+ Company profile

D+H company profile

Innovations “Made in Germany”

D+H Mechatronic AG has been setting trends in the market for 50 years with high-precision SHEV and ventilation technologies. We are number 1 in Germany and also rank among the market leaders internationally as a driver in the industry for natural, motorised smoke and heat exhaust ventilation (SHEV) and as a premium supplier. Our family-owned company in Ammersbek near Hamburg uses state-of-the-art technologies to research, develop and produce quality products that are tested and certified. We inspire our customers with customised solutions that are made in Germany and with a high planning and installation reliability on site.

D+H headquarters in Ammersbek, Germany

Certification in accordance with:

VdS • ISO 9001 • anerkannte Produkte • anerkannte Systeme

We are a member of:

ZVEI: Fachkreis elektomotorisch betriebene Rauch- u. Wärmeabzugsanlagen

Qualität ‚Made in Germany'

VFE Verband Fensterautomation und Entrauchung

Gemeinsam stark für natürlich frische Luft

Your trust requires 5 stars

Specialized expertise - The knowledge to turn ideas into reality

We live on air and love. Because we are just as much in our element when it comes to breathing air as we are with love for and in your product. We drive forwards and work in a future-orientated way, without neglecting to look back half a century. Today, as in the past, we meet all challenges with our unique expertise. Knowledge that serves only one purpose: to develop and realise your individual wishes.

Development - Where others stop, we keep going on

Our in-house research and development expertise doesn't just extend from the first stroke to the market-ready product. Your finished product is simply smarter than others thanks to the in-built intelligence of our experienced engineers. Why? Our mechanical, electronic, embedded software and front-end developers have mastered all the disciplines that your product needs to exceed your wishes and requirements.

Production - Capable of setting the pace

The assembly of a printed circuit board with 20,000 components per hour - just one of many figures that inspire our customers. With state-of-the-art machines and around 90 qualified specialists, we offer flexible, efficient series and individual production on 5500 m². People and technology work together to create high-quality solutions that exceed your expectations.

Technology “Made in Germany” - Creating products cherished by engineers

German engineering - the term is a real perennial favourite that still resonates internationally today when people talk about quality ‘Made in Germany’ and Germany as a production location. Because the seal of quality is still preceded by its excellent reputation. As a global premium supplier, we naturally feel at home on international terrain. But as a family-run and craft business with regional ties, we also know where our roots are. So your D+H technology will continue to be developed and produced in Ammersbek near Hamburg. This is as safe as our products. Rigorous tests guarantee top performance - genuine German engineering that is valued internationally.

Quality - Delivering something you can trust

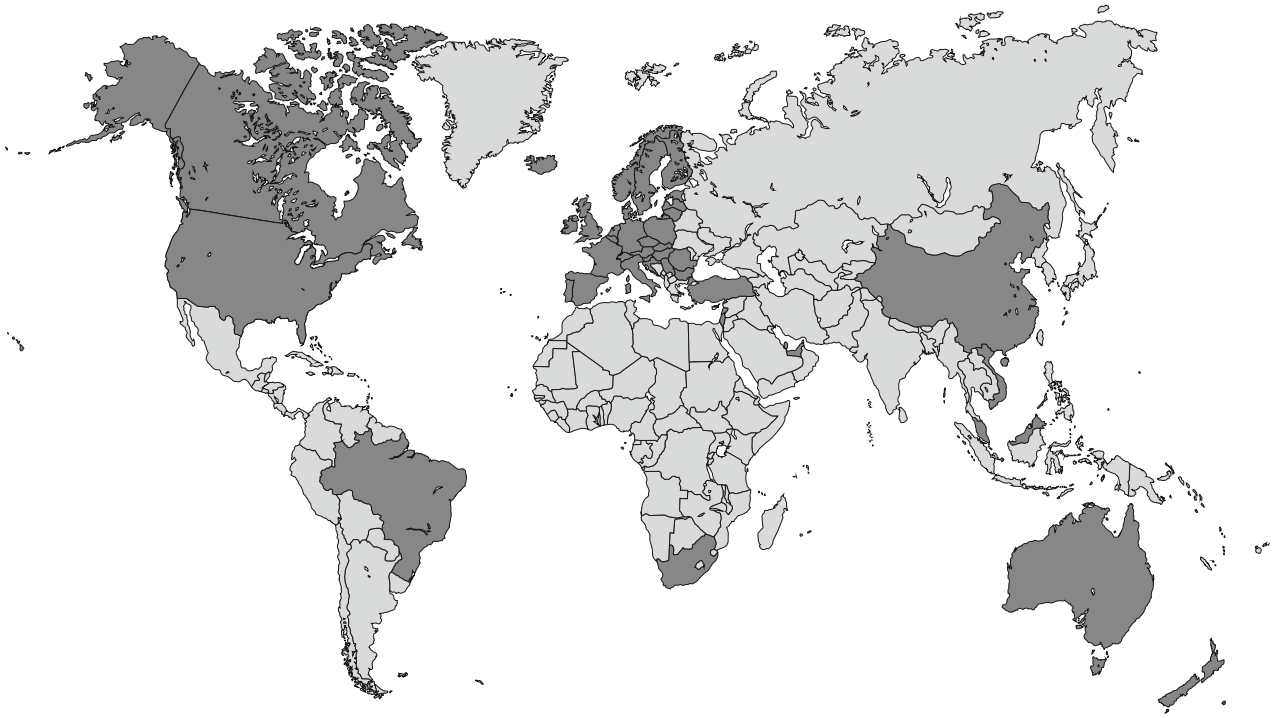
Quality means more than just a perfect product - it is the added value that fulfils the highest safety and comfort requirements. In order to meet the highest standards of safety and comfort, we not only have to explore the limits of what is technically feasible. The level of quality defined by D+H in Germany is also consciously and purposefully incorporated into European and global standards - for and in the interests of the customer and the safety of us all.

What connects us

Each product begins with a unique benefit. And the right time to begin your discussion with us. D+H offers you product solutions that set the standards of tomorrow today. Our highly precise drive and control technologies for smoke extraction and natural ventilation bring pioneering innovations into hundreds of thousands of buildings, and with about 500 D+H Group employees worldwide, this ensures an optimal indoor climate and sufficient air in case of fire.
At D+H, you can count on powerful and intelligent drive and control products, a flexible and quick production system, extraordinarily high development expertise, personalised service and our most valuable and unifying product: our knowledge

D+H Service and sales network

Our network of approximately 130 qualified D+H service and sales partners in over 50 countries is one-of-a-kind. Thanks to this presence of selected specialist companies nearly everywhere, D+H achieves nearly unrivalled proximity to its customers right where they are - and meets the high quality requirements for skilled complete services in all parts of the world: for object-oriented planning and consulting, professional installation and maintenance as well as a reliable supply of spare parts.



D+H Weltweit

Australia
Belgium
Brazil
Bulgaria
China
Denmark
Germany
Estonia
Finland
France
Great Britain
Hong Kong
Ireland
Iceland
Israel
Italy
Canada
Qatar
Croatia
Latvia
Lebanon
Lithuania
Luxembourg
Malaysia
New Zealand
The Netherlands
Norway
Austria
Poland
Portugal
Romania
Sweden
Switzerland
Serbia
Singapore
Slovakia
Slovenia
Spain
South Africa
Czech Republic
Turkey
Hungary
USA
United Arab Emirates
Vietnam

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Why SHEV?

Smoke vent saves lives and protects property

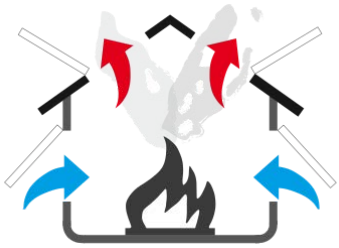
If there is a building fire, the smoke formation and toxic combustion gases represent the greatest danger for people. If fire breaks out, 9 out of 10 people die due to poisoning from inhaling extremely toxic flue gases. A closed room is quickly completely filled with toxic smoke; people in the building are cut off from escape and emergency routes. For this reason, fast and reliable smoke extraction gains considerable importance. Smoke and heat exhaust ventilators (SHEV) effectively conduct the smoke and fire gases out of the building and can thereby save lives.

