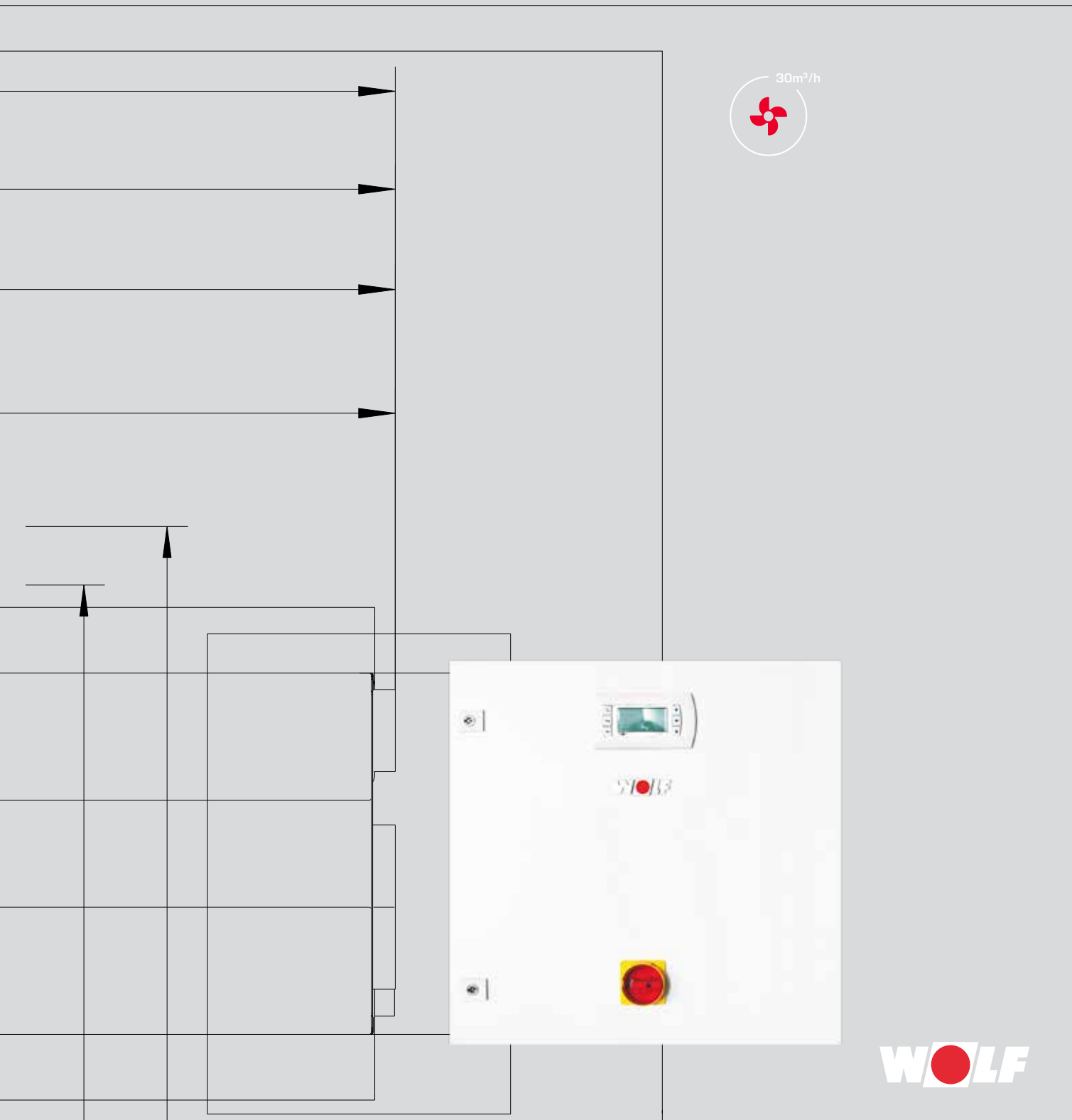
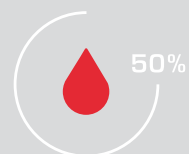
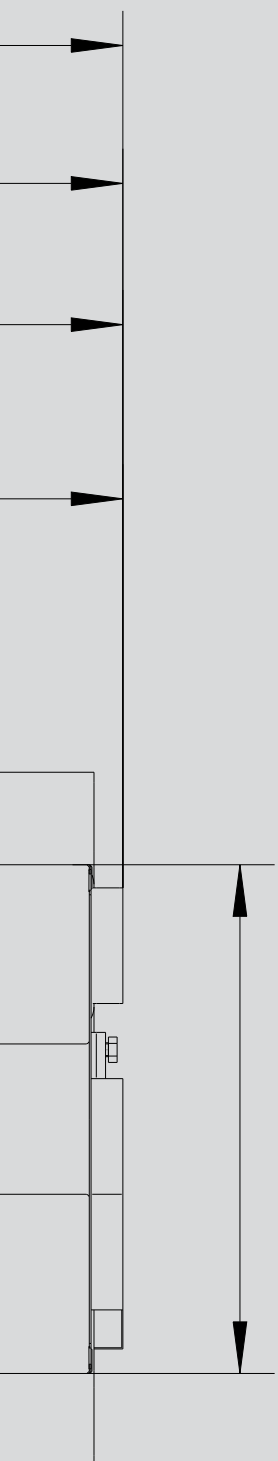


TECHNICAL DOCUMENTATION

WOLF CONTROL SYSTEM AIR HANDLING

WRS-K





THE EXTENSIVE EQUIPMENT RANGE

from system supplier WOLF offers the ideal solution for commercial and industrial buildings, new build and modernisation projects alike.

The range of WOLF control units can meet any requirement for heating convenience.

All equipment is easy to operate, highly energy efficient and reliable.

Solar thermal systems can be swiftly integrated into existing systems.

WOLF equipment is easy and quick to install and maintain.

| | | |
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WOLF AIR HANDLING CONTROL SYSTEM

TENDER DOCUMENTATION

CONTROL CABINET FOR AIR HANDLING AND VENTILATION UNITS

The fixed switchgear combination includes an IEC 62208 compliant enclosure and is suitable for internal installation. The switchgear combination is used to control ventilation and air handling systems, complies with the EMC Directive 2004/108/EC, the Low Voltage Directive 2006/95/EC and was built and tested in accordance with EN 61439-1 and EN 61439-2.

THE FOLLOWING EQUIPMENT FEATURES are included as standard and can be matched together on an order by order basis if needed:

Sheet steel casing (standard sizes: 600x600x210mm, 600x800x250mm, 800x800x210mm, 1000x1000x300mm); RAL 7035 paint finish; mounted door with rubber seal and cam lock, doorstop left/right (standard stop: right); door opening angle 130°; control unit separate and/or installed in door; equipment fitted on mounting plate and designed as modular units; fully fitted and wired; top/bottom cable entry with additional jumper conduit (standard entry: bottom); main switch omnipolar, lockable with emergency off function; protection class 1; terminal strip designed for push in connection; earthed service socket

DESIGNED FOR THE FOLLOWING CONDITIONS:

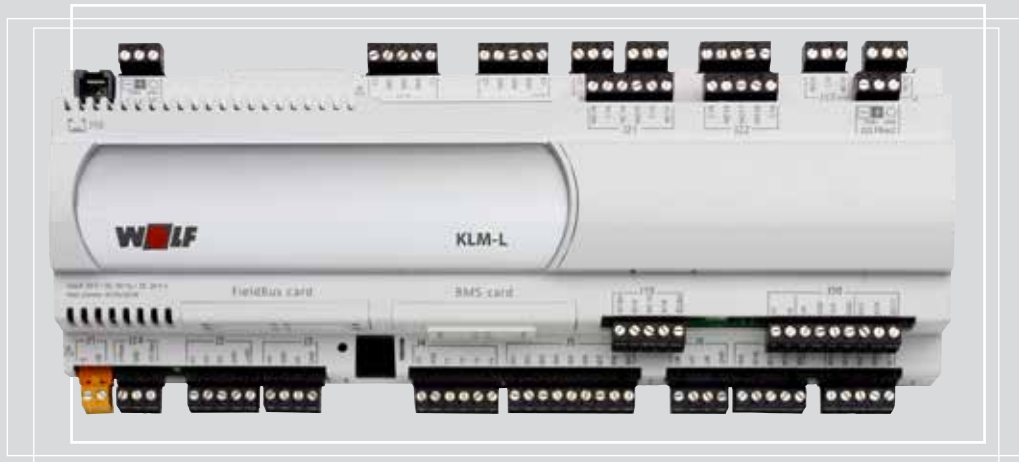
IP rating IP54; ambient temperatures between -5°C and 40°C; max. ambient temperature of 35°C over 24 hours, max. height: 2000 m above sea level; atmospheric conditions up to 90%r.H. at 20°C and up to 50%r.H. at 40°C; EMC environment A; electricity connection for a TN-C-S system; contamination level 2 according to EN 61439; cables fed in from outside must be made of copper

LIMITATION:

Use of the switch gear is not permissible for special operating conditions. Should the following operating conditions arise, you must inform WOLF.

Special operating conditions:

- a) Ambient temperature, relative humidity and/or height values that differ from the specification;
- b) Sudden changes in temperature and/or air pressure, meaning that there is an unusual amount of condensation inside the switch gear;
- c) Atmospheres which may contain a significant amount of dust, smoke, corrosive or radioactive components, vapours or salt;
- d) Exposure to strong electric or magnetic fields;
- e) Exposure to extreme climatic conditions;
- f) Exposure to mould or small animals;
- g) Siting in areas at risk of fire or explosion;
- h) The occurrence of excessive vibrations and impacts;
- i) Siting in a position that will affect the current carrying capacity or breaking capacity, e.g. if the switch gear is installed in machines or wall recesses;
- j) Exposure to conducted and radiated disturbances which are not electromagnetic, as well as exposure to electromagnetic disturbances in other environments than those listed;
- k) Unusual voltage surges



**AIR HANDLING AND VENTILATION
MODULE KLM-L / KLM-XL**

The hardware is a freely programmable control unit with 18 digital and 10 analogue inputs and 18 digital and 6 analogue outputs. For the purpose of user-friendly commissioning, the control unit is preconfigured at the factory to match specific system and customer requirements, using the WOLF configuration assistant. Users only need to select their required switching times and set values. The KLM-XL has an additional onboard Modbus-RTU interface which is used to connect to the WOLF Portal.

| | |
|---------------------|------------------------------|
| Ambient temperature | -25...+70°C |
| Dimensions | 110 x 315 x 60mm (H x W x D) |
| Installation | Top hat rail installation |

KLM-E EXTENSION MODULE

If additional inputs or outputs are required to perform specific functions, up to 5 KLM-E extension modules can be connected. A KLM-E has 4 digital and 4 analogue inputs, as well as 4 digital and one analogue outputs. This can also be used to add additional functions such as humidification or adiabatic cooling.

| | |
|---------------------|-----------------------------|
| Ambient temperature | -10...+70°C |
| Dimensions | 110 x 70 x 60mm (H x W x D) |
| Installation | Top hat rail installation |

WOLF AIR HANDLING CONTROL SYSTEM

APPLICATION EXAMPLES

SUPPLY AIR UNIT WITH HEATING COIL

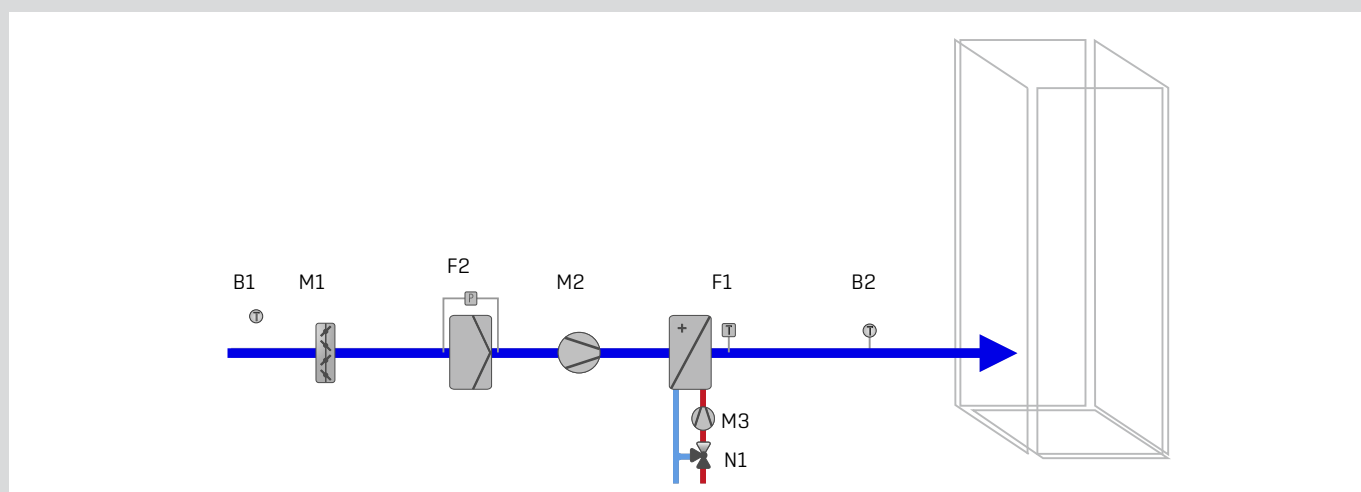
GENERAL

A supply air unit can be used to treat air for rooms for various applications. Supply air units are frequently used to prevent specific substances from reaching the outside. In such cases, the unit is operated as a recirculation unit. These units can also be used to compensate for pressure losses caused by extractor hoods, kitchen ventilators, etc. (negative pressure in room).

