ABB i-bus® KNX ClimaECO

Use KNX to monitor, manage and optimize HVAC systems

- A holistic solution for automated heating, ventilation and cooling
- Based on the global open Standard KNX
- Simplifies the planning and implementation of HVAC systems
- Reduces costs and increases energy efficiency

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Efficient climate control in one system – ClimaECO is the holistic HVAC automation solution based on ABB i-bus® KNX – a true ECOsystem.

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Efficient climate control in one system with KNX
The complete product range for HVAC automation

Heating, ventilation and air conditioning: ClimaECO combines all HVAC applications in a holistic solution based on the standardized KNX system.

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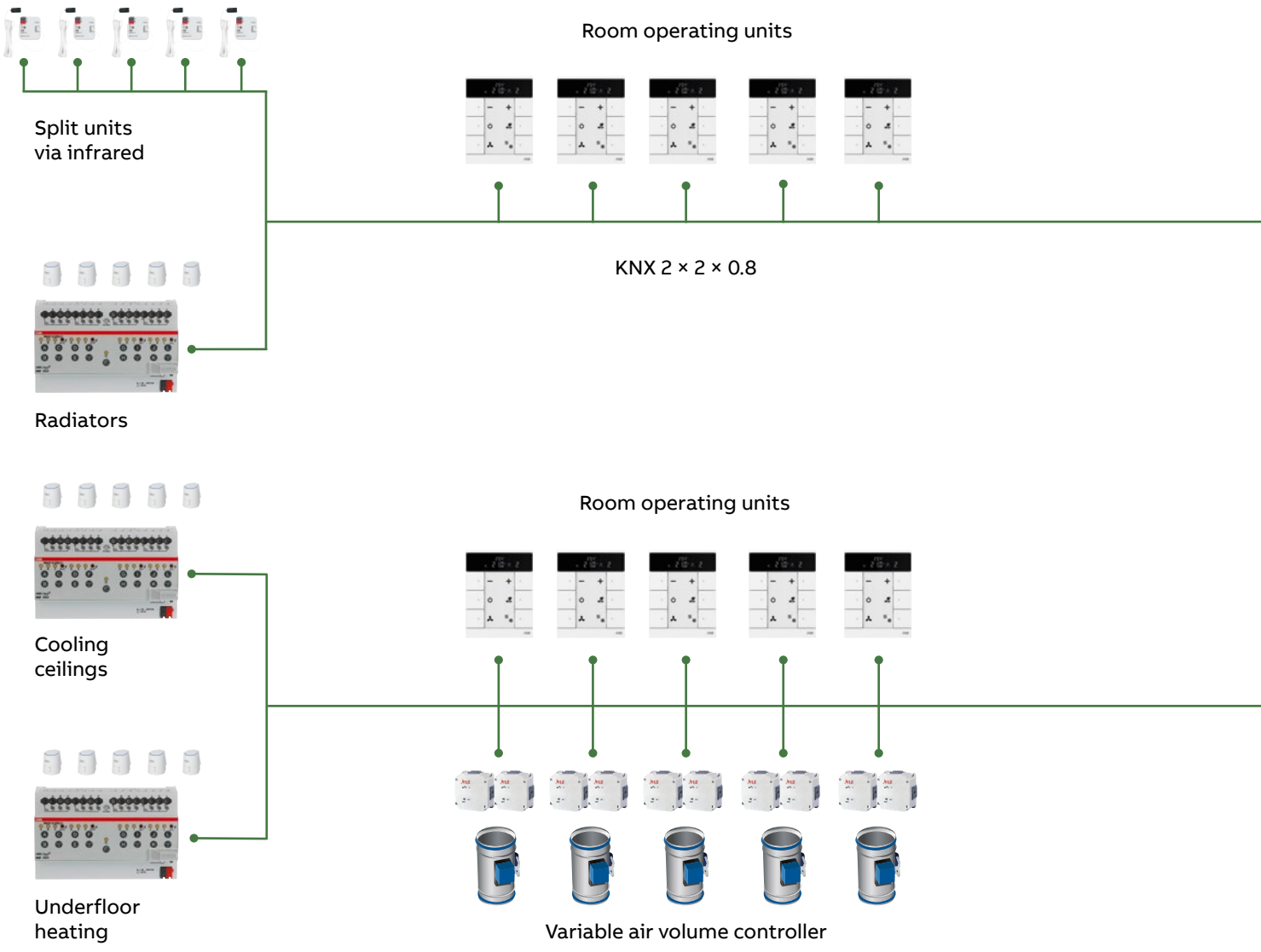
01 Complete solution

