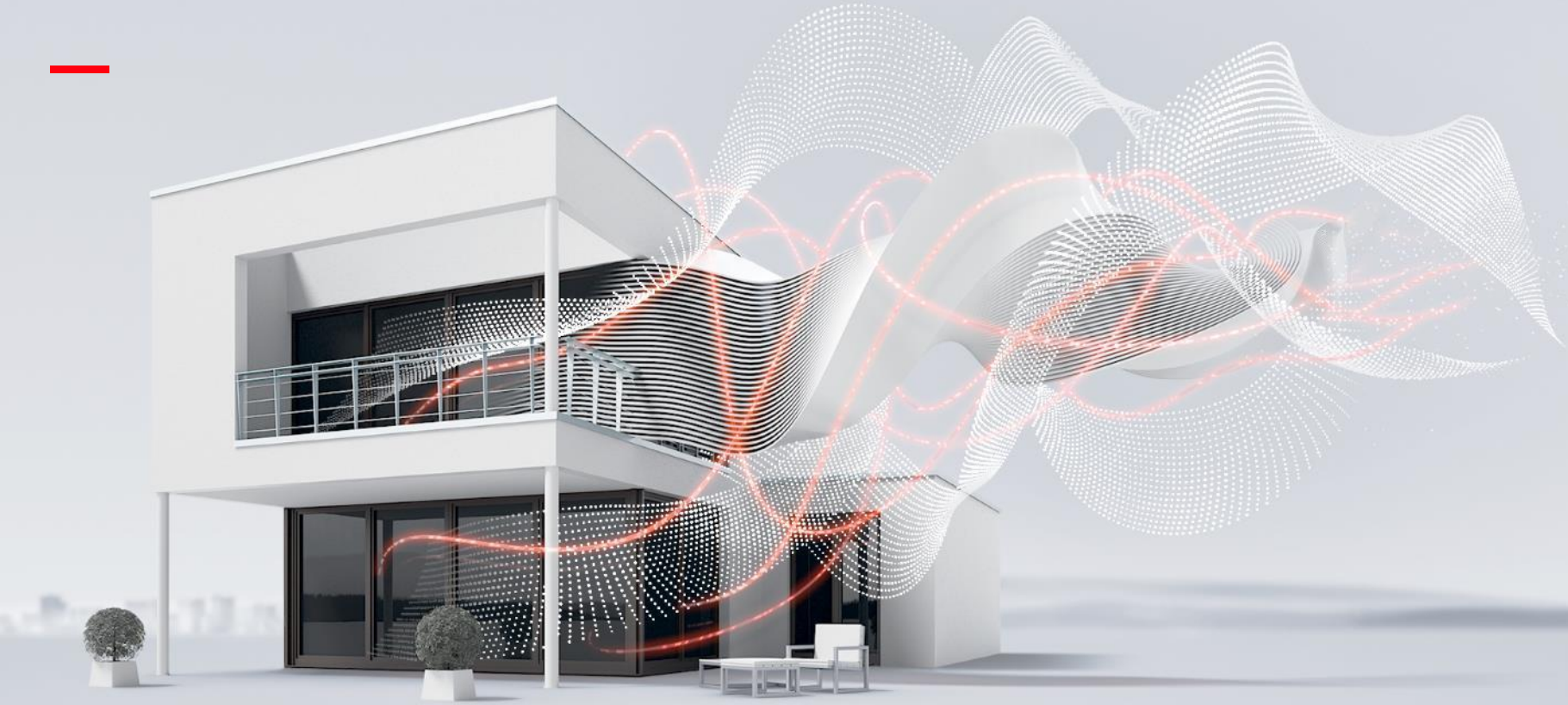

HEIDELBERG, MAY 2022

ClimaECO – Room climate control with ventilation and air quality

Practical Learning Session – Building Academy Smart Buildings

Thorsten Reibel & Juergen Schilder

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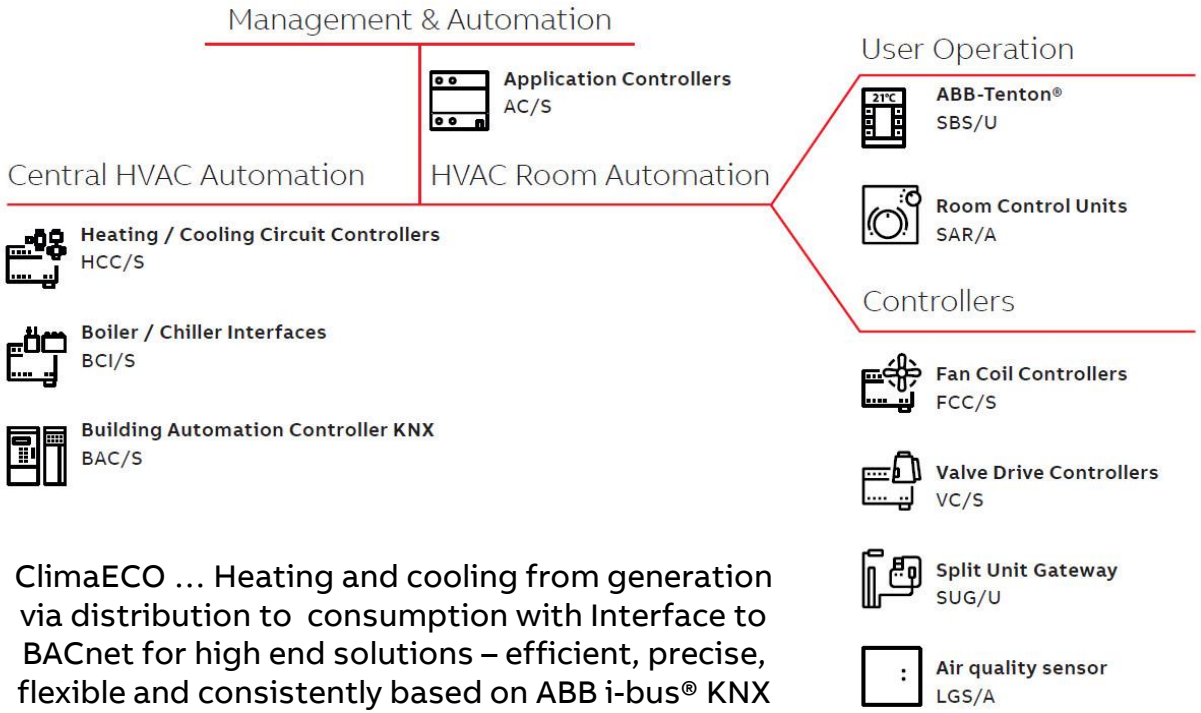
ClimaECO – Room climate control with ventilation and air quality