SYSTEM EXAMPLE DESCRIPTION

The supply air unit provides fresh air [M1] for a room. This air is brought to an adjustable temperature level in winter, spring and autumn using a heating coil. If the supply air temperature [B2] falls below the set value, the heating circuit pump [M3] and the heat generator are activated and the heating valve [N1] is kept open. A frost thermostat [F1] prevents the heating coil from being damaged when the outdoor temperature [B1] is low due to a lack of heating energy. A variable speed fan [M2] is used to control the amount of fresh air. An air filter ensures that the air is clean. A filter monitor [F2] is used to detect high levels of filter contamination and avoid unnecessary pressure losses. A silencer reduces the amount of noise in the room.

CONTROL LAYOUT



B1 Outdoor temperature sensor
B2 Supply air temperature sensor

F1 Frost thermostat
F2 Filter monitor

M1 Damper servomotor
M2 Supply air fan
M3 Heating circuit pump

N1 Heating valve

SUPPLY/EXTRACT AIR UNIT WITH PHE, HEATING COIL AND COOLING COIL

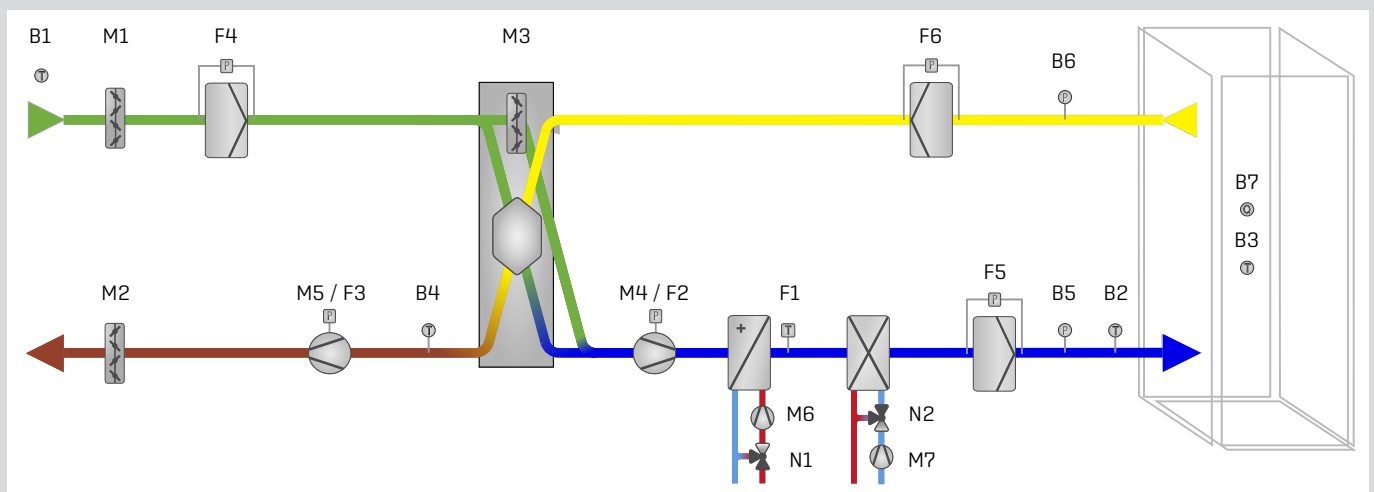
GENERAL

Supply/extract air units with a heating/cooling coil ensure that the room temperature is kept at a pleasant level for people or provide specific ambient temperatures for technical equipment. Optional state of the art plate heat exchangers, wheel heat exchangers and high performance run-around coil systems can be used for energy recovery.

SYSTEM EXAMPLE DESCRIPTION

In this example, a countercurrent plate heat exchanger is used for energy recovery. This system has a particularly high rate of heat recovery. Another advantage is that this process does not require additional drive energy. However, particular care should be given to the ice guard of the plate heat exchanger when designing the heating coil. When outdoor temperatures reach approximately -4°C , the high level of heat recovery causes the exhaust air temperature [B4] to go below 0°C . There is a risk of condensate from the extract air freezing and damaging the plate element. The ice guard in the air handling control unit counteracts this by keeping the PHE bypass damper [M3] open and guiding the outdoor airflow past the plate element. Filters in the supply air and extract air (F4/F5) prevent the recuperator from becoming contaminated. The hydraulics of the cooling coil are displayed as a diverting circuit in the system diagram in order to provide dehumidification in addition to cooling in summer.

CONTROL LAYOUT



| | | | |
|---------------------------------------|-----------------------------------|------------------------------------|------------------|
| B1 Outdoor temperature sensor | F1 Frost thermostat | M1 Damper servomotor - outdoor air | N1 Heating valve |
| B2 Supply air temperature sensor | F2 Air flow monitor - supply air | M2 Damper servomotor - exhaust air | N2 Cooling valve |
| B3 Room temperature sensor | F3 Air flow monitor - extract air | M3 Damper servomotor - bypass PHE | |
| B4 Icing-up temperature sensor | F4 Filter monitor - outdoor air | M4 Supply air fan | |
| B5 Supply air pressure sensor | F5 Filter monitor - supply air | M5 Extract air fan | |
| B6 Extract air pressure sensor | F6 Filter monitor - extract air | M6 Heating circuit pump | |
| B7 Air quality sensor CO ₂ | | M7 Cooling circuit pump | |

WOLF AIR HANDLING CONTROL SYSTEM

APPLICATION EXAMPLES

SUPPLY/EXTRACT AIR UNIT WITH PHE, HEATING/COOLING WITH HEAT PUMP (INTEGRATED CHILLER)

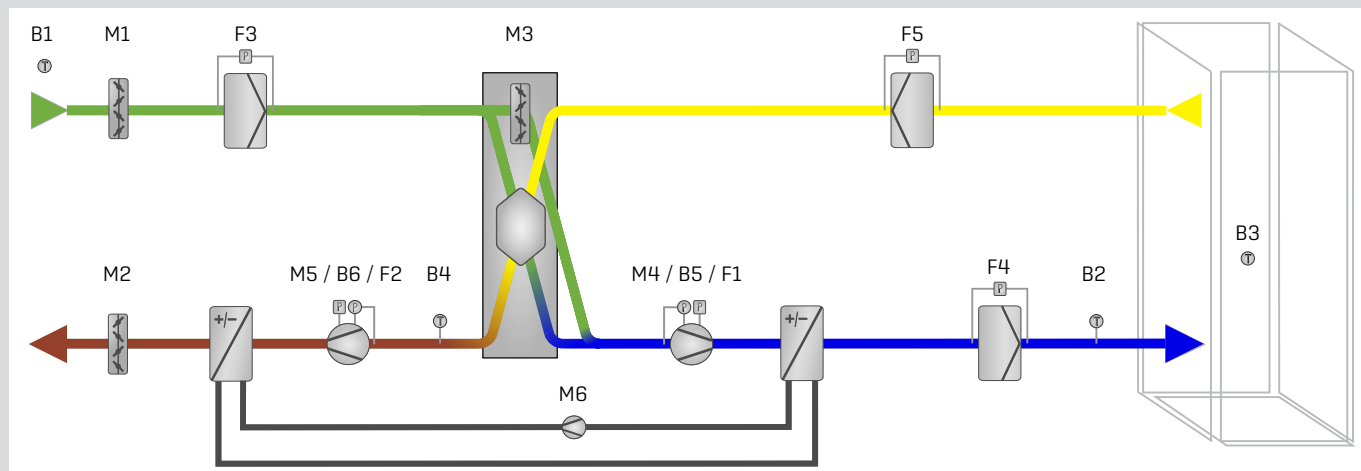
GENERAL

The cooling unit can be integrated directly into the ventilation unit if there is not enough space for a separate cooling system. This removes the need for external return cooling units or roof condensers because the exhaust air is used for reverse cooling. Fitting the integrated cooling system with a heat pump circuit for reversing the cooling circuit frequently removes the need for an additional heating coil for the supply air. This design also guarantees clearly defined warranty limits. Everything from a single source!

SYSTEM EXAMPLE DESCRIPTION

Example shows an integrated cooling unit with a heat pump circuit, i.e. heating and cooling using a single coil in the supply air. There is also a second coil in the exhaust air which can be used for heat recovery in heating mode or to provide reverse cooling for the cooling unit. Each system will require a specific flow rate [B6] in order to dissipate waste heat when the unit is used for cooling. When combined with an additional energy recovery system, the air inlet temperature at both coils is a particularly significant factor which should be given special attention during the planning stage in order to avoid frequent defrosting.

CONTROL LAYOUT



B1 Outdoor temperature sensor
 B2 Supply air temperature sensor
 B3 Room temperature sensor
 B4 Icing-up temperature sensor
 B5 Supply air flow rate sensor
 B6 Extract air flow rate sensor

F1 Air flow monitor - supply air
 F2 Air flow monitor - extract air
 F3 Filter monitor - outdoor air
 F4 Filter monitor - supply air
 F5 Filter monitor - extract air

M1 Damper servomotor - outdoor air
 M2 Damper servomotor - exhaust air
 M3 Damper servomotor bypass PHE
 M4 Supply air fan
 M5 Extract air fan
 M6 Compressor

SUPPLY/EXTRACT AIR UNIT WITH TWHE, HEATING COIL, DIRECT EVAPORATOR AND HUMIDIFIER

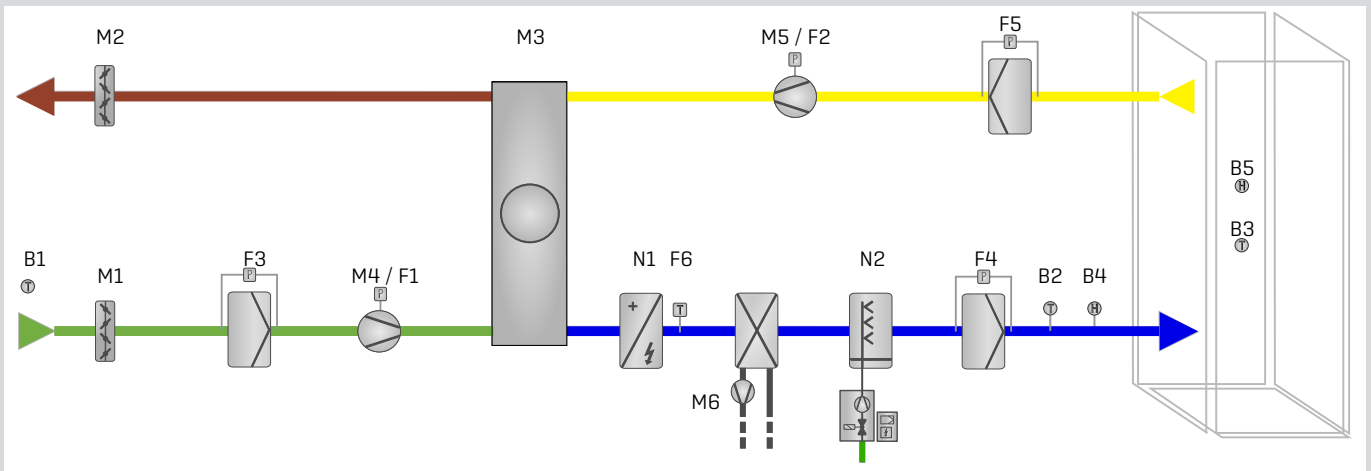
GENERAL

A supply air humidifier is frequently used to prevent dry air in residential and work areas in winter. This provides a pleasant environment. A humidifier can be an adiabatic humidifier [e.g. a high pressure humidifier] or an isothermal humidifier [e.g. a steam humidifier]. Steam humidifiers require a relatively large amount of energy but are very hygienic and do not usually require a condensate pan or mist eliminator. Isothermal humidifiers keep the air temperature constant, while adiabatic humidifiers cause the air to be cooled.