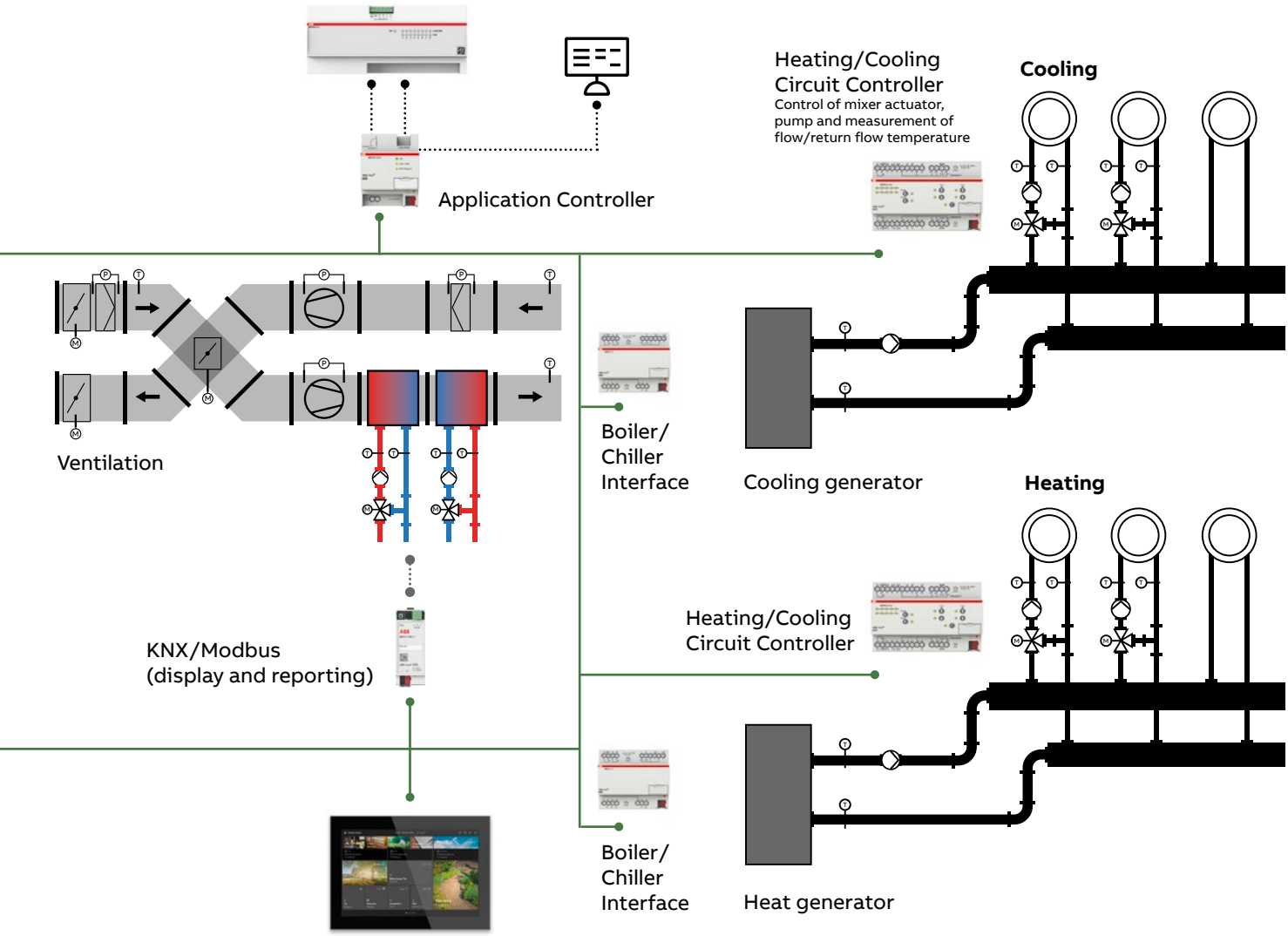


KNX is a system for building automation and HVAC control. This means that there is only one contact for the entire building system technology within the building. KNX has existed since 1990, it has been 100 % downward compatible since its market launch.

By using the commissioning software ETS, services and maintenance are carried out on site by the electrician or system integrator. Expensive maintenance contracts are no longer necessary.

ABB i-bus® KNX ClimaECO is the holistic automation solution for heating, ventilation and air conditioning (HVAC) in commercial buildings. A solution that seamlessly integrates room automation and primary HVAC systems into one system – a significant step that increases energy efficiency and reduces operating costs.

The system is evaluated using the Application Controller (AC/S1.x.1), and the resulting data, such as cooling and heating curves, can be viewed and read out via a PC.



Applications at room level
Operating elements for individual room temperature control

ABB's room automation solutions ensure that all functions in the room are operated as efficiently as possible to save operating costs and improve the overall room environment.

