

Experts in fire protection

**MINIMAX**

## Fire protection solutions for data centers and other IT areas



BRANCH SOLUTIONS

DATA CENTER

## Our top priority: keeping your data available

Given that information and communication technologies play the key roles in the value creation chain of most companies, even the most minor interruptions or access limitations can threaten their very existence. The golden rule for those running data centers is to keep data available, come what may.

### **Densely packed energy and technology equipment mean heavy fires loads**

Highly complex technical equipment in data centers and other IT areas, as well as the materials used, entail a particularly high fire risk.

All businesses, not just those in the IT sector, need a comprehensive fire protection system tailored to individual requirements and taking the typical range of fire risks into consideration. Besides keeping data online, installing an individual fire protection system also meets the requirements of the insurers, namely to determine risks and mitigate them.

### **Recognizing and mitigating risks**

Data centers are particularly prone to fire, given the high energy density and the nature of the materials used, such as plastics. When a cooling facility is lacking or inadequate, the result can be hot spots on the equipment, possibly causing overheating. The proliferation of active electronic components, a false ceiling housing complex cabling and the transition resistances of numerous cable clamps all exacerbate the risk of a short circuit, technical defect or thermal overload, never more so than for the computer and server surfaces, including related climate constraints

in data centers. Whether it be small- or medium-sized IT areas, server rooms or closed server racks and whatever the company infrastructure and section of industry involved, fire risks are more or less the same.

