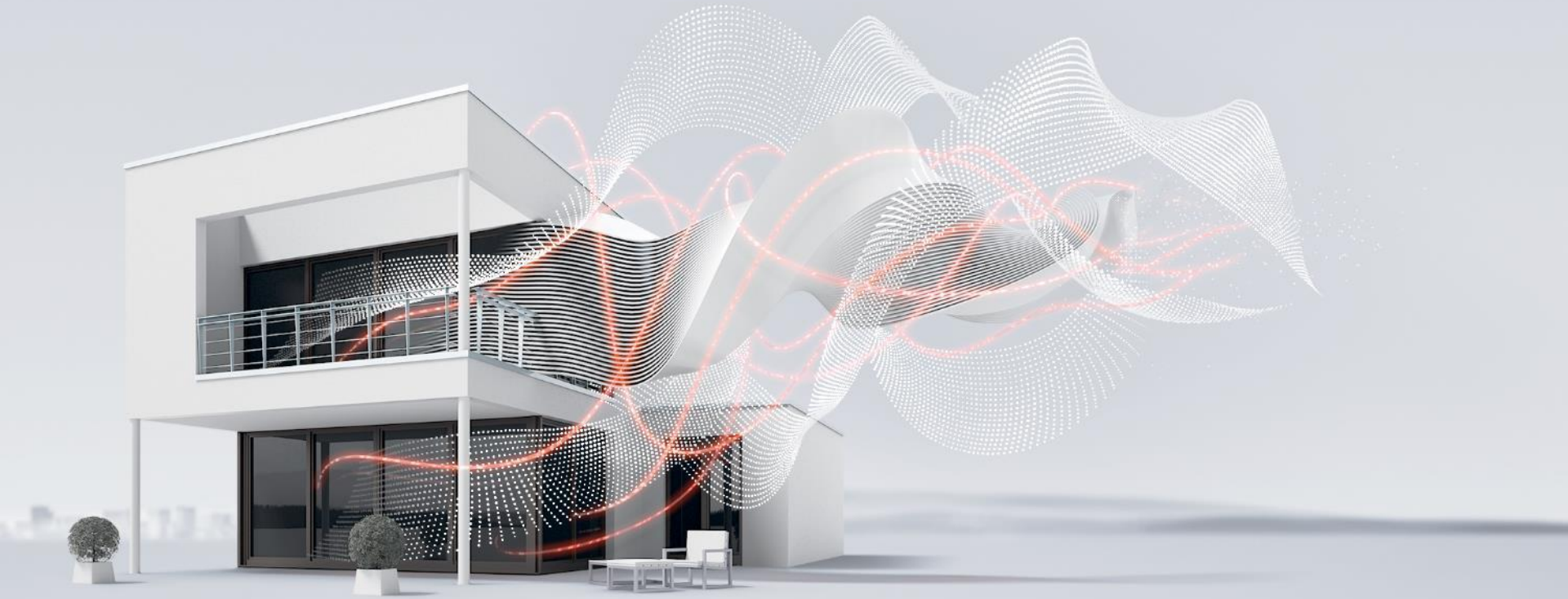

KNX Building Automation

Global I Secure I Connected

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ENGINEERS IRELAND
REGISTERED TRAINING PROVIDER 2021

History

- KNX, also known as Konnex, is an open international building control standard.
- It is a successor of three previous standards, European Home Systems Protocol (EHS), BatiBUS and the European Installation Bus (EIB).
- The KNX standard is administered by the KNX Association, which was founded in 1990.
- Producer-specific systems brought little penetration to market, therefore KNX/EIB was developed.

Away from proprietary systems…

Standards

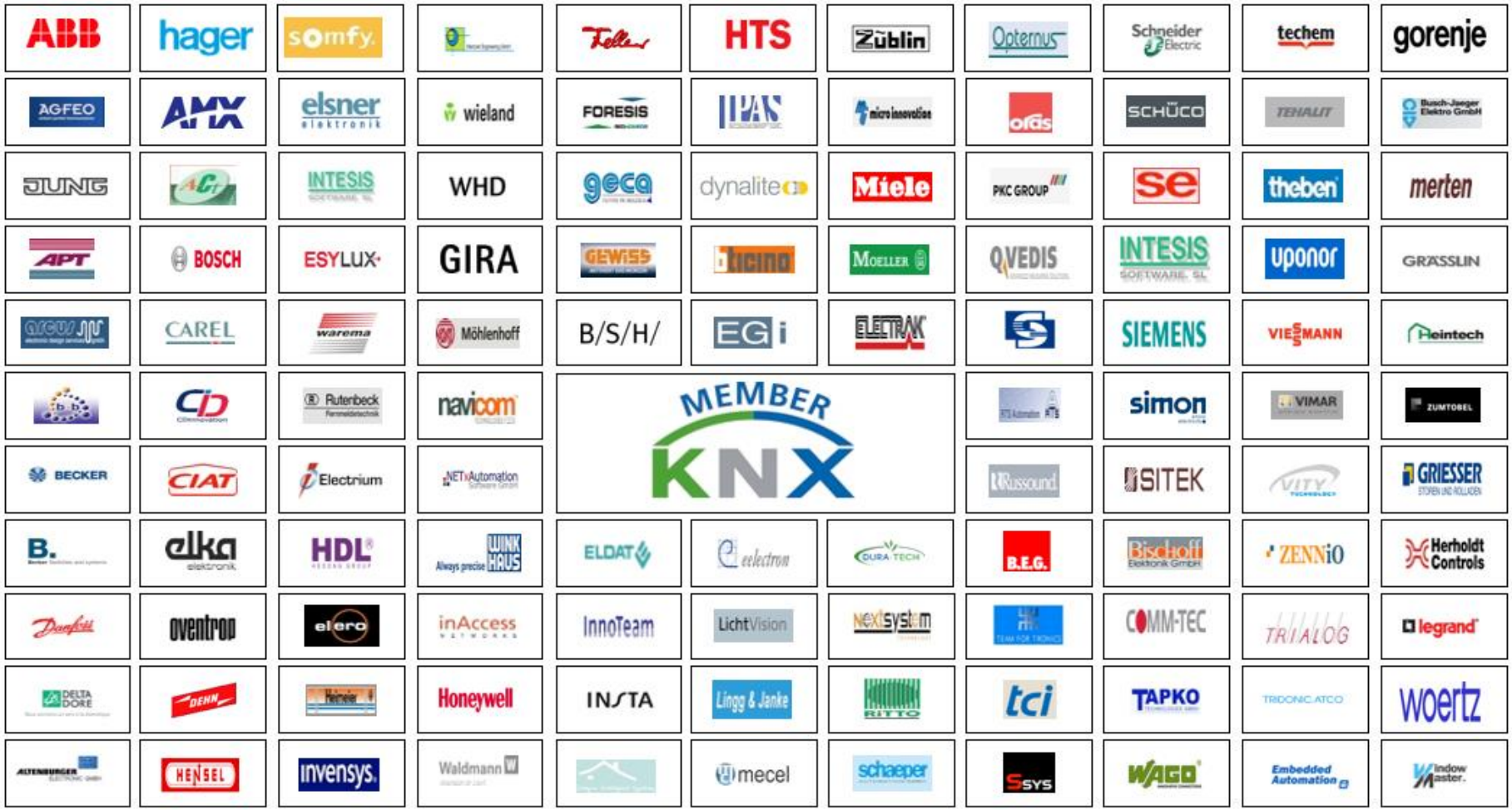
KNX complies to:

- The International Standard ISO/IEC 14543-3-1 to 7
- The European Standard series EN-50090 (CENELEC)
- The European Standards EN13321-1 and EN1332-2 (CEN)
- Chinese Standard GB/T 20965
- US Standard ANSI/ASHRAE 135
- Australia and New Zealand SA/SNZ TS ISO/IEC 14543.3 (parts 1 to 6)

Building information modelling (BIM)

BIM Ready

Manufacturers



The Logo

- Indication that product passed certification test
- Ensures the compatibility for all products, irrespective of function, brand or make
- Indicates the products compliance to relevant international standards

Numbers

500

MANUFACTURERS IN 44 COUNTRIES

Member companies that develop products, solutions and software

95,000

PARTNERS IN 190 COUNTRIES

Contractors, building designers, installers, integrators who successfully completed a KNX basic course to become a certified KNX partner

500

KNX TRAINING CENTRES IN 68 COUNTRIES

Private and vocational training institutes who have been certified by KNX to conduct basic and advanced KNX courses

Communication methods

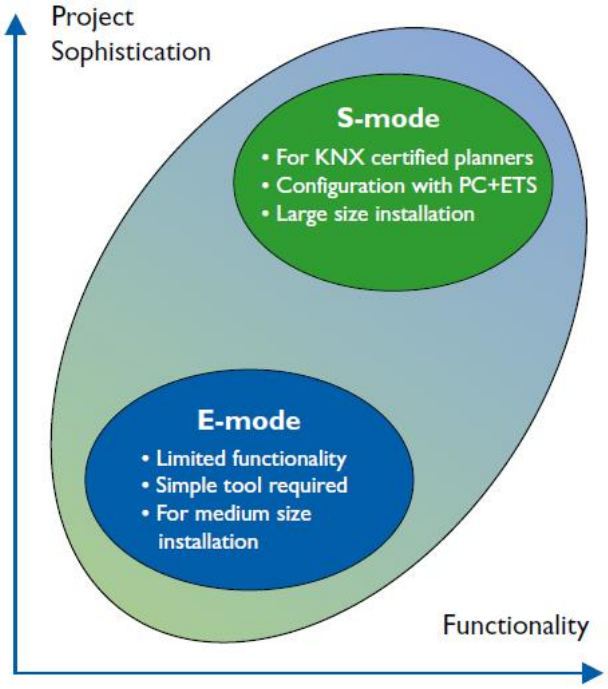
4 methods of communication, either stand alone or combined

TP (Twisted pair)	Twisted pair cabling is considered to be the best data transfer medium for KNX as it offers free topology. It is a moderately low-cost and easy to install as the devices can be connected to each other without any hubs or switches.
PL (Powerline)	Powerline is typically used in renovation works when installing new cables are not practical. Powerline, as the name indicates, uses 230 V AC cables as a data transfer medium. The powerline devices need only the phase and the neutral conductors.
RF (Radio frequency)	Radio network is a suitable option when a wiring is not an option as a communication medium. With radio frequency, there is no hierarchical structure to follow as long as the sensors and coupling units are located within the radio signal range.
IP (Ethernet/Wi-Fi)	The benefits of Ethernet as a data transfer medium are the high bandwidth (100 Mbit/s) and cost-effective components. Ethernet can be used as a backbone for inter-system communication when the system is extensive, and twisted pair cabling can be used for local control.

