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CLEAN[AIR]

**MERAK AIR TREATMENT TECHNOLOGIES &
SOLUTIONS FOR SUSTAINABLE HEALTH AND
COMFORT ALL-ROUND**



-  **KNORR-BREMSE**
-  **NEW YORK AIR BRAKE**
-  **IFE**
-  **MERAK**
-  **MICROELETTRICA**
-  **SELECTRON**
-  **KIEPE ELECTRIC**
-  **EVAC**
-  **ZELISKO**
-  **RAILSERVICES**

Cool Passion, All-Round

Travel now as carefree as you traveled before; Merak air conditioning systems provide the right environment for you. Clean air means health and therefore has become a matter of trust for the industry.



Make it real with clean[air]

More than ever before, passengers demand a safe travel environment and a pleasant indoor climate.

Whether on urban metro trains operating in tropical surroundings, on long-distance coaches in freezing arctic winters. For them it does not matter.

This is the background against which Merak is adapting and redesigning the conventional technologies to meet specific requirements of the railway sector in a highly innovative way.

The entire value chain from development to production and service

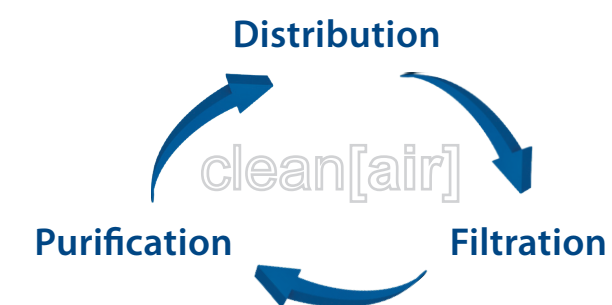
- More than 50 years of experience – worldwide
- On the spot on five continents
- More than 100.000 HVAC units successfully in operation

After thousands of hours of research and validation testing in a specific environment such as the railway, a new and effective purification technology is born: clean[air]

Not a coincidence. Merak was an early driver of the technological developments behind it. Now, they are also playing out their added value against SARS-CoV-2 and comparable pathogens.

Sustainable health & comfort all-round

Merak's patented clean[air] offers a proven solution to protect the health of passengers and train staff. It basically acts in three dimensions that can be deployed in a customized multi-layer strategy to combine short-term effectivity with sustainable long-term action.



1. Distribution

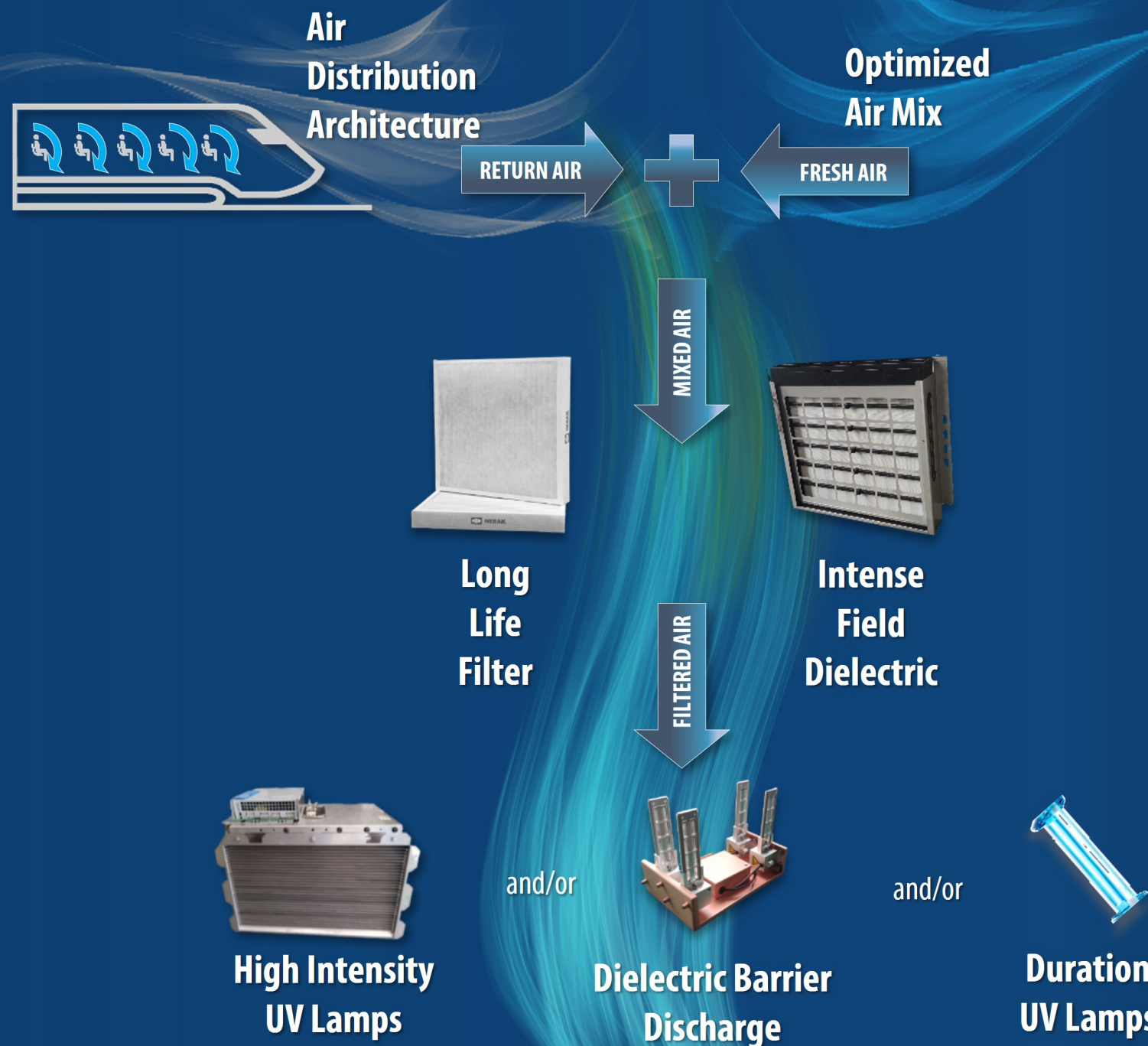
The optimum ratio of supply air and recirculated air significantly improves the air quality in trains. The systems prioritize vertical patterns, i.e. air injection from compartment ceilings and air suction from compartment floors. The vertical air flow minimizes the risks for passengers sitting or standing close together.

