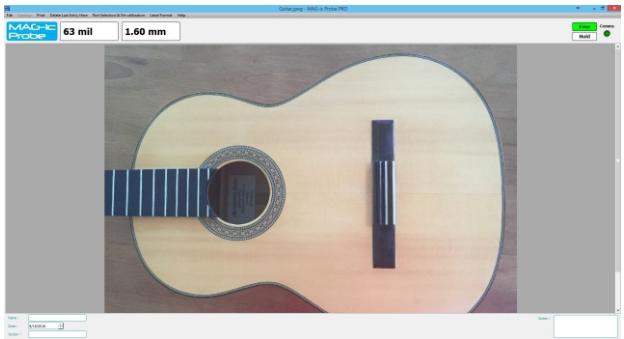
In the MAG-ic Probe software, Click on the ***Port Selection and Re-calibration*** Menu and select ***Serial Port***

- Select or type the correct ***COM Port #*** and click ***OK***. The Green light on the top-right of the monitor should light and the calibration messages will appear in the middle of the screen.



- Start without the Target magnet attached - If you missed the previous messages, the sequence should be paused at "**ATTACH BALL**"
- Once you attach the target magnet to the probe, then 8 second countdown will commence and then you will be asked to "**REMOVE BALL**". Please move the magnet at least 2 ft away from the probe.
- This will initiate another 8 second countdown which should then successfully calibrate the MAG-ic Probe.
- The display message will identify which target magnet has been detected and then the sequence is complete. Place the magnet on the probe and the measurement in the top-left of the display should show 0.00 or the current measurement.





- If you should exceed the measurement range of the selected magnet, the device will display an "Out of Range" message.
- Your MAG-ic Probe is now calibrated and ready for measurement.

For instructions on the MAG-ic Probe Software, please follow the tutorial videos on the SOFTWARE page at ***www.magicprobe.net***

- NOTE - It is **not** critical that the display should read absolute zero (0.00). However, in this case, repeat the above procedure by removing and restoring power to start the calibration again. If after the second calibration the device still does not display 0.00 but is close (1 - 3mil), continue with your normal measurements.

Advanced Calibration

a More advanced calibration sequence is advised for prolonged measurement sessions. Temperature variation is the biggest enemy of electronic measurement. Even the heat generated by a human hand will heat the probe enough to affect your measurements. However, the maximum effect this would probably have on measurements is in the order of 0.1mm - 0.2mm (4mil - 8mil). If this is important to you, please read on.....
When preparing for a more serious prolonged measuring session, such as mapping a complete top or plate with many measurements, a two-step calibration sequence is advised. The goal of this 2-step process is to only perform a calibration sequence, when the probe has reached peak operating temperature.

- Power the device ON either with Computer USB power or USB Battery power.
- Hold the probe in your hand just as you would when doing measurements on your object. Your fingers will transfer heat to the probe and after 3 - 5 minutes the probe internal temperature should be equal to your finger temperature.
- Now perform the calibration sequence as before. This calibration should be performed with the probe located above your instrument to be measured in order to closely approximate the final working condition.
- Your MAG-ic Probe is ready for use.
- If temperature conditions change during the session or if you have to interrupt the session for a prolonged period, repeat the above procedure.

Remove any metal from the work environment and within 3ft / 1m of your instrument. This includes vices, bolts, tools. Look under your bench also.
Any ferro-magnetic material in the area can affect the magnetic field and therefore the measurement.

Connecting the MAG-ic Probe to a Phone or Tablet via WiFi

If you do not need to save any measurements and simply want to display the measurements while you are shaping an instrument or doing comparisons, the MAG-ic Probe WiFi can connect to any Smartphone, Tablet or computer that has WiFi capability.