Configuration modes

S-mode (System Mode)
This configuration mechanism is intended for qualified KNX installers to realise sophisticated building control functions.

E-mode (Easy Mode)
This configuration mechanism is meant for installers with basic KNX training.
“E-mode” compatible products offer limited functions compared to S-Mode.



System integration

What is the role of the system integrator?

During system integration, all the requirements of the investor or building owner are implemented using KNX devices and the respective product software

1. **Planning**
   During the planning process the preliminary requirements of the specification are incorporated into the concept and summarized in the functional description

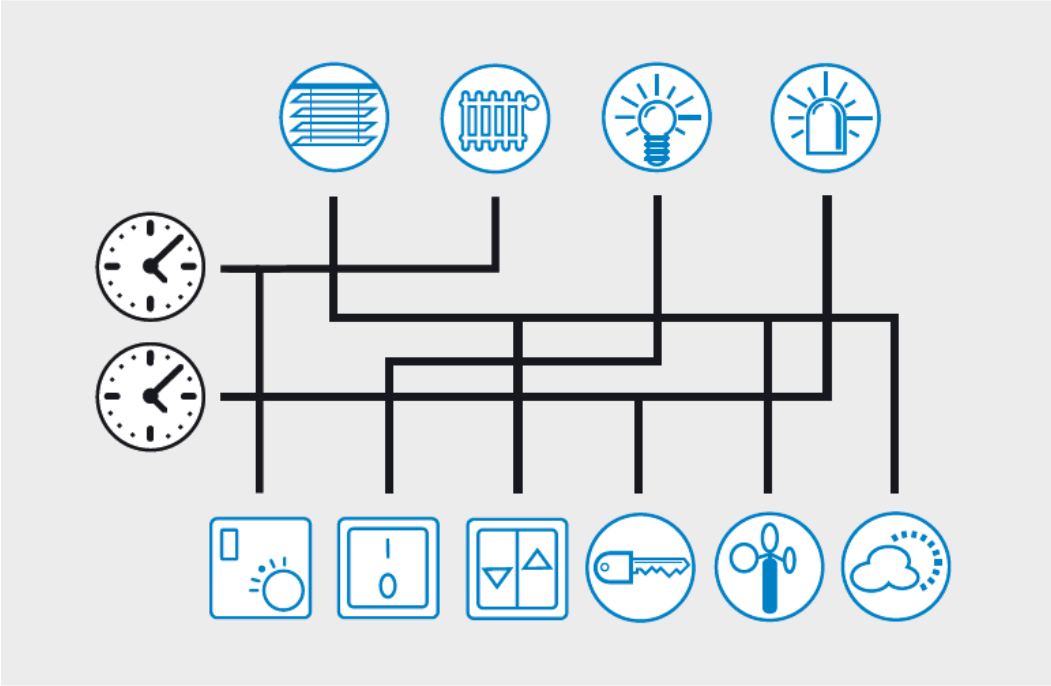
2. **Engineering**
   The most suitable components and software applications are selected. The planning of the bus topology is also realized during the engineering phase. The system devices required for implementing the KNX network are defined. The project engineering using ETS software also takes place in this phase

3. **Commissioning**
   During the commissioning phase, the KNX devices are addressed and programmed. The ETS project that has already been created is downloaded into the devices using the ETS software

4. **Handover**
   During the handover phase, the programmed functions are checked for compliance to the requirements in the functional description. In this way, the correct function of the installation can be determined and documented

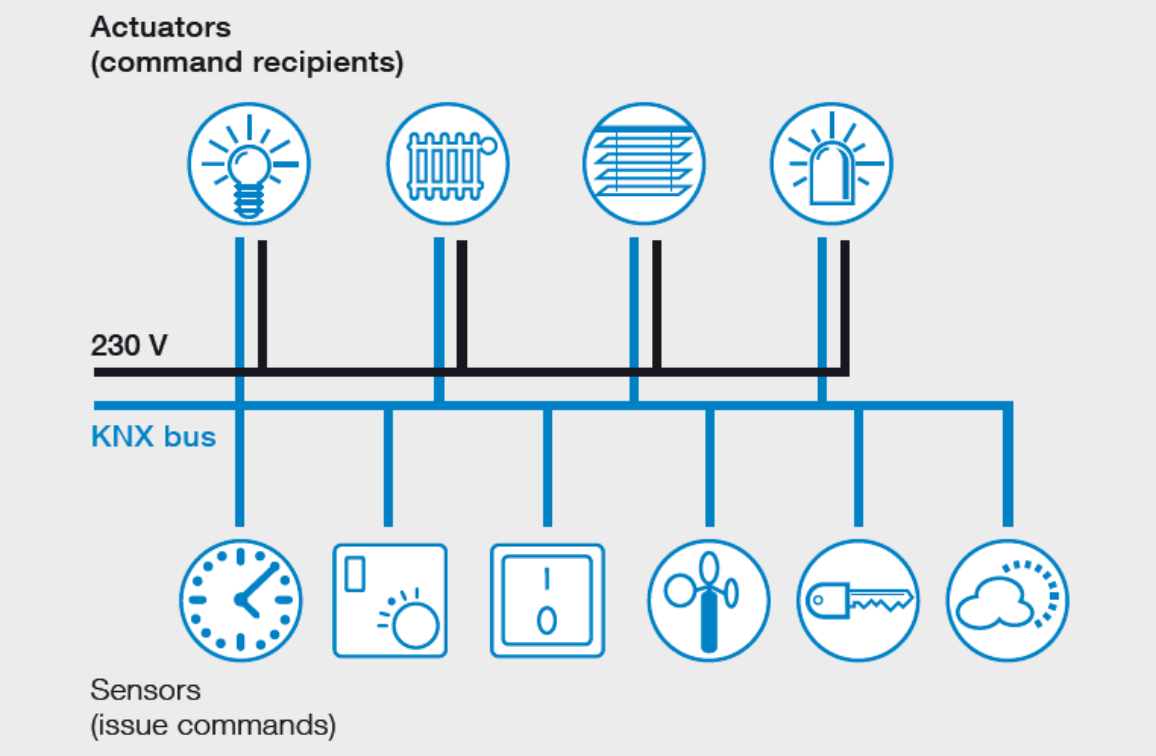
5. **Documentation**
   The customer receives the project documentation (schematics, function description and ETS project data) after the handover

Conventional solution



- Many separate installations
- No compatibility
- Separate functionality
- Little to no flexibility

Automated solution



- Flexible, future proof
- Systems approach
- Increased safety
- Convenience

Benefits of a KNX designed installation

Proven system

KNX was implemented over decades in various prestigious projects all around the world and is by now well known as a proven and trusted system

Independency

Investors value KNX highly due to the fact that it makes them independent of individual manufacturers or proprietary systems

Seamless solution

Creating outstanding working and living environments

Designed to embrace unique and individual corporate cultures and needs

Diversity

Covers a diversity of applications using one standard

Integration of all building functions

De-centralised system

There is no need for a central control unit

Each device holds its own device software and data

Wiring

Cabling and networking is much simpler and more cost efficient

All devices on the same bus line

Independent from DALI bus

Optimised energy savings

How do we maximise energy savings in a buildings?

- Energy is only consumed when it is actually needed
  (for example through the usage of presence detectors and schedules)

- Only the amount of energy actually required is used
  (for example through the use of constant lighting control and regulation)

- The energy used is employed at the highest possible degree of efficiency
  (for example through the use of energy efficient luminaires)

Applications

Internet of Things - IoT

Input devices

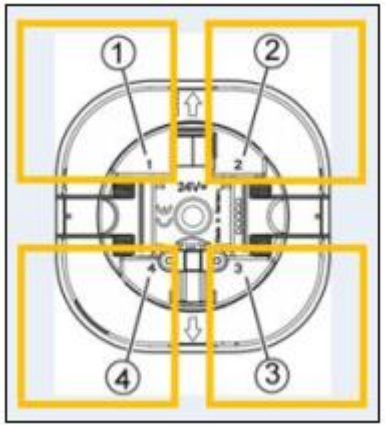
Input devices send telegrams with orders:

- Switches
- Scene setting controllers
- Binary inputs
- Sensors
- Thermostats
- Weather stations

Sensors

Various detection ranges
- Small offices
- Open plan areas
- Corridors
- High bay installations

4 channels

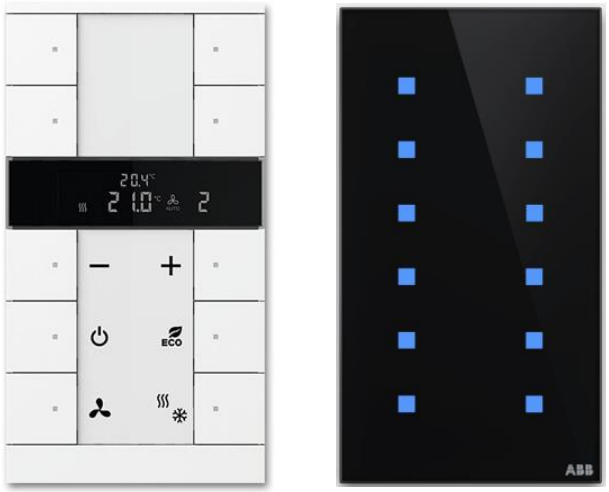


Sensors

Various detection ranges
- Small offices
- Open plan areas
- Corridors
- High bay installations

4 channels
Master and/or slave
Presence and absence control
Daylight monitoring
For switching, dimming or brightness control
HVAC functions
5 logic channels
Remote addressable

