

EvoKnee

Quick Guide — Assembly, Calibration and Adjustment

For certified practitioners (CPO)



EvoKnee microprocessor-controlled prosthetic knee

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IMPORTANT This guide is a quick reference; it does not replace the Instructions for Use (IFU). Read the complete IFU before fitting the device. EvoKnee may only be fitted by practitioners who have completed Protet certification training.

1. Critical safety rules

WARNING = protects against risk of injury · CAUTION = protects device or therapy function. Numbers come from the shared W-series records.

WARNING Do not let the patient walk on an uncalibrated device. The device signals this with a RAPIDLY FLASHING yellow LED + a short beep every 10 seconds (steady yellow indicates a medium battery). (W-001)

WARNING The maximum user weight is 125 kg (body weight). (W-003)

WARNING Do not open or disassemble the device; all service operations, including battery replacement, are performed only by an authorized service center. (W-008)

WARNING Not suitable for running as a sport, jumping or impact sports; unavoidable running of a few steps is tolerated. Inform the patient. (W-013)

WARNING Showering, swimming and immersion in water are prohibited. The device is rated IP66 (dust-tight, resistant to powerful water jets); intentional water contact is nevertheless prohibited due to seal ageing and the effects of hot/salt/chlorinated water. (W-006)

WARNING Driving with the prosthesis is subject to national regulations and an assessment by the competent authority/physician; it is not recommended before such an assessment. (W-010)

NOTE The knee defaults to SUPPORT resistance; whenever the system cannot recognize a situation, the outcome is always a "supported knee". Every workflow in this guide builds on this safety philosophy.

2. Box contents and device overview

Scope of delivery: EvoKnee knee joint · USB-C charging cable · documents (IFU + Quick Guide).



EvoKnee — side view

2.1 Technical specifications

Weight	1550 g
Total height	255 mm (230 mm from bottom pyramid to rotation axis)
Maximum flexion angle	130°
Maximum user weight	125 kg (body weight)
Mobility class	K2 – K4
Protection class	IP66 — fully dust-tight, resistant to powerful water jets
Battery	Built-in Li-ion, 14.8 Wh
Charging	Full charge in ~2.5 h via USB-C
Battery life	~1.5 weeks in typical use
Connectivity	Bluetooth LE → ProtedGO app
Operating temperature	-10 ... +40 °C
Storage	15 – 25 °C, dry environment

2.2 Controls and connections



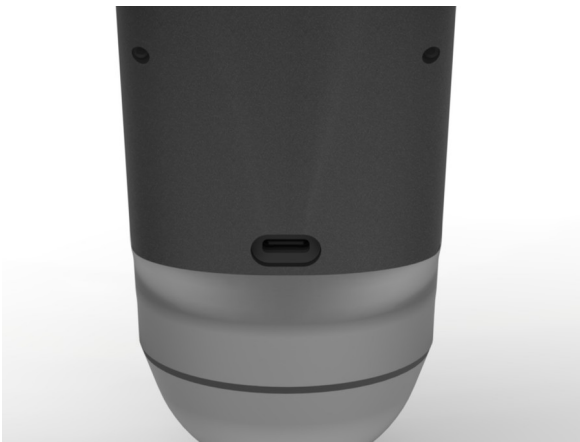
Mode (M) button



Power button



EVO status indicator (LED)



USB-C charging port — on the REAR-LOWER area of the device; the cable plugs in from behind

Item	Function
Power button	Turns the device on and off. Power-on is confirmed with sound/vibration. Hold to switch off; before shutting down, the device saves settings and counters and moves the valves to a safe shutdown position. Manual switch-off works regardless of the current mode and state of the device
Mode button	Enables/disables alternative activity functions. Actions are confirmed with sound/vibration (details: ProtedGO)
LED	Battery status and warning codes (see Section 11)
USB-C port	Charging — use a CE-marked, IEC 62368-1 compliant adapter capable of 5 V $\geq$ 2 A and a good-quality USB-C cable. Make sure the port is dry and clean before charging
Serial number (SN)	Laser-marked on the device body

