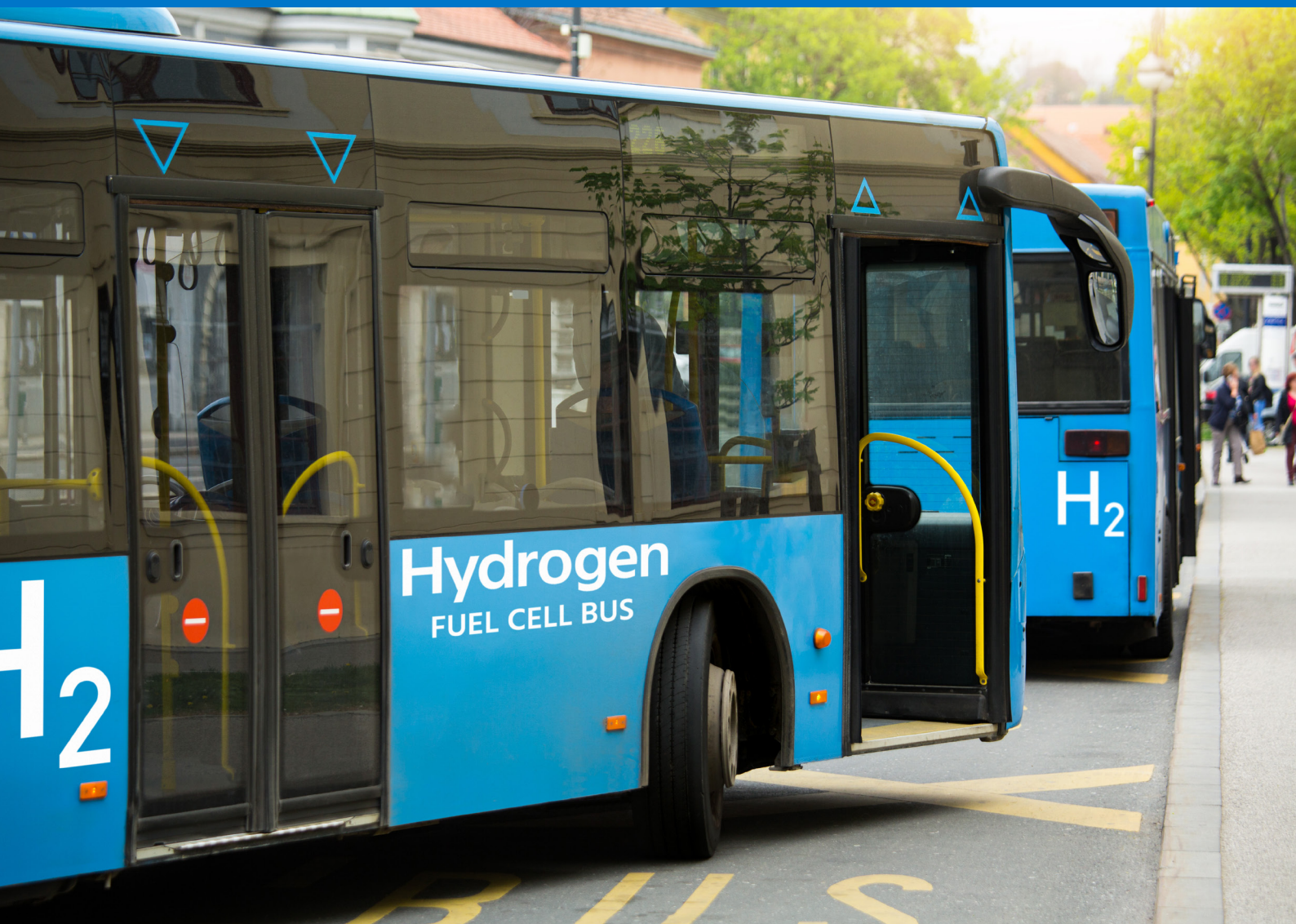
Donaldson
FILTRATION SOLUTIONS

Donaldson Solutions for **Hydrogen Fuel Cell Bus Applications**



Proven Filtration, Future Redefined

Hydrogen fuel cell technology is playing an increasingly pivotal role in the bus market as transit agencies worldwide seek sustainable and zero-emission solutions. Fuel cell electric buses (FCEBs) offer several advantages over traditional diesel buses and even battery electric buses making them an attractive option for modern public transportation systems.

