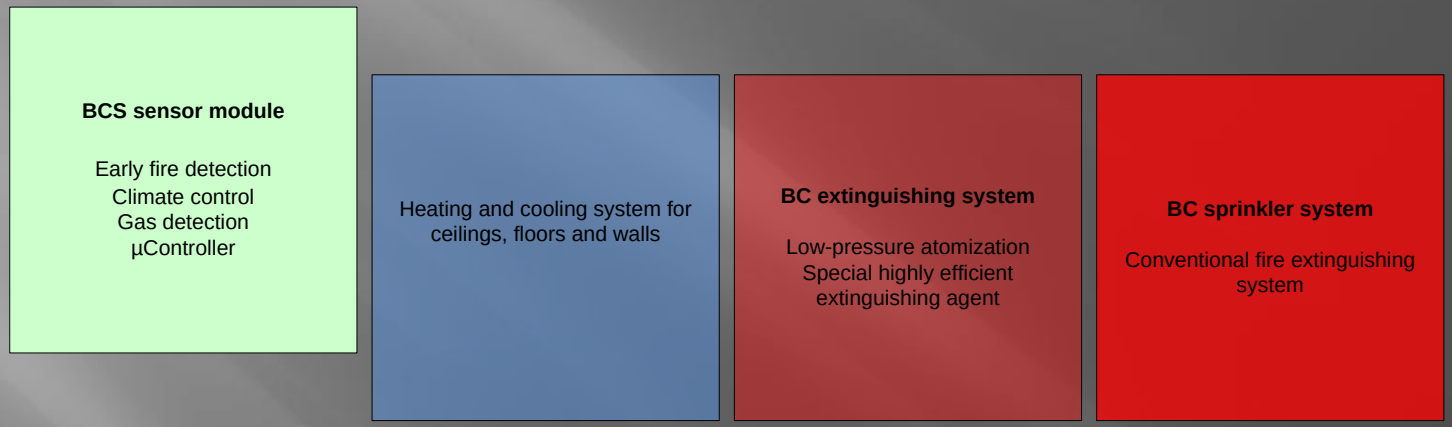
Sensor module for intelligent extinguishing and heating/cooling systems

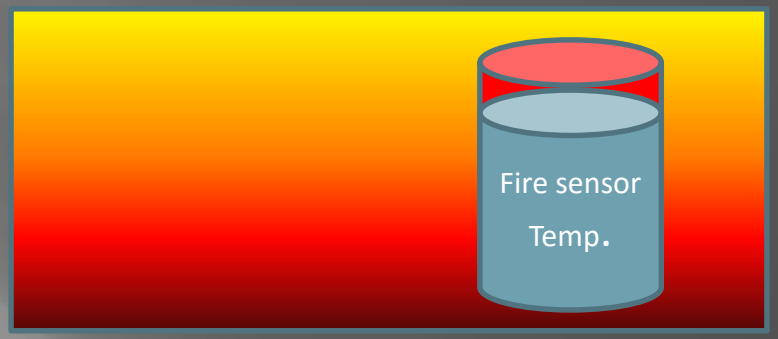
Innovation: One system for heating/cooling and fire detection/extinguishing

Blue Climate Sensors GmbH

Areas of compentence



Fire and hazard warning device



- An intelligent evaluation of combustion gases enables an early detection of smoldering fires with a very low probability of false alarms. These combustion gases always occur during normal house and smoldering fires. The concentration ratio is changing depending on the oxygen rate and fire temperature. Particularly toxic gases arise during the smouldering fire phase.
- Apart from the gas detector a temperature sensor is used as an additional alarm contact. It sets off a fire alarm independently at a temperature > 65°C.
- The sensor module detects highly-toxic gas concentrations of carbon monoxide. In Germany, more than 400 people die from CO smoke intoxication during home fires every year.
- This sensor module features very high unique selling propositions.