2.3 Fitting workflow at a glance

1  Mechanical assembly - Pyramid connections · 15 Nm - Bench: knee axis 0–10 mm behind plumb line - Full-flexion clearance ≥ 4 mm → Sections 3.1–3.2	2  Static alignment - Patient standing, weight even on both feet - Same target, ± 5 mm tolerance - Correction → re-torque to 15 Nm → Section 3.3	3  Calibration - Sitting: $\sim 90^\circ$, foot off the ground - Standing: knee fully extended, load balanced - Patient data: weight + height → Section 6	4  Dynamic alignment + adjustment - Parallel bars → level ground - Ramp / stair descent - Fine-tuning of clinical settings → Section 7
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NOTE The order is mandatory: each step is the precondition of the next. Do not proceed to dynamic alignment before calibration. Between steps 2 and 3 the device is charged, switched on and paired with ProtedGO (Sections 4–5).

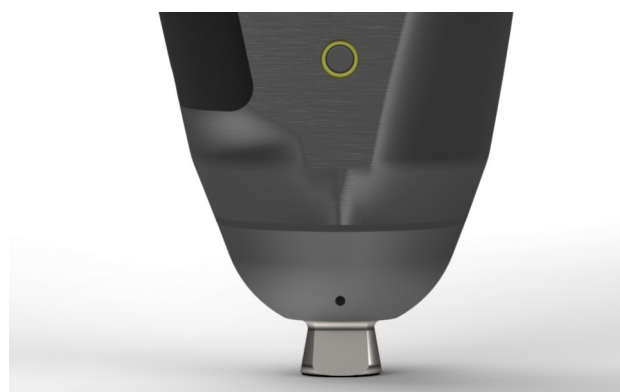
3. Assembly and alignment

3.1 Connections

- Proximal: pyramid adapter (standard). A threaded top connection is available on special order (particularly for knee disarticulation).
- Distal: pyramid adapter.
- Tighten all pyramid set screws to a torque of 15 Nm.
- The 15 Nm value applies to the EvoKnee pyramid adapters; for other components on the socket and foot side, the respective manufacturer's own torque instructions apply.



Proximal (top) pyramid adapter



Distal (bottom) pyramid adapter

WARNING An incorrect torque value can lead to loosening of the connection and a fall. Use a torque wrench at every fitting. (W-022)

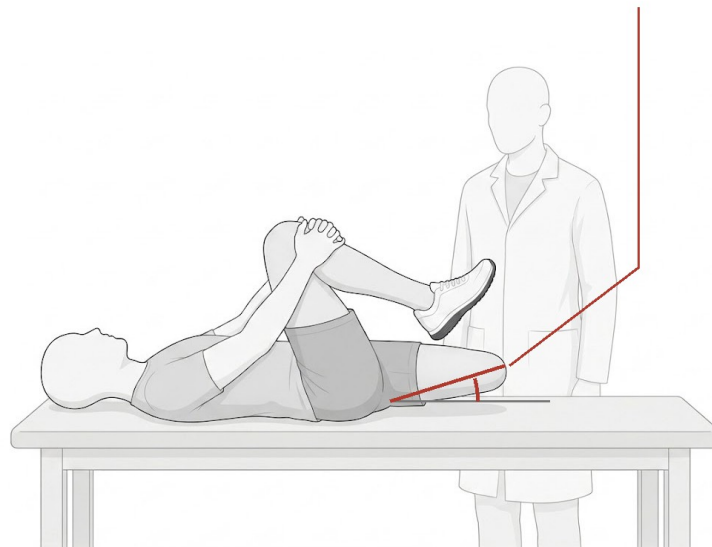
3.2 Bench alignment

Required equipment: plumb line (string + weight), marking pen, torque wrench. No alignment jig or extension fixture is needed.

- Mark the lateral midpoint of the socket at trochanter level.
- Drop the plumb line from this mark. The plumb line is the fixed reference.
- Position the knee rotation axis 0–10 mm BEHIND the plumb line (the plumb line passes in front of the knee).
By patient profile: close to 10 mm for K2 / new users (more stable), close to 0 for K4 / active users (smoother transition into swing).
- Position the foot so that the foot center is about 30 mm IN FRONT of the plumb line. Set the heel height with the patient's shoe and according to the foot component's own instructions for use.
- Socket flexion: perform the Thomas test; set it by adding 5° to the measured hip flexion contracture.

