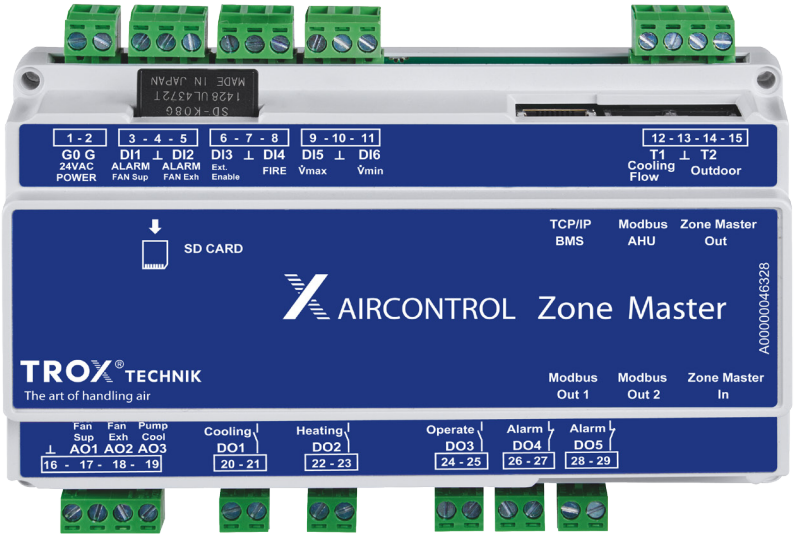
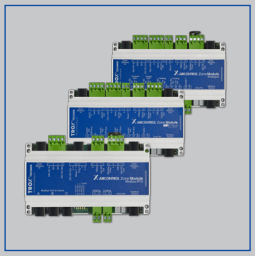
Master devices
Type X-AIR-ZMAS



Web server, also for mobile devices



Zone modules

Zone master module with plug-in connections for plug and play

Zone master module for up to 25 zone modules, with integral webserver and interfaces to higher-level systems

X-AIRCONTROL zone master module for the control of zone modules and as an interface to higher-level systems such as air handling units and central BMS

- Optimisation of control functions to achieve a comfortable and energy-efficient operation of ventilation and air conditioning systems
- One zone master module and up to 25 zone modules form a segment
- Up to five cascading master modules form a section with up to 125 zone modules
- Communication between master modules, and between master and zone modules, is by plug and play
- Web server for configuration and operation; user interface optimised also for mobile devices
- Modbus TCP and BACnet IP interfaces to higher-level systems such as the central BMS
- Modbus RTU interface to air handling units Type X-CUBE compact
- Connection of signals, e.g. outdoor air temperature and fire alarm
- Output of signals, e.g. requests and alarms

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Application

Application

- X-AIRCONTROL zone master module Type X-AIR-ZMAS, for the provision of control signals to zone modules and as an interface to higher-level systems
- Centralised parameter setting for, and operation and monitoring of, zone modules
- For use in office buildings, hotels, residential buildings and others
- One zone master module can be used to control a segment of up to 25 zone modules
- Up to five cascading master modules form a section with up to 125 zone modules
- For the connection of up to 25 zone modules to air handling units Type X-CUBE compact (only 4 zone modules if no master module is used)
- Communication between master modules, and between master and zone modules, is by plug and play
- Web server for configuration and operation; user interface optimised also for mobile devices
- Modbus TCP and BACnet IP interfaces to higher-level systems such as the central BMS
- Optimum number of data points allows for easy administration in higher-level systems
- Plug and play interface to air handling units Type X-CUBE compact
- Connection of signals, e.g. outdoor air temperature and fire alarm
- Output of signals such as operating states, requests and alarms
- Demand-based activation of the supply or extract air fan, depending on the damper blade positions or pressures in the supply or extract air system
- Pressure control or limitation in the supply air and extract air systems
- Energy-efficient operation of the air handling unit as a consequence of demand-based default settings (fan speed, supply air temperature setpoint); the default settings result from the evaluation of parameters sent by zone modules (e.g. damper blade positions, required heating, required cooling)
- Temperature setpoint shifting based on the outdoor air temperature (summer and winter compensation)
- Central alarm management; configuration display for all rooms in a section, e.g. display of actual and setpoint values
- Central device for firmware updates for a section