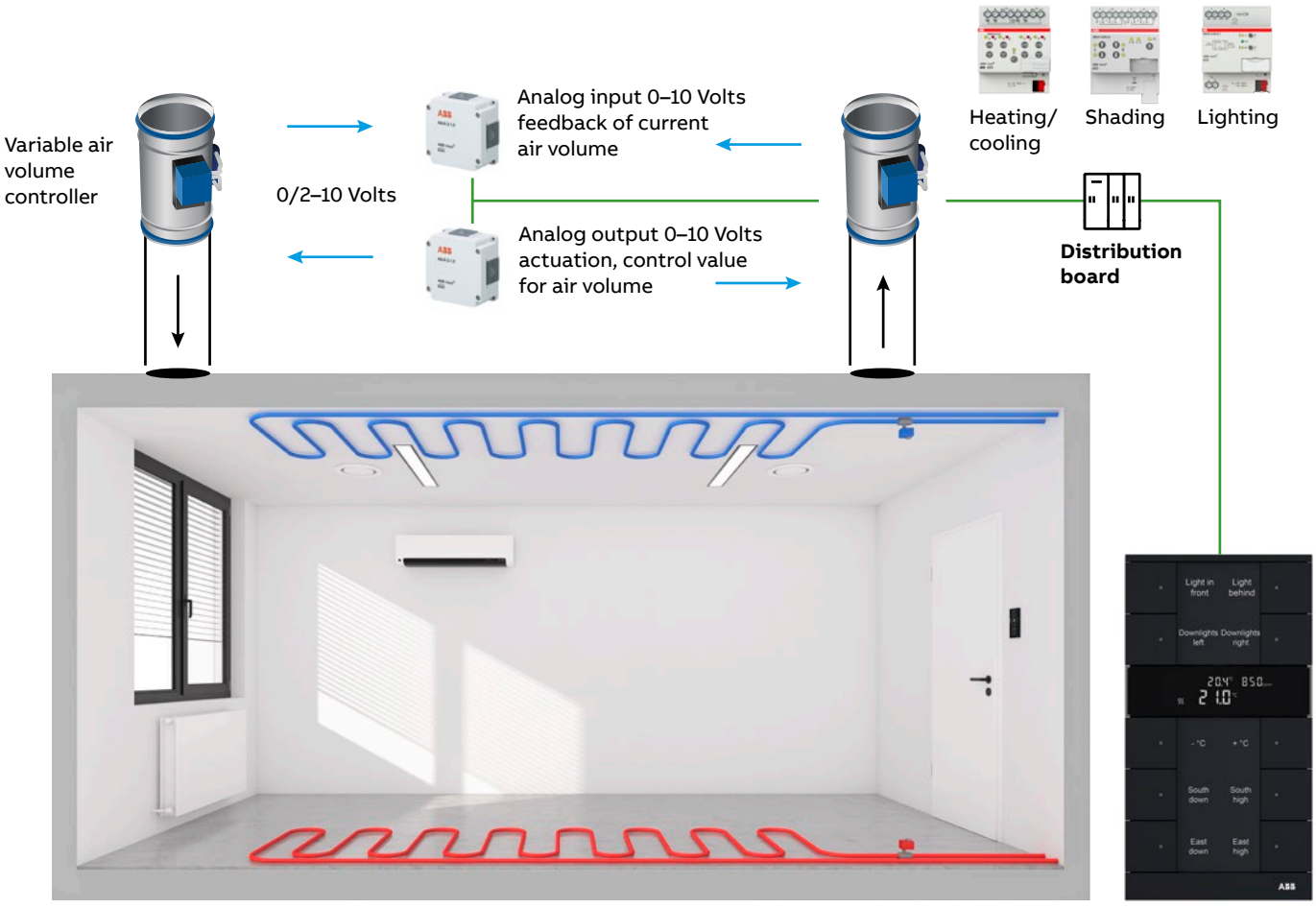
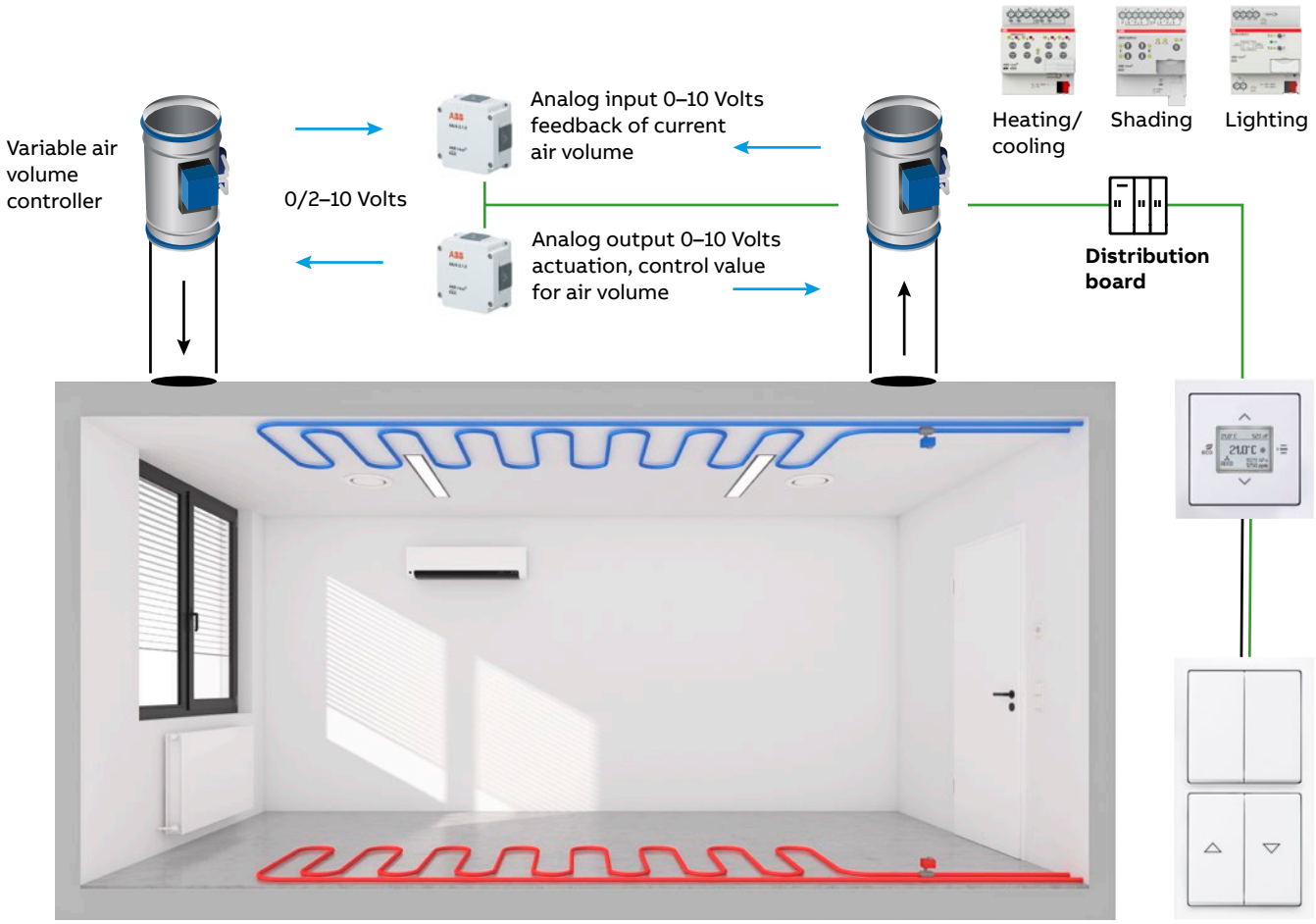


ABB Tenton® (SBx/U)
Easy to operate room temperature controllers for controlling all room functions from HVAC to shading and lighting.

- Room temperature controller: heating and cooling CO_2 sensor and controller
- Humidity sensor with dew point temperature calculation
- Lighting: switching and dimming
- Blind control: up and down as well as slat adjustment
- Scene control, e. g. in conference rooms for "presentation with projector"

Saving energy means needs-based heating, cooling and ventilation according to the use of the rooms. The individual room control takes into account heating caused by solar radiation and prevents further heating or reduces the required cooling energy by means of automatic shading. In addition, the dew point is calculated when temperature and humidity are measured by the room operating element and made available for calculating the cooling flow temperature. This prevents the air conditioning system from switching off owing to condensation on the cooling ceiling.

If blinds are used for shading, the sun position-guided azimuth control enables glare-free use of daylight and saves costs for artificial lighting. In addition to temperature regulation, the ABB Tenton® operating element can be used for ventilation control based on the amount of CO_2 in the air. The variable air volume controller is activated directly by the operating element. This means that unoccupied rooms are only ventilated minimally, which has a high savings potential and, at the same time, prevents the formation of mold.

