

# Protecting national treasure for future generations

*HI-FOG® for cultural heritage*



# Protecting our cultural heritage

The beautiful city of Venice has faced many threats, both internal and external, over the course of its glorious history. Fire has traditionally been among the greatest internal threats, but no longer. The city's custodians have discovered HI-FOG®, which is now protecting many of the most beautiful and famous buildings in the city.



The HI-FOG® Water Mist Fire Protection System is the most modern and effective fire protection technology for preserving irreplaceable world heritage for future generations. In case of fire, it safely controls and efficiently suppresses the fire, protecting the building, its precious contents and human lives.

HI-FOG® is a high-pressure system that uses small volumes of potable water as the fire fighting agent to produce HI-FOG® water mist. The mist is composed of micro-droplets which penetrate to the seat of fire, cooling the fire itself and the surrounding air, blocking its heat and starving it of oxygen. The fire is suppressed before it can spread. Smoke, heat and water damage are kept to an absolute minimum.

#### HI-FOG® protects:

- Museums and art galleries
- Cathedrals and churches
- Theatres and music houses
- Libraries and archives
- Historic buildings and tourist attractions

#### HI-FOG® can protect the entire building:

- Domes/cupolas, attics, roof structures
- Exhibition galleries
- Storage rooms and archives
- Lobbies and corridors
- Auditoriums and conference rooms
- Offices, shops and restaurants



National Portrait Gallery, London, HI-FOG®-protected

HI-FOG® IS ARCHITECTURALLY FRIENDLY: Marioff is expert at installing HI-FOG® artfully in historic buildings, minimizing structural interference and preserving aesthetic integrity.



Marriott 47 Park Street Hotel, London, HI-FOG®-protected

HI-FOG® PROTECTS THE BUILDING WITHOUT DAMAGING ITS CONTENTS: HI-FOG® fights fire with micro-droplets of water, not drops of water. When it activates, it will suppress fire with an absolute minimum of collateral damage to the building itself and what it contains.



NEXT Hotel Karhulan Hovi, Finland, HI-FOG®-protected

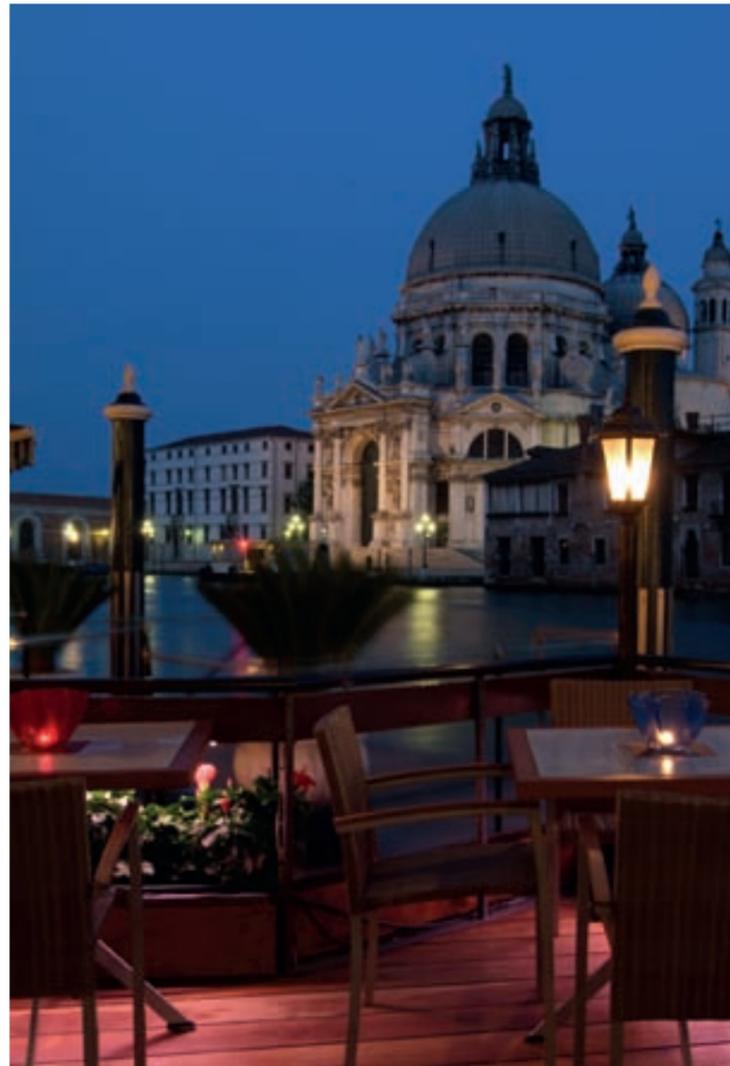
HI-FOG® IS IDEAL FOR SITES LACKING MUNICIPAL SERVICES: HI-FOG® can be supplied as an independent, stand-alone system that does not require mains electricity or a municipal water supply.