Special characteristics

- Plug and play system which automatically detects master and zone modules
- Energy-efficient operation of the air handling unit (fan speed, supply air temperature setpoint) as a consequence of the evaluation of parameters sent by zone modules
- Web server for configuration and operation; user interface optimised also for mobile devices
- Modbus TCP and BACnet IP interfaces to higher-level systems such as the central BMS; central signalling of higher-level data
- For the connection of up to 25 zone modules to air handling units Type X-CUBE compact (only 4 zone modules if no master module is used)
- Plug connections or plug-in screw terminals

Description

Parts and characteristics

- Micro processor system with software and system data stored in non-volatile memory
- Supply voltage 24 V AC
- Integral webserver for configuration and operation
- Modbus TCP and BACnet IP interfaces for the exchange of data with higher-level systems
- Modbus RTU interface for the exchange of data with an air handling unit (plug and play with X-CUBE compact)
- Two interfaces for the connection of another two zone master modules
- Digital inputs with plug-in screw terminals
- Digital outputs with plug-in screw terminals
- Temperature input with plug-in screw terminals
- Analog outputs with plug-in screw terminals
- Slot for SD cards (SDHC) of up to 8 GB
- 2 GB SD card

Useful additions

- Zone modules X-AIR-ZMO-MOD, X-AIR-ZMO-MP, X-AIR-ZMO-ANA
- Temperature sensor X-SENS-TEMP-PT1000

Construction features
- Casing fits on mounting rails
- All connections are at the outside

Materials and surfaces
- Plastic casing

Functional description

The X-AIR-ZMAS zone master module is used for the integration and configuration of up to 25 zone modules; 25 zone modules and the zone master module form a segment.
The zone master module includes a webserver. The webserver is used to access a web browser (e.g. Internet Explorer or Mozilla Firefox) for the configuration display and operation of the zone master. Interfaces to higher-level systems and to an air handling unit are used for exchanging data with those systems. The zone master module has inputs and outputs for the integration of components that are relevant to the entire segment.
Up to five cascading master modules form a section with up to 125 zone modules. The first master module in such a chain is the highest-level master, with higher-level functions. This highest-level master performs functions for the entire section, such as controlling the fans and releasing heating and cooling requests. All other functions of the zone master module apply only to the respective segment.