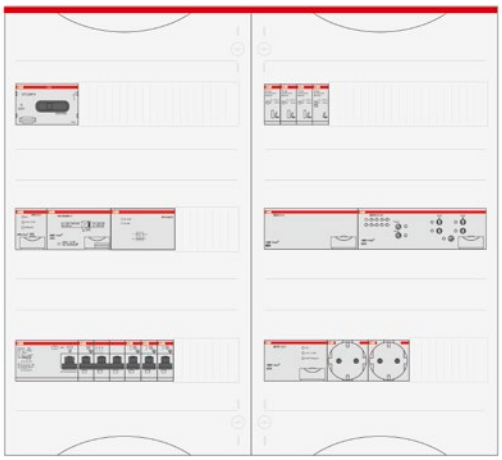


Room temperature controller with CO_2-humidity sensor (6109/28-500)
The room temperature controller has five universal inputs, two of them can also be used as analog inputs. These can be used, for example, to connect switches to control the lighting and blinds.

- Room temperature controller: heating and cooling
- CO_2 sensor and controller
- Humidity sensor with dew point temperature calculation
- Lighting: switching and dimming
- Blind control: up and down as well as slat adjustment
- Scene control, e. g. in conference rooms for “presentation with projector”
- Switchover from automatic sun protection to automatic heating/cooling

Applications for central HVAC
Actuators for controlling central HVAC and HVAC automation

Thanks to their installation in standard distribution boards, the devices are easy to use and can be operated by facility managers.



BCI/S1.1.1 Boiler/Chiller Interface, 1-fold
Used to control the heat or cooling generator via an enabling contact and a 0/1-10 V signal. Temperatures, operating and fault messages are also detected.

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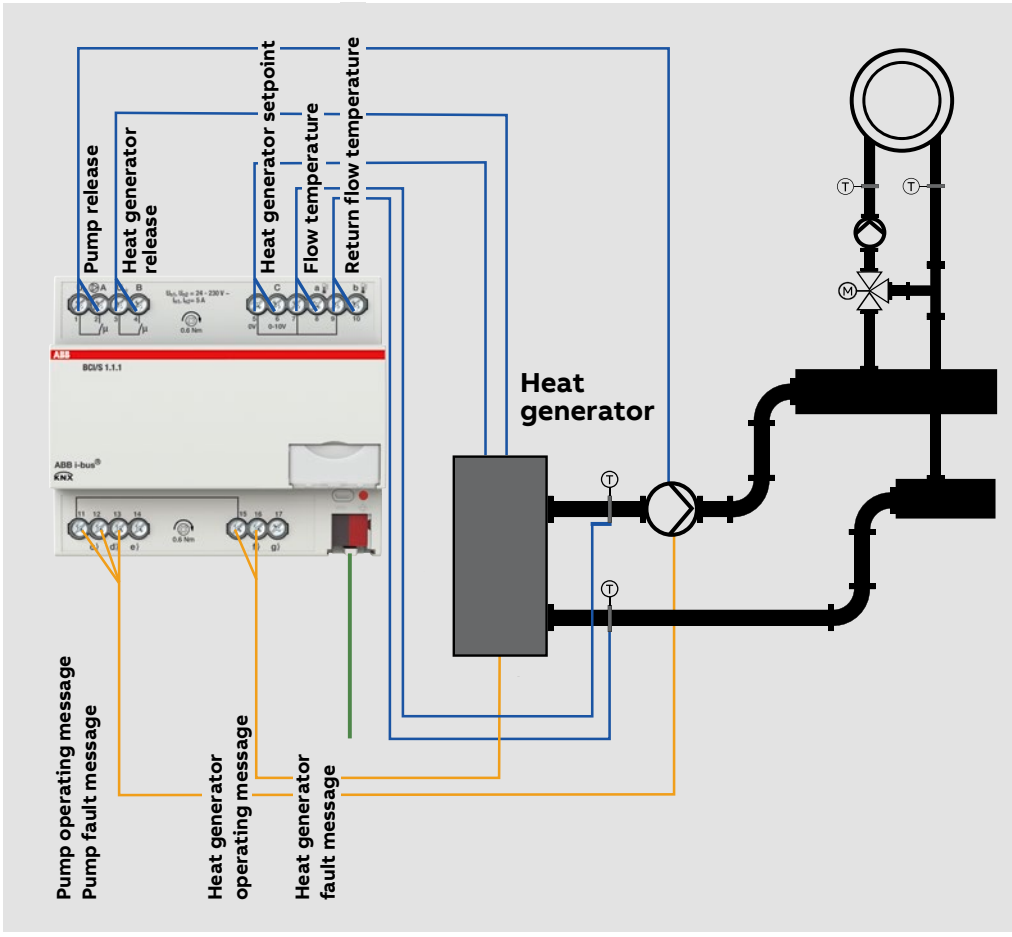
Product information for: BCI/S1.1.1



HCC/S2.1.2.1 Heating/Cooling Circuit Controller, 2-fold, 0–10 V, manual operation

The HCC/S works in a similar way to a DDC. It controls the flow temperature, measures the temperatures in the flow and return flow, enables the circulation pump and controls the mixer actuator. In addition, operating and fault messages from the circulation pump are detected.

To reduce bus communication, the complete control runs within the device. The mixer actuator, pump and temperature sensors can all be connected to one actuator.

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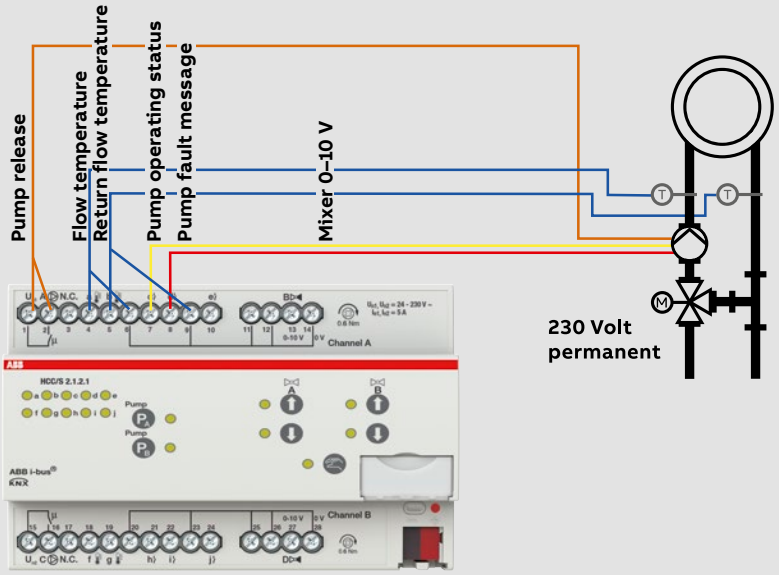
Product information for: HCC/S2.1.2.1



Connections for the second circuit

AC/S1.2.1 Application Controller, BACnet

Preconfigured modules for heating and cooling curves are provided in the automation controller. Measured values can be recorded which the integrated web server can display on any browser. Furthermore, an integrated soft PLC enables complex control options.

