

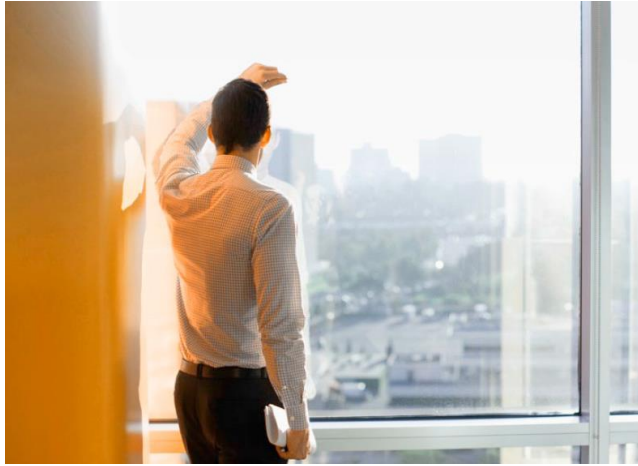


Specification Toolbox 2.0

Intelligent Building Solutions ABB i-bus[®] KNX in Office Buildings

ABB i-bus® KNX

The building types



Product solutions for all building types

- Office Buildings
- Hotels / Restaurants
- Exhibition Centers
- Sport Stadiums
- Theatres / Museums / Churches
- Schools / Universities
- Banks
- Airports
- Industrial Facilities
- Shopping Centers

ABB i-bus® KNX

The technology



- KNX is the first open standard for home & building control
- Fully compatible and interoperable
- Truly open bus technology
- 380 manufacturers worldwide
- Thousands of products
- Several applications

ABB i-bus® KNX

The standards



- **CENELEC**
EN 50090 – the only European Standard for Home and Building Electronic Systems (HBES) based on KNX.



- **CEN**
EN 13321-1 – the European Standard for Building Automation based on KNX.



- **ISO / IEC**
ISO/IEC 14543-3 – the World`s only Standard for Home Electronic Systems (HES) based on KNX.



- **GB/Z**
GB/Z 20965 – Chinese Standard for Home and Building Control based on KNX



- **US Standard**
ANSI/ASHRAE 135

KNX: The worldwide standard for home & building control

ABB i-bus® KNX

The functions



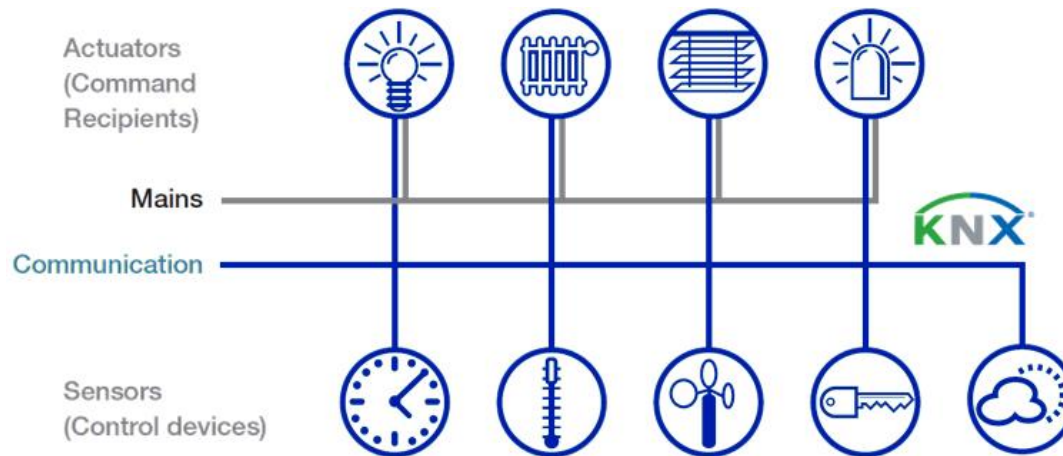
A broad product range for automation and control functions in today's modern buildings:

- Lighting control and regulation
- Heating, ventilation, cooling
- Blinds and shutter control
- Security and monitoring
- Energy and load management
- Visualization and operation
- Central automation
- Remote control / maintenance
- Interfacing to other control systems

ABB i-bus® KNX

The system

Graphic:
KNX – one system,
one standard, many
interconnected
functions for
maximum flexibility