SYSTEM EXAMPLE DESCRIPTION

The humidifier is activated if the room humidity [B5] falls below the set value [in%r.H.]. The absolute supply air humidity [B4/B2] is used as a basis due to the impact that the humidifier has on the supply air temperature. This keeps the unit stable. The wheel heat exchanger [M3] and the electric heating coil [Y1] also stabilise the supply air temperature. A high limit safety cutout [F4] protects the electric heating coil against overheating, which can happen if not enough air reaches the coil.

CONTROL LAYOUT



| | | | |
|----------------------------------|-----------------------------------|------------------------------------|--------------------------|
| B1 Outdoor temperature sensor | F1 Air flow monitor - supply air | M1 Damper servomotor - outdoor air | N1 Electric heating coil |
| B2 Supply air temperature sensor | F2 Air flow monitor - extract air | M2 Damper servomotor - exhaust air | N2 Humidifier |
| B3 Room temperature sensor | F3 Filter monitor - outdoor air | M3 Engine TWHE | |
| B4 Supply air humidity sensor | F4 Filter monitor - supply air | M4 Supply air fan | |
| B5 Room air humidity sensor | F5 Filter monitor - extract air | M5 Extract air fan | |
| | F6 High limit safety cutout | M6 Compressor | |

WOLF AIR HANDLING CONTROL SYSTEM

APPLICATION EXAMPLES

SUPPLY/EXTRACT AIR UNIT WITH PHE, HEATING COIL, COOLING COIL AND ADIABATIC COOLING

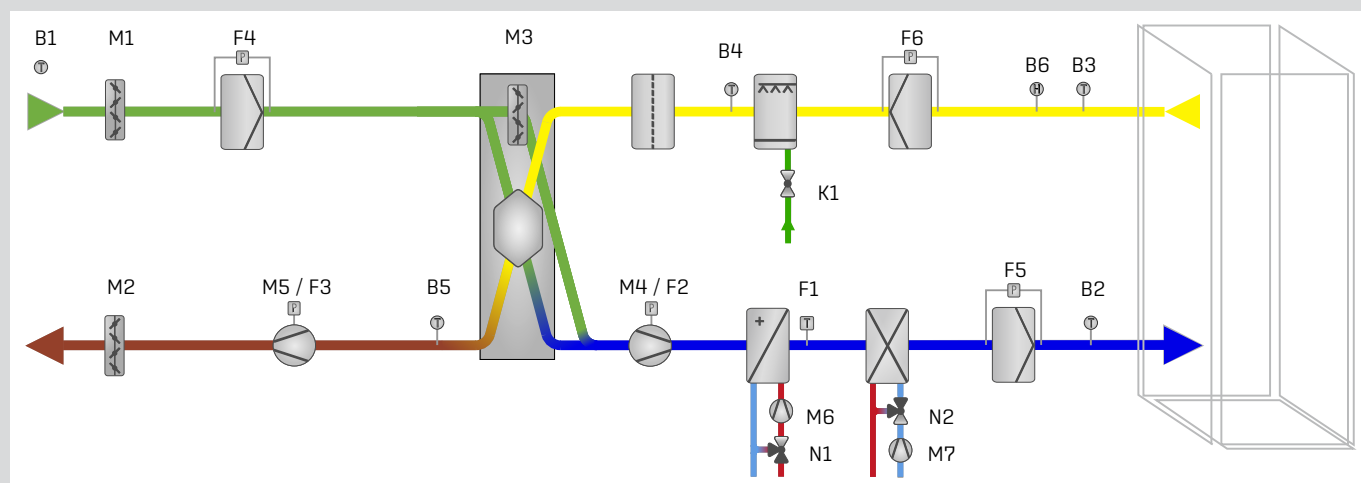
GENERAL

Adiabatic cooling is a cost-effective method for cooling rooms. This process uses water evaporation to take heat from the extract air and uses a cooling recovery system to feed the cooling energy to the supply air. The extent to which air from outside can be cooled is therefore dependent on the amount of water which is evaporated on the extract air side and the efficiency of the cooling recovery system. This can significantly reduce or even eliminate the energy costs associated with cooling systems.

SYSTEM EXAMPLE DESCRIPTION

A freshwater contact humidifier is used in this example. This system does not require any water treatment. The humidifier is connected directly to the freshwater line using a solenoid valve [K1]. When cooling is required, the enthalpy of the extract air is determined and used to calculate the expected extract air temperature after the humidifier. If this area is capable of reducing the outdoor temperature, the solenoid is opened. The HR [M3] regulates the set value for the supply air temperature. If the adiabatic cooling energy is not sufficient, the cooling coil is activated next. A water volume control system modulates the solenoid valve and minimises the amount of wastewater which is produced regardless of the flowrate. The contact humidifier can be "withdrawn" from the airflow to reduce pressure losses in winter.

CONTROL LAYOUT



B1 Outdoor temperature sensor
 B2 Supply air temperature sensor
 B3 Extract air temperature sensor
 B4 Temperature sensor after adiabatic K.
 B5 Icing-up temperature sensor

F1 Frost thermostat
 F2 Air flow monitor - supply air
 F3 Air flow monitor - extract air
 F4 Filter monitor - outdoor air
 F5 Filter monitor - supply air
 F6 Filter monitor - extract air

M1 Damper servomotor - outdoor air
 M2 Damper servomotor - exhaust air
 M3 Damper servomotor bypass PHE
 M4 Supply air fan
 M5 Extract air fan
 M6 Heating circuit pump
 M7 Cooling circuit pump

N1 Heating valve
 N2 Cooling valve
 K1 Solenoid valve

SUPPLY/EXTRACT AIR UNIT WITH PHE, HEATING COIL AND DEHUMIDIFICATION

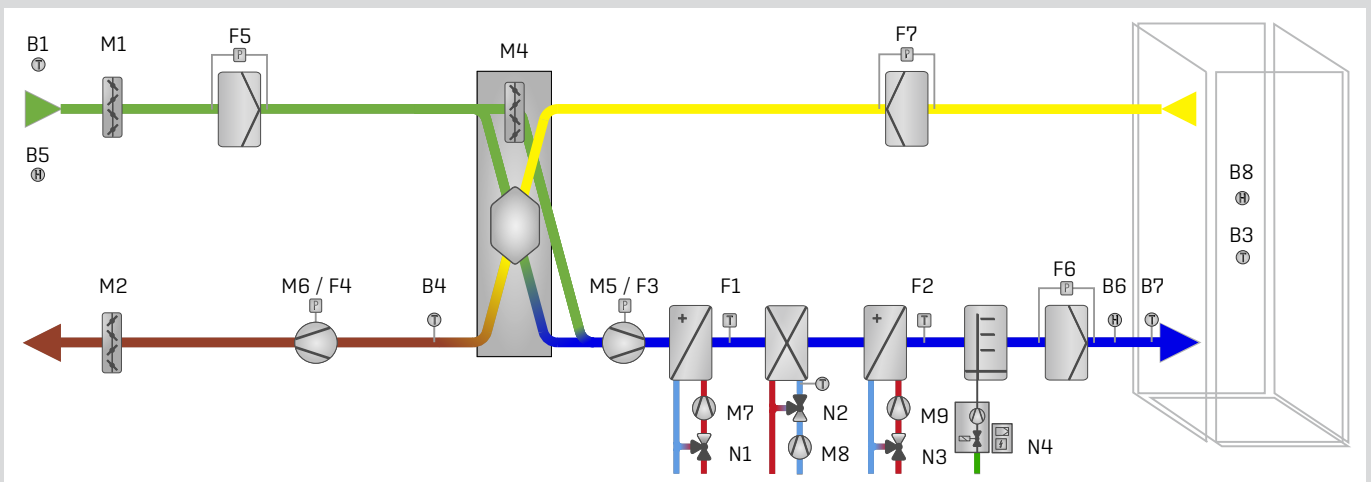
GENERAL

The dehumidification function is used in industries where consistent air humidity is vitally important, such as the printing, paper and textile industries. Maintaining a consistent indoor environment is also important in a laboratory setting. The air is dehumidified by feeding it past a cooling coil, where excess water is condensed and removed. This occurs as soon as the surface temperature of the fins falls below the dew point temperature of the air. A reheater coil is then used to heat the dry air to the desired temperature.

SYSTEM EXAMPLE DESCRIPTION

A pre-heater and reheater were used to protect the cooling coil against frost damage without affecting the efficiency by using a water/glycol mix. The pre-heater [N1/M7] is activated during the standard heating mode, while the reheater [N3/M9] is used for dehumidification. A room/supply air cascade control system is also normally used for these applications. Set values are calculated for the supply air temperature and supply air humidity based on the ambient conditions [B3/B7] / set values. The cooling coil regulates the set value for absolute supply air humidity, while the reheater regulates the set value for the supply air temperature. An optional enthalpy-regulated air damper [M3] can be activated based on external conditions [B1/B5].

CONTROL LAYOUT



| | | | |
|----------------------------------|------------------------------------|--|---------------------------------|
| B1 Outdoor temperature sensor | F1 Frost thermostat preheater | M1 Damper servomotor - outdoor air | N1 Heating valve preheater |
| B2 Supply air temperature sensor | F2 Frost thermostat, reheater bank | M2 Damper servomotor - exhaust air | N2 Cooling valve |
| B3 Room temperature sensor | F3 Air flow monitor - supply air | M3 Servomotor - recirculation air | N3 Heating valve reheating coil |
| B4 Icing-up temperature sensor | F4 Air flow monitor - extract air | M4 Damper servomotor bypass PHE | N4 Humidifier |
| B5 Outside humidity sensor | F5 Filter monitor - outdoor air | M5 Supply air fan | |
| B6 Supply air humidity sensor | F6 Filter monitor - supply air | M6 Extract air fan | |
| B7 Supply air temperature sensor | F7 Filter monitor - extract air | M7 Heating circuit pump preheater | |
| B8 Room air humidity sensor | | M8 Cooling circuit pump | |
| B9 Dew point temperature sensor | | M9 Heating circuit pump reheating coil | |

WOLF AIR HANDLING CONTROL SYSTEM

APPLICATION EXAMPLES

SUPPLY/EXTRACT AIR UNIT FOR SWIMMING POOLS

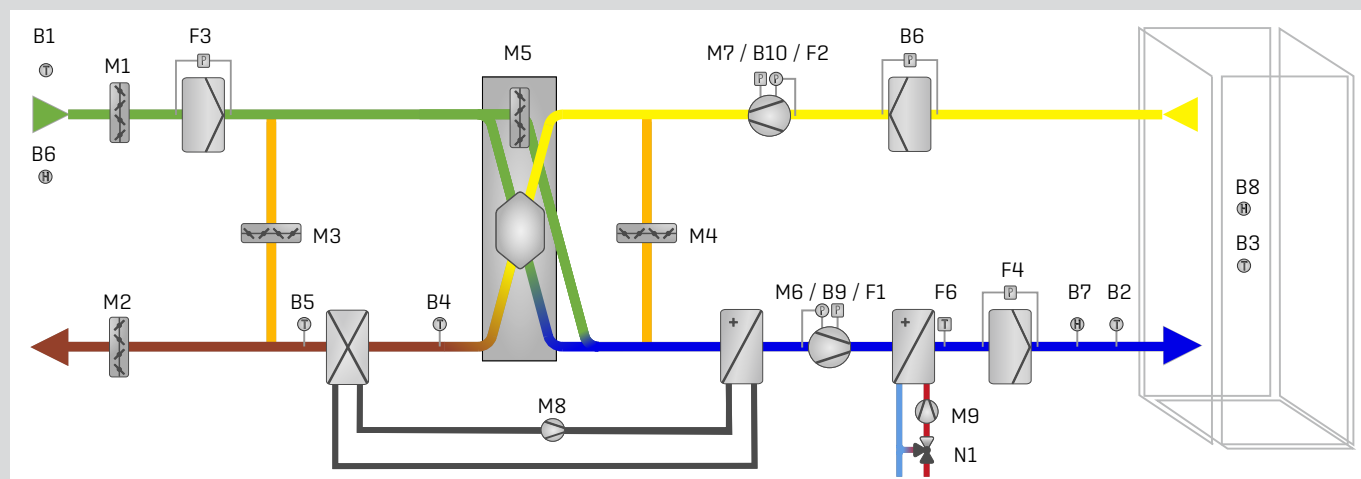
GENERAL

The primary purpose of this product series is to ensure that bathers are kept comfortable and the structure is protected. Water evaporation is a particularly important part of this design, as it prevents the humidity level in the pool area reaching uncomfortable levels. Excessive humidity levels can also lead to precipitation on cold surfaces, mould and corrosion. The room temperature should be 2-4K above the water temperature in order to minimise the evaporation of pool water.

