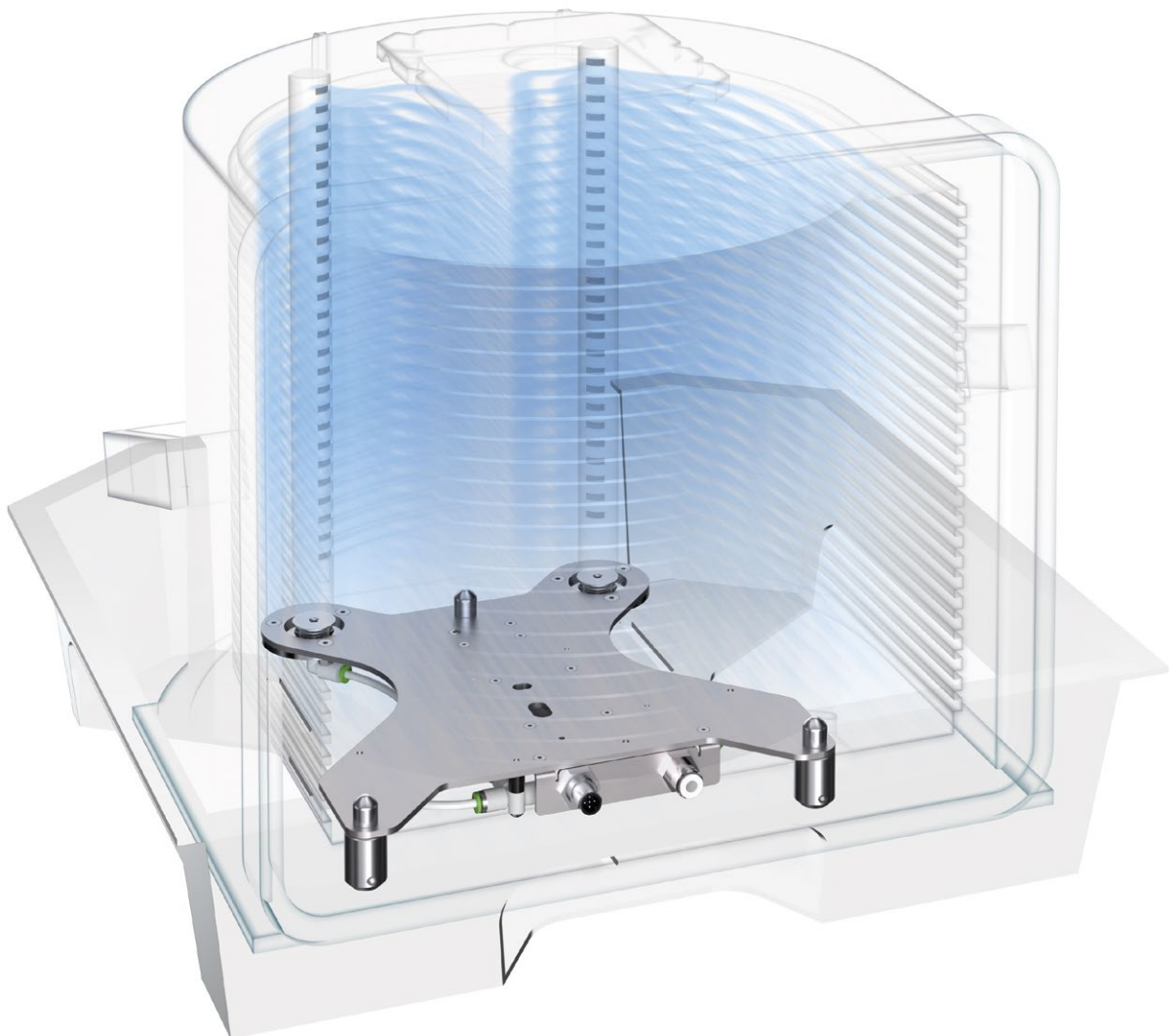# FOUP PURGE SYSTEM

Retrofitable inert gas purge system for FOUP storage bins

FOUP PURGE SYSTEM

Retrofitable inert gas purge system for FOUP storage bins

Semiconductor industry leading edge companies are developing and producing at process nodes of 28 nm and below. These smaller structures require a contamination and oxidation-free environment during production in order to exclude harmful influences like humiditiy, ambient oxygen or emission of molecules (airborne molecular contamination). These process related interactions may lead to surface defects and yield loss.