# Traditional sprinkler systems are good...

At Marioff we recognize that traditional sprinkler systems protect against fire, but we make a strong case that HI-FOG® is the best fire protection solution for cultural heritage sites.

Traditional sprinkler systems work. They suppress fire and save lives. In some buildings, the damage left behind by traditional sprinklers in the aftermath of a fire is a secondary consideration: deep soaking and widespread water damage, furnishings and fabric ruined by “black water”. The primary consideration is that the fire is out.

In cultural heritage sites, however, collateral damage can never be a secondary consideration. This is where HI-FOG® proves its value. HI-FOG® uses up to 90% less water than a traditional sprinkler system and offers equivalent or better performance. With an absolute minimum of collateral damage to the building itself and its priceless contents.



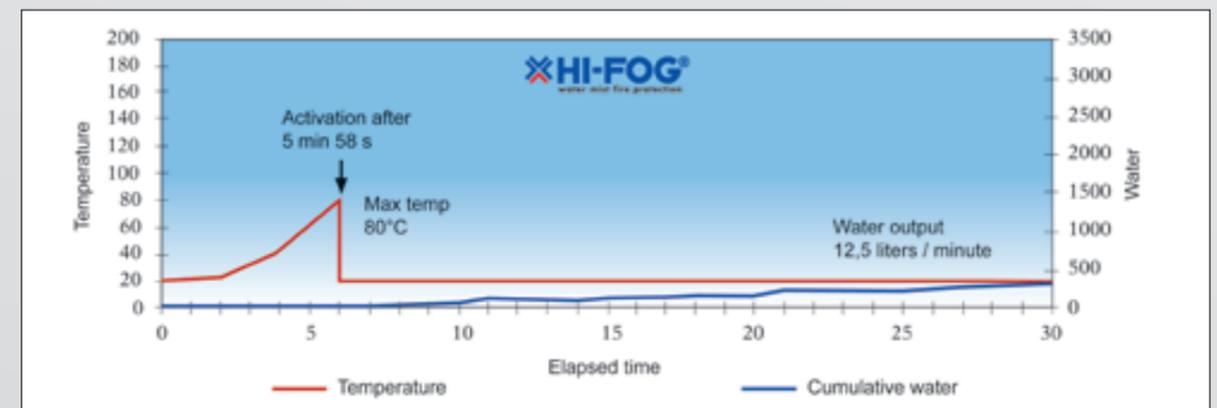
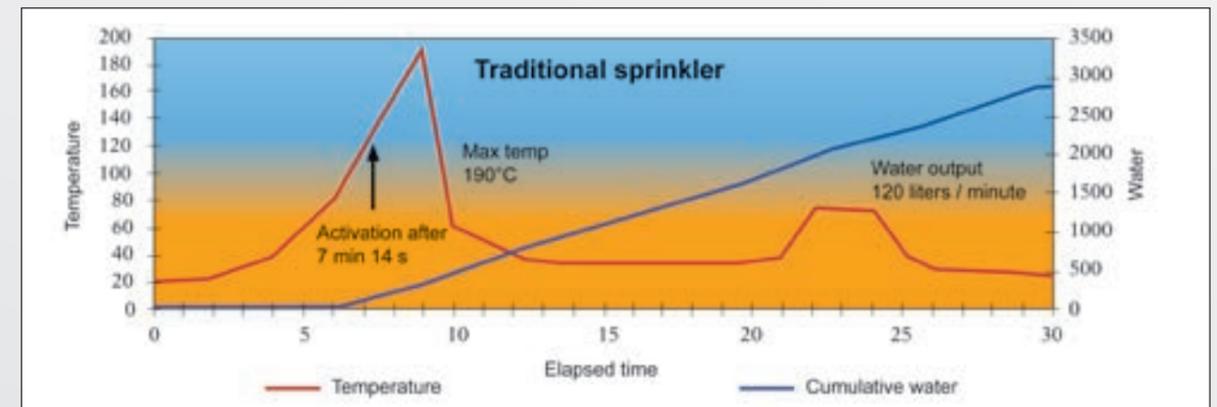
View from the HI-FOG®-protected Hotel Gritti Palace, Venice.