SYSTEM EXAMPLE DESCRIPTION

During bathing and standby mode, evaporated pool water is removed in the extract air and dehumidified using the HR and evaporator. It can then be partially fed back into the outdoor air [M3] or completely replaced with dry outdoor air [M1 / M2]. In this example, the waste heat generated during the dehumidifying process is fed directly into the supply air due to the integrated cooling system. As a result, no additional heating energy is required during bathing mode. When the unit is used in heating mode only, the air damper [M4] is opened and the reheater coil is activated. The direct evaporator and the HR are deactivated in this mode.

CONTROL LAYOUT



- B1 Outdoor temperature sensor
- B2 Supply air temperature sensor
- B3 Room air temperature sensor
- B4 Icing-up temperature sensor
- B5 Dew point temperature sensor
- B6 Outside humidity sensor
- B7 Supply air humidity sensor
- B8 Room humidity sensor
- B9 Supply air flow rate sensor
- B10 Extract air flow rate sensor

- F1 Air flow monitor - supply air
- F2 Air flow monitor - extract air
- F3 Filter monitor - outdoor air
- F4 Filter monitor - supply air
- F5 Filter monitor - extract air
- F6 Frost thermostat, reheater bank

- M1 Damper servomotor - outdoor air
- M2 Damper servomotor - exhaust air
- M3 Damper position recirculation bathing mode
- M4 Damper position recirculation heating mode
- M5 Damper servomotor bypass PHE
- M6 Supply air fan
- M7 Extract air fan
- M8 Compressor
- M9 Heating circuit pump reheating coil.

- N1 Heating valve reheating coil

SUPPLY/EXTRACT AIR UNIT WITH HIGH PERFORMANCE RCS

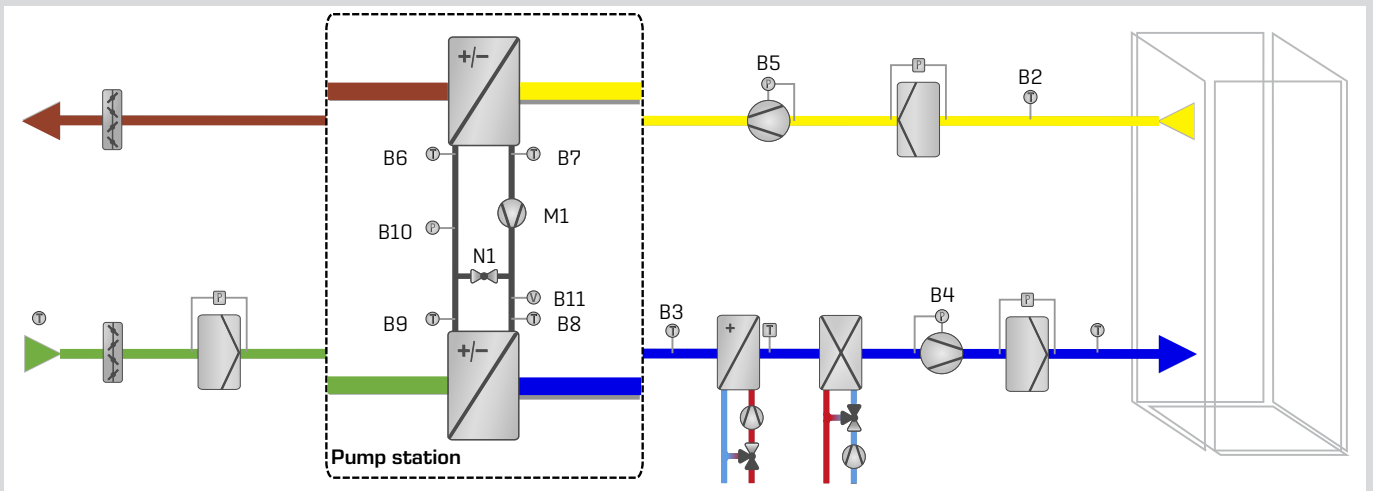
GENERAL

A run-around coil system keeps the extract air and the supply air separate, which ensures that germs, hazardous substances, moisture and odours cannot pass from one to the other. This is particularly useful for meeting stringent hygiene requirements. It is also used when separate extract air and supply air units are required for structural reasons. A separate control panel at the pump station ensures maximum efficiency during operation. This can be connected with a WOLF air handling control unit via a bus to reduce the number of sensors and cables on-site.

SYSTEM EXAMPLE DESCRIPTION

When required, a high efficiency pump [M1] regulates the thermal capacity flow ratio of air [B4 and B5] to brine [B11]. The glycol content can be configured to ensure a precise calculation. If there is a risk of icing, the brine is fed past the supply air coil [N1] so that the temperature at the extract air coil [B6] increases.

CONTROL LAYOUT



- B1 Outdoor temperature sensor
- B2 Extract air temp sensor
- B3 Supply air temp sensor after HR
- B4 Supply air flow rate
- B5 Extract air flow rate
- B6 Brine temperature sensor before extract air coil
- B7 Brine temperature sensor after extract air coil
- B8 Brine temperature sensor before supply air coil
- B9 Brine temperature sensor after supply air coil
- B10 RCS system pressure
- B11 RCS throughput

M1 RCS pump

N1 Bypass valve for ice guard

WOLF AIR HANDLING CONTROL SYSTEM

CONFIGURATION OPTIONS

LANGUAGES

According to the Machinery Directive (DIN EN 60204), all necessary instructions must be provided in the relevant national languages within the EU. Country-specific standards, regulations or permits must be identified and specified by the Export Department or the relevant branch. All control panels are designed and built to EU standards if no other requirements are specified.

AVAILABLE LANGUAGES:

DE, DK, ES, FR, GB, IT, LT, LV, NL, PL, PT, RU, HU, CZ, SK, RO, HR, EE *

* DE=Germany, Austria, Switzerland, Luxembourg
DK=Denmark | ES=Spain | FR=France, Luxembourg, Belgium
GB=United Kingdom, Malta, Ireland, Cyprus | IT=Italy | LT=Lithuania | LV=Latvia
NL=Netherlands, Belgium | PL=Poland | PT=Portugal | RU=Russia | HU=Hungary
CZ=Czech Republic | SK=Slovakia | RO=Romania | HR=Croatia | EE=Estonia

SYSTEM TYPE

Supply air system or supply/extract air system

AIR DAMPERS

Mixer air dampers, mixer/supply/extract air dampers, outside/exhaust air dampers, supply/extract air damper, outdoor/extract air damper, CRL damper system

MIXER AIR DAMPERS

One analogue output signal 0-10V for all variable actuators
(inverted configuration compared to all other dampers)

MIXER/SUPPLY/EXTRACT AIR DAMPERS

One analogue output signal 0-10V for all variable actuators
(inverted configuration compared to all other dampers) in digital output 230 V AC for all open/close actuators

OUTSIDE/EXHAUST AIR DAMPERS

One digital output 230V AC for all open/close actuators

SUPPLY/EXTRACT AIR DAMPER

One digital output 230V AC for all open/close actuators

OUTDOOR/EXTRACT AIR DAMPER

One digital output 230V AC for all open/close actuators

CRL DAMPER SYSTEM

2 analogue outputs 0-10V for outside/exhaust air dampers and recirculation air damper

FILTER

Outdoor air filter, supply air filter, extract air filter, outdoor/supply air filter, supply/extract air filter, outdoor/extract air filter, outdoor/supply/extract air filter

| | |
|-----------------------------------|---|
| OUTDOOR AIR FILTER | One digital input, including fault message |
| SUPPLY AIR FILTER | One digital input, including fault message |
| OUTDOOR/SUPPLY AIR FILTER | Two digital inputs, each with fault message |
| SUPPLY/EXTRACT AIR FILTER | Two digital inputs, each with fault message |
| OUTDOOR/EXTRACT AIR FILTER | Two digital inputs, each with fault message |
| OUTDOOR/SUPPLY/EXTRACT AIR FILTER | Three digital inputs, each with fault message |
| FANS | Variable, pressure control, flow rate control |
| VARIABLE | EC motor or control via frequency converter Operating display and fault message Floating enable contact (max. 2A) Control signal 0-10V corresponds to 0-100% |
| PRESSURE CONTROL | EC motor or control via frequency converter Operating display and fault message Floating enable contact (max. 2A) Control signal 0-10V Set value input in Pascal (max. 5000 Pa) |
| FLOW RATE CONTROL | EC motor or control via frequency converter Operating display and fault message Floating enable contact (max. 2A) Control signal 0-10V Set value input in m ³ /h (max. 120,000m ³ /h) |
| HEAT RECOVERY | Plate heat exchanger, wheel heat exchanger, run-around coil system without feed, run-around coil system without feed, run-around coil system with heat feed, run-around coil system with cold feed, run-around coil system with heat/cold feed, |

WOLF AIR HANDLING CONTROL SYSTEM CONFIGURATION OPTIONS

| | |
|---|--|
| <p>PLATE HEAT EXCHANGER</p> | <p>One analogue output signal 0-10V for controlling the bypass damper Icing-up temperature sensor Operating display</p> |
| <p>THERMAL WHEEL HEAT EXCHANGER</p> | <p>Enable contact, floating (max. 2A) Analogue output signal 0-10V for controlling the rotor Operating display and fault message</p> |
| <p>RUN-AROUND COIL SYSTEM WITHOUT INJECTION (H-KVS)</p> | <p>RCS enable contact, floating (max. 2A) Analogue output signal 0-10 V for HR output demand Operating display and fault message</p> |
| <p>RUN-AROUND COIL SYSTEM WITH HEATING ENERGY INJECTION (H-KVS)</p> | <p>RCS enable contact, floating (max. 2A) Analogue output signal 0-10 V for HR output demand Heating demand enable contact, floating (max. 2A) Analogue output signal 0-10 V for heating demand Operating display and fault message</p> |
| <p>RUN-AROUND COIL SYSTEM WITH HEATING/COOLING ENERGY INJECTION (H-KVS)</p> | <p>RCS enable contact, floating (max. 2A) Analogue output signal 0-10 V for HR output demand Cooling demand enable contact, floating (max. 2A) Analogue output signal 0-10 V for cooling demand Operating display and fault message</p> |
| <p>RUN-AROUND COIL SYSTEM WITH HEATING/COOLING ENERGY INJECTION (H-KVS)</p> | <p>RCS enable contact, floating (max. 2A) Analogue output signal 0-10 V for HR output demand Heating demand enable contact, floating (max. 2A) Analogue output signal 0-10 V for heating demand Cooling demand enable contact, floating (max. 2A) Analogue output signal 0-10 V for cooling demand Operating display and fault message</p> |
| <p>PREHEATER COIL</p> | <p>Pump DHW coil, electric heating coil 1-stage, heating coil 2-stage, heating coil 3-stage, heating coil 4-stage, heating coil 5-stage, heating coil variable, KGWO, heat pump, Clima Split system, change-over coil</p> |
| <p>PUMP DHW COIL</p> | <p>Pump control 230V/2A or 400V with operating display Selectable operating modes: when there is a heating demand, continuous operation, via outdoor temperature Heating valve control via 0-10 V Heat generator demand via floating contact (max. 2A), if pump is on Frost thermostat</p> |

