



The T-RHEX Haptic Unit holds two devices, one for each hand, in a common base. Each device tracks its handpiece in **six degrees of freedom** and gives **force feedback in three** (X, Y, Z), and a seventh sensor detects handpiece actions such as forceps closing. It is made for VR training in ophthalmic surgery, robotic surgery and general micro-surgery, with handpieces that snap onto the tool pins with one hand.

FEATURES

- **Ergonomics and handling** optimized for ophthalmic VR training, robotic surgery and general micro-surgery.
- **6 DOF tracking** per hand, **3 DOF force feedback** (X, Y, Z) and a sensor for handpiece actions.
- **Brushless motors** with incremental encoders for strength and durability.
- **Wide range of handpieces**, swapped with one hand and a button press.
- Simple and robust **handpiece sensing**, with no cable or Bluetooth.
- **One 24 V power supply** for both devices, and **one USB cable** through an internal hub.
- **Parking positions** with status LEDs and a **magnetic zone** that guides the tool pin home.
- Simple and intuitive **calibration**: lift, pull back and park.
- **Removable protection cover** for transport, and an optional **VR headset arm**.
- **Lightweight and compact**, designed for robustness and simple maintenance.

6 DOF

Tracking per hand

3 DOF

Force feedback, X, Y, Z

150 mm

Workspace cube per handpiece

0.09°

Orientation resolution

4 μm

Position resolution

CONFIGURATIONS



With VR headset arm

A post and an adjustable arm hold the VR headset over the unit during head-mounted training.



T-RHEX

The haptic unit ready for training at a monitor, with handpieces in the parking positions.



With protection cover

For transport, the arms fold up and the cover protects the arms and the tool pins.

HAPTICS PERFORMANCE

Per device.

PROPERTY	SPECIFICATION	CONDITIONS
Peak force	5.0 N	X, Y and Z. Limited when a motor winding reaches its maximum operating temperature.
Min force in free air	0.05 N	Resistance from motors, transmissions and joint friction.
Max rendered stiffness	1500 N/m	Based on testing.
Position resolution	4 μ m	X, Y and Z, in the neutral position (Arm1 and Arm2 at 90°).
Orientation resolution	0.09°	Yaw, pitch and roll.
Translational workspace	150 × 150 × 150 mm	A box for each handpiece; the two overlap about 100 mm in X.
Rotational workspace	Roll continuous Pitch -80° to +65° Yaw -125° to +125°	Roll around the tool axis without limit. Pitch front to back, yaw side to side.
Apparent mass	10, 90, 40 g	X, Y and Z: the inertia of the arms and gimbals.
Gravity compensation	10 g (programmable)	The largest imbalance, from Arm2 and Gimbal3.
Minimum distance	~10 mm	Between the handpieces, when oriented similarly.
Max update frequency	>6000 Hz	For both devices.
Update latency	35 μ s	Total update time in the physics thread.

SPECIFICATIONS

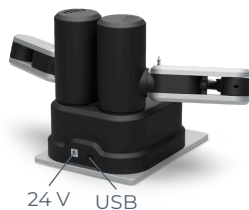
PROPERTY	SPECIFICATION	CONDITIONS
Devices	Two, left and right	In a common base, 62 mm apart (centre to centre).
Motors and sensors	3 motors, 7 sensors per device	Brushless motors with incremental encoders for X, Y, Z; angle sensors for yaw, pitch, roll; one sensor for handpiece actions.
Communication	USB-C to USB-A	One cable to the computer. An internal hub connects each device with USB 2.0 high speed.
Power	24 V / 300 W	External supply with a 5.5 × 2.5 × 11 mm barrel plug; EU and North American cords included. USB powers the controllers, the supply the motors.
Computer	Windows, macOS or Linux	64-bit. One USB 2.0 or 3.0 port.
Handpieces	Five in the set	Straight (e.g. blade), forceps, syringe, IOL injector and phaco; others on request. 5 to 24 g each.
Accessories	Hand rests, case	Hand rests for temporal position (left/right) and superior positions (left and right); a handpiece case that splits in two.
Protection	Motor temperature	Output is limited at a 110 °C winding temperature; a fan cools automatically.
Environment	10 to 30 °C	20 to 80 % RH, non-condensing. Storage 0 to 40 °C.
Weight	3.0 kg	Excluding power supply, cables, handpieces and accessories.

READY IN 1 MINUTE



1 Unpack

Lift off the protection cover and move the tool pins from the transport to the parking positions.



2 Connect

Connect the 24 V power supply and the USB cable to the back of the unit, in any order.



3 Calibrate

Lift the tool pins about 2 cm, pull them about 5 cm towards you and park them. The LEDs turn from red to blue to green.



4 Train

Start your simulation and click a handpiece onto each tool pin. A magnetic zone guides the pins home to park.