Practical Learning Session

ClimaECO – Intelligent HVAC solutions with ABB i-bus® KNX

- ClimaECO is the holistic heating, ventilation and air-conditioning (HVAC) automation solution based on ABB i-bus® KNX
- A solution that seamlessly integrates room automation, distribution, central HVAC functions, management and automation into one system – a significant step towards increasing energy efficiency and reducing operational costs
- ABB's ClimaECO portfolio includes
  - ClimaECO® Sensors SBx/U and Room Control Units SAx/A
  - Valve Drive Controllers VC/S
  - Fan Coil Controller FCC/S
  - Heating/ Cooling Circuit Controllers HCC/S
  - Boiler/ Chiller Interface BCI/S
  - Application Controllers AC/S with Interface to BACnet
  - Building Automation Controller KNX BAC/S
- Slides & videos of Webinars, Learning Sessions → T&Q Database



ClimaECO … Heating and cooling from generation via distribution to consumption with Interface to BACnet for high end solutions – efficient, precise, flexible and consistently based on ABB i-bus® KNX

ClimaECO – Room climate control with ventilation and air quality

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Overview ABB i-bus® KNX HVAC Range

Room Temperature Sensor (Slave) ...

Room Temperature Controller

Fan Coil Controller

Valve Drive Controller

Split Unit Gateway

Electronic Switch Actuator

Valve Drive Actuator

Blower Actuator

Electromotor Valve Drive

Building Automation Controller BAC/S KNX

Application Controller

Boiler/Chiller Interface

Presence Detector

Air Quality Sensor

Analogue Input

Room Master

Heating/Cooling Controller

Room Controller

Electrothermal Valve Drive

Heating Cooling Circuit Controller

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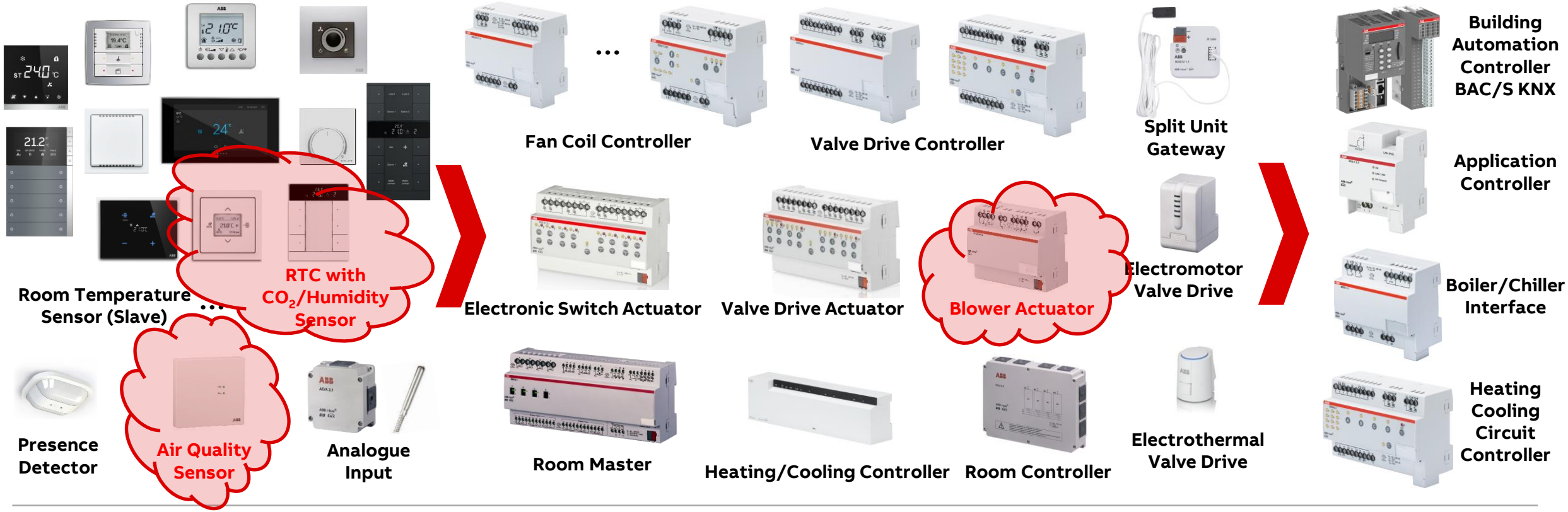
Overview ABB i-bus® KNX HVAC Range



