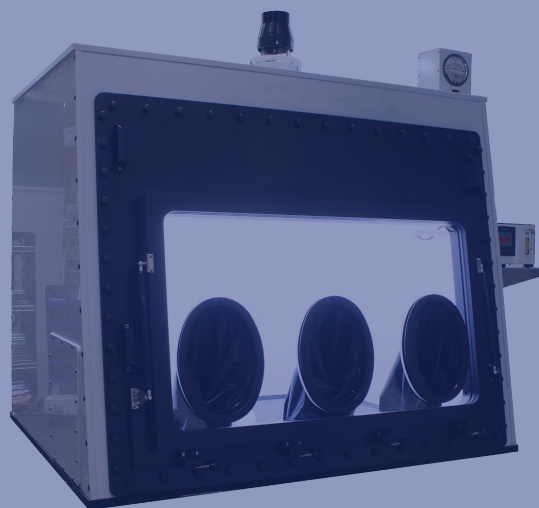




PCS
PROCESS CONTROL SOLUTIONS



CASE STUDY

Custom Flow Sciences Glove Box:

Purge Glove Box to Enclose Bruker SamplePro Robot

Situation:

During chemical purification and analysis, residual water content in compounds was leading to lower-quality nuclear magnetic resonance (NMR) results and unnecessary waste of high-value sample material. To preserve these precious samples and enhance analytical performance, the team required a more controlled environment during sample preparation. A custom Flow Sciences Nitrogenema II nitrogen purge glove box was developed to enclose the Bruker SamplePro Robot, creating a stable atmosphere that significantly improved NMR sensitivity and enabled further use of the same samples in subsequent experiments.

Problem:

While the Bruker SamplePro Robot included a built-in nitrogen purge for open sample preparations, its original enclosure lacked the sealing necessary to establish a true controlled atmosphere. As a result, ambient moisture continued to affect the sample quality, limiting the effectiveness of NMR analysis and causing material waste.

Solution:

To address this, Flow Sciences designed a custom glove box system that fully enclosed the Bruker SamplePro Robot, including clearance for its protective lift shield. The enclosure incorporated

safety interlocks and limit switches to ensure safe operation. A hinged, three-glove front panel allowed operator access while maintaining a gas-tight seal during use. For long-term serviceability, the unit also featured a removable top panel to support routine maintenance. An automated nitrogen controller maintained internal atmospheric conditions, using integrated oxygen and relative humidity sensors to ensure precise control. All electrical and utility connections were routed through Rextec cable glands on the rear panel, providing sealed access for power, signal, and drainage lines.

Conclusion:

Enclosing the Bruker SamplePro Robot within the sealed nitrogen atmosphere of the Flow Sciences Nitrogenema glove box reduced relative humidity levels to about 2% and O₂ to about 1%. Reducing the water content to this level increased NMR sensitivity and allowed these same samples to be used for further NMR experiments saving valuable material. The scientists can now analyze compounds using only tiny amounts of materials, saving resources and speeding up the development cycle.

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