Control elements



Freely configurable multifunction control element

- Toggle
- Switching
- Dimming
- Scene/value control
- Blocking function
- Group control
- Central control

Room temperature controller

- Integrated temperature sensor
- Actual value temperature display
- Display of set-value temperature
- Mode setting
- Fan coil control
- Integrated air quality sensors
  - $C0_2$ concentration
  - Humidity

Output devices

Output devices are usually in the electrical panel and will carry out these orders:

- Switching
- Dimming
  - Mains dimming (LEDi)
  - DALI control
  - 1-10V control
  - RGBW control
- Blind control
- Heating control

Switch actuators

Functions:
- Switching
- Timed function
- Scene control
- Logic control
- Heating control

Each output has independent load current detection
- Load current detection (from 20 mA)
- Detection of failures
- Recording of actual operating hours

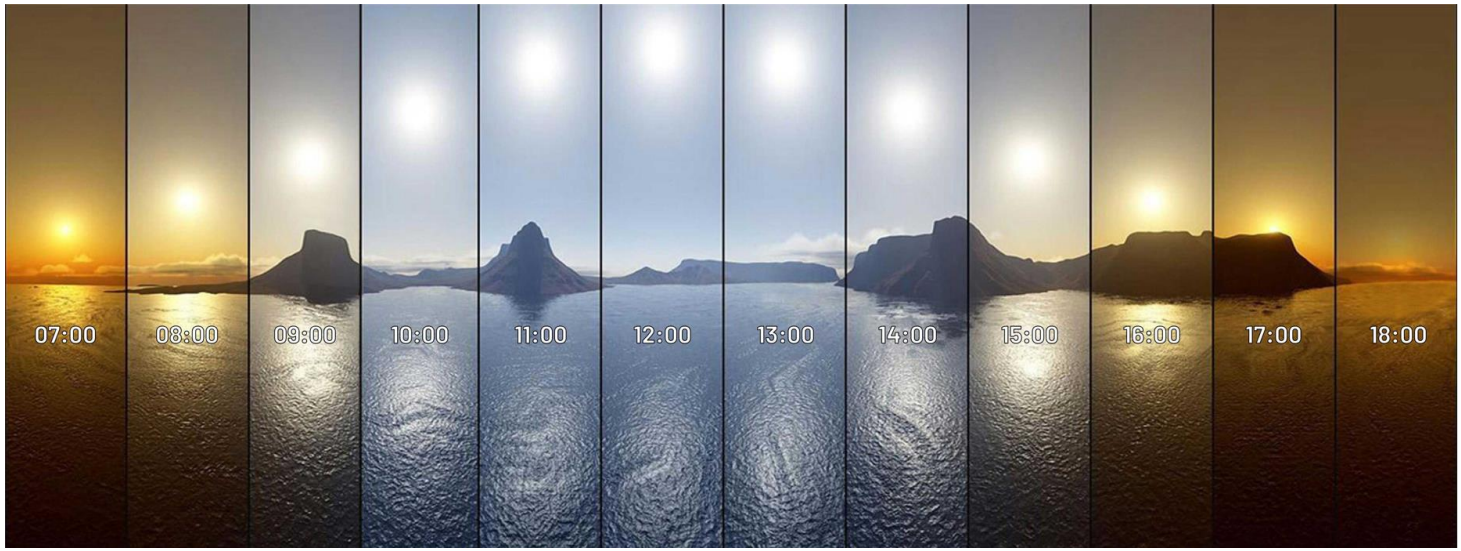
Available in 2, 4, 8, 12 and 24 channel devices

DALI control

2 models, 1ch/64dev & 2ch/128dev
DALI power supply integrated
Functions:

- Switching
- Dimming
- Constant light control
- Scene control
- Timed functions
- Tuneable white
- Human centric lighting

DALI control



DALI control

2 models, 1ch/64dev & 2ch/128dev
DALI power supply integrated
Functions:

- Switching
- Dimming
- Constant light control
- Scene control
- Timed functions
- Tuneable white
- Human centric lighting
- Emergency lighting
  - Status
  - Values
  - Errors
  - Faults
  - Reporting
  - Testing

ABB i-bus tool

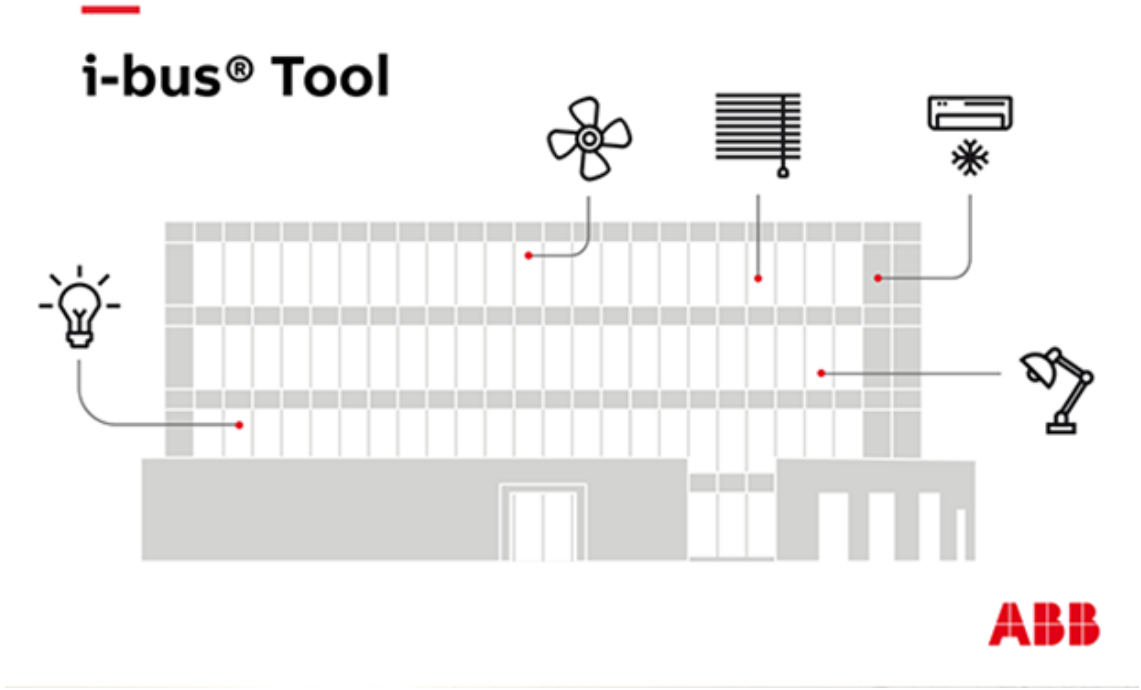
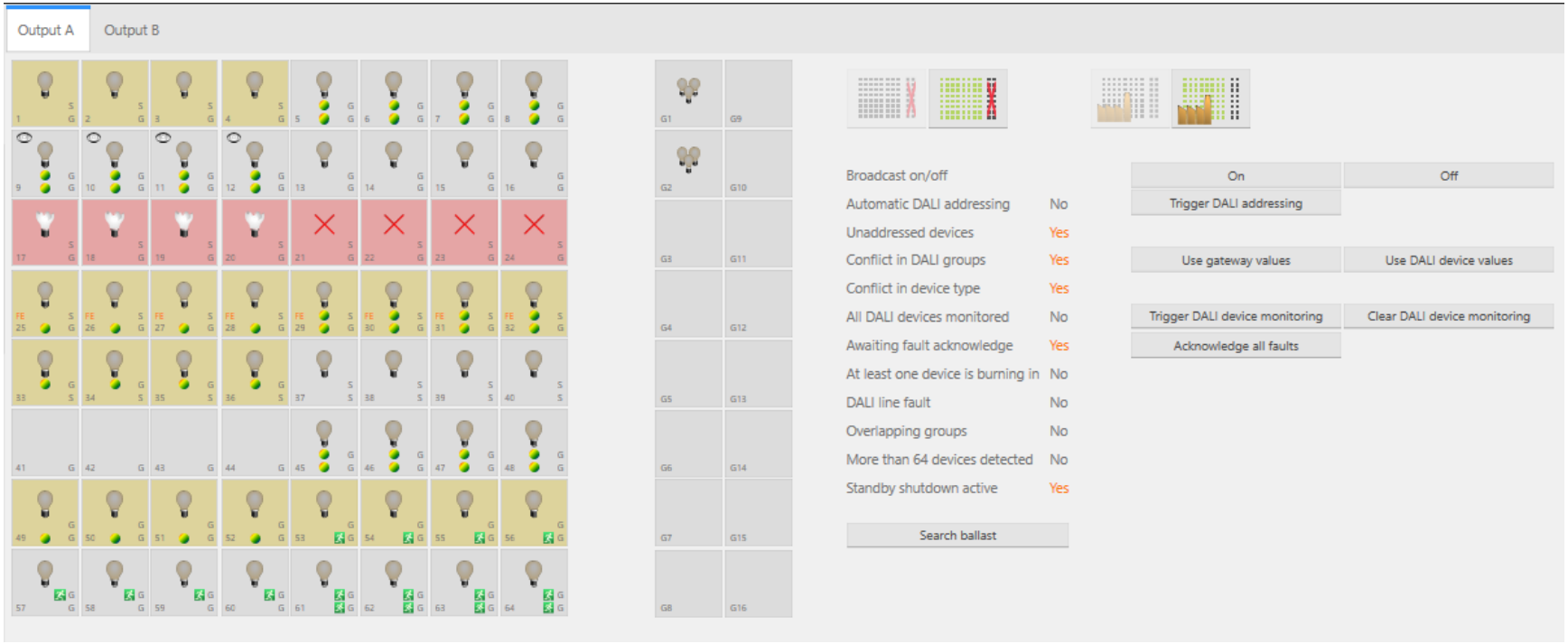
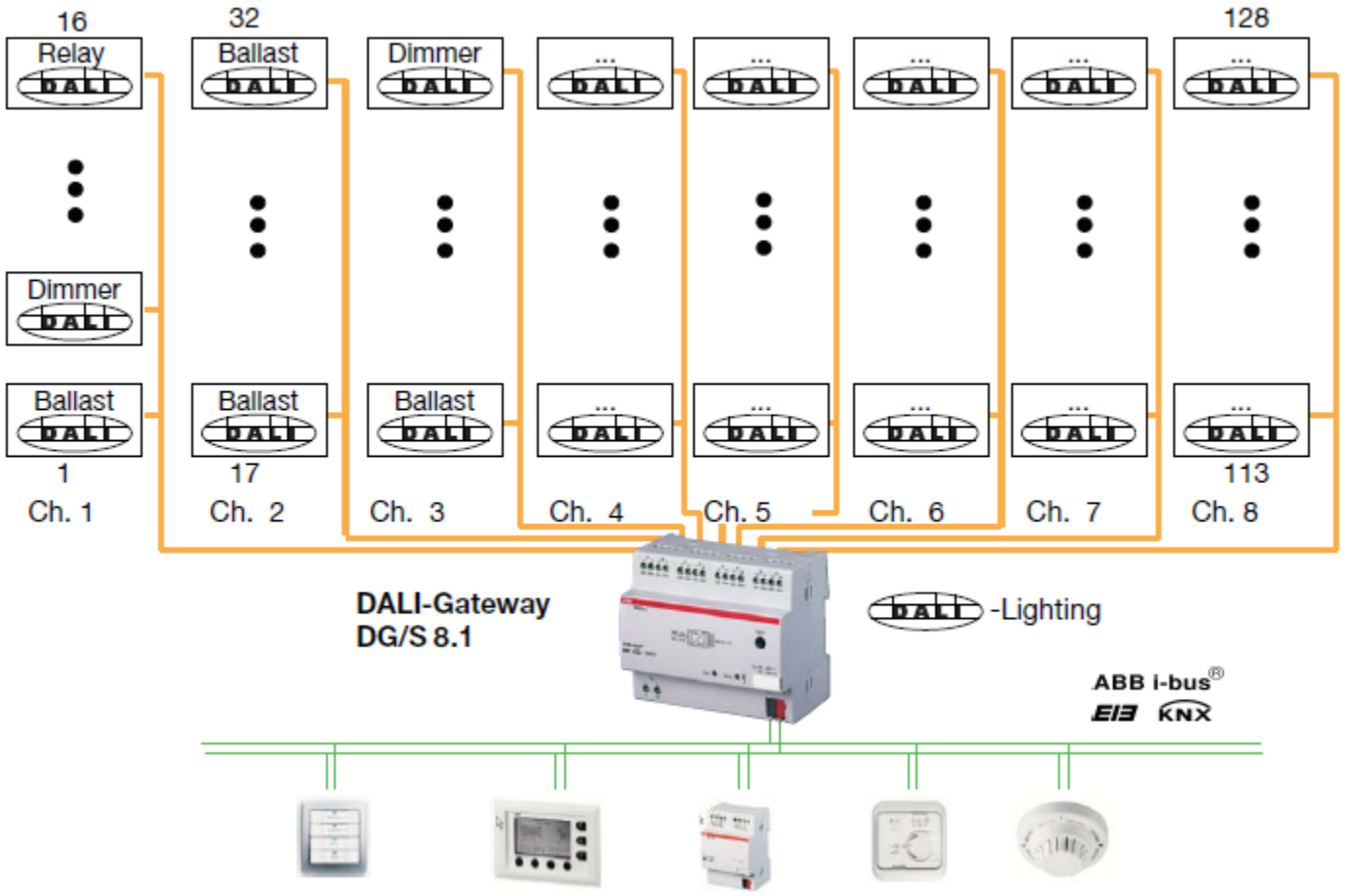