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Overview room air quality: CO_2 and humidity sensor with Blower Actuator FCL/S and Shutter Actuator JRA/S

Temperature, Humidity, CO_2

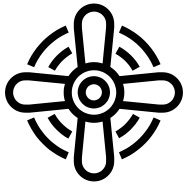
Air Quality Sensor LGS/A

RTC, CO_2/Humidity Sensor and Controller with Control Element

Presence Detector

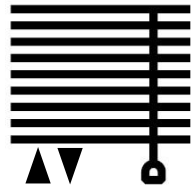
Control of fans and blowers, e.g. by FCL/S, FCC/S, RM/S, RC/A

Control of motor operated windows, window slats or roof hatches, e.g. by JRA/S



Blower Actuator FCL/S

Shutter Actuator JRA/S



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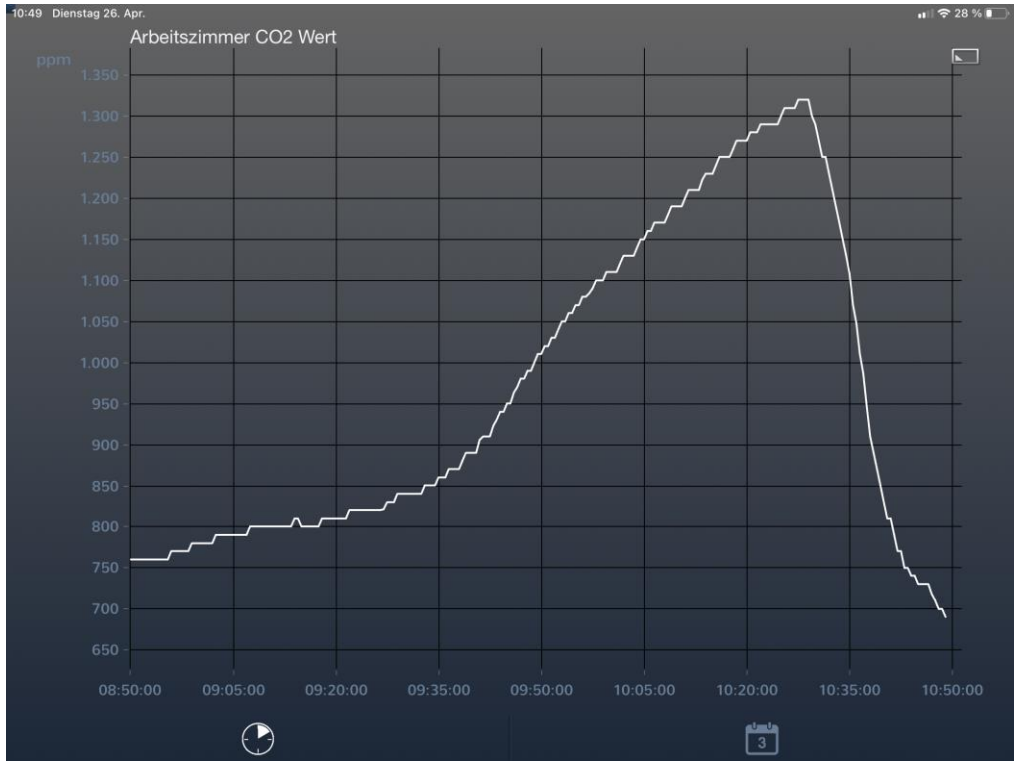
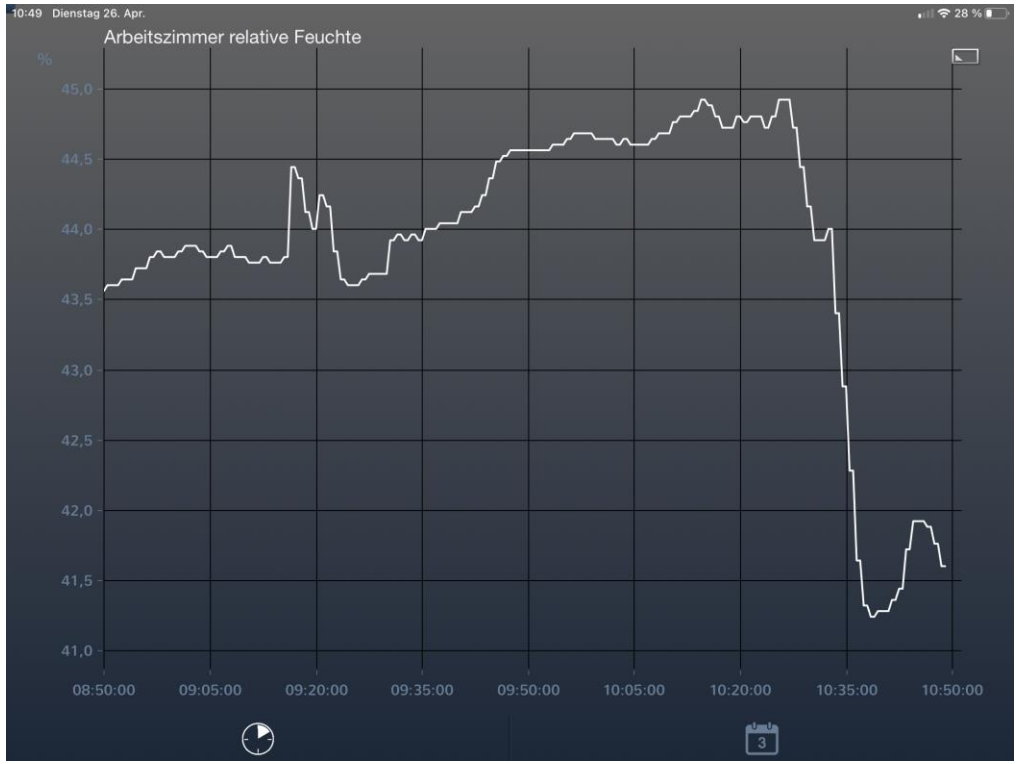
Example: Measuring of CO_2 and relative humidity at home in my office