WOLF AIR HANDLING CONTROL SYSTEM CONFIGURATION OPTIONS

| | |
|---------------------------------|---|
| ELECTRIC HEATING COIL 1-STAGE | <p>Control via a digital output (400V, max. 40kW) Temperature switches for preventing thermal overheating High limit safety cutout with mechanical reset Operating display; TC and HLSC fault message</p> |
| ELECTRIC HEATING COIL 2-STAGE | <p>Control via 2 digital outputs (400V, max. 40kW) Temperature switches for preventing thermal overheating High limit safety cutout with mechanical reset Operating display for active stages; TC and HLSC fault message</p> |
| ELECTRIC HEATING COIL 3-STAGE | <p>Control via 3 digital outputs (400V, max. 40kW) Temperature switches for preventing thermal overheating High limit safety cutout with mechanical reset Operating display for active stages; TC and HLSC fault message</p> |
| ELECTRIC HEATING COIL 4-STAGE | <p>Control via 3 digital outputs (400V, max. 40kW) (binary encoding; four optional digital outputs) Temperature switches for preventing thermal overheating High limit safety cutout with mechanical reset Operating display for active stages; TC and HLSC fault message</p> |
| ELECTRIC HEATING COIL 5-STAGE | <p>Control via 3 digital outputs (400V, max. 40kW) (binary encoding; five optional digital outputs) Temperature switches for preventing thermal overheating High limit safety cutout with mechanical reset Operating display for active stages; TC and HLSC fault message</p> |
| ELECTRIC HEATING COIL, VARIABLE | <p>Enable contact, floating (max. 2A) Analogue output signal 0-10 V for output demand Temperature switches for preventing thermal overheating High limit safety cutout with mechanical reset Operating display for active stages; TC and HLSC fault message</p> |
| KGWO | <p>Burner enable Analogue output signal 0-10V for controlling the bypass damper Burner thermostat for preventing thermal overheating Contact for fan run-on to prevent thermal overheating in the stopping point Burner operating display and fault message</p> |
| HEAT PUMP | <p>Enable contact, heating Enable contact, cooling One or two analogue output signals 0-10V for heating/cooling demand (optional) Heat pump operating display and fault message</p> |

WOLF AIR HANDLING CONTROL SYSTEM CONFIGURATION OPTIONS

| | |
|----------------------------|---|
| CLIMA SPLIT SYSTEM | <p>Enable contact Contact for operating mode selection heating/cooling One analogue output signal 0-10 V for heating/cooling demand Fault and defrost message contact of split unit and one analogue input for detecting temperature after HR</p> |
| CHANGE-OVER COIL | <p>Enable contact, heating Enable contact, cooling Digital output for secondary cycle pump with run-on time for using residual energy Optional digital output for second secondary cycle pump [if used: secondary cycle pump 1 for heating/secondary cycle pump 2 for cooling] One analogue output signal 0-10 V for heating/cooling demand Fault input for pump fault and frost thermostat</p> |
| REHEATER COIL | <p>Pump DHW coil, electric heating coil* [stage-1, stage-2, stage-3, stage-4, stage-5 or variable]</p> <p>* If an electric heating coil is selected as a pre-heater coil, it is not possible to select an additional electric heating coil as a reheater coil.</p> <p>Note: See pre-heater coil for a description of the components</p> |
| COOLING COIL | <p>Pump cold water coil, direct evaporator 1-stage, direct evaporator 2-stage, direct evaporator variable, heat pump, Clima Split, changeover</p> |
| PUMP COLD WATER COIL | <p>Pump control 230V/2A with operating display Selectable operating modes: when there is a cooling demand or continuous operation Cooling valve control via 0-10 V Demand, cooling source two-stage via floating contacts [max. 2A]</p> |
| DIRECT EVAPORATOR 1-STAGE | <p>Control of direct evaporator via a floating contact [max. 2A] Operating display and fault message contact Minimum runtime and lock-on adjustable Operating range adjustable using outdoor temperature and supply air temperature limit</p> |
| DIRECT EVAPORATOR 2-STAGE | <p>Control of direct evaporator via two floating contacts [max. 2A], depending on output requirements Operating display and fault message contact Minimum runtime and lock-on adjustable Operating range adjustable using outdoor temperature and supply air temperature limit</p> |
| DIRECT EVAPORATOR VARIABLE | <p>Control of direct evaporator via 0-10V + enable contact Operating display and fault message contact Minimum runtime and lock-on adjustable Operating range adjustable using outdoor temperature and supply air temperature limit</p> |

WOLF AIR HANDLING CONTROL SYSTEM CONFIGURATION OPTIONS

HEAT PUMP

Enable contact, heating
Enable contact, cooling
One or two analogue output signals 0-10V for heating/cooling demand (optional)
Heat pump operating display and fault message

CLIMA SPLIT SYSTEM

Enable contact
Contact for operating mode selection heating/cooling
One analogue output signal 0-10 V for heating/cooling demand
Fault and defrost message contact of split unit and one analogue input for detecting temperature after HR

CHANGE-OVER COIL

Enable contact, heating
Enable contact, cooling
Digital output for secondary cycle pump with run-on time for using residual energy
Optional digital output for second secondary cycle pump
(if used: secondary cycle pump 1 for heating/secondary cycle pump 2 for cooling)
One analogue output signal 0-10 V for heating/cooling demand
Fault input for pump fault and frost thermostat

ADIABATIC COOLING

Freshwater contact humidifier, recirculating contact humidifier, high pressure humidifier

FRESHWATER CONTACT HUMIDIFIER

Digital output for controlling the supply valve [24VDC]
Digital output for a drain valve for emptying the water supply line
Extract air temperature and extract air humidity sensor for calculating enthalpy in the extract air
Extract air temperature sensor after adiabatic cooling for function check
Operating display; fault message for inadequate cooling capacity

RECIRCULATING CONTACT HUMIDIFIER

Control of the circulation pump 230V or 24V
Digital output for a supply valve [24VDC]
Digital output for a drain valve for emptying the water supply line [24VDC]
Digital output for a drain valve for emptying the pan [24VDC]
Extract air temperature and extract air humidity sensor for calculating enthalpy in the extract air
Extract air temperature sensor after adiabatic cooling for function check
Operating display; fault message for inadequate cooling capacity

HIGH PRESSURE HUMIDIFIER

Enable contact for high-pressure humidifier
Input for fault, maintenance and operation of humidifier
Input for demand for drying run-on
Extract air temperature and extract air humidity sensor for calculating enthalpy in the extract air
Extract air temperature sensor after adiabatic cooling for function check

WOLF AIR HANDLING CONTROL SYSTEM

CONFIGURATION OPTIONS

| | |
|--------------------------------------|---|
| HUMIDIFIER | Isotherm, adiabatic |
| ISOTHERM (STEAM HUMIDIFIER) | Control via 0-10V + enable contact Input for fault, maintenance and operation of humidifier Input for demand for drying run-on Minimum control of humidifier adjustable Operating range can be defined based on outdoor temperature |
| ADIABATIC (HIGH PRESSURE HUMIDIFIER) | Control via 0-10V + enable contact Input for fault, maintenance and operation of humidifier Input for demand for drying run-on Minimum control of humidifier adjustable Operating range can be defined based on outdoor temperature Adjustable priority for temperature control |
| CONTROL TYPE - TEMPERATURE | Supply air temperature control, indoor/supply air cascade, extract/supply air cascade |
| SUPPLY AIR TEMPERATURE CONTROL | Set value input relative to supply air temperature Input for a supply air temperature sensor (NTC5k) |
| INDOOR/SUPPLY AIR CASCADE | Set value input relative to room temperature A cascade control unit calculates the supply air conditions required to achieve the desired room temperature Input for a room temperature sensor (NTC5k) Input for a supply air temperature sensor (NTC5k) |
| EXTRACT/SUPPLY AIR CASCADE | Set value input relative to extract air temperature A cascade control unit calculates the supply air conditions required to achieve the desired extract air temperature Input for an extract air temperature sensor (NTC5k) Input for a supply air temperature sensor (NTC5k) |
| CONTROL TYPE - HUMIDITY | Supply air humidity control, indoor/supply air cascade, extract/supply air cascade |
| SUPPLY AIR HUMIDITY CONTROL | Set value input [% r.H.] relative to supply air humidity Input for a supply air humidity sensor (4-20mA) Detection of absolute supply air humidity (g/kg) |
| INDOOR/SUPPLY AIR CASCADE | Set value input [% r.H.] relative to room humidity A cascade control unit calculates the supply air conditions required to achieve the desired room humidity Input for a room humidity sensor (4-20mA) Input for a supply air humidity sensor (4-20mA) Input for a room temperature sensor (NTC5k) Input for a supply air temperature sensor (NTC5k) Reference temperature for set humidity level adjustable [set room temperature/ current room temperature] |

WOLF AIR HANDLING CONTROL SYSTEM CONFIGURATION OPTIONS

EXTRACT/SUPPLY AIR CASCADE

Set value input [% r.H.] relative to extract air humidity
A cascade control unit calculates the supply air conditions required to achieve the desired extract air humidity
Input for an extract air humidity sensor (4-20mA)
Input for a supply air humidity sensor (4-20mA)
Input for an extract air temperature sensor (NTC5k)
Input for a supply air temperature sensor (NTC5k)
Reference temperature for set humidity level adjustable (set extract air temperature/current extract air temperature)

BUILDING MANAGEMENT SYSTEM

BACnet, Modbus, KNX, LON Works, Ethernet

BACNET

Interface module for integration into an existing BACnet network
BACnet Device Profile: BACnet Advanced Application Controller (B-AAC)
Data Sharing BIBBs: DS-RP-B; DS-RPM-B; DS-WP-B; DS-WPM-B; DS-COV-B; DS-COVP-B; Data Link Layer: BACnet IP

MODBUS

Interface module for integration into an existing Modbus (RTU) network
8 data bits, adjustable stop bits (1/2), parity adjustable (None/Even/Odd)
Maximum baud rate: 19200 bit/s

KNX

Interface module for integration into an existing KNX network
Plugin for ETS4 and ETS5 available from www.wolf.eu

LON WORKS

Interface module for integration into an existing LON Works network

ETHERNET

Interface module for integration into an existing LAN network
With integrated web server
Simple remote monitoring using a standard browser
(Internet Explorer, Chrome, Firefox or Safari)

FIRE DAMPER

Depending on the configuration, up to 21 inputs are available for connecting a fire damper 1-21

WOLF AIR HANDLING CONTROL SYSTEM

FIELD DEVICES

VALVES



| | |
|----------------------------|----------------------------------|
| Casing sections | Gunmetal |
| Seat/closing unit | CrNi steel |
| Performance curve | linear |
| Leakage loss | 0...0.02% of RCS value |
| Threaded connection | Valve ISO 228/1, fitting ISO 7/1 |
| Nominal stroke | 5.5mm |
| Operating pressure | max. 1600 kPa [16 bar] |

Permissible media

- Water between 2...110°C, 120°C for a short period heating water (DHW); cooling water [system water]
- Water with additives
Oxygen-binding treatment chemicals; glycol, max. 50% [as frost protection]

| TYPE | DN | | k_{vs} value m ³ /h | Adjustment ratio K_{vs}/K_{vr} | Δp_{max} kPa |
|------------------------|--------------------|----|-------------------------------------|-------------------------------------|-------------------------|
| | inches | mm | | | |
| VXP 459.10-0.63 | G $\frac{1}{2}$ " | 10 | 0.63 | >50 | 400 |
| VXP 459.10-1 | G $\frac{1}{2}$ " | 10 | 1 | >50 | 400 |
| VXP 459.10-1.6 | G $\frac{1}{2}$ " | 10 | 1.6 | >50 | 400 |
| VXP 459.15-2.5 | G $\frac{3}{4}$ " | 15 | 2.5 | >50 | 350 |
| VXP 459.20-4 | G1" | 20 | 4 | >50 | 350 |
| VXP 459.25-6.3 | G1 $\frac{1}{4}$ " | 25 | 6.3 | >50 | 300 |
| VXP 459.25-10 | G1 $\frac{1}{2}$ " | 25 | 10 | >100 | 300 |
| VXP 459.32-16 | G2" | 32 | 16 | >100 | 175 |
| VXP 459.40-25 | G2 $\frac{1}{4}$ " | 40 | 25 | >100 | 75 |