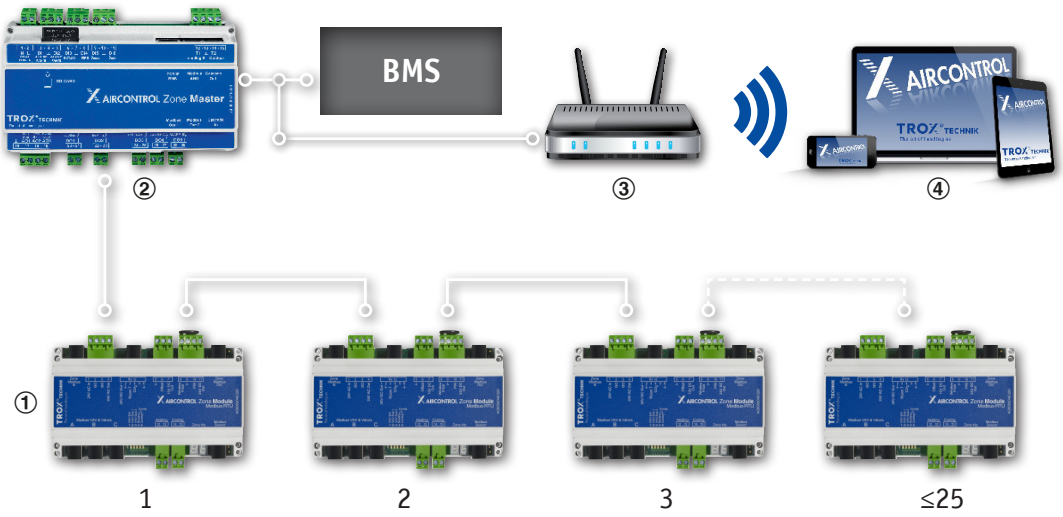
Signals and functions

- Outdoor air temperature sensor: Summer or winter compensation for all zone modules is based on the outdoor air temperature.
- Fire alarm: Signal from the central fire alarm system for the (override) control of all VAV terminal units in a segment; the function can be configured: supply air $\dot{V}_{max}$ or shut-off, extract air $\dot{V}_{max}$ or shut-off
- Release of zones: Switching between Standby and Automatic mode for all zones
- Alarm signal from the supply air and extract air fans: For signalling to the central BMS
- Supply air fan activation: Control of the supply air fan, based on demand and on the actual damper blade positions of all supply air terminal units (only if X-AIR-ZMO-MOD or X-AIR-ZMO-MP is included in the segment); if required, including pressure limitation in the supply air system (only with a duct pressure sensor, which is a useful addition)
- Supply air fan activation: Control of the supply air fan for constant pressure control in the supply air system (only if X-AIR-ZMO-ANA is included in the segment, and only with a duct pressure sensor, which is a useful addition)
- Extract air fan activation: Control of the extract air fan, based on demand and on the actual damper blade positions of all extract air terminal units (only if X-AIR-ZMO-MOD or X-AIR-ZMO-MP is included in the segment); if required, including pressure limitation in the extract air system (only with a duct pressure sensor, which is a useful addition)
- Extract air fan activation: Control of the extract air fan for constant pressure control in the extract air system (only if X-AIR-ZMO-ANA is included in the segment, and only with a duct pressure sensor, which is a useful addition)
- Cooling fluid temperature sensor: Optimised operation of the cooling circuit as the pump is triggered based on the valve position; alarm output if the configured temperature value is exceeded (only X-AIR-ZMO-MOD or X-AIR-ZMO-MP)
- Cooling request output: The output is active if at least one zone requests cooling
- Heating request output: The output is active if at least one zone requests heating
- Operating mode output: The output is active when all zones are in Automatic mode
- Alarm output: Major fault (A alarm, leads to the system being switched off) or minor fault (B alarm)

Operating modes

- Automatic: Demand-based zone control
- Minimum volume flow rate: All volume flow controllers are set to $\dot{V}_{min}$, temperature control and control of heating and cooling valves remain active
- Maximum volume flow rate: All volume flow controllers are set to $\dot{V}_{max}$, temperature control and control of heating and cooling valves remain active
- Fire alarm: Supply air $\dot{V}_{max}$ or shut-off, extract air $\dot{V}_{max}$ or shut-off
- Standby: All volume flow controllers are shut off, heating and cooling valves are closed

X-AIRCONTROL segment



① Zone modules
② Master module
③ WiFi router
④ Smartphone or tablet
Central BMS

Supply voltage	24 V AC ± 15 %
Power rating	5 VA without peripheral systems
SD card slot	Up to 8 GB (SDHC)
SD card	2 GB
Operating temperature	0 – 50 °C
Max. humidity	10 – 90% rh, no condensation
IEC protection class	III (protective extra-low voltage)
Protection level	IP 20
EC conformity	EMC to 2014/30/EU, ROHS 2011/65/EU
Installation location	Switch cabinet, wall or ceiling
Fixing	With screws or on a mounting rail
Dimensions	156 × 110 × 58 mm
Weight	430 g

6 digital inputs	Volt-free
2 digital outputs (DO1, DO2)	2 relays, NO, 5 A, 230 V max.
3 digital outputs (DO3, DO4, DO5)	3 relays, 1x NO, 2x NC, 5 A, 30 V max.
2 inputs for temperature sensors	PT1000 temperature sensors
3 analogue outputs	0 – 10 V DC
All digital and analogue inputs and outputs	Plug-in screw terminals
1 interface to higher-level systems	Ethernet, 10/100 Mbit/s, network cable SF-UTP, at least cat. 5e, 100 m max., structured wiring
2 interfaces for zone modules	Modbus, AWG 26/6 C data cable, RJ12 plug (6P6C), 100 m max. (module to module)
2 interfaces for cascading zone master modules	Modbus, AWG 26/6 C data cable, RJ12 plug (6P6C), 100 m max. (module to module)
1 interface for air handling unit	Modbus RTU, data cable AWG 26/6 C, RJ12 plug (6P6C), 100 m max. (30 m to X-CUBE compact)

