



## Polarean 9600

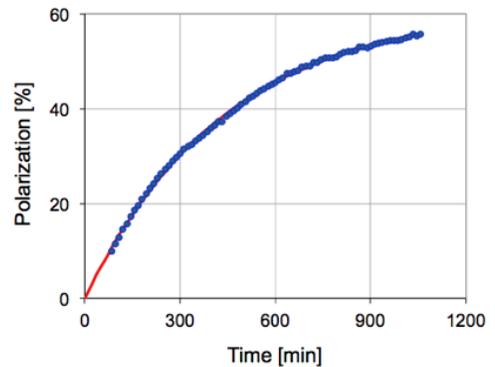
<sup>3</sup>He Hyperpolarizer



The 9600 <sup>3</sup>He hyperpolarizer provides a routine supply of high-purity, hyperpolarized <sup>3</sup>He for gas phase magnetic resonance studies. The polarizer is typically installed near the MRI/NMR suite and processes a custom mixture of unpolarized <sup>3</sup>He and N<sub>2</sub>, into one or more doses of pure hyperpolarized <sup>3</sup>He that is available for magnetic resonance studies. There is no chemical change associated with hyperpolarization—only nuclear spin alignment. The hyperpolarized <sup>3</sup>He is then thawed and dispensed into a container or bag. Once dispensed into an appropriate container, and maintained within a modest holding magnetic field, the polarization relaxes with a T<sub>1</sub> of 1-2 hr.

### System Overview and Specifications

The 9600 Helium Hyperpolarization system can be operated on site by personnel who have undergone appropriate training. Polarization levels range from 25-55% depending on the processing speed and optical cell quality. A typical <sup>3</sup>He volume of 1-liter can be polarized in 4-12 hrs. The system operates as a Class I laser, and thus requires no laser protective eyewear during normal operation.



**Note:** The 9600 Helium Hyperpolarization system is designed for research use. If the system is used to produce hyperpolarized <sup>3</sup>He for human inhalation, all applicable institutional and federal approvals must be obtained.

### System Components

- Polarizer cart, compatible with either  $^3\text{He}$  or  $^{129}\text{Xe}$  cartridges
- $^3\text{He}$  hyperpolarization cartridge
- 795nm optical pumping laser in Class I housing
- Circular polarizing and beam collimating optics
- On-board  $^3\text{He}$  polarization measurement
- Pressure readings at all key process points
- Precision regulator for  $^3\text{He}$  filling
- Vacuum Pump/Purge to prepare delivery vessel
- Shielded optical oven with temperature control
- Aluminosilicate optical cell containing Rb metal
- Laser Transmission and Spectral Diagnostics
- Safety Interlocks
- Power Distribution

### Safety Features

- Filtered power distribution
- Air flow interlocks
- Interlocked protective laser housing for Class I operation
- CE Mark, UL and CSA approval
- DOT approved shipping of replacement optical cells

### Optional Equipment and Services

- Polarization measurement station with absolute calibration for  $^3\text{He}$  and  $^{129}\text{Xe}$
- $^{129}\text{Xe}$  hyperpolarization cartridge
- DOT-approved shipping of replacement optical cells
- $^{129}\text{Xe}$  cylinder manifold for connecting xenon mixture, UHP  $\text{N}_2$ , and commercial  $\text{N}_2$  tanks
- Dose mixing syringe
- Thermal  $^3\text{He}$  QA phantom
- On-site installation and training
- Training services at Polarean
- Regulatory affairs support

### Polarizer Dimensions

- 170cm L x 60cm W x 160cm H (65" L x 24" W x 60" H)

### Laboratory Space Requirements

- Controlled space capable of temporary Class IV laser operations
- Minimum room dimensions:
  - width 120" (3m)
  - depth 84" (2m)
  - height 84" (2m)
- Ferrous materials to be at least 3' (1m) away from the polarizer
- Local ambient magnetic field preferably less than 1 Gauss

### Electrical Requirements

- 3 phase 208 V, 47-63 Hz, 20 A per phase
- Power outlet: US NEMA L21-30R
- Lockable isolate box

### Compressed Air

- 20 psig (1.5 bar) minimum pressure
- 4 standard cubic feet per minute (110 L/min) minimal flow
- 0.01% water maximal content

### Environmental Requirements

- 5 kW maximal power load
- Room temperature between 68-75 °F (20-24 °C)
- Dedicated temperature control

### Supplies and Consumables

- Internal  $^3\text{He}/\text{N}_2$  cylinder
- External UHP  $\text{N}_2$  tank
- Dose delivery bags