

Experts in fire protection

MINIMAX

TurbineProtect Fire protection solutions for gas turbines



SPECIAL SOLUTIONS

TURBINEPROTECT

Identify and control fire risks on gas turbines

Industrial gas turbines, which are used in the oil and gas industry, for example, drive generators for power generation or compressors (mechanical drives) for gas compression or gas liquefaction. The operating temperature inside turbine acoustic enclosures can reach up to 120°C and the surface temperature of the turbine itself up to 800 °C. Oils leaking from the leaks in oil pipelines can easily get ignited on these hot surfaces. Once lit, a fire can quickly spread to other areas due to the high air flow rate actually used for cooling. Long downtimes and higher costs are often the result.

In the meantime, modern gas turbines and gas compressors have reached a high level of efficiency. They are typically characterized by a complex overall system. Varying operating units including different turbine and compressor types form a construction with high demands on the organisation of reliability and safety.

In addition, the conditions, such as extremely hot surfaces and lubricating oils, create enormous fire hazards.

If a fire in the gas turbine enclosure at its initial stage, is not automatically detected and immediately extinguished, damages caused can put millions of euros at risk. Even fire damage in a section or in associated auxiliary devices such as switch gear

rooms or containers can interrupt the entire process for a long time.

In order to protect people, objects and the environment, a well thought-out and customized fire protection concept is necessary. Various fire protection technologies can be used for this purpose. For more conclusive and secure integrated protection concept and better installation and operation of systems, more of these should come from one source.

Together with well-known gas turbine and gas compressor manufacturers, Minimax has been developing fire protection concepts and solutions from a single source for over 30 years.



The flexible fire protection solution: TurbineProtect

TurbineProtect combines industrial fire detectors and fire detection systems and suppression control with various fire protection technologies such as:

- CO₂ High and low-pressure fire extinguishing systems
- Oxeo inert gas fire extinguishing systems (with argon or nitrogen)
- Minifog ProCon XP high-pressure water mist suppression systems

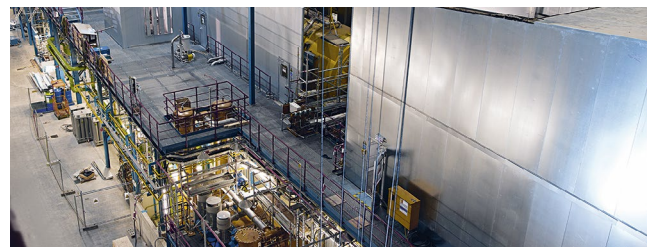
This enables a reliable integrated fire protection solution that can be individually customised to the requirements on site. Other solutions according to customer requirements are also possible.

The core elements of TurbineProtect are the Clunid FMZ6000 fire detection and extinguishing control panel and the UniVario industrial fire detectors. UniVario heat detectors combined with UniVario IR or UV flame detectors, which reliably detect a fire and send messages to the Clunid FMZ6000, have proven their worth. The control panel evaluates the messages and activates the visual and audible notification devices to warn people in the affected areas.

The control panel (logic to be parameterised individually: for two-detector dependency or 2-out-of-n-dependence) subsequently controls the outputs in order to trigger the connected extinguishing system. TurbineProtect focuses on maximum flexibility – also in the selection of the extinguishing agent. In most cases, carbon dioxide fire extinguishing systems or Oxeo inert-gas extinguishing systems with the inert gases nitrogen and argon are best suited. If a solution without gas is to be used as the extinguishing agent, Minifog ProCon XP high-pressure water mist suppression systems are the right alternative.

