

Pico Laser for Pigmentation - Official Clinical Overview & Datasheet

EXECUTIVE SUMMARY

The Pico Laser for Pigmentation represents a paradigm shift in the treatment of dermal and epidermal pigmented lesions. Clinically positioned between nanosecond Q-switched lasers and non-ablative rejuvenation devices, this platform leverages picosecond pulse durations to generate a pure optoacoustic effect. This mechanism fragments targeted melanosomes and pigmented chromophores into microscopic dust particles without significant thermal diffusion, thereby reducing the risk of collateral thermal injury, post-inflammatory hyperpigmentation (PIH), and scarring. The device is specifically architected for high-volume dermatology clinics and medical spas seeking to expand their revenue streams with a differentiated, high-efficacy solution for refractory melasma, solar lentigines, and cafe-au-lait macules.

In a competitive aesthetic market dominated by thermal-based devices, our Pico Laser delivers a superior value proposition: treatment efficacy with fewer sessions, minimal patient downtime, and a dramatically improved safety profile for all Fitzpatrick skin types IV-VI. The integrated dual-wavelength configuration (532nm and 1064nm) combined with a proprietary diffractive lens array enables both superficial pigment clearance and deep dermal remodeling. For clinic owners, this translates to higher patient throughput,

reduced consumable costs, and a rapid return on investment (ROI) driven by premium procedure pricing and low service overhead.



CLINICAL ARCHITECTURE & DESIGN

The system's clinical robustness begins with its optical engine. We utilize imported, aerospace-grade laser bars from a certified German supplier, ensuring pulse-to-pulse stability and a minimum operational lifespan exceeding 200 million shots. The optical cavity is hermetically sealed and humidity-controlled to prevent condensation-induced energy decay. Unlike competing platforms that rely on air-cooled diodes, our architecture integrates a closed-loop, four-stage thermal management system: (1) a high-efficiency TEC (thermoelectric cooler) module for instantaneous handpiece tip cooling, (2) a medical-grade sapphire contact window for uniform epidermal heat

extraction, (3) a multi-chamber water circulation pump with anti-microbial filtration, and (4) whisper-quiet cross-flow fans for radiator extraction. This cascade design maintains a handpiece tip temperature of +2 °C to +4 °C, enabling aggressive fluences (up to 1.8 J/cm² for 1064nm) without epidermal compromise. The handpiece itself is ergonomically balanced with a zero-backlash trigger and a swivel cable strain relief to minimize operator fatigue during high-volume procedures. All firmware is managed via a 15-inch capacitive touchscreen running a real-time energy calibration algorithm that self-adjusts for ambient temperature and system runtime.

KEY INDICATIONS & CAPABILITIES

- Picosecond Pigment Shattering (Optoacoustic Lysis): Delivers 450 picosecond pulses at 1064nm and 350 picoseconds at 532nm. The ultra-short dwell time generates a peak power >1.8 GW, converting melanin into sub-micron particles cleared by lymphatic phagocytosis within 2-4 weeks.
- Dual-Wavelength Diffractive Lens Array (DLA): A proprietary handpiece attachment that converts the Gaussian beam into a uniform 10x10 array of high-fluence micro-beams. This induces laser-induced optical breakdown (LIOB) in the dermis without ablating the stratum corneum, indicated for atrophic scars and textural irregularities.
- Smart Clinical Presets & Adaptive Dosimetry: Pre-programmed algorithms for 14 pigmentation pathologies (e.g., Nevus of Ota, ephelides, Hori's nevus). The

system recommends fluence, spot size (2-8mm continuously adjustable), and pulse count based on patient skin type (Fitzpatrick I-VI) via a built-in decision tree interface.

- Epidermal Protection with Real-Time Thermal Feedback: Integrated contact-sapphire cooling with a thermistor array that measures skin surface temperature 1000x/sec. If temperature exceeds 40°C, the system automatically reduces fluence by 0.05 J/cm² increments, preventing burns.

- Dual-Footswitch & Burst Mode For Large Areas: Allows the clinician to operate hands-free and activate a 2Hz or 5Hz repetition rate. A large 15mm spot size option (upgradeable) achieves full-face melasma treatment in under 8 minutes, optimizing clinic workflow.

COMPLIANCE & STANDARDS

The Pico Laser for Pigmentation is manufactured under an ISO 13485:2016 certified quality management system. The device holds Medical CE Certification (Class IIb, Notified Body 0123) for the indication of pigment lesion removal and skin rejuvenation. FDA 510(k) clearance is pending for the U.S. market; however, the platform currently complies with 21 CFR 1040.10 and 1040.11 laser product performance standards. Additional certifications include IEC 60825-1:2014 (Laser Safety), RoHS compliance for environmental hazardous substance control, and CB Scheme certification for global electrical safety. Each unit ships

with a factory-issued calibration certificate traceable to NIST standards.

TECHNICAL SPECIFICATIONS

The following electrical and optical parameters define the operational envelope of the production model. All specifications are measured at the distal tip under full load (25°C ambient, 50% RH).

Parameter	Specification
Laser Type / Wavelength	Solid-State Nd:YAG / 532nm & 1064nm
Pulse Duration	532nm: 350 ps ; 1064nm: 450 ps
Peak Power	> 1.8 GW (at 1064nm, 1.8 J/cm ² , 5mm spot)
Spot Size (Continuously Variable)	2mm - 8mm (optional DLA: 10x10 mm array)
Maximum Fluence	532nm: 1.2 J/cm ² ; 1064nm: 1.8 J/cm ²
Repetition Rate	Single shot, 2 Hz, 5 Hz
Cooling System	TEC + Sapphire (+2 °C to +4 °C) + Closed-loop Water + Wind
Display / Interface	15' Capacitive Touchscreen, Android OS

Power Requirements	110-240 VAC, 50/60 Hz, 1500 VA (Standby < 50W)
Dimensions (W x D x H)	42 cm x 55 cm x 110 cm (cart base included)
Weight (System + Cart)	48 kg (106 lbs)
Laser Class	Class 4, IEC 60825-1:2014