Inner-city transit buses face a host of environmental challenges: air loaded with particulate matter, variable humidity levels, and unpredictable weather conditions. Achieving optimal performance in these rigorous conditions requires more than cutting-edge technology – it demands components designed for efficiency, durability, and reliability. Donaldson understands the unique design challenges faced and have developed advanced hydrogen fuel cell filtration solutions tailored to address them head-on.

Donaldson offers:

- Cathode air filters
- Hydrogen gas filters
- Water separators
- Coolant ion exchanger

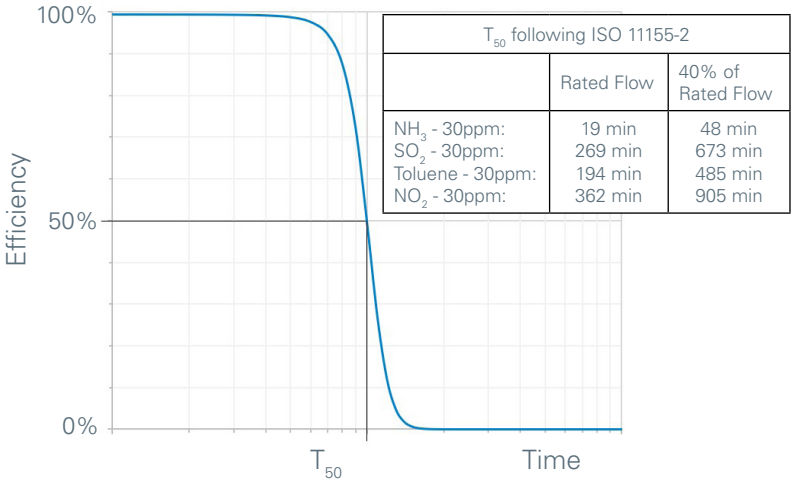
FC3
FUEL CELL CONTAMINATION CONTROL

8” & 9.5” Cathode Air Filters

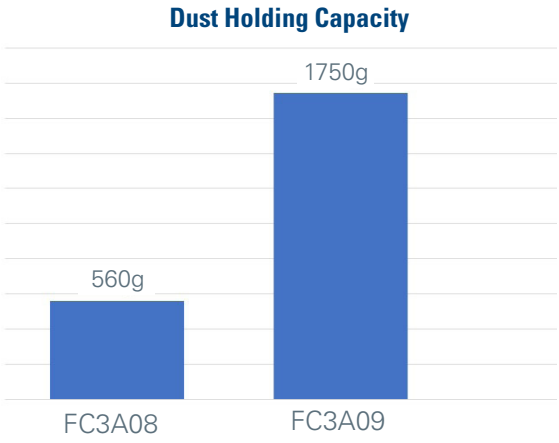
Model	FC3A08	FC3A09
Gross Power Fuel Cell	5 - 70 kW	60 -140 kW
Dimensions (D x L)	227 x 359 mm	267 x 433 mm
Absorption of	Ammonia (NH_3), Sulfur (SO_2) Nitrogen Oxide (NOx), Toluene and more	

- Compact and designed to simplify serviceability
- Additional filter sizes available
- Able to fit custom housings

Donaldson’s cathode air filter technology is engineered specifically for hydrogen PEM fuel cells, ensuring optimal airflow while removing harmful chemical pollutants and dust. Our filter elements go beyond particulate filtration and are capable of neutralizing acidic gases, base gases and volatile organic compounds.