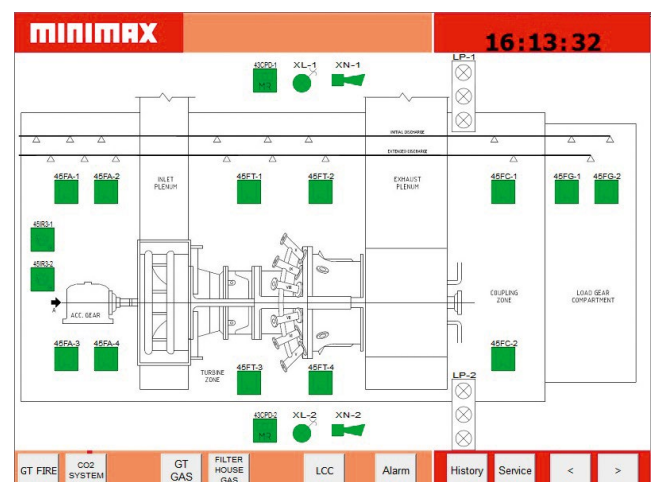


Manual fire extinguishing signals are generally initiated with manual call points. A pre-warning time for possible evacuation of the extinguishing area is implemented electrically or mechanically.



In redundant or hot-swap-capable fire detection and extinguishing control panels, defective control panel or I/O units can be replaced during operation. This ensures a continuous availability of the entire system. Prioritized messages are transmitted over potential-free contacts or industrial standard interfaces to higher-level systems such as the turbine control, DCS or a higher-level fire detection system.

Alarm messages can be visualized both centrally and locally. While the Minimax Inveron risk management system visualizes and seamlessly documents all messages at one place, important information can be displayed locally at almost any location using HMI touch panels.



Construction and function

TurbineProtect combines state-of-the-art fire detection technology as well as fire alarm and extinguishing system control with effective and approved fire protection technologies. Thanks to its flexible design, TurbineProtect can be adapted to any situation as required.

Fire detection and extinguishing technology

TurbineProtect uses UniVario-type detectors. UniVario industrial fire detectors are intelligent, platform-based, microprocessor-controlled fire detectors with a

robust housing and assembly technology for even the harshest operating conditions.

Thanks to the modular concept and use of the latest signal processing technology, these devices meet individual specifications in an unusually wide range of applications.

Thus they function both indoors and outdoors, in immediate proximity to the equipment to be protected or from longer distances, in sterile clean areas as well as under extremely contaminated processing conditions.

Variables detected by detectors are processed by fire detection and extinguishing control panels. They are then activating alarm equipment and send alarm messages to permanently manned stations and the fire brigade. They continuously monitor the function of fire extinguishing systems and trigger them electrically in case of fire. Furthermore, they communicate with hazard management systems or via web interfaces with internet-enabled devices. Due to availability of different models and sizes, it is possible to select appropriate fire detection and extinguishing control panel, from compact small to demanding large.



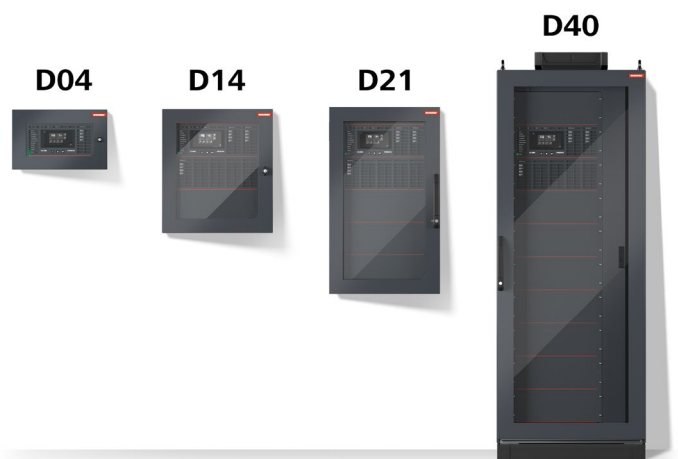
UniVario IR flame detector YMX5000



UniVario heat detector WMX5000 FS Flex



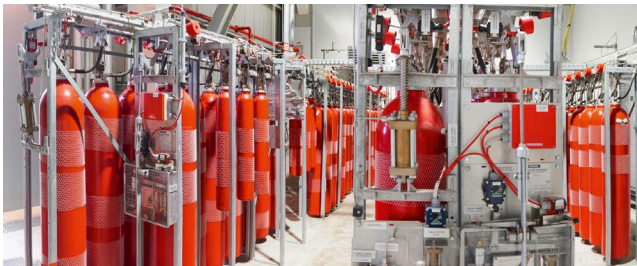
UniVario flame detector FMX5000 IR HR – also available in special colors