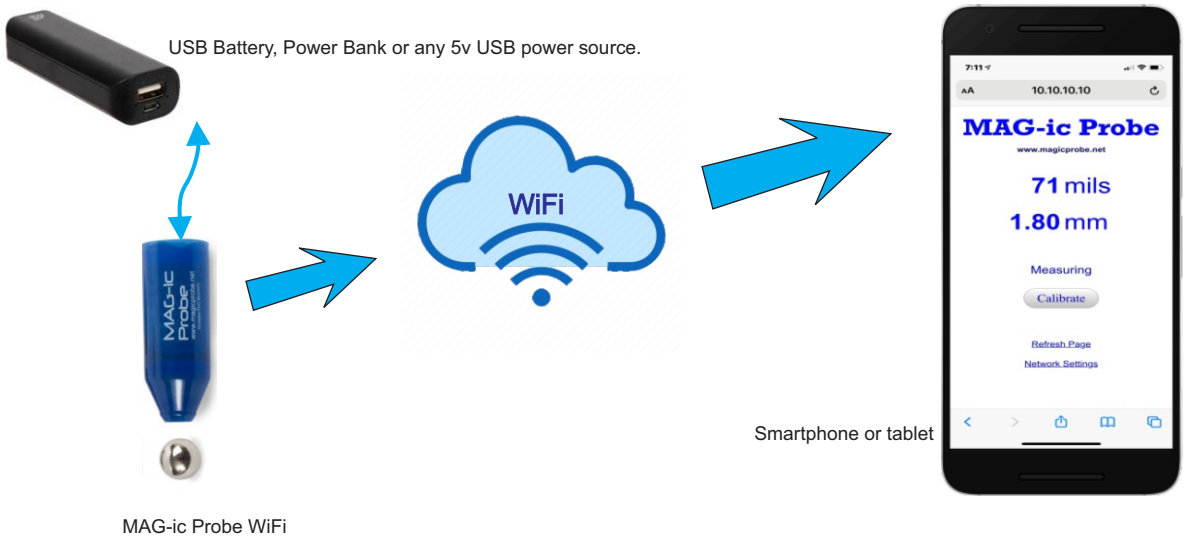
Introduction

WiFi is a wireless technology allowing devices to connect together in a network. Commonly in your home, your internet provider placed a Router to provide your home with internet access. In most cases this router also provides WiFi network so that you can connect phones, tablets, laptops and other devices like alarms, door locks etc to the same network. This WiFi radio can also be called an **Access Point or AP**. This WIFi will have an **SSID Name**" like "Jones Family WiFi" or "Spectrum C323FE34" etc. You configure your phone or tablet to join with this AP name and you are then connected to the Network and in most cases the INTERNET. Every device on your home network is identified by an IP ADDRESS, which is a set of 4 numbers separated by periods. These numbers can vary but typically your home network devices would have an IP range like 192.168.1.1 through 192.168.1.254. Typically your router would be the first device and have the 192,168,1,1 address and your personal devices would then have IP addresses 192.168.1.2 or 192.168.1.103 etc.

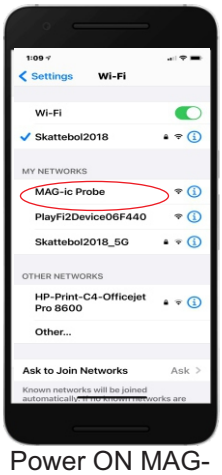
MAG-ic Probe WiFi options.

In the same way as above, the MAG-ic Probe WiFi can act as an **Access Point or AP**. You can configure you phone, tablet or computer to join the MAG-ic Probe Access Point. Your phone or tablet will then be in a "network" with the MAG-ic Probe and will be able to receive the measurement data from the MAG-ic Probe.

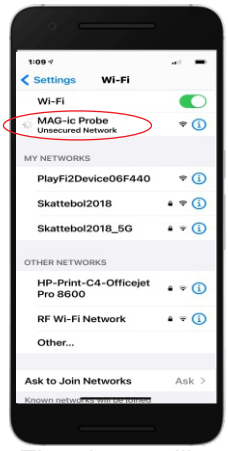
The following instructions are based on IOS (Apple) devices. Android procedures should be very similar as you are simply connecting to a WiFi AP and then starting your Internet Browser app.