Controlled by fire-detecting sensors, they open areas in the upper wall or ceiling area, through which the rising hot combustion gases can escape. On the other hand, a low-smoke layer forms in the lower area of a building, which enables people to escape the fire-affected area and the fire brigade to go directly to the fire source. Property within this low-smoke layer is largely protected from smoke and soot. And the extraction of heat prevents the thermal load on the building structure from causing it to collapse.

Comparison without / with SHEV

Without SHEV:

Toxic fire smoke and extreme heat accumulate in the building and endanger lives.



With SHEV:

Smoke and heat can escape through intake air openings in the lower wall area and exhaust air openings in the upper wall or ceiling area. The smoke is diverted in a stable smoke layer boundary above the area where there are people; escape and evacuation routes are kept free.

Number 1 in Germany in the field of smoke and heat exhaust ventilation

D+H provides innovative standard and customised solutions for smoke and heat exhaust ventilation (SHEV) around the world. For over 45 years we have been developing products for your safety in the event of a fire. As one of the first companies to have developed natural SHEV and as the first manufacturer of certified electric SHEV, today we have more experience and skills than any other provider. From extracting smoke from a stairwell to complex SHEV systems for large buildings: D+H provides you with a comprehensive programme of tested and certified products for smoke and heat exhaust ventilation.

SHEV compact unit with an integrated smoke vent and ventilation button: receives fire detector signals, evaluates the measurement results, controls the window drives and the ventilation function

Fire detector automatically detects a fire in enclosed rooms

Control elements enable triggering via buttons, with integrated ventilation function

Chain and rack and pinion drives open SHEV and ventilation flaps into any position with precision

Risk Assessment and Protective Measures

Power-Operated Windows (in accordance with the Machinery Directive 2006/42/EG)

Possible danger points at power-operated windows

1. Risk of crushing and injury by shearing on main closing edge
2. Drive (incomplete machine)
3. Risk of impact injury
4. Risk of crushing and injury by shearing on side closing edges
5. Danger point between side closing edge and reveal

Task

Power-operated windows are façade or roofing elements that are equipped with a drive system. These elements are in extremely widespread use as com- ponents of smoke and heat exhaust systems (SHEV) and ventilation systems in all kinds of buildings, that are used for a huge variety of purposes. There are potential risks associated with power-operated windows, especially if they are controlled automatically. These risks must be countered by appropriate specifi- cations, defined by the planner, and protective measures, implemented by the installers, operators or maintenance technicians. Ensuring that power-operat ed windows are safe starts with the risk assessment. This includes identifying possible dangers, putting in place suitable countermeasures and warning of residual risks. A risk assessment is performed at the planning stage, well before installation starts.

Legal basis

Machinery Directive 2006/42/EG, issued by the European Parliament and the European Council on May 17th, 2006, defines a uniform level of protection within the European Economic Area, Switzerland and Turkey, intended to prevent accidents involving machines and incomplete machines when they are being brought into operation. The Appendix to product standard EN 14351-1 for windows and external doors refers to the Machinery Directive. A machine is a unit equipped with a drive system that does not consist of directly applied human force, and includes parts that are connected together, at least one of which is mobile. In this context, it is irrelevant whether this unit is already equipped with a connection cable, or has been connected to its own power supply. As defined in the Machinery Directive, the manufacturer of the ma- chine is the agency that combines the drive or drive system with the window (e.g. the metal fabricator, window manufacturer or SHEV installer). The machine's manufacturer or their representative must ensure that a risk assess- ment is performed, to identify the health and safety requirements applicable to the machine. That manufacturer or representative accepts general liability for performing the risk assessment correctly, and applying the necessary protective measures, no matter on whose behalf they are acting. The results of the risk assessment must be taken into consideration when the machine is designed and manufactured.

What do I need to do to meet the requirements of the Machinery Directive?

» Carry out risk assessment
» Putting protective measures in place
» Apply CE labe
» Determine protection class
» Certificate of conformity

Assignment of protective measures

Protective measures are all the measures that reduce risk. Different protective measures are needed to minimise risk, depending on what risk is present. There are no standard protective measures for the use of power-operated windows in buildings. If power-operated windows are used in buildings, a building-specific risk analysis must always be performed to identify effectiv and cost-efficient solutions! Protective measures can be assigned to the pro tection classes shown in the table below.

The required protection class is achieved by applying one of the measures identified there. However, that measure must be suitable for actual use involved. Measures can also be combined. Measures in a higher protection class also cover a lower protection class.

Examples of protective measures

Protection class 0	- No protective measures required
Protection class 1	- Warning notices
Protection class 2	- Access is made safe with constructional measures or - Rounded, padded edges, closing force of 80 N to 150 N, no shearing effect or - Audible warning signal or - Warning lights or - EMERGENCY-OFF switch on the window or - Non-fixed devices in front of the window that prevent access to it
Protection class 3	- Dead-man's control without higher-level central control system or - Movement is stopped 25 mm before the end position over a period of 10 s. Triggering of an optical or audible signal. Further movement with signal up to end position or - Slower sash movement, max. 5 mm/s or - Access width less than 8 mm or - Rounded, padded edges, low closing force (less than 80 N), no shearing effect
Protection class 4	- Safety achieved by touch-activated safety equipment, e.g. safety edges, contact sensors or - Safety achieved by a contactless active safety device, e.g light barriers, light grid or - Dead-man's control with authorised operation of each window without a higher-level central control system (e.g. key button) or - Access width less than 4 mm or - Sccess is prevented by constructional measures

Solutions from D+H

All protective measures can be implemented with D+H drives. A wide variety of protective measures can be achieved even with the standard version. Additional options can be fitted to cover an even greater range of protective measures. These options are available for many D+H drives

Warning notices:
Every D+H drive has a warning label that must be attached to the power-op erated window.

Closing force 80 N to 150 N:
The closing force of most D+H drives (apart from ZA, DXD and CDP drives) is limited at the factory to 150 N over the last 100 mm of travel. The running speed at this distance is also reduced to 5 mm/s. These parameters can be adjusted in the D+H software SCS.

Audible warning signal (option -AS2):
The drive is fitted with a 2.3 kHz signal emitter. An audible signal is emitted for the duration of the stroke while a window is closing. Cycle timing: 0.5 s pause and 0.5 s signal. The volume and the cycle timing can be adjusted in the D+H software SCS.

Warning lights:
A warning light can be connected either directly to the drive, or to the drive's clamping unit. It produces a visible warning signal during the entire closing process.

Dead-man's control:
At the factory, all D+H control panels are set to be key-operated. In other words, the drives only run when the ventilation button is being pressed.

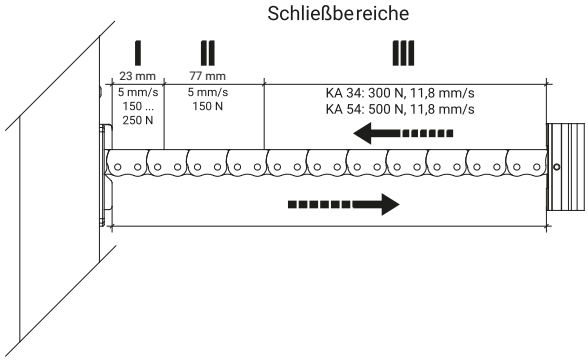
Security provided by the D+H presence detector

Stops the movement and generates an audible warning signal (option -AS3):
The drive is a fitted with a 2.3 kHz signal emitter. An audible signal sounds for 4 s before the window starts closing. The closing process starts after this. When the window is 25 mm away from its closed position, the drive stops for 11 s. At the start of this 11 s stopping time, an audible signal is emitted. This signal continues to sound until the window reaches its end position. The clos- ing speed is reduced to 5 mm/s over this final 25 mm before the end position. The volume of the signal, and other parameters, can be adjusted in the D+H software SCS.