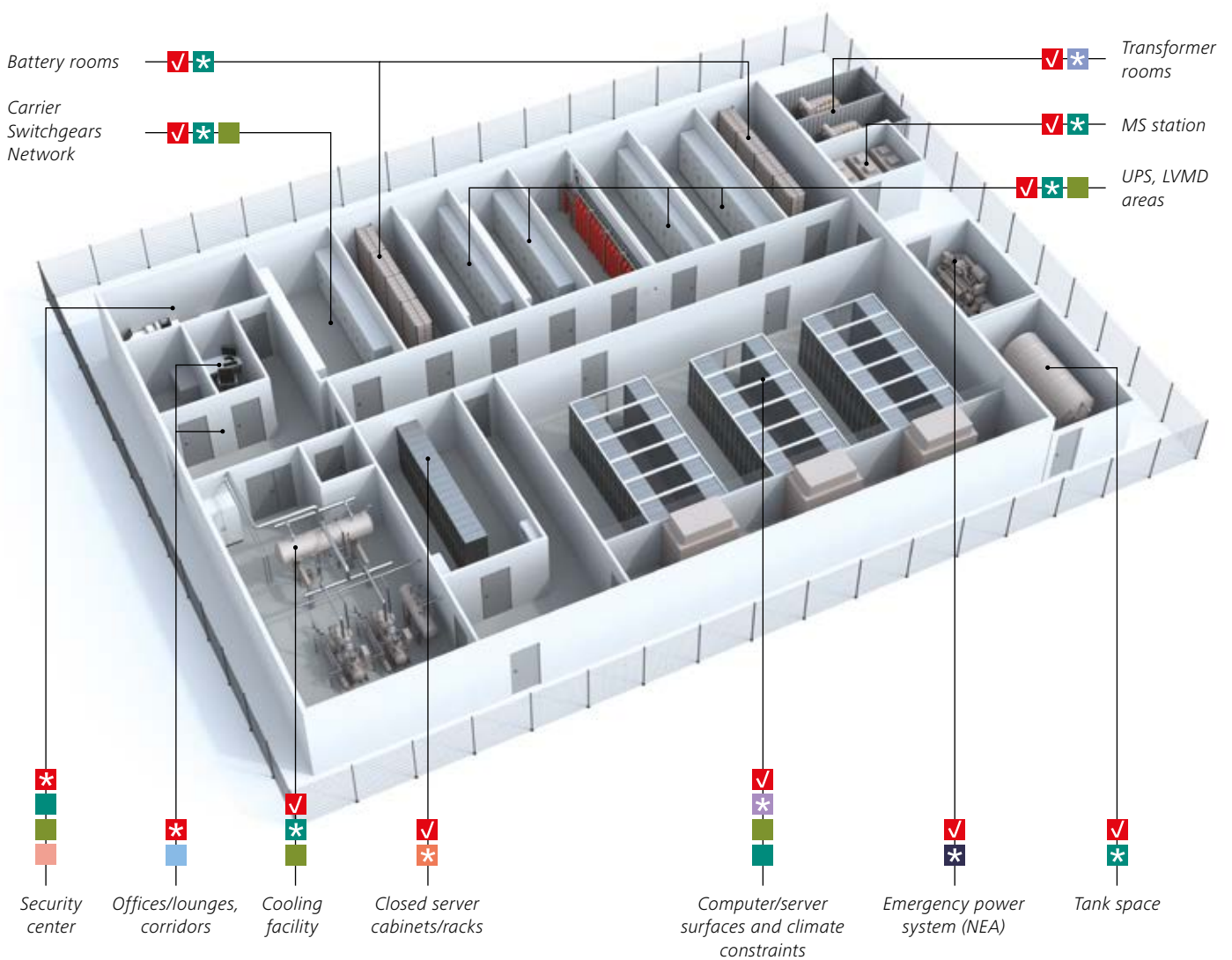
### **Effective fire detection**












The crucial criterion dictating the success of extinguishing efforts – and thus data center availability – is how early an incipient fire is detected and the associated extinguishing system activated.

Nevertheless, installing a fire protection solution for the core areas of a data center alone is not enough – dependable fire protection must also extend to other areas of infrastructure, such as technical, transformer and battery rooms and emergency power systems as well as office and social rooms. This guarantee is contingent on providing fire protection solutions to cover risk areas across the board – something Minimax, a leading one-stop fire protection supplier, can do. Minimax engineers leverage the results from their own in-house research center – one of the most modern in Europe – to develop innovative systems that protect complex premises against fire. Minimax industry specialists work with customers to devise bespoke solutions tailored to the project at hand.

# Protection areas

Providing unbeatable fire protection for data centers requires coordinated solutions for every application, which helps ensure dependable protection for material assets, prevents operational failures that put the existence of the company into question and guarantees personal protection at the same time. As a one-stop fire protection solution provider, Minimax can draw on a unique range of groundbreaking and tried-and-tested fire protection systems, system variants and components, which meet wide-ranging data center requirements and combine effectively and economically to provide a complete solution.



	Fire detection systems		Oxeco inert gas suppression systems		Oxeco EcoPrevent fire protection systems
	MX 1230 fire extinguishing systems (Novec™ 1230)		Water spray extinguishing systems		Minifog ProCon XP High-pressure water mist extinguishing systems
	Hydrant systems		CPS 1230 cabinet protection system OneU fire protection system (Novec™ 1230)		Inveron hazard management system
	Preferred solution		Minimum scope of protection		

# Computer/server surfaces and climate constraints

Components that are overloaded or insufficiently cooled may overheat quickly, and circuit boards, cables and plugs provide ample fuel to spark and feed fire in the event of a short circuit. Even smaller fires tend to cause severe damage in server rooms. The only guaranteed way to stop the fire gaining a hold in computer environments is by intervening swiftly with the right extinguishing agent.

### Risks

- High fire load due to high energy density and material concentration, e.g. plastic
- Hot spots, due to insufficient cooling
- The proliferation of active electronic components, a false ceiling housing complex cabling and the transition resistances of numerous cable clamps all exacerbate the risk of a short circuit, technical defect or thermal overload.

### Fire protection

By using nitrogen, Oxexo EcoPrevent systems offer energy-efficient fire protection with unrivaled safety. Instead of tackling fires reactively using extinguishing devices or fire engines, they actively target the fire at source by cutting off its oxygen. Oxexo EcoPrevent systems are synonymous with uptime, flexibility and effectiveness – there is no better fire protection solution, especially in the most sensitive areas. Depending on which system is used, the approach involves either ongoing reduction of oxygen in the protected area or as and when needed in emergencies, by the controlled supply of nitrogen. Even a blazing fire subsides. The potential for smoldering fires to spread is minimized, while using nitrogen avoids any damage the extinguishing agent itself may cause – often a problem for water extinguishing systems when sensitive components are involved. Compared to gas extinguishing systems, the oxygen concentration in Oxexo EcoPrevent systems remains at a constant level that is safe for people thanks to the controlled nitrogen supply.