The BACnet version provides 500 data points.

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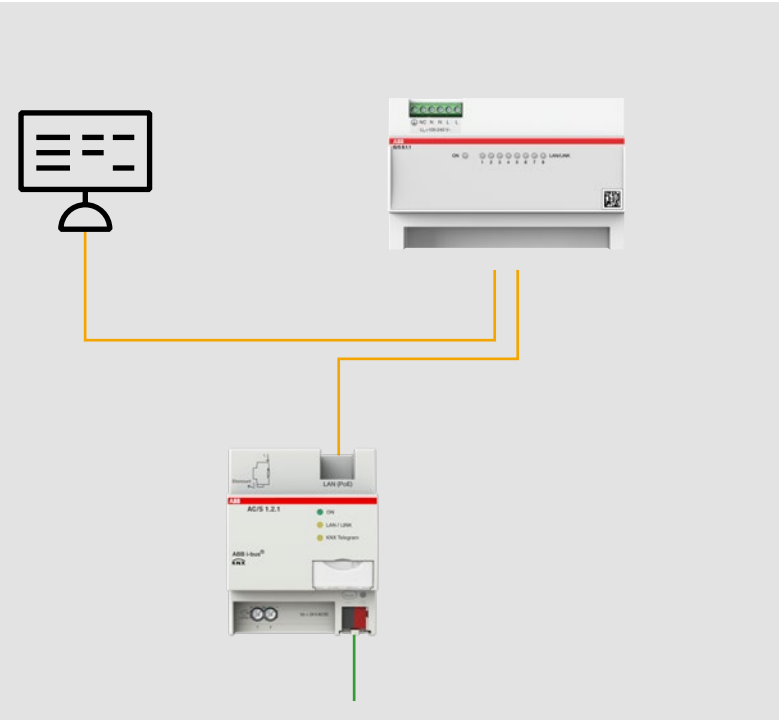
Product information for: AC/S1.2.1



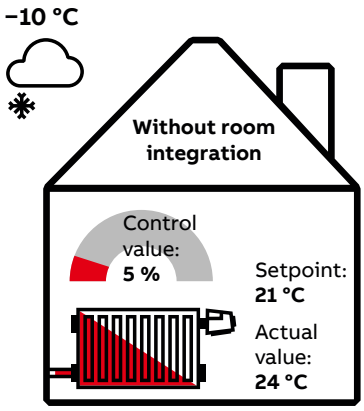
Room integration

Integration of the room level with central HVAC

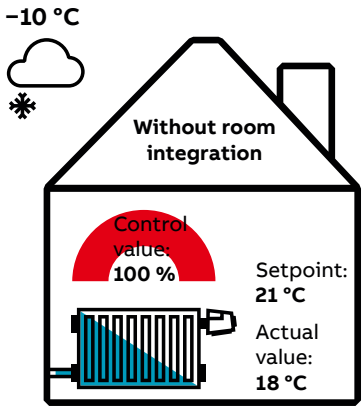
In most buildings, the individual room controls and the central HVAC equipment in the basement are completely separate from each other. Because of this lack of communication between the electrical & mechanical trade, the flow temperature can be significantly higher or significantly too low. In neither case is a satisfactory solution possible. In the examples given, the outside temperature is –10 °C.

Case 1:
Flow temperature much too high
If the valve is opened by the Room Temperature Controller (RTC), the room is overheated and control takes place until the temperature falls below the temperature setpoint.

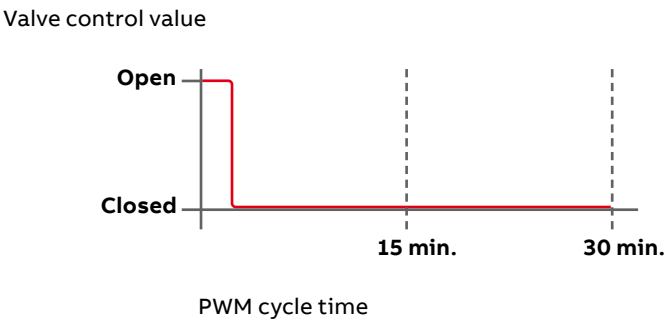
Case 2:
Flow temperature much too low
The flow temperature is not sufficient to supply the room with enough heat. The valve is permanently open, there is also no control. The desired room temperature is not reached.

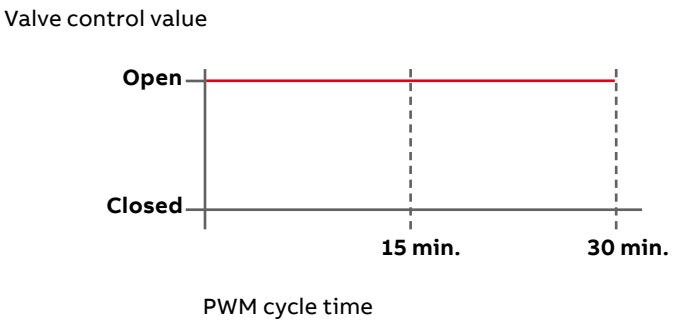


Flow temperature too high:
- Energy loss
- difficult to adjust



Flow temperature too low:
- possible lack of hydraulic balancing
- difficult to adjust

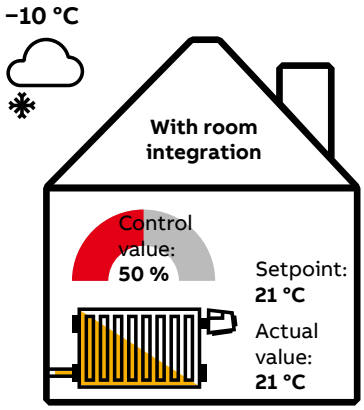




ClimaECO is a holistic system consisting of individual room control and the integration of central HVAC in the basement, based on KNX (see pages 4 and 5). The heat requirement of the individual rooms is recorded and the maximum value is used to recalculate the value of the flow temperature.