Note: Larger valves on request

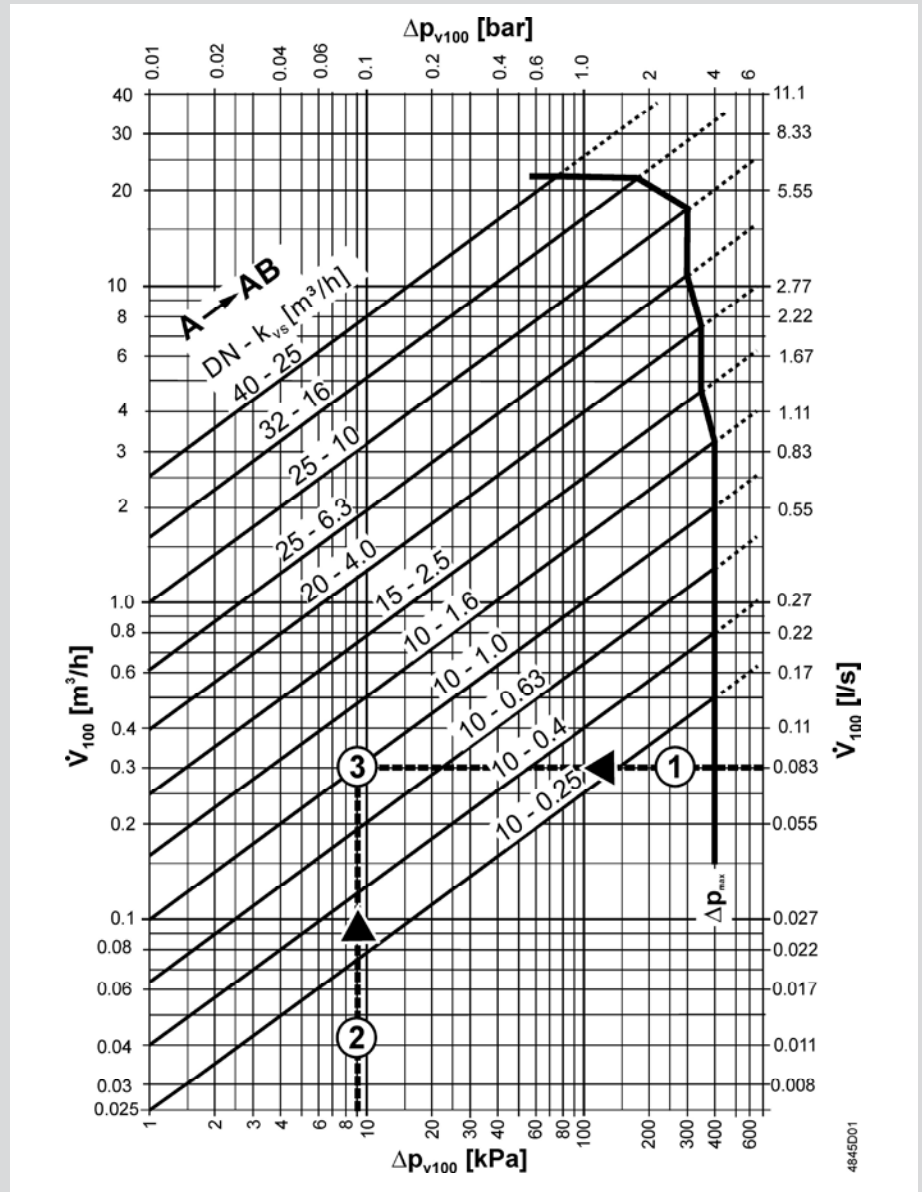
Threaded connection set as accessories

A threaded connection set can be provided upon request in order to connect the three-way valve to pipes.

SIZING

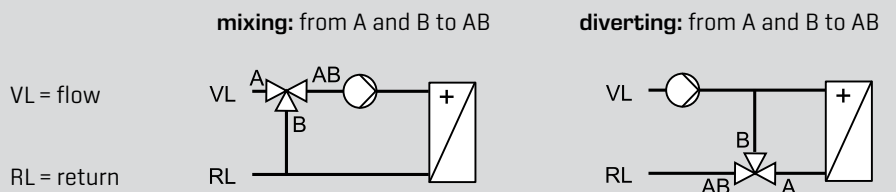
Select a pressure differential [Δp_v] between 8-25 kPa to ensure that the valve can be easily controlled.

Example: Valve VXP 459.10-1 should be used assuming a water flow rate of 0.3 m³/h.



INSTALLATION

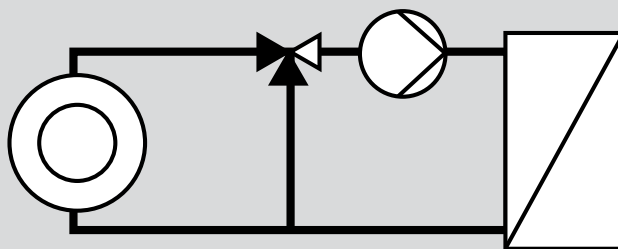
Please note the flow direction on the valve during installation.



WOLF AIR HANDLING CONTROL SYSTEM FIELD DEVICES

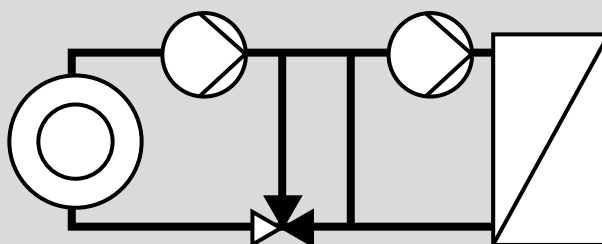
ADMIXING CIRCUIT

The 3-way valve divides the circuit into a primary and a secondary circuit. Output is controlled by changing the flow temperature while keeping the flow over the coil at a constant rate. The water flow rate in the primary circuit is variable.



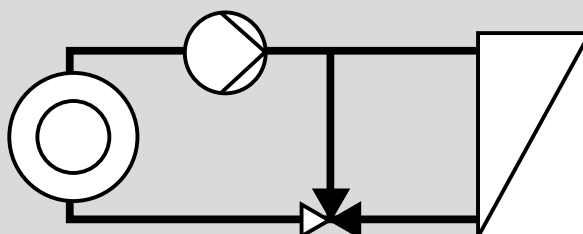
INJECTION CONTROL

The pump on the left handles the pressure/flow rate in the generator circuit, including the pressure reduction caused by the actuator. The pump on the right handles the pressure/flow rate in the consumer circuit. Depending on the position of the 3-way valve, the generator pump injects a mixture of hot/cold water into the consumer circuit. This is mixed together with the heated/cooled consumer return water in the generator circuit, which is drawn through the bypass by the consumer pump. The consumer circuit has a constant flow rate and a variable temperature.



DIVERTING CIRCUIT

The flow is distributed between the consumer and the bypass depending on the position of the valve [consistent water flow rate in primary circuit]. The output in the consumer is controlled using the flow rate. The temperature difference at the consumer goes up as the flow rate goes down. This circuit is particularly important for the cooling coils as it improves the dehumidifying process, even under partial load.





VALVE DRIVES

| | |
|-------------------------------|--|
| Operating voltage | 24 V AC/DC |
| Control signal | 0 ... 10V |
| Power consumption | 2 VA |
| Duration | 30 s |
| Nominal force | >300 N |
| Unit IP rating | IP10 |
| Permitted ambient temperature | Operation [+5 ... +50°C]; handling and storage [-25 ... +70°C] |
| Permitted ambient humidity | <95% r.h. |



SERVOMOTOR OPEN / CLOSE

| | |
|----------------------|---|
| Operating voltage | 230V AC, 50/60Hz |
| Power consumption | 4 VA at 5 Nm torque 6 VA at 20 Nm torque |
| Rotational direction | Selectable with switch (left/right) |
| Manual setting | Gearbox release with self-resetting pushbutton |
| Angle of rotation | max. 95°, can be limited on both sides by adjustable mechanical stops |
| Attachment | Rotatable clamping block |
| IP rating | IP54 |
| ambient temperature | -30 ... +50°C |
| Maintenance | Maintenance-free |



SERVOMOTOR VARIABLE

| | |
|----------------------|---|
| Operating voltage | 24V DC/AC |
| Power consumption | 2VA at 5Nm torque 4VA at 20Nm torque |
| Rotational direction | Selectable with switch (left/right) |
| Manual setting | Gearbox release with self-resetting pushbutton |
| Angle of rotation | max. 95°, can be limited on both sides by adjustable mechanical stops |
| Attachment | Rotatable clamping block |
| IP rating | IP54 |
| ambient temperature | -30 ... +50°C |
| Maintenance | Maintenance-free |



SERVOMOTOR WITH SPRING RETURN

| | |
|----------------------|--|
| Operating voltage | 230V AC, 50/60Hz |
| Power consumption | 11 VA at 15 Nm torque |
| Rotational direction | Selectable based on installation (left/right) |
| Angle of rotation | max. 95°, adjustable from 33° at 5.5° intervals with included rotation angle limit |
| Attachment | Rotatable clamping block |
| IP rating | IP54 |
| ambient temperature | -30 ... +50°C |
| Maintenance | Maintenance-free |



ROOM TEMPERATURE SENSOR

| | |
|-----------------|-----------------------------|
| Sensor type: | NTC5k |
| Measuring range | -30...+50°C |
| IP rating | IP54 |
| Dimensions | 100 x 69 x 33mm [H x W x D] |



ROOM TEMPERATURE SENSOR WITH SET VALUE TRANSDUCER

For detecting the room temperature with additional set value transducer for temperature control. With a selected supply air temperature control, the setting corresponds to the supply air temperature set point. Setting corresponds to the room temperature set point when the indoor/supply air cascade is selected.

| | |
|----------------------|----------------------------|
| Sensor type: | NTC5k |
| Set value transducer | PT1000 |
| Measuring range | -30...+90 °C |
| IP rating | IP30 |
| Dimensions | 81 x 79 x 26mm [H x W x D] |



ROOM AIR HUMIDITY SENSOR IP30

Detects the room air humidity and transmits it to the control unit

| | |
|-----------------|----------------------------|
| Output signal | 4-20mA |
| Operating range | 10...90%r.H |
| IP rating | IP30 |
| Dimensions | 81 x 79 x 26mm [H x W x D] |



ROOM AIR HUMIDITY SENSOR IP65

Detects the room air humidity and transmits it to the control unit

| | |
|-----------------|------------------------------|
| Output signal | 4-20mA |
| Operating range | 0...95%r.H |
| IP rating | IP65 |
| Dimensions | 115 x 108 x 73mm [H x W x D] |



ROOM HYGROSTAT

Detects the room air humidity and switches when it falls below an adjustable threshold

| | |
|-------------------------------|-----------------------------|
| Switching capacity | 24-250VAC, 2A |
| Setting range | 35-100%r.H. |
| Permitted ambient temperature | 0-40°C |
| IP rating | IP30 |
| Dimensions | 98 x 106 x 34mm [H x W x D] |



ROOM AIR QUALITY SENSOR (MIXED GAS VOC)

Detects the room air quality using a mixed gas sensor and transmits it to the control unit

| | |
|---------------------|---|
| Output signal | 0-10 V |
| Detectable gases | Mixed gas, alkanol vapours, cigarette smoke, car exhaust, breath, smoke from combustion |
| Ambient temperature | 0...50°C |
| IP rating | IP30 |
| Dimensions | 81 x 79 x 26mm [H x W x D] |



ROOM AIR QUALITY SENSOR (CO2)

Detects the room air quality on the basis of the CO2 concentration and transmits it to the control unit

| | |
|---------------------|----------------------------|
| Output signal | 0-10 V |
| Measuring range | 0...2000ppm |
| Ambient temperature | 0...50°C |
| IP rating | IP30 |
| Dimensions | 95 x 97 x 30mm [H x W x D] |



ROOM AIR QUALITY SENSOR (CO2) WITH LIGHT

Detects the room air quality on the basis of the CO2 concentration and transmits it to the control unit. The measured concentration is also visualised using LEDs on the sensor

| | |
|---------------------|----------------------------|
| Output signal | 0-10 V |
| Measuring range | 0...2000ppm |
| Ambient temperature | 0...50°C |
| IP rating | IP30 |
| Dimensions | 95 x 97 x 30mm [H x W x D] |



OUTDOOR TEMPERATURE SENSOR

Detects the outdoor temperature and transmits it to the control unit

| | |
|-----------------|-----------------------------|
| Sensor type: | NTC5k |
| Measuring range | -30...+50°C |
| IP rating | IP54 |
| Dimensions | 100 x 69 x 33mm [H x W x D] |



DUCT TEMPERATURE SENSOR

Detects the average temperature of the air flowing by and transmits the measured temperature to the control unit

| | |
|-----------------|-------------|
| Sensor type: | NTC5k |
| Measuring range | -30...+80°C |
| IP rating | IP65 |
| Rod length | 400mm |



