

Islandix Wheel Analytics

Instruction Manual

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Specifications and requirements

Wheel Analytics takes raw data from compatible digital indicators and makes it available on the network in the form of visualizations for building bicycle wheels.

Wheel Analytics reads data from Mitutoyo and Mitutoyo-compatible digital indicators.

Wheel Analytics is a network device that interconnects via Wifi or USB. It's compatible with 802.11b/g/n wireless networks on the 2.4GHz spectrum, with and without WPA2 encryption. Wheel Analytics supports wired networking via USB where compatible system drivers exist. It supports ECM, NCM and RNDIS interfaces.

Wheel Analytics visualizations are designed for modern desktop and mobile browsers.

Kit contents

Quantity	Description
1	Islandix WA-1 controller
1	Islandix FP-2 duplex foot pedal with builtin 3m/9ft cable
2	Mitutoyo 1m/40in Digimatic SPC data cables
1	USB power supply
1	USB cable
1	Printed manual
2	Optional: Mitutoyo or Mitutoyo-compatible digital indicators with Digimatic SPC interface (\$)
1	Optional: Indicator roller contact point for lateral inspection (\$)
1	Optional: Indicator flat contact point with extension for radial inspection (\$)

Connection options

Wheel Analytics moves the truing stand to the network. Means of attaching to the network are flexible to meet the needs of most installations. On the network wheelbuilding tools are accessed using a web browser.

There are two options for linking with Wheel Analytics: wireless and wired networking. Stress tests in the Islandix lab indicate no performance difference between these options. Very little bandwidth is used in either case.

The typical configuration is to attach Wheel Analytics to the existing network using Wifi. This allows any wireless device to control the truing stand including laptops or tablets that may be co-located with the truing stand only when in use. Wifi networking is compatible with the widest range of devices. Wireless networking is documented in the sections immediately following.

Wireless networking may be difficult in areas of high radio interference or poor router signal strength. In challenging cases or as a matter of preference Wheel Analytics may be accessed using USB networking. USB networking is dependent on driver availability on the connected computer so is compatible with fewer systems. Due to the diversity of computer configurations, technical support for USB networking is limited. Wired networking using USB is documented on page 10.

Hybrid installations are also possible. For example a dedicated truing stand display may be connected using USB with Wifi also enabled to support other displays that may be used from time to time.

Connecting for the first time wirelessly

In its factory configuration Wheel Analytics creates a captive hotspot network like those in hotels however the hotspot only serves wheelbuilding applications (no general internet access). The system may be configured for the first time using the hotspot.

To connect using the hotspot network:

1. Apply power using the included USB power supply per *Figure 1* below.
2. Wait 60 seconds for the system to initialize and create the hotspot network.
3. Scan for wireless networks from your wireless device.
4. Connect to the *Truing Stand* network using WPA2 password *truelove* (eight letters).



Depending on the client device a hotspot popup browser will typically appear. For best compatibility it's recommended to close this window and invoke your preferred web browser as normal. If you are warned about staying connected to a network that does not provide internet access, dismiss or disregard it and remain connected to *Truing Stand* for now.

5. In your browser visit an arbitrary nonsense site such as *http://abc.example.com/* and the system will redirect to the Wheel Analytics welcome screen. From here you can run applications, configure the system and update its software.

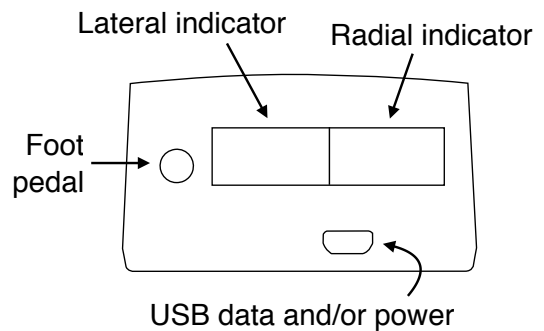


Figure 1: Connection diagram

Figure 2: Settings

The following sections concern the setup and configuration of Wheel Analytics. For reference a copy of the single page settings screen is reproduced here.

	Local	Factory
Country	Canada	Canada
Hostname	truingstand	truingstand
Act as a wireless hotspot	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Announce hotspot	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Hotspot network name	Truing Stand	Truing Stand
Hotspot network password	truelove
Join existing wireless network	<input type="checkbox"/>	<input type="checkbox"/>
Wireless network name		
Wireless network password		
Wireless network configuration	DHCP Static	DHCP Static
Wireless IP address		
Wireless subnet mask		
Wireless router IP address		
USB IP address	192.168.3.1	192.168.3.1
Lateral gauge position	Left Right	Left Right
Target tolerance	0.50mm	0.50mm
Spoke tension units	Newtons	Newtons
Play audio tones	<input type="checkbox"/>	<input type="checkbox"/>

Save and restart

Linking with an existing wireless network

It's helpful to integrate Wheel Analytics with the existing wireless network in your workshop. Doing so allows devices to access the internet and wheelbuilding applications at the same time without switching networks.