Slower sash movement:
The running speed over the last 100 mm in the CLOSED direction is limited to 5 mm/s in all D+H drives. This running speed is set at the factory. The D+H software SCS has settings for reducing this speed over the entire range of travel. This option can also be supplied as a factory setting by requesting "option -LS".

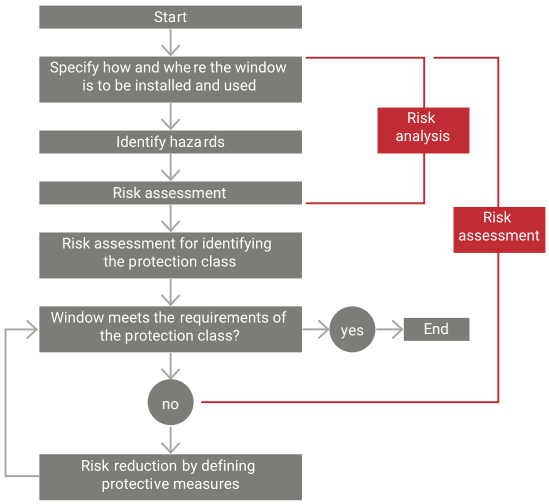
Safety provided by safety equipment (option -SKS):
Touch-activated or contactless active safety devices can also be attache directly to the drives or drive groups on all D+H drives that use BSY+ technolo- gy. Alternatively, a closing edge protection module can be installed in front of the drive to which the safety device is connected.

Dead-man's control with authorised operation:
All D+H drives can also be operated by key vent buttons, which also prevents them from being opened by unauthorised persons.

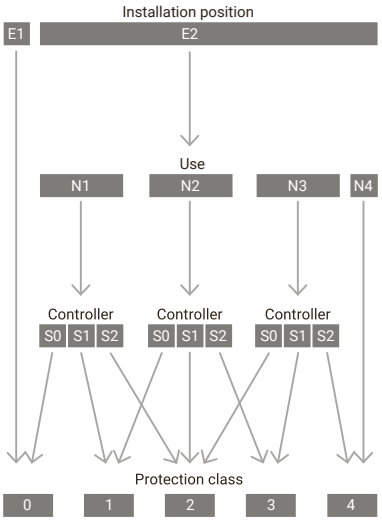


Running speeds and forces for KA 34 / KA 54

Risk assessment



Determining the protection class



Risk assessment

Example installation	Risk Level	Risk Parameter
a) installation height of lower edge of sash is at least 2.5 m above the floor or fixed access level b) fixed objects installed in front of the window to prevent access c) window sills or ledges that prevent users from having free access to the window	-	E1
Installation height of lower edge of sash is less than 2.5 m above the floor or access level, and window is easily accessible	++	E2

Room use	Risk Level	Risk Parameter
Rooms that are used for commercial purposes, whose users know how to use this window technology (e.g. office space, industrial halls)	-	N1
Living areas, whose users know how to use this window technology, or rooms whose users/visitors can judge the risks and react accordingly	o	N2
Rooms used regularly by people who are not familiar with how to use window technology safely and cannot receive training in how to do so (e.g. sales rooms, events rooms, etc.)	+	N3
Rooms used regularly by vulnerable people or people who are unable to assess the risks (e.g. nursery schools, schools, hospitals, etc.)	+++	N4

Control/operation	Risk Level	Risk Parameter
Manual operation without self-locking mechanism (dead-man's control), where a windows can be clearly seen (e.g. use of a key vent switch)	-	S0
Manual operation with self-locking mechanism where all windows can be clearly seen	-	S1
Automatic operation (e.g. wind/rain controller, building management system) or manual operation without a clear view of all windows	++	S2

MEANING OF SYMBOLS: - very low risk - low risk | o average risk | + high risk | ++ higher risk | +++ very high risk
REFERENCES: Parts of the data sheet correspond to a publication issued by the ZVEI (“Zentralverband Elektrotechnik- und Elektronikindustrie e.V.”, known in English as the German Electrical and Electronic Manufacturers’ Association).

Basic knowledge of CPS-M

Introduction

The CPS-M is a modular SHEV system, which is used for the smoke and heat exhaust ventilation of a building in the event of a fire.

The CPS-M makes use of fire detectors or is operated by SHEV operation panels in order to activate motorised drives and open existing windows for natural smoke extraction

Components

Four different modules are used for the implementation of the individual tasks and to provide different interfaces …

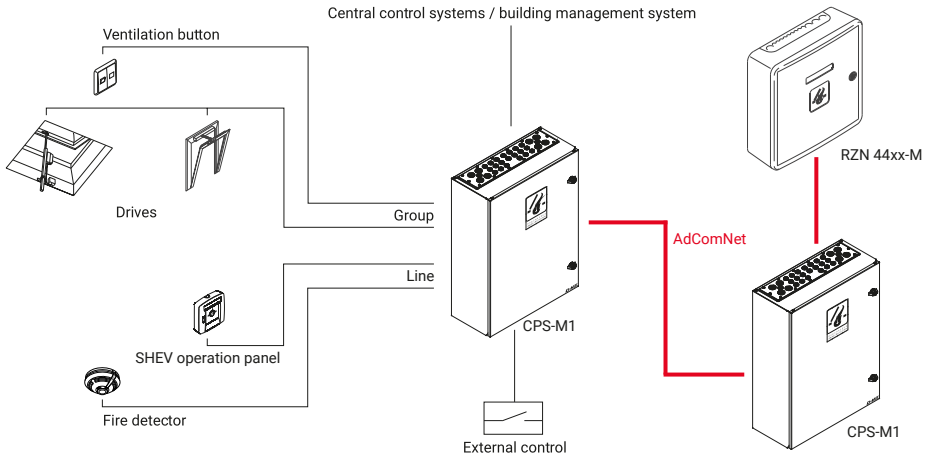
- The controller module is responsible for the internal communication of the control panel as well as for communication to other control panels and only one is required per control panel.
- The supply module is used to power the control panel via an external power pack and is also responsible for charging the emergency power battery. Depending on the overall performance of the system, the number of components required for a control panel can be scaled.
- The drives and ventilation buttons are connected to the actuator module. Depending on the number of drives and the separately assigned fire compartments, the number of actuator modules can be adjusted at any time.
- The fire detectors and the SHEV operation panels are connected to the trigger module. Here, the number of modules must also be adjusted to the quantity of fire detectors and SHEV control panels as well as the separately controlled fire compartments.

… which can be plugged into 3 different module sockets.

- The basic module socket serves as a connection for the controller module and the first supply module of each CPS-M control panel to other modules used by the control panel.
- The expansion module socket is used for the actuator module as well as for the trigger module, in order to expand the system piece-by-piece.
- The supply module socket takes over the task of integration for the supply module and handles the separation of individual control panel sections on the supply level.

While the modules themselves handle the individual tasks of the control panel, the module sockets are used for installation on the TS 35 top hat rail. In addition, the integrated connectors ensure power supply and communication. Other assemblies such as the temperature sensor or the bus termination module are required to ensure the safe operation of the control panel.

Example of application



Operation

When using SHEV, the CPS-M is operated via the mentioned SHEV operation panels in order to open windows in combination with D+H drives at the highest possible speed. Drives from other manufacturers can be connected and operated as well, although not in high speed mode.

Additionally, the CPS-M has a comfort ventilation function, with which windows can be used for natural ventilation purposes. Here, speed is optimised for a particularly low noise emission. Commercially available ventilation buttons are used for operation.

The touch panel in the CPS-M housing can also be used to display the status of the system and the individual statuses of the inputs and outputs, as well as to perform basic functions. The controlled operation of the system is also possible without a touch panel. In this case, the control panel is operated using interfacing buttons and control points

Module arrangement / defining a control panel section

For the most part, the modules can be arranged freely. Be aware of the load on the individual sections of the control panel. These sections are rearranged due to additional supply modules in combination with a power pack. The controller module and the first supply module are positioned first and based on the system design. Actuator and trigger modules can then be freely positioned. We recommend that you adhere to the path of lowest load and, if possible, place the utilised actuator modules at the respective supply modules of the control panel sections.