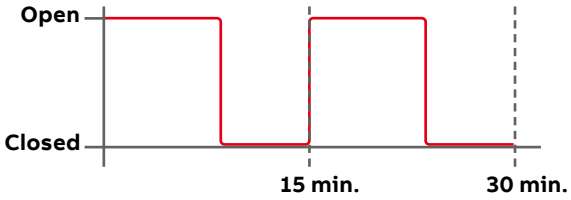
Case 3:
Ideal flow temperature, thanks to room integration
The RTC is at a control value of, e. g., 50 % because of the ideal flow temperature. The exact setpoint value is reached in the room.

The desired control value can be changed in the web interface of the Application Controller (AC/S) by the authorized user of the building, as shown in the following illustration.



Ideal flow temperature:
- Energy savings
- easy to adjust

Valve control value



PWM cycle time

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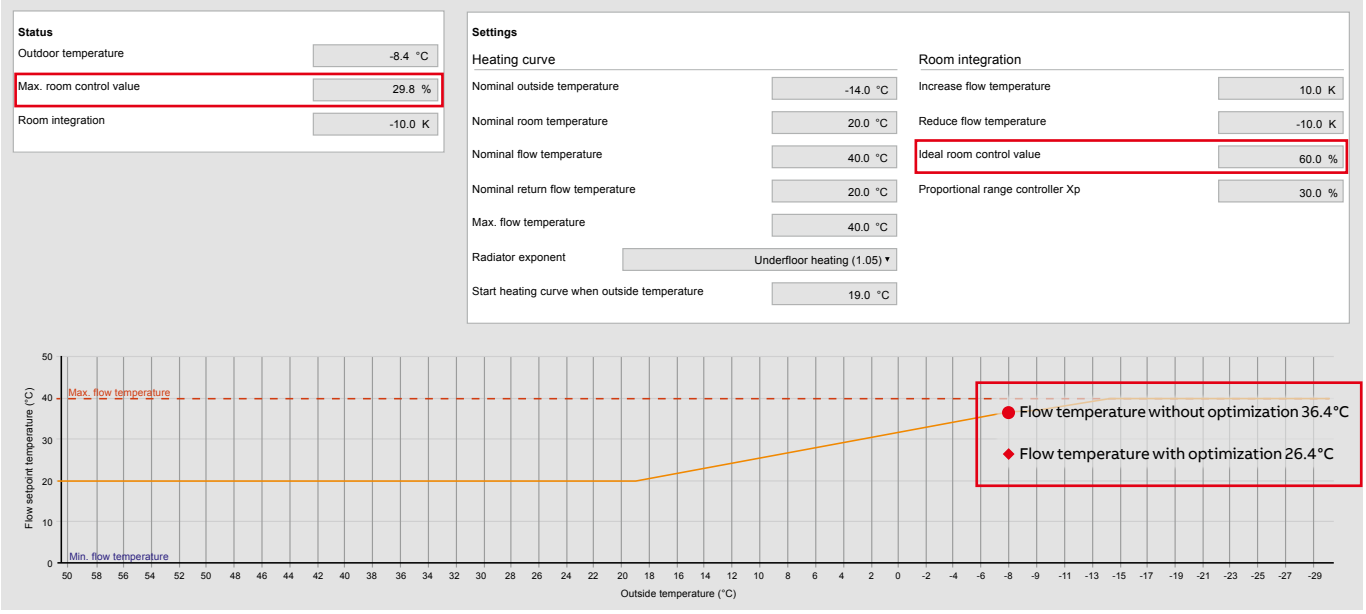
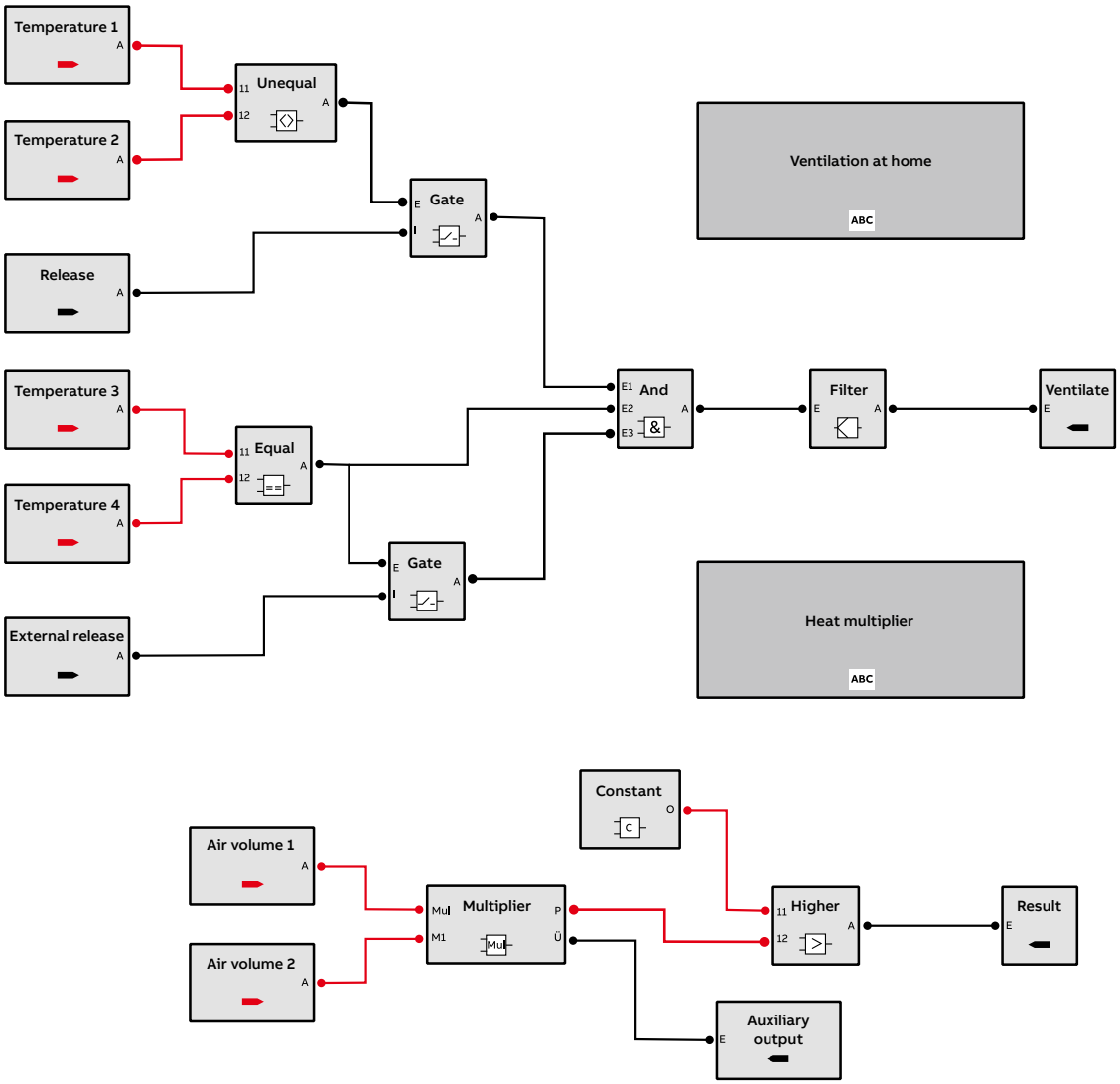
Heating curve: underfloor heating