X-AIRCONTROL zone master module, for the control of zone modules and as an interface to higher-level systems. Centralised parameter setting, operation and monitoring of zone modules in decentralised control systems. The zone master modules expand the functions of the control system such that any energy savings potential can be fully used; they also improve safety and comfort in the zones.
One zone master module and up to 25 zone modules form a segment. Up to five cascading master modules form a section with up to 125 zone modules. Communication between master modules, and between master and zone modules, is by plug and play. Web server for configuration and status display; user interface optimised also for mobile devices. Modbus TCP and BACnet IP interfaces to higher-level systems. Module suitable for installation in switch cabinets (on a mounting rail) or for installation on the face of walls or ceilings.

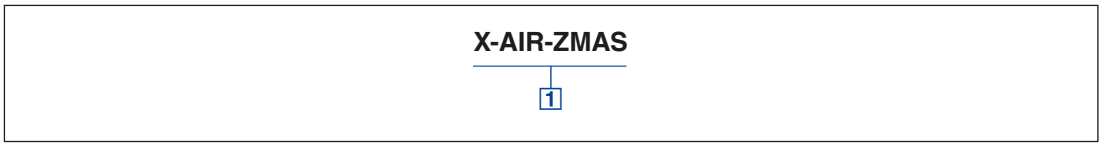
Special characteristics
- Plug and play system which automatically detects master and zone modules
- Energy-efficient operation of the air handling unit (fan speed, supply air temperature setpoint) as a consequence of the evaluation of parameters sent by zone modules
- Web server for configuration and operation; user interface optimised also for mobile devices
- Modbus TCP and BACnet IP interfaces to higher-level systems such as the central BMS; central signalling of higher-level data
- For the connection of up to 25 zone modules to air handling units Type X-CUBE compact (only 4 zone modules if no master module is used)
- Plug connections or plug-in screw terminals

Materials and surfaces
- Plastic casing

Technical data
- Supply voltage: 24 V AC ±15 %, 50/60 Hz
- Power rating: 5 VA without peripheral systems
- Slot for SD cards: Up 8 GB (SDHC)
- SD card: 2 GB
- 6 digital inputs: Supply air fan alarm, extract air fan alarm, release of zones, fire alarm, $\dot{V}_{max}$, $\dot{V}_{min}$
- 2 digital outputs: 5 A, 230 V max., release of cooling function, release of heating function
- 3 digital outputs: 3 A, 30 V max., supply air fan alarm, extract air fan alarm, operating mode
- 2 inputs for temperature sensors: PT1000, cooling fluid temperature, outdoor air temperature
- 3 analogue outputs: 0 – 10 V DC, supply air fan, extract air fan, cooling fluid pump
- All digital and analogue inputs and outputs with plug-in screw terminals
- 1 interface to the central BMS: Ethernet TCP/IP, 10/100 Mbit/s, 100 m max.
- 2 interfaces to zone modules: Modbus, for RJ12 plug (6P6C), 100 m max. (module to module)
- 2 interfaces to cascading zone master modules: Modbus, for RJ12 plug (6P6C), 100 m max. (module to module)
- 1 interface to an air handling unit: Modbus RTU, for RJ12 plug (6P6C), 100 m max.
- Operating temperature: 0 to 50 °C
- Max. humidity: 10 – 90% rh, no condensation
- IEC protection class: III (protective extra-low voltage)
- Protection level: IP 20
- Installation location: Switch cabinet, wall or ceiling
- Fixing: With screws or on a mounting rail
- Dimensions: 156 × 110 × 58 mm

Measurement and control functions
- Demand-based activation of the supply or extract air fan, depending on the damper blade positions or pressures in the supply or extract air system
- Pressure control or limitation in the supply air and extract air systems
- Energy-efficient operation of the air handling unit as a consequence of demand-based default settings (fan speed, supply air temperature setpoint); the default settings result from the evaluation of parameters sent by zone modules (e.g. damper blade positions, required heating, required cooling)
- Temperature setpoint shifting based on the outdoor air temperature (summer and winter compensation)
- Central alarm management; configuration display for all rooms in a section, e.g. display of actual and setpoint values