Especially while wafers stored in FOUPs are waiting for the next process step, the danger of these unwanted side reactions is very high. Our purge system **avoids oxidation and other chemical reactions** by purg-ing the FOUP with an inert gas during interim storage between two process steps. The system can be **easily retrofitted to existing storage bins** (e.g. Zero Footprint Storage) in cleanrooms. The advantage in this case versus the exclusive use of purgeable loadports, which can only flush the FOUP with gas during docked on process tools, is the **continuing supply of an inert gas** like nitrogen at any conceivable storage location by using an economical flowrate. This is triggered as soon as the FOUP is deposited and ends once it will be removed from the nest again. This reliably protects the wafers during the entire storage period.

General system design
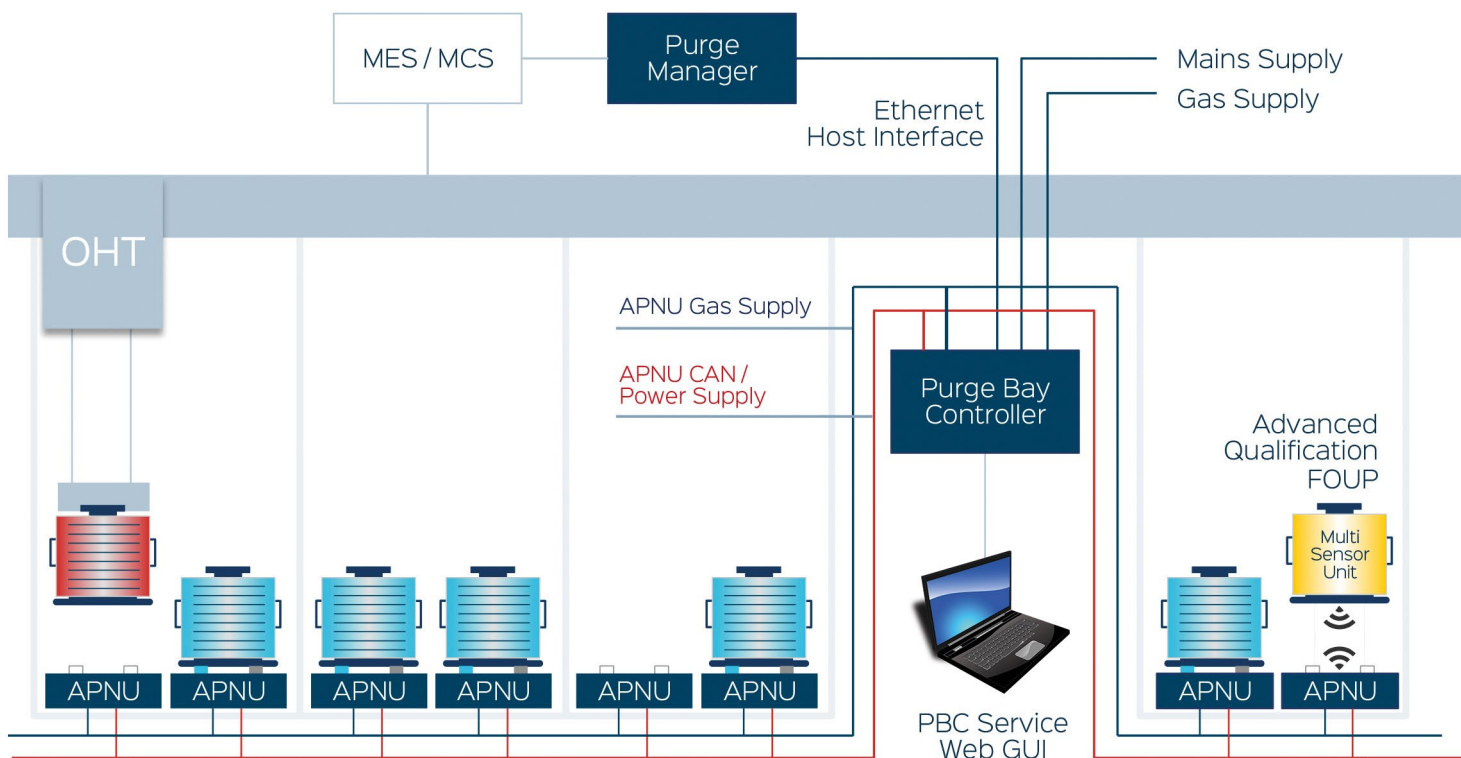
Application example for Zero Footprint Storage

The purge system consists of three main components:

- Advanced Purge Nest Unit (APNU)
- Purge Bay Controller (PBC)
- Purge Manager Software

Every Zero Footprint Storage bin can be retrofitted with an **Advanced Purge Nest Unit (APNU)** which is used to accommodate the purge inlet interfaces. They directly communicate via a combined CAN power bus wire with the **Purge Bay Controller (PBC)**. The PBC controls up to 108 APNU modules and is responsible for the communication to the **Purge Manager Software**. Each Purge Bay Controller has its own IP address for individual access with a Service GUI via a standard web browser and optional via HSMS.

