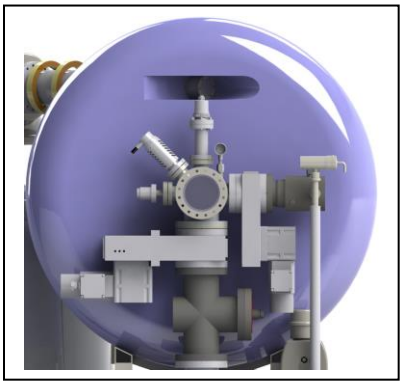
Sorlox Corporation
Isotope Production

Sorlox Deuterium Cell

Model: IP-SDC 100

Data Sheet



Overview

The Sorlox Deuterium Cell, model IP-SDC 100 is a multi-particle pulsed plasma device designed for use in the production of radioisotopes. Our technology enables the production of neutron-rich and neutron-depleted isotopes using a single machine.

The IP-SDC 100 will enable your facility to meet the needs for clinical studies, research, and regional distribution, if desired. The innovative approach to production will certainly have an impact on current and future planning for PET, TAT, in VIVO, and others.

The PET isotopes than can be produced by the IP-SDC 100 include Copper-64, as well as a number of other target generated specialty isotopes.

The production of Helium-3 is a by-product of our process.

Primary Benefits

Expanded Capabilities

The innovative approach of the IP-SDC 100 for isotope production provides additional capabilities previously not available within the industry using a single machine.

A single IP-SDC 100 machine will generate both neutron-rich and neutron-depleted isotopes to be used in multi-disciplinary procedures.

Direct Access

The IP-SDC 100 is configured for a target system positioned in the centroid of the beam. This allows researchers and scientist a very simple mechanical interface for a wide variety of projects or experiments.

Configurable

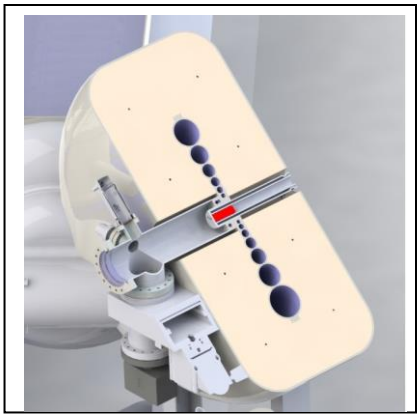
The IP-SDC 100 manages the process based on the activity required. A configurable interface uses stored data or new parameters to achieve the desired results.

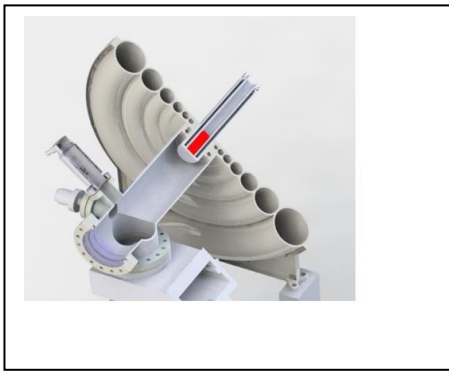
Automation

The IP-SDC 100 will optimize and monitor the activation process based on the parameters entered. This information is available to the user and remote management interface continuously.

Obsolescence

Commercial components are used throughout to minimize future issues.





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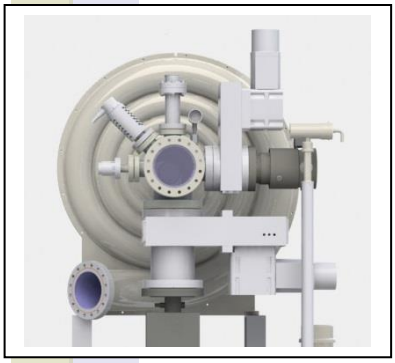
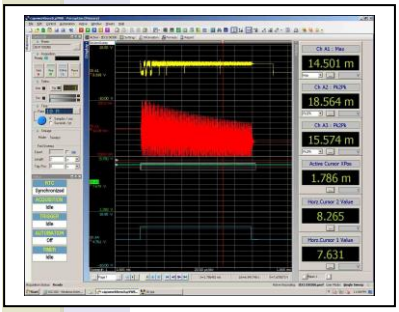
System Operation



IP-SDC 100

SDC Casting



User Interface

In Vivo molecular imaging provides sensitive, quantitative imaging of fluorescent, luminescent and radioisotopic labels.

TAT has the advantage of delivering therapeutic doses to individual cancer cells while reducing the dose to normal tissues.

The IP-SDC 100 generates particles by igniting deuterium gas within a plasma structure. Particles from this process are directed to the target material for isotope production.

The optimum scale for the IP-SDC 100 came from an extensive parameter studies and prototype testing.