Configuration

The assignment of the different fire compartments and the associated allocation of the actuator module group to the trigger module line as well as the assignment and use of the available digital inputs and outputs, for example as ventilation buttons, are configured via the SCS software tool.

In the SCS tool, different settings can also be selected for the individual modules with regard to behavioural patterns. In a network consisting of several control panels, a single point can be used to apply the configuration to all participants, including control panels or ACB (Advanced Communication Bus) drives

Functions

The functions of the individual modules are also set in the SCS tool. For example, in the case of the actuator module, the storage operation in the OPEN and CLOSED direction can be set separately for each motor output.
The digital inputs and outputs can be integrated into SHEV or natural ventilation operations and equipped with functions. Depending on the link being used, different functions are available for selection

Actuator types

In the actuator module, the actuator type can also be selected. You can select between reverse-polarity drive and ACB drive.

In combination with ACB drives (and their bus technology), the CPS-M can interact with the drive and use its information for better and more secure operation. All ACB drives are monitored separately from the control panel via bus communication. This also enables cable monitoring to the drives and use of the terminal module is unnecessary.

In addition, when the reverse-polarity drive actuator type is selected, it is possible to activate a required stop-hold function required for drives of other manufacturers. This prevents unintentional movement of the drives under load when disconnected from a power supply.

NOTICE/INFORMATION: When the stop-hold function is used, cable monitoring in accordance with EN 12101-09 can not be guaranteed.

None of the drives available from D+H require the described stop-hold function

Basic knowledge of MSE with CPS-M1-MSE

Introduction

As you have already seen from the previous chapter, “Basic knowledge of CPS-M”, this controller has a modular structure. This characteristic gives it the flexibility required to provide a tailored, individually-planned solution for every project. In addition, the controller is thus capable of managing even the most complex fire scenarios – especially in combination with powered smoke and heat exhaust systems. This is where our CPS-M comes into its own and unleashes its full potential.

The CPS-M processes information from sensors commonly used in SHEV applications such as smoke detectors and manual tripping devices. Not only that, it also processes information from sources such as carbon monoxide, NOX or LPG sensor systems, which are found particularly in connection with vehicle exhaust fumes in underground car parks. But a ventilation scenario triggered by carbon monoxide is also conceivable. The versatility of the CPS-M is also reflected in the number of options for actuating fans. There is the option of actuating them either via inverter, soft starter or directly via contactors. The ultimate extent of the controller’s adaptability is made clear by the SCS software used to program it. There are a multitude of freely assignable programming options that are particularly useful for MSE applications. These options allow you to resolve any problem, no matter how complex. Completely individualized and not tied to specific PLC manufacturers or their complicated programming. The CPS-M supports the open Modbus RTU protocol, which allows easy connection to a building management system.

And if the controller ever does end up reaching its limits, it can be turned into a “team player” in no time. Using AdComNet , you can combine multiple systems to form a network, meaning there is virtually no project beyond the scope of this all-rounder CPS-M

Application

The CPS-M is commonly used in large-scale buildings. Thanks to the control panel’s modular structure, it can be used in a wide variety of facilities.

» Large-volume buildings
» Underground car parks
» Multi-storey car parks
» High-rise buildings
» Street tunnels
» Evacuation routes that run horizontally
» Industrial and production plants
» Shopping and logistics centres
» Power plants and heating systems

Possible system components

The following system components can be used in conjunction with the CPS-M1-MSE:
» Roof, wall and duct fans (with different starting modes)
» 24 V DC or 230 V AC fire dampers and/or smoke extraction flaps
» 24 V DC or 230 V AC drives at the windows, doors and gates
» Fire detectors, manual smoke vent buttons (D+H), smoke detectors and building control systems
» As well as additional components used in MSE systems

Planning options

Option 1: Powered smoke exhaust system
The smoke has been detected in one fire compartment. The CPS-M goes into an alarm state, intake air openings are opened and the smoke extraction fans are started.

Option 2: Ventilation application
Say, for example, a CO^2 sensor is reporting increased gas concentration. The CPS-M opens windows as intake air openings and starts the fan in order to conduct the polluted air out of the building

Operating principle

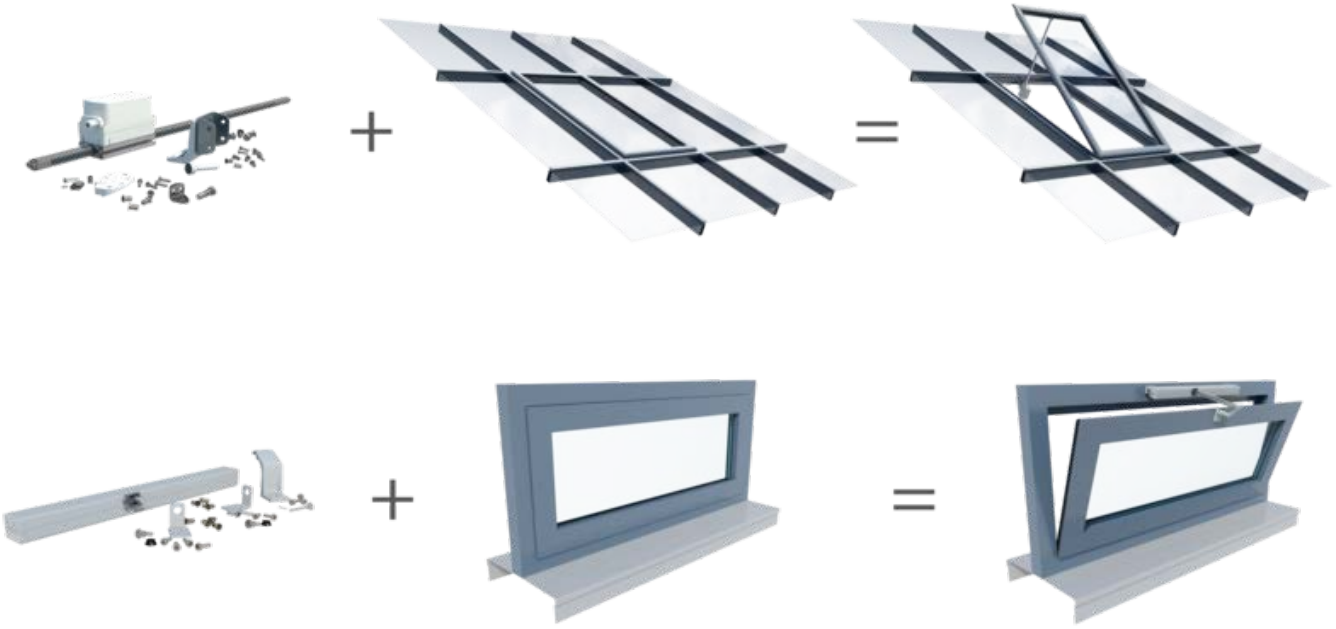
1. Roof fan
2. Smoke detectors from D+H
3. Smoke vent buttons from D+H
4. Smoke extraction flaps / blinds
5. CPS-M1-MSE controller from D+H
6. RZN-M control panel from D+H
7. Intake air opening e.g. by means of a D+H drive (e.g. CDC Series
8. Smoke extraction shaft

NSHEV made simple

Application areas for EN 12101-2

Natural smoke and heat exhaust ventilators (NSHEV) are installed to divert hot flue gases in the event of a fire to ensure that there is a smoke-free area near the floor and in escape routes. Since September 2006, EN 12101-2 is to be used for all NSHEV. This standard defines the requirements and test methods for NSHEVs.

A NSHEV consists of the following components: a motorised drive with corresponding components (bracket, fittings), the filling (glass, panel) and the SHEV opening with corresponding components (profiles, seals, fittings) in the façade or roof.



An approved NSHEV has passed the following individual tests:

» Opening time ≤ 60 s
» Aerodynamically acting surface
» Functional safety
» Snow load / Wind load
» Low ambient temperatures
» Resistance to heat

The tested components must not be replaced with other components.