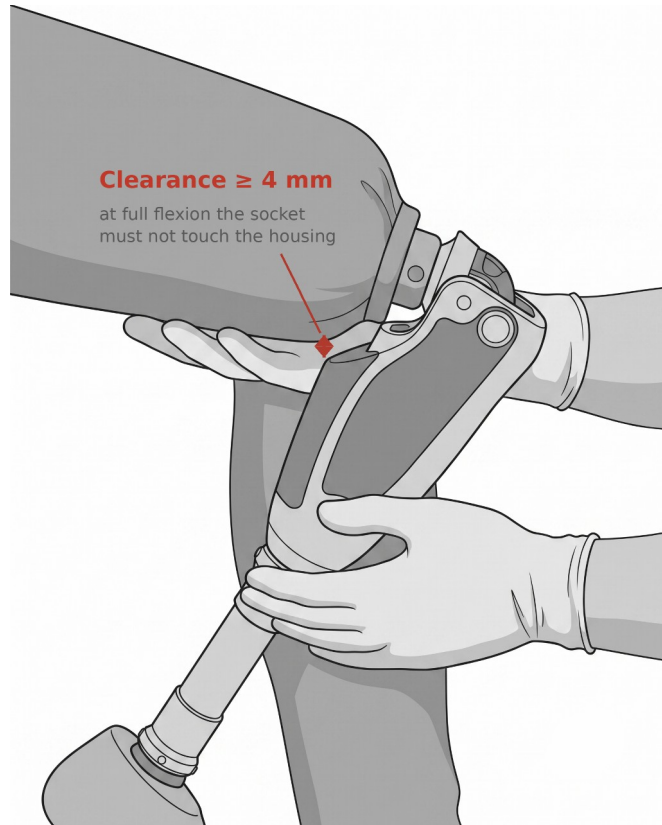
Hip flexion contracture

socket flexion = measured angle + 5°



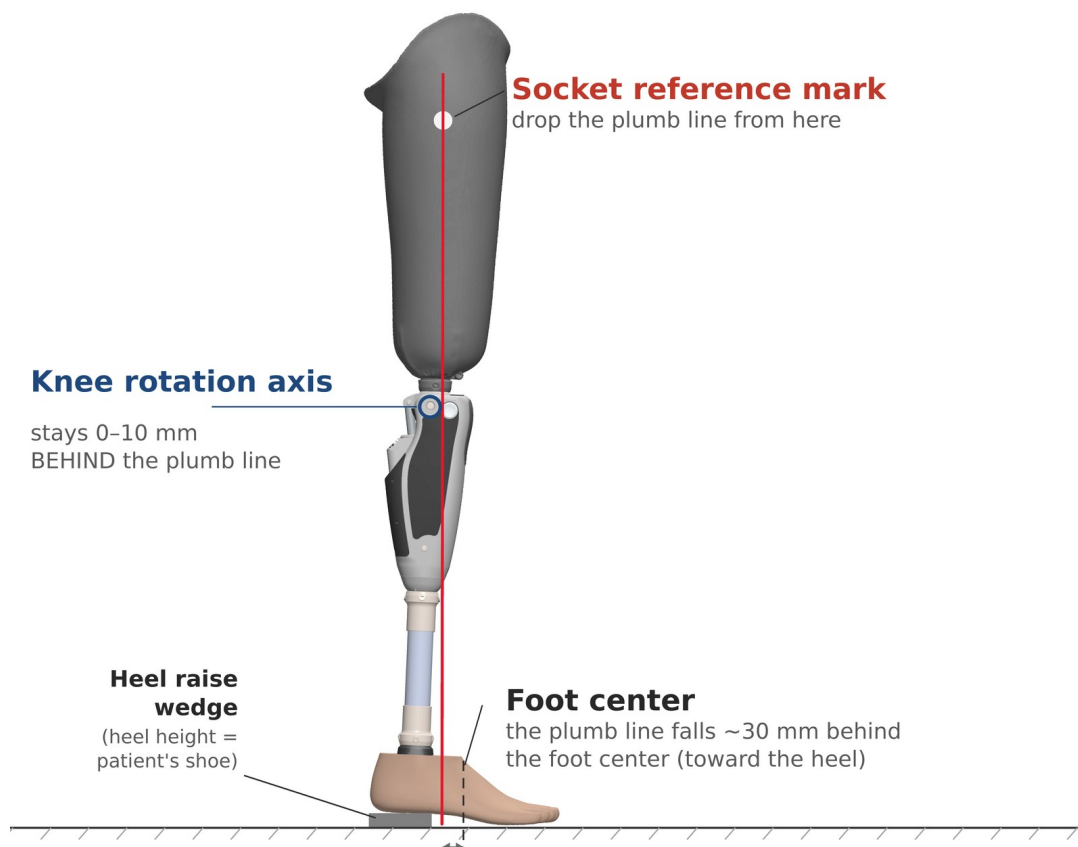
Thomas test — measuring the hip flexion contracture