To link with an existing wireless network:

1. Connect to the *Truing Stand* network as described in the previous section.
2. Switch to the *Settings* tab on the Wheel Analytics main screen.
3. Select the checkbox to *Join existing wireless network*.
4. Enter the name and, if applicable, WPA2 password for your wireless network.
5. Commit changes by clicking *Save and restart*.

These steps are sufficient to connect Wheel Analytics to your network but not necessarily sufficient to allocate a known address on your network. See the next section for establishing coordinates to access Wheel Analytics.

Addressing on the network

Wheel Analytics can be located on the network by peer-to-peer means or by conventional IP addressing. The appropriate method(s) will depend on the client devices used to access Wheel Analytics.

Peer-to-peer addressing

This style of addressing is most straightforward since it requires no further configuration. The address URL entered in the client browser is based on the *Hostname* field in the *Settings* tab—each Wheel Analytics system on the same network should have a unique hostname. The default is *truingstand*.

There are two possible automatic addresses depending on the standard(s) supported by a given client. Because these addressing modes are automatically configured, try them first in preference to conventional IP addressing, described next.

Standard	Default address URL	Compatibility
Zeroconf	http://truingstand.local/	Apple MacOS, Apple iOS, Linux, other systems
LLMNR	http://truingstand/	Microsoft Windows, Linux, other systems



Some browsers may incorrectly interpret a peer-to-peer address as a search query. To avoid this problem enter the complete address starting with *http://...*

Conventional IP addressing

Most wireless networks are configured to assign IP addresses automatically using DHCP. Wheel Analytics supports this scheme, which requires no additional configuration out of the box. While convenient, DHCP comes with the risk that the wireless access point (router) may assign a different address in the future.

To guarantee a constant and predictable IP address, it's helpful to reserve an address for Wheel Analytics in your DHCP configuration. This takes place on your router. Look for a table that maps wireless hardware addresses, also called MAC addresses, to IP addresses. The unique wireless address for each Wheel Analytics system is given on the *Help* tab under *Hardware*. The address is six pairs of alphanumeric characters separated by colons in a form like *B8:27:EB:0A:07:6E*.

Alternatively you may assign an IP address to Wheel Analytics explicitly. On the *Settings* tab, set the *Wireless network configuration* option to *Static*. This enables the subsequent three fields, which may be configured according to your network.

Deactivating the hotspot

If Wheel Analytics is connected to an existing wireless network, the hotspot network may be deactivated. It is recommended that new installations leave the hotspot enabled for a period to ensure the primary wireless connection is stable.

To deactivate the hotspot entirely:

1. Connect to Wheel Analytics over the existing wireless network.
2. Switch to the *Settings* tab on the main screen.
3. Unselect the checkbox labelled *Act as a wireless hotspot*.
4. Commit changes by clicking *Save and restart*.

Restricting the hotspot

As an alternative to deactivating the hotspot entirely, Wheel Analytics can be configured to suppress network announcements by unchecking *Announce hotspot* in the *Settings* tab. Doing so will prevent the hotspot from appearing as an available wireless network. In this case the hotspot network remains functional however its name must be entered manually in order to connect (not chosen from a list). The default hotspot name is *Truing Stand* but can be changed in the *Settings* tab—ensure each Wheel Analytics system in common radio range has a unique hotspot name.

Securing the hotspot

For security purposes the default hotspot network password can be changed on the *Settings* tab—the default password is *truelove*. This is a write-only interface, allowing the password to be updated but not read. In the Islandix lab the hotspot password is changed to match the password of the main Wifi network, just as an aid to memory.

Connecting with USB

Wireless networking may be impossible in some environments. For operation in areas saturated with radio interference, such as a trade show or near a power station, there is an alternative to wireless networking—wired networking over USB.

To connect using USB:

1. Connect Wheel Analytics to a client system using the USB data port per *Figure 1*.
2. Wait 60-90 seconds for the system to initialize and be detected.
3. In your preferred browser navigate to *http://192.168.3.1/*.



Wheel Analytics presents itself as a network adapter connected via USB. This scheme depends on the host computer to provide a device driver, which, in testing so far, has shown good results with Mac OS, Windows and Linux. Compatibility depends on the host system and is not guaranteed.



Wheel Analytics supports ECM, NCM and RNDIS variants of USB network adapters in a wide-ranging effort to connect with a compatible system driver. Some platforms may have drivers for more than one of these personalities, which may cause Wheel Analytics to appear as more than one device—this is harmless.