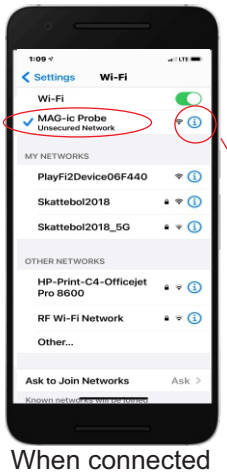
Connect the MAG-ic Probe to a USB power source. You can use a USB Power Bank or any available USB power source like a computer or a phone charger.
The MAG-ic Probe automatically becomes an AP and assumes an IP address of 10.10.10.10.
This address is chosen for simplicity



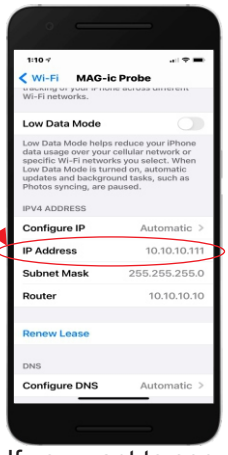
Power ON MAG-ic Probe.
Go to Settings - WIFI on the phone and select MAG-ic Probe



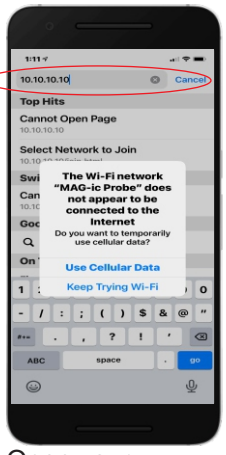
The phone will try to connect to MAG-ic Probe AP



When connected a check mark appears next to MAG-ic Probe AP. You phone has joined.

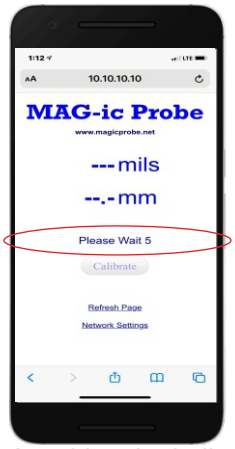


If you want to see the IP address your phone has required touch the info symbol and scroll down



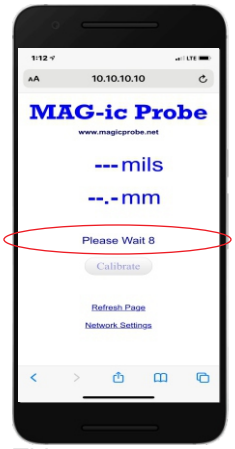
Open your browser and in the address bar, type 10.10.10.10 and ENTER or GO

After a few seconds the MAG-ic Probe page should appear.



Attaching the ball will start the 8 second countdown

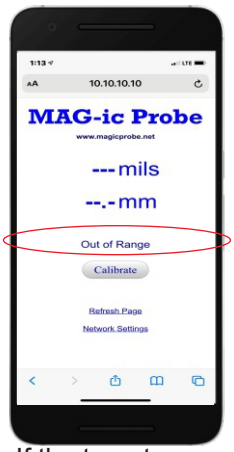
Remove the ball at least 2 ft from the probe



This starts another 8 second countdown

The size of the detected ball is displayed

Calibration is completed



If the target magnet is out of range

Successfully displaying live measurements. To repeat calibration, touch CALIBRATE

Note - This was the simple and recommended method. Once you have completed the measurements, power o ff MAG-ic Probe and return your phone WiFi settings to your home WiFi.

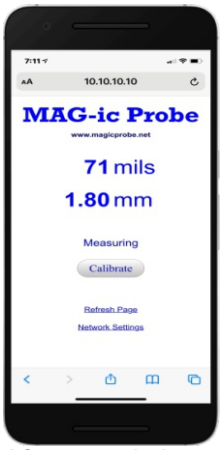
For advanced users - If you prefer your MAG-ic Probe to join your Home WI-Fi, then follow the instructions on the next page.

This is not required for most users.

For advanced users only!

How to connect MAG-ic Probe to your home WiFi

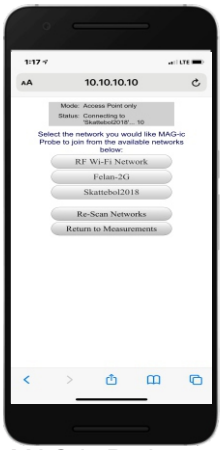
For most users, the procedure on the previous page is sufficient. However while your phone/tablet is connected to the MAG-ic Probe AP, it is disconnected from your home WiFi. If this is not desirable even for the short periods that you are measuring, it is possible to have MAG-ic Probe join your home WiFi. In this case MAG-ic Probe will obtain an IP address from your home WiFi router. Then future connections can take place without connecting the phone to the MAG-ic Probe AP