ABB i-bus tool



DALI control - Broadcast



Blind actuators

Blinds, curtains, shutters, windows, doors
230V AC & 24V DC control
Contacts mechanically interlocked
Functions:

- Open/Close or Up/Down
- Feedback
- Scene control
- Slat adjustment
- Fault indication
- Automated control with weather station

SMI (Standard Motor Interface) devices available

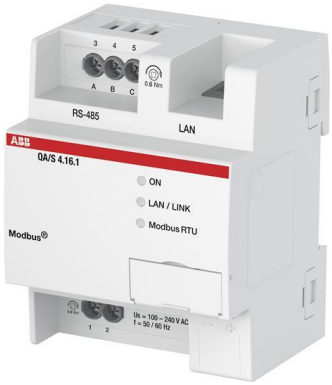
Air quality sensors

Control and measuring of the room air quality
Accurately measures:

- $C0_2$ concentration (390…10.000 ppm)
- Humidity (0...100 %)
- Temperature (0…50 °C)

Local indication
Fully configurable

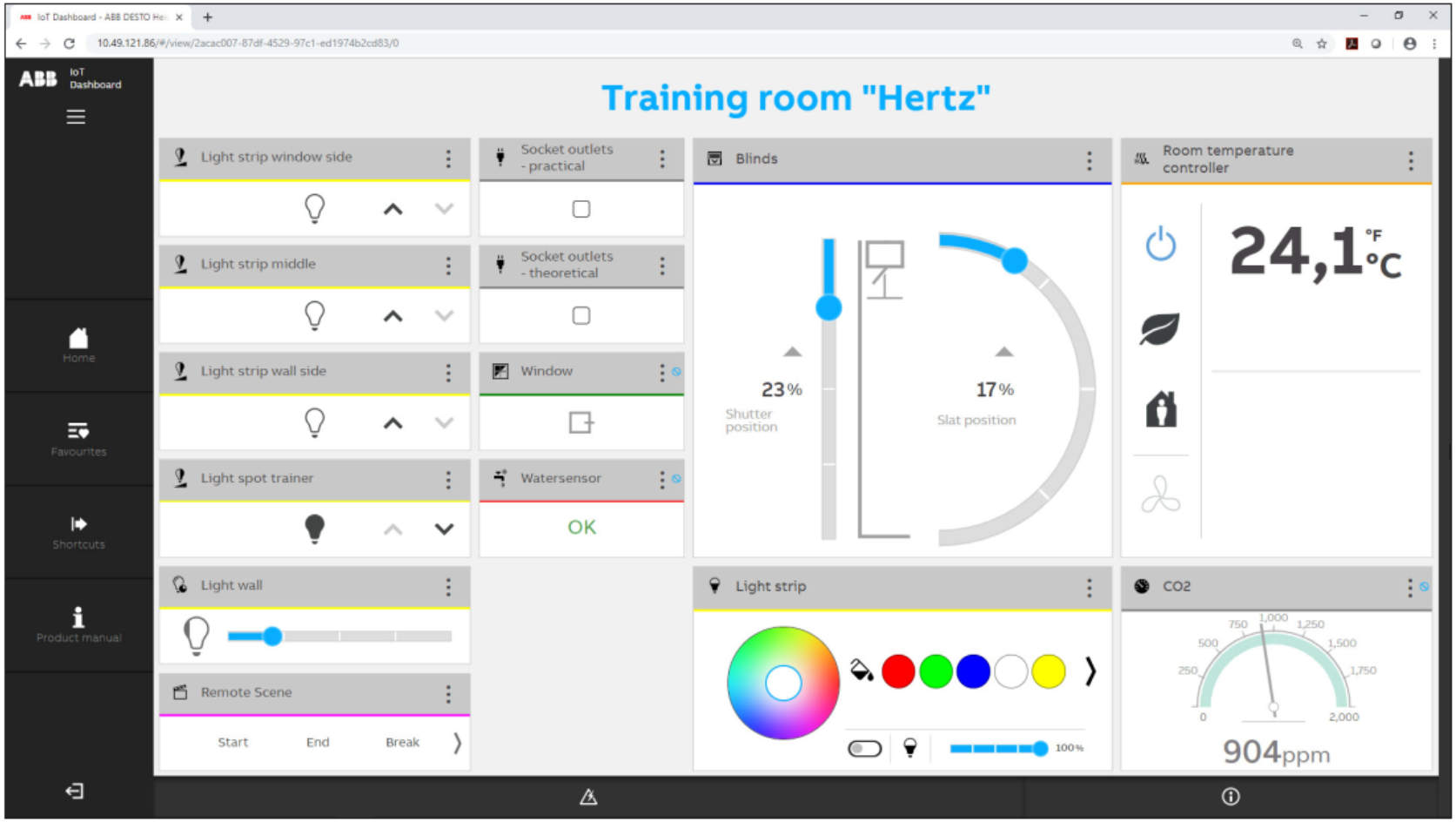
Interfaces and gateways



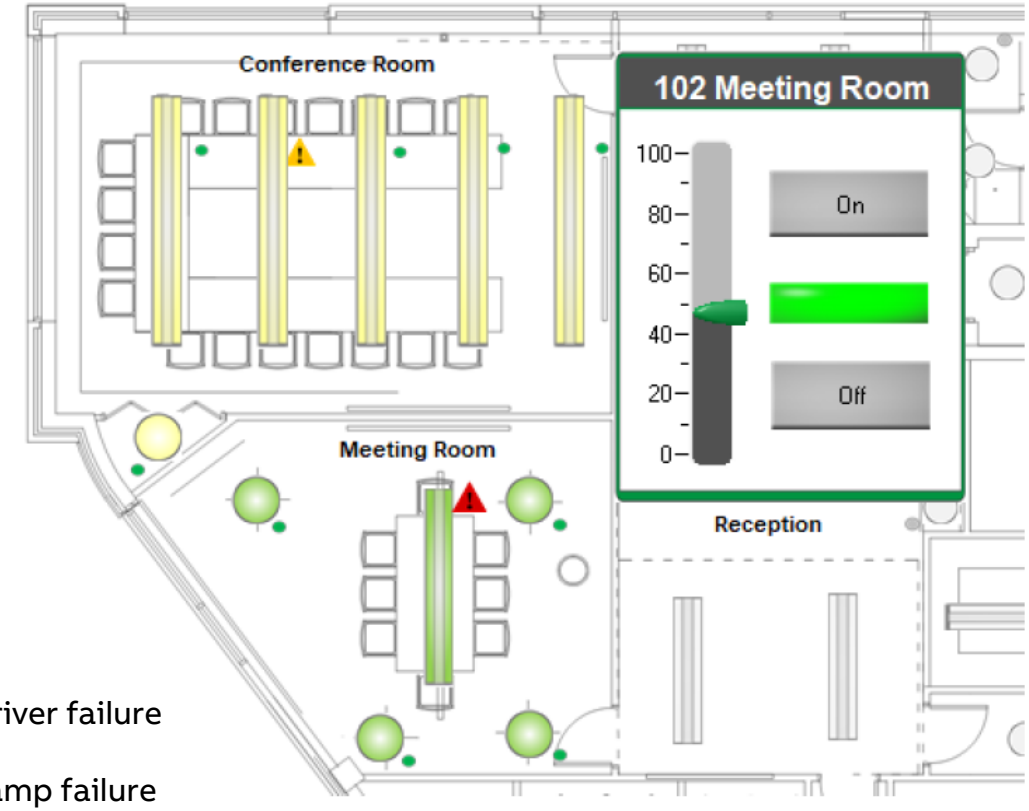
Interface/gateway protocols:

- KNX-USB
- KNX-IP
- KNX-M-Bus
- KNX-Modbus
- KNX-BACnet
- KNX-EnOcean
- KNX-RS232

Visualisation



Visualisation



Feedback
Status
Schedules
Manual control
Reporting

Driver failure

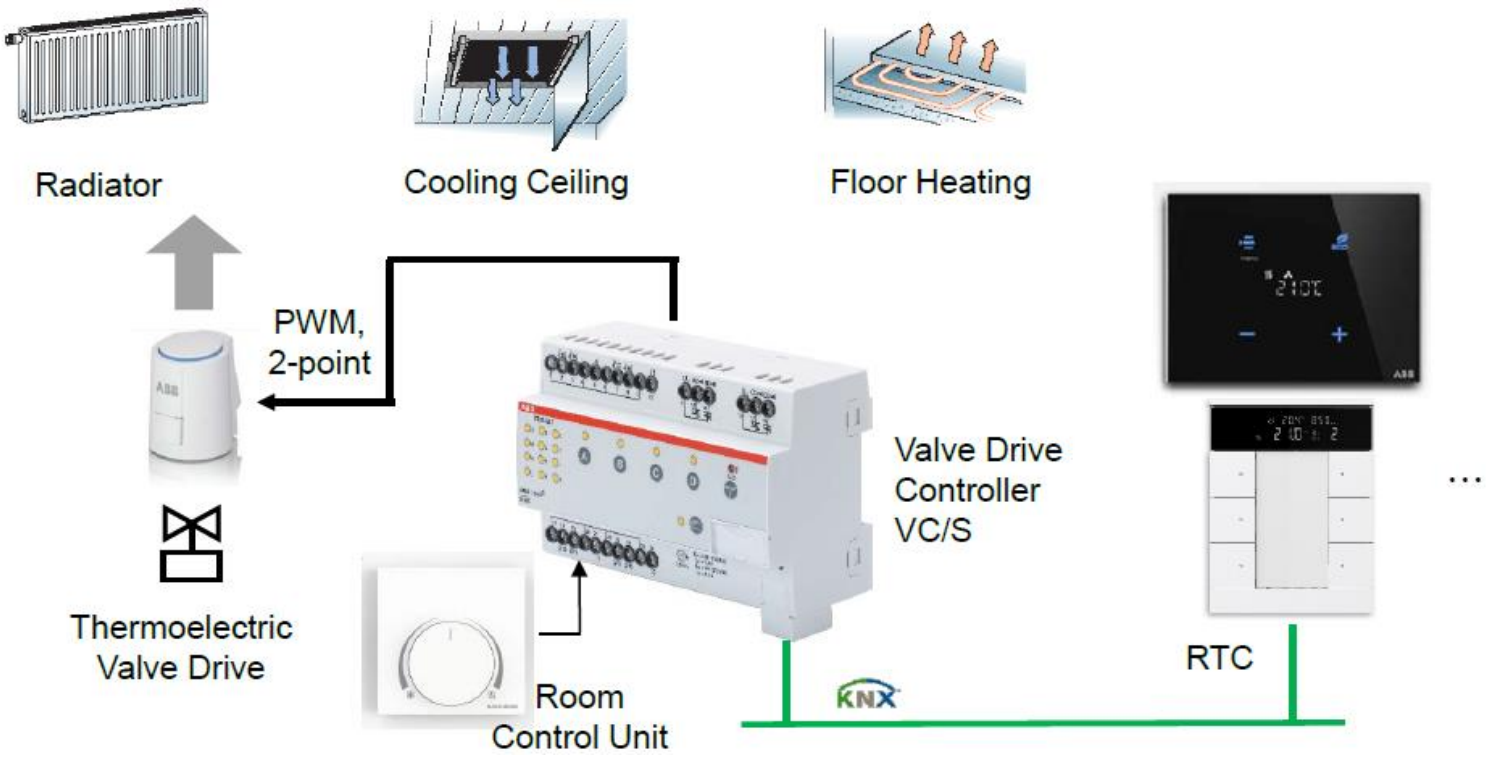
Lamp failure

Luminaire – On

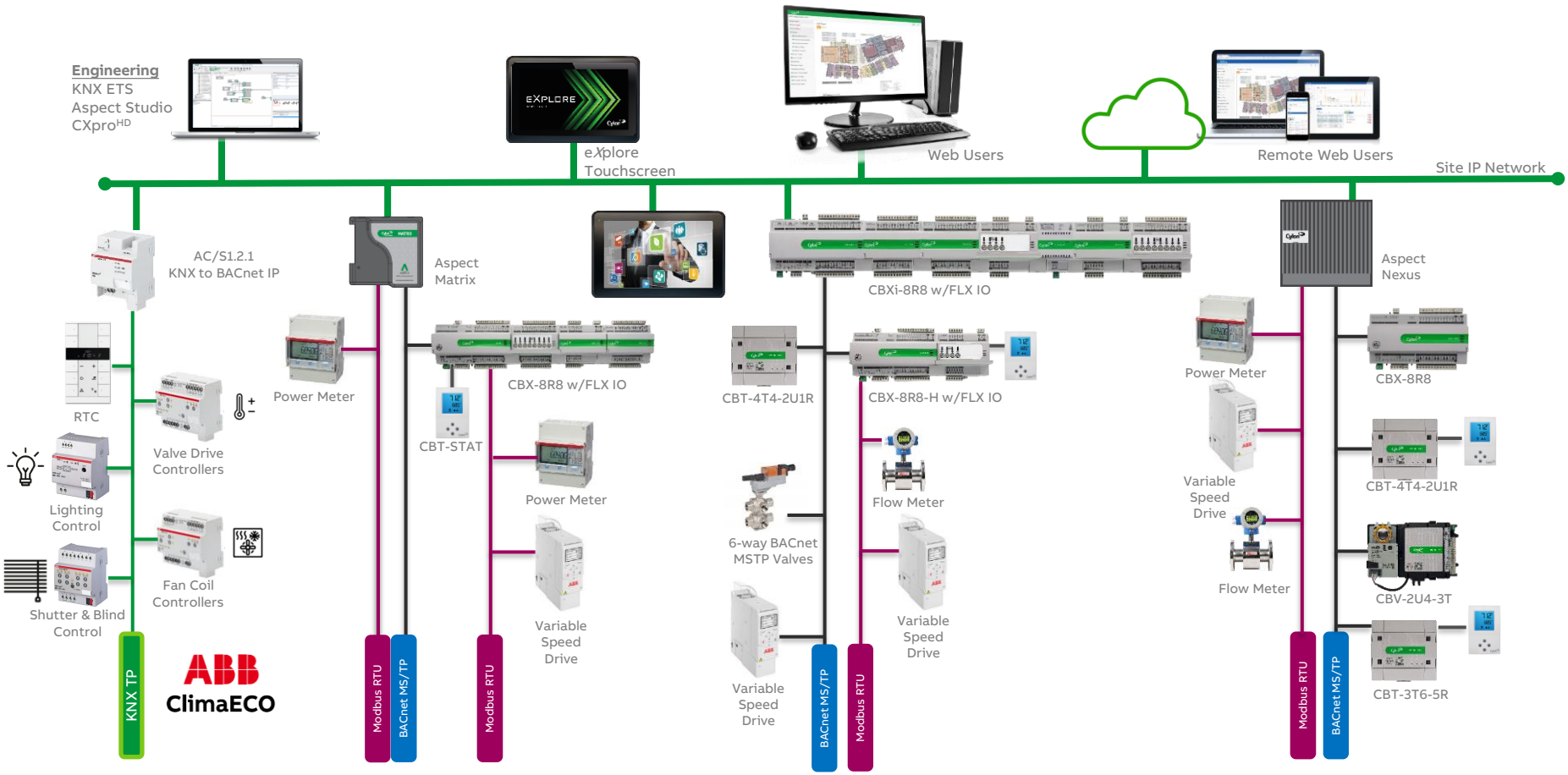
Luminaire – Dimmed

Luminaire – Off

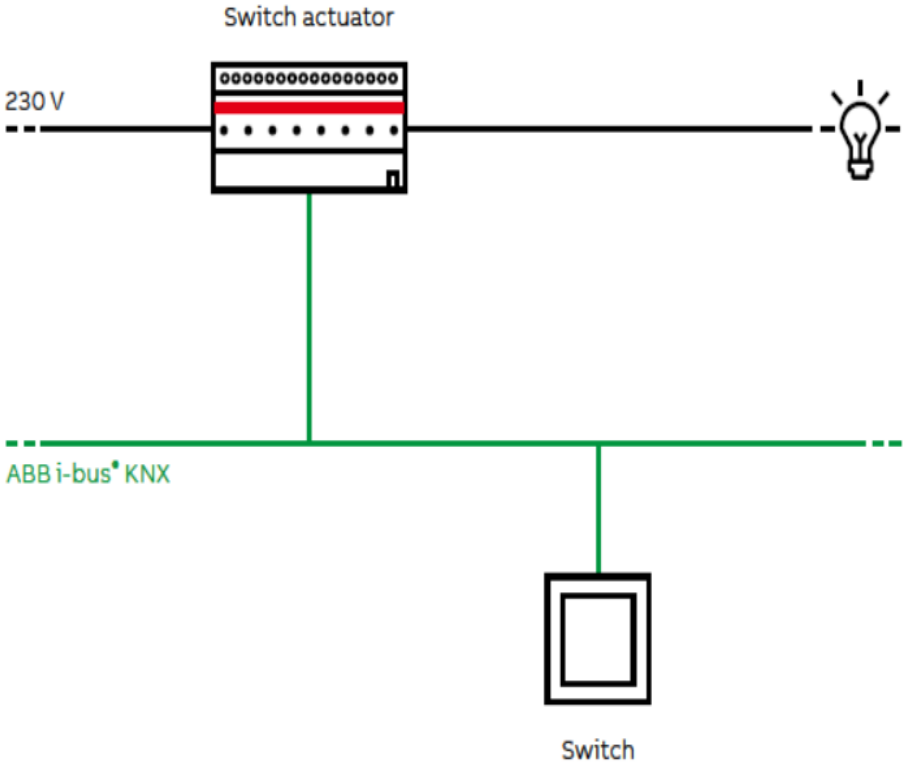
Heating control



Climate control (HVAC)

