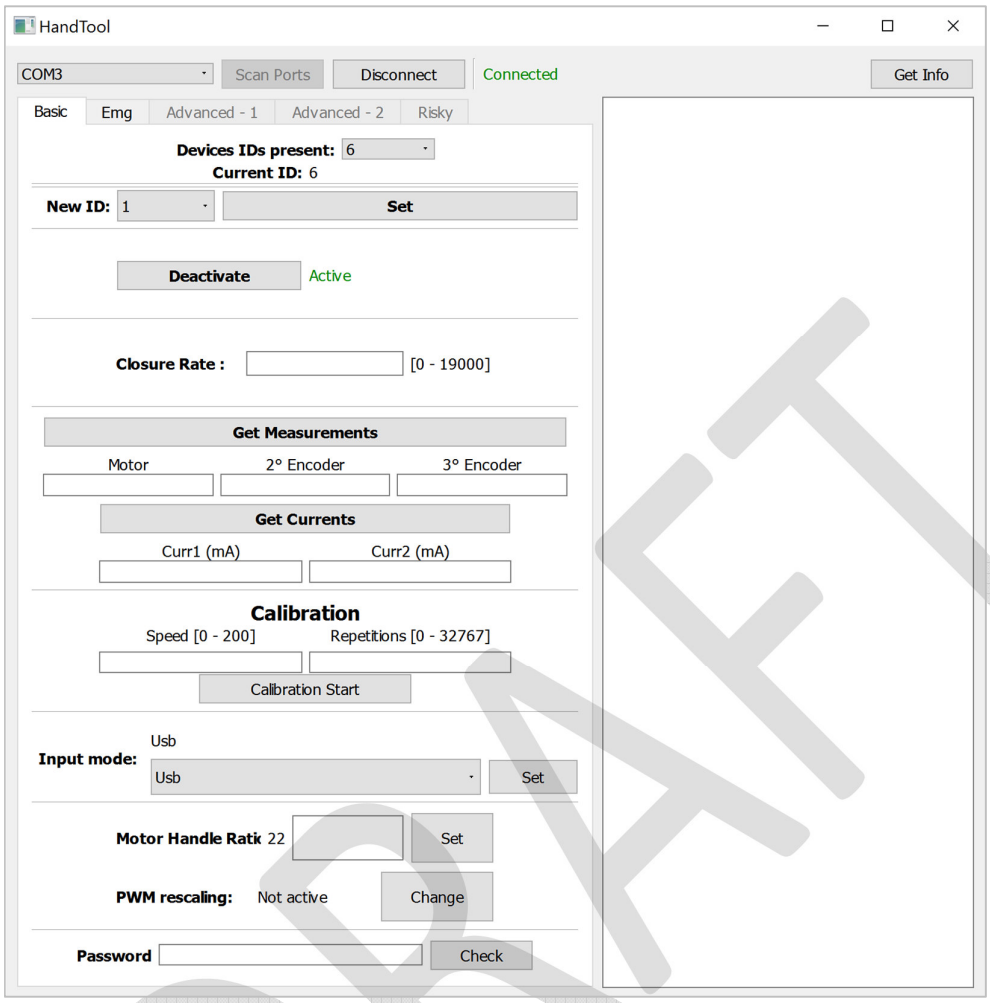

qbhand GUI

USER MANUAL

www.qbrobotics.com

Summary

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Installation procedure

- **Mac:**
  If not already installed, it is necessary to install the FTDI serial drivers to make possible the device is seen as a serial port.
  Double click on the App and use it. There is also a .dmg package. You can open it and move the application to your dock or the Application folder.