- Flex the knee fully and measure the clearance between the socket and the EvoKnee housing: it must be at least 4 mm.



Socket-housing clearance check at full flexion

- Tighten all pyramid set screws to 15 Nm.



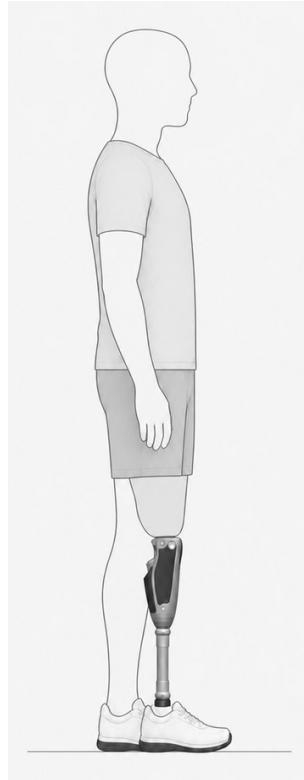
Bench alignment: plumb line dropped from the socket mark, knee axis 0–10 mm behind, plumb line ~30 mm behind the foot center (toward the heel), heel raise wedge

WARNING If the socket–housing clearance at full flexion is below 4 mm, the socket strikes the hydraulic unit and damages the device. If the clearance is insufficient, the socket must be revised. (W-023)

NOTE Dimensional reference: total height 255 mm; 230 mm from the bottom pyramid to the rotation center.

3.3 Static alignment (patient standing)

- The patient stands upright on firm level ground, next to parallel bars or another support, with weight distributed evenly on both feet.
- Drop the plumb line from the trochanter mark again. In the sagittal plane the knee rotation axis must again be 0–10 mm behind; a deviation of up to ± 5 mm from the target value chosen on the bench is acceptable — always stay within the 0–10 mm window.
- In the frontal plane, check that the pylon is vertical and the foot external rotation is symmetrical with the contralateral side.
- If there is deviation, correct it with the pyramid screws and re-torque to 15 Nm.



Static alignment posture

NOTE The order matters: Bench → Static alignment → Calibration (Section 6) → Dynamic alignment and clinical settings (Section 7). Do not proceed to dynamic alignment before calibration — the knee cannot run its gait algorithm safely.

4. Charging and first power-on

1. Switch the device on with the power button. Power-on is confirmed with 1 long beep + vibration.
2. At every power-on the device starts in normal walking mode and at support resistance.
3. Check the LED battery color (green = good). Charge via USB-C if needed — about 2.5 h from empty to full. The LED lights purple while charging.

WARNING Never walk with the charging cable plugged in; charging while wearing the device is allowed only in a seated position. (W-019)

NOTE A new device is uncalibrated: a yellow LED + one beep every 10 s is normal and disappears after calibration.