The IP addressing method in Step 3 always works over the wired USB connection. The peer-to-peer addressing schemes described earlier also work depending on the client device. Again the address URL is based on the *Hostname* field in the *Settings* tab.

Standard	Default address URL	Compatibility
Zeroconf	http://truingstand.local/	Apple Mac OS, Apple iOS, Linux, other systems
LLMNR	http://truingstand/	Microsoft Windows, Linux, other systems



Some browsers may incorrectly interpret a peer-to-peer address as a search query. To avoid this problem enter the complete address starting with *http://...*

Troubleshooting

Most systems will automatically detect and configure inserted USB network devices. If Wheel Analytics does not become available automatically, your system may need manual intervention (some systems are configured this way by choice). Look for a new device in your list of detected ethernet adapters and attempt to enable it.

Software updates

*Applications may be added or improved with downloadable software releases. **After configuring Wheel Analytics, updating to the latest release is recommended to take advantage of new features and performance enhancements.***

To update the system software:

1. Download the latest package from <https://www.islandix.com/downloads>.
2. Switch to the *Update* tab on the Wheel Analytics main screen.
3. Click *Select file...* and choose the previously downloaded software package.

The system will indicate its progress and return to the welcome screen on completion. At this point Wheel Analytics will be running updated software. The version number is listed at the top of the welcome screen.



A client device connected to Wheel Analytics via its hotspot may revert to another wireless network on reset. If using multiple wireless networks, reconnecting to the hotspot may be required after a software update. This is not a concern if Wheel Analytics is accessed over your primary wireless network or over USB.

Factory reset procedure

There is one and it will be described here in the future. In the meantime please contact support@islandix.com for assistance.

Application notes

The remainder of this manual concerns the operation of wheelbuilding tools included with Wheel Analytics. Please see the eight minute video at <https://www.islandix.com/video> as a companion.

Software tips

1. On small rectangular screens some visualizations may function better by rotating to landscape mode. Visualizations can be custom-scaled for any aspect ratio with browser zoom. Choose zoom settings under a browser *View* menu, using keyboard shortcuts or by pinching a touchscreen. Recommended.
2. Tensiometer applications can be configured to *Play audio tones* by checking that label on the *Settings* tab. With the ability to trigger readings by foot pedal and receive confirmation by audio tone, the wheelbuilder can focus on the wheel and tensiometer. Support for playing audio tones is browser dependent.

Tips for using digital indicators

1. Better digital indicators are able to produce 10-11 readings per second. To generate a representative picture of the wheel, allow 3-4 seconds per rotation in the truing stand when taking measurements. The slower the wheel is turned, the more accurate the result. Indicators are sensitive so use a gentle touch.
2. If a digital indicator appears to be malfunctioning, it's often the case the battery is no longer supplying adequate current. Replace the battery and retry.

General tips for indicator truing

1. On rims with a pronounced joint or a decal that straddles the entire profile across the joint, it can be helpful to orient the build from there instead of from the valve hole. Scan the wheel beginning immediately after the joint and take a snapshot of the wheel immediately before returning to the joint. If this proves counter-intuitive, install a small piece of masking tape over the joint as a reminder.
2. Some rims may present defects (e.g. seam, decals, etc.) on one side of the wheel only. Relocating the indicator or flipping the wheel in the truing stand to indicate alignment from the opposite side is sometimes helpful.

Target plot

The *Target plot* application is the big vision of Wheel Analytics. It's a unified view of lateral and radial alignment, a visualization designed to promote improvement of both dimensions at once. It may be unfamiliar but note the tutor function relates the image to actions required (see video starting at 7:00).