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Introduction air quality sensors

- An air quality sensor is used to measure the room temperature as well as the CO_2 concentration and the humidity in the room
- Based on these information it's possible to implement a room temperature control and also air quality control via ventilation
- CO_2 and relative humidity controller type:
  - Single-, two- and three stage (e.g. Switch Actuator SA/S)
  - PI (e.g. Blower Actuator FCL/S)
- Additionally, the measured values can be used to display them in the visualization as information for the room user
- The display/LEDs on front of the device can be used to show the room user an indication of the air quality

Air Quality Sensor with Room Temperature Controller LGS/A 1.2

Room temperature controller with CO_2/Humidity sensor 6109/28

Control element ABB Tenton® with room temperature controller function and CO_2/Humidity sensor SBC/U x.0.1

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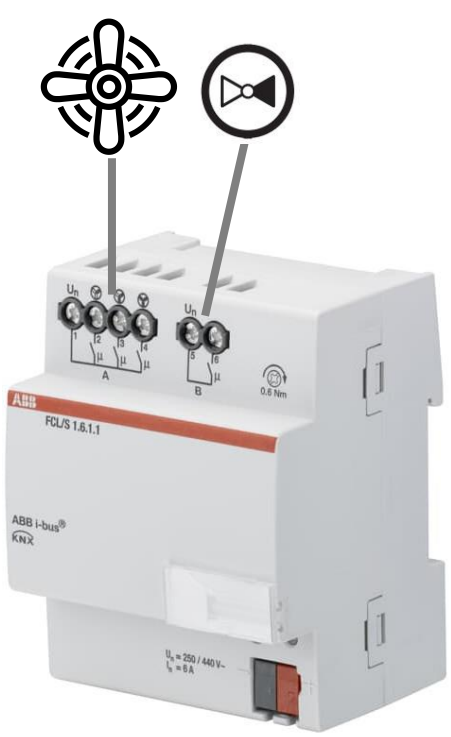
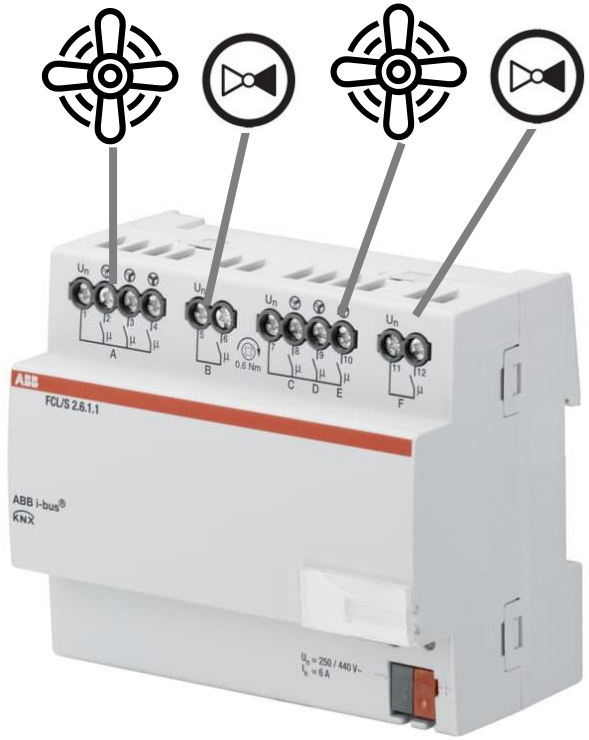
Blower Actuator FCL/S x.6.1.1

- A Blower Actuator is used in ventilation applications
- It is a compact device that serves the following functions:
  - Controlling fans and blowers
  - Switching loads (e.g. blower main switch, damper or valve)
- Outputs that are not being used for fan functions can be used as switch actuators for switching electrical loads
- The Blower Actuator
  - Controls a single-phase fan with up to three fan speeds via a changeover or step switch
  - Ensures that no two fan speeds can be switched on simultaneously (changeover control)
  - Receives its control value via the ABB i-bus® KNX, e.g. from an air quality sensor