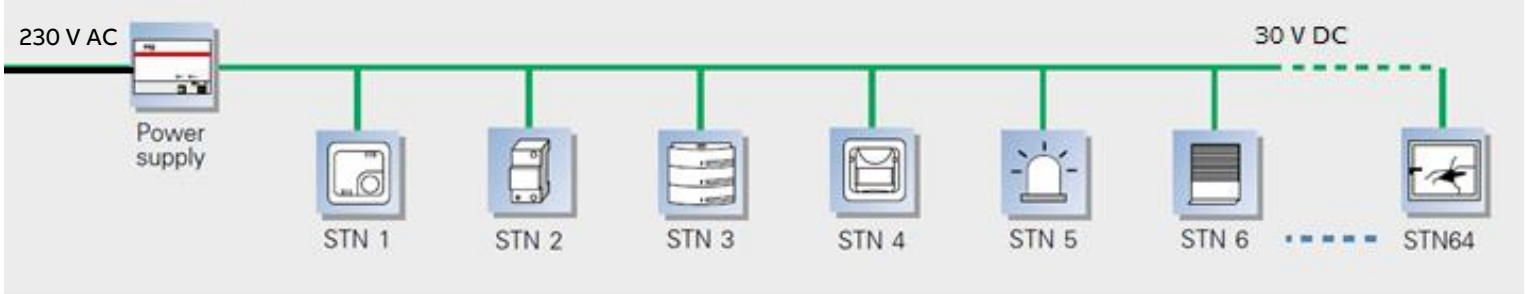


KNX topology



Based on the principle of separation of energy and information.

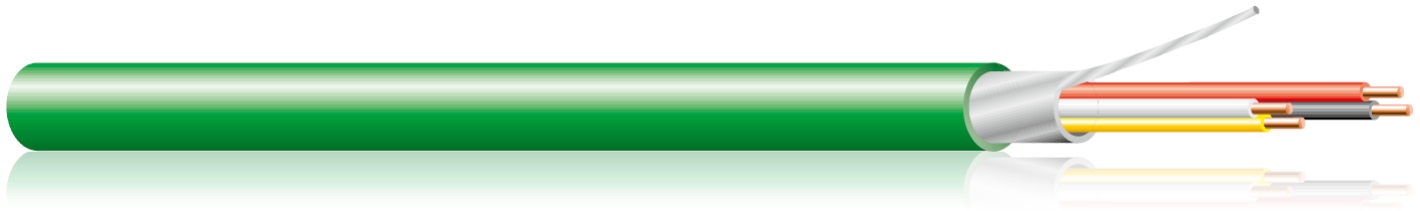
KNX bus cable



All KNX devices are connected in parallel with a bus line.

The bus line provides power and enables the flow of data.

It is recommended to use a KNX-certified bus line. In addition to the requisite physical properties (number of cores, cross-section, isolation voltage, etc.), the bus line can be immediately distinguished from other weak-current lines.



KNX bus cable

YCYM 2x2x0.8

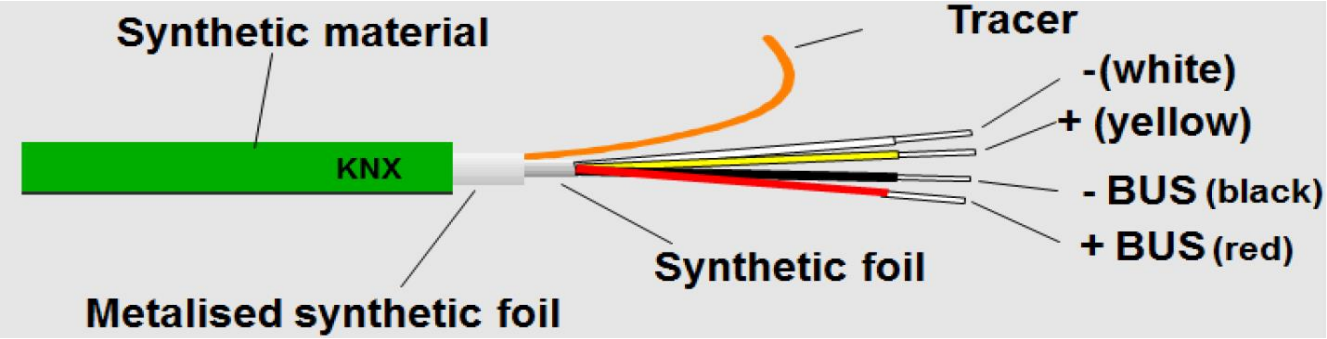
Fixed installation
- Dry, humid and wet rooms
  - Wall mounted
  - Flush mounted
  - In conduits
- Outdoor
  (if protected against direst sun radiation)

Test voltage: 4kV according to EN 50090

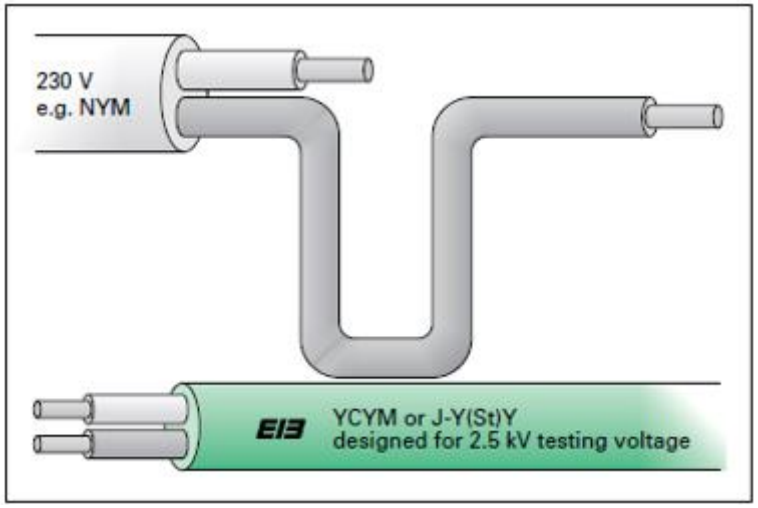
J-Y (St) Y 2x2x0.8 VDE 0815

Fixed installation
- Dry, humid industrial sites
  - Wall mounted
  - Flush mounted
  - In conduits
- Outdoor
  - Flush mounted
  - In conduits

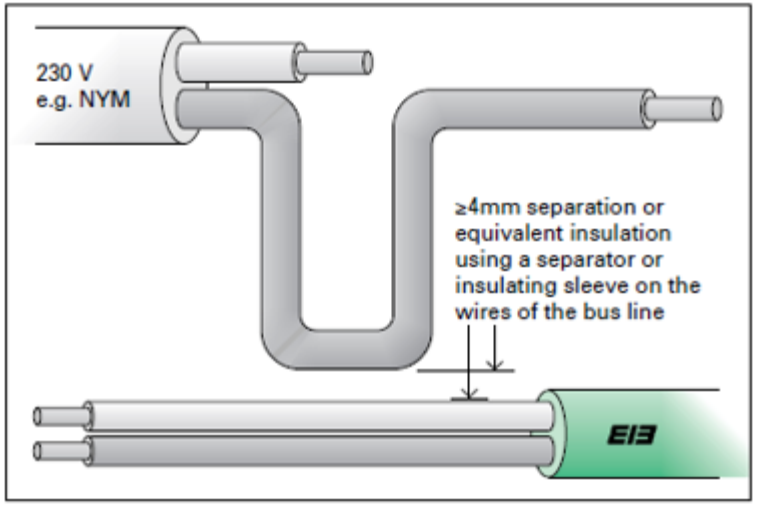
Test voltage: 2,5kV according to EN 50090