Additional functions of the Application Controller

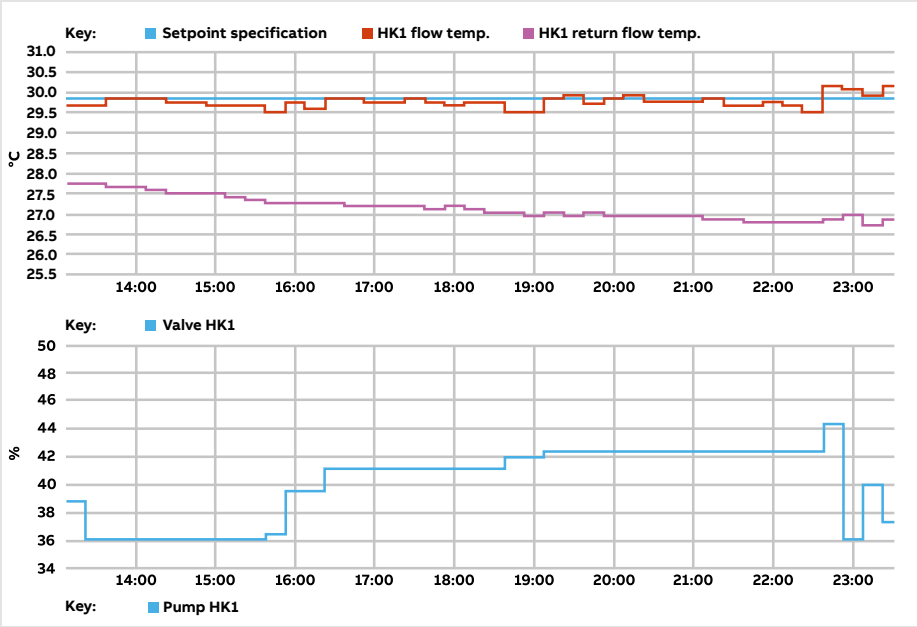
The Application Controller (AC/S) has predefined automation modules, such as heat demand calculation, schedules and value recordings. Display and operation are carried out via an automatically generated web interface.



Complex controls and regulations
In the free-of-charge Device Configuration App (DCA), logics, e. g., for the sequence control of two heat generators (1st sequence heat pump 0 … 100 %, 2nd sequence gas boiler 0 … 100 %), are created.

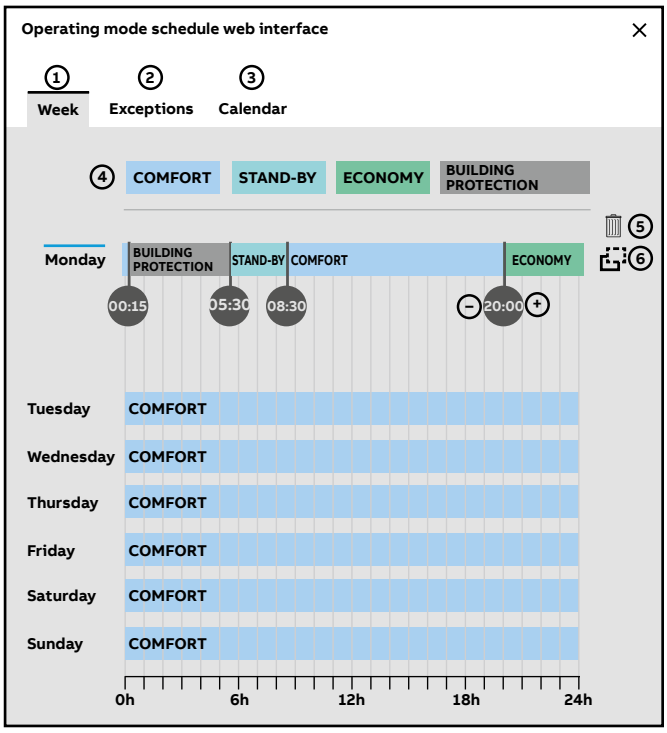
Web-UI
of the Application Controller

Heating curve
Heating curve for outdoor temperature-dependent flow temperature control. Up to 15 heating or cooling curves can be stored in the AC/S.