DUCT HUMIDITY SENSOR

Detects the relative air humidity and transmits it to the control unit

| | |
|-----------------------|--------------|
| Output signal: | 4-20mA |
| Operating range | 10...90%r.H. |
| Ambient temperature | -50...+50°C |
| IP rating | IP65 |
| Measuring pipe length | 230mm |



DUCT HYGROSTAT

Detects the humidity of the air flowing by and switches when it falls below an adjustable threshold

| | |
|-----------------------|--------------|
| Setting range | 35...100%r.H |
| Ambient temperature | 0...60°C |
| IP rating | IP65 |
| Measuring pipe length | 220m |

WOLF AIR HANDLING CONTROL SYSTEM FIELD DEVICES



DUCT AIR QUALITY SENSOR (MIXED GAS VOC)

Detects the air quality of the air flowing by using a mixed gas sensor and transmits it to the control unit

| | |
|-----------------------|---|
| Output signal | 0-10 V |
| Detectable gases | Mixed gas, alkanol vapours, cigarette smoke, car exhaust, breath, smoke from combustion |
| Ambient temperature | 0...50°C |
| IP rating | IP65 |
| Measuring pipe length | 190mm |



DUCT AIR QUALITY SENSOR (CO2)

Detects the air quality of the air flowing by on the basis of the CO2 concentration and transmits it to the control unit

| | |
|-----------------------|-------------|
| Output signal | 0-10 V |
| Measuring range | 0...2000ppm |
| Ambient temperature | 0...50°C |
| IP rating | IP65 |
| Measuring pipe length | 190mm |



DUCT SMOKE ALARM

Detects smoke in ventilation ducts and sends an alarm to the control unit if necessary. Note: Mounting bracket for KRM, see chapter "Accessories"

| | |
|-----------------------|-----------------|
| Supply voltage | 24V DC/AC |
| Ambient temperature | -20...+50°C |
| IP rating | IP54 |
| Measuring pipe length | min.160...600mm |



DUCT SMOKE DETECTOR WITH DIBT APPROVAL

Detects smoke in ventilation ducts and sends an alarm to the control unit if necessary. Fire/smoke protection can also be activated

Note: Mounting bracket for KRM, see chapter "Accessories"

| | |
|-----------------------|-----------------|
| Supply voltage | 230V |
| Ambient temperature | -20...+50°C |
| IP rating | IP54 |
| Measuring pipe length | min.160...600mm |



DIFFERENTIAL PRESSURE SENSOR

Detects the differential pressure via the ventilator nozzle and duct pressure and transmits it to the control unit

| | |
|-----------------|-------------------------|
| Output signal: | 0-10 V |
| Measuring range | 0...1000Pa / 0...5000Pa |
| IP rating | IP65 |



DIFFERENTIAL PRESSURE SENSOR/SWITCH

Detects the differential pressure, visualises the measured value at the sensor and transmits it to the control unit. A relay also switches if an adjustable threshold is exceeded

| | |
|---------------------|------------------|
| Output signal: | 0-10V and 4-20mA |
| Measuring range | 15...1000Pa |
| Ambient temperature | -10...+40°C |
| IP rating | IP54 |



DIFFERENTIAL PRESSURE SENSOR WITH FLOW RATE INDICATION

Detects the differential pressure via the ventilator nozzle and transmits it to the control unit. The corresponding flow rate can also be displayed by entering the K factor at the sensor

| | |
|---------------------|------------------|
| Output signal | 0-10V and 4-20mA |
| Measuring range | 0...2000Pa |
| ambient temperature | -10...+50°C |
| IP rating | IP54 |



DIFFERENTIAL PRESSURE SWITCHES

Detects the pressure differential before and after the filter and switches if it is below an adjustable limit

| | |
|---------------------|-------------|
| Setting range | 30...500Pa |
| Ambient temperature | -50...+70°C |
| IP rating | IP54 |



FROST THERMOSTAT

Detects the temperature downstream from the heating coil and switches if it is below an adjustable limit

| | |
|---------------------|--------------------|
| Capillary length | 1.5m / 3.0m / 6.0m |
| Setting range | +2...+20°C |
| Ambient temperature | -50...+70°C |
| IP rating | IP44 |

WOLF AIR HANDLING CONTROL SYSTEM ACCESSORIES



BMK CONTROL UNIT

(PANEL MOUNTING OR WALL MOUNTING)

Full control unit operation (default settings, engineer menu). Design is available for both wall mounting and panel mounting

| | |
|---------------|---|
| Ambient temp. | -20...+60°C |
| IP rating | IP65 (panel mounting), IP40 (wall mounting) |
| Dimensions | 82 x 156mm (H x W) |



BMK-F REMOTE CONTROL

For easy control of the unit, range of functions can be specified by the customer. (On/off; operating mode; temperature offset, speed offset, fresh air proportion offset; utilisation time extension; intermittent ventilation)

| | |
|---------------------|-----------------------------|
| Installation | Wall mounting |
| Ambient temperature | 0...+50°C |
| IP rating | IP30 |
| Dimensions | 86 x 135 x 30mm (H x W x D) |



TOUCH CONTROL UNIT BMK-T10

Easy operation of the control unit, can be used to display trends in measurement and control variables. Suitable for operating multiple systems. Available with optional system diagram.

| | |
|---------------------|---------------------------|
| Touch technology | Projecting capacitive |
| Mounting type | Panel mounting |
| Ambient temperature | -5...+50°C |
| IP rating | IP65 |
| Display | 10.4" |
| Dimensions | 213 x 266 x 6 (H x W x D) |



WOLF LINK PRO

External LAN/WLAN interface module for remote access over the local network or Internet.

| | |
|---------------|---|
| Operation | App (Android or iOS), Browser, PC application |
| Encryption | TLS1.2 |
| Mounting type | Wall mounting |
| IP rating | IP30 |
| Dimensions | 160 x 83 x 31mm (H x W x D) |



ETHERNET INTERFACE

| | |
|---------------------|--------------|
| Connection | RJ45 |
| Ambient temperature | -10...+55°C |
| ambient humidity | 20...80%r.H. |



BACNET INTERFACE

| | |
|---------------------|--------------|
| Connection | RJ45 |
| Ambient temperature | -10...+55°C |
| ambient humidity | 20...80%r.H. |



LON WORKS INTERFACE

| | |
|---------------------|-------------------------|
| Connection | Screw terminals, 3-pole |
| Ambient temperature | -10...+55°C |
| ambient humidity | 20...80%r.H. |



MODBUS INTERFACE

| | |
|---------------------|-------------------------|
| Connection | Screw terminals, 3-pole |
| Ambient temperature | -10...+60°C |
| ambient humidity | 20...80%r.H. |



KNX INTERFACE

| | |
|---------------------|-------------------------|
| Connection | Screw terminals, 2-pole |
| Ambient temperature | -10...+60°C |
| ambient humidity | 20...80%r.H. |



BRACKET FOR DUCT SMOKE ALARM

For fitting the duct smoke alarm to round or insulated ducts.
Includes rubber cable entry to seal the sampling pipe to the air duct

| | |
|----------------|-------|
| Max. clearance | 100mm |
|----------------|-------|



CONTROL PANEL LIGHTING

Illuminates the switchgear when performing maintenance/repairs

| | |
|--------|------------|
| Light | 230V / 13W |
| Length | 540mm |



MAINTENANCE SOCKET

Earth socket for servicing with no RCD

| | |
|---------|----------|
| Voltage | 230V |
| Current | max. 10A |

ADDITIONAL VOLTAGE OUTPUT

Can be used to connect on-site components. Available with or without RCD

| | |
|----------------|-------------|
| Version 400V | max. 10A |
| Version 230V | max. 10A |
| Version 24V AC | max. 160 VA |
| Version 24V DC | max. 2.5A |

WOLF AIR HANDLING CONTROL SYSTEM ACCESSORIES



FAN SWITCHING FOR GARAGE EXTRACTOR FANS

The fan switching system makes it easy to ventilate underground garages with single stage fans in the supply and extract air. The clear layout of the control and display elements makes the control unit easy to operate and has a particularly compact design which is easy to install. External signals (e.g. CO system, gate contact, fire alarm system) can be used to activate the fans. Alternating fan switching to ensure that every fan spends an equal amount of time in operation.

Optional: Module for controlling EC motors or inverter operation.

| | |
|---------------------|-------------------------------|
| Output/fan | max. 4kVA |
| Current/fan | max. 9A |
| Ambient temperature | -10...+40°C |
| IP rating | IP54 |
| Dimensions | 456 x 296 x 118mm [H x W x D] |

TIME PROGRAM

In all, there are 4 adjustable day programs available. A day program can be split into a max. of 5 day sections, to each of which a start and end time [resolution 1 min] can be assigned. Individual programs can be assigned to the individual days of the week via the 7-day program. If no program is assigned to a specific day of the week, then the system will remain switched off for the whole day.

HOLIDAY PROGRAM

5 holiday programs [date] can be defined. These programs take precedence over the time program. The set values for temperature, speed [pressure or flow rate] and fresh air proportion [if an air damper is used] can be adjusted for each holiday program.

UTILISATION TIME EXTENSION

A utilisation time extension can be activated using the remote control or the control unit. The system will continue to run for that amount of time as a minimum. If the extension of utilisation time is activated whilst the system is shut down, it will start and remain active for the selected time. This makes it possible to operate the system outside of defined switching times.

SETBACK MODE

Setback mode can be enabled to make the stop times in the time program overlap subject to outdoor temperature. This function counteracts any ice formation in external units taking in air from areas with a high level of air humidity, since moisture rising through the duct system is permanently removed from the unit.

BACKUP MODE

Backup mode is active when the system is deactivated. If the room temperature falls below the set value for "Backup mode heating", the system is activated automatically to heat the room. Backup mode heating is deactivated when the room temperature exceeds the set value. If the room temperature exceeds the set value for "Backup mode cooling", the system is activated automatically to cool the room. Backup mode cooling is deactivated when the room temperature falls below the set value.

NIGHT VENTILATION

In summer, cooling energy can be saved with night ventilation by pre-cooling the rooms for the following day with cool outdoor air. This operating mode activates the air handling/ventilation unit based on the room/outdoor air conditions with priority over the time programme.

SET VALUE COMPENSATION

The set room temperature can be adjusted based on the outside temperature. When the outside temperature is high, the set room temperature is increased to avoid large temperature differences between the room and the outside. This reduces the need for cooling energy. When the outside temperature is low, the set room temperature is increased. This compensates for the feeling of cold caused by the low temperatures on the external surfaces of the building.

TEMPERATURE CONTROL

Temperature control either utilises a ventilation air temperature control with a fixed set value for the supply air temperature control or as a room or extract air cascade control. For the room or extract-supply air cascade, the set supply air temperature is determined by means of a deviation from the set room temperature to the actual room or extract air value. The minimum and maximum set supply air temperature can be adjusted.

WOLF AIR HANDLING CONTROL SYSTEM

CONTROL FUNCTIONS

HUMIDITY CONTROL

The humidity control system can take the form of a supply air humidity control system or a room/extract air humidity control system. The supply air humidity control system keeps the supply air humidity at an adjustable minimum level. The room/extract air humidity control system keeps the room humidity level above an adjustable minimum. The supply air humidity is limited to a maximum level. The control unit of the humidifier is activated with a constant control signal [0-10V] based on the difference between the actual humidity and the set value. Systems with adiabatic humidifiers incorporate a temperature priority control. If the system is turned off when the humidifier is active, it will continue to run (drying run-on). The humidity control system can also be enabled or blocked based on the outdoor temperature to avoid cycling the humidifier in the meantime.

DEHUMIDIFICATION CONTROL

The system attempts to maintain a supply air humidity level or a room/extract air humidity set value congruent with the humidity control. The dehumidification function prevents the humidity exceeding the desired level. When there is a need for dehumidification, the cooling coil is activated so that condensate accumulates when the temperature falls below the dew point temperature. An enthalpy-controlled recirculation air damper control is also available. When the energy content of the outdoor air is lower than the energy content in the extract air or room air, the fresh air proportion is increased to 100% while the dehumidification function is active. As a result, less energy is required in order to reach the desired humidity level.