X-AIR-ZMAS



1 Type

X-AIR-ZMAS X-AIRCONTROL zone master module

Inputs

6 digital inputs
- Supply air fan alarm
- Extract air fan alarm
- Release of zones
- Fire alarm
- Override control $\dot{V}_{max}$
- Override control $\dot{V}_{min}$

2 inputs for temperature sensors
- Cooling fluid temperature sensor PT1000
- Outdoor air temperature sensor PT1000

Outputs

5 digital outputs
- Release of cooling function
- Release of heating function
- Operating mode
- Major fault alarm (leads to the system being switched off)
- Minor fault alarm

3 analog outputs
- Supply air fan
- Extract air fan
- Cooling fluid pump

SD card reader

- SD card reader for standard SDHC cards of up to 8 GB

Communication interfaces

- Ethernet to central BMS
- Modbus to zone modules
- Modbus to cascading zone master modules
- Modbus to air handling unit

X-AIR-ZMAS

① Supply voltage connection
② Digital inputs
③ Inputs for temperature sensors
④ Communication interfaces
⑤ Communication interfaces
⑥ Digital outputs
⑦ Analogue inputs
⑧ SD card reader

Installation and commissioning

- Screw-fix the module inside a switch cabinet or to a wall or ceiling, or mount it onto a mounting rail
- Connect zone master and zone modules (in series) using flat cables with RJ12 plugs (6P6C)
- Connect externel components, if any
- Connect the 24 V AC supply voltage
- Adapt the standard IP address, if necessary (no additional device addressing required)
- Adapt the configuration by using the webserver (access is password protected)
- Take account of the network wiring (IP) and infrastructure

Increasing requirements on the energy efficiency of ventilation and air conditioning systems as well as EU regulations can be fulfilled with intelligent control engineering solutions.
X-AIRCONTROL is a control system that uses information from sensors and actuating elements to optimise ventilation and air conditioning systems. It calculates what all is required to achieve a comfortable room climate, and controls fans, pumps and valves accordingly.
X-AIRCONTROL is a modular system that can be used to optimise individual functions or a whole range of functions for a project.
- Evaluate the damper blade positions of all air terminal units
- Optimise fan control (optimiser function)
- Evaluate the heating and cooling required for a zone
- Calculate the supply air temperature setpoint value for the air handling unit
- Configure the system, display the system configuration and manage alarms – all this from a central point

X-AIRCONTROL zone

An X-AIRCONTROL zone is an area where air conditioning parameters such as temperature and humidity are controlled based on demand and based on the occupancy. These are usually single rooms, but it is possible to create individual zones also in larger areas, e.g. in open plan offices.
- Each zone is controlled by a zone module
- Sensors detect various air conditioning parameters as well as occupancy
- Actuators control these conditions
- Room occupants can use control panels to adapt the system to their individual comfort requirements
- A zone module can be used either as a stand-alone unit or as part of a larger system

X-AIRCONTROL segment

A segment is a group of up to 25 zone modules; the entire segment is controlled as a unit, i.e. the same conditions apply to the entire segment. Grouping zones into segments is necessary when these zones are to be controlled centrally and when data from these zones are to be evaluated. A segment may be a floor in a building, the wing of a building or simply areas that are used differently from adjacent areas.
- A segment is controlled by a zone master module.
- Sensors detect various air conditioning parameters that are relevant to the segment, e.g. the outdoor air temperature
- Digital inputs and outputs are used to activate functions for a segment, e.g. to activate a fire alarm
- A webserver (integral part of the zone master module) is used to configure the entire segment, to display the segment configuration, to monitor all segment functions and to manage alarms
- Modbus TCP and BACnet IP interfaces allow for the integration with higher-level systems
- A segment can be treated as an individual unit (stand alone) or it can be combined with other segments to form a section