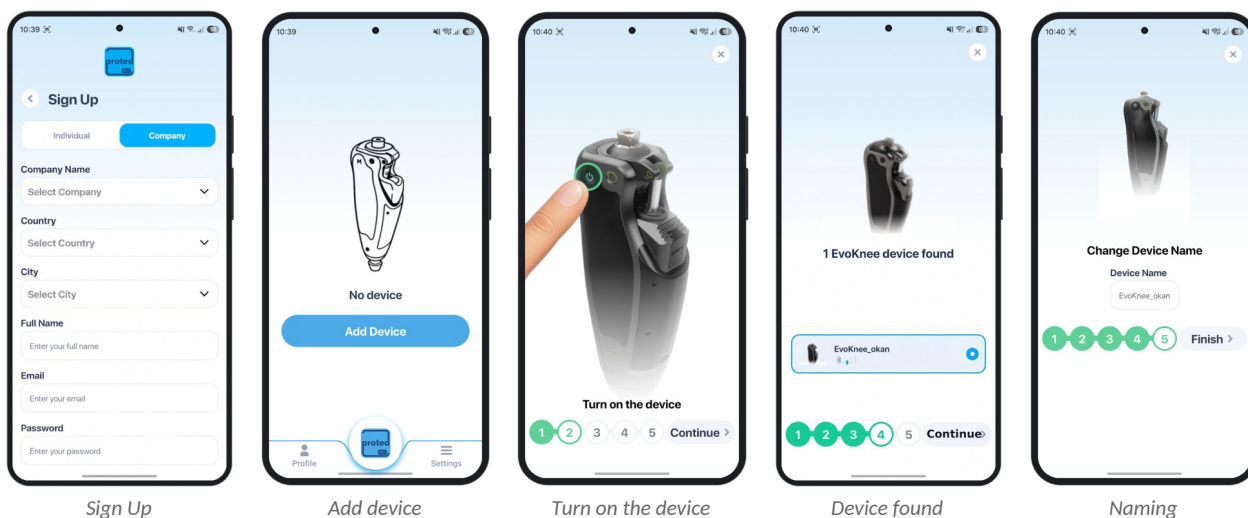
WARNING At the low-battery warning (red LED + a beep every ~30 s) the device keeps working normally — charge as soon as possible. If the battery falls below the critical threshold, the device performs a safe shutdown: the valves move to the shutdown position and the knee is never left free; a switched-off device behaves with the Power-off resistances (see 7.2). (W-007)

NOTE EvoSave power management: after a period without movement the device automatically enters a low-power sleep; waking at the first movement is too fast for the patient to notice. Sleep is always entered in the support position — if the patient stands up during sleep, the knee does not collapse. The LED is off during sleep; while asleep, the power button does not switch the device off — it wakes it first. The device does not sleep while charging or while data exchange with the app is in progress.

5. ProtodGO setup and pairing

Requirements: iOS 15+ / Android 10+ · Bluetooth (BLE) enabled.

1. Download ProtodGO and create your practitioner account.
2. Complete the requirements for account activation and wait for the approval notification — an unapproved account cannot connect to a device.
3. With the device switched on, connect to it from the app. The app guides you through the connection steps.



ProtodGO registration and device connection flow — the in-app wizard guides you through 5 steps

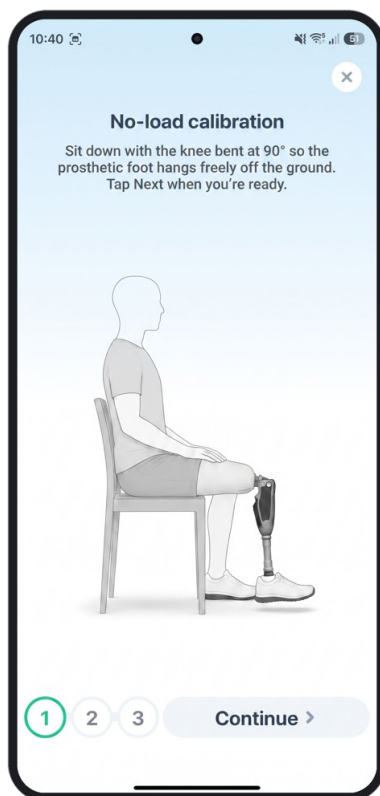
NOTE While data exchange with the app is in progress the device does not go to sleep; the connection will not drop.

6. Calibration

Calibration references the load and knee-angle sensing to this fitting and this patient. Angle and load calibration is done in a single flow with two postures. The app guides you step by step; each step is confirmed with a beep + vibration.