Clunif FMZ6000

Extinguishing technology based on customer requirement

Preferably, carbon dioxide fire extinguishing systems or Oxeo inert-gas extinguishing systems with the inert gases nitrogen and argon are used. These ensure quick, residue-free fire extinguishing, even in areas that are difficult to access. For large turbines, low-pressure CO₂ extinguishing systems can be beneficial as the entire quantity of extinguishing agent is stored in one container which means comparatively smaller area is required for storing a large quantity of extinguishing agent.



Alternatively, Minifog ProCon XP high-pressure water mist extinguishing systems offer reliable protection. As compared to conventional water spray systems, Minifog ProCon XP system manages to extinguish a fire with approximately 95% less extinguishing water. This extremely low use of extinguishing water reduces the risk of water damage and thermal warping of hot machine parts to a minimum.

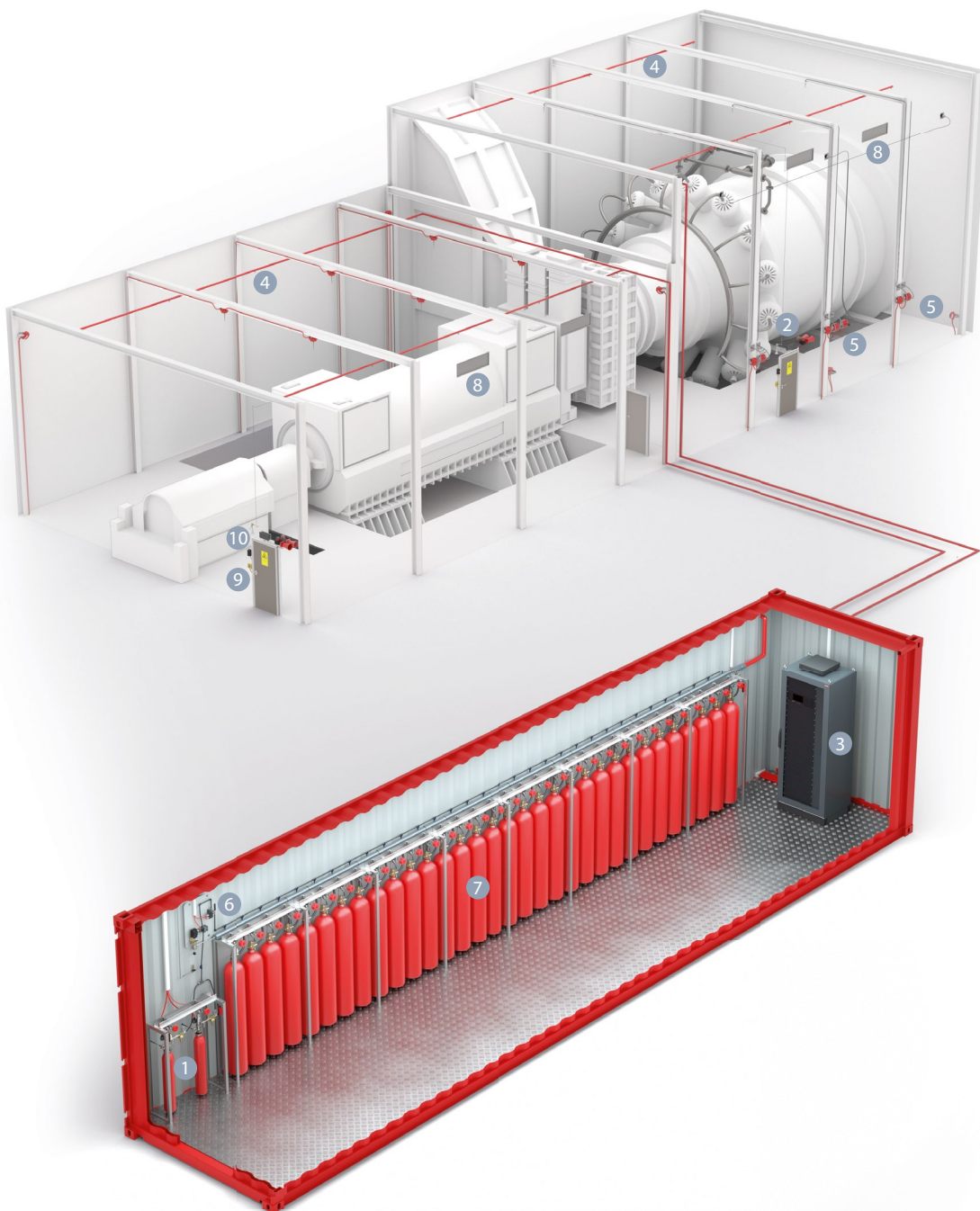


Risk management system – Safety at a glance

The Inveron risk management system summarizes information in visual form from various systems on one interface. Responsible people can thus, especially in the case of extensive and complex production or building structures, quickly view all relevant data of fire alarm and extinguishing systems as well as other hazard detection systems at a glance. Inveron enables the operator to make the right decisions in stressful situations and ensures complete documentation of all safety-related events.



Construction and function



1	Extinguishing agent pilot cylinders
2	Alarm horns and flashing lights
3	Fire detection and extinguishing control panel
4	TurbineProtect nozzles
5	Fire detectors
6	Time delay unit/blocking valve/pressure switch
7	Extinguishing agent cylinders
8	Pressure relief flaps
9	Manual release
10	Status display

Our strengths – your safety

Meeting special requirements: Whether it's sprinkler systems, gas extinguishing systems, fire prevention systems or fire detection systems – Minimax can rely on a unique range of tested and certified components and systems from its own development and production facilities.