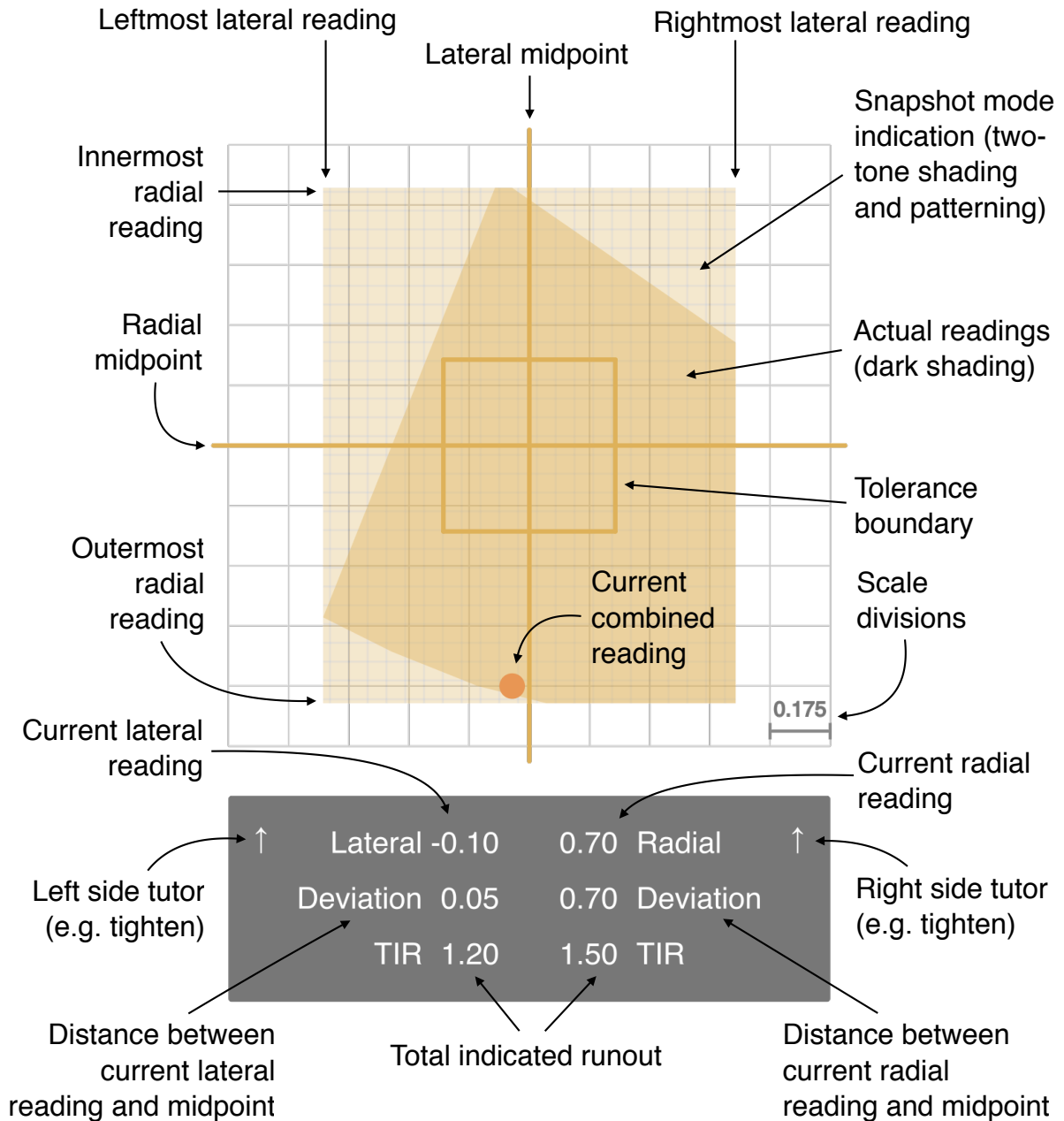
The interface has two commands: *Snapshot* and *Clear*. The *Snapshot* command suspends the accumulation of readings in order to manipulate the wheel. It also recenters and rescales the display based on readings taken. The *Clear* command discards recorded readings so new ones can be taken and the process repeats. These commands can be signalled in various ways depending on the hardware available:

Input	Snapshot command	Clear command
Foot pedal	Momentarily tap either pedal	Same, hold depressed 0.5s
Keyboard	Momentarily press spacebar	Same, hold depressed 0.5s
Mouse	Momentarily click left mouse button anywhere	Same, hold depressed 0.5s
Touchscreen	Momentarily tap screen anywhere	Same, hold depressed 0.5s

The basic operating procedure is:

1. Load the *Target plot* application from the Wheel Analytics welcome screen.
2. With the digital indicators in position, spin the wheel.
3. Signal the *Snapshot* command.
4. Rotate the wheel, navigating to a location in need of adjustment.
5. Make a correction (early in the process make multiple corrections).
6. Signal the *Clear* command and repeat the process until the wheel is complete.

Figure 3: Target plot legend



All figures in millimeters

Augmented indicators

The *Augmented indicators* module is the oldest application. It features independent lateral and radial indicators, representationally similar to indicator-equipped truing stands available today. Wheel Analytics indicators have special features for wheelbuilding such as scales that zoom automatically, scales that zero automatically, history tracking and tolerance verification.



This application is the right choice when working with the radial indicator disconnected as one might do during an inspection or basic repair. It's also suitable for disc brake rotor truing if a digital indicator can be suitably fixtured.