Step 1 — Sitting (~90°, no load)

The patient sits; the knee hangs naturally at ~90° flexion; the FOOT DOES NOT TOUCH THE GROUND. The device measures for a few seconds.

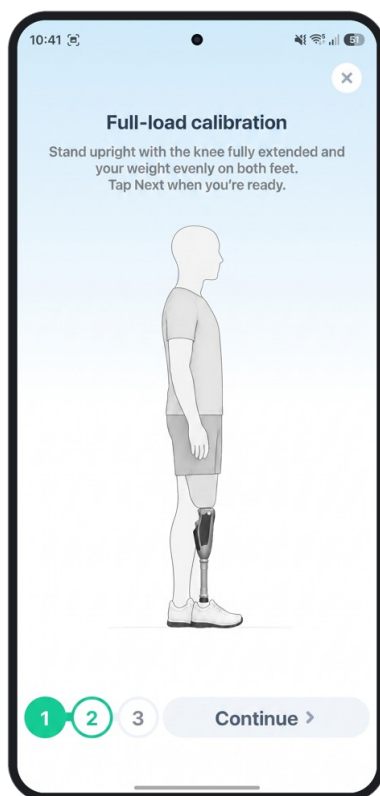


Step 1 — ProtelGO No-load calibration screen: knee bent ~90°, prosthetic foot off the ground, sound foot on the floor

WARNING If the foot touches the ground during Step 1, the references are corrupted. (W-002)

Step 2 — Standing (full extension, balanced load)

The patient stands up; both feet on the ground, side by side. Make sure the knee is FULLY EXTENDED and body weight is BALANCED EVENLY ON BOTH FEET. The device records the measurement.



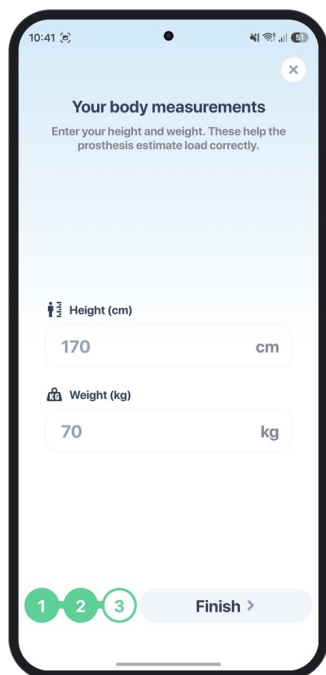
Step 2 — ProtodGO Full-load calibration screen: knee fully extended, feet side by side, weight balanced on both feet

WARNING If the knee is not fully extended or the load is shifted to one side during Step 2, the references are corrupted. The order matters: first sitting, then standing. (W-002)

NOTE Standing on an uncalibrated device is safe — the knee is at its default support resistance. What W-001 prohibits is walking on an uncalibrated device.

Step 3 — Patient data

Enter the patient's weight and height. Calibration only becomes valid once all three steps are complete.



The image shows a smartphone screen with a light blue background. At the top, the status bar shows the time 10:41 and various icons. The app interface has a title 'Your body measurements' and a subtitle 'Enter your height and weight. These help the prosthesis estimate load correctly.' Below this, there are two input fields. The first is labeled 'Height (cm)' with a person icon and contains the value '170'. The second is labeled 'Weight (kg)' with a weight icon and contains the value '70'. At the bottom, there is a progress indicator with three green circles numbered 1, 2, and 3, where the third circle is highlighted. To the right of the progress indicator is a 'Finish >' button.

Step 3 — patient data: height (cm) and weight (kg) entry

NOTE Calibration is persistent: switching off, battery depletion and software updates do not erase it. "Reset to factory defaults" does not erase it either. Routine recalibration is not required.

