

# FOGMAKER

INTERNATIONAL AB

## Protect Lives and Equipment Fire Suppression for Electric Vehicles



Pure Performance with Triple Action

# Safety shouldn't be a Compromise

## THE CHALLENGE...

As alternative energy sources become more common, society must get used to new ways of thinking, and managing new risks. Electric Vehicles are not yet standardized and the designs differ between manufacturers, which means different vehicles have a variety of risk areas in different places. In addition, we don't know much about how the vehicles will age.

In battery-electric vehicles and machines, both thermal runaway and components can be fire initiators. Research presented at the 2023 FIVE conference shows 50-60% of EV fires never involve the battery itself, and the remaining 40-50% rarely start in the battery. The main reasons for battery fires are damage by collision and external fires.

Traditional fire instigators still remain, such as hydraulics, compressors, power steering, and heaters. In addition, EVs have high voltage connectors where corrosion can generate heat, there's a power inverter and other electronics, and a charging port that will wear with time.

## ...AND SOLUTION

Water-based solutions are considered the best option for lithium-ion fires, because of the cooling effect. Fogmaker works through preventing a fire from reaching the battery, and if a battery should catch fire, the Fogmaker system cools it and gives time to evacuate.

Fogmaker has decades of experience in detecting and suppressing fires, and the system will provide the best possible fire protection performance if there is an emergency.

The specially formulated water-based mist protects engines, hydraulic components, and similar at-risk areas. **The system is always active, fully automatic, and independent of electricity. It has a great cooling effect due to a long emptying time, and this prevents re-ignition.**

"From 870 °C to 136 °C in 10 seconds!"



+870 °C  
0 sec

5 sec

+136 °C  
10 sec

**Unique cooling effect vital for electric vehicles; temperature reduction of 734 °C in 10 seconds!**

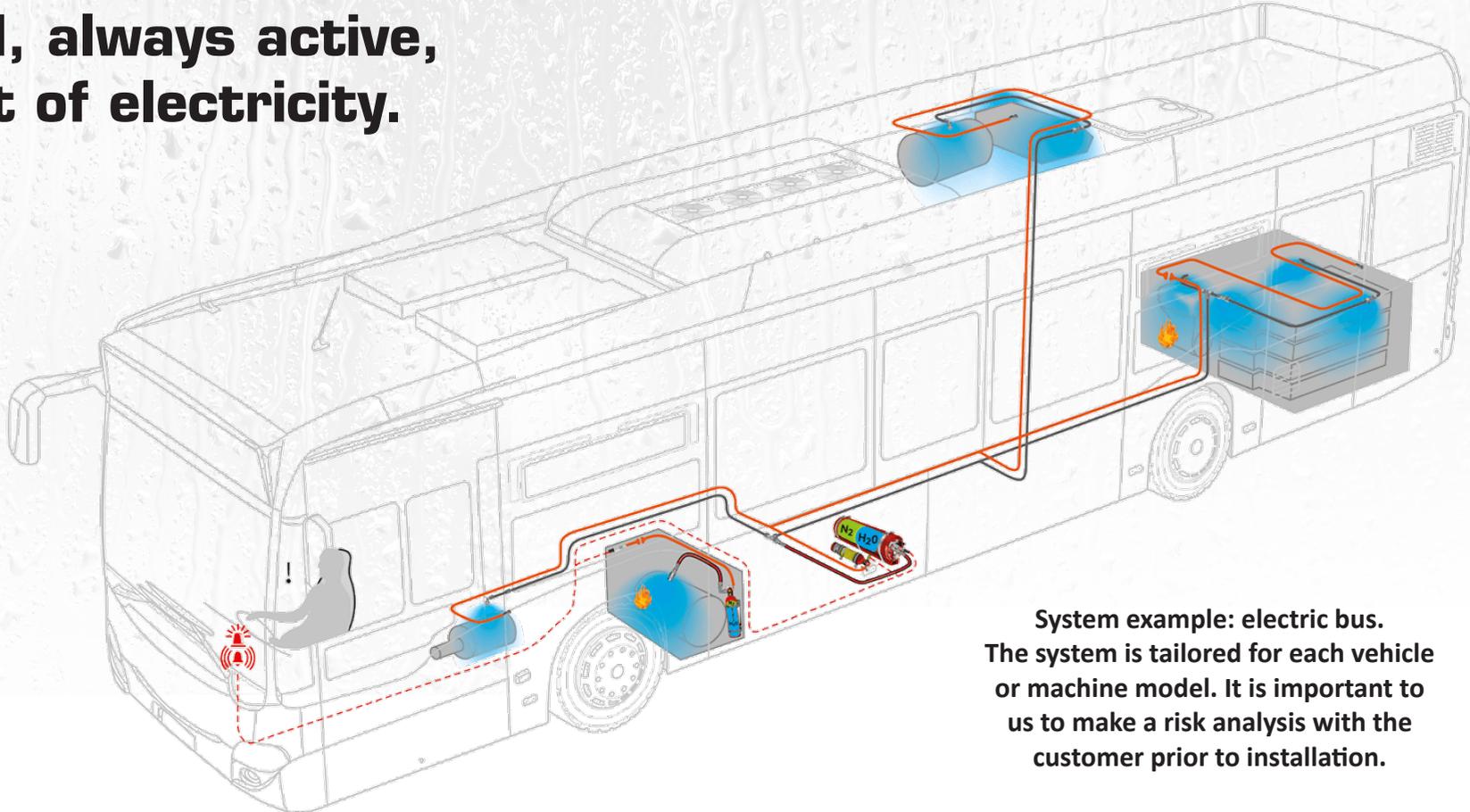
*Fire suppression test in a simulated engine compartment with a volume of 2,5 m<sup>3</sup>. The fire source consists of four 20 x 40 cm trays filled with diesel. Diesel spray is also applied at a rate of 2 liters per minute at a pressure of 5 bar. The heat effect reaches approximately 1,600kW. The pictures are taken with 2 second intervals. During the whole interval, 10 seconds, approximately 7 dl suppressant is used.*