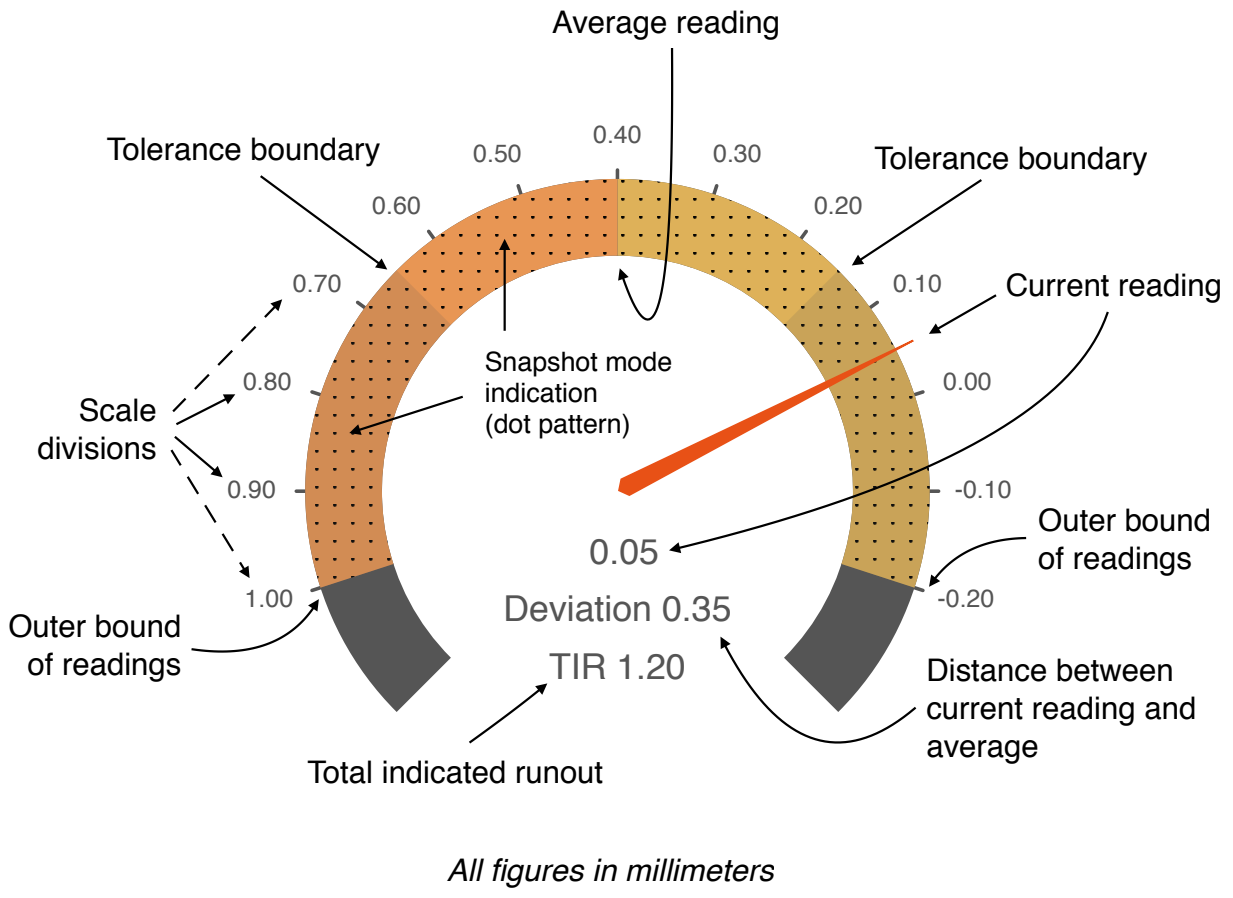
The interface has two commands: *Snapshot* and *Clear*. The *Snapshot* command suspends the accumulation of readings in order to manipulate the wheel. It also recenters and rescales the display based on readings taken. The *Clear* command discards recorded readings so new ones can be taken and the process repeats. These commands can be signalled in various ways depending on the hardware available:

Input	Snapshot command	Clear command
Foot pedal	Momentarily tap either pedal	Same, hold depressed 0.5s
Keyboard	Momentarily press spacebar	Same, hold depressed 0.5s
Mouse	Momentarily click left mouse button anywhere	Same, hold depressed 0.5s
Touchscreen	Momentarily tap screen anywhere	Same, hold depressed 0.5s

The basic operating procedure is:

1. Load the *Augmented indicators* application from the welcome screen.
2. With the digital indicators in position, spin the wheel.
3. Signal the *Snapshot* command.
4. Rotate the wheel, navigating to a location in need of adjustment.
5. Make a correction (early in the process make multiple corrections).
6. Signal the *Clear* command and repeat the process until the wheel is complete.

Figure 4: Augmented indicators legend



Live tensio

The *Live tensio* module offers a range of functions for compatible digital tensiometers. Its most visible function is to read deflection measurements from a connected tensiometer and convert those to tension values in real time. *Live tensio* does so continuously without the need to explicitly transmit each reading. It's capable of showing conversions for two spoke models at once, useful for wheels built with different spoke models on opposite sides of the wheel.

The application works by borrowing the data cable from either indicator. After choosing *Live tensio* from the Wheel Analytics welcome screen, press the orange button on the chosen data cable to designate that port for readings.