7. Dynamic alignment and clinical settings

7.1 Dynamic observation

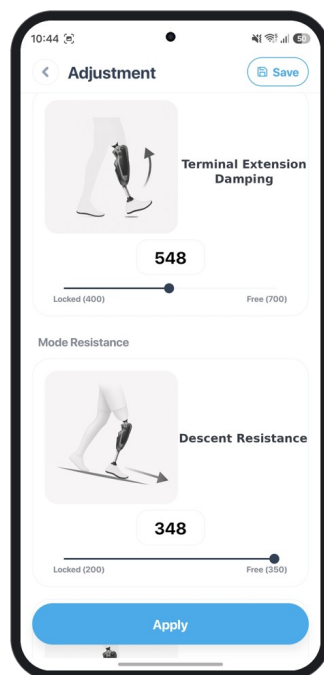
- After calibration, walk the patient first with parallel bars/support, then on level ground.
- Verify Descent Resistance on ramp and stair descent; watch for trunk compensations (sudden hip hiking, lateral lean, shortened step).
- Fine-tune the settings below according to observation; return to alignment if needed.

7.2 Clinical settings — recommended order

Each setting has its own value range; the lower end acts toward Locked (full lock — maximum resistance), the upper end toward Free (fully free). The ranges are shown at the two ends of the slider in ProtedGO. Settings are written permanently to device memory and are retained when the device is switched off. The table below is the complete list of clinical settings. Slider values are internal device units (they carry no physical unit); record them as numbers in the patient file.

	Setting	What it does / target
	1 • Descent Resistance	Support (yielding) resistance of the stance phase: standing, weight transfer, ramp/stair descent, after stumbling. Adjust while testing on a ramp and stairs, to the firmness at which the user feels safe. Too free: the knee yields quickly during descent and the feeling of falling increases. Too firm: may feel safe but disrupts the natural descent flow.
	2 • Terminal Extension Damping	Brakes the knee as it approaches full extension at the end of swing; reduces the terminal impact. Adjust during level walking according to user comfort. Too firm: gives a foot-lagging-behind feeling. Too free: the terminal impact is felt.
	3 • Swing Flexion Resistance + Swing Flexion Angle Limit	Resistance and maximum permitted angle of knee flexion (heel rise) in swing. Adjust during level walking. Recommendation: keep the resistance at the freest position; restrict according to user comfort. Excessive heel rise is limited by the angle limit.
	4 • Extension Resistance	Resistance of the leg swinging forward (extending) in swing. Adjust during level walking. Recommendation: keep at the freest position; restrict according to user comfort.
	5 • Sitting Resistance	EXTRA resistance that engages during a recognized sitting descent once the knee passes a certain flexion angle. If set equal to Descent Resistance, no extra sitting resistance is felt; if set firmer, extra support is felt while sitting down. The app does not allow a value freer than Descent Resistance.
	6 • Heel Damping + Heel Damping Angle Limit (opt.)	Comfort damper enabling the loading-response movement at heel strike (resistance + permitted flexion angle). If the angle is 0, the feature is off. If the resistance is set very free and the angle very high, the knee flexes excessively at heel strike — the user may feel unsafe.

	Setting	What it does / target
	7 • Power-off Flexion Resistance	Fixed flexion resistance in effect when the device is switched off or shuts down with a depleted battery. After setting the value, switch the device off and try it; set it to the value the user can use most safely after battery depletion and test in all scenarios.
	8 • Power-off Extension Resistance	Fixed extension resistance in effect while the device is off. Adjusted together with Power-off Flexion by switching the device off and trying it; the safest value is selected and tested in all scenarios.



Adjustment screen example; slider ends are Locked and Free — tap Apply to save

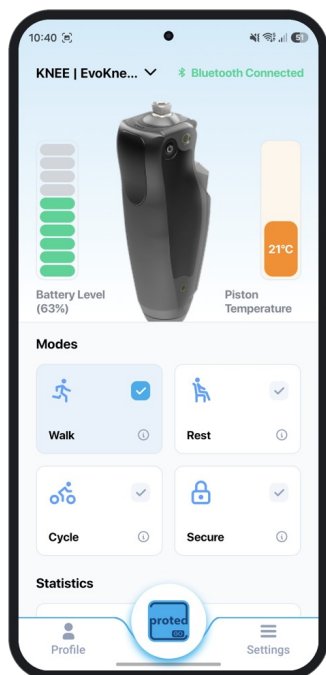
NOTE Energy tip: if Swing Flexion Resistance and Heel Damping are set equal, the flexion valve does not move at all during level walking — since the valve motors are the largest energy consumer, battery life increases noticeably. Clinical requirements always take priority; apply this equalization only if the clinical goals are met.

