



Communication system Wildeboer-Net

NEW

- Modules for volume flow/pressure controller
- user's signalling units



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Control-related demands for ventilation and air conditioning systems

Prevention of the spread of fire according to MBO ¹⁾

According to § 41 of the “Musterbauordnung” (German model building code), ventilation ducts must only bypass enclosing components for which there is a stipulated fire resistance, if the spread of fire is not to be feared for a sufficiently long period, or if measures have been taken to prevent it. According to § 14 of the “Musterbauordnung” (German model building code) the spread of fire refers to the spread of fire and smoke. A further distinction between cold, warm or hot smoke is not made in the building code. In reference to § 3 of the “Musterbauordnung” (German model building code) smoke is defined as any smoke which puts life, health and natural livelihood at risk. Thus, even smoke with a temperature below the nominal release temperature (72°C) of a fire damper. If there is a risk of the transfer of smoke below the fire damper release temperature, additional measures must be taken in order to achieve the required protection objective of § 14 of the “Musterbauordnung” (German model building code). Shutting off the ventilation fan of an area affected by the fire alone can be regarded as insufficient as the protection objective of internally sealing off a building in case of fire cannot be achieved with a purely thermally triggered fire damper. In order to reliably prevent smoke transfer, the shut-off devices of the area affected by the fire must be closed in good time. The protection objective can be achieved with appropriately classified fire dampers equipped with additional actuators. Today’s state-of-the-art technology is a fire damper which is motorised for this purpose, allowing it to close in good time when a fire is detected.

Functional check of the fire dampers according to MVV-TB ²⁾

The motorisation makes for additional synergy effects in addition to the comprehensive protection which a motorised fire damper reliably provides in relation to § 41 and § 14 of the “Musterbauordnung” (German model building code) (if it is closed in good time in case of fire). Thus, a motorised fire damper can be used conveniently to implement the regular functional check, as required in accordance with the MVV-TB building code, from a central point. The breaks in operation or operational limitations which usually occur with a manual local functional check, do not apply in this case, or only apply to a minimal extent. The prerequisite for this is the use of fully maintenance-free fire dampers. The functional check of the fire dampers is the responsibility of the owner of the ventilation system.

Note:

The local inspection by a specialist inspector for special construction, as required every 3 years in accordance with the model inspection code (MPrüfVO ³⁾), is excluded from this provision.

EnEV (German Energy Saving Ordinance) ⁴⁾

The European Directive 2010/31/EU on the overall energy efficiency of buildings (EPBD ⁵⁾) includes minimum requirements for the overall energy efficiency of building services systems, e.g. systems for ventilation and air conditioning. These requirements are implemented in EnEV (German Energy Saving Ordinance).

The requirements of EnEV (German Energy Saving Ordinance) include provisions for the installation and replacement of technical systems for air volume flow rate control in buildings. According to § 15 (3) of EnEV, systems for ventilation and air conditioning which are engineered for a volume flow rate of supply air of at least 4000 cubic metres, must be equipped with mechanisms for automatic control of the volumetric flow rates in accordance with the thermal and material loads, or for setting the volumetric flow rates in accordance with time. This applies if the supply air volume flow rate of the system per square metre of the supplied net floor area exceeds nine cubic metres per hour for each square metre of supplied building floor area in residential buildings.

According to DIN V 18599 ⁶⁾ presence detectors, people counters, gas sensors etc. can be used for requirement-based control. This makes for lower mean outdoor air volume flow rates during the system operation time. This leads to a reduction of the energy requirement for treatment and conveying of the air.

Note:

This does not apply if increased supply air volume flow rates are required in the supplied rooms for reasons of occupational health and safety requirements, or if load changes cannot be ascertained either metrologically or with regard to chronological sequence.

¹⁾ “Musterbauordnung” (German model building code) - “MBO” - Most recently amended by the ruling of the conference of construction ministers of 13.05.2016

²⁾ “Muster-Verwaltungsvorschriften Technische Baubestimmungen” (MVV-TB) (model administration code, technical building rules) 31.08.2017

³⁾ “Muster-Prüfverordnung” (MPrüfVO) (model inspection code), issue March 2011

⁴⁾ Ordinance on energy-saving thermal protection and energy-saving system technology for buildings (“Energieeinsparverordnung – EnEV”) - last amended 24.10.2015

⁵⁾ Directive 2010/31/EU of the European Parliament and Council of 19 May 2010 on the overall energy efficiency of buildings

⁶⁾ Calculation of energy efficiency of buildings DIN V 18599-11:2018-09



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Product description

The **Wildeboer-Net** is a system for meeting the control requirements for energy efficiency, fire protection and operational reliability and safety of a ventilation and air conditioning system.

High-performance topology and convenience values guarantee the best possible effectivity and synergy at all stages of engineering and operation.

Fire protection

The Wildeboer-Net upgrades fire protection in ventilation systems with easily parametrisable release groups (⇒ see page 12) for fire dampers, smoke protection dampers, and volume flow and pressure controllers. Input/output modules can be used to integrate fire detections (smoke detections) into the release groups. This way, the building can be reliably sealed off internally at the early stage of a fire to provide effective protection from the transfer of cold smoke gases. ⇒ see page 2 (spread of fire)

Operational reliability and safety

Wildeboer-Net upgrades the tried-and-tested operational reliability and safety of maintenance-free fire dampers with easily parametrisable functional checks (⇒ see page 10). The functional check can be carried out individually, in groups or for all dampers simultaneously. The time requirement is the same regardless of the number of fire dampers. Breaks in operation and influences on operation are thus reduced to a minimum. As a result, functional checks can be carried out at shorter intervals, and thus considerably increase the operational reliability and safety of the system. The results of the functional checks are permanently stored, and can be exported. A graphic trend analysis of the results allow you to detect weaknesses in good time. ⇒ see page 2 (MVV-TB)

Energy efficiency

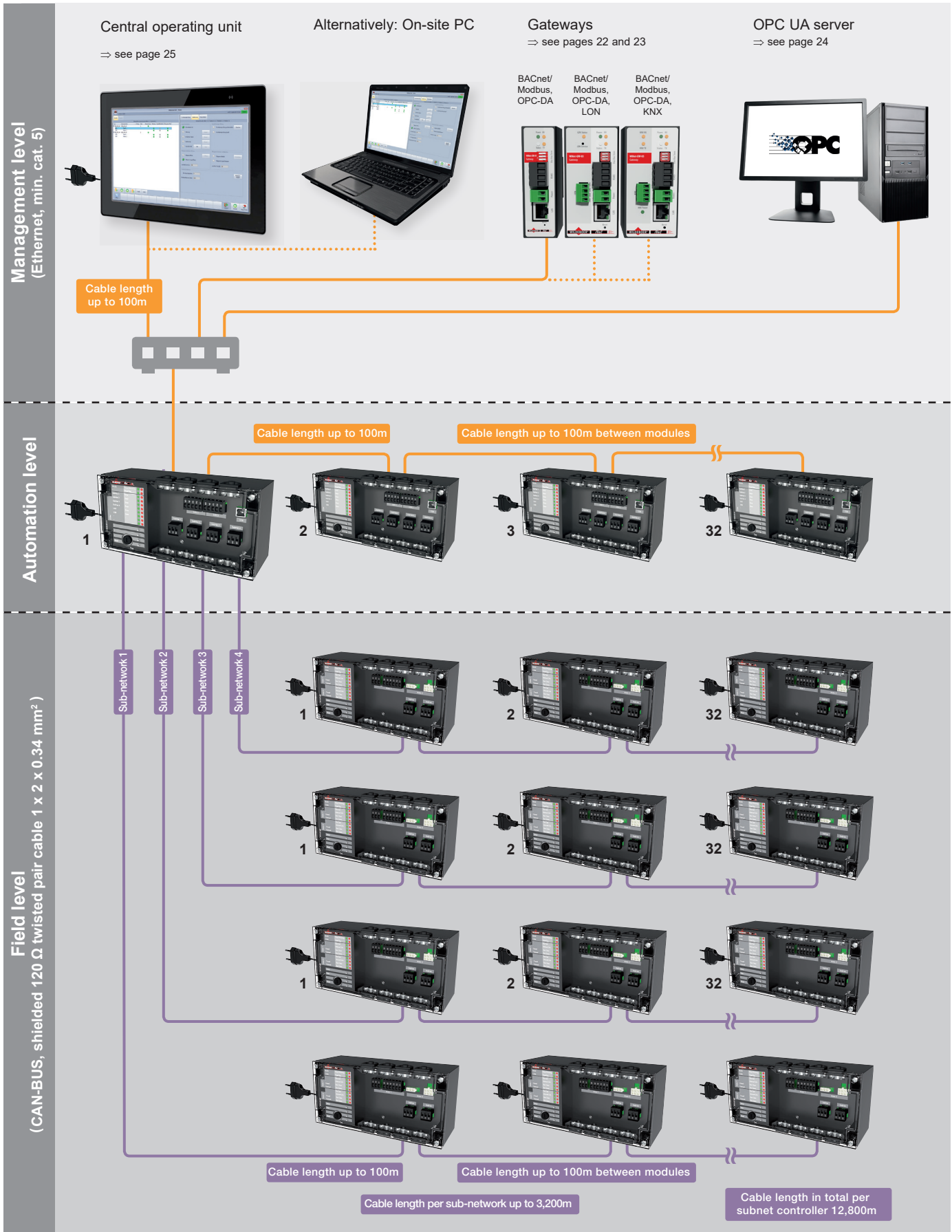
Wildeboer-Net improves the energy efficiency of a ventilation and air conditioning system. Parametrisable calendar controls (⇒ see page 14) can be used to define the supply air and exhaust air volume flow rates of connected volume flow and pressure controllers with a timer function. Sequence controls (⇒ see page 13) can also be used to make requirement-based settings by integrating presence sensors and CO₂ switches. The connected controllers can be overridden by integrating window contacts so that they close as soon as a window is opened, for instance. The reduction in the mean outdoor air volume flow rate of the system according to DIN V 18599 which is achievable as a result, makes for a reduction in the required energy. Monitoring functions facilitate the graphic analysis of the ventilation ratios in the system. Adjustments can be made at any time from a central point. ⇒ see page 2 (EnEV)

Effectivity in engineering and operation

All the functionalities in Wildeboer-Net are parametrisable using the Wildeboer-Net software. Programming is not required. Integrated assistants make individual processes easier. All the parameters of volume flow and pressure controllers available for pre-order in the factory are automatically applied. All the devices are detected and addressed automatically during commissioning. High-performance topological characteristics, graphic analysis tools and the option of integrating building layouts make planning, commissioning and operation of the system easier. The system can be expanded or modified at any time without the need for programming.

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System configuration





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System properties and benefits

Properties

- A subnet controller is used to set up to four subnets which can each be up to 3200 m in length.
- Up to 32 field modules can be connected per subnet. They are detected and addressed automatically.
- A total of up to 32 subnet controllers can be included in a single Wildeboer-Net. The subnet controllers contain the 2-way switches required for connection.
- If more Ethernet connections are required, a switch needs to be planned for on site.
- A length of 100 m for the data cable between modules is permitted.
- Galvanically isolated partial segments between modules.
- Faults on the field modules or interruptions and short circuits on the galvanically isolated partial segments of a subnet can be localised, rest bus operation is then performed. Once the fault has been eliminated, communication as a whole is continued.
- "Management level" cable recommendation : min. CAT 5
- "Field level" cable recommendation : CAN-BUS, shielded 120 Ω twisted pair cable, 1 x 2 x 0.34 mm²
- The Wildeboer-Net software required for visualisation of status and diagnostics data and for configuration and programming is contained in the central operating unit, or can be installed on the user's PC.
- A permanent connection to the central operating unit or the user's PC is not required for operation of the system.
- Gateways for BACnet, Modbus, LON, KNX or OPC-DA are available for connection of building control systems. Alternatively, data can be forwarded via an OPC-UA server.
- The connected periphery is supplied with 24 V DC of power from the motor, IO and volume flow and pressure controller modules.
- Field modules and subnet controllers
 - permanently store data, even in the event of a power failure.
 - in the plastic housing 250 mm x 110 mm x 85 mm (L x B x H). Protection class II, protection rating IP40.
 - with T2.5 A microfuse which can be replaced from the front.
 - with standard Europlug and 1.5 m connecting line for direct connection to an on-site 230 V AC socket. Alternatively, the standard Europlug on the module can be removed for a permanent connection. Fuse protection for up to 10 modules with a category C, 16 A circuit breaker.
 - with LEDs for displaying operational data.
 - with push button for manual operation of the basic functions.
 - Real-time clock with leap year adjustment and daylight saving/standard time switching. Initial charge time of the buffer capacitor 30 minutes, discharge time 31 days.

Benefits

- Reduction of the fire load thanks to field bus technology.
- Voltage drops on the lines between field modules are ruled out, additional power units not required.
- Long cable length 4 x 3200 m per subnet controller thanks to galvanically isolated partial segments.
- Quick commissioning with automatic addressing of the field modules.
- Simple system upgrade.
- Automatic restoration of the system after module replacement.
- Partial commissioning is possible.
- User-friendly operating interface with comprehensive functions.
- Simple parametrisation, no programming.
- Quick fault diagnosis in case of module failure and bus malfunctions.
- Simple implementation of building code control requirements for ventilation and air conditioning systems.