Our promise: Minimax quality from the simple fire extinguisher to the complex extinguishing system. Intensive development work carried out in our research centers ensures that the company will continue to develop advanced technologies in the future.

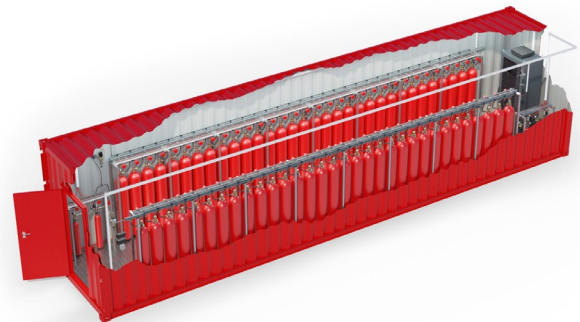
International approvals and suitability for ex areas

Minimax products and systems have many country-specific approvals. This enables worldwide use. Our portfolio also covers operation in explosion hazard areas (ex-zones 1 and 2). Regardless of whether it's fire detectors, control panels or extinguishing systems – for nearly every application, and for almost every possible area application, Minimax offers suitable industrial-quality solutions.



Container and skid solutions

Pre-assembled container solutions allow extinguishing systems of any size and almost anywhere to be quickly and easily upgraded or expanded. These individual extinguishing system solutions are manufactured and assembled according to standardized processes, delivered and commissioned on site. The commissioning costs remain within a manageable range due to the high degree of pre-assembled parts. This saves time and therefore money.



Tailor-made solutions based on customer requirement

If required, Minimax engineers can develop customized fire protection solutions for all requirements. Risks are assessed in close consultation with the customer and an adequate concept is developed that meets all worldwide requirements.



Already hundreds of turbines are safely protected across the world with TurbineProtect. There are many reasons for choosing TurbineProtect:

- Comprehensive solution with maximum flexibility through modular design
- High degree of pre-assembly saves time and costs during installation and commissioning
- Integration in higher-level systems such as turbine controls or DCS
- Meets international guidelines (FM, NFPA, VdS and many others) and SIL requirements
- Can be used in explosion hazard areas
- A global contact: engineering, delivery and service from one source

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