WARNING The power-off resistances define the knee's behavior while the device is off. With the device off, the gait algorithm does not run; the patient must not walk relying on this passive resistance. (W-005)

CAUTION "Reset to factory defaults" only returns the settings to factory values (calibration is retained) — the knee feel changes for the patient; inform the patient. (W-016)

8. Activity modes

Alongside the normal walking algorithm, EvoKnee offers additional modes for specific activities. Modes are selected from ProtédGO; some modes can also be entered and exited with the mode button on the device. The current mode list and behaviors are described in ProtédGO.



Device home screen: battery status and mode selection (Walk · Rest · Cycle · Secure)

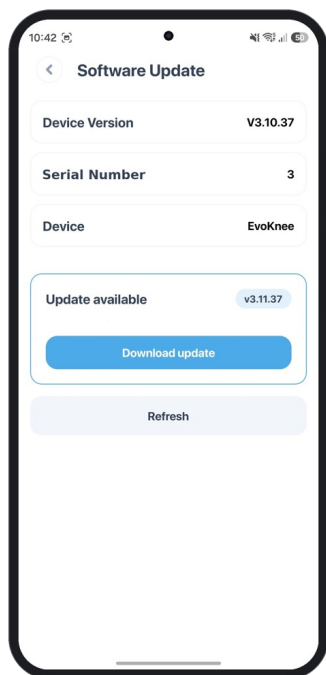
WARNING In Cycle mode and any other mode that releases the knee, the knee bears no load — do not stand or walk while in these modes. Make sure the patient is taught this. (W-004)

WARNING The device always starts in normal walking mode — a device switched off in a special mode is NOT in that mode after power-on. (W-018)

9. Software update (OTA)

Updates are performed via ProtedGO; the patient or the practitioner can start them. Conditions:

- Battery at least 40% charged.
- The device must not be worn — or the patient must be seated and motionless.



Software Update screen: current version, available update and Download update

WARNING Do not stand or walk during the update. (W-021)

10. Patient handover checklist

- ☐ Bench alignment done: knee axis 0–10 mm behind the plumb line
- ☐ Socket–housing clearance ≥ 4 mm at full flexion verified
- ☐ Static alignment checked (within ± 5 mm tolerance)
- ☐ Pyramid screws torqued to 15 Nm
- ☐ Calibration completed with all 3 steps (no yellow LED warning)
- ☐ Dynamic observation done; settings verified while walking (level ground + ramp/stair descent)
- ☐ Battery, charging routine and low-battery signal explained
- ☐ Risk of free-swing modes and button functions explained (W-004)
- ☐ Water/running/vehicle restrictions explained (W-006, W-013, W-010)
- ☐ Beep and LED table introduced, IFU handed over
- ☐ Patient-side ProtedGO functions demonstrated (mode selection, step counter, updates)

11. Troubleshooting and LED codes

Signal	Meaning	Action
Green LED	Battery good (full/high)	—
Yellow/amber LED	Battery medium	—
Orange LED	Battery getting low	Plan charging
Yellow LED flashing rapidly + beep every 10 s	Not calibrated (distinguished from the battery yellow by flashing)	Perform calibration (Section 6)
Red LED + beep every ~30 s	Low battery	Charge the device
Power-on signature + 2 short beeps	The device restarted	Usable; have the log read out at the next service visit
Single short beep (during use)	A valve command could not be executed	If it repeats: service
3 beeps (intermittent)	Internal communication problem	Switch off and on; if it persists: service
3 very short beeps + one beep per minute	Motion sensing disabled — safe fallback behavior	Walking is possible; service as soon as possible; battery drains quickly
Purple LED	Charging	Normal — returns to battery color when charging is complete
LED off	EvoSave sleep or switched off	Move the device or switch it on with the button

NOTE For situations not covered here, see the IFU troubleshooting section or contact Protred authorized service: (+90) 312 394 7575 · protred@protred.com.tr

NOTE Serious incidents related to the device must be reported to the manufacturer and to the competent authority of your country.