Fire and hazard warning device

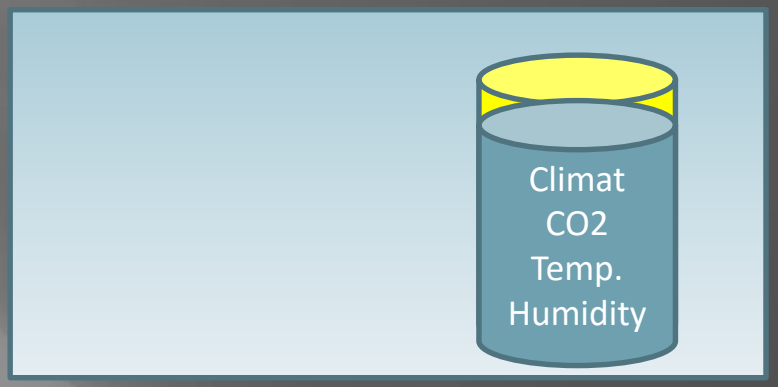
CO is a tasteless and odorless gas. Carbon monoxide poisoning is difficult to diagnose. As CO attaches to the hemoglobin about 300 times better than oxygen a person cannot be rescued by giving oxygen.

Previous fire alarm detectors mainly function on the basis of optical smoke detectors. Newer devices use the combination of optical detection and semiconductor gas sensors. Semiconductor gas sensors react to various oxidizable and reducible gases which results in frequent false alarms.

Comparison of optical smoke detectors with the patented technology described above:

	Optical smoke detector	bcs3
CO gas detection	no	yes
CO2 gas detection	no	yes
Smoldering fire detection	no	yes
Safe fire detection	(yes)	yes
Timely protection against gas poisoning	no	yes
Response time	ca. 60s	ca.10s
Probability of false alarms	high	very low
Coupling with extinguishing nozzles	no	yes

Indoor Climate



The indoor climate is playing an increasingly important role. For years the building envelopes have become tighter and tighter by energy optimization which prevents a natural air exchange. As a consequence, the air is bad and full of high CO2 values and the mould formation is increasing. Stuffy air impairs the ability to think (State University New York U.S. Department of Energy. Elevated Indoor Carbon Dioxide Impairs Decision-Making Performance. 2013). The study of the New York State University shows that the decision-making ability and logical thought is limited from already 1000ppm onwards.

A high CO2 content in the interior of a building is mainly caused by people.
CO2 was defined as a hygienically established reference value by the Federal Environmental Agency.

APP realization

Example APP

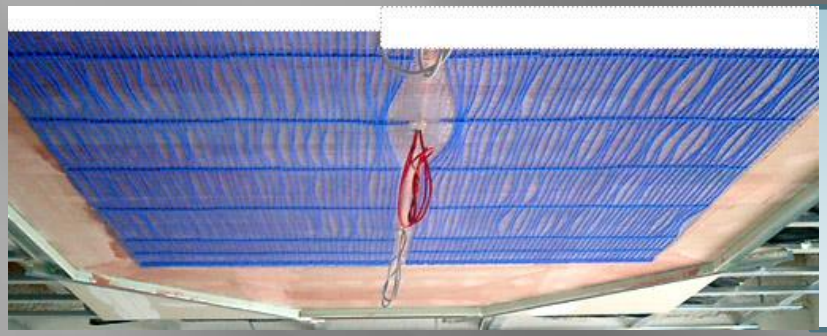
Results

Which results does the new module achieve?

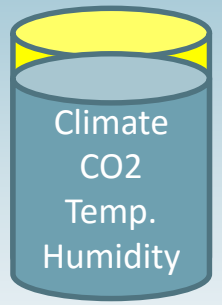
- **High precision** (in this price segment)
  Using a 2-channel NDIR system for the determination of the CO2 concentration and a precise fire sensor means that the best architecture for an early fire detection and for the protection of one's own life that is currently available and economically useful has been chosen.
- **Self-calibration**
  The system is self-calibrating using a CO2 independent spectrum range.
- **Low cross interference**
  Based on the NDIR technology for CO2 and the narrow-band fire sensor there are just minor cross interferences and the false alarm rate is quite low.
- **High lifespan**
  The entire system has a life span of about 7 years.
- **Optimum scaling**
  The CO2 sensor can be scaled up to a measuring range of 2,000, 5,000 or 10,000ppm.
- **High flexibility**
  Based on the integration of other sensors like temperature, humidity and pressure it is possible to control the climatic conditions of a room optimally. So a value-stable module is provided in the long run that can respond quickly to the demands of the market.
- **Data aggregation**
  Other information that is important for the user can be derived from the merging of the measured values of the integrated sensors.

