

D+H

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+ MECHANICAL
SMOKE EXTRACTION

Mechanical smoke extraction - now also with D+H

The thermal properties of flue gases and fresh air are not always sufficient to ensure safe, reliable smoke extraction from a building. This issue can be addressed by using fans/ventilators and smoke extraction ducts. When the function of a smoke and heat exhaust system (SHEV) is achieved with motor-driven fans/ventilators, this is defined as mechanical smoke extraction (MSE).

How does mechanical smoke extraction work?

In case of fire, a mechanical smoke and heat exhaust system (MSE) ensures that interior facilities, basement rooms or underground car parks can have smoke extracted safely and reliably. A mechanical smoke and heat exhaust system uses motor-driven fans/ventilators to suck smoke out of the building either directly or through an installed duct system. At the same time, a comparable amount of fresh air is fed in through backflow openings. This creates a stable low-smoke layer of air in the lower area of the room where the fire can be fought and people can be rescued. At the same time, the thermal load on the building structure is reduced by targeted heat removal. This makes firefighting operations easier

and increases the safety of the firefighters. In addition, at lower temperatures there is a higher chance that a burning building can be saved. A mechanical smoke and heat exhaust system helps make it possible to rescue people who are still in the building. It makes firefighting operations in the building easier for the firefighters and helps protect property as well as prevent operating failures. A mechanical smoke exhaust system can also be used for general ventilation as well as for ventilation after a gas leak, such as CO₂, NO₂ or LPG.

Areas of application

If the use of a natural smoke extraction system is not possible for structural or thermal reasons, then a mechanical smoke and heat exhaust system is used. Examples of this include multi-storey buildings, interior facilities and underground car parks (requires important planning steps in addition to MSE). Moreover, shopping centres, large-scale industrial buildings, logistics centres, power plants or heating plants can be equipped with a mechanical smoke exhaust system. The use of a mechanical smoke exhaust system may be the result of specifications in local guidelines and regulations or in the building permit.

What does the process look like in case of fire?

The intake and exhaust air paths are opened

The smoke extraction fans are not turned on until confirmation is received that the backflow openings have been opened. This prevents the building and people from being harmed by an excessively high negative pressure in the building.

The smoke is extracted

Heat-resistant smoke extraction fans guide the smoke out of the affected room. These fans can be installed on the roof, in the wall of the relevant facilities or at a central location. In the case of interior rooms without windows, smoke is routed out of the building through a duct system. Here it is necessary to ensure that the smoke is not released into adjacent rooms. To prevent this unwanted effect, fire dampers can be installed inside of the duct system.

Fresh air flows back into the building

Backflow openings for supply air must have sufficient dimensions and be positioned near the floor with uniform space between them. This ensures that fresh air can flow in within the low-smoke layer without creating turbulence in the smoke. Here, the flow velocity must not exceed the normative requirement. Overall, it must be ensured that there is a balance between the outflowing smoke and the backflowing supply air. If a natural backflow is not possible, then fresh air is supplied mechanically.

Complex smoke extraction scenarios can be realised with a combination of mechanical and natural backflow of supply air (e.g. with fans, automatically opening windows, blinds or automated doors).



How mechanical smoke extraction works with the CPS-M controller

We have developed an outstanding controller for all application areas, such as a mechanical smoke exhaust system. The CPS-M is a control panel for controlling systems designed to prevent the spread of smoke, heat and fire - and it can be expanded to meet individual requirements. The CPS-M controls and monitors all components and regulates the power supply for the entire system. During everyday use, the CPS-M is also suitable for controlling ventilation systems in buildings. Above all, however, the CPS-M demonstrates its special capability in complex systems such as a mechanical smoke and heat exhaust system. The programming and structure of the CPS-M are based on fire scenarios or on directives for the design of ventilation systems. This means, for example, the controller can be used in underground car parks. If sensors detect too much carbon dioxide (CO₂), nitrous dioxide (NO₂) or liquefied petroleum gas (LPG) in the underground car park, then smoke extraction fans will be started by the CPS-M. The fans can be activated by means of frequency converters, soft starters or directly by contactors (switches).