The tested NSHEV can be recognized by the CE marking:

RES RA 1472 1523 - ZA 24 V						
CE	SL1000	Aa 1.044	Av 1.885	B300-E	Re1000+Le10.000	WL1500	T(00)
	1368-CPR-C-7080	EN 12101-2:2003		22505-2		42/2018
D+H Mechatronic AG						D+H

The path to the CE marking and certificate of constancy of performance of the NSHEV

The CE marking of SHEV products requires a defined testing process for the product and manufacturing plant.
The required steps for issuing the certificate are:

1. Application to a notified testing centre of D+H
2. Testing according to the specified performance classes
3. Application for issuance of a certificate of constancy of performance
4. Setting up a Factory Production Control (FPC)
5. Receive of the certificate of constancy of performance

D+H Euro SHEV manufacturer partnership

D+H Euro SHEV is a one-of-a-kind and optimum solution for manufacturing a NSHEV. The profile system is tested and certified for this purpose in connection with the D+H drive systems. The window manufacturer uses these system tests.
To manufacture NSHEVs in accordance with EN 12101-2, the D+H partners and the window manufacturers work together as follows:

1. The D+H partner calculates a NSHEV based on the respectively valid certificate of constancy of performance.
2. The window manufacturer produces the window, taking into consideration and adhering to these specifications as well as the respectively valid manufacturer guidelines and administrative regulations of the profile system in use.
3. The window manufacturer ensures there is an in-house Factory Production Control (FPC).
4. The window is installed in the object by the window manufacturer in accordance with the processing instructions of the profile system manufacturer.
5. The window manufacturer attaches the CE marking issued by the D+H partner on the NSHEV.
6. The D+H partner annually checks the processes displayed in the FPC in the plant of the window manufacturer and creates an audit report

Overview of advantages:

» Maximum safety with renowned test institutes (IFI Aachen,VdS and MPA)
» No additional costs for NSHEVs
» Widest range of EN solutions on the market » Maximum planning security with Euro SHEV
» NSHEV calculations with myCalc, specialised software
» Creation of EN documents such as NSHEV specification, declaration of performance, CE label, EN test specification, EN instruction for use in 17 languages
» Numerous certified specialist companies (Euro SHEV partners) are also near you

conventional SHEV window

No additional costs for D+H products !

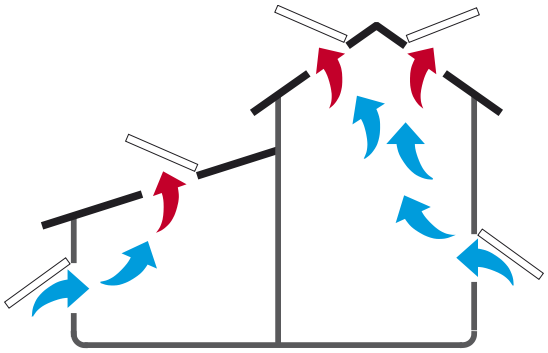
NSHEV in accordance with EN 12101-2

Ventilate: But how?

Healthy climate - quite naturally

With controlled natural ventilation, you can control your indoor climate simply by using natural, freely available energy sources and thermal effects. This method is simple, inexpensive and effective. Opening the windows also creates a particularly healthy and comfortable indoor climate.

Operating principle of controlled natural ventilation



The ventilation is controlled depending on the respective requirements regarding temperature, air hygiene and energy. Intelligent control systems evaluate the prevailing weather and room air conditions, such as the temperature, humidity and carbon dioxide content in the room, plus the outdoor temperature, wind velocity and precipitation.

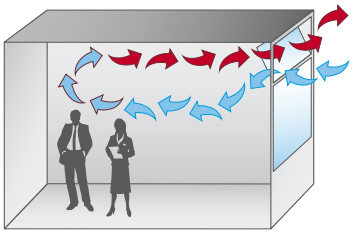
Motorized opening of windows generates a targeted exchange of warm, stale indoor air and fresh outdoor air by means of the difference between indoor and outdoor temperatures, the thermal lift in the room and the wind conditions surrounding the building.

The three basic principles of controlled natural ventilation

Controlled natural ventilation can be achieved in various ways:

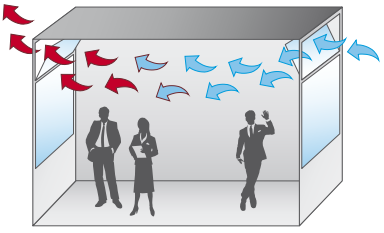
Unilateral ventilation

In the case of unilateral ventilation, windows are to be opened on only one side of the room. The extent of the air exchange is limited, therefore this is used for smaller rooms that can fit a low number of people.



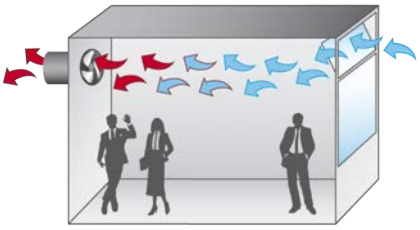
Cross ventilation

Cross ventilation is achieved through windows in two or more outer surfaces by pressure differences at the façades caused by wind. It enables optimum air exchange even in larger rooms with greater depth.



Hybrid ventilation

Hybrid ventilation refers to the combination of motorized windows and an exhaust fan. It is used where ventilation is required even under difficult climatic conditions



The state-of-the-art alternative to mechanical ventilation

With intelligent control systems and window drives from D+H, you can create a customised indoor atmosphere that is pleasant and comfortable. Fresh air enters the building as needed and stale air can escape.

» Optimum air exchange and a healthy indoor climate, even outside of the usage times
» Prevention of damage from humidity and mould formation by continuously dissipating the moisture
» Cooling at night of the building's heated thermal masses as needed in the summer months
» Prevention of overly dry and poor air, which frequently causes health problems in the case of mechanical ventilation (sick-building syndrome)

Controlled natural ventilation is an extremely environmentally friendly, healthy and inexpensive alternative to mechanical ventilation.

Overview of advantages:

» Lower investment costs, significantly lower costs for system technology
» Lower costs for maintenance and repairs (maintenance-free technology)
» Lower energy consumption (no active cooling and fans)
» Shorter construction times thanks to fast installation and commissioning
» Significantly lower space requirements (no distribution shafts and ducts)
» Lower CO2 emissions

AdComNet - The reliable SHEV bus

Convenience and reliability intelligently combined

AdComNet (Advanced Communication Network) is the bus technology from D+H, with which you can integrate decentralised standard SHEV control systems into smoke extraction and ventilation concepts which can be programmed easily and flexibly. The modularly designed network technology is the first VdS-certified bus system for SHEV on the market.

A complex smoke vent scenario, controlled easily and reliably

With AdComNet the conventional control panels can be linked to enable complex scenarios for opening and closing windows or other ventilation equipment, depending on how the room is being used. Smoke vent example: If a fire breaks out on one storey, the closed windows on that storey open immediately and conduct the hazardous fire smoke out of the building.

On the remaining storeys unaffected by the fire, AdComNet closes the open windows to prevent toxic combustion gases from entering. The closed windows in the stairwell are also opened automatically, to keep this escape route free of smoke. By dividing the bus system into independent segments, the individual fire compartments remain functional even if there is a break in communication.