Fields of application

Sensor module for climate control in buildings – CO2 management

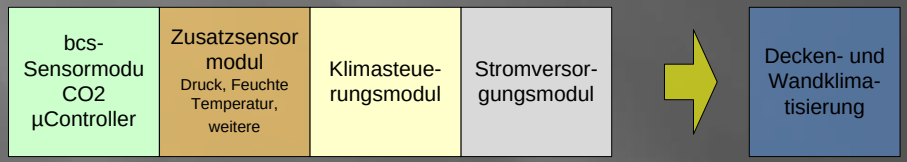


Monitoring of interior spaces such as conference rooms, living rooms, bedrooms etc.



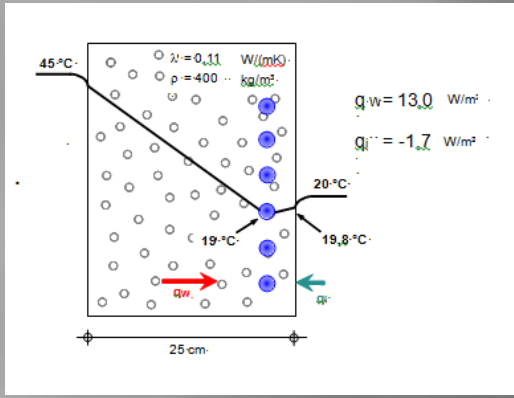
Innovative capillary tube mats or other area cooling systems can be used to provide an optimum heating and cooling system for ceilings, floors and walls. The sensor module ensures the recording of the physical parameters and controls the states of the control. It can also be used for a quick and precise detection of CO2 concentrations.

It used for measuring CO2 concentrations, temperature and humidity and the respective control pulses are outputted which ensures a healthy indoor climate and avoids the formation of mould.

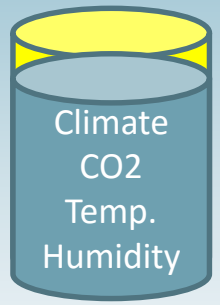


Fields of application

Climate control in buildings



Heating and cooling system for interior spaces such as conference rooms, living rooms, bedrooms etc.

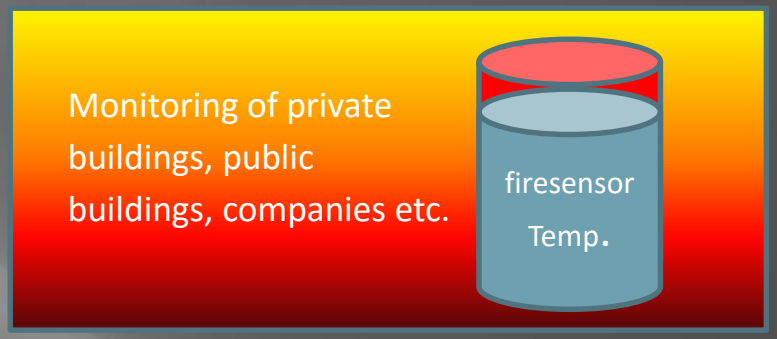


Innovative capillary tube mats can be used to provide an optimum heating and cooling system for ceilings, floors and walls. The functional principle is explained by taking the example of an outside wall. The outside temperature in a warm region during a heat wave is 45°C. A comfortable and cool room temperature of ca. 20°C would be desirable. Previous systems pumped cold air into the rooms at a high speed. Result: inhomogeneous unhealthy indoor climate which also brings about high costs. The heating and cooling system introduced here is used to withdraw the heat from the inside of the wall so that the inside temperature of the wall is kept at a constant value (the heat cannot get into the room). Result: completely homogenous, healthy, comfortable and draft-free climate (at little costs). The same principle can be used of course – vice versa – in the winter season (for heating).