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Product overview

Management level



WiNet-SW-01 Wildeboer-Net software for installation on the user's PC. Included and pre-installed in the scope of delivery of the central operating unit. ⇒ see page 24

WiNet-ZB-01 central operating unit with pre-installed operating system and Wildeboer-Net software, ready for immediate use. ⇒ see page 25



WiNet-GW gateway for connection to existing on-site building control system with different communication protocols.

Six gateway types are available, each with a different communication protocol and a different number of data points. ⇒ see pages 22, 23



WiNet-OPC-01 OPC-UA server software for integrating Wildeboer-Net into SCADA applications. ⇒ see page 24

Automation level



BS2-SC-01 subnet controller for initialising, controlling and monitoring up to four subnets, and for data exchange with the higher management level via Ethernet. ⇒ see page 16

Field level



BS2-VR-01 volume flow and pressure controller module for connection of up to four electronic volume flow and/or pressure controllers with RS485 or MP-Bus (manufacturer Wildeboer). ⇒ see page 17



BS2-MO motor module for connection of up to two fire dampers and/or smoke protection dampers with electrical spring return actuator.

Three versions of the motor module, with different connection technologies, are available. ⇒ see pages 18, 19



BS2-IO-01 I/O module for connection of external sensors and actuators using eight galvanically isolated inputs and eight galvanically isolated outputs. ⇒ see page 20



FACP module for connection of on-site signalling units using four inputs for floating contacts and two floating outputs. The module monitors the lines connected to the inputs for faults.

⇒ see page 21



FK90 fire damper for commercial kitchens with FKKUE-03 control unit ready for connection for Wildeboer-Net. ⇒ see page 16 and user manual 5.0-1



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Commissioning

A unique address for each field module is required within Wildeboer-Net for data communication. The type of field module (motor module, I/O module etc.) also has to be defined within the system. The detection and addressing of all connected field modules is performed automatically by the Wildeboer-Net software and takes just a few minutes. All addresses are managed automatically in the event of expansions and reductions. Thanks to the galvanically isolated construction of all subnets, partial commissioning is also possible whilst further partial segments or subnets have not yet been fully installed. Faults when installing the bus lines or modules can be localised easily.

An essential step when commissioning a system is the proper documentation and inspection of the orderly connection of field devices to the field modules. In Wildeboer-Net a "1-to-1 test" can be carried out using pinging with the Wildeboer-Net software for fire dampers for this purpose.

In pinging mode the Wildeboer-Net software detects any fault messages from the field devices which arise, and saves them to a list (ping list) in the order of occurrence. The faults must be generated deliberately in order to carry out the test. If fire dampers are connected, the fusible link can be pulled off or the test button on the motor can be actuated to trigger the desired fault message. The fire dampers must be in the OPEN position for this purpose.

To carry out pinging, it is necessary to inspect the system. During the inspection, the installation location and the equipment identification marking on the field device according to the general identification system (GIS) are noted.

This data can subsequently be transferred to the established ping list in the Wildeboer-Net software, and from there it can be added to the comments list automatically. ⇒ see page 8

Note:

- At the time of pinging no parametrised release groups must have been transferred, as all the fire dampers in the group will otherwise be closed.
- The structure of the Wildeboer-Net system is monitored cyclically. Deviations are detected. That means that field modules which have already been addressed cannot simply be expanded or re-installed in the bus in another position. However, modules can be replaced simply using the Wildeboer-Net software thanks to an assistant.

On completion of commissioning, the system is ready for use and parametrisation of the functions can be started.

Functions

- Comment function ⇒ see page 8
- Fan enabling ⇒ see page 9
- Functional checks ⇒ see page 10
- Manual fan shut-off for functional checks ⇒ see page 11
- Release group control ⇒ see page 12
- Sequence control ⇒ see page 13
- Calendar control ⇒ see page 14
- Graphic analysis ⇒ see page 15

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Functions (1)

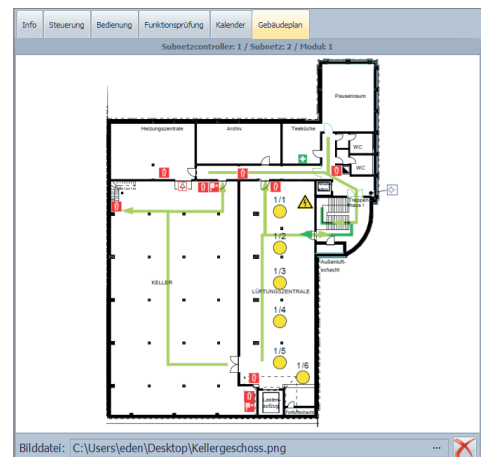
Comment function

Items of information can be provided for the field modules and the connected field devices within the Wildeboer-Net software for clear identification and description purposes.

- There are up to 32 index lines available for information for each field module. A designation (max. 15 characters) and a comment (max. 30 characters) can be entered for each index.
- Fixed designations are assigned in the first index lines by the system. The number of indexes with a fixed designation depends on the module type. Otherwise, all other pieces of information can be entered freely. Indexes with a fixed designation are used within the Wildeboer-Net software for controlling good operability in all displays and dialogues. An additional code issued by the user according to the general identification system (GIS) with any desired length can be allocated for indexes with a fixed designation.
- Comments and GIS codes set by pinging (⇒ see page 7) for connected fire dampers are applied automatically in the information with fixed assignment.
- Information can optionally be saved on the field modules. GIS codes are not saved on the field modules.
- Building layouts can be entered to locate field modules and field devices simply.

Info			
Index	Designation (max. 15 characters)	Comment (max. 30 characters)	GIS code
1	Module	VC 310 technology	375-01-M-431-102-K00-0120
2	Motor 1	VC 311 fire damper supply air	375-01-M-431-102-G053-0023-S-01
3	Motor 2	VC 311 fire damper exhaust air	375-01-M-431-102-G053-0023-S-02
4			
5	Installation situation	Fire damper difficult to access	
6		3 m ladder required	
...			
32			

Index 1 to 3: Fixed designation + free comment + free GIS
 Index 4 to 32: Free designation + free comment



Use of the comment function for data point definitions for gateways ⇒ see page 22

Data point definition on Wildeboer-Net, as on a system connected by a gateway, always consists of an address in conjunction with additional metadata (structured data, information on the characteristics of other items of data included).

Data point definition = address + metadata

A component of the metadata is the symbol information for the data point. The symbol information is used for text identification of the data point. The address alone is not definitive enough for convenient further processing. The symbol information consists of a symbol name plus a description of the function of the data point.

Symbol information = symbol name + description of the function

The data point function is generated automatically, specific to the module, when this data is created. The comment or the GIS code can be selected for the symbol name. ⇒ see table

- Example with comment: Symbol information = VC 311 fire damper supply air + M1_open
- Example with GIS code: Symbol information = 375-01-M-431-102-G053-0023-S-01 + M1_open

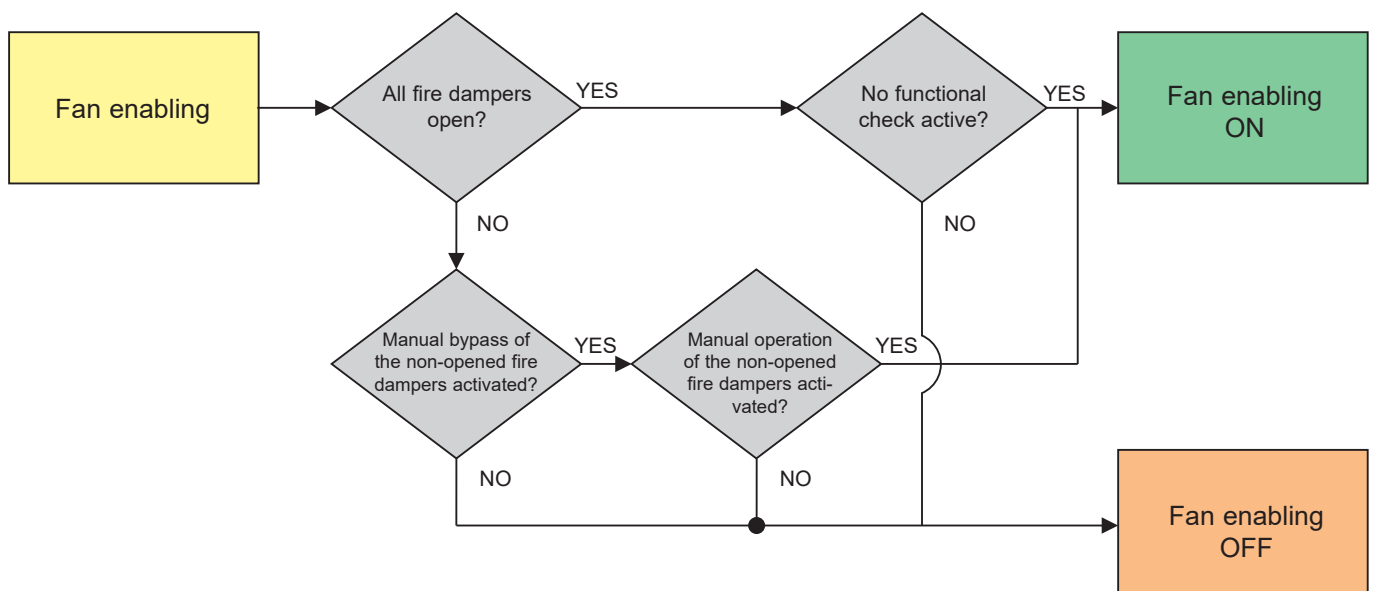
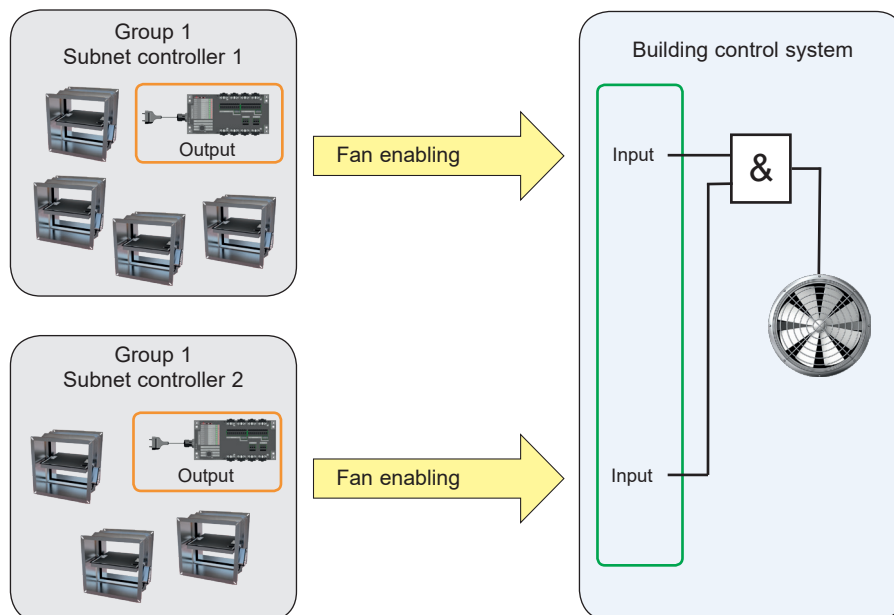


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Functions (2)

Fan enabling

The fan enabling function can be used to cause a fan to be shut off automatically. The enabling signal for a fan can be deactivated via an output of the I/O module as soon as an OPEN limit switch on a group of fire dampers is no longer active. This mechanism can optionally be overridden so that it is possible to close a selected fire damper even with an activated fan. The fan enabling signal can also be deactivated as soon as a functional check is active. Ideally the deactivation of the fan enabling signal causes a controlled shut-off of the fan. If this is not possible, and if there is a risk of damage to the duct network due to the fan running down and the fire dampers closing, on-site measures must be taken to prevent it. The fan-enabling signal is restricted to field level below a subnet controller. If it is necessary to integrate fire dampers which are arranged in the field level of another subnet controller, this can be achieved using further I/O modules.



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Functions (3)

Functional checks ⇒ see page 2 (MVV-TB)

The functional check is the only regular maintenance measure required for maintenance-free fire dampers. The damper blade has to be moved from the OPEN position into the CLOSED position, and then back into the OPEN position. This task is performed by the motor modules in Wildeboer-Net.

The prerequisite for a remote-controlled functional check is that the motorised fire damper has been checked reliably to make sure that the CLOSED and OPEN positions are reached and this has been documented. The limit switches required for this purpose are included in the motors on the fire dampers. The running performance of the fire damper is recorded. The results of the functional check are stored reliably and permanently on the field modules, and in the Wildeboer-Net software after downloading.