X-AIRCONTROL section

A section is a group of up to 5 segments. A section may consist of up to 5 zone master modules and 125 zone modules.
- A section is controlled by the first zone master module
- If the first zone master module is connected to the control system of an air handling unit, the system can be operated most efficiently
- It is possible to have several, independent sections and hence create larger structures; there are virtually no limits to the size of the overall system

Stand-alone solution for a zone

A single zone module and a room control panel can be used to control a single room.
- Integrate air terminal units (up to 2 for supply air and 1 for extract air)
- Activate valves for cooling and heating
- Measure the temperature and configure the zone with the X-AIR-CP-2T control panel (required)
- Define schedules independent of the central BMS
- Simple wiring
- Connect components using plug and play

Use additional sensors (optional) to include other parameters.
- Occupancy
- Air quality
- Humidity

Interconnecting zones for multi zone operation

Up to 25 zone modules and another 4 zone master modules can be connected to a zone master module such that a system of up to 125 zones is achieved. Different zone modules (Modbus, MP bus or Analogue) can be combined and connected with plug and play.
- Up to 25 zone modules per zone master module (segment)
- Up to 5 zone master modules (section)
- Up to 125 zone modules in a section

Each zone module controls and maintains individually the required conditions for the particular zone (single room) for which it is used. The zone modules are connected in series; 100 m cables (module to module) allow for linking even large areas or different buildings. Each zone master module and each zone module is automatically assigned a unique address (plug and play), which simplifies commissioning.

Advantages of a zone master module
- Central access for displaying and setting individual zone parameters using the integral webserver
- Ethernet connection allows for easy integration with higher-level systems and for remote maintenance via the internet
- Option to connect a WiFi router (WLAN)

System solution with X-CUBE compact

If a project is to include X-CUBE compact air handling units, zone control with X-AIRCONTROL is the ideal system solution. With such a solution the air handling unit's X-CUBE Control system not only activates fans, dampers and other components of the air handling unit, it also acts as the zone master.
The X-CUBE compact air handling unit can serve up to four zones. If up to four zone modules are connected to the X-CUBE compact, no additional zone master module is required.
X-CUBE Control includes an Ethernet interface and a webserver for the configuration of the air handling unit, yet it can also be used to configure the connected zone modules.

- The zone master function is included in X-CUBE Control
- Up to four zone modules per X-CUBE compact unit, including different variants (Modbus, MP bus or Analogue)
- Integral webserver for configuring the air handling unit and the zone modules
- Remote maintenance is possible
- Expansion option: Up to 25 zone modules per air handling unit if an additional zone master module is used

System solution with X-CUBE

X-CUBE air handling units with X-CUBE Control offer zone master functions; no additional units or devices are necessary.

- Control of the air handling unit
- Zone master function for up to 125 zone modules

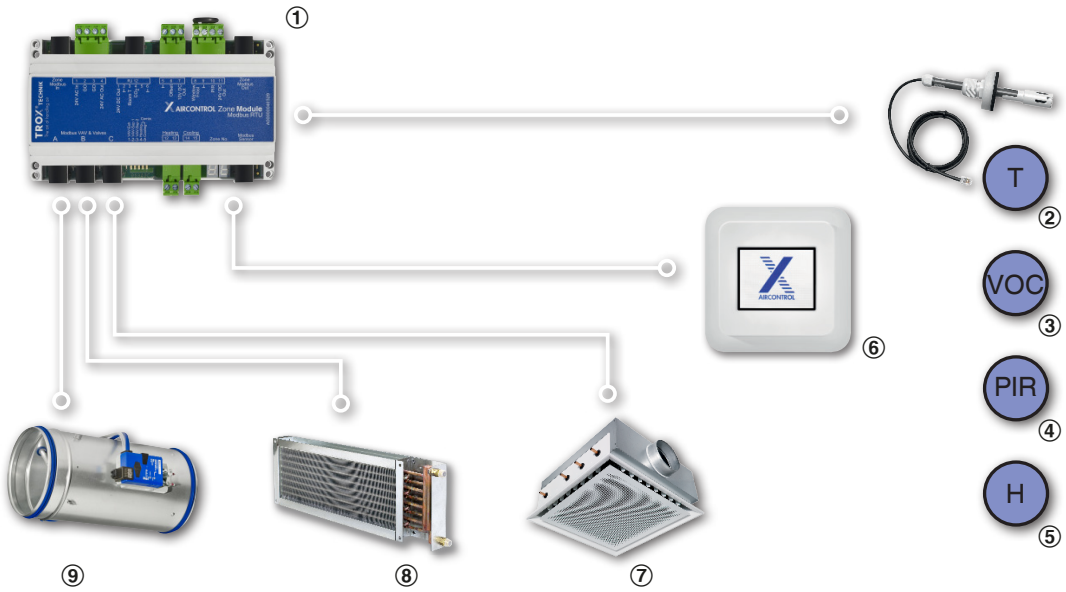
If X-CUBE Control is to be used for the zone master function, all entries, both for the X-CUBE and for the zone modules, have to be made on the X-CUBE Control touch screen. This includes configuration, display of the system configuration, monitoring, and alarm management.
Since X-CUBE Control includes an integral webserver, the system can be accessed from anywhere with the correct password.

