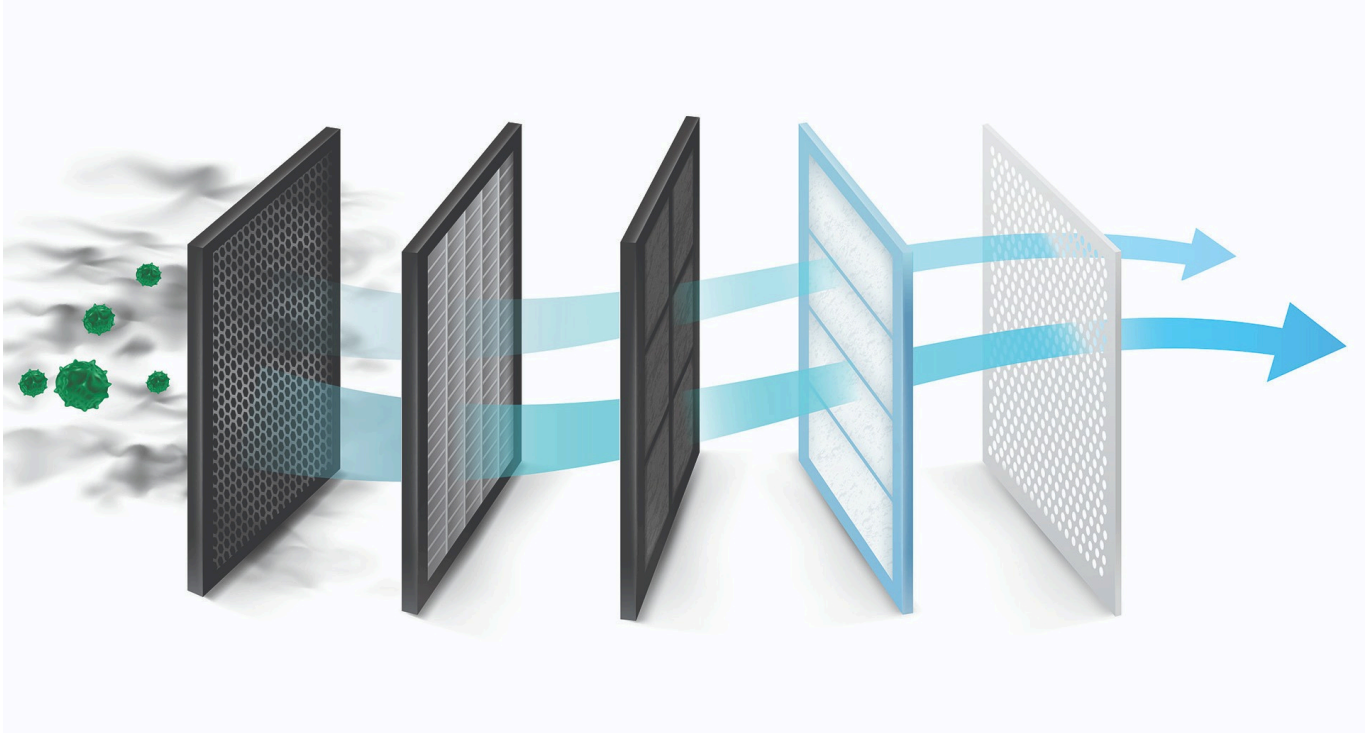


TECH OFFER

Dilution Air Processing Unit for Reduced Transmission of Airborne Infectious Diseases



KEY INFORMATION

TECHNOLOGY CATEGORY:

Green Building - Heating, Ventilation & Air-conditioning
Sustainability - Sustainable Living

TECHNOLOGY READINESS LEVEL (TRL): TRL6

COUNTRY: SINGAPORE

ID NUMBER: TO174153

OVERVIEW

The Dilution Air Processing Unit (DAPU) is an ideal solution for small and medium businesses to prepare themselves for the Covid-19 new normal by employing an enhanced air ventilation technique. The DAPU system allows the creation of zones (e.g. sickbays, waiting rooms, etc.) within workplaces with no recirculation of air. This prevents cross-contamination of unclean air in between the zones. This solution is suitable for hotels and other premises to be used for quarantine purposes.

The DAPU consists of the following key features:

- Provides 100% fresh air supply with no recirculation
- Reduces airborne particles exposure by greater than 60%
- Achieves 25% energy efficiency in providing 100% fresh air supply as compared to conventional systems
- Uses fully portable modular approach
- Can be easily retrofitted to any existing air-conditioning system resulting in lower implementation cost

The DAPU can also be deployed in any area without an existing air-conditioning system making it highly versatile.

TECHNOLOGY FEATURES & SPECIFICATIONS

Key design advantages:

- A portable and modular design suitable for any area, even those without an existing Air conditioning system.
- Air Change Rate per Hour (ACH) of 40 for dilution, which means it is able to perform air change every 1.5 min for an entire room volume in contrast to the nominal 5 to 6 mins by conventional systems.
- 100% air change per room volume by fresh air in contrast to the nominal 25% to 30% using traditional mixed ventilation.
- The modular design feature makes it unique and versatile. The system is suitable for various operating modes bypassing intermediate devices. This allows for the adjustment of nominal operating conditions during post-pandemic situation.

Key Performance advantages:

- Achieved 27.7% (target: 25+/-5%) energy efficiency improvements in building HVAC in comparison to conventional approach for achieving 100% fresh air supply.
- Actual measurements showed that there was a 30% reduction (target: 20%+/-5%) of cumulative concentration of airborne particles (greater than 0.3 μm and less than 1 μm). This is in comparison to conventional room air conditioner without fresh air.
- The use of the novel Bio antibody filter has reduced the airborne exposure of the occupants within the test chamber. There was a reduction of 45% of PM 1.0 particle concentration in the absence of fresh air.
- With the availability of both 100% fresh air and the Bio antibody filter, airborne exposure of the occupants is further reduced by greater than 60%.

POTENTIAL APPLICATIONS

DAPU is an innovative solution for enhanced ventilation and reduced transmission of airborne infectious diseases. Its aim is to offer an easily implementable and low-cost solution for 100% fresh air supply to buildings in curbing infections during a pandemic. The system has 25% less energy consumption in comparison to conventional options and maintains the optimum humidity range at 45% to 55%. The modular design feature makes it unique and can be easily retrofitted to buildings. DAPU achieves 60% reduction of integrated airborne particle concentration in comparison to ordinary air-conditioners (with 100% recirculation).

DAPU could be an ideal solution when it comes to the creation of isolation zones within buildings to curb the spread of infectious diseases. This can play a vital role in safeguarding public health and ensuring global health security.

Examples of practical applications are as follows:

- Isolation rooms in hospitals
- Sick Bays in campus or business places
- Swab stations
- Waiting rooms

MARKET TRENDS & OPPORTUNITIES

The DAPU technology demonstrates the innovative strategy in improving the capabilities of existing solutions and applying novel concepts to a very challenging situation such as pandemic control. The estimated market size for this technology could be largely due to its sustainable approach in meeting the demands for an expanding healthcare facility in the future.

UNIQUE VALUE PROPOSITION

For pandemic control, DAPU can be operated indoor for the test chamber with 1 patient and 1 attending nurse/staff. This setup has a simple payback of less than 2 years. However, for high usage areas such as swab test stations in airports or conference venues, simple payback is expected to be less than a year.

The business case for DAPU can only be properly articulated after this solution has been deployed in an actual situation and feedback obtained from stakeholders. This will ensure the integrity of the information provided and improvements to be made to ensure wider adoption of the system by other companies.