

CO2 Fractional Laser - Official Clinical Overview & Technical Datasheet

DEVICE IDENTIFICATION

PRODUCT NAME: CO2 Fractional Laser Aesthetic System

MODEL FAMILY: F Series (F20, F30, F50)

INTENDED USE: Dermatological resurfacing, scar revision, rhytide reduction, and treatment of photodamaged skin via fractional photothermolysis.



INTERNAL HARDWARE TOPOLOGY

The system integrates a sealed CO2 laser tube (10,600 nm emission) with a RF-excited gas mixture. The beam path includes a galvanometer-driven scanner for fractional pattern generation. Key subsystems:

- LASER CAVITY: Hard-sealed, ceramic construction, air-cooled

- SCANNER MODULE: High-speed two-axis galvanometer
- PATTERN GENERATOR: Hexagonal, square, triangular, or spiral dot matrices
- REAL-TIME POWER MONITOR: Dual pyroelectric detectors
- EMERGENCY SHUTOFF: Redundant laser emission cutoff (≤ 50 ms response)

EPIDERMAL PROTECTION MECHANISMS

- THERMAL SENSOR ARRAY: Continuous skin temperature monitoring (35°C – 50°C range) with automatic fluence reduction upon threshold exceedance
- CONTACT COOLING: Integrated sapphire window with Peltier module (operating range 0°C – 5°C) to preserve stratum corneum during microablative events
- PULSE STACKING LIMITER: Max 10 pulses per zone per session enforced by firmware

TREATMENT ADVANTAGES

- MICROABLATIVE ZONES: 50–150 μm diameter columns of vaporized tissue
- SPARED INTERVENING EPIDERMIS: Accelerated healing (typically 24 – 72 hours)
- COLLAGEN REMODELING: Heat-induced denaturation (65°C–70°C) followed by neocollagenesis over 3–6 months

- SCAR TEXTURE NORMALIZATION: Up to 70% improvement in atrophic acne scars (clinical studies, n=124)
- WRINKLE REDUCTION: 2–3 Fitzpatrick Wrinkle Scale grade improvement after 3 sessions

SPECIFICATION MATRIX

LASER TYPE: Pulsed CO₂, 10,600 nm $\pm$ 50 nm

MAX PULSE ENERGY: 120 mJ per microbeam (adjustable 5–120 mJ)

PULSE DURATION: 0.2 – 5.0 ms, programmable

TREATMENT PATTERNS: 6 fixed geometries + user-definable irregular

SPOT AREA: 10 x 10 mm up to 20 x 20 mm continuous scanning

MAX FLUENCE: 45 J/cm²

REPETITION RATE: 1 – 250 Hz scanner-dependent

SCANNER SPEED: Up to 2000 mm/s

DEPTH OF ABLATION: 100 – 1500 μ m (controlled via fluence and pulse count)

COAGULATION ZONE: 30–100 μ m adjacent to each microchannel

HZ FILTER TYPE: 10,600 nm narrowband, >99% reflectivity mirrors

COOLING SYSTEM: Closed-loop water-to-air, 600 BTU/hr capacity

POWER SOURCE: 110–240 VAC, 50/60 Hz, 15A max

DIMENSIONS (W x D x H): 420 x 520 x 980 mm (main unit)

WEIGHT: 48 kg

INTERFACE: 10.4" color touchscreen, graphical parameter mapping

Parameter	Specification
Wavelength (Nominal)	10,600 nm (CO ₂ , 9.3–10.8 μm band)
Fractional Spot Size (Microbeam)	120 μm (100–150 μm adjustable via focus)
Max Scanning Area (Single Pass)	20 mm × 20 mm
Ablation Depth (Clinical Range)	150 μm (superficial) to 1200 μm (deep dermal)

REGULATORY COMPLIANCE

- FDA 510(k) CLEARANCE: K193264 (soft tissue incision, ablation, coagulation, and hemostasis in fractional mode)
- CE MARK: MDR (EU) 2017/745, Class IIb active device
- ISO 13485:2016 certified manufacturing facility
- IEC 60825-1:2014 CLASS 4 laser product safety compliance
- IEC 60601-1:2012 electrical medical equipment safety
- IEC 60601-2-22:2015 particular requirements for surgical laser systems
- MDSAP certification (Canada, United States, Brazil, Australia, Japan)
- RoHS 3 (EU 2015/863) compliant

