Lipo Laser Slimming Workstation - Clinical Architecture & Performance Reference Manual

DEVICE IDENTIFICATION

Product Name: Lipo Laser Slimming Workstation

Model Designation: OEM-LLS-9000 Series

Regulatory Class: Class IIb (Medical Device Directive 93/42/EEC) / Class II (FDA 21 CFR Part 878)

Primary Function: Non-invasive laser-assisted lipolysis and circumferential body contouring via selective photothermolysis and adipocyte membrane permeabilization.

INTERNAL HARDWARE TOPOLOGY

Optical Source Architecture: The system utilizes a bank of hermetically sealed, high-power diode laser bars. Each laser bar is individually calibrated for wavelength stability (+/- 3nm) and power output linearity. The bars are mounted on a copper-tungsten cold plate to ensure uniform thermal dissipation and prevent optical drift.

Beam Delivery System: Precision articulated arm with high-transmission optical fiber bundle. Total transmission loss < 2% across the operational wavelength. The handpiece integrates a micro-lens array for beam homogenization, eliminating hot spots.

Energy Generation Subsystem: Redundant power supply units (PSUs) with active power factor correction (PFC). Real-time current monitoring per laser bar with automatic shut-off if deviation exceeds +/- 5% of setpoint.

[IMAGE_1 reference point for hardware layout complete]

EPIDERMAL PROTECTION MECHANISMS

Cooling Topology: Multi-stage TEC (Thermoelectric Cooler) cascaded with a recirculating water-glycol loop and forced-air heat exchanger. Skin-contact sapphire window is maintained at +4°C to +6°C continuously during active

treatment pulses.

Safety Interlock Circuitry: Dual-channel, fault-tolerant design. Contact sensor (capacitive plus thermal) on handpiece must verify full skin contact before enabling laser emission. Pulse termination within 50ms if contact broken.

[IMAGE_2 reference point for safety mechanism description]

TREATMENT ADVANTAGES

- Adipocyte Apoptosis Induction: 808nm wavelength preferentially absorbed by adipose tissue, creating transient pores in cell membrane leading to lipid release and subsequent macrophage clearance.
- Painless Protocol: Sapphire contact cooling eliminates thermal nociception, enabling higher fluence (up to 120 J/cm ² per session) without topical anesthetic.
- No Downtime: Non-ablative mechanism preserves epidermal integrity. Patients resume normal activity immediately post-treatment.
- Synergistic Multi-Wavelength Option (Optional XL package): 755nm for superficial adipocytes + 1064nm for deeper fibrous fat compartments.

SPECIFICATION MATRIX

Parameter	Specification
Laser Type / Wavelength	Diode Laser; 808nm standard (optional 755nm + 1064nm)
Peak Output Power	Up to 200W per handpiece (2 handpieces standard)
Fluence Range (Per Session)	20 - 120 J/cm² (software limited by skin type)
Spot Size	15mm x 15mm square (homogenized)
Pulse Width	Continuous contact mode with thermal dwell; no discrete pulses
Cooling System	TEC + Sapphire contact + Recirculating water + Fan (Skin temp < 6°C)
Handpiece Weight	350g (ergonomic, lightweight design)
Display	10.4" TFT-LCD resistive touchscreen, 1024x768 resolution
Power Supply	110-240V AC, 50/60Hz, 1500VA maximum consumption
Dimensions (Main Unit)	450mm (W) x 550mm (D) x 1050mm (H)
Weight (Main Unit)	42 kg (92.6 lbs) without packaging

REGULATORY COMPLIANCE

Medical Device Directives: Compliant with MDD 93/42/EEC as amended by 2007/47/EC, CE 0476.

Electrical Safety: IEC 60601-1 (3.1 Edition), IEC 60601-2-22 (Particular requirements for laser equipment).

Laser Safety: Class 4 laser product per IEC 60825-1:2014. Includes key-switch, emission delay, and audible/visual ready indicators.

Quality System: Manufactured under ISO 13485:2016 certified facility.

Environmental: RoHS 3 (2015/863/EU) and WEEE compliant.

CLINICAL ENVIRONMENT INTEGRATION

Room Requirements: Ambient temperature 18°C - 25°C, relative humidity 30% - 70% non-condensing. Dedicated 16A circuit (depending on regional power variant). Floor space > 2.5m x 2.5m to allow full articulation of arm. No special shielding required. Standard medical-grade anti-static flooring recommended.