FCL/S 1.6.1.1



FCL/S 2.6.1.1

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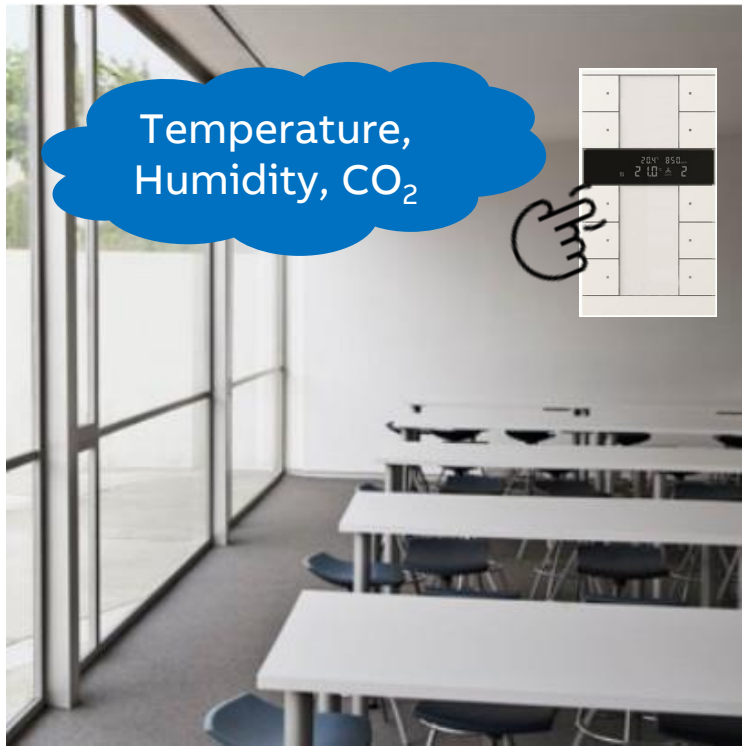
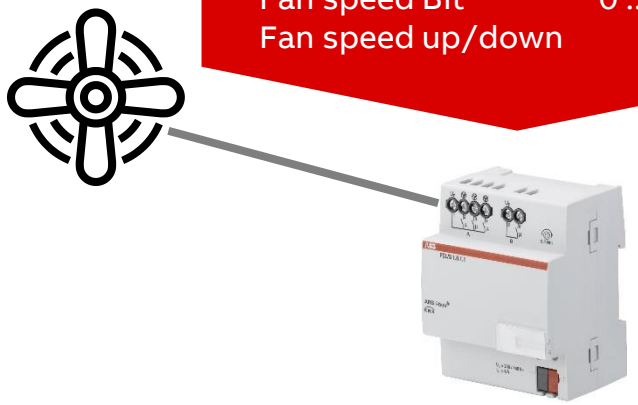
Example “Room air quality”: CO_2 and humidity sensor with controller and Blower Actuator FCL/S to control a fan



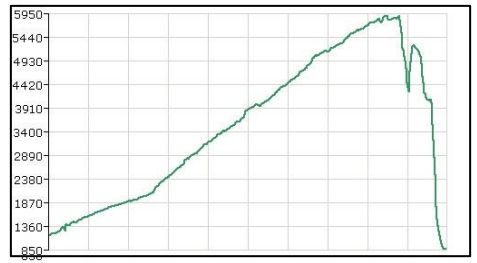
RTC, CO_2/Humidity Sensor and Controller with Control Element

Direct Operation	Automatic Control
Fan speed Byte	Control value
Fan speed Bit	0 .. 100%
Fan speed up/down	

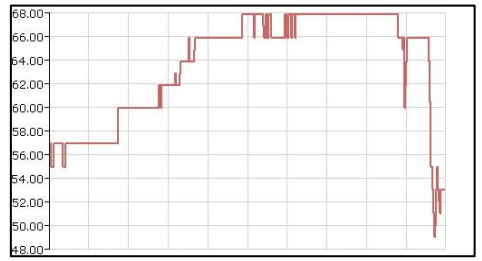


Blower Actuator FCL/S

ppm CO_2



% Humidity



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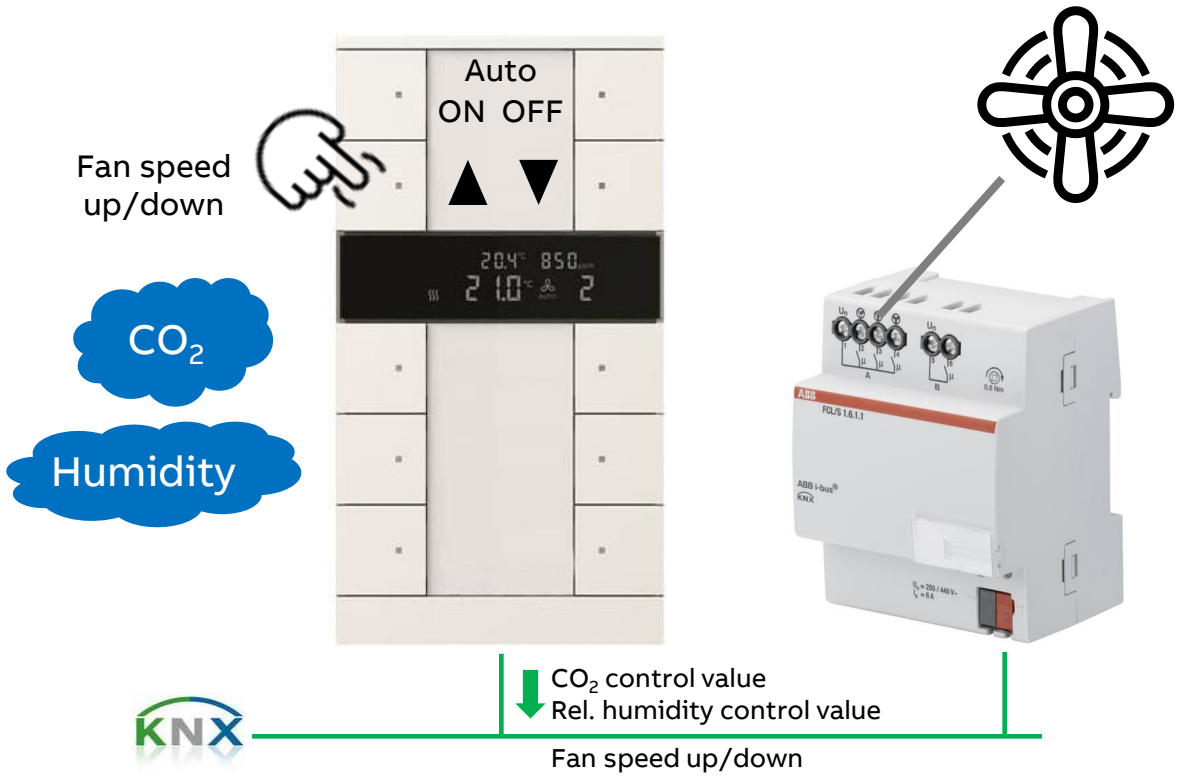
Practical Learning Session