# Fully automated, always active, and independent of electricity.

## Fogmaker Benefits

-  Choice between several piston accumulator sizes for greater flexibility.
-  Easy installation.
-  Simplicity – no power supply, position independent, and requires minimal space.
-  Triple Action<sup>3</sup> – attacks all three sides of the fire triangle.
-  Automatic engine shutdown (optional).
-  Great cooling effect and long emptying time, which prevent re-ignition and down-time.



**System example: electric bus.**  
 The system is tailored for each vehicle or machine model. It is important to us to make a risk analysis with the customer prior to installation.

-  System monitoring – activity, low pressure, and fire alarm.
-  Quality and environmental certifications. IATF-16949.
-  Global network via Certified partners.
-  Low Life Cycle Cost – annual inspection, 5 year service, 10 year service.
-  Free technical support.
-  Certified Partner and OEM training courses via Fogmaker Academy.



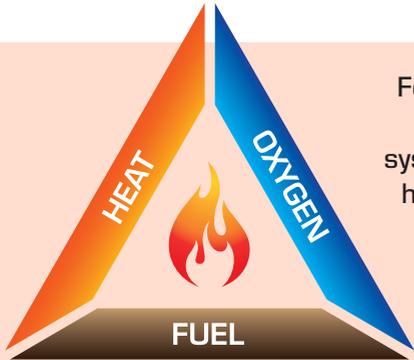
**WATER-BASED MIST**  
 Research shows water mist is the most efficient fire suppressant for EV.



**SAFE FOR USE**  
 Fogmaker's mist will not penetrate IP classification IP66 or higher.



**EASY TO CLEAN**  
 After system activation, just rinse well with clean water.



Fogmaker's fire suppression system handles all three sides of the fire triangle: heat, oxygen, and fuel. The system deploys when the protected area becomes too hot, and sprays a water-based mist that expands and chokes the fire. The mist also cools the area for a long time - at least double compared to other certified systems\* - which prevents reignition.

*\*Result of the SP4912 testing method*

# FREQUENTLY ASKED QUESTIONS

## Q: Can you really mix electricity and water?

Water mist isn't considered conductive. In addition, electric vehicles are constructed to withstand humidity, rain, road splash, etc and have a lot of protection for high-voltage parts. Fogmaker's suppressant will not penetrate components with an IP class of IP66 or higher, and a lower IP grade can also be possible, depending on the nozzle angle, flow, and distance.

## Q: What if the IP-enclosure is damaged?

Every vehicle or machine owner is responsible for repairing damaged critical parts, otherwise the vehicle/machine isn't safe to use. A fire could naturally damage the IP protection, but in those cases the fire will most likely cause more damage than the water mist will.

## Q: Isn't it better to use a powder or other dry fire suppressant?

Over the last ten years, the recommendation for fire suppressing agents for electric vehicles have gone from dry or gaseous to wet agents. One of the main reasons is the cooling effect of water.

## Q: Won't the release of water mist in an electric compartment lead to people getting electrocuted?

That is very unlikely, for multiple reasons:

1. Water mist isn't considered conductive
2. The protected areas aren't inside the vehicle - there aren't any people in the vicinity.
3. To get current through your body, you need to be a part of the circuit. That is, you need to make physical contact with both the negative and positive terminals. It's the same principle that allows birds to sit on a power line - they're not part of a closed circuit.
4. The vehicle's Battery Management System has many safety features to protect from dangerous currents.

## Q: How do I know if Fogmaker would work for my vehicle or machine?

We protect all sorts of vehicles and other enclosed spaces, and make a risk assessment for each to ensure high-risk areas are covered. Get in touch with us or one of our partners - can be found on [www.fogmaker.com](http://www.fogmaker.com) - and we'll help you.

## Q: Don't batteries cause a lot of fires?

It's natural to associate fire in electric vehicles with the batteries, but statistics presented at the 2023 FIVE conference show 50-60% of EV fires never involve the battery. It didn't start in the battery or spread to it before the fire was put out. There are more and higher risks in an electric vehicle than the battery.

## Q: Why would a battery catch fire?

There are mainly two reasons for a vehicle battery to start burning:

1. Collision
2. External Fire

A fire suppression system can't protect against collision, but it can prevent a fire from reaching the battery pack. It is important to make a risk assessment to identify fire risks, and in some applications, it can be an option to protect the battery pack by shielding it with water mist. This approach can prevent or delay an external fire from reaching the battery pack, and in the unlikely event of a fire originating inside the battery, the mist can give time to safely leave the vehicle.

## Q: Is it possible to put out a lithium-ion battery fire?

Extinguishing a fire in a lithium-ion battery is very difficult. The cells are hard to reach - the fire suppression system is installed outside the battery pack and the suppressant can't reach the cells inside. Another reason is that a cell in thermal runaway burns very hot and quickly.



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## PFAS-Free For the Future

The Fogmaker system has a large number of international certifications, and our suppressant Eco 1 is 100% PFAS free and Greenscreen Certified™ at the silver level.



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