INTEGRATION

Follou's device library connects the T-RHEX to your simulation, whatever language it is written in. Both devices share one USB cable; the library finds them, and your simulation reads positions, orientations and handpiece actions and sets forces, at over **6000 Hz** for both devices. Interfaces are available for **Unity, C++ and Python** and for physics frameworks such as **SOFA, DefKit, CHAI3D and iMSTK**.

Your simulation

Unity, C++, Python, a physics framework or any other environment



FROM FOLLOU

Follou device library

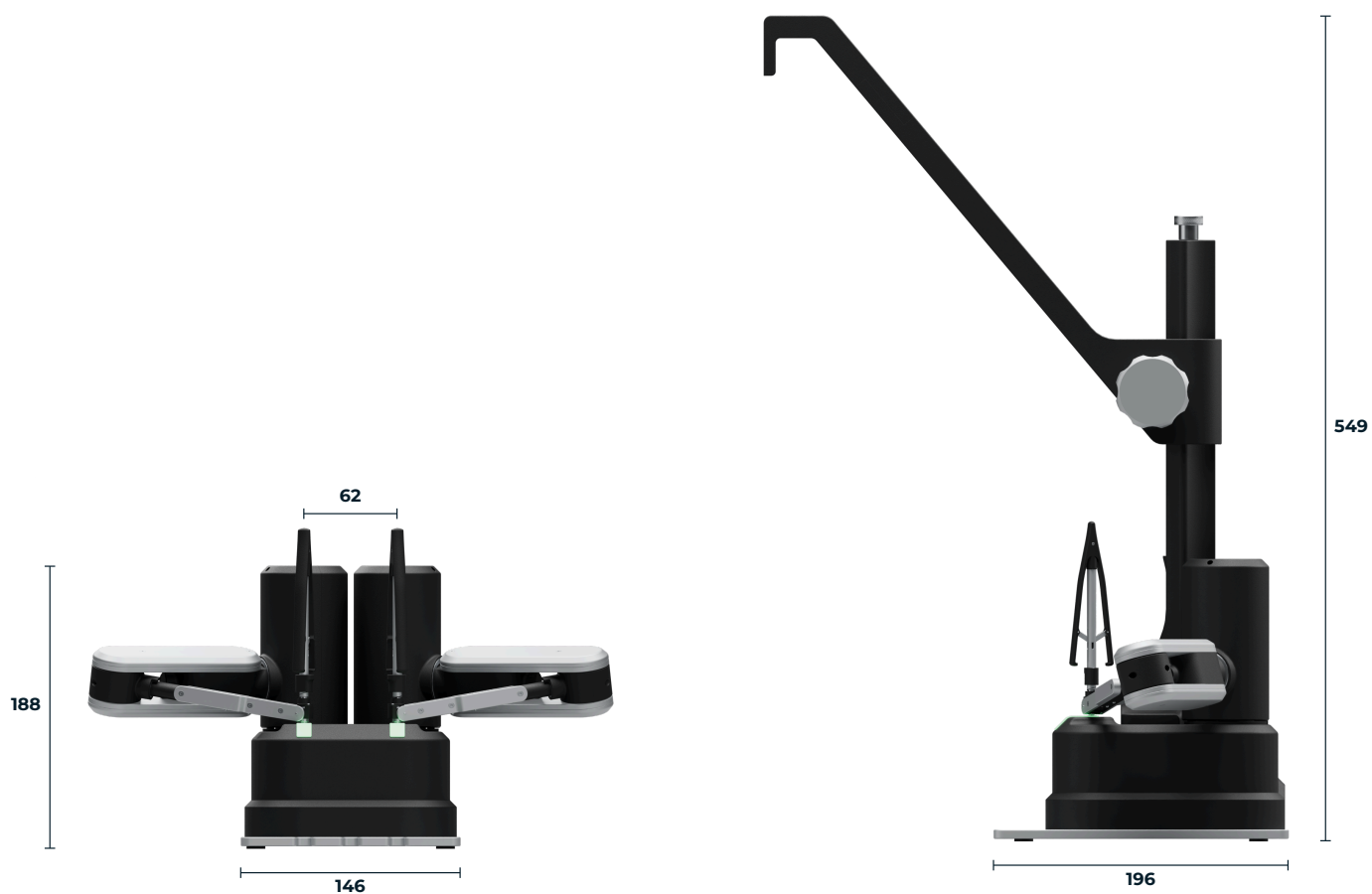
A DLL on Windows, dylib on macOS, .so on Linux. Download from follou-haptics.com



T-RHEX

Left and right device: position, orientation and handpiece action.

DIMENSIONS



Dimensions in mm, measured in the CAD model. The headset arm is shown at its highest position.

HANDPIECES



The delivered set holds a straight handpiece (e.g. a blade), forceps, a syringe, an IOL injector and a phaco handpiece. Other handpieces, such as scissors, on request.