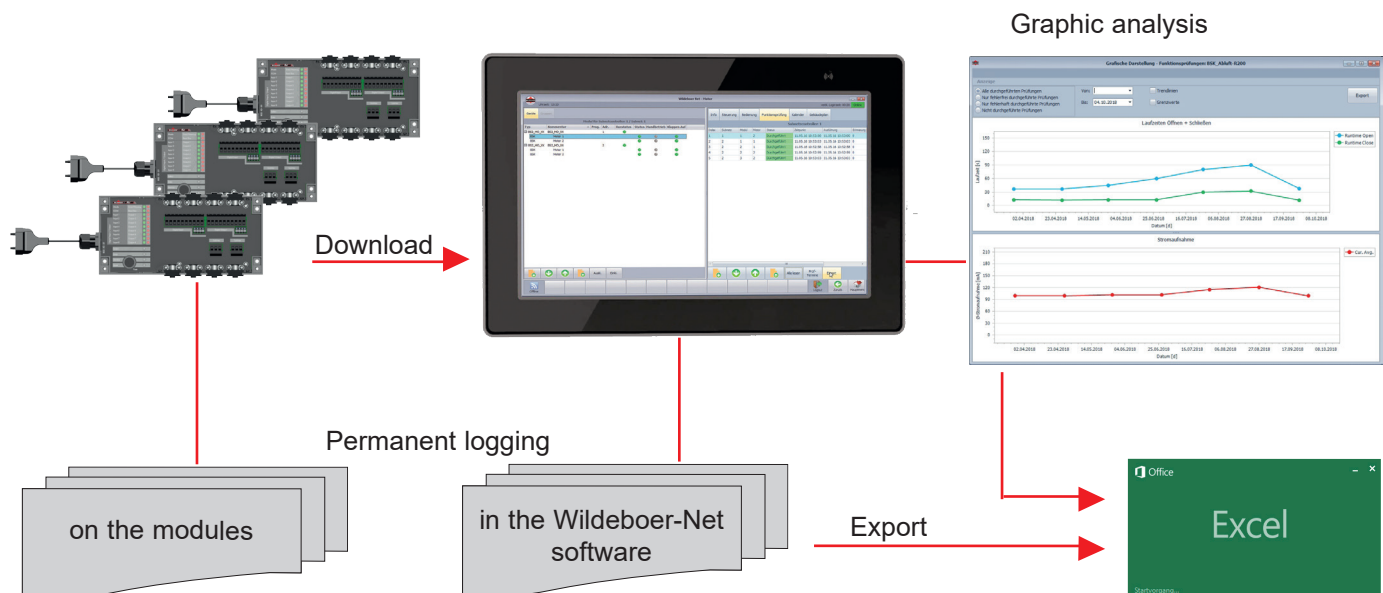
The functional check can be carried out for all fire dampers simultaneously, but also for selected groups or individual fire dampers. This only ever takes a few minutes, regardless of the number of dampers. As a result, even on large systems the influence of the checks on operation are reduced to a minimum. This way, functional checks can be carried out problem-free at shorter intervals, thus increasing the reliability and availability of the system considerably.

Functional checks can be scheduled easily using a timetable. They are started automatically or manually at a defined deadline. For scheduled automatically started functional checks the fan enabling function (⇒ see page 9), using an optional I/O module, should definitely be used to shut off the fan. Scheduled functional checks are monitored to make sure that they are carried out. Checks which are carried out with a delay, or not carried out at all, are marked accordingly in the logs.

Functional checks can also be started manually at any time. A manual shut-off of the fan can be parametrised for manually started functional checks. A functional check can be started locally using a motor module, regardless of the status of commissioning of the overall system. This way, it is possible to locally check that the fire damper is properly connected to the motor module and also check that the fire damper is fully functional, directly after installation. This makes it much easier to carry out commissioning of the overall system at a later time.

To assess the results of the functional check using the Wildeboer-Net software, the data has to be read out by the decentralised field modules. During the download, parametrised sequence controls, calendar controls and release groups are deactivated. On larger systems the download can take a few minutes. A table view which contains all dampers, and a graphic trend analysis (⇒ see page 15) for individual dampers are available for analysis purposes. This way, any required maintenance measures can be detected and arranged in good time. An export function to Excel is available for documentation purposes.

That way, the building code requirements in MVV-TB for regular checking of the function of the fire dampers can be met from a central point.

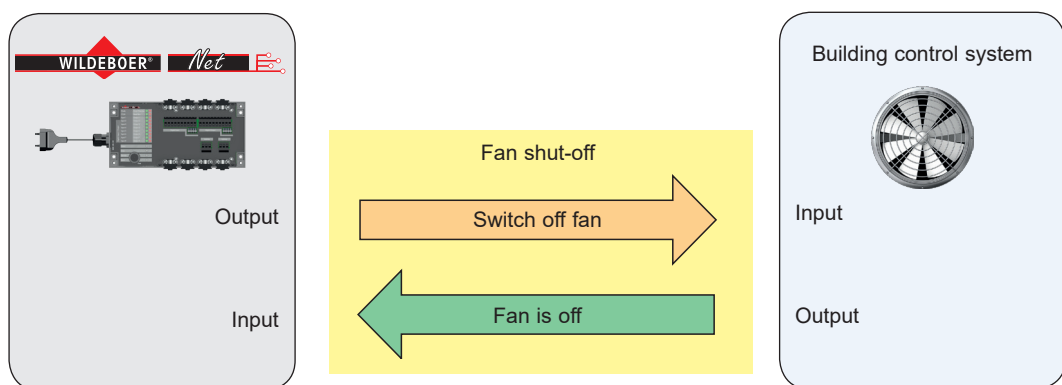


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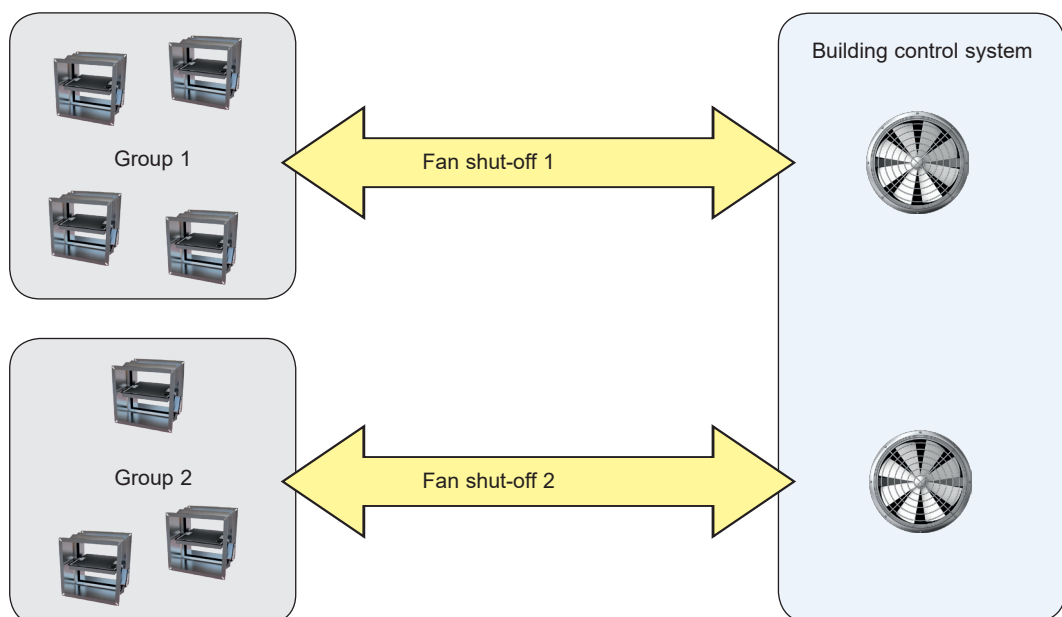
Functions (4)

Manual fan shut-off for functional checks

A parametrisable manual fan shut-off for functional checks is integrated into Wildeboer-Net. The application is used when it is necessary to shut off the fan before and after carrying out a functional check for system reasons. The use of an I/O module is required for this purpose. The fan is shut off via an output of the I/O module as soon as a functional check is to be performed for one or more of the fire dampers assigned to the fan. A functional check cannot be started manually until feedback has been signalled via an input of the I/O module to confirm that the fan has been shut off. The mechanism is valid for non-scheduled and scheduled manually started functional checks. The fan has to be shut off and switched on, and the functional checks have to be started manually using the Wildeboer-Net software. The mechanism is not effective for functional checks which are started locally using the motor modules directly.



The required control inputs and outputs are simply integrated into the group definition. All the required connections and settings are set automatically by the Wildeboer-Net software. A separate fan shut-off is defined for each group.



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Functions (5)

Release group control → see page 2 (MBO)

To ensure that the building is sealed off internally in case of fire, it is often necessary to close other fire dampers when one fire damper is released. Release groups are defined for this purpose.

Fire dampers can additionally be activated by smoke detectors in order to comply with the building code requirements for the cold smoke safety of ventilation and air conditioning systems. Depending on the requirement, this is performed either in a decentralised manner on the fire dampers and/or centrally using a fire detection system. Within Wildeboer-Net volume flow and pressure controllers can additionally contribute to cold smoke safety (VDI 6010) by carrying out a passive alarm function as passive devices in release groups. These controllers cannot release the group. The release of a group must always be acknowledged with the Wildeboer-Net software.

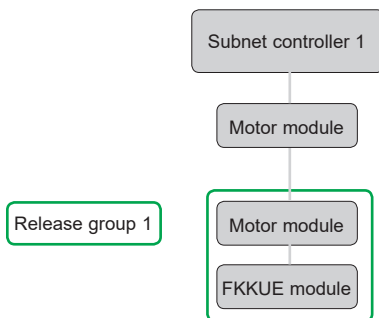
Release groups are parametrised by the Wildeboer-Net software and transferred to the field modules in the form of release group matrices. In the process, the field devices connected to the field modules can always be included as devices in one or multiple release groups.

The field modules monitor each other mutually within a release group. For this purpose each field module must receive what is referred to as a "heart beat signal" (sign of life) from every other field module within a certain time interval. If this "heart beat signal" is not received for a longer period, the devices in the affected group automatically assume their safe status. In the case of fire dampers this is the CLOSED position. The safe status of other field modules depends on the respective parametrisation. Possible causes for the missing signal include, for example, power failure on a field module or a bus interruption.

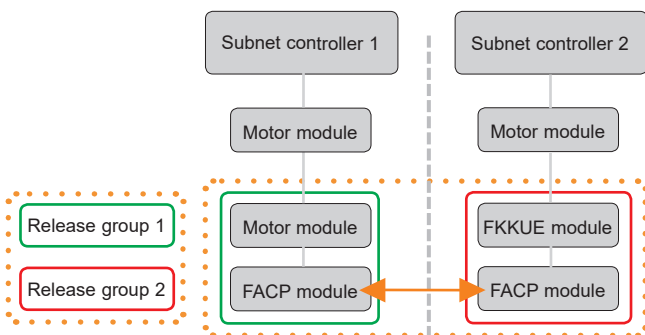
Release group controls in Wildeboer-Net are restricted to the field level of a subnet controller. Release groups can be connected universally for all subnet controllers using additional on-site fire detection system couplers or by integrating fire detection panel modules or I/O modules. The use of FACP modules is recommended due to the existing line monitoring. → see page 21

This way, it is possible to comply with the cold smoke safety requirements of MBO.

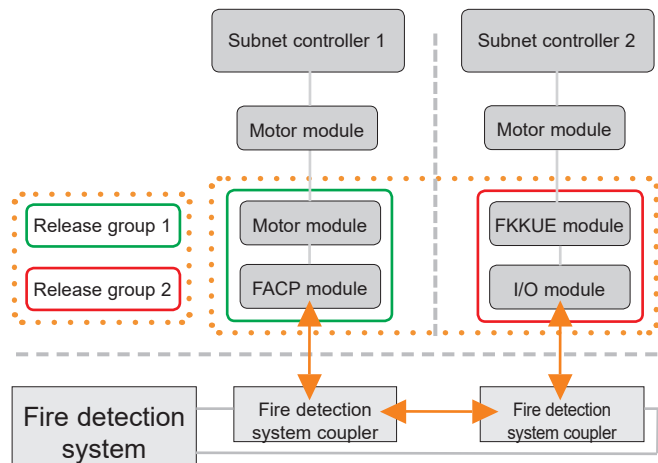
Example 1:
Single release group



Example 2:
Universal to all subnet controllers with FACP module



Example 3:
Universal to all subnet controllers with fire detection system coupler