2. Filtration

Multi-stage, market-proven filters reliably separate particles and aerosols with an effectiveness similar to high-efficiency filters. Merak filters are both active and passive and their multilayer structure and electrostatic field retain microorganisms, bacteria, viruses and fungi.

3. Purification

Air purification completes the clean[air] concept to perfection: Pathogens are not only separated but also eliminated.



DISTRIBUTION

- **Optimized Air Mix:** Prioritizes fresh air during sanitation periods while maintain the thermal comfort.
- **Air Distribution Architecture:** avoids air circulation between passenger rows.

FILTRATION

- **Long Life Filter:** last up to 4 times longer than a standard filter with the same dimension.
- **Intense Field Dielectric:** thanks to the multilayer structure and the electrostatic field, it can retain even the smallest pathogen and dust particles with sizes between 0.3 and 2.5 μm .

PURIFICATION

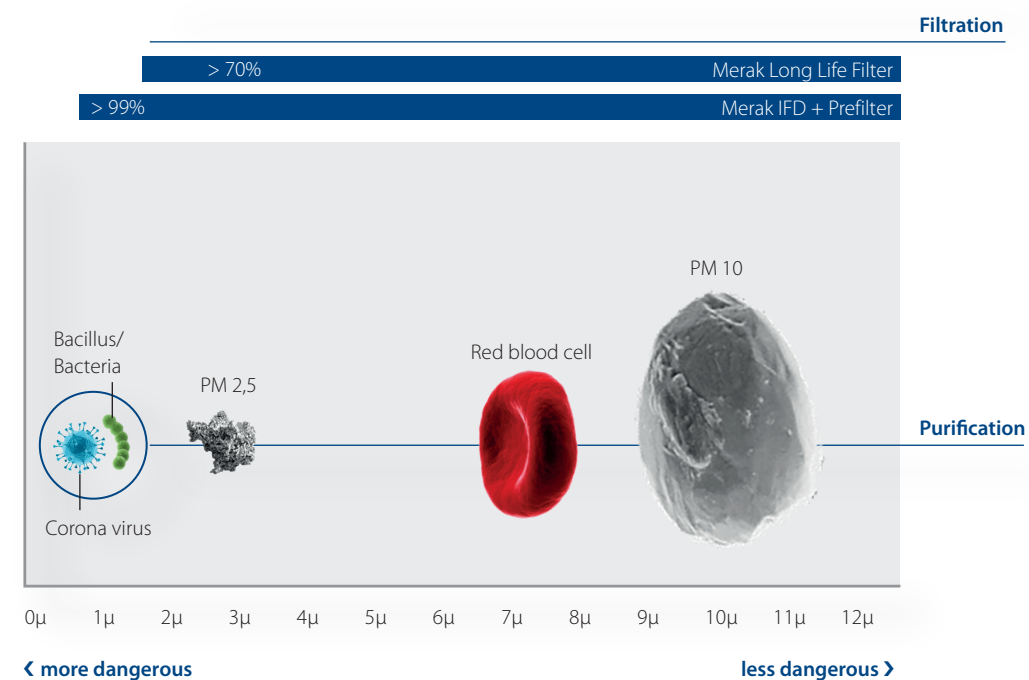
- **UV Lamps:** in the versions "High Intensity" and "Extended Exposure" irradiate the filters surface and air flow to kill viruses and bacteria.
- **Dielectric Barrier Discharge:** improves air quality by killing pathogens with an ionizing device.