Data recording for trend analysis
Setpoint and actual values of the flow and return flow temperature as well as the control value for the mixer actuator (access and data export to Excel possible via any web browser)

Schedules for temperature presets or switching commands as weekly and annual timers



Conclusion
There is generally no limit to the size of the system when implementing ClimaECO applications. Detailed information with schematics and connection diagrams are available online.

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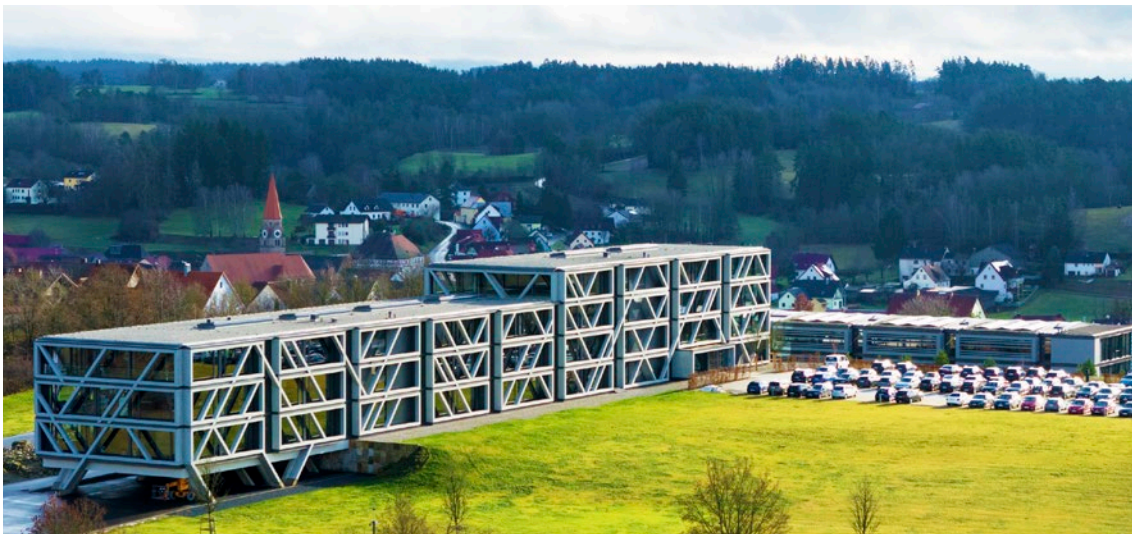
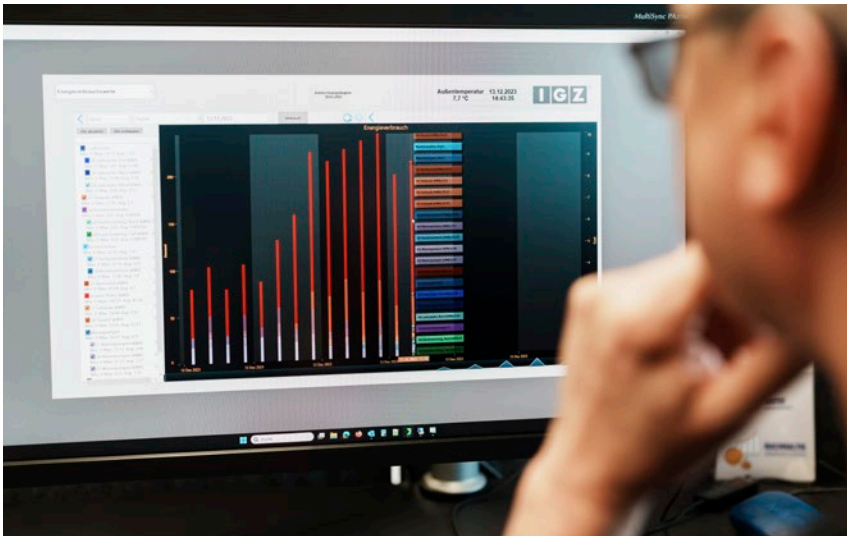
Find more information on the ClimaECO webpage

Project Reference – IGZ Falkenberg, Germany



New Work in rural areas
Since the fall of 2022, an impressive new office building has completed the IGZ campus in Falkenberg, Germany: With the new building, IGZ Falkenberg is implementing flexible new work concepts, making it even more attractive for highly qualified IT talent. In addition to the innovative room and lighting design, a KNX-based smart building solution from ABB also ensures contemporary comfort – and that the new software forge meets the highest standards of energy efficiency and climate protection. This includes a sustainable energy supply from predominantly renewable sources such as geothermal energy and photovoltaics as, well as the comprehensive networking of all control systems. The KNX standard has been a technological constant on the IGZ campus since 1999. Completely new is the dimension of the building automation system implemented in the 8,000 square meters of floor space: the end-to-end networking of all energy-related components, including electrics, heating, ventilation and cooling, enables an integrated automation solution with which IGZ can ideally leverage the energy efficiency potential in the new building.

The ABB platform at IGZ includes KNX-integrated switches and sockets from Busch-Jaeger, various residual current devices (RCDs) and matching distribution cabinets from ABB Striebel & John. In addition, there are various measuring and monitoring components for effective energy management, such as the ABB M4M network analysis device. The information collected from all data sources is compiled, aggregated and displayed using EisBaer SCADA 3 visualization software. The facility managers in the new IGZ building therefore have an overview of the current status of energy supply and consumption at all times. This allows them to respond immediately to any deviations from the regular consumption pattern.



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SAP project house, equipped with ABB technology

At the heart of the energy efficiency platform is the KNX-based ABB ClimaECO automation solution. It can be used to centrally control, regulate and monitor all components of the heating and air conditioning system. This leads to reduced energy costs and a pleasant indoor climate. The solution also improves the effectiveness of facility management. This allows maintenance cycles to be defined and dynamic maintenance scenarios to be supported. Maintenance costs are therefore reduced and resources conserved.

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“ABB’s holistic energy efficiency portfolio enables largely climate-neutral building management, minimizes our energy costs and significantly improves the employees’ experience while they’re in the building.”

Quote from Christian Kopf, IGZ Project Manager

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