T_{50} following ISO 11155-2		
	Rated Flow	40% of Rated Flow
NH_3 - 30ppm:	19 min	48 min
SO_2 - 30ppm:	269 min	673 min
Toluene - 30ppm:	194 min	485 min
NO_2 - 30ppm:	362 min	905 min



Hydrogen Gas Filters

High Pressure H_2 Filter Up to 420 Bar

Filter protects high pressure side of the gas fuel system from contamination by condensates, particles ingressed during refueling, particles generated by assembly, and wear particles in hydrogen. Housing available in aluminum, carbon steel or stainless steel.

Low Pressure H_2 Filter Up to 25 Bar

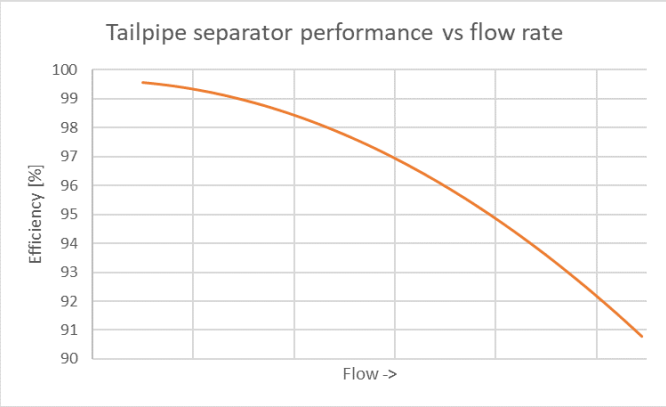
Filter safeguards fuel cell powertrain from performance reduction or poisoning by contaminants (liquid aerosols, solid particles, and optionally by poisonous gases). Housing available in aluminum or stainless steel.

Key Features:

- Off-the-shelf filters available in 8 sizes (diameter from 90 to 186 mm, length 159-404 mm)
- Suitable for compressed hydrogen flow rate from 4 to 160 kg/h (1 to 45 g/s)
- Low restriction due to pleated (large surface area) design of serviceable filter elements
- Liquid aerosols removal by coalescing, efficiency ISO 12500-1 ranging 90 to 99.9%
- Absolute (100%) solid aerosols removal efficiency ISO 12500-3 ranging from 0.5 to 3 um
- Removal of poisoning gases by adsorption testing by ISO 11155-2 specific method
- Internal testing following ISO 19887-1 “Fuel system components for hydrogen-fueled vehicle”

Water Separator

Donaldson's tailpipe water separator solution is designed to remove liquid condensed water from the vehicle tailpipe. This allows for efficient water management of the fuel cell vehicle, making it ideal for fuel cell buses operating in challenging environment.



Key Features:

- Operating temperature: Up to 95°C
- Compact and modular design to remove liquid droplets from the gas stream
- Controlled discharge of water generated by hydrogen fuel cell
- Optionally with integrated water reservoir
- Potential of adding noise reduction
- Potential to filter out any residue PFAS from water with additional filter

Coolant Ion Exchanger

Our advanced coolant ion exchanger is engineered for efficient serviceability, featuring a toolless design that allows access from both the top and bottom. With high ion capacity, it is optimized to align service intervals with other components, reducing the frequency of maintenance. The low-pressure-drop design eliminates the need for a coolant bypass loop, simplifying system architecture and reducing the number of components. This integration-friendly solution enhances reliability while minimizing complexity.

Key Features:

- Effectively removes free ions from the coolant to keep electric conductivity low
- High Ion capacity
- Designed for easy and clean servicing in the field, with no spillage
- Tailored specifically for fuel cell applications
- Prevents large particles from blocking channels in the bipolar plates, safeguarding the fuel cell system

Technical Specifications:

- Design: Cartridge style, serviceable
- Compatibility: Suitable for glycol-based fuel cell coolant liquids

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