Efficiency against particle size

The all-round principle of Merak air-conditioning systems also applies to pathogens. The most comprehensive added value is provided by the technologies in their combination.

By combining the **Intense Field Dielectric** and the **Long Life Filter**, up to 99 percent of pathogens with sizes between 0.3 and 2.5 μm are blocked.

For comparison: FFP2 protective masks reach about 95 percent.




<3 μm can deposit in the bronchia and reach bronchioles and alveoli.

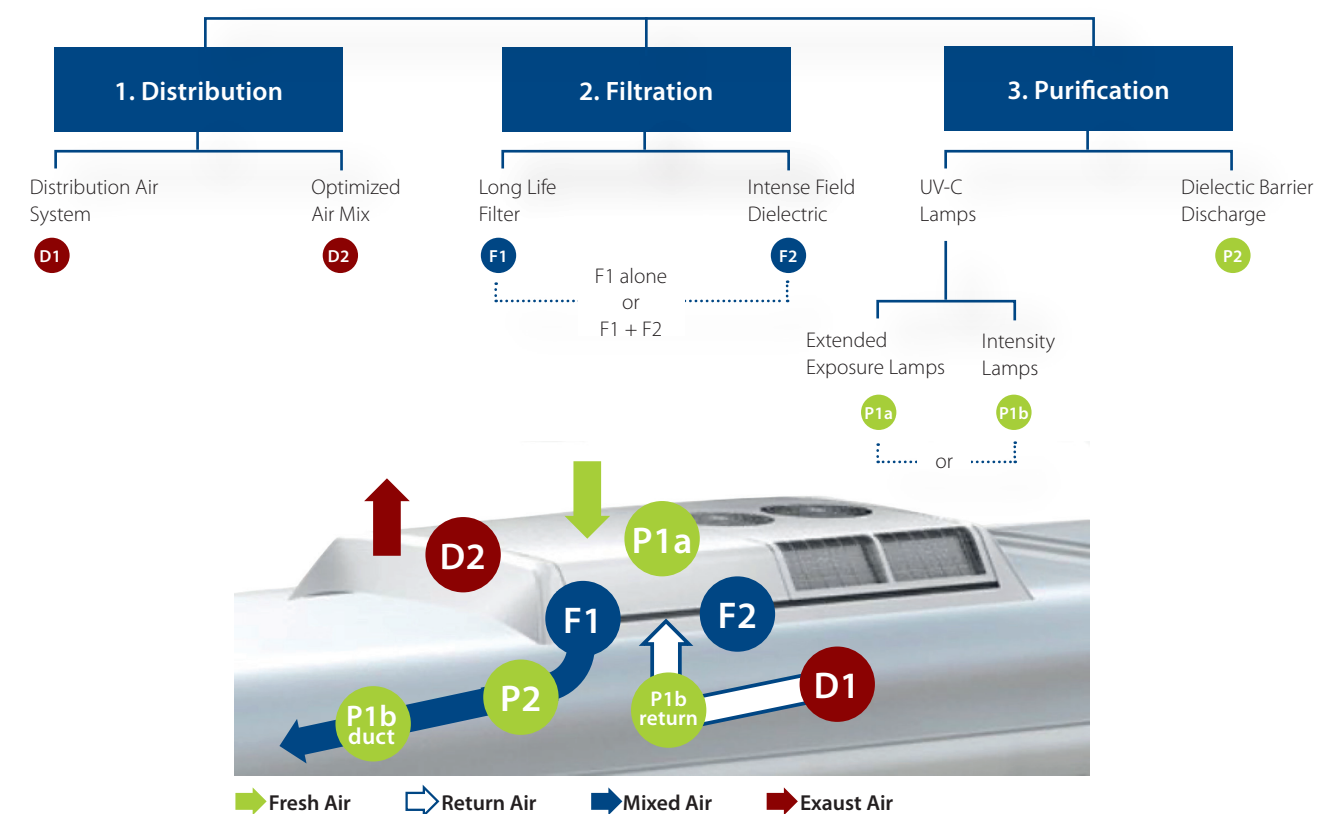
Between 3 and 5 μm can deposit in the trachea.

Between 5 and 10 μm can deposit in the nose and pharynx, causing irritation and inflammation.

> 10 μm can be filtered by the nose and aren't considered particularly dangerous.

The Clean[air]-architecture

Smartly designed and customized, the clean[air] concept can create an almost insurmountable obstacle even for the smallest pathogens.



ID	Solution	Location	Efficiency	Reference Samples	Picture
D1	Air Distribution System	Ducting System	Mid	Since 2006	
D2	Optimized Air Mix	HVAC	Mid	Since 2001	
F1	Long-Life Filter	HVAC / Duct	Mid	Since 2020	
F2	Intensive Field Dielectric	HVAC / Duct	High	Since 2020	
P1a	UV-C Extended Exposure Lamp	HVAC	High	Since 2008	
P1b	UV-C Intensity Lamp	HVAC	High	Since 2014	
P2	Dielectric Barrier Discharge	HVAC / Duct	High	Since 2020	