The integrated sensor module ensures the recording of the physical parameters and controls the states of the control. It can also be used for a quick and precise detection of CO2 concentrations.

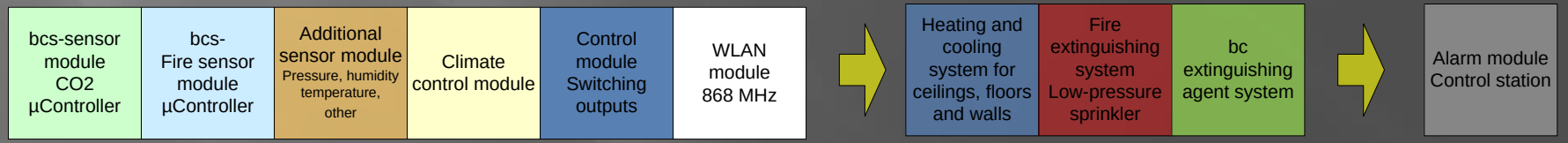
Fields of application

Sensor module for fire extinguishing systems in buildings



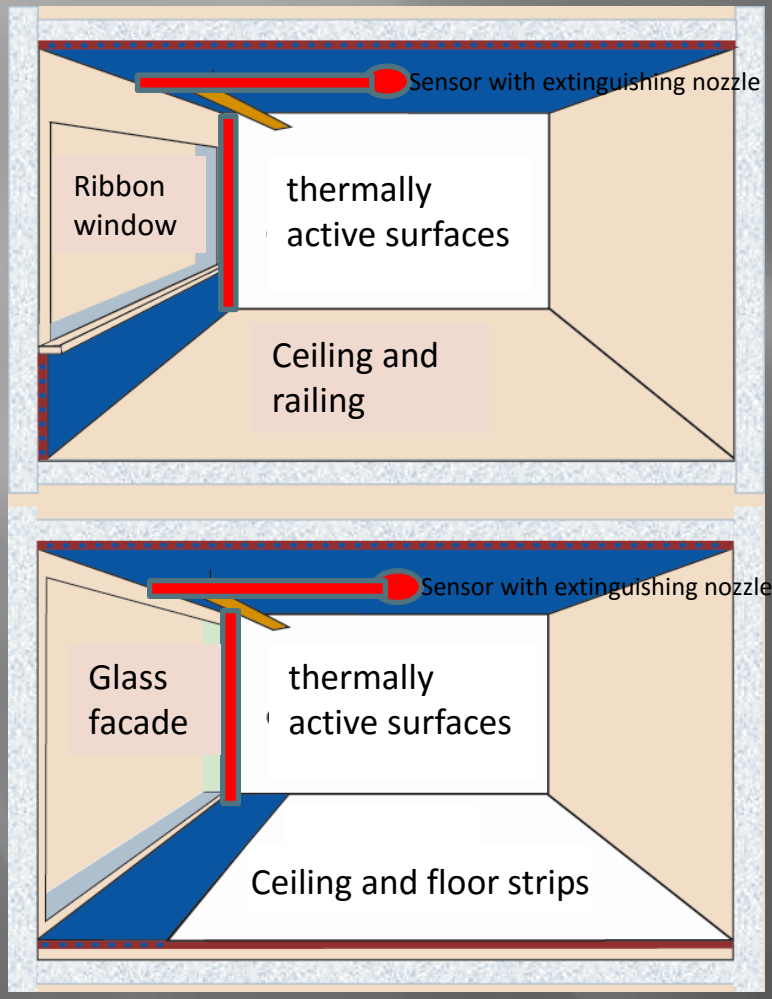
The sensor module can be used optimally for a quick and precise detection of combustion gases.
So it is possible to extinguish delimited areas which minimizes damages caused by extinguishing water. The early recognition of fires makes it possible to reduce the amount of extinguishing agent noticeably compared to conventional sprinkler systems.
An optimum solution is reached by the combination with a flexible heating and cooling concept. In this case only one system has to be installed (see picture top left).