Live tensio has two commands: *Record* and *Clear*. The *Record* command assigns the current reading to ongoing tallies of readings. This command has two variants depending on the side of the wheel of the sample being taken. *Clear* discards recorded readings. These commands can be signalled in multiple ways:

Input	Record left/right command	Clear command
Foot pedal	Momentarily tap left/right pedal	Same, hold depressed 0.5s (1.0s to clear both)
Keyboard	Press left/right arrow key	Press keyboard delete key (not backspace)
Mouse	Click left/right reading with left mouse button	Click trashcan with left mouse button
Touchscreen	Tap left/right reading	Tap trashcan

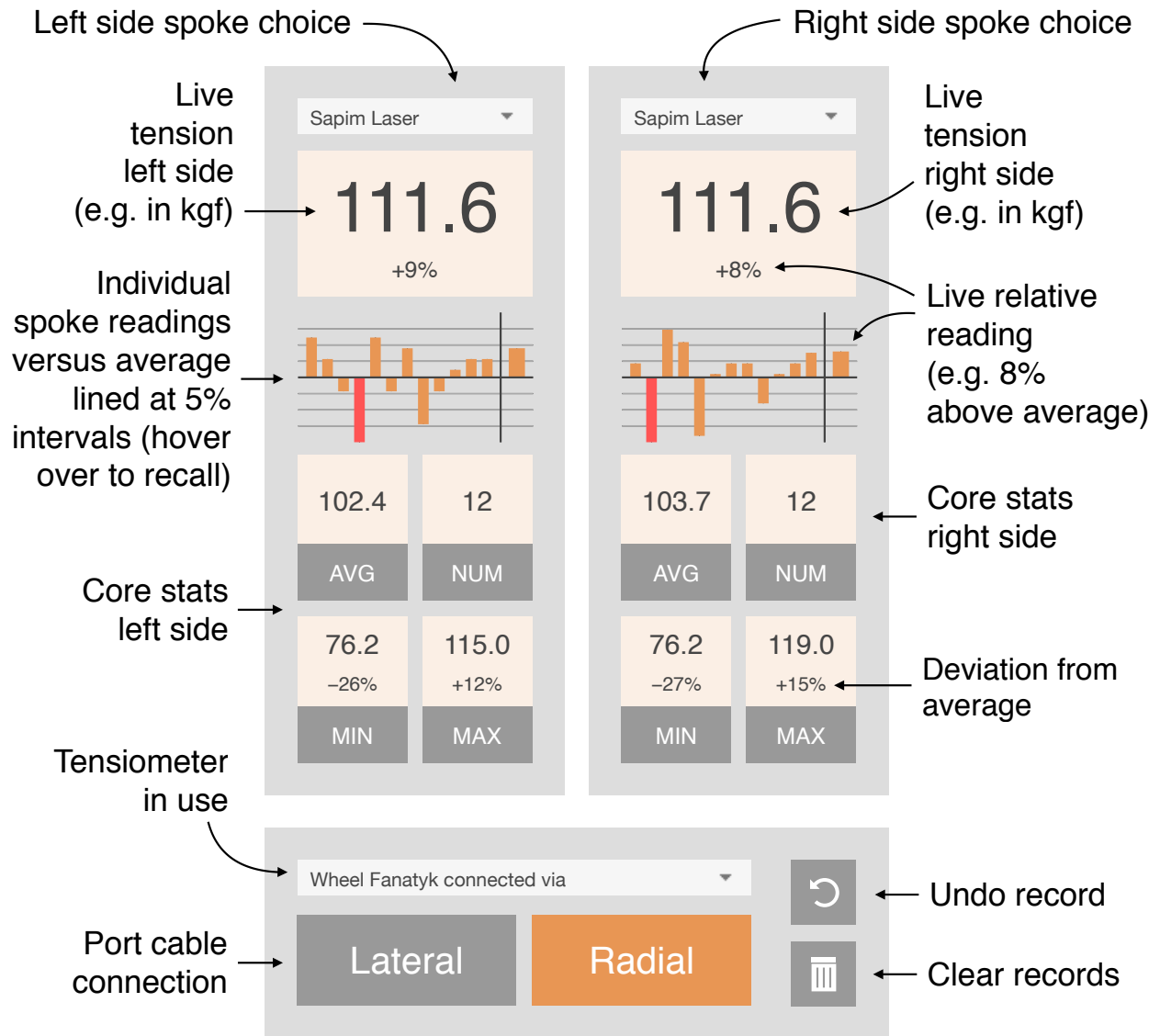
The number of recorded readings for each side of the wheel are listed with min/max/avg. Min and max are annotated with percentages from their respective averages.