- A **single system** instead of separate control solutions; more comfort, more economy, more safety
- Enables the realization of a **complete solution** according to the wishes the project partners and customers, whether they are buyers, tenants or operators
- **Cost advantages** throughout the **entire lifetime** of the building: from planning and implementation, through the building phase, sale or rental, right up to operation and administration



ABB i-bus[®] KNX in Office Buildings Advantages

ABB i-bus® KNX

Advantages in office buildings



- Integration of many applications within one system
- Truly open technology, every time extendable and reprogrammable
- Bus cable with two wires instead of numerous control wires
- Central control and displaying of the building (visualization)
- Reduction of running costs with control of loads if required
- Advance of comfort, efficiency and security

Raise of building's value and energy efficient operation

Energy Saving Potential in Office Buildings

Presence detection



Is anybody in the room?

- YES**
- Constant lighting control
 - Automatic blind control with antiglare protection and sun tracking
 - Room temperature controller in “comfort” mode
- NO**
- Lighting switched off
 - Blinds controlled by heating / cooling control system
 - Room temperature controller in “standby” mode

Saving potential for electrical energy consumption of lighting
approx. 8 - 13%

Energy Saving Potential in Office Buildings

Constant light control



Saving potential in terms of electrical energy consumption of lighting
approx. 20%

Energy Saving Potential in Office Buildings

Automatic shading for optimized daylight usage



Saving potential in terms of electrical energy consumption of lighting
approx. 6%

Energy Saving Potential in Office Buildings

Automatic shading for optimized room climate



Saving potential in terms of electrical energy consumption of cooling
approx. 40 %



ABB i-bus[®] KNX in Office Buildings Applications

ABB i-bus® KNX

Lighting control and regulation



- Switching
- Dimming
- Automatic lighting
- Constant lighting control
- Lighting scenes
- 1 – 10 V control
- DALI control (Digital Addressable Lighting Interface)
- RGB control (colour light control red-green-blue)

ABB i-bus® KNX Climate control



- Individual room temperature control
- Climate control
- Ventilation
- Fan-coil control
- Window monitoring
- Interfacing to advanced HVAC control systems via gateways to BACnet and LON

ABB i-bus® KNX Sun protection



- Roller shutter and window control
- Blind control with louver adjustment
- Sun shading control
- Curtain and roller blind control
- SMI interfaces (Standard Motor Interface)

ABB i-bus® KNX

Security and safety



- Personal and building protection
- Door and window monitoring
- Fire and smoke alarms
- Signaling of danger and unauthorized entry
- Technical alarms
- Emergency signals
- Occupancy simulation
- Panic lighting

ABB i-bus® KNX

Energy management



- Recording of consumption and metering functions
- Demand controlled lighting
 - Scene control
 - Presence detection
 - Lighting regulation
- Energy-saving climate control
 - Room temperature monitoring
 - Interfaces to air-conditioning controls

ABB i-bus® KNX

Visualization and communication gateways



- Comprehensive building control via centralized visualization software
- Control via remote control e.g. with individual PCs
- Interfacing to other system e.g. with OPC server

ABB i-bus® KNX

User Operation – Unique diversity of the range



Standard and multifunction
control elements

Millenium

Busch-triton®

Busch-priOn®



ABB i-bus[®] KNX in Office Buildings Configuration levels

ABB i-bus® KNX in Office Buildings

LEED certification – Basic information

- LEED (Leadership in Energy and Environmental Design) is a set of rating systems for the design, construction, operation, and maintenance of green buildings, homes and neighborhoods
- LEED certification is granted by the Green Building Certification Institute (GBCI)
- Buildings can qualify for four levels of certification:
 - Certified: 40–49 points
 - Silver: 50–59 points
 - Gold: 60–79 points
 - Platinum: 80 points and above
- All credits in this presentation are based on “LEED for New Construction and Major Renovations (v2009)”