The extinction is only carried out as long as it is really necessary!



Fields of application

Heating/cooling and fire extinguishing systems in buildings



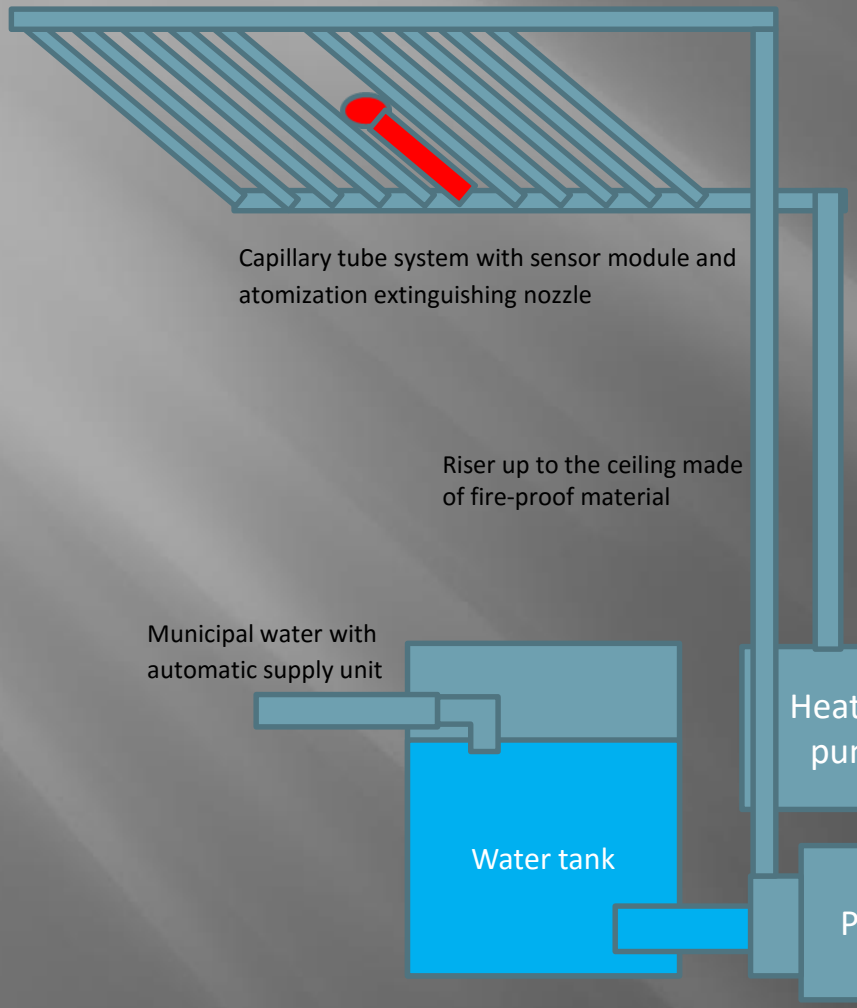
Monitoring of private buildings, public buildings, companies etc.

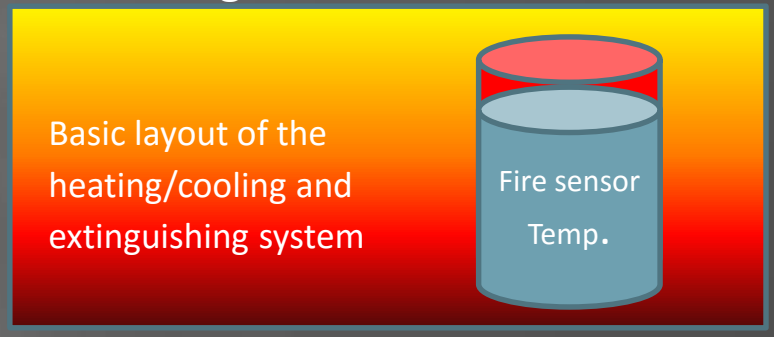
The extinguishing system is coupled with the heating and cooling system. It is important for the installation that the main pipes and risers are constructed in accordance with certified sprinkler systems so that in the case of fire the water transport is ensured through the supply wells up to the ceilings. The extinguishing system in the ceilings can be supplied from the heating and cooling system.
The extinguishing system is not provided for the extinction of the climate capillary system.