After completing the previous steps, touch the NETWORK SETTINGS button

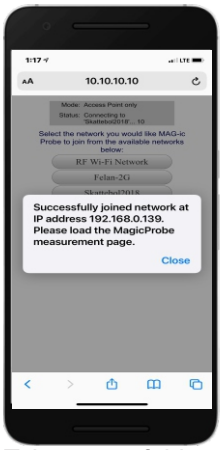
This displays a list of WiFi networks in your vicinity. Select your home WIFi network

Enter your home WiFi password in the dialog.

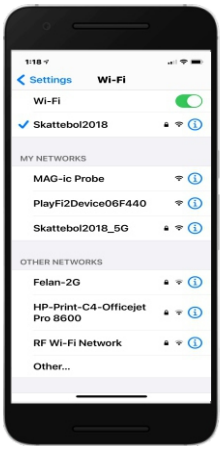


MAG-ic Probe will try to connect with your home WiFi

If the connection is successful, the message will be displayed and the New IP address will be displayed.

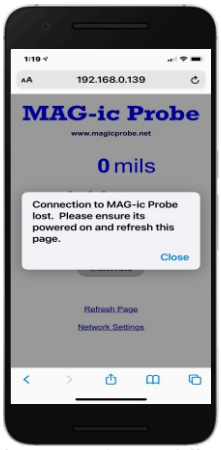


Take note of this new address. You will need to type this into the browser again after re-connecting the phone to your home WiFi

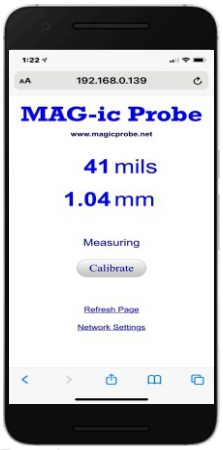


Return to your Settings - WiFi page and select your home WiFi. This will return your phone to your home WIFi.

Now enter the new IP address into the browser address bar and tough ENTER or GO. Note- your IP address will be different to this sample address.



It may take awhile for the web browser to establish a connection with the MAG-ic Probe. If not, power down the MAG-ic Probe and then power up again. Re-type the new IP and connection should be established.



Ready to measure. Future connections should use the same IP address and connection should be simple.

Usage Tips

MAG-ic Probe WiFi is capable of measuring very small distances to 1/1000th inch. It should make sense then that the probe should be absolutely square to the surface being measured and the opposing magnet. If the probe is slightly tilted, the distance from the center of the probe to the target magnet will be slightly increased giving rise to incorrect measurements.
In the MAG-ic Probe software, there is a HOLD function which can assist in ensuring that the current measurement is the lowest measurement at the location. It is s good idea to use the HOLD function while making small rocking motions at each measuring location to ensure the lowest measurement.
Please refer to the software tutorial video's at http://www.magicprobe.net/mag-ic-probe-software-1/ for more information.

Take care of the magnets, they are fragile and will shatter or splinter if allowed to SNAP together or to steel objects.
Avoid major temperature changes after calibration. If for some reason there is a significant environmental temperature change, re-calibrate the MAG-ic probe.

Depending on the thickness of the material being measured, it is possible the target magnet could "jump" over reasonable obstacles like internal braces in guitars. This is not guaranteed and really depends on the size and shape of the brace. You should know the internal pattern of braces and follow the easiest path for the magnet to remain attached to the probe.

Remove any metal from the work environment and within 3ft / 1m of your instrument. This includes vices, bolts, tools. Look under your bench also.
Any ferro-magnetic material in the area can affect the magnetic field and therefore the measurement.

Specifications

Measuring range (Large Magnet)	1 - 600mil (0-15mm) (0-10mm High Resolution)
(Small Magnet)	0 - 420 mil (10.6mm)
Resolution	1mil (decreasing after 10mm)
Accuracy	3 mil - 0.1mm
Battery Voltage	USB 5VDC
Power Consumption	10mA - 50mA

Contact Info

We welcome any feedback and suggestions. If you have any problems with your device please contact us.

email - info@magicprobe.net
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