## Technical and other IT sections

The processes in surrounding technical areas such as UPS and LVMD rooms, cold rooms etc. are also critically important to ensure the data center operates flawlessly. Safety and availability remain the top priorities, which is also why fire protection deserves special attention in control areas of all kinds.

### Risks

- Overheating of technical equipment
- Short circuits
- Even minor fires causing serious damage

### Fire protection

Oxeo inert gas suppression systems from Minimax fight fires with nitrogen and argon. The stand-out feature of these natural inert gases is their exceptional extinguishing effect – including in areas of special risk. Their electrically non-conductive nature and the fact that zero extinguishing agent is left behind after a fire make them perfect for use in rooms housing high-quality and sensitive equipment.

If a fire breaks out, the inert gases used by Oxeo extinguishing systems are evenly spread, displacing the oxygen from the fire source in the process. Even the risk of concealed fire sources bursting back into flame can be ruled out by the three-dimensional mode of action. The inert gases used leave no solvent residues behind and are easily eliminated from the premises after the fire is displaced by ventilation. As non-conductive materials, they are also safe to use alongside electrical or electronic components. This approach helps Oxeo extinguishing systems avoid extended stoppages, downtimes and costly operational downtime. Although even extinguishable concentrations of nitrogen and argon are non-toxic, far less oxygen is present than in ambient air, which is why audio and visual alarms alert all present to leave the extinguishing area before the extinguishing agent flooding begins. All of which reaffirms how Oxeo extinguishing systems are ideal for deployment in areas frequented by people.



## Protection areas

# Emergency power system (NEA)

Emergency power systems, which are often housed elsewhere, keep power flowing if the main power source fails, in order to maintain operations and prevent the financial damage a power outage would otherwise cause.

### Risks

- Diesel fuel possibly igniting on hot surfaces
- Lubricating oil escaping through leaks

### Fire protection

The Minifog ProCon XP high-pressure water mist extinguishing systems from Minimax offer unrivaled protection for emergency power systems, while minimizing the use of extinguishing water. Indeed, the Minifog ProCon XP water mist extinguishing system reduces the use of such water by up to 95% compared to conventional water spray extinguishing systems. Such ultra-low water consumption minimizes the risk of water damage and thermal distortion of heated machine parts as well as allowing a far more compact water supply unit. This saves on on-site space and costs, and paves the way for retrofitting in particular. The choice of water as an extinguishing agent also eliminates the need for specialized personal protective equipment. Under normal circumstances, the area protected against fire can be re-entered as soon as the fire has been extinguished. Meanwhile, the use of Minifog ProCon XP with high-pressure water mist allows for far more compact pressure relief devices than with gas extinguishing systems – as well as pressure relief to neighboring rooms. The system is triggered by a fire alarm system using UniVario flame and heat detectors for fire detection.



## Transformer rooms, battery rooms

As the link that binds together the turbine, the turbine generators and the grid, transformers ensure that electricity is made available for distribution within the grid and typically comprise transformer housing components with a radiator, oil-compensating vessel and oil-filled insulators. Alongside the emergency power system, batteries are also the key component of uninterruptible power supply in the data center, and the rooms housing them must be regularly maintained and ventilated.

### Risks

- The greatest fire risk in rooms housing transformers comes from accidents like short circuits within the transformers. There is the risk of oil overheating and igniting.
- Within battery rooms, there is a risk of batteries heating up and igniting if not properly maintained. The fire risk stems from the battery's plastic components.

### Fire protection

Although conventional water spray extinguishing systems have often proven their worth when combating transformer fires, the relatively large volumes of extinguishing water used entail correspondingly complex dimensioning and higher system costs as a result. Furthermore, the risk of the extinguishing water being contaminated by the escaping transformer oil has to be taken into account, which entails subsequent collection and reprocessing. With this in mind, the base tray must be dimensioned so that it can accommodate the extinguishing water as well as the oil. TraFoProtect is a means of protecting transformers, which considerably reduces the amount of water

applied to the bulkhead compared with conventional water spray extinguishing systems but is capable of withstanding the impact of wind in outdoor areas.

Oxeo inert gas extinguishing systems from Minimax use nitrogen and argon to suppress fires. The stand-out feature of these natural inert gases is their exceptional extinguishing effect – including in areas of special risk. Given they are also electrically non-conductive and leave no extinguishing agent residue behind in the event of a fire, they are the preferred fire protection solution for areas such as battery rooms.