Direct Operation and Automatic Control of a Blower Actuator via control element ABB Tenton® with 2 control values (CO_2/Humidity)



1.1.4 FCL/S1.6.1.1 Blower Actuator, 1f, 6 A, MDRC > - Automatic control

General	Object value "Automatic On/Off" switch on to the automatic	1 / 0
Enable outputs A...B	Threshold value OFF <-> speed 1 in % [1...100]	10
A: Fan	Threshold value speed 1 <-> speed 2 in % [1...100]	30
- Status messages	Threshold value speed 2 <-> speed 3 in % [1...100]	70
- Automatic control	Hysteresis threshold value in % +/- [0...20 %]	5
- Direct operation	Minimum dwell period in fan speed in s [0...65,535]	0
	Number of control value inputs	1 / 2
	select by...	Largest value / Communication object "Control value A/B"

Num	Name	Object Function	Length	Data Type
14	Fan A	Fan speed up/down	1 bit	step
26	Fan A	Automatic ON/OFF	1 bit	enable
29	Fan A	Control value A	1 byte	percentage (0..100%)
30	Fan A	Control value B	1 byte	percentage (0..100%)

ClimaECO – Room climate control with ventilation and air quality

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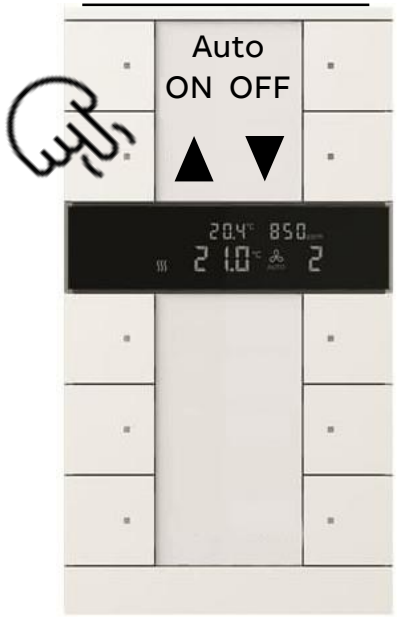
Direct Operation and Automatic Control



Control element ABB Tenton®
…
S1/S2: Switching (1-bit ”ON - OFF”)
L1: LED status
L2: LED status
S3/S4: Switching (1-bit ”ON - OFF”)
…
CO2: Control value (1-byte “0…100%”)
CO2: Value (2-bytes “ppm”)
…
RH: Control value (1-byte “0…100%”)
RH: Relative humidity value (2-bytes “humidity”)
…

Blower Actuator FCL/S
…
Fan A – Automatic ON/OFF
Fan A – Status Automatic
Fan A – Fan speed up/down
…
Fan A Control value A
Fan A Control value B
…
Fan A Status Fan ON/OFF
Fan A Status Fan speed
Fan A Status Fan speed 1
Fan A Status Fan speed 2
Fan A Status Fan speed 3
Fan A Status Byte Mode
…

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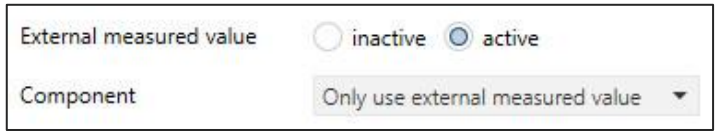
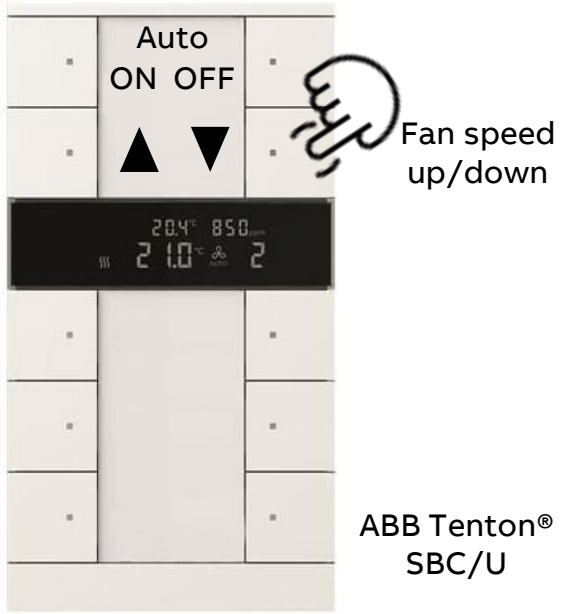
(3) Direct Operation and Automatic Control of a Blower Actuator via control element ABB Tenton® with 2 control values (CO_2/Humidity)

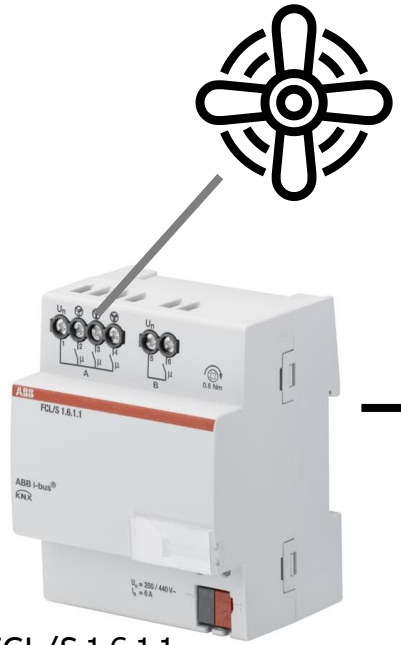
Practical demonstration

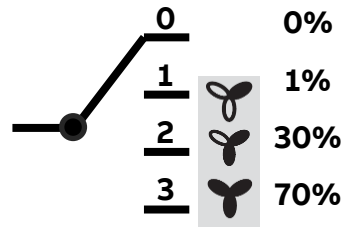
- Simulation of CO_2 and rel. humidity values
- Control element ABB Tenton® uses only external measured (=simulated) values