We can win over customers with these equipment features and functionalities

- » Design for customised solutions/projects
- » Guarantees the safe and gentle start-up of fans (with a frequency converter, soft starter or directly)
- » Compatible with all fire dampers, smoke extraction flaps and electric window drives for backflow openings
- » Monitored group outputs 24 V DC / 230 V AC for activation of all common smoke extraction flaps and fire dampers
- » Runtime monitoring
- » Multiple options for displaying the operating status, e.g. touch panel (optional)

The CPS-M supports the Modbus RTU protocol, which means that status signals of the individual components and control signals can be forwarded to the building management system (BMS). A shared touch panel can be used to display the operating status of multiple control units in the building. As a result, you can keep track of everything even in large, extensive systems with multiple AdComNet nodes. The individual nodes are networked using AdComNet, the first bus system to be certified for SHEV by the VdS Technical

Inspection Services, an internationally renowned institution for fire protection and general safety in companies. This technology allows control panels to be combined to form a single decentralised and overarching system. This involves linking the controllers in such a way that complex scenarios and individual smoke compartments can be configured depending on space utilisation.

Your advantage with the CPS-M

- » Thanks to its modular design, the controller can be individually configured for all of the customer's requirements
- » If the building is ever expanded, simply retrofit additional assemblies
- » The controller can be freely and easily configured with the D+H SCS software
- » Not bound to the software and programmers of other PLC manufacturers
- » The Modbus RTU-based ACB bus communication for the drives makes it possible to reduce the cost of the entire system. In addition to lower costs and effort for the cabling, the number of modules required is also reduced
- » Window drives can be activated individually by the CPS-M, even for a shared line with just one connection, by means of ACB (Modbus)
- » No additional lines are needed for the ACB drive end position messages required for the MSE because they are queried over the same bus line
- » The integrated emergency power supply guarantees smooth operation of the controller even if there is a power cut in the building
- » Low energy requirements for the controller in emergency power operation
- » Flexible and cost-conscious support provided by the global D+H service network

CPS-M1-MSE



Performance features

- » Variable modular technology for complex control requirements
- » Flexible system design thanks to the supporting rail assembly for all modules and additions
- » Supply connection and communication using integrated plug connectors
- » Assemblies can be retrofitted in case of building modifications
- » Configurable MSE and ventilation functions via D+H SCS software
- » Inputs and outputs monitored for line breakage and short circuit
- » VdS-approved AdComNet bus system for seamless networking of the modules within the CPS-M and other D+H AdComNet components
- » Flexible use of configurable, digital inputs and outputs
- » 24 V DC:
 - 2x max. 10 A drive current per actuator module
 - Stabilised output voltage thanks to power pack technology
 - No signal loss in case of mains outage thanks to integrated emergency power supply (72 h)
- » 230 V AC:
 - VdS-approved emergency power supply (72 h)
 - Option to connect up to 45 drives (230 V AC) per drive group (1840 VA)
- » 400 V AC:
 - Selection of fan actuation by inverter, soft starter or directly
 - Supply via main switch and with automatic switching to mains supply if necessary

Technical data

	CPS-M1-MSE
Supply	400 V AC / 50 Hz
Output	24 V DC / 230 V AC / 400 V AC
Ripple	< 50 mVss at 24 V DC
Mode of operation monitoring	Pulse operation
Type of protection	IP 54
Temperature range	-5 °C ... +40 °C
Housing	Steel sheet

Batteries must be ordered separately.

Design

Type	Art. No.	Remark
CPS-M1-MSE	31.700.02	Variable equipment possible

Accessories

Module sets

Batteries

SHEV operation panels

Remote maintenance gateway

Sensor systems

External accessories

The following external accessories can be used for a MSE system:

- » Ventilator
- » Smoke extraction flap
- » Fire damper
- » CO₂-, NO₂- & LPG-Sensor
- » Jetfan
- » Smoke extraction channel
- » Smoke curtains
- » 400 V AC Emergency power supply