## Protection areas

# Offices/lounges

Employees spend their time in offices, administrative areas and recreation rooms or break rooms respectively during working hours. Outside normal working hours, these areas are generally unsupervised.

### Risks

- Defects in electrical devices such as projectors or computers
- Overheating of the lighting
- Short circuits in automatic machines

### Fire protection

Thermolytic gases, smoke, flames, heat – a fire breaking out makes its presence felt in various ways. But whatever transpires, Minimax has the right fire detectors, and special sensors are also available to detect thermolytic gases at an early stage. All fire detectors and sensors transmit their signals to the Minimax fire detection and control panel, and this is also where information from all fire detection and monitoring elements converges. They receive details of the events, evaluate them and control the required response automatically and purposefully: notification of the alarm, control and testing of extinguishing systems to the situation-specific control of building services equipment depending on how the fire develops. The fire protection thus centers on the fire alarm and extinguisher control panels.





## Server cabinets/racks

Self-contained and air-conditioned server racks come as standard, and these high-tech IT racks are packed with high-performing systems.

**Risks**

- Their compact and modular design results in high fire loads in a tiny area

**Fire protection**

IT systems working flawlessly cannot be considered a given. This is a concept on which companies having to guarantee that data remains online for ever more powerful systems depend. High-tech 19" racks with a compact design, in particular, generate a significant heat load that will spark a fire in the worst case scenario, and it is here that OneU fire protection systems provide optimal protection. The most innovative aspect of these devices is their space-saving construction and their ability to pack all the required equipment into such narrow quarters. The OneU fire protection systems, designed for installation in closed 19" racks, boast fire detection sensitivity and residue-free extinguishing. Redundant modules and an integrated emergency power supply ensure that data remains available, while the modular expandability of OneU systems allows them to offer maximum flexibility. Conventional fire protection systems require up to three height units in the rack. Conversely, when using

OneU fire protection systems, unique scope for single height unit installation (1.75") frees up far more space for the IT components in expensive racks.



# Green IT with a return on investment

The Oxexo EcoPrevent FC (Fuel Cell) fire protection solution is a VdS-compliant combination uniting an oxygen reduction system and a fuel cell with exceptional efficiency: saving CO<sub>2</sub>, supplying nitrogen around the clock at no additional cost and generating rather than consuming energy. Not only does this system offer secure fire protection, it is also a key component in a resource-saving and environmentally friendly data center.

In the same way as for motorized cogeneration units, fuel cells generate power and heat (or cooled air) at the same time, using the principle of cogeneration. The process is virtually noiseless and ultra-efficient since the chemical energy of the gas used is directly converted. Fuel cells can also achieve an unparalleled return on investment in a fire prevention context. In the process of generating energy, the fuel cell generates clean exhaust air as a by-product that is rich in nitrogen. This exhaust air is generated permanently during operation, without incurring any additional costs. Consequently, it is the ideal choice when operating an oxygen reduction system for fire prevention. This solution is exceedingly environmentally friendly and results in significantly less CO<sub>2</sub> being produced.

Within the IT industry, gas extinguishing technology has emerged as a tried-and-tested fire protection solution. The ideal solution – one uniting the economic advantages of the fuel cell with the safety of a gas extinguishing system – is a hybrid system centering on fuel cell technology and a newly conceived extinguishing system in the form of Oxexo EcoPrevent CS: breaking new ground and meeting user needs. Among other things, one of the major advantages here is that there is no need to stockpile fire extinguishing agent. Including a fuel cell with permanently reduced atmospheric oxygen e.g. 17% by volume, there is less chance of a fire developing and unrestricted accessibility. When a possible fire is detected, e.g. by a short circuit, the extinguishing system is triggered as required. The combined solution therefore offers the added security of an extinguishing system. The two-stage extinguishing concentration (prevention and intervention mode), e.g. 15 and 11 vol.%, is controlled only as required and maintained as long as necessary by leveraging innovative valve technology to meet customer requirements.