|                                      | Typical drop size range (mm) | Number of droplets per litre of water                                  | Surface area (m <sup>2</sup> )                       |
|--------------------------------------|------------------------------|--|--|
| Conventional sprinkler / water spray | 1...5                        | 15 thousand to 2 million   | 1...5  |
| Low-pressure water mist              | 0.2...1                      | 2 million to 250 million   | 6...30   |
| HI-FOG®                              | 0.025...0.2                  | 250 million to 150 billion<br><i>Superior cooling and soot marking</i> | 30...250<br><i>Superior blocking of radiant heat</i> |

HI-FOG® water mist is composed of an enormous number of micro-droplets of water representing a huge surface area. HI-FOG® water mist is unparalleled in its ability to attack two of the three things that fire needs to grow — heat and oxygen (the combustible material being the third) — while being entirely harmless to people and the environment.

# HI-FOG® is the best for cultural heritage



Results of two identical fire tests conducted in accordance with the VdS fire test protocol for Ordinary Hazard Group 1 occupancies. The fire suppression performance of the HI-FOG® GPU system was superior to that of the traditional sprinkler system, while using up to 90% less water. The HI-FOG® system had a faster activation time and only one sprinkler discharged. In the traditional system, two sprinklers activated.

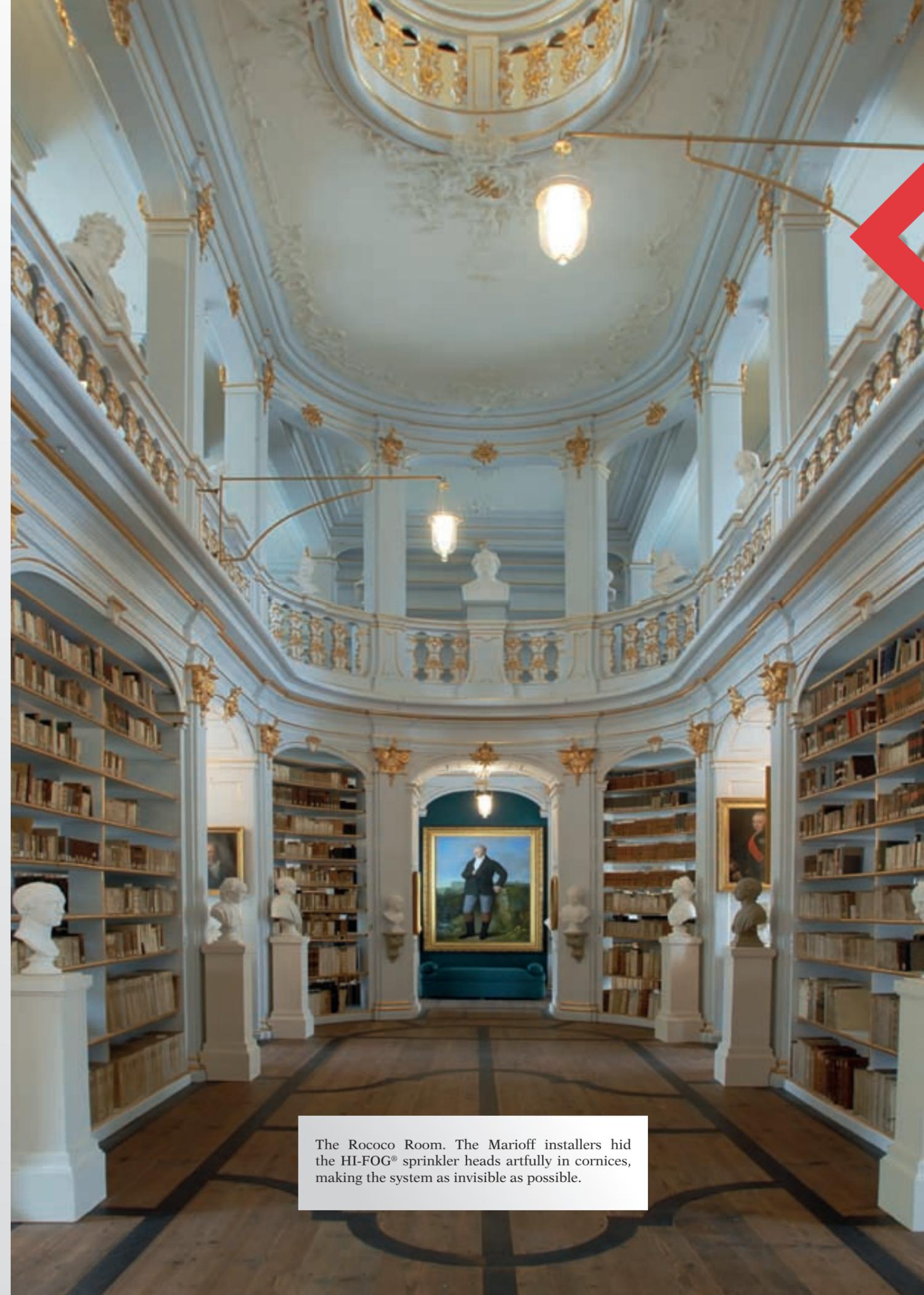