AdComNet: modular and flexible

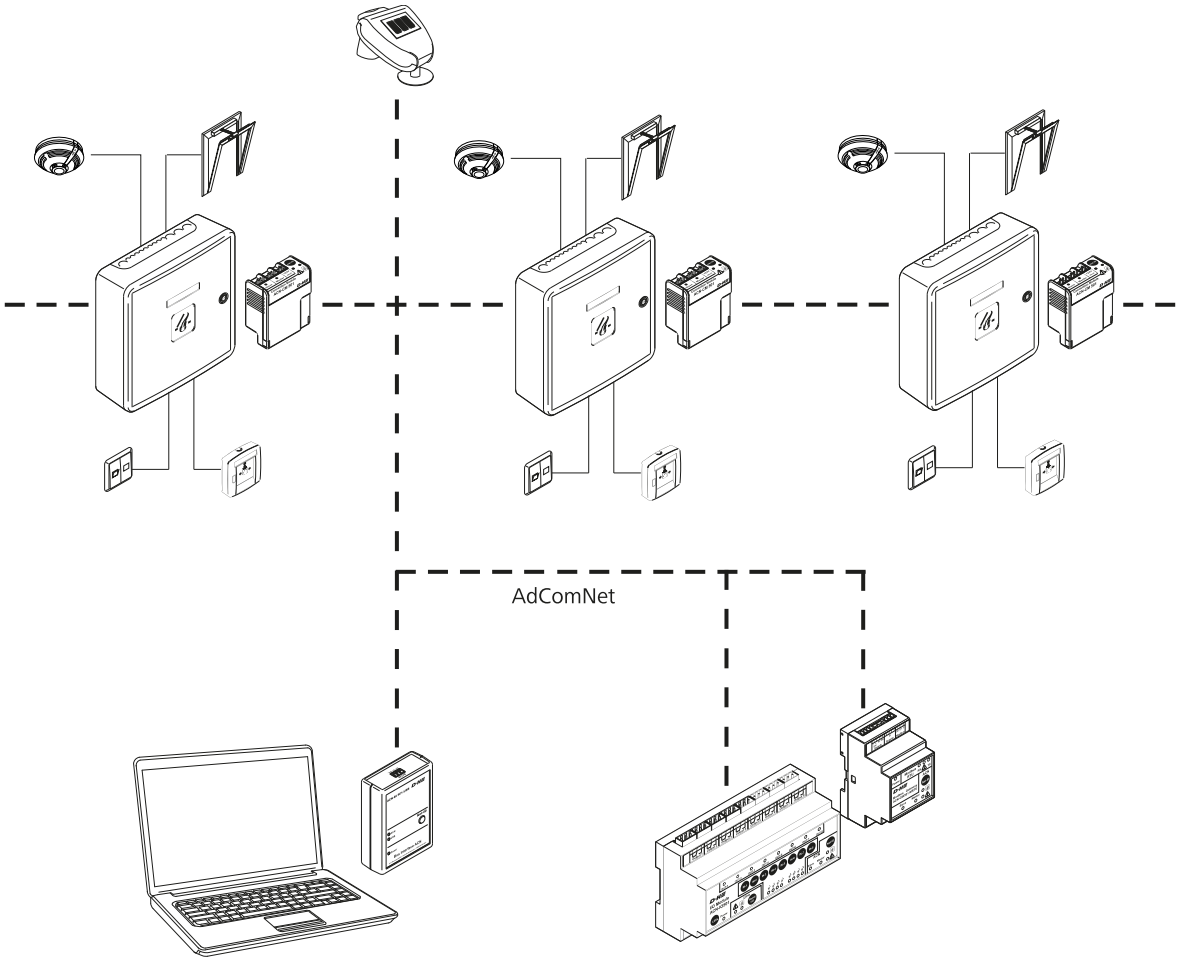
The modular and decentralised bus system has been designed as a long-term economical solution for all types of buildings in which not only SHEV systems, but also natural ventilation systems are used. Since the bus system is easy to reprogram if the room will be used differently, AdComNet is ideal for building types with sophisticated requirements for SHEV and ventilation, such as buildings with multiple storeys and fire compartments (office and administrative buildings, schools, places of assembly, production facilities etc.).

The system can be expanded or adapted at any time, either while it is being installed and set up, or during later conversions or retrofits. Smoke compartments, load and zone groups as well as the corresponding field devices can be reprogrammed without changing any cables. No need for laborious and expensive new installations and cabling.

Overview of advantages:

» Large savings potential thanks to lower cabling effort, significant reduction of cable cross-sections and lengths
» Only a tenth of the usual power consumption per node item, thanks to low-power technology
» Cost savings when designing and dimensioning the SHEV controllers thanks to a reduced need for battery power and size
» No special power supply required in the event of a mains outage; initial states are kept
» No need for special system integrators

Example of application



Basic knowledge of ACB

What is a bus system?

Generally, a bus is a system for data transfer between several nodes over a shared transfer path. Today, there are all different kinds of bus systems, such as in cars (CAN bus) or in smart homes (KNX, LON, BACnet etc.). In most cases, the most important nodes in a smoke extraction and ventilation network are a building technology system, the window drives and the control panels. Protocols are used as transmission paths in order to meet the requirements for system-internal, secure and stable communication. These protocols can be transported either by way of a radio signal or a cable. The individual devices can “talk to each other”, i.e. exchange information, by determining one of these protocols as the type of information exchange. Before the alarm has even gone off, the rolling shutters slowly move up.

Sunlight falls into the room. In the kitchen, the coffee brewer starts up automatically. At the same time, the heating adjusts to a comfortable temperature in the bathroom and the television in the living room jumps to the latest news. All of this may sound like luxury or like futuristic thinking, but this has long been the daily routine in many households thanks to modern bus systems. Even large building complexes such as schools, offices or hotels are regulated by what is referred to as a building management system (BMS). Such systems are becoming more and more automated these days. In these systems, all “smart” devices communicate with each other in order to offer the user maximum comfort and convenience and to provide benefits in terms of energy.

Modbus: A common language among the transfer protocols

Over time, a wide variety of transmission systems have been developed by various manufacturers. On an international level, though, only some of these systems meet recognised standards. One of the protocols that meets international standards is Modbus RTU. It is an indispensable element in industrial communication, but it has also arrived on the scene in international markets in the “living” sector. Many applications and devices are equipped with a Modbus interface. Modbus is easy to integrate thanks to its relatively simple structure and is highly stable compared to other systems. Therefore, it is a language that is ideally suited for building management systems (BMS).

Gateways, as they are called (D+H gateway is the ACN-GW501-MRTU-0200), are used in buildings where other bus systems, such as BACnet or KNX, take over control of all technical functions. They translate the other information languages into the common Modbus protocol - in that respect, there is no language that Modbus cannot speak. You could say that Modbus is the English, that is, the universal language of transmission protocols. Based on the advantages of this system, D+H decided to structure their ACB technology around the open Modbus RTU protocol.

The windows speak ACB

Using Advanced Communication Bus (ACB), the newly developed bus system by D+H, window drives can now also be integrated directly into existing building automation. This way, windows open and close fully automatically depending on the weather and ambient air conditions. Using building management systems (BMS), ACB drives can only be operated in ventilation mode.

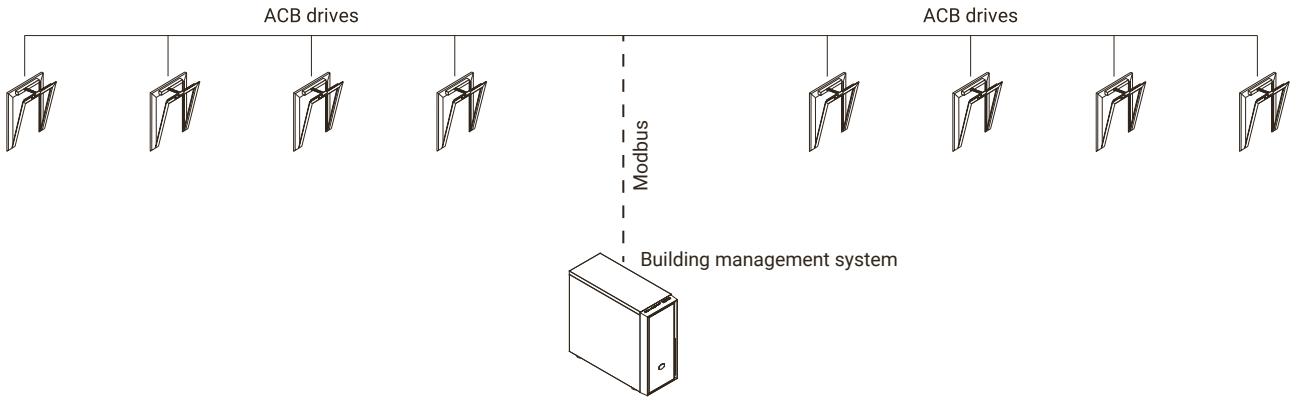
The use of smoke vent (SHEV) functions such as highspeed requires the integration into the D + H digital smoke vent control panel (CPS-M). ACB is based on the open Modbus RTU protocol, making integration into a BMS playfully simple.