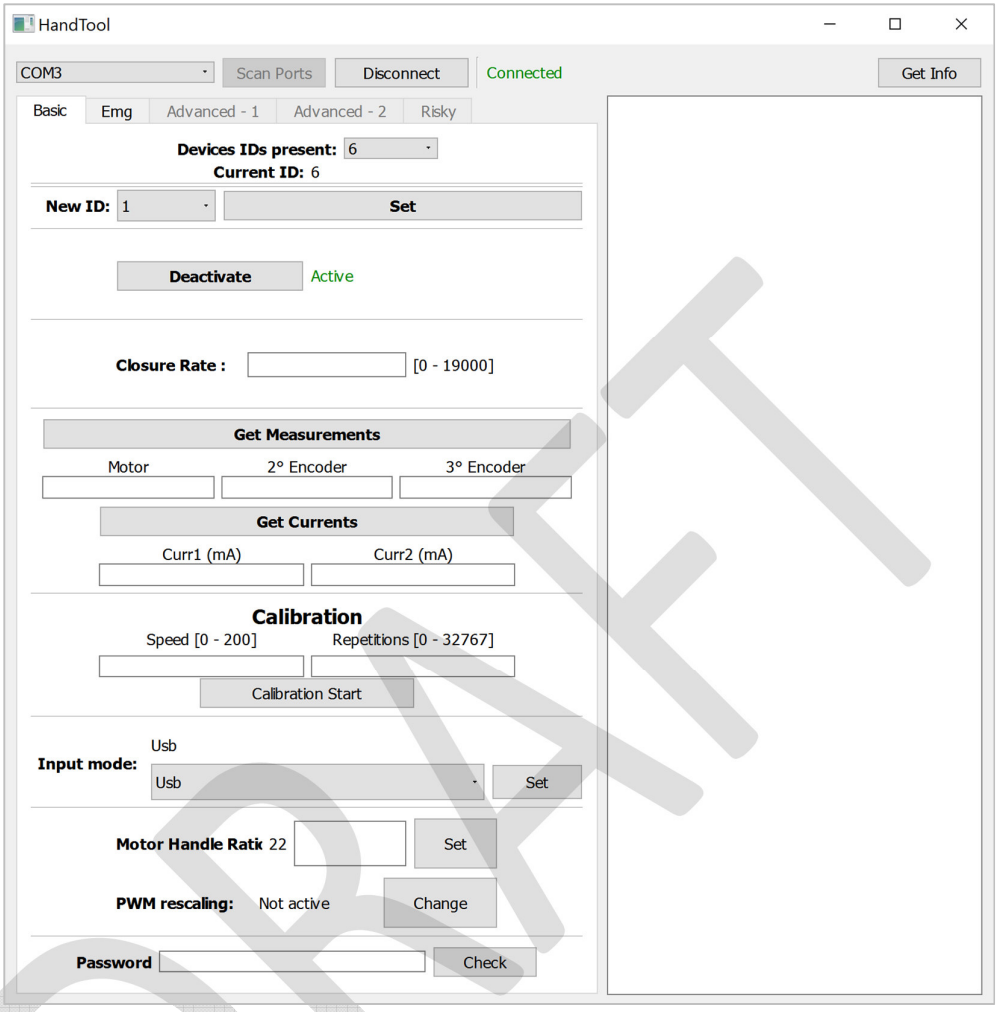
- **Windows:**
  If not already installed, it is necessary to install the FTDI serial drivers to make possible the device is seen as a serial port. If the serial port is not seen on the GUI main window, it is possible that the system has recognized the COM port with a high COM number. The supported serial ports are from COM1 to COM9. To change the port number, go under Control Panel > Hardware and Sound > Device Manager.
  Open the Ports (COM & LPT) drop down menu, right click on the COM port and select Proprieties.
  Select the Port Settings tab and then click on Advanced. Once in Advanced menu select from the drop down menu a COM number between COM1 and COM9 and click on OK.
  The device should now be recognized properly.

- **Unix:**
  Before using the GUI it is mandatory to add the user to the `dialout` group. In order to do so, you have to put the following command on a terminal.

  ```
  sudo adduser user_name dialout
  ```

  where `user_name` is the username under which the GUI is used.
  Once this command is executed, it is necessary to log out and back in, for the changes to take effect.