- Remote access via webserver
- Display of actual operating values
- Adjustment of parameters
- Maintenance management
- Alarm alert by e-mail or SMS

Design information

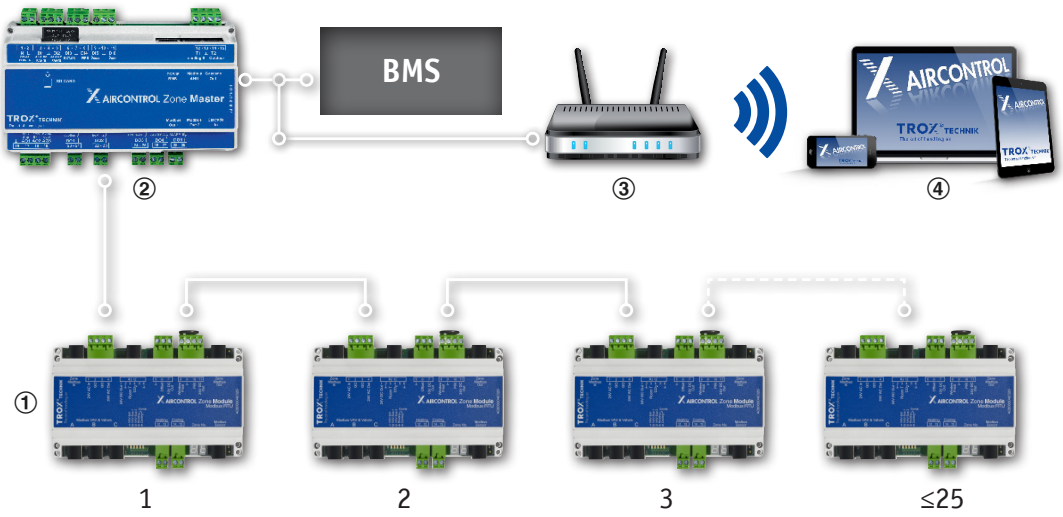
- Design and select sensors depending on the required zone functions
- Ensure that the zone module variants (Modbus, MP bus, Analogue) and actuators (volume flow controllers and valve actuators) you select are compatible
- For optimum energy efficiency select zone modules with bus compatible actuators (Modbus, MP bus) as only these will signal information on valve and damper positions
- If you use an X-CUBE air handling unit with integral X-CUBE Control system, you may connect up to 125 zone modules without the need for an additional zone master module
- If you use an X-CUBE compact air handling unit, you may connect up to 4 zone modules without the need for an additional zone master