Correct and secure planning

For project planning, it is important right at the start to know how many windows and thus how many drives are required for the project. The number of Modbus slave drives per Modbus master is limited to 32 nodes. This ensures virtually delay-free drive communication. The reason for the limitation of the number of drives is the maximum cable length in the Modbus system of 200 m

Since each drive has connection power of approx. 2 m, this adds up to 64 m of cable length for 32 drives. This means that there is a length of 136 m remaining. However, at an average distance of 4 m between two windows, a further 128 m (4 m x 32 m) is added to that 64 m, which together comes out to a cable length of nearly 200 m.

Added value of ACB drives



Programming made easy

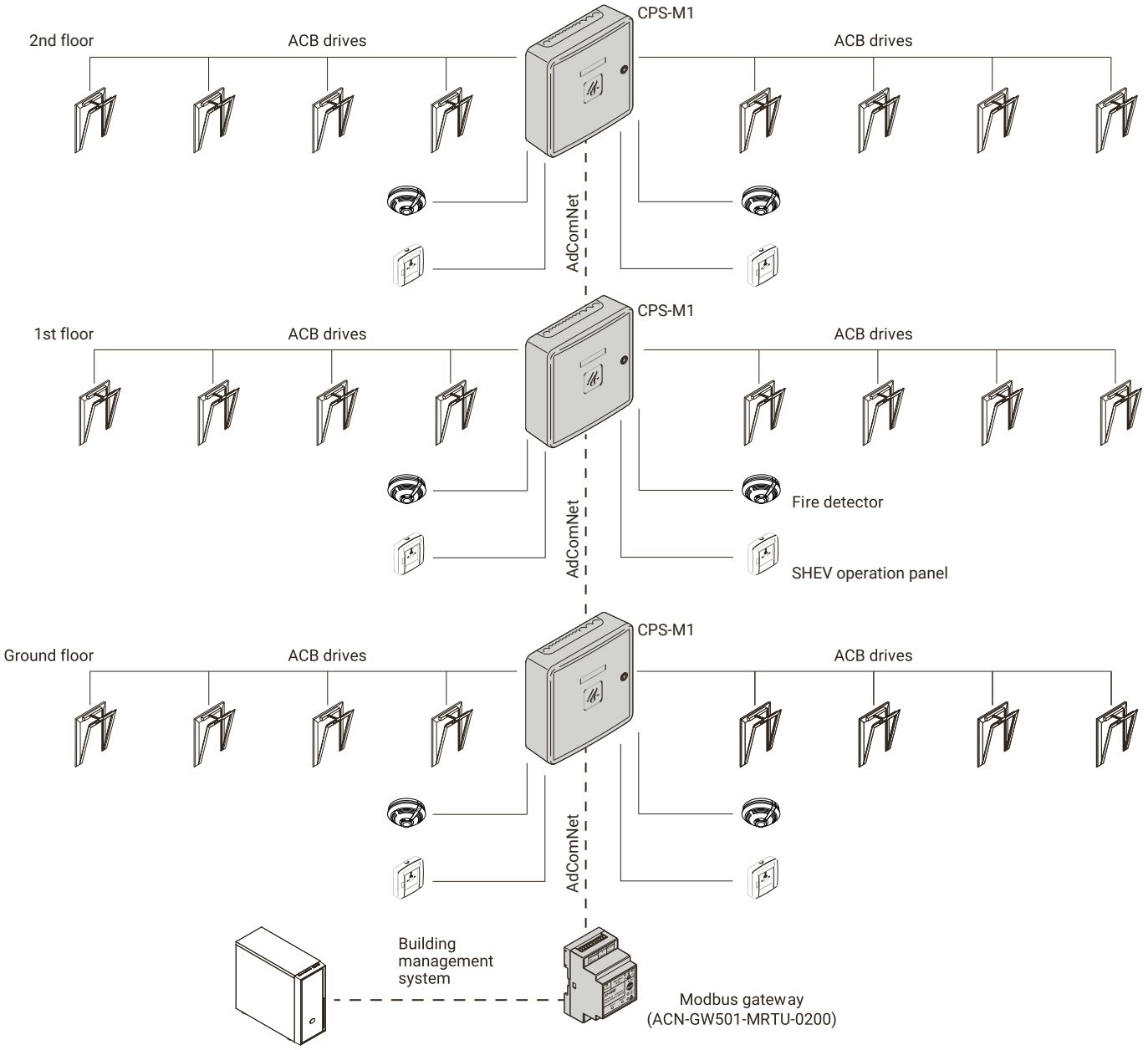
We have explained how ACB drives for ventilation purposes can be controlled directly by the building automation. But were you aware of just how precise this control can be? Control with perfect positioning is an aspect of the programming thanks to the building management system (BMS) or the SCS software from D+H, for example. In the summer, do you want the windows to open 10 percent of the way to create a small gap?

Or would you rather have them open 80 percent of the way to let a strong purge ventilation the building out? You can find all details relating to programming in the D+H planning manual

Modbus RTU - Taking a look at the technology

The RTU after Modbus stands for Remote Terminal Unit. Why remote? This relates to the master/slave architecture of the Modbus RTU protocol. It works as follows: A device, such as the building management system (BMS), a computer or a touch display, takes over the master management function and sends instructions to the “remote” slave – for example, a D+H drive. This drive receives the signal and executes the instruction.

Networking between CPS-M and ACB drives



Live communication with the drive

» Bi-directional bus communication between D+H controllers and D+H drives
» Programmable using D+H controllers and D+H SCS Software using a PC or tablet with a Windows operating system
» Multiple drives can be combined to form a drive group and can run synchronously
» Highly accurate control allows the drive to be extended and retracted with precision down to the millimetre
» The ACB can be used to read out all status messages such as the exact opening stroke or the OPEN and CLOSED status

Approvals / Directives

The CE marking, the European Union product passport

The Construction Product Directive (CPD) was implemented in 1989 to remove trade barriers within the European Union. It was intended to ensure an uniform system for testing, certifying and subsequently classifying construction products. The new Construction Product Regulation has been in effect since March 9, 2011. You can read more about it below.

By using the CE marking for its products, the manufacturer declares compliance with all product-relevant European directives. For electro-mechanical components for smoke and heat exhaust ventilation, these are the Low Voltage Directive (2014/35/EU) and the EMC Directive (2014/30/ EU). Specifically for drives, the manufacturer also declares compliance with the Machinery Directive (2006/42/EC). For building products which are subject to a harmonised European standard (e.g. EN 12101-10), the manufacturer declares and verifies that the products meet with the product performance listed in the declaration of performance when attaching a CE marking.

Difference between Construction Product Directive and Construction Product Regulation

The new Construction Product Regulation (CPR) took effect on March 9, 2011. Effective July 1, 2013, the old Construction Product Directive (CPD) has been fully replaced by the new Construction Product Regulation.

Due to its designation as a “regulation”, the new CPR is already being implemented automatically within the national law of the respective countries without requiring an additional national legislative act. This is one of the main reasons why a construction product regulation was implemented.