Once readings have been recorded for a given side of the wheel, a bar chart illustrates tension deviation for that side. Each horizontal line on the scale represents 5% deviation from the average. Deviation is shown as a vertical bar for each spoke with values beyond 20% highlighted in red. At the far right deviation is shown for the live reading in the same manner. Hovering a mouse over any reading or touching the same displays its numerical value.

Compatibility

Live Tensio works with any tensiometer having a compatible digital indicator, meaning a Mitutoyo or Mitutoyo-compatible unit with Digimatic SPC data output. Conversion charts can be entered by selecting *Edit* at the bottom of any dropdown menu.

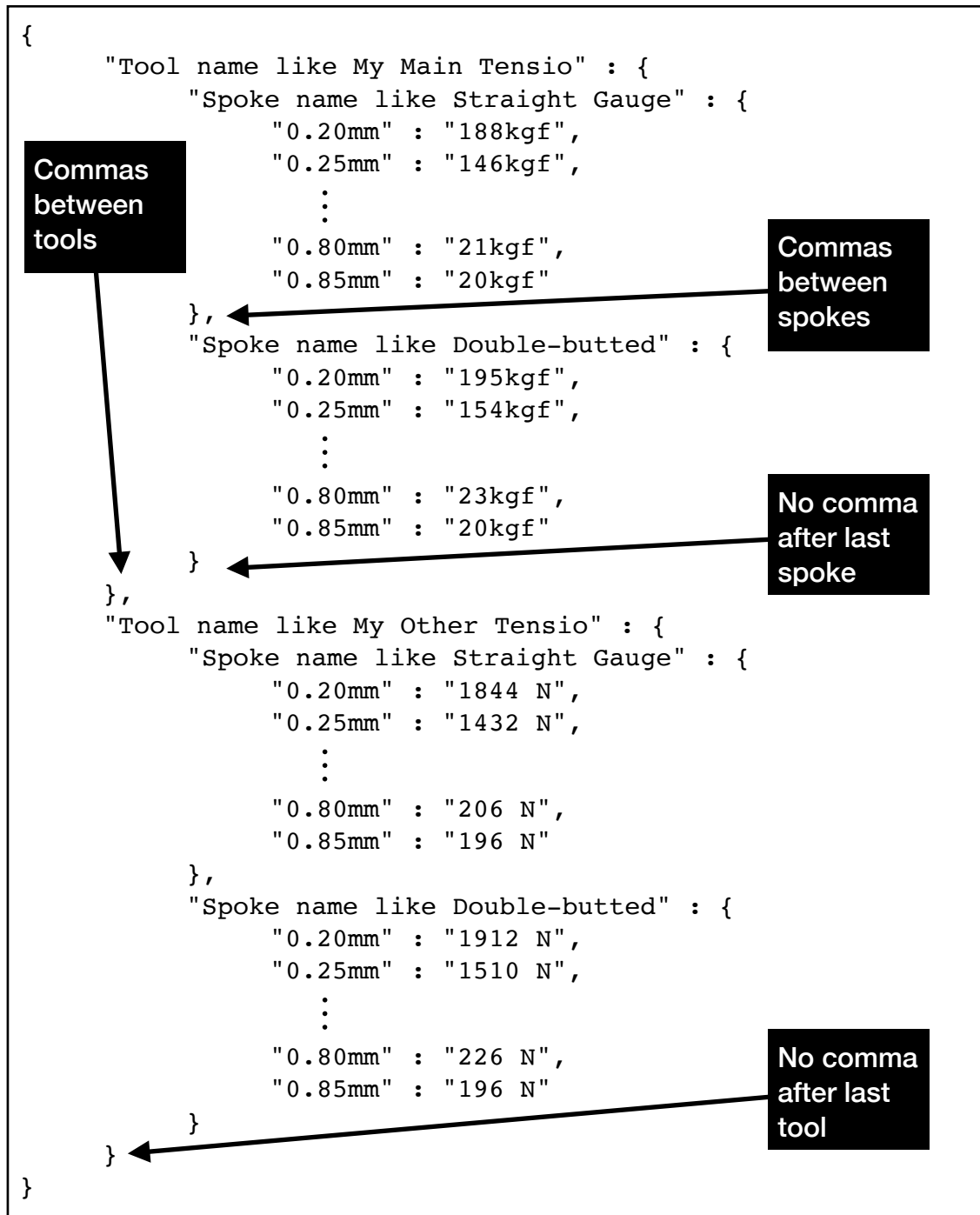
Figure 5: Live tensio legend



Figures in Newtons or kilogram-force (shown) by configuration

Figure 6: Entering conversion charts

Conversion charts can be edited within *Live Tensio*. Charts for multiple tensiometers can be stored in the system simultaneously. They are formatted in JSON notation. The following is an annotated example for descriptive purposes:



Keyboard bridge

The *Keyboard bridge* module is designed to support legacy tensiometer applications, namely those that function by entering deflection readings into a spreadsheet or other information system. It provides an emulated USB keyboard output function normally provided by specialist hardware like Mitutoyo part IT-016U and compatibles.