# Challenge: Duchess Anna Amalia Library

The Duchess Anna Amalia Library in Weimar, Germany, is a UNESCO World Heritage Site and a jewel in Germany's cultural crown. Johann Wolfgang Goethe worked here for over thirty years. The library houses a priceless collection of manuscripts, medieval autographs and works of art.

On the night of September 2<sup>nd</sup>, 2004, Anna Amalia experienced the worst library fire in Germany since World War II, caused by a mere electrical fault. As part of the building restoration work, a HI-FOG® system was installed to protect the library's four floors, Rococo Room and tower. The system is a pre-action system: activation requires both a sprinkler bulb to break and an alarm from an independent fire detection system.

Three factors can be singled out as to why the HI-FOG® system was chosen. First, the HI-FOG® system will cause an absolute minimum of collateral damage to the library's delicate collection upon activation. Second, the system tubing is small in diameter – skilled installers can put it in unobtrusively. Third, the HI-FOG® system is a stand-alone system that will protect the library even during a power outage.

The Duchess Anna Amalia Library was skilfully restored after a catastrophic fire.



The Rococo Room. The Marioff installers hid the HI-FOG® sprinkler heads artfully in cornices, making the system as invisible as possible.

# A proven track record

Marioff has vast experience of protecting cultural heritage sites. HI-FOG® protects internationally renowned places as well as historic sites of local importance. The following is an abbreviated list.