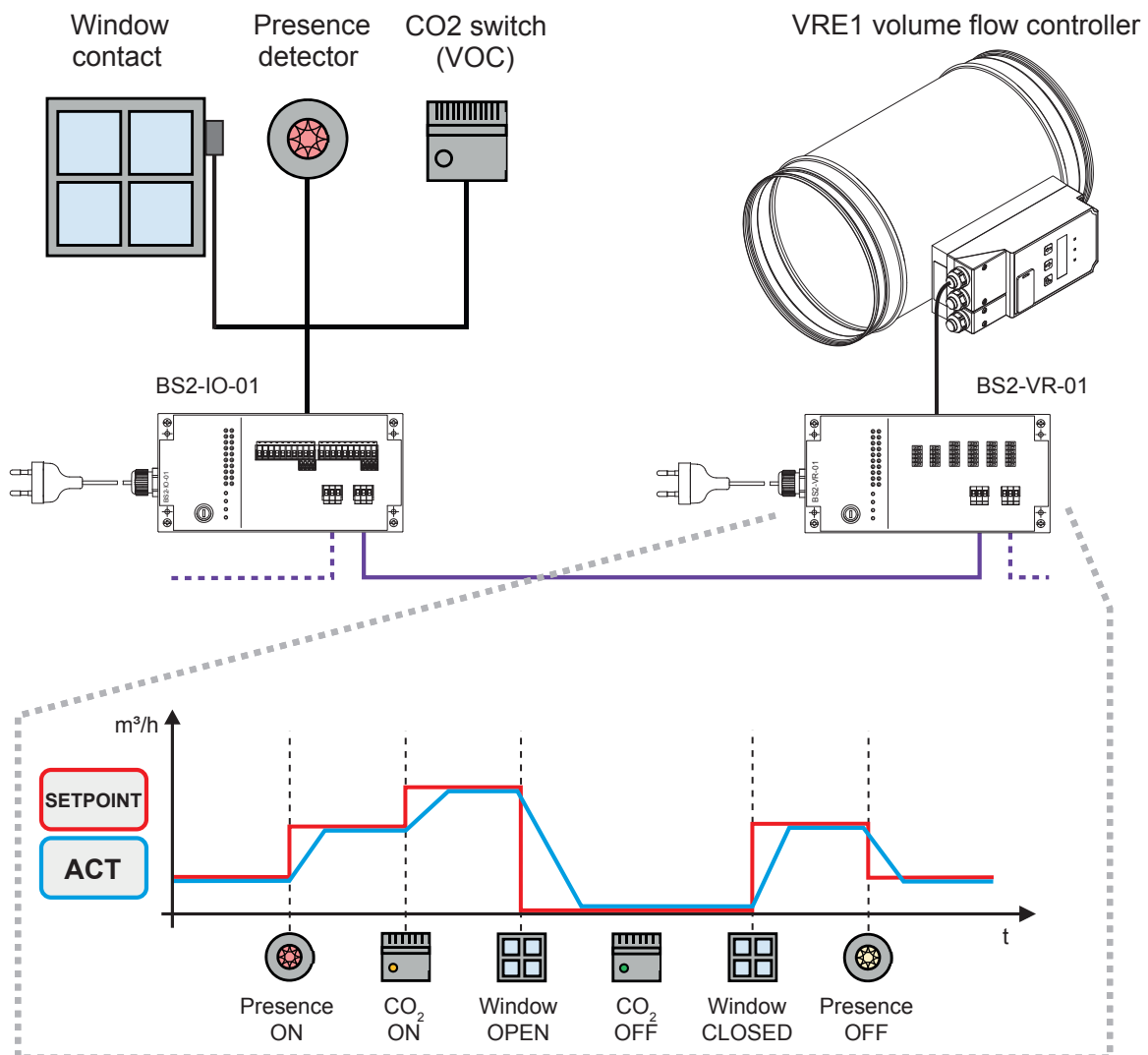
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Functions (6)

Sequence control → see page 2 (EnEV)

The Wildeboer-Net software is used to implement the most frequent control application cases using assistants. An example of this is the fan enabling function (→ see page 9). The results of these assistants are automatically generated sequence controls. The sequence control editor can be used to read out and display the generated sequence controls. Sequence controls can be created separately for each field module. The status data from the respective field module and the status data from all other field modules under the same subnet controller can be used as input signals. Flags and the physical outputs of the respective field module are available as outputs. Note that the assistants overwrite manually created sequential circuits in advance. The fan enabling thus always has to be created before the sequential circuits which have to be created manually.

This way, it is possible to comply with the requirements of the EnEV (German Energy Saving Ordinance) for equipment for automatic control of volume flow rates in accordance with thermal and material loads.



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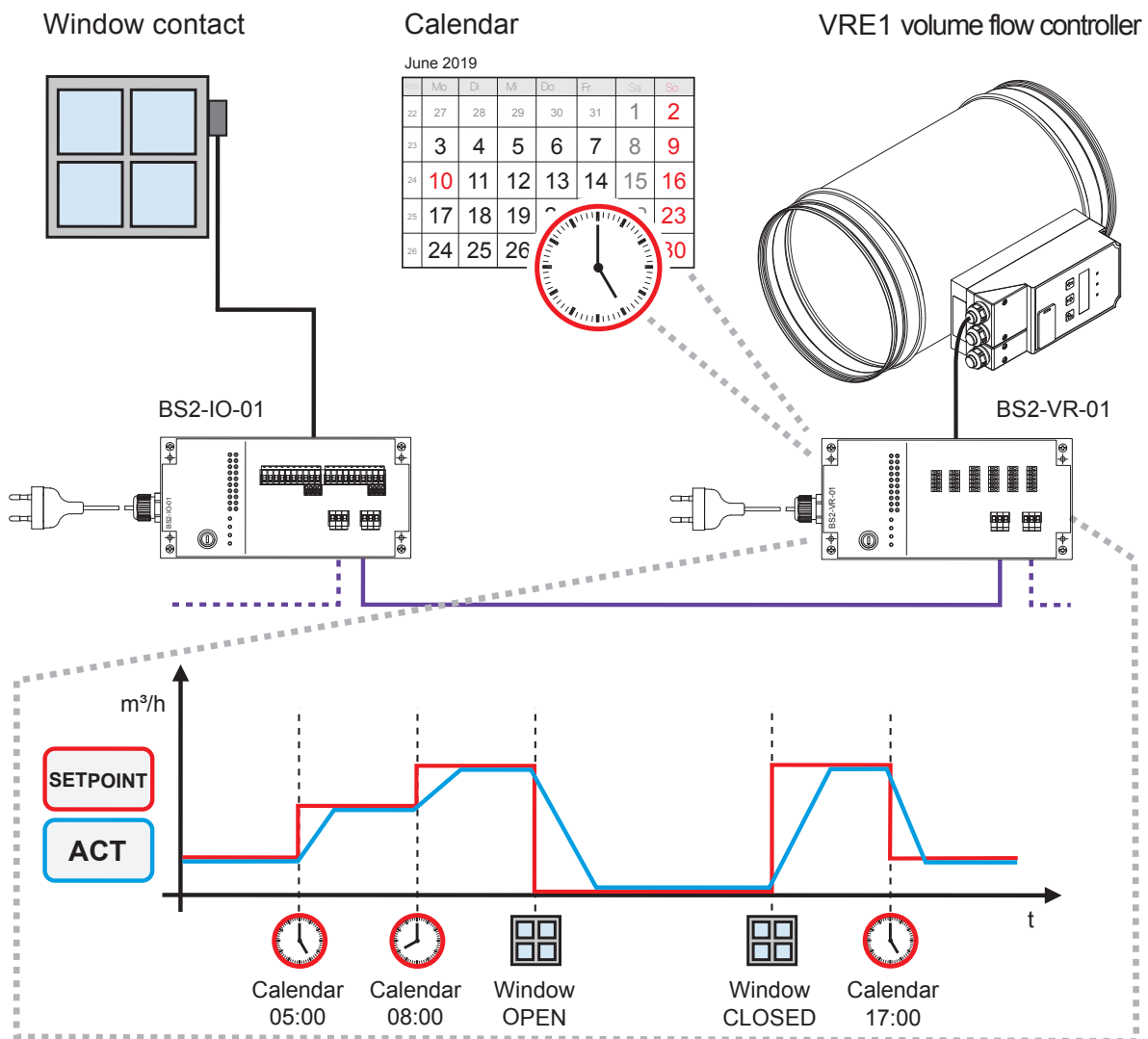
Functions (7)

Calendar control → see page 2 (EnEV)

The calendar control makes it possible to automatically carry out actions specific to a product at defined points in time or at fixed intervals.

For example, motor modules or the FKKUE-03 control unit for FK90 fire damper for commercial kitchens can be used to close the connected fire and smoke protection dampers at the end of operation and open them at the start of service (VdS directive 2038). The I/O module of the ventilation fan can also be used to switch off and switch on for scheduled control. The volume flow and pressure controller module can be used to open and close the connected controllers and control their setpoint values at defined points in time.

This way, it is possible to comply with the requirements of the EnEV (German Energy Saving Ordinance) for equipment for automatic control of volume flow rates in accordance with time.

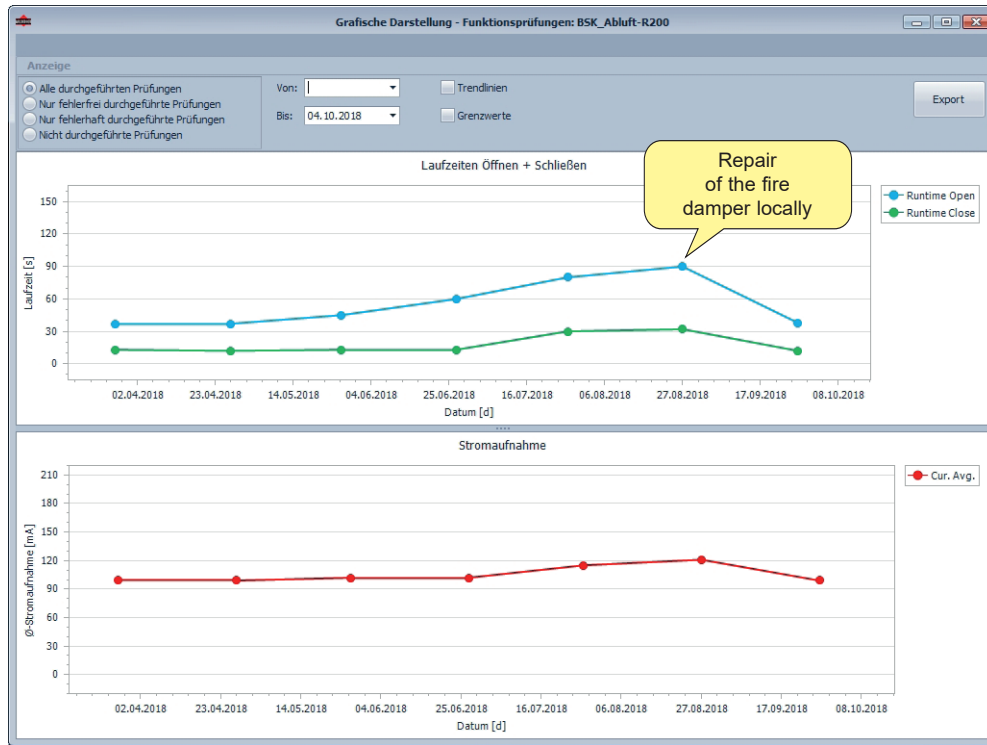


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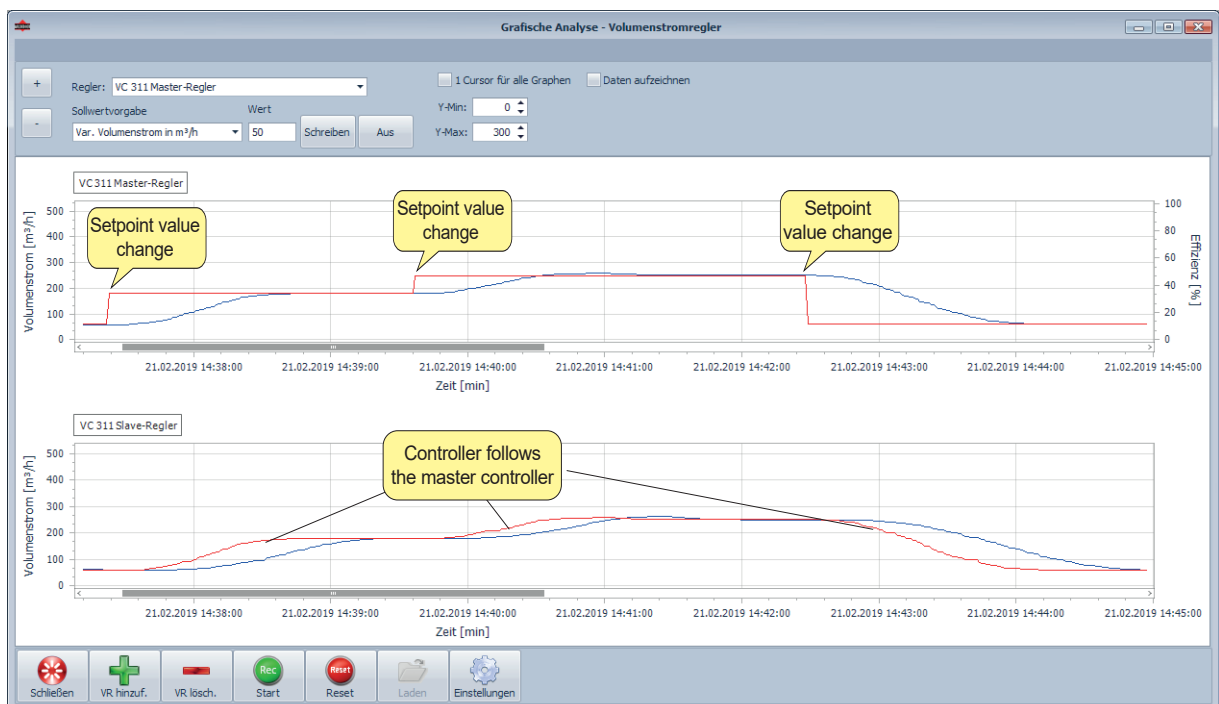
Functions (8)

Graphic analysis

The Wildeboer-Net software also provides graphic analyses which allow you to detect trends simply. They can be used, for example, to display results of functional checks clearly so that the required maintenance measures can be easily identified and arranged in good time.