ADIABATIC COOLING

Adiabatic cooling involves humidifying the extract air with a contact humidifier. The evaporation cools the extract air. A heat recovery system then transfers the cooling energy of the extract air to the supply air to cool it. The heat recovery system is kept active to maintain the supply air temperature at the set value. An additional active cooling system [PCW cooling coil or direct evaporator] is only activated if the adiabatic cooling is not sufficient to cool the supply air to the set value. The humidifier can be monitored using an optional temperature sensor after the contact humidifier.

NATURAL COOLING CONTROL

Natural cooling helps to save cooling energy by utilising the temperature differential between the room air and the outdoor air. The outdoor temperature is compared with the room air temperature. If the outside air is warmer than the room air, the mixed air damper is appended to the maximum extent for cooling.

MIXED AIR DAMPER CONTROL

3 operating modes can be selected for outside, discharge and mixed air dampers:

- a) Fixed fresh air proportion
The system always uses the configured fresh air proportion.
- b) Gradual reduction of fresh air proportion in low outdoor temperatures. The configured fresh air proportion is the fixed fresh air proportion used during normal operation. When an adjustable outdoor temperature is not reached, the fresh air proportion is reduced (modulating) down to an adjustable minimum proportion.
- c) Energy optimised:
Energy optimised mode saves heating and cooling energy. The fixed air proportion is reduced to a minimum level when cooling in higher outdoor temperatures [summer] and when heating in low outdoor temperatures [winter]. This reduces energy requirements.

QUICK HEAT-UP

The quick heat-up system saves heating energy in winter by operating the system in UML mode and bringing connected rooms to the desired temperature as quickly as possible.

PEAK VENTILATION

When peak ventilation is active, the fresh air proportion of the system is increased to a preconfigured level and the fan runs at a predefined speed or in a predefined stage. This mode can be configured to run for a specific amount of time. The system will then return to normal operation.

AIR QUALITY CONTROL

An air quality sensor (installed in the room or the extract air channel) monitors the quality (mixed gas or CO₂) of the room or extract air. As the air quality goes down, the fan speed and the fresh air proportion are increased. When the system is deactivated, it can be reactivated if the air quality falls below a certain level, depending on requirements.

HYGROSTAT FUNCTION

When a hygrometer (installed in the room or extract air channel) is activated, the fan speed and the fresh air proportion are increased to a configured level. If the system is deactivated, it can be reactivated if necessary if the hygrometer turns on.

CONSTANT HYGROSTAT FUNCTION

A humidity sensor (installed in the room or extract air channel) monitors the room air humidity. The fan speed and the fresh air proportion are increased as the air humidity level goes up. When the system is deactivated, it can be reactivated if the humidity goes above a set value, depending on requirements.

PRESSURE CONTROL

A pressure sensor monitors the pressure in the supply air and extract air, and compares its readings with the set values. The variable speed fan is controlled within the specified limits based on the difference between the two in order to keep the pre-charge pressure in the channel at a constant level. It is also possible to use just one sensor in the supply air and track the extract air fan with a configurable difference.

FLOW RATE CONTROL

A pressure sensor monitors the pressure differential across the supply air and extract air fans and converts it into a flow rate based on the specified k factor (manufacturer or impeller-specific). The variable speed fans are controlled within the specified limits based on the difference between the set values in order to keep the flow rate at a constant level.

WINTER START HR

The heat recovery system of ventilation units should be preheated in winter months so that heating energy is available immediately when the supply air fan is activated. The extractor fan is activated first, followed by the supply air fan.

WOLF AIR HANDLING CONTROL SYSTEM

CONTROL FUNCTIONS

ICE GUARD PHE

An icing-up temperature sensor is installed at the outlet after the plate element to protect the plate heat exchangers. If there is a risk of icing, the HR control is consistently reduced. If possible, the speed of the supply air fan is reduced first [imbalance between supply and extract air].

PREHEATING PROGRAM

Activating the preheating program prevents cold air being blown into the room at system start (when heating coil is cool). Prior to the fan starting, the system checks whether the outdoor temperature lies below an adjustable limit. If it is, the heating circuit pump is activated, the heating valve is opened and the heat generator is activated. After a configurable period (preheat time), the dampers are opened and the fans are activated.

FROST PROTECTION WITH FROST THERMOSTAT

The frost protection function prevents damage to the heating coil at low outdoor temperatures. When the frost thermostat is activated, the fans are deactivated, the outside air damper is closed, the heating circuit pump is activated, the heating valve is opened and the heat generator is activated. It is possible to select whether the system should restart automatically or only after the corresponding fault message has been acknowledged when the frost thermostat is reset.

FROST PROTECTION VIA SUPPLY AIR TEMPERATURE

When the supply air temperature falls below the frost protection threshold, the fans are deactivated, the outside air damper is closed, the heating circuit pump is activated, the heating valve is opened and the heat generator is activated, all for a configurable amount of time. It is possible to select whether the system should restart automatically or only after the corresponding fault message has been confirmed following this period.

AIR FLOW MONITORING

An external differential pressure cell is used for airflow monitoring, with air ducts before and after the fan. This ensures that louvre dampers are opened and that the fan does not try to work against a closed damper.

STANDSTILL PROTECTION

Standstill protection [anti-seizing protection] is active for pumps and valves. If it has not been activated within the previous 24 hours, it will be activated for five seconds at a specified time [pump on, valve open].

FILTER MONITOR

An external differential pressure switch is used for filter monitoring, with air ducts before and after the filter. The filter is constantly monitored for contamination. For systems with multistage or variable speed fans, the air flow rate is increased to the nominal air flow rate at an adjustable interval. A message is displayed if the filter is contaminated [e.g. "Outside air filter contaminated"]

It is also possible to monitor the filter with differential pressure sensors [0-10V]. The limits can be set at the engineering level.

FIRE DAMPERS

You can select whether the system should be deactivated [restart after fault message confirmed] or continue to run if a fire damper is triggered. A fault message is displayed in both cases. Up to 21 fire dampers with individual messages can be connected. WRS-K can be used to control motorised fire dampers. The functionality must be defined using the checklist "Evaluation/control of BSK, RSK, KRM and BMZ".

SMOKE DETECTOR

When a smoke detector detects smoke, the system is deactivated (restart after fault message confirmed) and a fault message is displayed.
WRS-K can be used to close the air damper and other fire dampers. The functionality must be defined using the checklist "Evaluation/control of BSK, RSK, KRM and BMZ".

FIRE ALARM SYSTEM

You can select whether the system should be deactivated (restart after fault message confirmed) or continue to run if a fire alarm system is triggered. A fault message is displayed in both cases. WRS-K can be used to control motorised fire dampers or close the recirculation air damper. The functionality must be defined using the checklist "Evaluation/control of BSK, RSK, KRM and BMZ".

EXTERNAL FAULT MESSAGE CONTACT

You can select whether the system should be deactivated (restart after fault message confirmed) or continue to run if an external fault message is triggered. A fault message is displayed in both cases.

CENTRAL FAULT

In the event of a fault, an output is activated to pass a central fault to a central office. The fault message is displayed on the control unit.

EXTERNAL RELEASE

An external floating contact (e.g. switch) can be used to release or block the system (in addition to and taking priority over the control unit).

EXTERNAL STAGE DEMAND

Floating contacts (e.g. switches) can be used to specify 3 set values for the fan speed, pressure or flow rate [for pressure or flow rate control]. When the system is shut down, it can be started via an external stage demand.

HIGH/LOW PRESSURE CONTROL WITH IK CONTROL COOLING CONTROLLER

If a WOLF cooling controller is used, it is possible to regulate the high/low pressure in the cooling circuit by changing the fan speed. Sensor values and parameter settings can be exchanged via a bus.

MANUAL CONTROL LEVEL

For commissioning purposes, every unit (fan, pumps, valves, dampers, humidifier, etc.) can be activated by hand at a fixed value when the system is deactivated.

SENSOR ADJUSTMENT

Each sensor can be adjusted in the "Engineer" menu.

WOLF AIR HANDLING CONTROL SYSTEM

CONTROL FUNCTIONS

HOURS RUN

The number of hours which each component has run for is monitored and displayed. A service message is triggered when a set limit has been exceeded. The hours can be reset for each component separately.

KEY LOCK

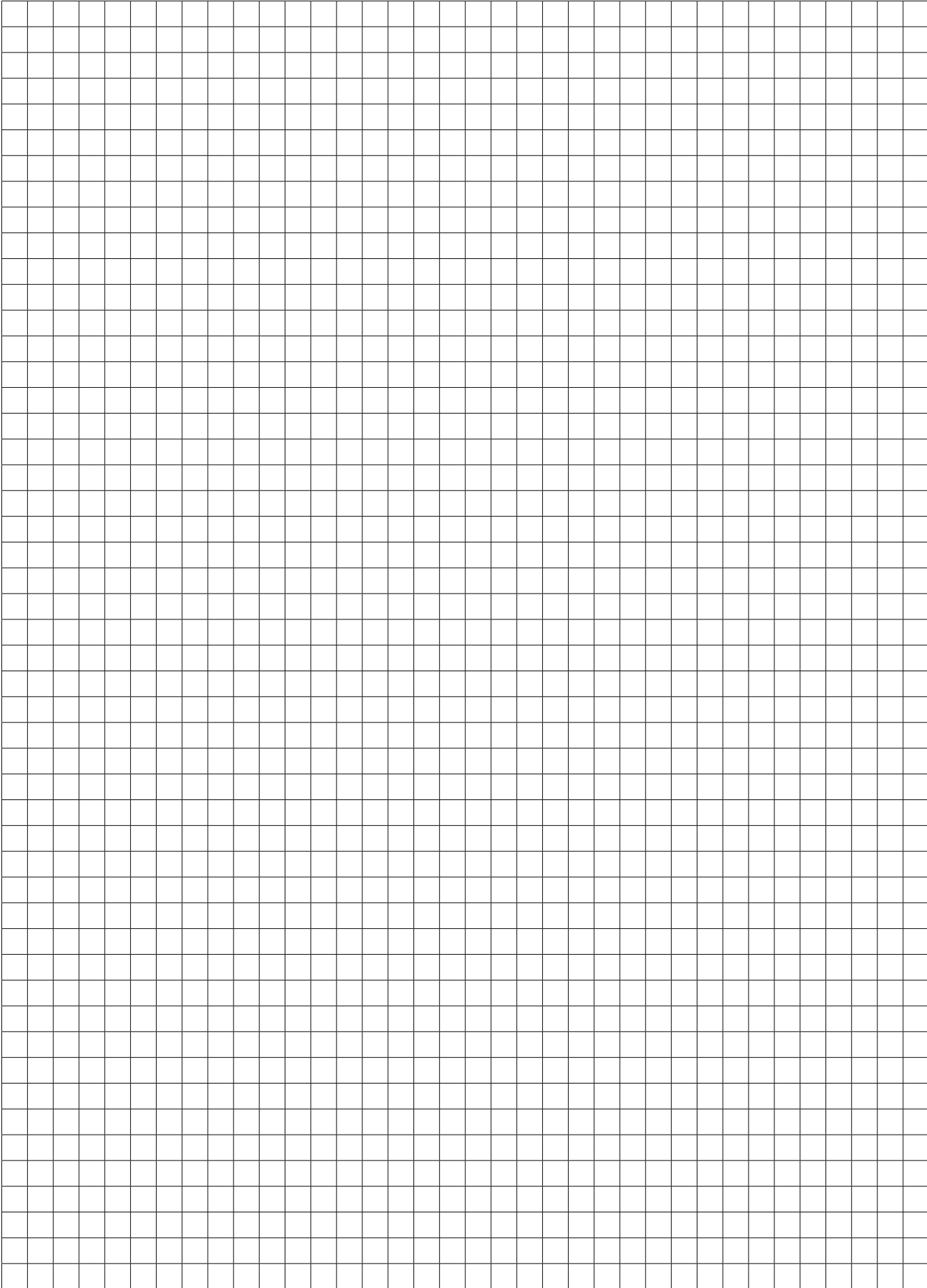
A key lock can be set up on the control unit to prevent the system being used incorrectly.

PARAMETER SETS LOAD/SAVE

The factory settings can be loaded if the system is misconfigured. Customer settings (after commissioning, for example) can be saved and loaded.

POST-CONFIGURATION OF ACCESSORIES AND FIELD DEVICES

A BMK-F remote control, BMK-10 touch panel, sensors (e.g. pressure sensors used to display the flow rate, room/extract air temperature sensor, air quality sensor), external activation/deactivation of the system, external stage demand and a hygrostat can all be post-configured.



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