## Museums, art galleries

- Maritime Centre Vellamo, Kotka, Finland
- Marco Museum, Vigo, Spain
- Beer and Octoberfest Museum, München, Germany
- National Portrait Gallery, London, UK

## Cathedrals, churches

- Saint Mark's Basilica, Venice, Italy
- Jokioinen Church, Jokioinen, Finland
- Habo Church, Habo, Sweden
- Rautalampi Church, Rautalampi, Finland

## Libraries

- Anna Amalia Library, Weimar, Germany
- Fakultätsbibliothek, Innsbruck, Austria

## Castles

- Freudenstein Castle, Freiberg, Germany
- Norwich Castle, Norwich, UK

## Other historic buildings, tourist attractions

- Gritti Palace Hotel, Venice, Italy
- NEXT Hotel Karhulan Hovi, Kotka, Finland
- Eversand Oberfeuer lighthouse, Dorum-Neufeld, Germany
- Røros mining town, 102 dwellings, Røros, Norway
- Staatstheater Cottbus, Cottbus, Germany
- Nordea Bank, Helsinki, Finland



Freudenstein Castle, Freiburg, Germany



Røros mining town, Norway



Cottbus Staatstheater, Cottbus, Germany



Norwich Castle, Norwich, England

Saint Mark's Basilica, Venice, Italy



Maritime Centre Vellamo, Kotka, Finland

Beer and Octoberfest Museum, München, Germany



# HI-FOG<sup>®</sup>, full service



Protecting cultural heritage from fire is an important mission requiring a proven system and trusted partner. This a long-term proposition, and Marioff supports HI-FOG<sup>®</sup> over the complete lifecycle of the system.

#### **Design & project management services**

Marioff's engineers will design the right HI-FOG<sup>®</sup> system for your cultural heritage site based on your general needs and project-specific requirements. A Marioff Project Manager will ensure smooth system delivery.

#### **Installation**

Marioff is expert at installation, having gained vast experience in numerous installation projects across a wide variety of applications. Installation work is carried out in accordance with your operations.

#### **System commissioning**

A Marioff commissioning engineer will make the final adjustments and inspect the installed system, ensuring it functions correctly and efficiently.

#### **Service and maintenance**

Marioff's service and maintenance team provides a full palette of services to ensure that your HI-FOG<sup>®</sup> system stays in peak condition throughout its life.

#### **Training**

As a part of the overall safety regimen, Marioff will train your staff to operate and maintain the HI-FOG<sup>®</sup> system to make sure it performs at its best when it really matters — all the time.

# The world's leading water mist company

Marioff Corporation Oy was founded in 1985 with an entrepreneurial and innovative spirit. The spirit lives on and today Marioff is the world's leading provider of water mist fire protection systems on land and at sea. HI-FOG<sup>®</sup> protects almost every large cruise ship in the world and a fast-growing number of installations on land.

#### **Relentless fire testing**

HI-FOG<sup>®</sup> development is based on full-scale fire tests that are evaluated by independent, third-party authorities. Since its launch in 1991, HI-FOG<sup>®</sup> has received over 100 type approvals as a result of over 6,000 full-scale fire tests conducted to date for marine, offshore, buildings, transportation, industry and energy

applications. HI-FOG<sup>®</sup>'s performance in the fire protection of cultural heritage is a known, impressive quantity.

#### **World's most approved water mist system**

HI-FOG<sup>®</sup> has received more type approvals, across more application areas, than any other water mist system.

Marioff Head Office, Vantaa, Finland





HI-FOG® 2000-series  
sprinkler head



HI-FOG® 1000-series  
sprinkler head



HI-FOG® 2000-series sprinkler heads  
are available in chrome, gold and  
antique finishes.



HI-FOG® tubes are made of high-quality AISI 316L stainless steel.



The small-diameter HI-FOG® tubing bends easily around  
corners and obstructions, a key strength of HI-FOG®  
installation in historic buildings.



The HI-FOG® high-pressure, gas-driven  
pump unit. An option when the HI-FOG®  
system is required to be entirely independent  
of mains electricity and water.



The HI-FOG® electric pump unit.  
Standard option.



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