The system has not been certified yet.

Fields of application

Heating/cooling and fire extinguishing systems in buildings

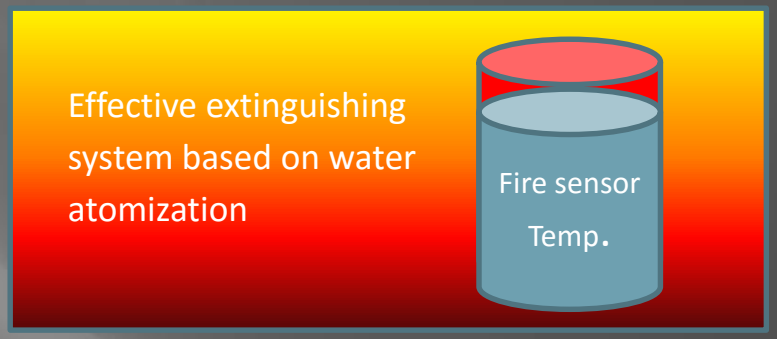




The heating and cooling system is a closed circle. In the case of a fire, additional water is pumped from the water tank to compensate the water loss caused by extinguishing the fire.
The system can be equipped with an emergency generator to increase the safety in order to keep the extinguishing system working in the case of a power failure. The emergency system is only used for supplying the sensor module and the pump.

Fields of application

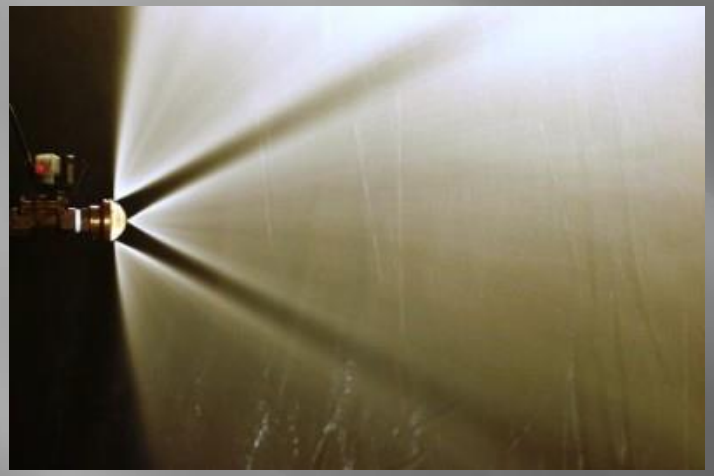
Extinguishing system with twin swirling nozzles

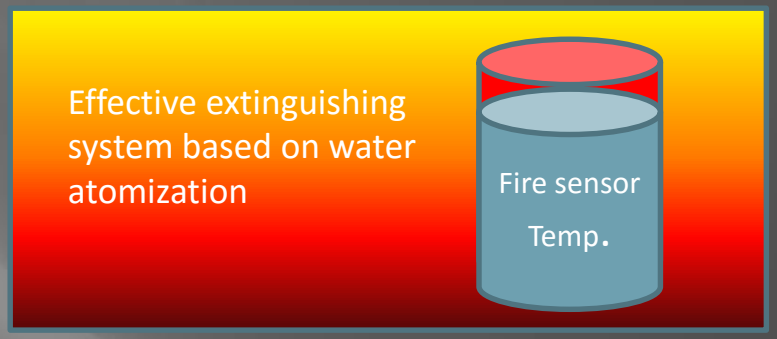


Twin swirling nozzles provide an excellent protection in the case of a fire because of their two hollow cones that fit into each other. The two hollow cones that meet the bottom in a circle minimize a possible spray shadow and minimize the fire propagation.
Although the twin swirling nozzles are provided with two spray cones they are really water-saving. A flow rate of less than 10 l/min is possible. So they are many times more efficient than sprinkler systems.
The nozzles have a spray diameter of 5-9 m, cover a reach of efficiency of ca. 12m² and can therefore be efficiently used for the protection of rooms (Source: Figures and text by Herzog Ingenieur-Büro).