The monitoring function facilitates a graphic analysis of the ventilation ratios in the system for volume flow control. Any number of controllers can be displayed simultaneously. The following is an example with a master-slave function.



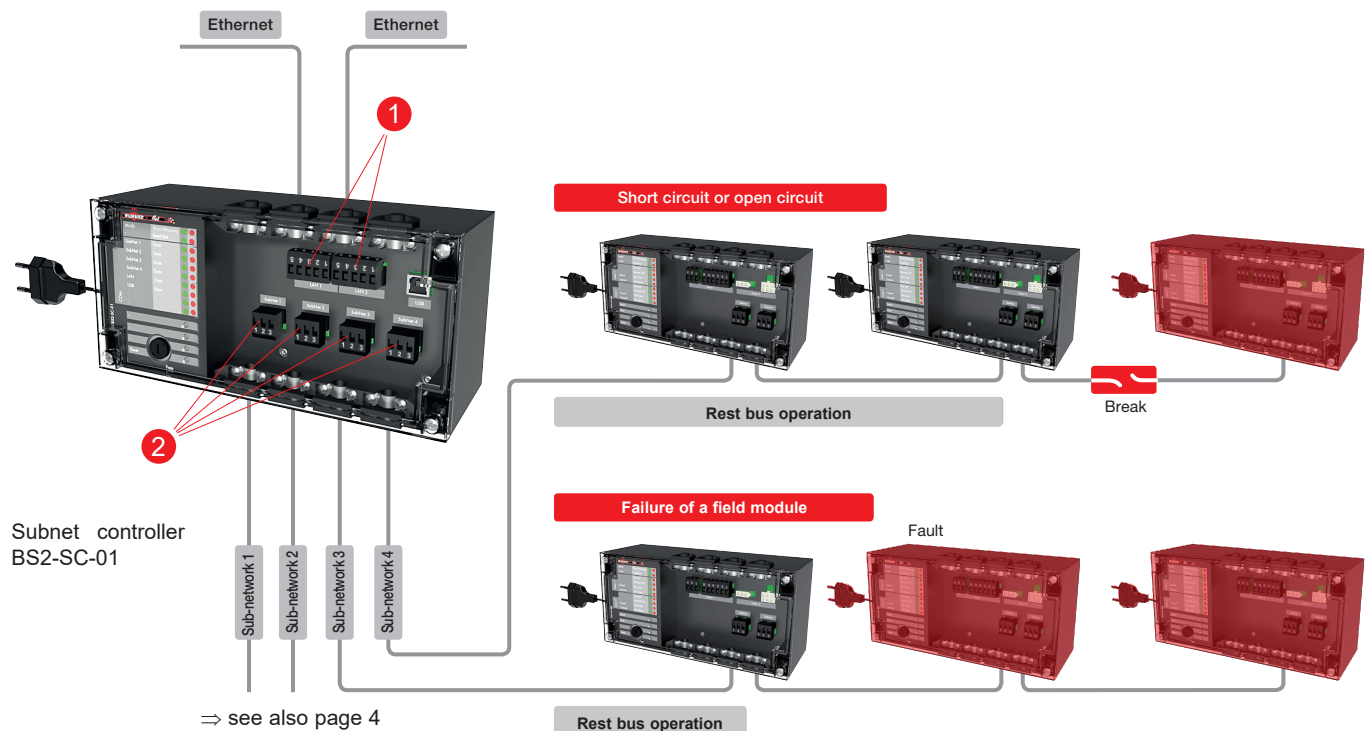
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Products (1)

BS2-SC-01 Subnet controller

The subnet controller controls, regulates and monitors data communication within its four subnets and initiates rest bus operation in case of faults, interruptions and short circuits. Full operation automatically resumes once the cause has been eliminated. It regulates the exchange of the operating data in its subnets with the higher management level via Ethernet, for example, with the Wildeboer-Net software or via a gateway with higher-level building control systems. During commissioning, the field modules connected to the subnets are detected and addressed automatically.

- Four galvanically isolated CAN-BUS connections with plug-in screw terminals.
- Two Ethernet connections with integrated switch.



⇒ see also page 4

Explanation for rest bus operation ⇒ see also page 5

1
LAN

Connection	Signal	according to EIA/TIA 568A	according to EIA/TIA 568B
1	TX+	white/green	white/orange
2	TX-	green	orange
3	RX+	white/orange	white/green
4	RX-	orange	green
5	shielded	shielded	shielded

min. cat. 5, max 100 m between modules

2
Sub-network

Connection	Signal
1	CAN HIGH
2	CAN LOW
3	CAN shield

shielded 120 Ω twisted pair cable, 1 x 2 x 0.34 mm², max 100 m between modules

Wildeboer-Net

Products (2)

BS2-VR-01 Volume flow and pressure controller module → see page 2 (EnEV, MBO)

The volume flow and pressure controller facilitates connection of up to four electronic volume flow and/or pressure controllers (manufacturer WILDEBOER) using spring terminals. → see table 1

The module is used to optimise the energy efficiency of a ventilation and air conditioning system. For this purpose, the parametrisable calendar control can be used to set the supply air and exhaust air volume flow rates of connected controllers with timer control to suit the building usage. Sequence controls can also be used to make a requirement-based setting by integrating presence sensors and CO2 switches. The connected controllers can be overridden by integrating window contacts so that they close as soon as a window is opened, for instance. The reduction in the mean outdoor air volume flow rate of the system which is achievable as a result makes for an optimisation in the required energy. Monitoring functions facilitate the graphic analysis of the ventilation ratios in the system. Adjustments can be made at any time from a central point.

- Communication between the module and the connected controllers via RS485 or MP-Bus.
- 24 V DC operating voltage for the connected controllers from the volume flow and pressure controller module.
- Existing VRE1 or VKE1 volume flow controllers can be connected via SM-01 interface modules.
- Connected controllers are detected by the module, and it reads out their parameters, which are available for factory pre-order.

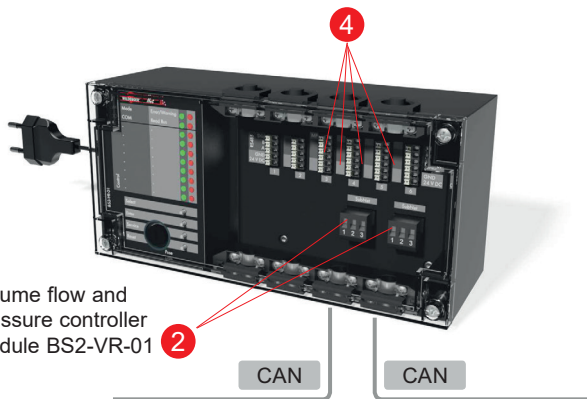


Table 1: Connection options

	Standard speed actuator	Drive type Spring return actuator
DRpro	+	+ 1)
VRpro	+	+ 1)
VKE1/VRE1	+	
VRup	+	

1) max. 2 spring return actuators or 1 spring return actuator + 1 standard speed actuator

Further combinations available on request.

2

Sub-network

Connection	Signal
1	CAN HIGH
2	CAN LOW
3	CAN shield

shielded 120 Ω twisted pair cable,
1 x 2 x 0.34 mm², max 100 m between modules

4

VR
Volume flow/pressure controller

Connection	Signal
6	MP
5	RS485-Shld
4	RS485-B
3	RS485-A
2	GND
1	24 V DC

JYSTY 2 x 2 x 0.8
max. 100 m between modules

SM-01 Interface module

The interface module facilitates the connection of a VRE1 or VKE1 volume flow controller to a BS2-VR-01 volume flow and pressure controller module.

- Plastic housing, protection rating IP54 in conjunction with the drive housing of the volume flow controller.
- Is installed in place of the connection cover on the volume flow controller.



5

SM
Interface module

Connection	Signal
1	RS485-A
2	RS485-B
3	RS485-Shld
4	GND
5	24 V DC

JYSTY 2 x 2 x 0.8
max. 100 m between modules

Wildeboer-Net

Products (3)

BS2-MO motor modules ⇒ see page 2 (MVV-TB, MBO)

The motor module makes it possible to connect on or two fire dampers and/or smoke protection dampers with electrical 24 V spring return actuator, integrated limit switches and thermo-electric release for fire dampers.

The module monitors the operating status of the dampers, with functional tests checking that they are fully functional. The dampers are closed and opened again. In the process, the run times and current consumption values of the motors are measured, and changes can thus be detected in good time. Local functional tests can thus be replaced¹⁾. Calendar controls facilitate automatic functional tests. The results of the functional check are stored reliably and permanently on the module, and in the Wildeboer-Net software after downloading.

A functional check can be started locally using a motor module, regardless of the status of commissioning of the overall system, in order, for example, to check directly after installation that the fire damper is connected properly and to make sure that the fire damper is fully functional. ⇒ see page 10

The motor modules can be parametrised to perform uninterruptible release controls (⇒ see page 12) if, for example, other fire dampers have to close when a particular one is closed and if fans have to be switched off.

All actuations and functions are remote-controlled or controlled using the motor module's push buttons. Fire dampers can be opened so long as they have not been permanently closed by thermo-electric tripping.

- Operating voltage for 24 V DC spring return actuators from the module.
Current consumption ≤ 0.5 A, start-up currents ≤ 5.8 A and ≤ 5 ms. Electronic protection against overcurrent, and undervoltage detection.

Types by connections:

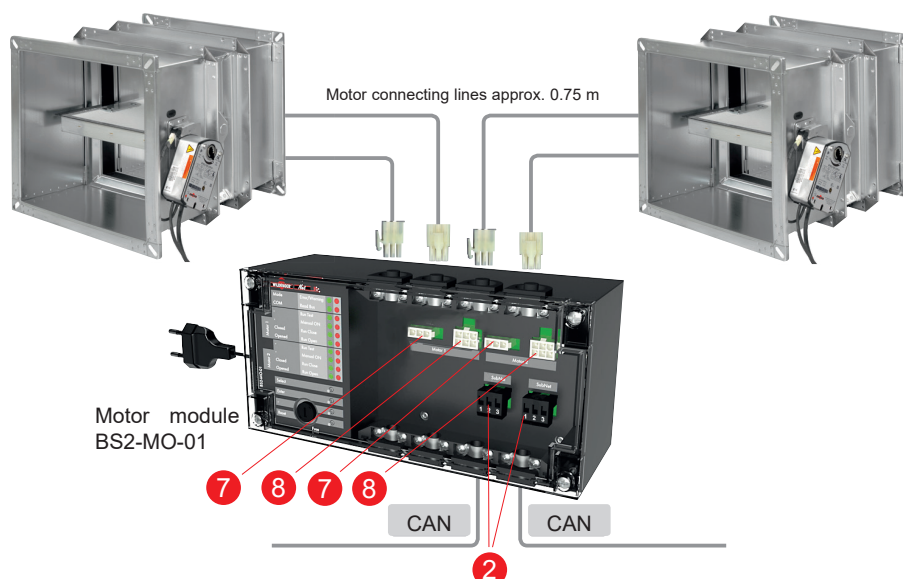
- BS2-MO-01 for AMP connector of fire dampers.
- BS2-MO-02 for duct connections with plug-in screw terminals.
- BS2-MO-03 for AMP connector of a fire damper and with plug-in screw terminals for the second fire damper or smoke protection damper.

All the benefits of Wildeboer-Net can also be applied for the FK90 fire damper for commercial kitchens, in the same way as the motor modules. For this purpose, the FK90 fire damper for commercial kitchens can be order for connection to the Wildeboer-Net with FKKUE-03 control unit (⇒ see user manual 5.0-1). The fire damper is supplied pre-installed with the control unit fitted.



FK90 fire damper for commercial kitchens with FKKUE-03 control unit

BS2-MO-01 Connection of fire dampers directly to a motor module

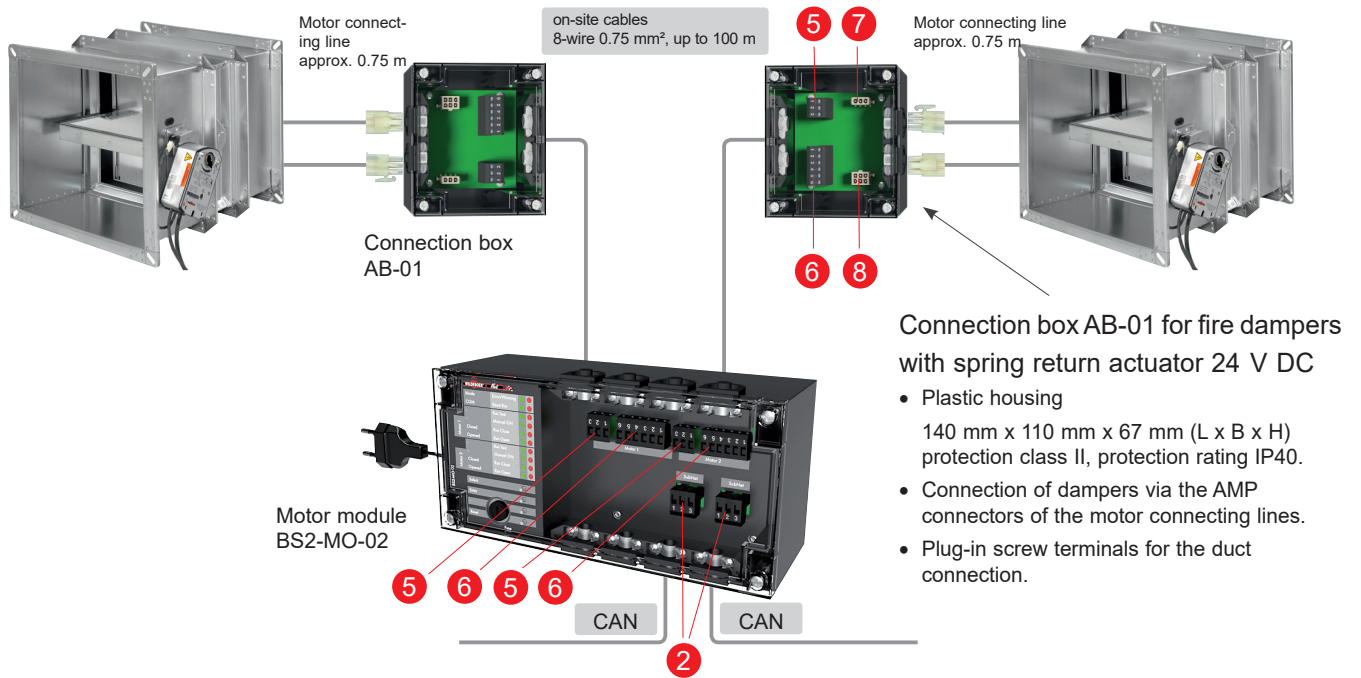


¹⁾ The local inspection by a specialist inspector for special construction, as required every 3 years in accordance with the model inspection code (MPrüfVO), is exempted from this provision.