Our system incorporates and utilizes several known existing techniques, magnetized target fusion (MTF), field reversed configuration (FRC), and compact toroid (CT) generation.

The IP- series designation represents the Isotope Production application of Sorlox technology.

Targets and experiments are isolated in the non-vacuum section of the beam origin. The vacuum section of the SDC contains a magnet, RF drive, compressor, pumps, diagnostics, and a gas delivery system.

The IP-SDC 100 is a repetitive pulsed system with automatic exhaust-capture operations performed between each pulse.

Components

Vacuum System

Turbo-molecular & ion/getter pumps.

Magnet

Optimized for generation of the compact toroid (CT) plasma.

RF Drive

Fined tuned to the CT for a given density number at factory check-out.

Compressor

Our primary innovation is the use of a spiral-walled chamber (a nautilus) for the compression of the CT, increasing the plasma density and temperatures as it travels inward.

Diagnostics

A wide variety of redundant instrumentation is provided for systems monitoring and calibration.

Control System

Rack mountable controllers with a data acquisition system continuously monitor all parameters in operation. User interface is accomplished through remote local commands or remote supervisory monitoring.

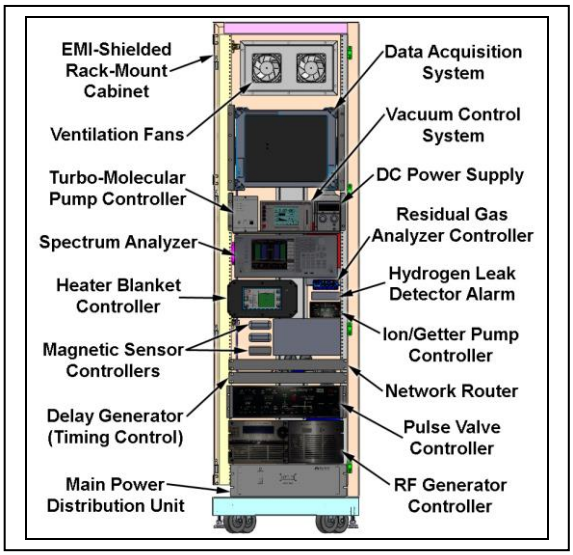
Power Supply

Pulse Power

Delivers current to form the CT. See site requirements next page.

Ejector

Delivers current to accelerate the CT entering the compressor. See site requirements next page.



Control System

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Performance

Conventional Radioisotopes		Specialty Radioisotopes	
Irradiation of standard target for 1 hour	Activity in mCi	Irradiation of standard target for 1 hour	Activity in mCi
Molybdenum-99	745	Actinium-225	900
Samarium-153	679	Copper-64	8,218
Rhenium-186	909	Copper-67	8,900
Rhenium-188	501	Sn-117m	1,300
Holmium-166	34	Zirconium-89	2,700

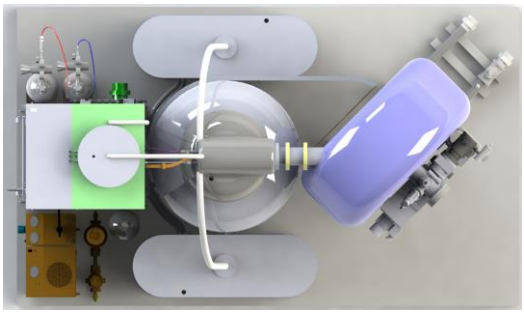
Beam Properties

Based on (6) pulses per minute
Neutrons 2.4 MeV and 14 MeV
Protons 3 MeV and 14.6 MeV
Protons 74 keV using Hydrogen
X-rays up to 119 keV
Photons 4 THz in broadband synchrotron light
Neutron-Flux per pulse 1.0 x 10^{15} cm^{-2}
Pulse Duration 9.5 milliseconds

Front View

Site Requirements

System Dimensions	Power Consumption
IP-SDC 100	14 kW Operating Mode
Width 282 cm (111 in)	0.9 kW Standby Mode
Depth 168 cm (66 in)	**Cooling Circuit**
Height 221 cm (87 in)	30 kW heat load
Weight 4,000 kg (8,800 lbs)	44 liters per minute or (12 gpm) flow rate



Top View

Design Life Cycle

The Sorlox Deuterium Cell (SDC) offers instant access to the latest science behind Magnetized Target Fusion (MTF). Its compact design offers benefits in facility sizing and minimal shielding requirements for operations.

Organizations considering ventures into fusion research and testing can now focus on the application versus the science. Given the features and ease of access to the SDC, customers can conduct operations with little to no plasma background.

Improving upon previous technologies contributed to the overall robust design and was a key factor for our success on this design.

Decades of development from researchers all over the world have lead us to this point.

Please visit our site www.sorlox.com

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