## Advantages compared to conventional oxygen reduction systems

- ✓ Produces energy: electricity, heat, optional cooling
- ✓ High CO<sub>2</sub> savings
- ✓ Low extinguishing agent consumption\*
- Return on investment
- Enhanced VdS-certified safety as a hybrid system from FC/CS
- Boosts independence:  
In the event of a power outage, the system secures 100kW of fuel cell energy for emergency use and oxygen-reduced air for fire protection.
- The protected area is accessible unhindered in preventive mode I
- Nitrogen is available around the clock at no extra cost
- No utility room required to house the fuel cell
- An optional 15 year "all-in" service package with performance guarantee
- Space-saving after reducing the amount of extinguishing agent storage needed\*

\*(compared to conventional extinguishing systems)



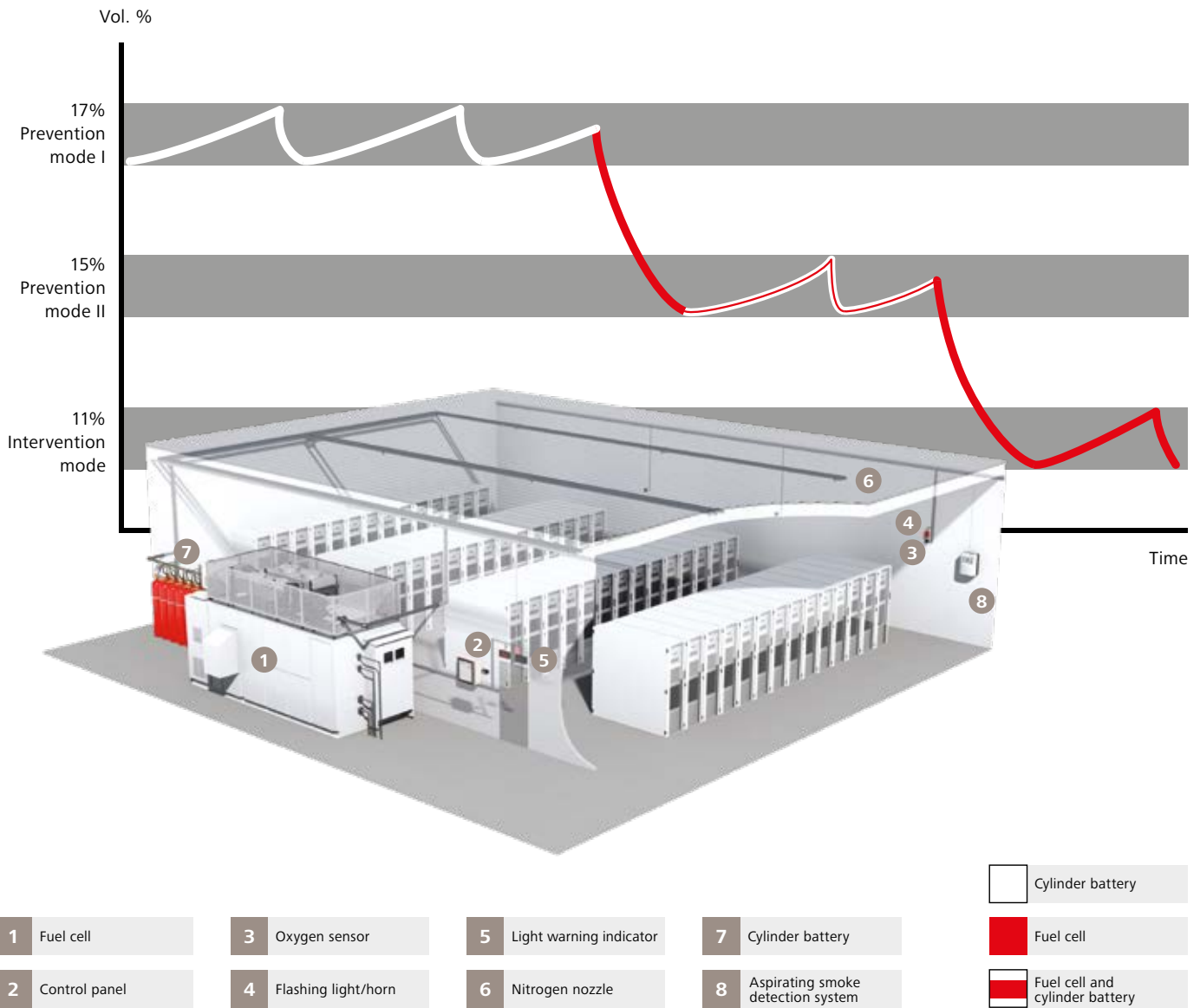


Fig.: Oxeo EcoPrevent FC/CS functional diagram

**Prevention mode I:** The fuel cell keeps the oxygen content within the control range of 17 vol.% on an ongoing basis (i.e. still freely accessible).