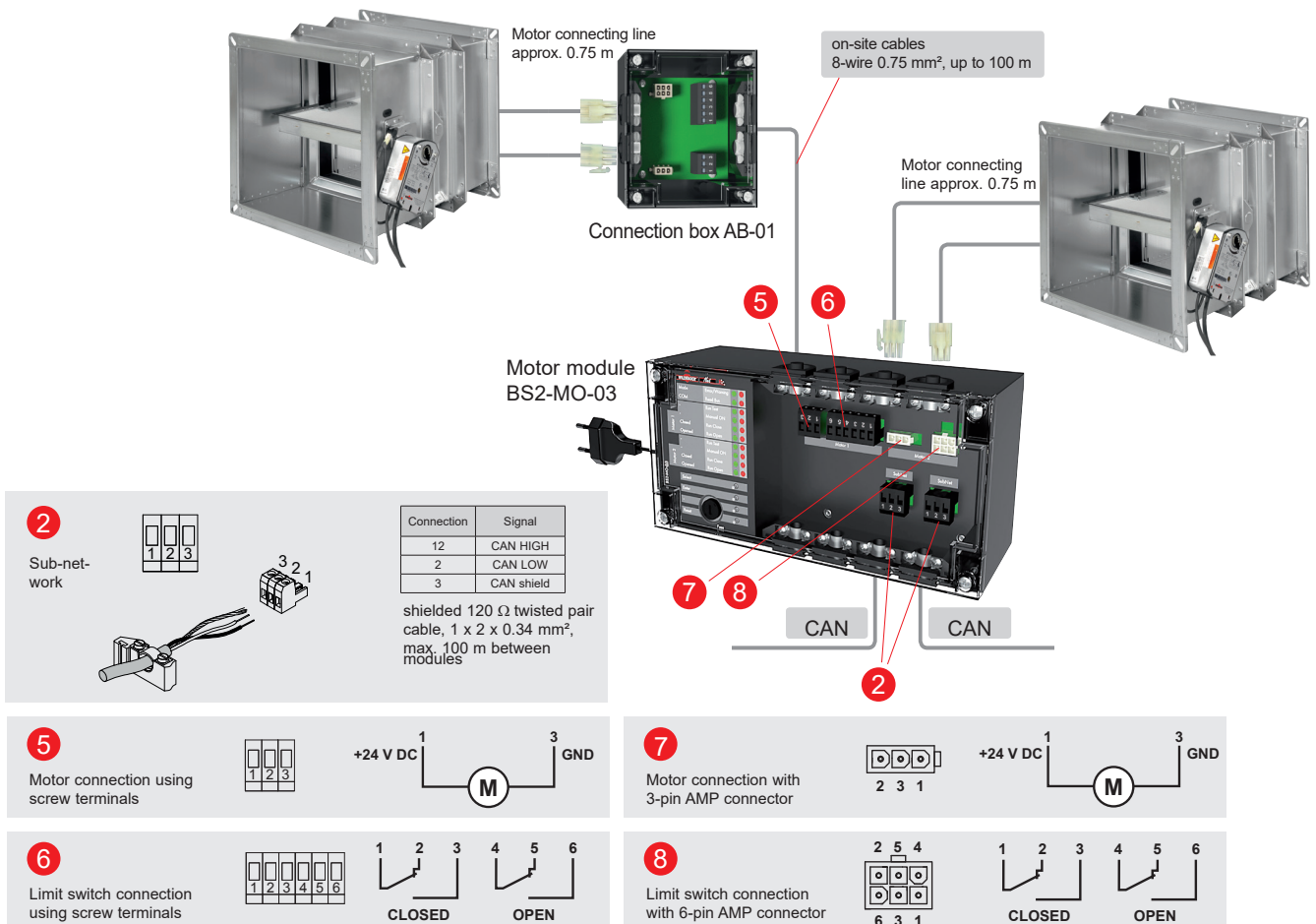
Wildeboer-Net

Products (4)

BS2-MO-02 Connection of fire dampers and/or smoke protection dampers to connection boxes



BS2-MO-03 Connection of the fire dampers and/or smoke protection dampers to a motor module directly and to a connection box



Wildeboer-Net

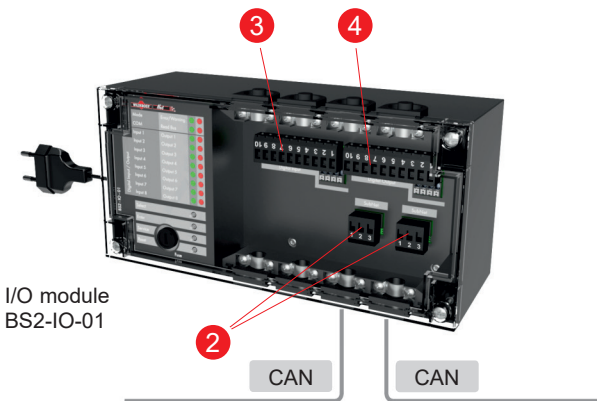
Products (5)

BS2-IO-01 I/O module

The I/O module facilitates connection of external sensors and actuators to Wildeboer-Net using eight galvanically isolated inputs and eight galvanically isolated outputs. The module can be used for sequence controls - for example, to shut off fans - release groups and calendar controls.

All actuations and functions can be remote-controlled or manually controlled using the I/O module's push-buttons.

- Eight galvanically isolated inputs (24 V DC) according to EN 61131-2 (type 1) for external sensors. Connections with plug-in screw terminals.
- Eight galvanically isolated outputs (24 V DC / 0.6 A) according to EN 61131-2 for external actuators. Connections with plug-in screw terminals.
- 24 V DC operating voltage for inputs and outputs, either on-site or from the I/O module (max. 0.85 A total).



I/O module BS2-IO-01

2 Sub-network

Connection	Signal
1	CAN HIGH
2	CAN LOW
3	CAN shield

shielded 120 Ω twisted pair cable, 1 x 2 x 0.34 mm² max 100 m between modules

3 Operating voltage 24 V DC (SELV) from the I/O module

Digital inputs

factory-produced bridges

Current rating
• max. 0.85 A over all inputs and outputs

Operating voltage 24 V DC (SELV) on site

remove factory-produced bridges

4 Operating voltage 24 V DC (SELV) from the I/O module

Digital outputs

factory-produced bridges

Current rating
• max. 0.85 A over all inputs and outputs
• max. 0.6 A per output
• 1000 µF in total for the outputs

Operating voltage 24 V DC (SELV) on site

remove factory-produced bridges

Current rating
• max. 0.6 A per output



Wildeboer-Net

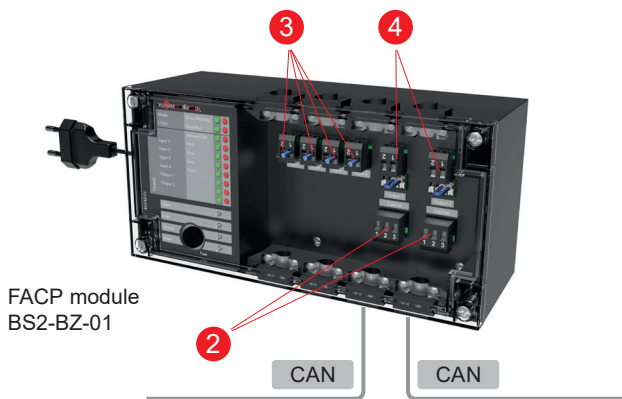
Products (6)

BS2-BZ-01 FACP module

The FACP module facilitates connection of on-site signalling units to Wildeboer-Net using four inputs for floating contacts and two floating outputs. The module monitors cables connected to the inputs for faults. It can be used for sequence controls, release group controls and calendar controls.

All actuations and functions can be remote-controlled or manually controlled using push buttons in the FACP module.

- Four inputs for floating contacts. Connections with plug-in screw terminals. Connected cables are monitored for faults.
- Two floating outputs (2 – 30 V DC / 10 µA – 2 A). Connections with plug-in screw terminals.



FACP module BS2-BZ-01

2

Sub-network

Connection	Signal
1	CAN HIGH
2	CAN LOW
3	CAN shield

shielded 120 Ω twisted pair cable, 1 x 2 x 0.34 mm², max 100 m between modules

3

inputs

Resistors:

- R3 = 680R
- R4 = 3K3

2) Remove the terminating resistor (3k3) when using the interface.

4

outputs

Resistors:

- R1, R2 = provided by the user

Wildeboer-Net

Products (7)

Gateways

WiNet-GW-01 gateway

WiNet-GW-02 gateway

for BACnet, Modbus and OPC Server DA 2.0

WiNet-GW-03 gateway

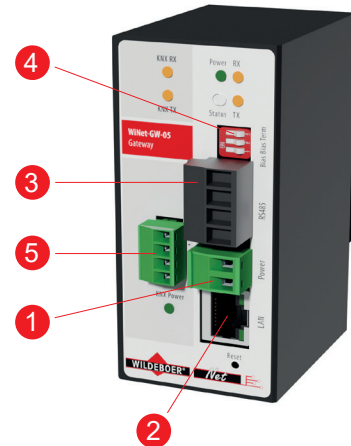
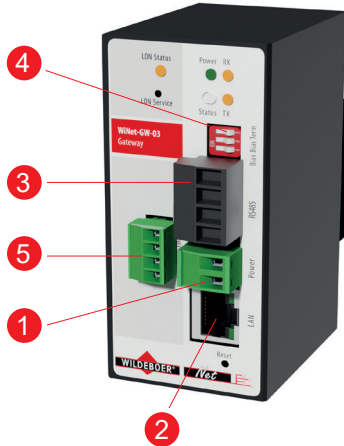
WiNet-GW-04 gateway

for BACnet, Modbus, OPC Server DA 2.0 and LON

WiNet-GW-05 gateway

WiNet-GW-06 gateway

for BACnet, Modbus, OPC Server DA 2.0 and KNX



- Housing 65 mm x B x 100 mm (L x B x H)
 B = 31 mm for WiNet-GW-01, -02
 B = 48 mm for WiNet-GW-03, -04, -05, -06
 Protection class III, protection rating IP20
- DIN mounting rail TS35 according to EN 50022
- Supply voltage 12 – 24 V AC/DC
- Current consumption max. 200 mA
- Operating temperature range 0 – 45°C
- Relative humidity 20 – 80% without condensation
- Module permanently stores configuration, even in the event of a power failure.
- Galvanically isolated RS485 interface with plug-in screw terminal.

- Development and automatic generation of the EDE file required for BACnet using the Wildeboer-Net software.
 => see page 8

- Types with corresponding data points

WiNet-GW-01:	200 Data points
WiNet-GW-02:	1100 Data points
WiNet-GW-03:	200 Data points
WiNet-GW-04:	1100 Data points
WiNet-GW-05:	200 Data points
WiNet-GW-06:	1100 Data points

An update to 2500 data points is possible.

1 Power

1 +24: 24 V AC/DC supply voltage
 2 GND: GND

2 LAN

RJ45 10/100 Mbit Ethernet

3 RS485

1 B+: non-inverted input
 2 A-: inverted input
 3 AGND: GND
 4 Shld: Shield connected to PE
 Data cable: Twisted pair, 120 Ω, shielded

4 DIP switch

1+2: Bias voltage for RS485
 ON: If few RS485 devices are connected or no other RS485 device specifies a bias voltage
 3: 120 Ω terminating resistor
 ON: If the gateway is connected to the end of a RS485 chain.