As an improvement over existing systems, Wheel Analytics allows each transmission to be terminated with a choice of characters. The options are *Return*, *Tab* and *Space*. Typing any of these characters on the display device keyboard will instruct the system to follow readings with that keystroke. Clicking each of the onscreen options has the same effect. Touchscreen devices may tap these locations too.

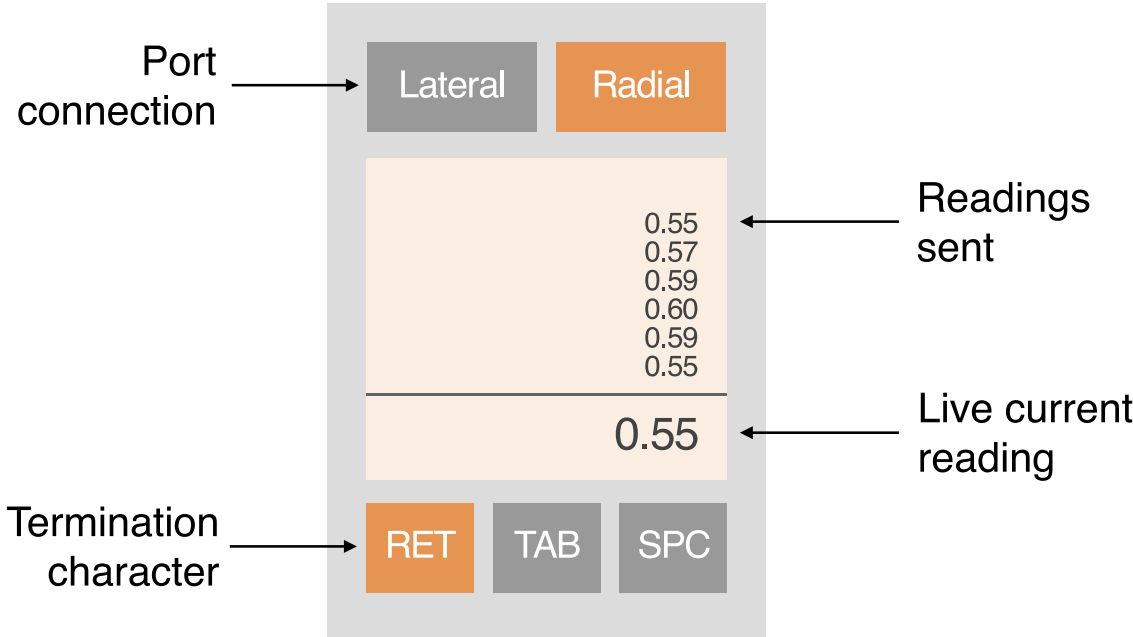
There is only one operational command and that is to *Send* the current reading:

Input	Send command
Foot pedal	Tap either pedal
Data cable	Press orange button on data cable
Keyboard	Press up arrow key
Mouse	Click display output area with left mouse button
Touchscreen	Tap display output area

The basic operating procedure is:

1. Connect a USB output cable according to the connection diagram in *Figure 1*.
2. Move the lateral or radial indicator data cable to the tensiometer.
3. Indicate the chosen port by pressing the orange button on the data cable.
4. Signal the *Send* command when ready to transmit the shown reading.

Figure 7: Keyboard bridge legend



All figures in millimeters

Reporting issues

If an application appears to be working incorrectly, it's helpful to replicate the problem using other equipment. This includes using a different browser on the same device or connecting from a different device altogether. Reports of browser and system compatibility issues are welcome.

Please report issues by email to support@islandix.com. It's helpful to describe the equipment being used with Wheel Analytics such as operating system and browser. Screenshots are very helpful for rendering issues. Please mention your version of Wheel Analytics software, which is printed on the welcome screen. If you are not running the latest software release, you will be asked to upgrade as the first step in any problem resolution. For efficient service please do this before emailing.

Warranty

Islandix equipment is warranted for compatibility for 30 days from the date of delivery. Within this trial period returns are accepted if determined to be incompatible with the intended usage environment. Please email support@islandix.com to arrange a return. A full refund less freight costs will be processed on receipt of goods in new condition in their original packaging.

Otherwise Islandix-manufactured equipment, including the WA-1 controller and FP-2 foot pedal, is warranted against defects in manufacturing for a period of two years from the date of purchase. Accessories bundled with Wheel Analytics such as indicators and cables are warranted free of defects for one year from purchase. At our discretion Islandix Instruments Corporation will repair or replace any components determined to be defective. Warranty terms are extended to the original purchaser and include one-way shipping by postal mail service (or a freight subsidy of the same value).