Features

Easy to retrofit
- May be retrofitted on existing systems for FOUP storage (e.g. ZFS, stocker) without having to change the fab structure
- Installation during regular operations possible

Flexible installation
- APNU modules can be installed wherever necessary, in rows, isles or in a matrix
- Quick servicing possible

No additional footprint needed
- Purge nests are integrated into existing storage bins
- Slim, light & functional design

High purity operation
- Advanced purge interface design provide maximum pureness and durability
- Each APNU features its own particle filter

Intelligent software
- Every purge nest is individually monitored and controlled
- Sensors in the nest monitor the gas flow via back pressure and report errors
- Independent purge functionality for each nest, no gas spill / waste
- Interval purge functionality can set up via purge profiles
- Service GUI via web interface
- Continuous quality monitoring in combination with Advanced Qualification FOUP (optional)
- Lean and flexible control system based on embedded Linux
- HSMS interface based on SEMI E88 (optional)
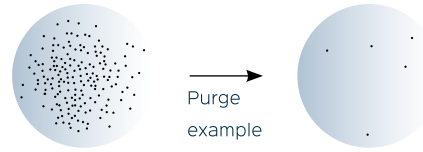
General characteristics
- Silent noise free purge operation on any condition
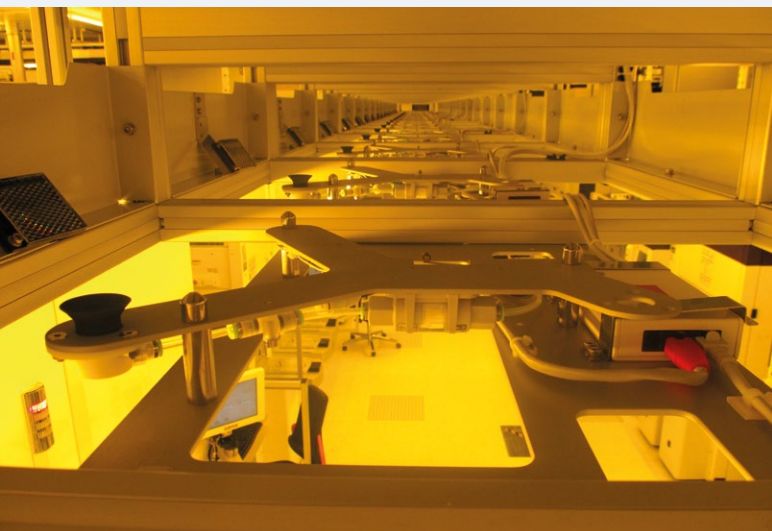
More than 7,000 FOUP purge bins already in operation (here: application example at GLOBALFOUNDRIES Dresden)

Benefits

- Avoids AMC (Airborne Molecular Contamination) and other chemical reactions

Purge example

- Allows extended queue time between process steps

| No Purge |
| Purge |

Queue time

- Improves overall process yield
- Minimized cost of ownership by optimized long term durability of all components

Technical data

Advanced Purge Nest Unit (APNU)	
Placement sensor	Optical LiDAR-TOF
Flow rate	3 slpm by default, divergent upon request
Supported FOUP types	Entegris Spectra (rear purge), others upon request
No. of interfaces	1 or 2, upon request
Pressure sensor	Software defined switch points detect multiple back-pressure ranges (e.g. low, good, high)
Weight	1 kg / 2.2 lb
Material (baseplate)	Anodized aluminium
Features	Multi LED status display, Qualification FOUP IR data link

| Purge Bay Controller (PBC)	
Amount of connectable APNUs	108
Communication uplink	Web GUI and HSMS (optional) via Ethernet
Operation system	Embedded Linux
Weight	6 kg / 13.2 lb
Material (case)	ABS plastic
Features	Web GUI provides overall pressure, flow and utilization monitoring

STORAGE
ZERO FOOTPRINT STOCKER
PURGE SYSTEMS
RFID RACKS

HANDLING
MOBILE ROBOTS
ROBOT CELLS
EFEMS

TRANSPORT
CONVEYOR SYSTEMS
AGVS / RGVS
PGVS
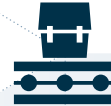
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