KNX bus cabling rules

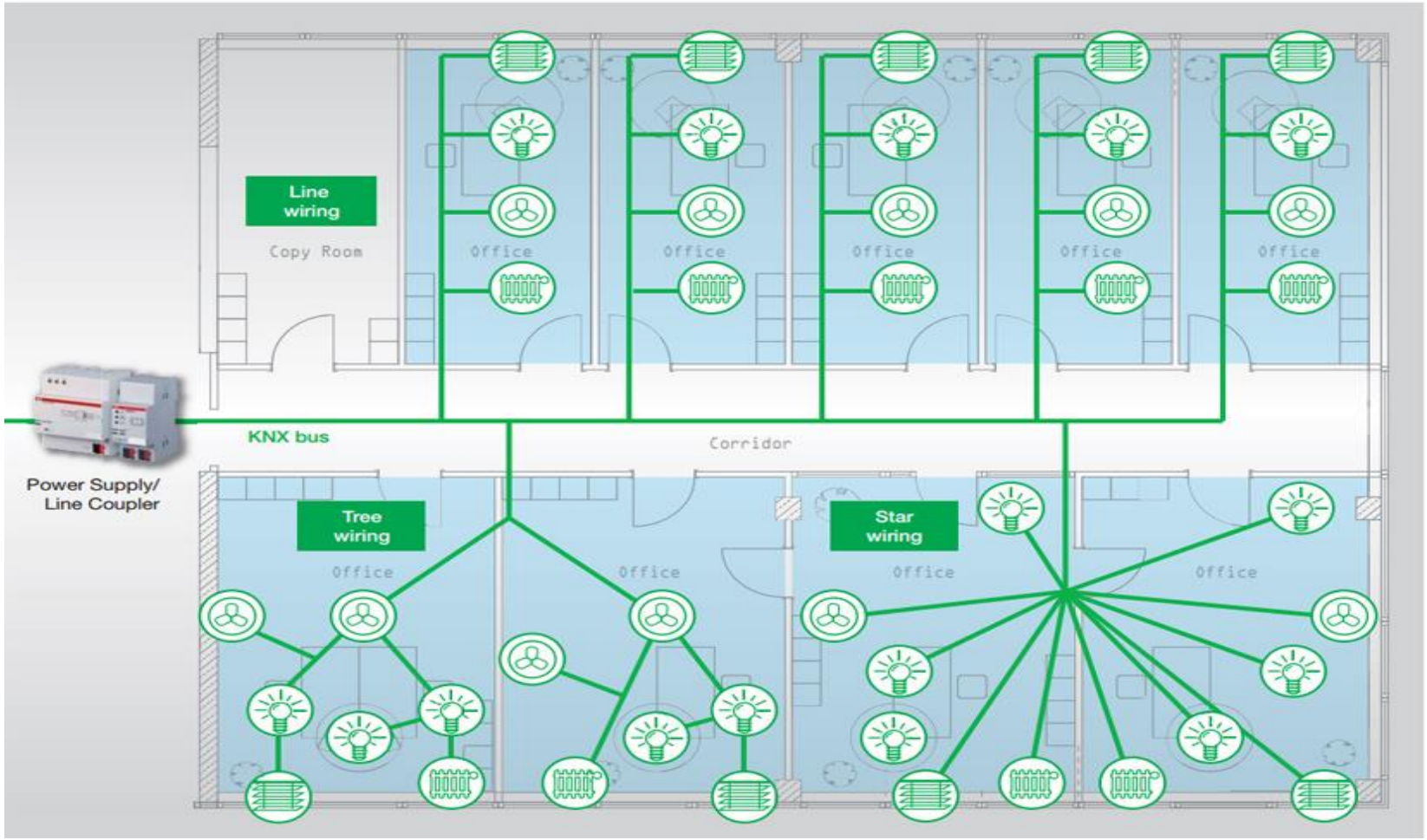


Isolated single core 230V adjacent to the sheath of the bus cable

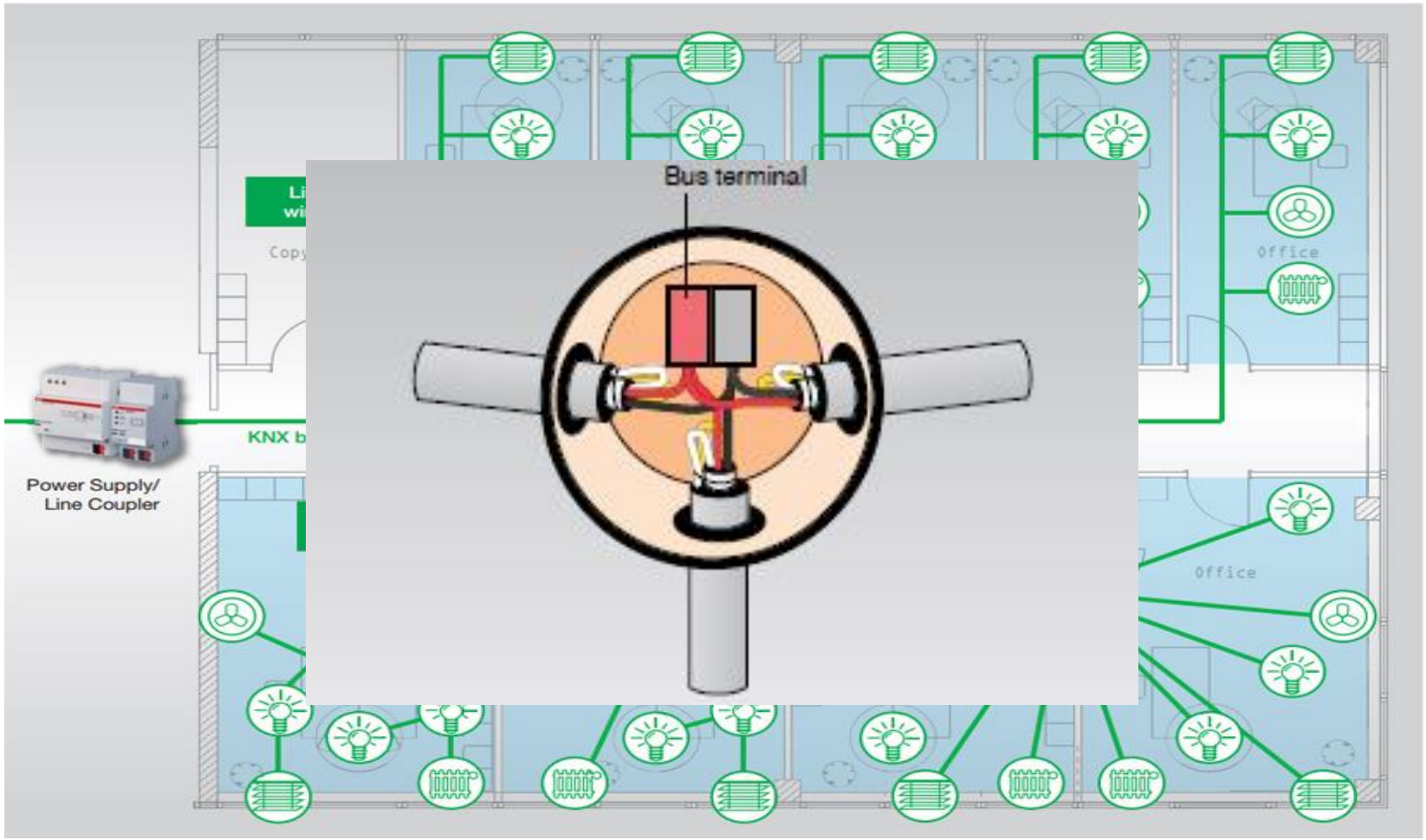


Adjacency of individual wires

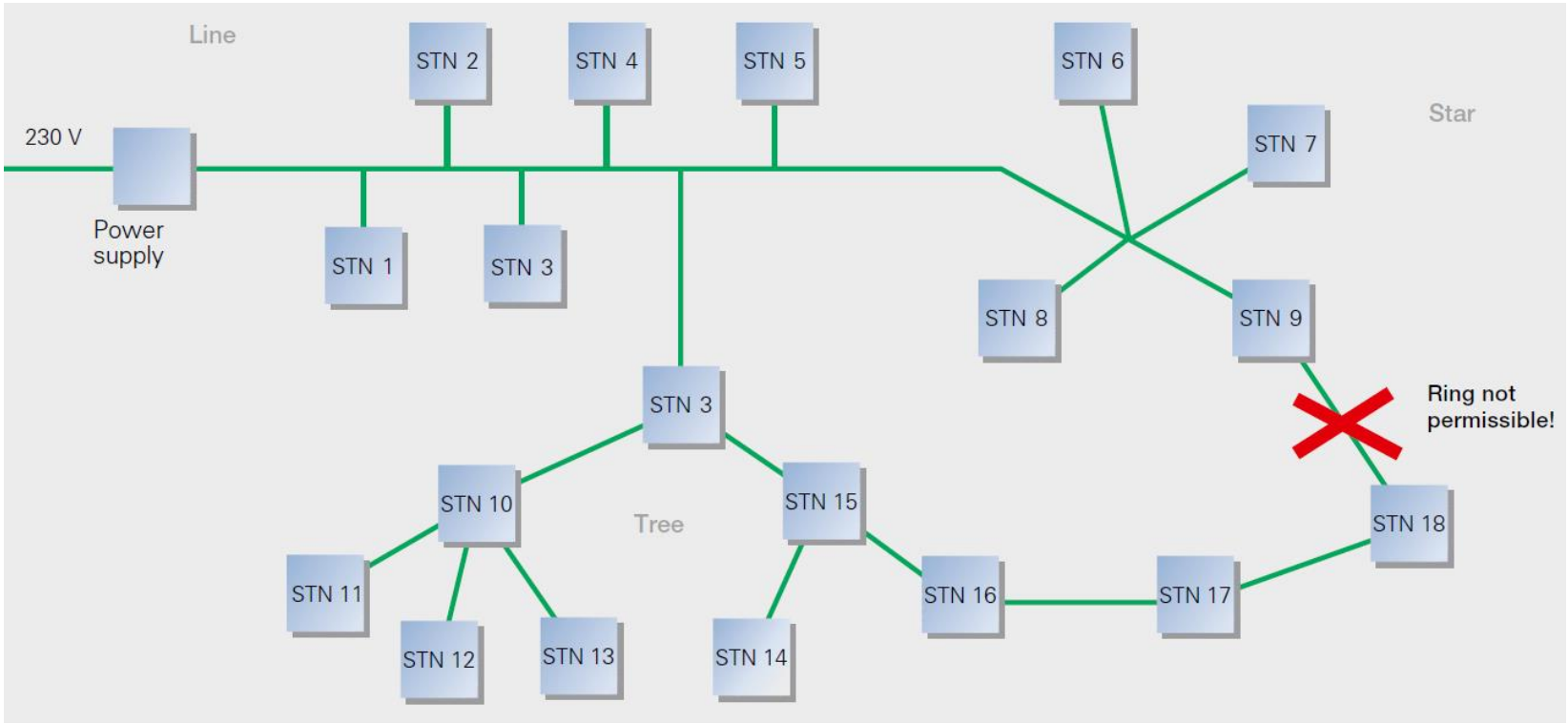
KNX bus cabling rules



KNX bus cabling rules



KNX bus cabling rules



It is important to respect the KNX rules when connecting different lines or segments!