5 LON

1 Shield: Shield
 2 Shield: Shield
 3 LON: LON2
 4 LON: LON1

WiNet-GW-03
 WiNet-GW-04

KNX

1 + KNX connection
 2 + KNX connection
 3 - KNX connection
 4 - KNX connection

WiNet-GW-05
 WiNet-GW-06

Wildeboer-Net

Products (8)

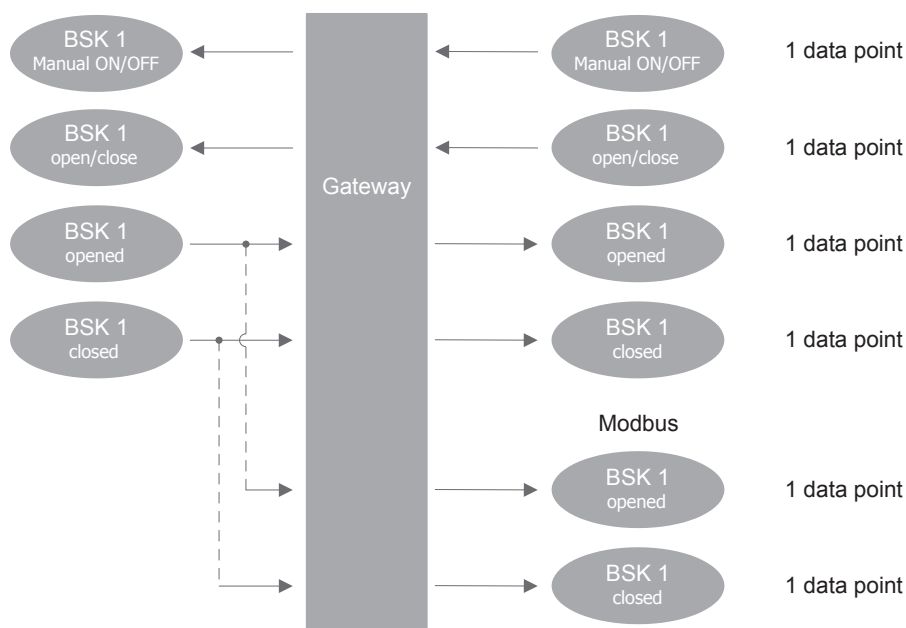
Gateways are used for communication between devices which have different communication protocols. A WiNet-GW gateway enables the connection of Wildeboer-Net to the following open communication protocols. Different protocols can also be operated simultaneously with a single gateway.

Protocol	Gateway					
	WiNet-GW-01	WiNet-GW-02	WiNet-GW-03	WiNet-GW-04	WiNet-GW-05	WiNet-GW-06
BACnet MS/TP ¹⁾	x	x	x	x	x	x
BACnet IP	x	x	x	x	x	x
Modbus/serial (ASCII & RTU) ¹⁾	x	x	x	x	x	x
Modbus/IP	x	x	x	x	x	x
OPC Server DA 2.0	x	x	x	x	x	x
LON			x	x		
KNX/TP					x	x
Data points	200	1100	200	1100	200	1100

¹⁾ not possible simultaneously

Data point definition ⇒ see page 8

Information is exchanged between devices with different communication protocols via data points. A data point, for example, is the position indicator “fire damper (BSK) opened”. If a data point of the Wildeboer-Net system is not only ported to one other protocol via the gateway, but to several protocols, more data points are required accordingly.



Wildeboer-Net provides a large number of data points. The Wildeboer-Net software is used to configure which data points are to be transferred from Wildeboer-Net to the target system.

The number of data points initially available is predetermined by the type of device and the licence.

The number of data points can be upgraded to 2500 with a license update.

Wildeboer-Net

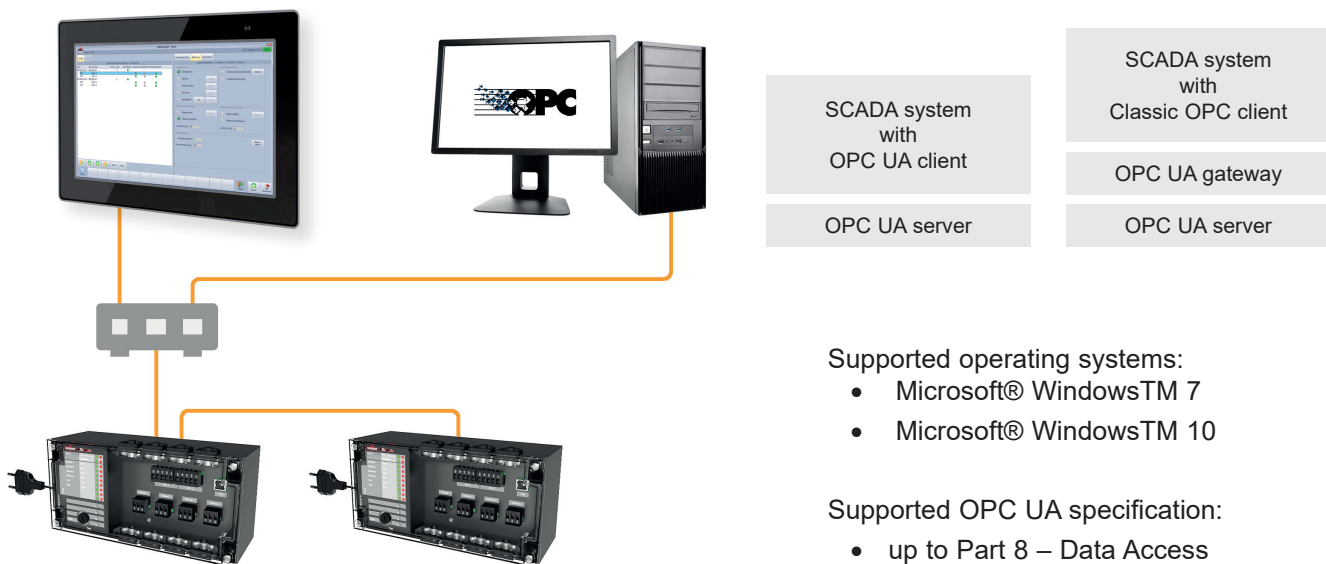
Products (9)

WiNet-OPC-01 OPC-UA server software

The OPC-UA server software facilitates the integration of Wildeboer-Net into SCADA applications. SCADA (supervisory control and data acquisition) denotes a computer system in which technical processes are monitored and controlled. The WiNet-OPC-01 OPC-UA software is used to query status data from the field modules of Wildeboer-Net. In addition, this can be used to operate field modules, i.e. fire dampers can be opened and closed. Functional tests can be started and faults and alarms can be reset.

An OPC UA client is required for visualisation and operation.

The user must provide an OPC gateway for connecting SCADA systems which are not based on the OPC UA standard, but on Classic OPC. It is included on the OPC-UA server software data medium. The required licence for using the OPC UA gateway must be purchased from Unified Automation, www.unified-automation.com. Hardware information, such as MAC address, is exchanged for this purpose.



WiNet-SW-01 Wildeboer-Net software

The Wildeboer-Net software is used for visualisation of the operating and diagnostics data collected in the field and to control connected modules and their parametrisation, for example, for function tests, sequence controls, release group controls and calendar controls.

The scope of delivery of the central operating unit (⇒ see page 25) includes the software, which is pre-installed.

Optionally, the software can be installed on the user's PC which is connected to the subnet controller via Ethernet.

System requirements:

- Windows 7, Windows 8 or Windows 10 (32 bit or 64 bit)
- Microsoft .Net Framework 4.0
- 2 GB RAM
- 100 MB free hard drive space
- USB interface (min. USB 2.0, Enhanced Host Controller Interface)
- Ethernet interface (100 Mbit/s)

No permanent connection between the subnet controller and the Wildeboer-Net software on the user's PC or the central operating unit is required to operate the system.

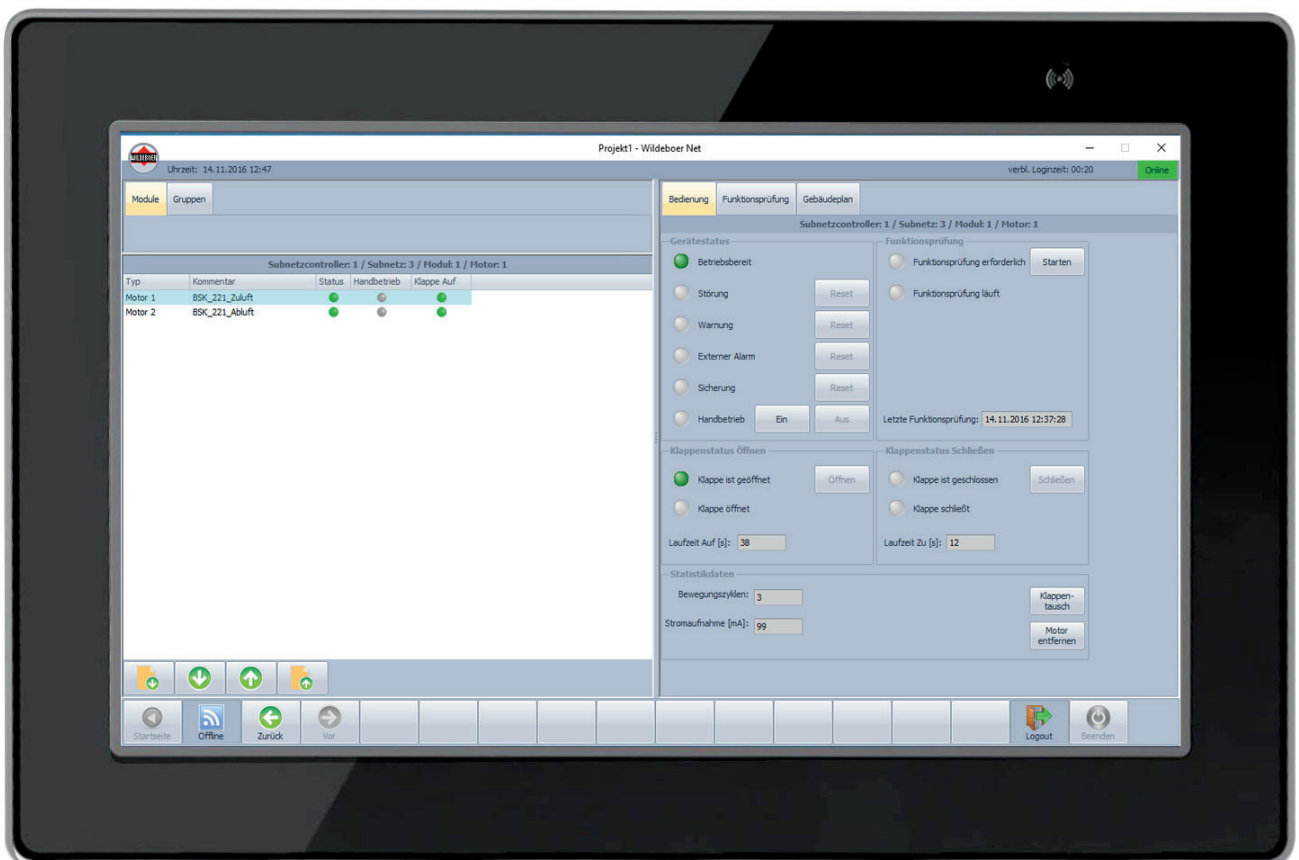
Wildeboer-Net

Products (10)

WiNet-ZB-01 Central operating unit

The central operating unit offers a 15.6-inch multi-touch display to be installed in an IP65 switch cabinet front panel. Windows 10 Enterprise 2016 LTSB and the Wildeboer-Net software are pre-installed.

- The display is resistant to shock and vibration, thermally stable and compliant with EMC standards. Long service life thanks to LED backlighting. Display format 16:9.
- Wildeboer-Net software pre-installed ⇒ see page 24
- Mains connection 230 V AC with mains adapter 24 V DC.
- External dimensions: 414 mm x 298 mm x 98 mm (L x B x H).
- Switch cabinet section: 398 mm x 282 mm (L x B).



WiNet-AP-01 Support for commissioning and system parametrisation

Our customer service department can provide supporting instructions on the operation of the software and the system for commissioning. For example, this includes instruction on generating texts, functional checks, calendar controls, release groups and sequential circuits.

The following points are a prerequisite for this purpose:

- At least one responsible employee is provided who is familiar with the local conditions and the system. This person assumes responsibility for operation of the system and entering the parameters.
- All the cables and components required for the system are fully installed, wired and fully functional, and accessible. Moreover, the building voltage supply is guaranteed for the day of commissioning.
- The user's specifications for texts, calendar controls, functional checks and release groups are available.
- Any necessary scaffolds, work platforms, ladders or other aids must be made available on site.