Fields of application

Extinguishing system with multiple swirling nozzles





Due to their specific alignment, multiple swirling nozzles are perfectly suitable for special constructions. They can protect larger areas from the consequences of a fire or provide an effective protection of openings (doors, windows or large glass facades).
This opening protection can be installed as a smoke and/or heat retention and is therefore predestined for the protection of escape routes or as a partition (object protection for glass facades) (Source: Figures and text by Herzog Ingenieur-Büro).

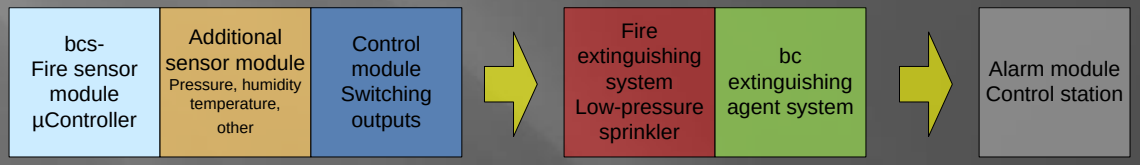
Fields of application

Sensor module for fire extinguishing systems in containers

Monitoring of containers, mobile of fixed objects etc.

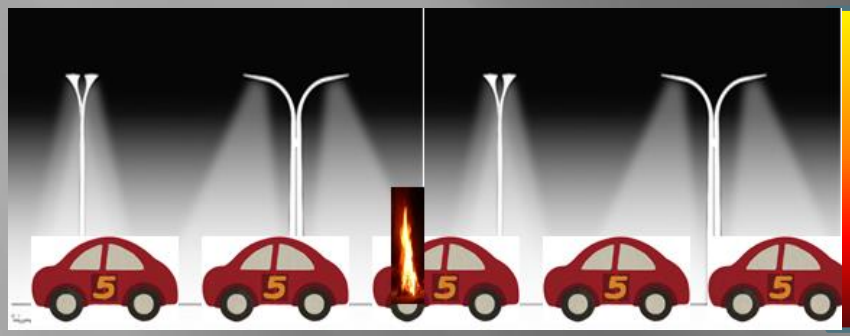
The sensor module can be used optimally for a quick and precise detection of combustion gases.
So it is possible to extinguish delimited areas which minimizes damages caused by extinguishing water.
The early recognition of fires makes it possible to reduce the amount of extinguishing agent noticeably compared to conventional sprinkler systems.
In container systems, too, the heating and cooling system can be combined optimally with the fire extinguishing system.

The extinction is only carried out as long as it is really necessary!



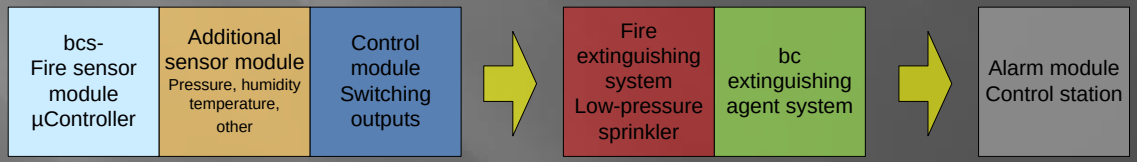
Fields of application

Sensor module for fire extinguishing systems in vehicles, on ships etc.



Monitoring of land, air, water vehicles, motor yachts, professional shipping, trains etc.

The sensor module can be used for a quick and precise detection of a fire in vehicles.
It recognizes natural fires (caused by technical defects) and also artificial fires (caused by arson) reliably. The objective of the use of the sensors is to give real-time information in a dangerous situation in order to prevent such a situation quickly and efficiently.



Thank you very much
for your attention.