Fan speed up/down





Thresholds control value

Simulation of 700…1,800 ppm

Simulation of 30%... 100%

CO_2

Humidity

ABB Tenton® SBC/U

FCL/S 1.6.1.1

KNX

CO_2 control value

Rel. humidity control value

Fan speed up/down

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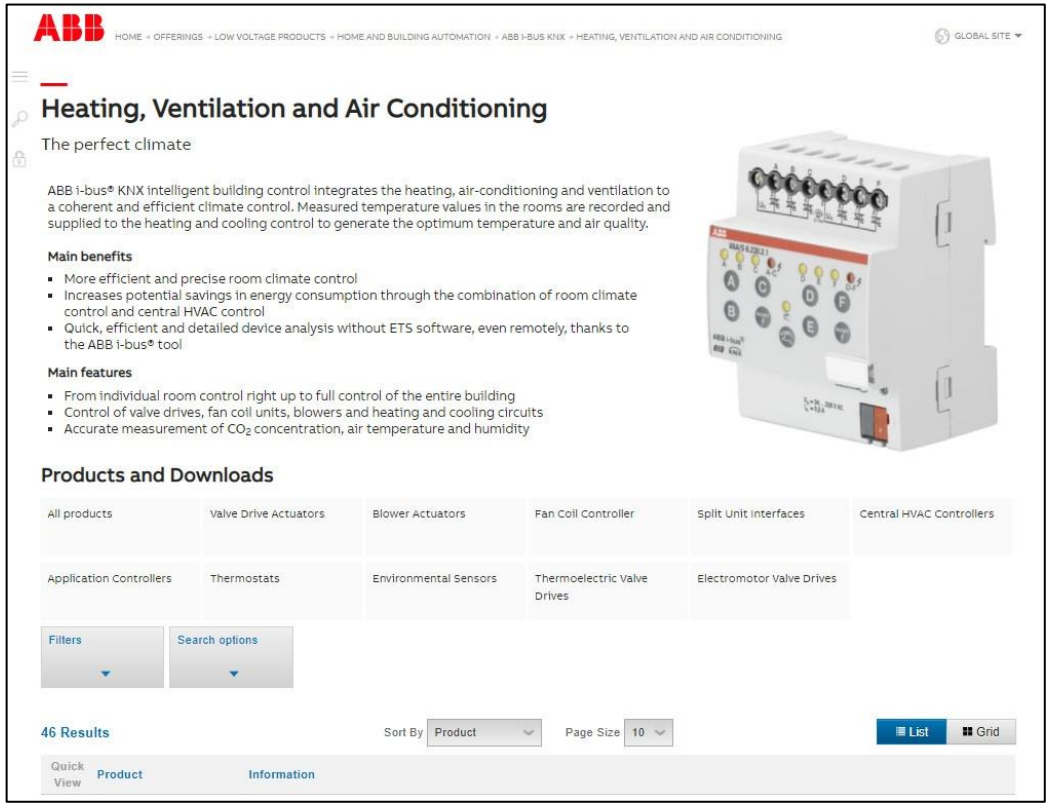
Homepage

www.abb.com/KNX

→ Products and Downloads
→ Heating, Ventilation and Air Conditioning

- ETS Application
- ABB i-bus® Tool
- Product Manual
- Engineering Guides
- Installation and Operating Instructions
- Specification Text
- …



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Training Material

Training & Qualification Database

– The database contains extensive training content
  - Webinar, Learning Sessions, … slides and videos
  - Presentations
  - Video tutorials
  - and more …
  - https://go.abb/ba-training
  - ww.abb.com/knx (→ Services & Tools → Training and Qualification → Training Database)

YouTube

– Channel “ABB Home and Building Automation”
  - https://www.youtube.com/user/ABBibusKNX