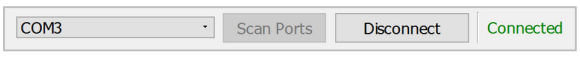
Main Layout



The application is structured into five tabs

- **Basic:** Basic commands. ID setting, activation of the board, measurements and currents reading, position input, calibration test, Input mode selection, Handle ratio, PWM rescaling, password input
- **Emg:** Electromyographic sensors related parameters and measurements;
- **Advanced 1/2:** Advanced commands. Control Mode, Resolution, Multipliers and Offset settings, Startup Activation, Absolute Encoder.
- **Risky:** PID controller, Position and current limits, Bootloader mode.

In order to use the qbHand with this application you have to click on *"Scan Ports"*. If the qbHand is properly connected, you'll see the serial port in the little window on the left. Once the serial port is seen you could connect the device clicking on the Connect button. This operation, if successful, enables all of the buttons and you should see a green *"Connected"* text near the Connect button.

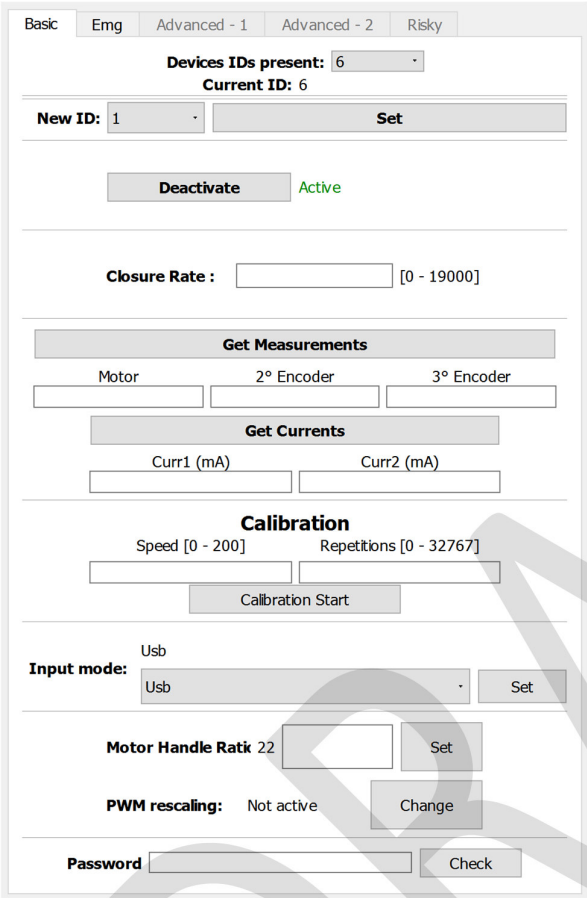


The *"Get Info"* button prints useful information about the qbHand and its control board in the blank window on the right side of the application, like: firmware version, parameters values and position measurements.

By default, only the first two tabs (Basic, Emg) are enabled, to unlock the other tabs (Advanced 1/2, Risky) please contact directly qbrobotics.

Basic Tab

The functions associated to the buttons of the basic tab are:



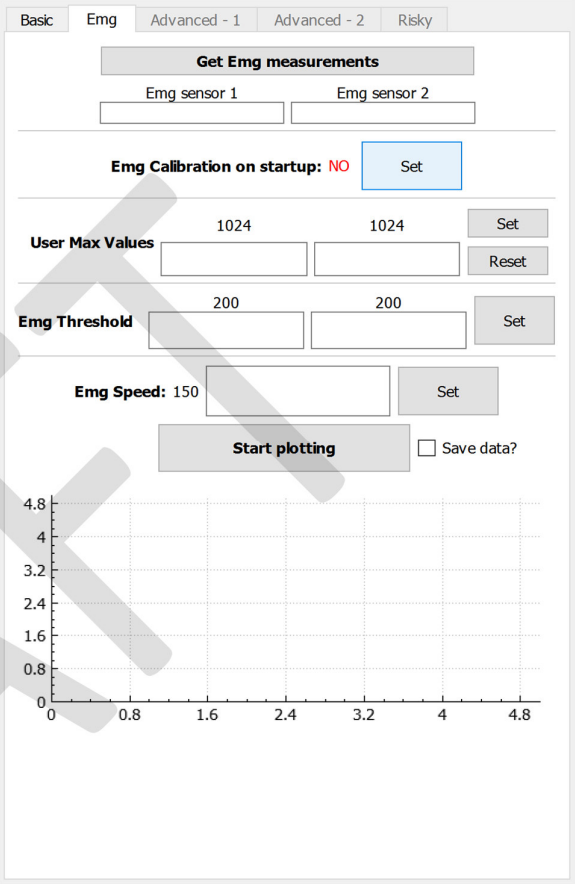
- **Devices IDs present:** Once the device, or devices (if connected in a chain), are connected clicking on *"Connect"*, the list of their IDs are going to be showed here. Selecting the desired ID from the drop-down menu will make the application connect to that device and the possibility to use that specific device;
- **New ID:** The default ID of the board is 1. Clicking on the drop-down menu will show a list of available IDs (1 to 127). Clicking on the "*Set"* button will set the ID equal to the New ID selected;
- **Activation:** In order to use the qbHand you first have to activate the qbHand driver. You can do this by clicking on *"Activate"*. The string next to the button will show the state of activation of the board;
- **Closure Rate:** The closure rate differs depending on which is the qbHand control modality. Showed are the position limits, in ticks.
- **Measurements and Currents:** Clicking on *"Get Measurements"* and *"Get Currents"* will show the encoder measurements for the first one and the current measurements, for the second one. The encoder measurements are shown in encoder ticks, the current in mA
- **Input Mode:** With this menu is possible to change the hand input modality. By default, the value is 'Usb'. The Handle modality must be selected if the hand is used with a Handle device. The emg modalities must be selected if the hand is used through Electromyographic sensors.
- **Motor Handle Ratio:** This parameter is used to multiply the value of the lever of the Handle device in order to use the lever to drive the hand. If you don't have a handle device don't consider this parameter.
- **PWM Rescaling:** If the hand must be powered with 12V and you have a source supply different from 12V and less than 24V this parameter must be activated. Otherwise must be deactivated.
- **Password:** This field is used to unlock the Advanced 1/2 and Risky tabs. For information on how to unlock those tabs please directly contact qbrobotics.

Remember to power the qbHand, or the chain, before using it.

EMG Tab

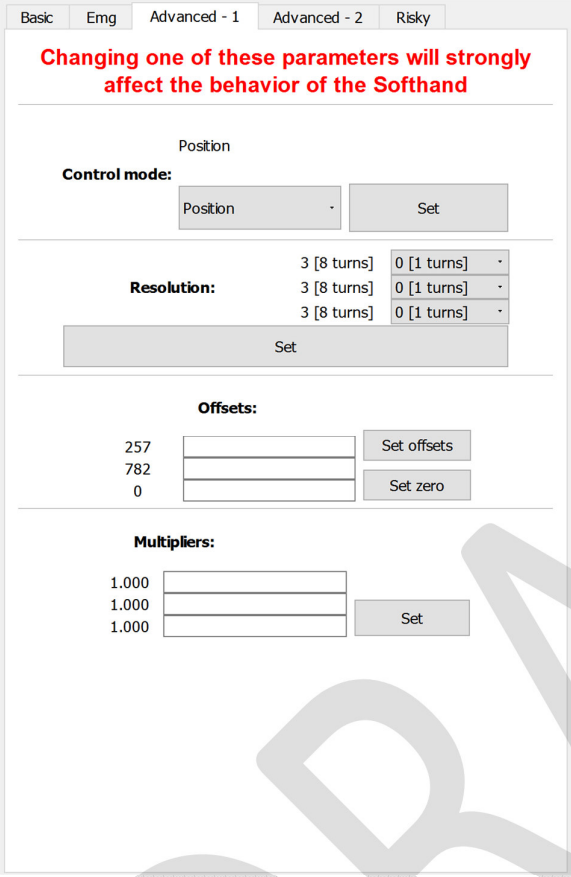
The functions associated to the buttons of the emg tab are:

- **Get EMG measurements:** Clicking on this button will show the two EMG sensors measurements in the blank fields below;
- **EMG calibration on startup:** Setting this parameter to “YES” will make a calibration for users’ maximum values when the hand is powered.
- **User max values:** This parameter is used to manually set the users’ maximum values. These parameters are used to correctly set the measurements’ range to [0 - 1024] according to user’s strength.
- **EMG threshold:** Depending on the input mode, those parameters are used to close/open the hand.
- **EMG speed:** This parameter is used to speed up or slow down the hand opening/closing when controlled with the EMGs.
- **Start plotting:** This button will make the graph start plotting. In blue it will be shown the first measure. In red the second one. The darker blue and darker red lines are respectively the first and second threshold. If the user wants to save the data, the checkbox “**Save data?**” must be checked. The data will be saved in a .txt file in the same folder where the Handtool is.



Advanced Tab - 1

The functions associated to the buttons of the first part of the Advanced tab are:



- **Control and Input Mode:** In the same way of the ID setting, is possible to change the Control mode. To use the hand with the application the parameter “Position” must be selected.
- **Resolution:** The resolution is a multiplier used to divide the encoder measurement. The higher it is, the higher is the value needed to close the hand. The default value for the Softhands is 3 - [8 turns].
- **Offsets:** Clicking on *“Set zero”* will set the zero position of the qbHand. The zero position is where the hand will return when 0 is driven as a position input. it is possible to manually set the offset values, by inserting the wanted values into the three white bars and clicking on *”Set Offsets”*, even if this is not recommended.
- **Multipliers:** Clicking on *“Set”* will set the Multipliers to the values written in the blank lines. The multipliers are used to multiply the encoder readings by a certain value.

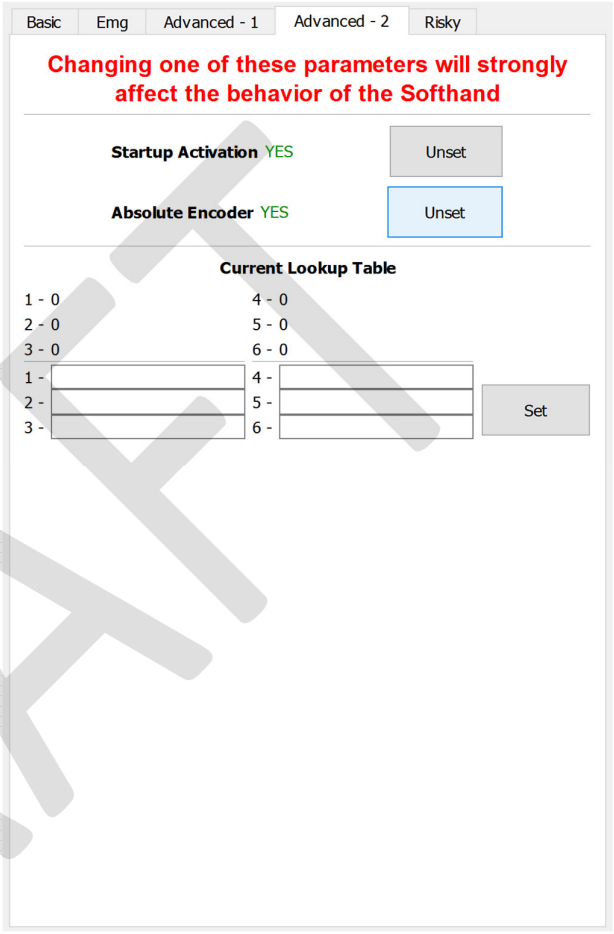
Changing one of this parameters is highly not recommended

