Laser, Ophthalmic

**Health problem addressed**

Devices used to coagulate abnormal vascular tissue in the retina. Proliferation of such tissue (diabetic retinopathy) may lead to blindness. They may create highly localized perforations in the iris or in the trabecular meshwork to relieve excessive intraocular pressure (glaucoma). They can also be used to reshape the cornea to correct vision problems.

**Product description**

Most ophthalmic laser systems consist of a laser module—a laser medium, laser pump, laser cavity, and cooling system that is typically coupled to a slit-lamp biomicroscope by a flexible fiberoptic cable. Other laser-energy delivery systems include indirect ophthalmoscopes, intraocular probes, and interfaces for operating microscopes.

**Principles of operation**

These devices are grouped into three main types: photocoagulating lasers, photodisrupting lasers, and photoablating lasers. Some ophthalmic lasers are also used for photodynamic therapy. For photocoagulation ophthalmologists use argon, dye, krypton, diode, and frequency-doubled Nd:YAG lasers to coagulate abnormal vascular tissue in the retina. Dye and diode lasers are being used in the photodynamic treatment of intraocular tumors. Q-switched Nd:YAG ophthalmic lasers are used for microsurgery in the anterior portions of the eye. Excimer lasers are used in phototherapeutic keratectomy to smooth over corneal scarring and remove calcification plaques, in photorefractive keratectomy to shape the cornea to correct myopia, and in automated lamellar keratoplasty to correct both myopia and hyperopia.

**Operating steps**

The ophthalmologist views the structures within the patient’s eye and aims and focuses the laser through the optics of the slit lamp; when the laser is fired, the energy is delivered through these optics or through coaxial optics.

**Reported problems**

Adverse outcomes include hemorrhage in and behind the retina, retinal membrane contraction, atrophy of the iris, corneal edema and neovascularization, loss of blue vision, changes in corneal epithelial cell density, and increased intraocular pressure. Using an Nd:YAG laser in the presence of an IOL can pit the lens, affecting visual acuity.

**Use and maintenance**

User(s): Surgeon

Maintenance: Medical staff; technician; biomedical or clinical engineer

Training: Initial training by manufacturer and manuals; supervised training with experienced surgeons

**Environment of use**

Settings of use: Hospital; clinic

Requirements: Stable power source

**Product specifications**

Approx. dimensions (mm): 130 x 220 x 250

Approx. weight (kg): 47

Consumables: NA

Price range (USD): 75,000

Typical product life time (years): 7

Shelf life (consumables): NA

**Types and variations**

With integrated slit lamp; without integrated slit lamp