X-AIRCONTROL zone



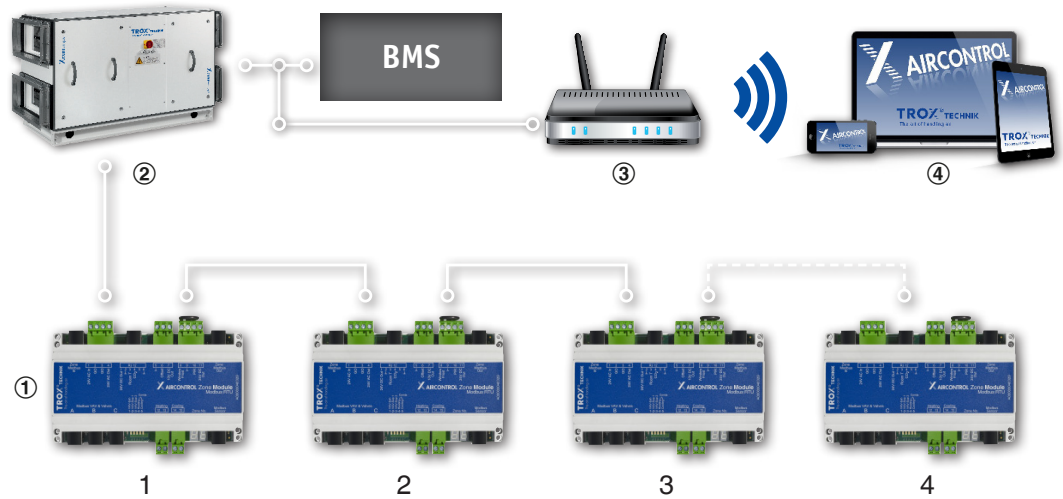
① Zone module
② Temperature sensor
③ Air quality sensor
④ Motion detector
⑤ Humidity sensor
⑥ Control panel
⑦ Cooling, e.g. with an active chilled beam
⑧ Heating, e.g. with a heating coil
⑨ Volume flow control

X-AIRCONTROL segment



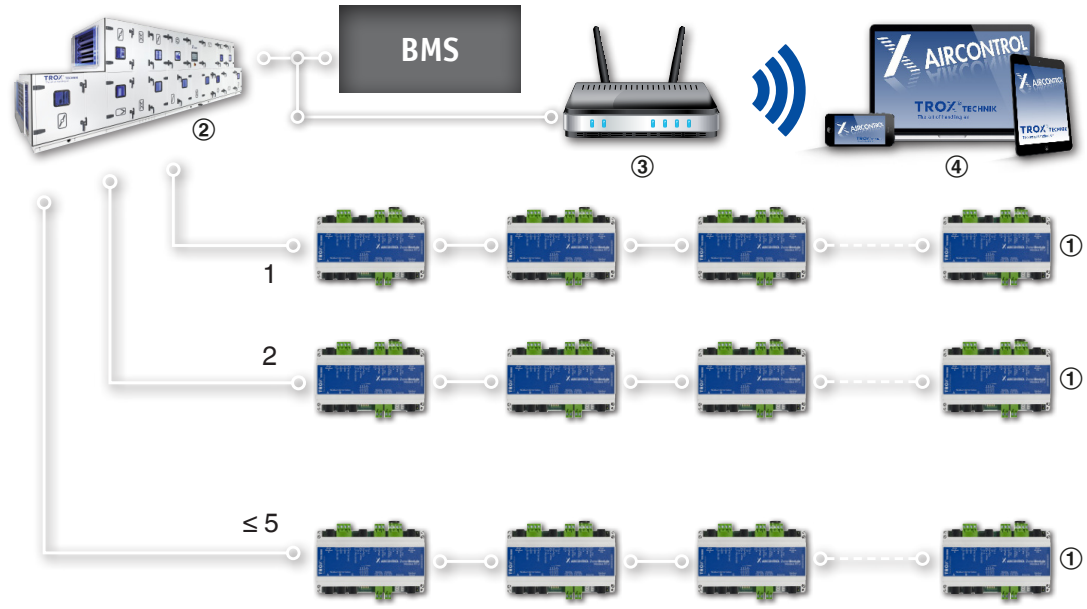
① Zone modules
② Master module
③ WiFi router
④ Smartphone or tablet
Central BMS

X-AIRCONTROL section with X-CUBE compact



① Zone modules
② X-CUBE compact
③ WiFi router
④ Smartphone or tablet
Central BMS

X-AIRCONTROL section with X-CUBE



① Zone modules
② X-CUBE
③ WiFi router
④ Smartphone or tablet
Central BMS