Advanced Tab - 2

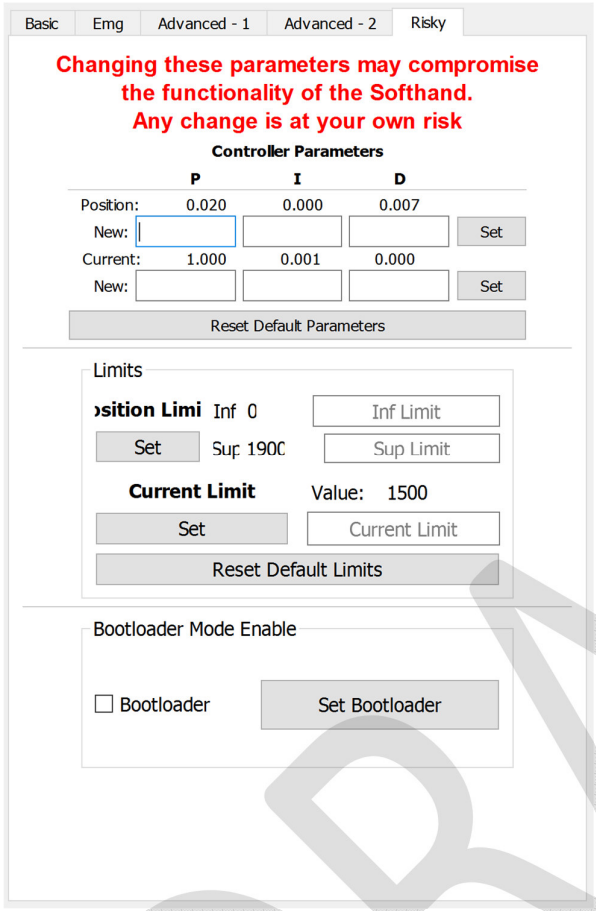
The functions associated to the buttons of the second part of the Advanced tab are:

- **Startup Activation:** If this parameter is set to YES, the qbHand will activate the motor when connected to a USB port and vice versa. The motor won't move if the qbHand is not powered and is not receiving position references.
- **Absolute Encoder:** If this parameter is set to YES two encoders are mounted on the qbHand to retrieve the motor position. Otherwise there are only one encoder. Do not change this parameter if you don't know how many encoders are mounted on the hand.
- **Current Lookup Table:** The current lookup table values are used to calculate an estimation of the hand current, based on the motor velocity and acceleration. The value of the estimation is shown in the second line of the *"Get Current"* command.

  Changing one of this parameters is highly not recommended



Risky Tab



The functions of the Risky tab are:

- **PID setting:** It is possible to change the position and current PID parameters clicking on the *"Set"* button. Changing these parameters may change the qbHand operation. It is possible to reset these parameters by clicking on the *"Reset Default Parameters"* button.
- **Position Limits:** These are the limits set to the position driven by the Closure rate in the Basic tab. The default parameters are set from the firmware. The superior limit should not be higher than 19000.
- **Current limit:** These parameter sets a limit on the absorbed motor current. The higher it is, the faster the hand can close. Beware to not set this value higher than 1500 mA.
- **Bootloader Mode Enable:** Checking the Bootloader blank square and clicking on *"Set Bootloader"* will put the board in Bootloader Mode. This is used to update the firmware using the USB cable. **DO NOT** set the board in Bootloader mode if you don't know how to update the firmware using the USB cable.

Changing these parameters may significantly change the SoftHand behaviour. Any change, is at your own risk.