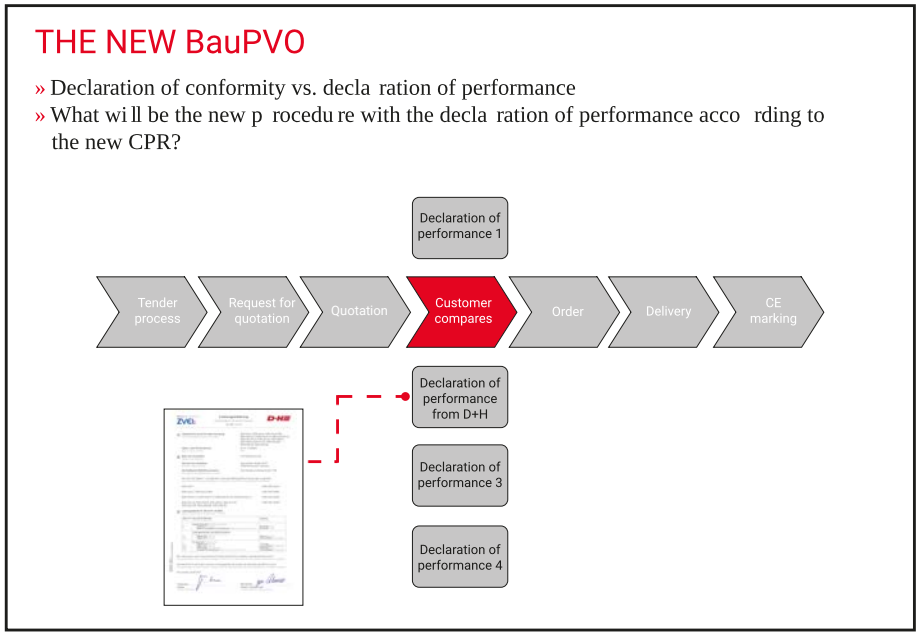
In contrast to the old CPD, the manufacturer declares conformity of its product with all product-relevant European directives and conformity to their own issued declaration of performance since the mandatory enforcement of the CPR.

In contrast to the old CPD, a manufacturer must specify a performance value for only one essential feature in accordance with the new CPR. For all other essential features, manufacturers can declare n.p.d (no performance determined). Also, according to the CPR, manufacturers can choose which essential feature they provide information for.

Example: A NSHEV has the fundamental task of ensuring smoke extraction from hot combustion gases through an area measured in aerodynamically precise form. However, a manufacturer is not required to specify an aerodynamic free cross-section or to have it checked. Instead, the manufacturer could theoretically only declare a wind load class of 1,500 WL, for example. We consider it useful and necessary to check and specify all features. This is the only way to ensure comparability of product performance features as well as safe planning and implementation

“New” declaration of performance vs. “old” declaration of conformity

From the tendering and selection phase, the declaration of performance has a much higher significance than the declaration of conformity which had previously been submitted with the product.
One clear advantage of the declaration of performance is the fact that—similar to a refrigerator—the NSHEV’s performance behaviour is declared in advance, and does not have to be confirmed starting with delivery of the product. The following figure clearly shows that the declaration of performance starts having an effect on the customer’s selection early and is expected to be an essential supporting factor in the selection. Compared to the old declaration of conformity (which only comes into play during the final step in presentation), the new declaration of performance supports the selection and provides security.



What must the planner keep in mind?

The planner should pay attention to the completely filled-in declaration of performance when selecting natural smoke and heat exhaust ventilators (NSHEV). It gives the planner and manager the chance to compare the climatic and functional requirements imposed on the NSHEV. A comparison is impossible without specifying numerical values and it is doubtful that a product tested in such a way really conforms to requirements.

In conclusion, the new Construction Product Regulation provides the clear advantage of better comparability based on the condition that all features must be demonstrated with numerical values. A product (such as a NSHEV) with a declaration of performance filled in completely with reasonable number values represents today’s standard of quality.

D+H, along with an international network of D+H subsidiaries and D+H sales and service partners, offers a wide range of natural smoke and heat exhaust ventilators (NSHEV) that have been fully tested in accordance with EN 12101-2 and meet all architectural requirements, even with asymmetrical NSHEV

D+H is active

D+H has played a very active role in the development of national standards and directives as well as European and international (global) standards since 1996. We want to ensure that the level of safety that we have known and accepted here in Germany for decades becomes a part of European and global standards as well. One result is the establishment of European standards (e.g. EN 12101-10, power supplies for smoke and heat exhaust systems), which are then to be used as mandatory, harmonised standards in Germany as EN 12101-10. Another result is the creation of global standards, which are then published as ISO standards (e.g. ISO 21927-10; power supplies for SHEV). These standards may then be used worldwide although there is no requirement to do so.

Overview of standards

DIN EN

DIN EN 60335-2-103
Requirements and test methods for drives for windows

DIN EN 12101-2
Requirements and test methods for natural smoke and heat exhaust ventilators (NSHEV)

Pr EN 12101-9
Requirements and test methods for control panels (draft)

DIN EN 12101-10
Requirements and test methods for power supplies

DIN 18232-9
Significant features and their minimum values for natural smoke and heat exhaust ventilators in accordance with EN 12101-2, for energy supply systems in accordance with EN 12101-10 and for control panels in accordance with ISO 21927-9

ISO

ISO 21927-2
Requirements and test methods for natural smoke and heat exhaust ventilators (NSHEV

ISO 21927-9
Requirements and test methods for control panels (draft)

ISO 21927-10
Requirements and test methods for power supplies

VdS

VdS Richtlinie VdS 2580
Requirements and test methods for electro-mechanical drives, for natural smoke extraction systems (NSE)

VdS Richtlinie VdS 2581
Requirements and test methods for electric control units for natural smoke extraction systems (NSE)

VdS Richtlinie VdS 2592
Requirements and test methods for electric manual control units for natural smoke extraction systems (NSE)

VdS Richtlinie VdS 2593
Requirements and test methods for electric energy supply systems for natural smoke extraction systems (NSE)

VdS Richtlinie VdS 2594
This standard regulates the interaction between the various products in accordance with the above-mentioned VdS directives. The result is a system approval for electric smoke and heat exhaust systems.

UL

UL 325
This test standard defines, among other aspects, the requirements and test methods for electro-mechanical drives, which shall be used for ventilation purposes. The result of this test is a UR certificate.

GOST

GOST R 53325-2012
DOMESTIC STANDARD OF THE RUSSION FEDERATION. General technical requirements and test methods for fire automatization including natural smoke protection systems.

Test centres / test symbols

Dekra
Approvals for the electric safety/security of products (drives and control panels) - particularly regarding Low Voltage Directive approvals for drives in accordance with the EN 60335-2-103 standard.

VdS Schadenverhütung
Well-established as a test laboratory for fire protection technology in Europe.
Inspection of SHEV control panels in accordance with the standards listed below or VdS directives.
Named as a notified body by DIBt; inspections in accordance with EN 12101-2 European standards for natural smoke and heat exhaust ventilators and subsequent certification.
Inspection of electro-mechanical drives in accordance with the VdS directive VdS 2580.

I.F.I.
I.F.I. is a Notified Body pursuant to the Construction Products Regulation for natural smoke and heat exhaust ventilators (NSHEV) in accordance with EN 12101-2.

EN 12101-2
Drive tested in conjunction with NSHEV in accordance with EN 12101-2. See pages 18-19.

Underwriters Laboratory UL
Underwriters Laboratories (abbreviated UL) is an independent organisation which inspects and certifies products in terms of their safety. UL inspects products, components, materials and systems to see whether they conform to US and Canadian market requirements.

CNPP
The CNPP is a French test institution which conducts specific function checks for individual components or systems for SHEV facilities in accordance with French standards.

AFNOR
The AFNOR is a French test institution which issues country-specific certificates on the basis of tests conducted by the CNPP for components or systems of SHEV systems in accordance with French standards.

CNBOP
The CNBOP is a Polish test institution which conducts specific function checks for individual components or systems for SHEV systems in accordance with Polish standards and laws and which issues certificates based on these tests.

CCCF
The CCCF is a Chinese test institution which issues country-specific certificates on the basis of tests conducted at accredited Chinese test institutions for components or systems for SHEV systems in accordance with Chinese standards and laws

OS POZHTEST FGBU VNIIPO EMERCOM
The institute is part of the system of the state fire department of the Russian Ministry of Disaster Management. It is the most important fire related research institute in the Russian Federation.

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