Topology – Cable distances

Line topology

The wire lengths within a line are limited. Total length maximum 1000m

Maximum distance

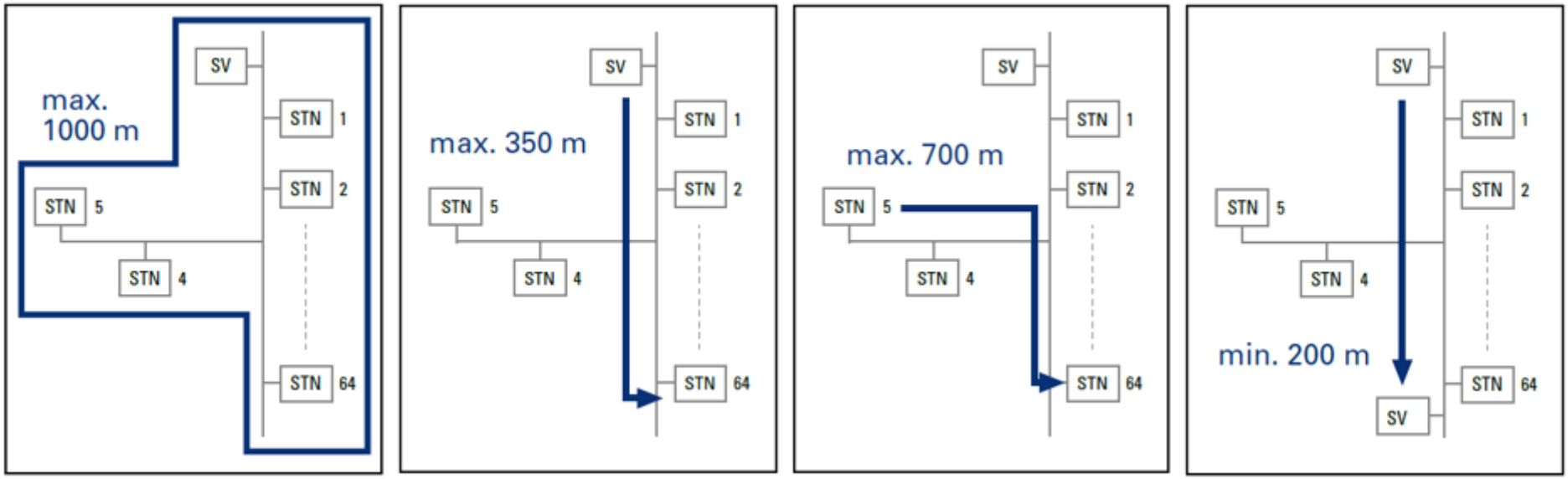
Between power supply and last device: maximum 350m

Maximum distance

Between 2 devices: maximum 700m

Minimum distance

Between 2 power supplies: minimum 200m



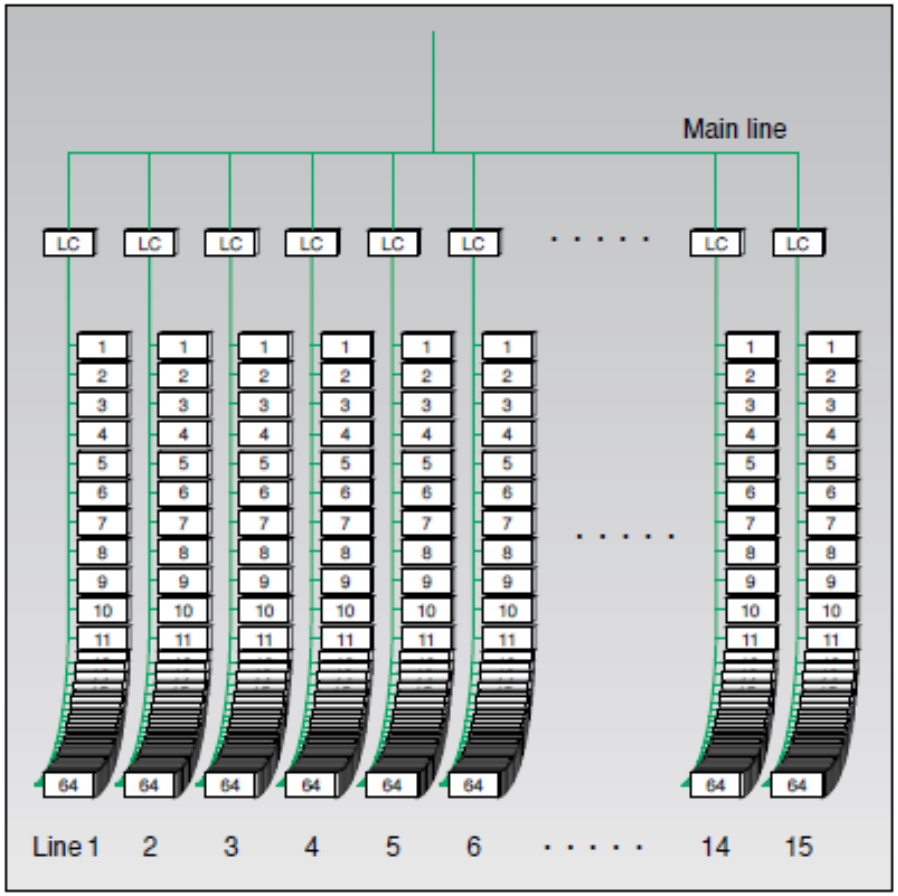
SV = Power supply
STN = Station

Topology - Lines

Each line can accommodate up to 64 devices. If there are more than 64 devices, or several parts of the building are involved, it might be necessary to create more lines in an area.

This is done by utilizing line couplers. The different lines are all connected to a main line, and this line, which only has a power supply, forms the backbone of the line couplers.

A line can also be extended by using a line coupler as a line repeater. Up to 3 can be added to a line, increasing the amount of devices to 256!

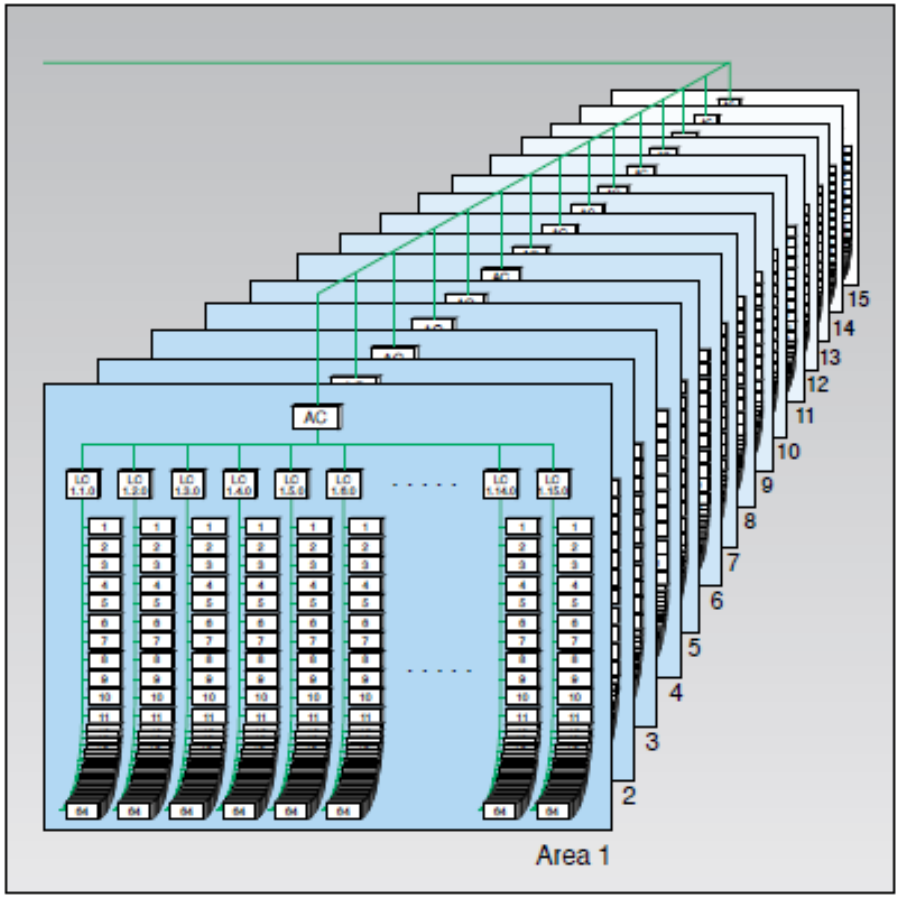


Topology - Areas

The line limit per area are 15 lines. This can be overcome by creating additional areas, with the limit also being 15.

Area couplers are used to connect the different areas.

And furthermore, suitable interfaces will allow KNX to be connected to other systems of the building systems automation.



Conclusion

Energy Savings with KNX:

- Up to 40% with KNX shading control
- Up to 50% with KNX individual room control
- Up to 60% with KNX lighting control
- Up to 60% with KNX ventilation control

ABB in Ireland

ENGINEERS IRELAND
REGISTERED TRAINING PROVIDER 2021

At a glance

180

People work for ABB in Ireland

5

Sites where products are sold, serviced or engineered

Want to know more?

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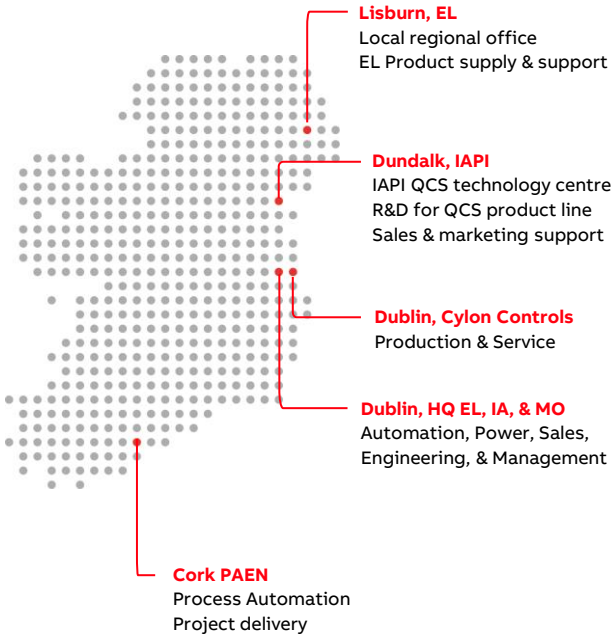

Skilled and experienced Irish team, backed by global networks

Thank you...