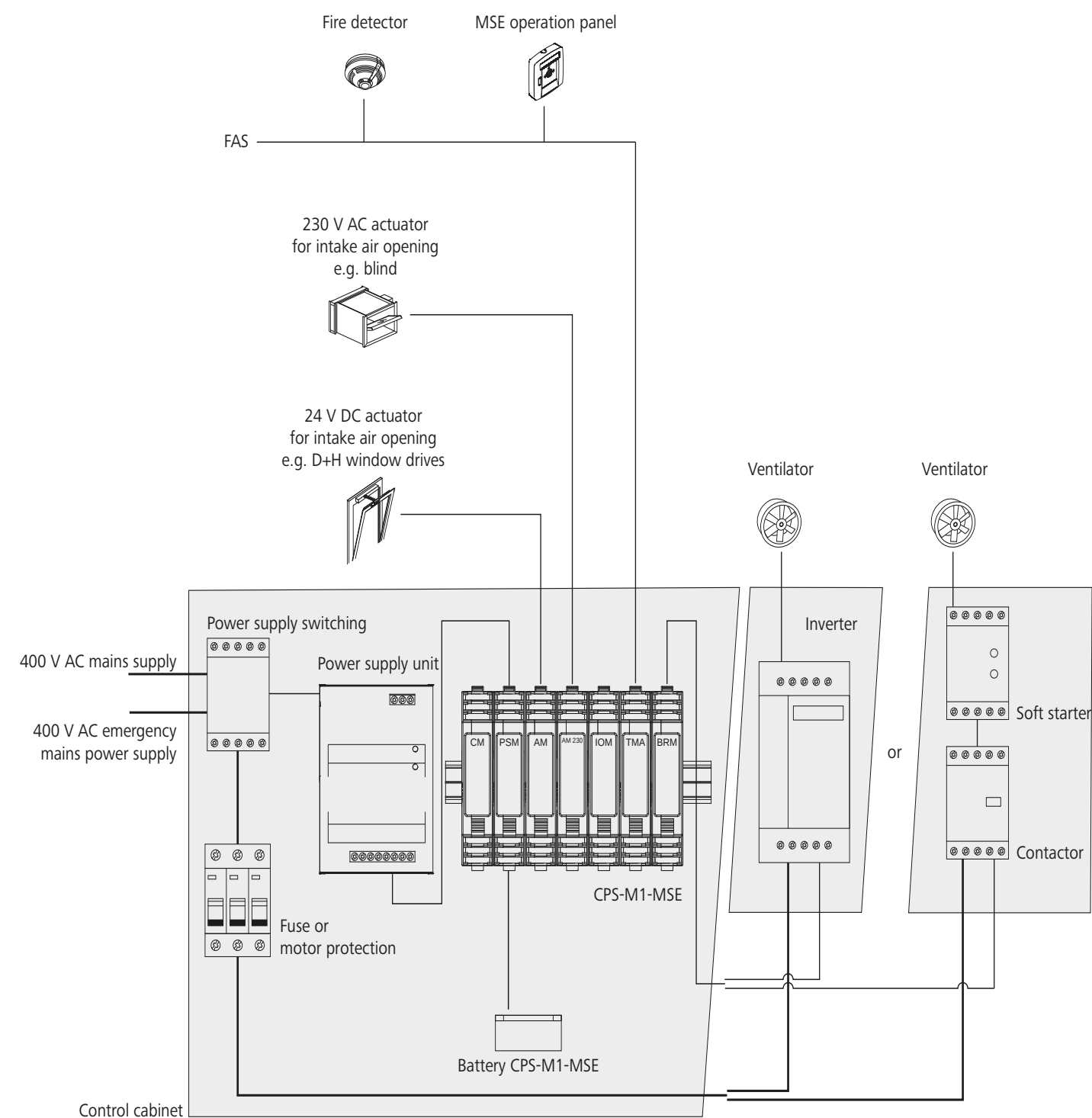
On request we can provide you with sources of supply for fans and fire dampers. We will be delighted to advise you on the choice of proper components.

Operating principle



- 1 Roof fan
- 2 Smoke detectors from D+H
- 3 Smoke vent buttons from D+H
- 4 Smoke extraction flaps / blinds
- 5 CPS-M1-MSE controller from D+H
- 6 RZN-M control panel from D+H
- 7 Intake air opening e.g. by means of a D+H drive (e.g. CDC Series)
- 8 Smoke extraction shaft

Example of application





D+H Mechatronic AG
Georg-Sasse-Straße 28-32
22949 Ammersbek
Germany

Phone: +49 40 60565 0
Fax: +49 40 60565 222
E-Mail: info@dh-partner.com

Your D+H service and sales partner:

WWW.DH-PARTNER.COM