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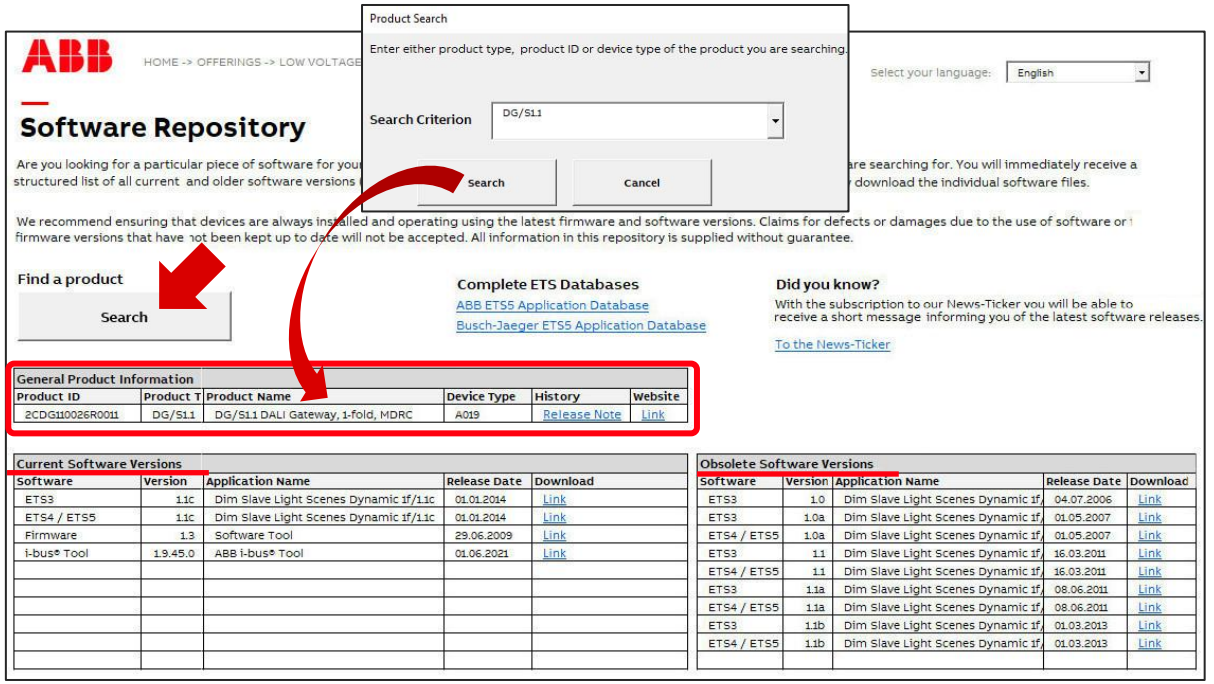
Software Repository

- Excel list in German and English
- Link to general product information
- Search for a KNX product and the corresponding software (firmware, ETS application) will be displayed
- Current firmware of Welcome IP and free@home devices
- A direct download of this software is possible via a link
- Historical ETS applications can also be downloaded (database for ETS App “Reconstruction Tool”)

- www.abb.com/KNX
  → Additional materials
  → Downloads for KNX
  → Software Repository



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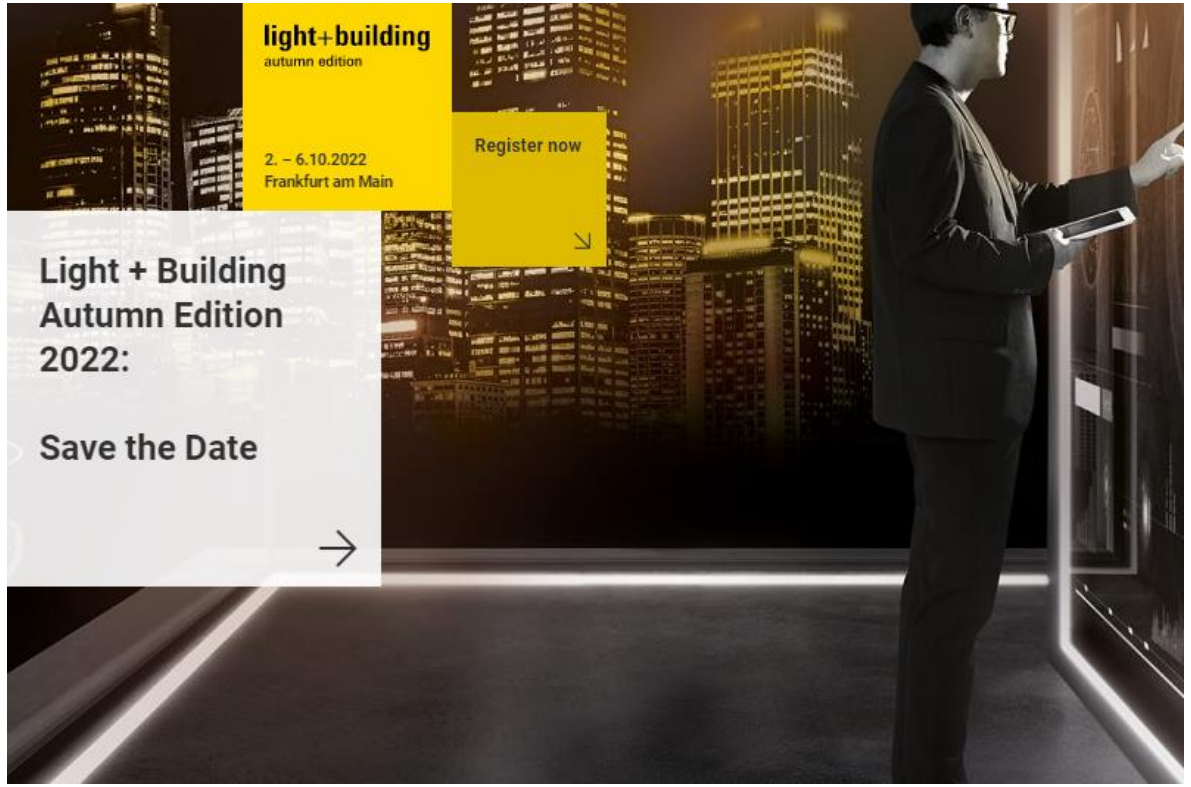
Light + Building Autumn Edition in October 2022

Onsite + digital: here we go

- At Light + Building the industry presents every two years the latest products for the fields of lighting, electrical engineering and home and building automation
- Light + Building opens in Frankfurt from 2nd to 6th October 2022
- The new Light + Building Digital Extension will also be available at the same time and beyond
- We plan our participation in general as a hybrid event, so that customers can join remotely
- You will find ABB and BUSCH-JAEGER booth in the NEW hall 12.0



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