**Prevention mode II:** If thermolytic gas is detected at an early stage, the cylinder battery is activated and rapidly lowers the oxygen concentration to 15% by volume. Prevention mode II is kept within the control range by using a fuel cell and introducing nitrogen from the cylinder battery as and when required, giving the customer time to pinpoint what triggered the detection alert.

**Intervention mode:** If the aspirating smoke detector detects aerosols or minute smoke particles, the system activates the intervention mode via the control panel. After the alarm sounds, the cylinder battery reduces the atmospheric oxygen in the data center to a level of 11% by volume to promote extinguishing, and maintains this for a holding time defined with the customer.

<p><b>i</b> Did you know that a fuel cell can save up to 250t CO<sub>2</sub> compared to conventional electricity procurement? This equates to up to 100 mid-range vehicles!</p>	<p>Did you know that a fuel cell generates about 850,000 kWh of electricity per year? If we assume an electricity price of 0.16 ct/kWh, this equates to a yield of approx. €136,000 per year!</p>
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## Technologies used

Regardless of whether it is water extinguishing systems, gas extinguishing systems, fire prevention systems or fire detection systems – Minimax can fall back on a unique range of tested and certified systems from its own development and production facilities.



### Fire detection and suppression control panels – heart of active fire protection

Fire detection and extinguishing control panels process detection results detected by sensors, control of alarm devices and set off alarms to permanently manned stations and the fire department. They continuously monitor extinguishing systems for functionality and trigger them electrically if necessary. In addition, they communicate with risk management systems or via web interface with Internet-enabled devices. Different model versions, from a compact small panel to sophisticated large control panels make it possible to select the appropriate fire detection and extinguishing control panel.



### Oxexo inert gas extinguishing systems – residue-free fire extinguishing

Oxexo inert gas extinguishing systems fight fires by introducing inert gases, such as argon or nitrogen, and the resulting lowering of the oxygen content. They are particularly suitable for protecting areas with high-quality and sensitive equipment, where residue-free extinguishing – without the use of water, foam or powder extinguishing agent – is to be preferred. Argon and nitrogen are natural constituents of the ambient air and, moreover, nontoxic and non-electrically conductive.



### Oxexo EcoPrevent fire protection systems – exclude fires

Oxexo EcoPrevent fire protection systems do not allow fires to develop in the first place. The oxygen reduction systems permanently reduce the air oxygen content through the controlled supply of nitrogen to such an extent that a "fire-proof" atmosphere is created. Five different variants of nitrogen generation and storage are available for individual solutions.

### **MX 1230 fire extinguishing systems – efficient and compact**

MX 1230 fire extinguishing systems fight fires using the chemical extinguishant Novec™ 1230 by 3M™. This extinguishant is neither corrosive nor electrically conductive. It is thus especially suitable for protecting rooms containing electric and electronic equipment. MX 1230 systems extinguish fires without leaving residue, while offering a high level of personal and environmental protection at the same time. They are particularly suitable for the protection of small and medium-sized rooms, and the extinguishing agent can be stored compactly, either inside the room or in another area.



### **Sprinkler systems – universal protection**

Sprinkler systems detect and report fires and automatically initiate the extinguishing process with water. The underlying principle of selective extinguishing makes them extremely effective: In the event of a fire, only the sprinklers located in the immediate proximity of the fire will be activated. Immediate extinguishing action using water is taken, while the other sprinklers remain closed. Sprinkler systems provide dependable fire protection for buildings and industrial plants. For special fire risks, a film-forming foaming agent can be added to the extinguishing water to increase the extinguishing effect.