Wildeboer-Net

Order data

Management level

WiNet-SW-01	Wildeboer-Net software ⇒ see page 24	
WiNet-ZB-01	Central operating unit with pre-installed Wildeboer-Net software ⇒ see page 25	
WiNet-GW-01	Gateway for BACnet/Modbus + OPC Server DA 2.0	with 200 Data points
WiNet-GW-02	Gateway for BACnet/Modbus + OPC Server DA 2.0	with 1100 Data points
WiNet-GW-03	Gateway for BACnet/Modbus + OPC Server DA 2.0 + LON	with 200 Data points
WiNet-GW-04	Gateway for BACnet/Modbus + OPC Server DA 2.0 + LON	with 1100 Data points
WiNet-GW-05	Gateway for BACnet/Modbus + OPC Server DA 2.0 + KNX	with 200 Data points
WiNet-GW-06	Gateway for BACnet/Modbus + OPC Server DA 2.0 + KNX ⇒ see pages 22, 23	with 1100 Data points
WiNet-OPC-01	OPC-UA server software ⇒ see page 24	

Automation level

BS2-SC-01	Subnet controller ⇒ see page 16
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Field level

BS2-VR-01	Volume flow and pressure controller module ⇒ see page 17
BS2-MO-01	Motor module, connection type: 2 x AMP connector
BS2-MO-02	Motor module, connection type: 2 x plug-in screw terminals
BS2-MO-03	Motor module, connection type: 1 x AMP connector and 1 x plug-in screw terminals ⇒ see pages 18, 19
BS2-IO-01	I/O module ⇒ see page 20
BS2-BZ-01	FACP module ⇒ see page 21

Accessories

SM-01	Interfaces module ⇒ see page 17
AB-01	Connection box ⇒ see page 19
WiNet-AP-01	Commissioning support for Wildeboer-Net ⇒ see page 25



Wildeboer-Net

Specification text (1)

Communication system for control and monitoring of fire dampers and smoke protection dampers, and electronic volume flow and pressure controllers (manufacturer: Wildeboer) for the ventilation and air conditioning system.

Operation, visualisation and parametrisation of all functions is performed from a central point using ready-to-use software. The software is pre-installed on the central operating unit. Alternatively it can be installed on the user's PC. Permanent logging of operating data in the software and on the field modules, even in case of mains failure. Gateways for BACnet, Modbus, LON, KNX or OPC are available for connection to building control systems. Software, gateways and subnet controller communicate with each other via Ethernet. Up to 32 subnet controllers can be connected via Ethernet. Each controller operates up to four subnets. Up to 32 field modules can be connected per subnet. Cable lengths per subnet of up to 3200 m, up to 100 m between modules. Safe and reliable data transfer via CAN-BUS in the subnets, galvanically isolated partial segments between the individual field modules and to the subnet controller. Faults on the subnets are diagnosed automatically, restricted to the partial segment or module and displayed. Rest bus operation is performed in case of faults. Bus operation continues automatically once the fault has been eliminated.

Field modules and subnet controllers are ready for connection for 230 V AC mains voltage without additional power units.

Quick commissioning with automatic addressing of the field modules, partial commissioning can be performed during the construction phase. Simple upgrade of the system without programming. Automatic restoration after module replacement.

Comment function for description and identification marking of the connected field modules and field devices, and integration of building layouts for orientation in the building. The information is collected separately for each field module and for each field device. Additionally, existing identification codes can be applied in accordance with the general identification system (GIS). Optionally, the entered comments or the identification codes are applied in the EDE files automatically generated for the gateways.

Two areas of application, separately or in combination, are required for control of a ventilation and air conditioning system.

Control for implementation of the building code requirements for cold smoke safety and for functional checks on fire dampers:

Sequence controls for creation of control connections for fire dampers and smoke protection dampers with sensors and actuators. Fan enabling functions using I/O modules, for example, can thus be implemented. Simple parametrisation of fan enabling using a matrix. Release group controls for increasing cold smoke safety and fire protection by integrating fire dampers and smoke protection dampers into release groups together with volume flow and pressure controllers, and sensors and actuators using I/O modules. The devices in a release group can be all the field modules under a subnet controller. The field modules within the release group monitor each other using a "heart beat signal". Simple parametrisation of release group control using a matrix.

Calendar controls for scheduled opening and closing of fire dampers and smoke protection dampers, adapted to the operating times of the building and implementation of regular functional checks on fire dampers. Simple creation of calendar entries using timetable assistant.

Functional checks on fire dampers within a few minutes for all dampers simultaneously, in groups or individually. The check starts either automatically according to schedule, manually to schedule or manually. Permanent logging of results of functional checks and scheduled manual checks not carried out. An export function is available for the results. The fire dampers can be operated using the modules without previously commissioning the overall system, including carrying out functional checks with logging of results. Graphic trend analyses for detecting changes when carrying out functional checks on fire dampers.



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Specification text (2)

A pinging function can be carried out by a single person as a "1-to-1 test" for the planned connection of the fire dampers.

Field modules for fire dampers and smoke protection dampers supply them with 24 V DC operating voltage. Field modules for external sensors and actuators can supply them with 24 V DC voltage. Alternatively, an on-site 24 V DC voltage can be connected via the module for the sensors and actuators.

Requirement-based control of a ventilation and air conditioning system in accordance with time settings, and thermal and material loads:

Sequence controls for implementation of requirement-based setpoint values for volume flow and pressure controllers in accordance with thermal and material loads (presence detector, CO2 switch) and master-slave controls.

Calendar controls for implementation of requirement-based setpoint values for volume flow and pressure controllers, adapted to the operating times of the building. Simple creation of calendar entries using timetable assistant.

Release group controls for upgrading cold smoke safety and fire protection by integrating volume flow and pressure controllers into release groups together with volume fire dampers and smoke protection dampers, and sensors and actuators using I/O modules. The devices in a release group can be all the field modules under a subnet controller. The field modules within the release group monitor each other using a "heart beat signal". Simple parametrisation of release group control using a matrix. The alarm function for volume flow and pressure controllers is adjustable.

Graphic analysis of any number of setpoint and actual values from volume flow and pressure controllers. Permanent logging of data. Parameters which are available for factory pre-order, are applied automatically by the volume flow and pressure controllers. Field modules for electronic volume flow and pressure controllers supply them with 24 V DC operating voltage. Field modules for external sensors and actuators can supply them with 24 V DC voltage. Alternatively, an on-site 24 V DC voltage can be connected via the module for the sensors and actuators.

Accordingly, they must consist of:

Wildeboer-Net software for installation on the user's PC as user interface for visualisation of the operating and diagnostics data collected in the field. For parametrisation and control of connected modules.

..... pc. of WiNet-SW-01 deliver:
 Manufacturer: WILDEBOER install:

Central operating unit with 15.6-inch multi-touch glass display for installation on the IP65 switch cabinet front panel. Mains connection via plug-in power supply unit to 230 V AC. Fully pre-installed with the operating system and with the WiNet-SW-01 Wildeboer-Net software for data communication with subnet controllers via Ethernet. For visualisation of the operating and diagnostics data saved on the modules and control of parametrisation of the field modules.

..... pc. of WiNet-ZB-01 deliver:
 Manufacturer: WILDEBOER install:

Wildeboer-Net

Specification text (3)

Gateway for the implementation of Wildeboer-Net on BACnet/ IP, Modbus/serial, Modbus/TCP or OPC server DA 2.0. Up to 200 data points are developed and an EDE file is generated by the Wildeboer-Net software.

..... pc. of WiNet-GW-01 deliver:
 Manufacturer: WILDEBOER install:

Gateway for the implementation of Wildeboer-Net on BACnet/ IP, Modbus/serial, Modbus/TCP or OPC server DA 2.0. Up to 1100 data points are developed and an EDE file is generated by the Wildeboer-Net software.

..... pc. of WiNet-GW-02 deliver:
 Manufacturer: WILDEBOER install:

Gateway for the implementation of Wildeboer-Net on BACnet/ IP, Modbus/serial, Modbus/TCP or OPC server DA 2.0 or LON. Up to 200 data points are developed and an EDE file is generated by the Wildeboer-Net software.

..... pc. of WiNet-GW-03 deliver:
 Manufacturer: WILDEBOER install:

Gateway for the implementation of Wildeboer-Net on BACnet/ IP, Modbus/serial, Modbus/TCP or OPC server DA 2.0 or LON. Up to 1100 data points are developed and an EDE file is generated by the Wildeboer-Net software.

..... pc. of WiNet-GW-04 deliver:
 Manufacturer: WILDEBOER install:

Gateway for the implementation of Wildeboer-Net on BACnet/ IP, Modbus/serial, Modbus/TCP or OPC server DA 2.0 or KNX/ TP. Up to 200 data points are developed and an EDE file is generated by the Wildeboer-Net software.

..... pc. of WiNet-GW-05 deliver:
 Manufacturer: WILDEBOER install:

Gateway for the implementation of Wildeboer-Net on BACnet/ IP, Modbus/serial, Modbus/TCP or OPC server DA 2.0 or KNX/ TP. Up to 1100 data points are developed and an EDE file is generated by the Wildeboer-Net software.

..... pc. of WiNet-GW-06 deliver:
 Manufacturer: WILDEBOER install:

Wildeboer-Net

Specification text (5)

Manufacturer: WILDEBOER

I/O module with eight galvanically isolated inputs and eight outputs for connection of external sensors and actuators using plug-in screw terminals. Use for connections, transmitting alarm notifications, switching of fans etc. Mains connection 230 V AC with standard Europlug and 1.5 m connecting line. Galvanically isolated bus connections with plug-in screw terminals. Manual operation using push buttons, LEDs for diagnostics. Plastic casing IP40.

..... pc. of BS2-IO-01 deliver:
 Manufacturer: WILDEBOER install:

FACP module for connection of on-site signalling units. Two floating outputs and four inputs for floating contacts with plug-in screw terminals. Cables connected to the inputs are monitored for faults. Mains connection 230 V AC with standard Europlug and 1.5 m connecting line. Galvanically isolated bus connections with plug-in screw terminals. Manual operation using push buttons, LEDs for diagnostics. Plastic casing IP40.

..... pc. of BS2-BZ-01 deliver:
 Manufacturer: WILDEBOER install:

Interface module for connection of an electronic VRE1 or VKE1 volume flow controller to a volume flow and pressure controller module. IP54 plastic housing in conjunction with the drive housing of the volume flow controller.

..... pc. of SM-01 deliver:
 Manufacturer: WILDEBOER install:

Connection box for 24 V DC spring return actuator with AMP connector on connecting lines for transmission using plug-in screw terminals to on-site cable. Plastic casing IP40.

..... pc. of AB-01 deliver:
 Manufacturer: WILDEBOER install:

Support for commissioning and system parametrisation of Wildeboer-Net.

..... pc. of WiNet-AP-01 deliver:
 Manufacturer: WILDEBOER install:

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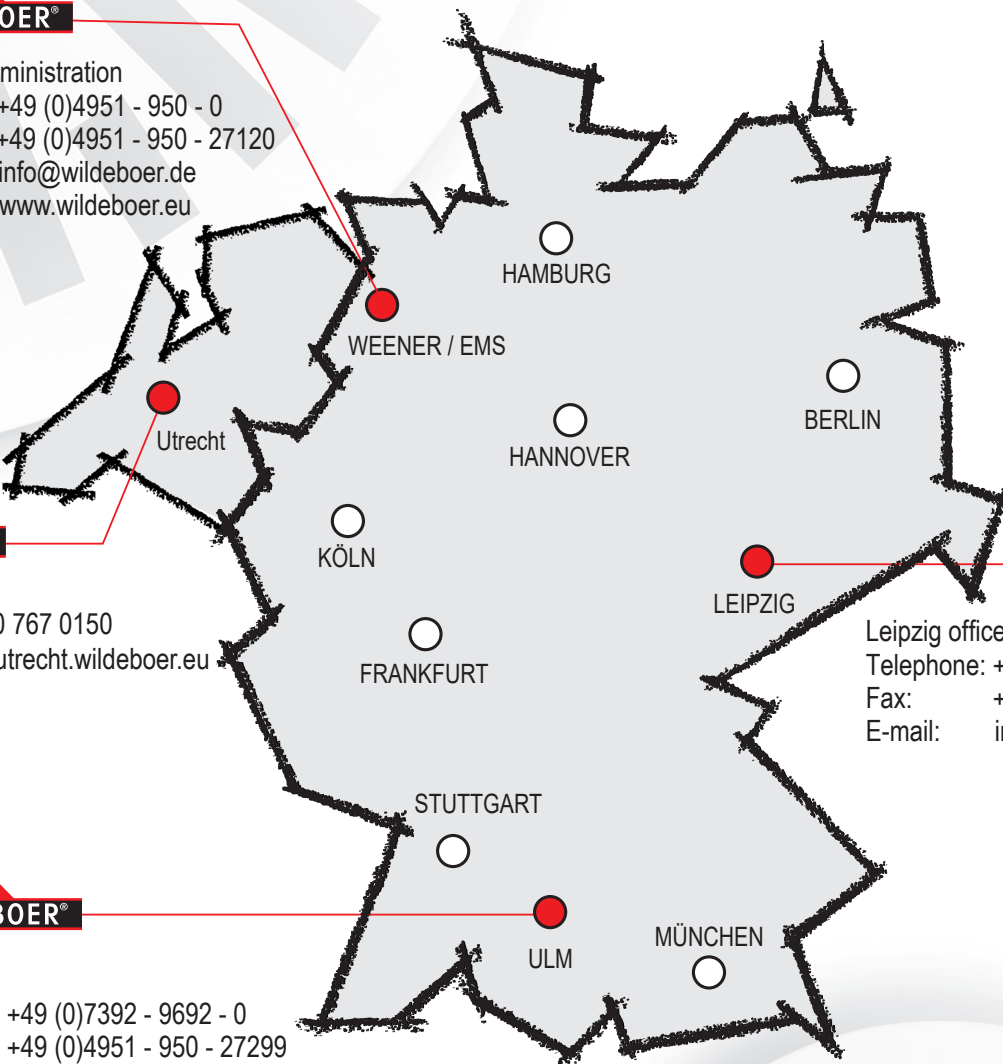
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