### **Deluge systems – fast, with overall coverage**

Deluge systems are triggered hydraulically, pneumatically or electrically, and disperse water throughout the entire protection zone with open nozzles. In this way, they dependably fight fires in rooms and facilities, even if a particularly fast spreading of the fire is to be expected. If necessary, a film-forming foam agent can be added to the extinguishing water. Deluge systems are also installed to keep the fire from spreading to neighboring areas by means of water curtains, or to cool down particularly vulnerable areas through irrigation.



### **Minifog water mist systems – extinguishing with water mist**

Minifog water mist systems disperse the extinguishing water very finely through special nozzles and sprinklers and/or increased operating pressures. At the same time, the overall surface of the extinguishing water is increased, enabling it to absorb heat and evaporate faster. The related cooling and smothering effect makes it possible to fight fires in a particularly effective way with a reduced consumption of extinguishing water. Diverse system variants, customized for each application, ensure optimal protection for buildings, rooms and facilities.





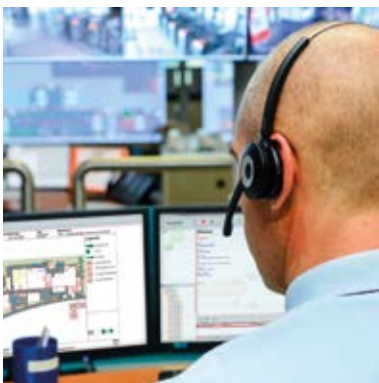
### **Hydrant systems – be prepared for action**

Wall hydrants and external hydrants are only the visible end of a dependable extinguishing water supply for manual extinguishing action by fire departments, operator personnel or building occupants. They are the visible extension of dependable water supply components designed to fit with local conditions, such as pump systems, underground pipework and filling and drainage stations. These components ensure a dependable supply for safe hydrants.



### **OneU fire protection system (Novec™ 1230) – minimum space requirement**

Stand-alone and air conditioned server cabinets are filled with high-capacity systems. Their compact, modular build harbors high fire risks in very small areas. The OneU fire protection system specially designed for installation in closed 19" IT racks is distinguished by sensitive fire detection and residue-free extinguishing using Novec™ 1230. With its minimal space requirements in the elaborate and expensive IT racks, modular expandability, high availability through redundant component groups and integrated emergency power supply, OneU is setting new benchmarks for 19" IT rack fire protection systems.



### **Inveron hazard management system – safety at a glance**

Inveron is a transparent and user-friendly system for visualizing and operating fire detection, extinguishing and hazard detection systems. All reports and events are automatically merged on a surface and represented graphically on the screen. Inveron offers ideal monitoring especially for sprawling, complex building structures. In addition, the hazard management system supplies operators with a range of additional information and help on individual messages and supporting them in carrying out the required measures.

## About Minimax

For more than 110 years, Minimax has been one of the leading brands in fire protection. Qualified and certified staff plan and install modern fire protection systems – in Germany, Europe and the whole world. With its comprehensive service range, Minimax is also at your disposal after installation.

### Technologies

Whether it is water extinguishing systems, gas extinguishing systems, fire prevention systems or fire detection systems – Minimax can fall back on a unique range of tested and certified components and systems from its own development and production facilities. Our promise: Minimax quality ranges from the simplest fire extinguisher to the most complex suppression system. Extensive development work carried out at our fire protection research center ensures our future advanced technologies approach.

### Solutions

Data center, recycling facilities, power plants, shops, ships or logistics centers – every industry, every property and every application requires different fire protection solutions. Taking the latest standards into account, our expert teams have years of experience

and support each project individually in order to meet the requirements of authorities, insurers and operators. From the engineering of the fire protection system through project management to installation and commissioning, with Minimax, you are on the safe side.

### Service

Regular inspection and maintenance are a fundamental requirement for a fire protection system to remain operational in the long term. The Minimax service team offers the necessary peace of mind by professionally executing all inspections, maintenance and repair work. In addition to maintenance, we offer specific measures and programs to ensure that your fire protection equipment continues to function correctly and corresponds to the latest technological developments even after years on standby.



Minimax can fall back on a unique range of proven and innovative fire protection systems for all areas. These meet the multifaceted requirements of data centers and combine extremely efficiently and economically into a total solution.

#### Fire protection solutions for

- Computer/server surfaces and climate constraints
- Technical and other IT sections
- Emergency power system (NEA)
- Transformer rooms, battery rooms
- Offices/lounges
- Server cabinets/racks

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