ABB i-bus® KNX in Office Buildings

Example office room layout

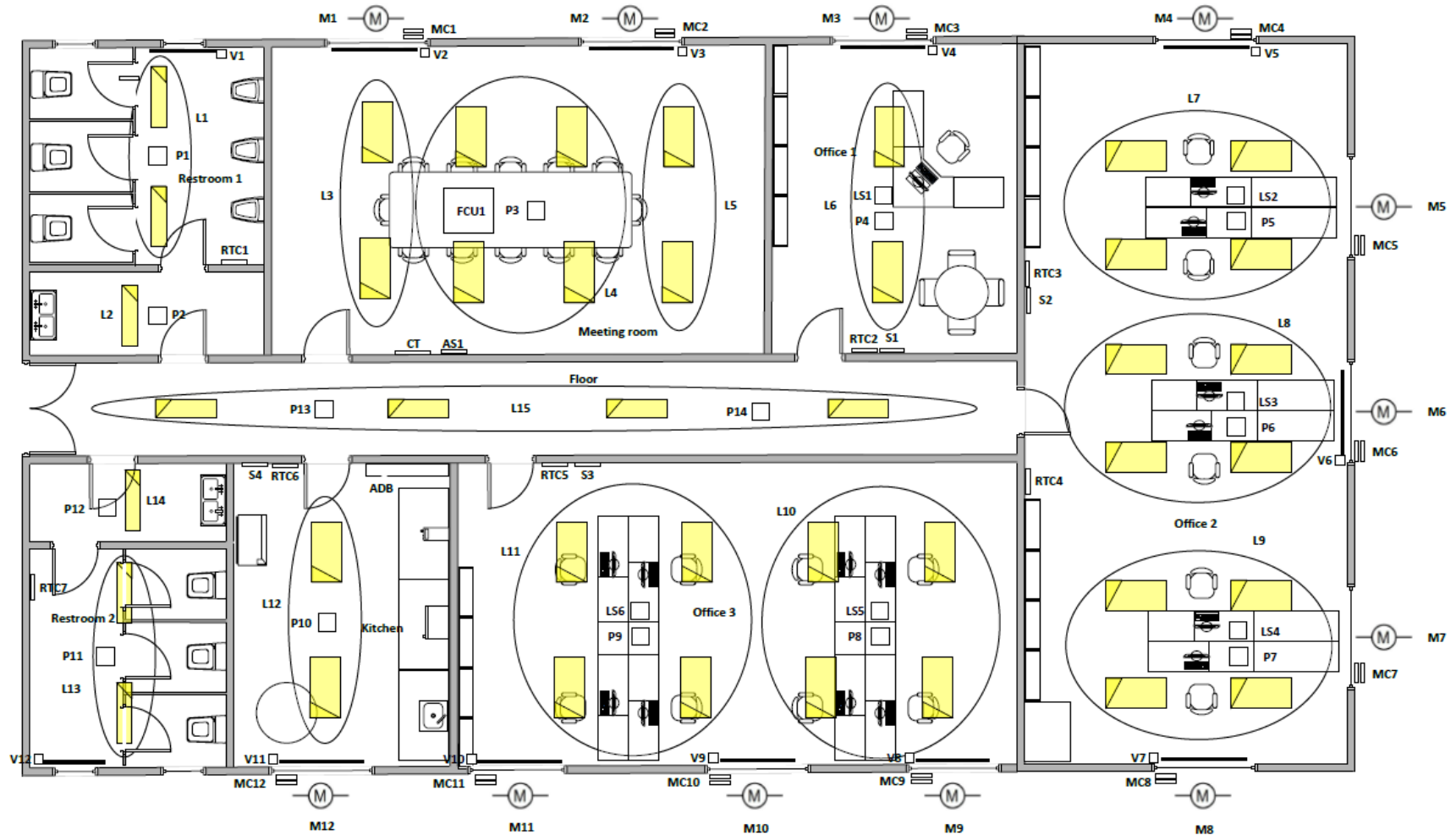


ABB i-bus® KNX in Office Buildings

Basic configuration

Interfacing of
presence detectors



Switching of lighting



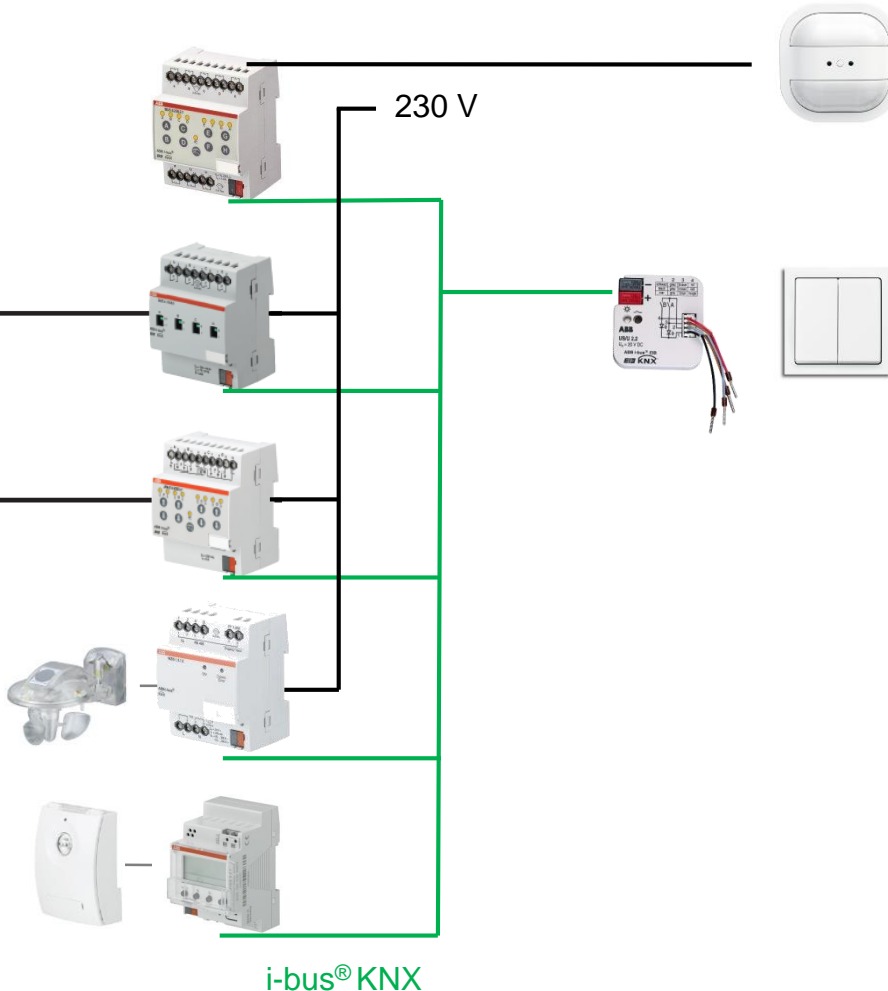
Blind control



Weather station e.g.
for wind alarms



Radio / GPS time
switch for time
programs



Conventional presence
detector for switching of
lighting in floor and
restroom area

Conventional switches for
operating lighting and
blinds

ABB i-bus® KNX in Office Buildings

Basic configuration – Energy efficiency class

- Energy efficiency class according to European Standard EN 15232:

	Heating / Cooling control	Ventilation / Air conditioning control	Lighting	Sun protection
A	<ul style="list-style-type: none"> Individual room control with communication between controllers Indoor temperature control of distribution network water temperature Total interlock between heating and cooling control 	<ul style="list-style-type: none"> Demand or presence dependent air flow control at room level Variable set point with load dependent compensation of supply temperature control Room or exhaust or supply air humidity control 	<ul style="list-style-type: none"> Automatic daylight control Automatic occupancy detection manual on / auto off Automatic occupancy detection manual on / dimmed Automatic occupancy detection auto on / auto off Automatic occupancy detection auto on / dimmed 	<ul style="list-style-type: none"> Combined light/blind/HVAC control
B	<ul style="list-style-type: none"> Individual room control with communication between controllers Indoor temperature control of distribution network water temperature Partial interlock between heating and cooling control (dependent on HVAC system) 	<ul style="list-style-type: none"> Time dependent air flow control at room level Variable set point with outdoor temperature compensation of supply temperature control Room or exhaust or supply air humidity control 	<ul style="list-style-type: none"> Manual daylight control Automatic occupancy detection manual on / auto off Automatic occupancy detection manual on / dimmed Automatic occupancy detection auto on / auto off Automatic occupancy detection auto on / dimmed 	<ul style="list-style-type: none"> Motorized operation with automatic blind control
C	<ul style="list-style-type: none"> Individual room automatic control by thermostatic valves or electronic controller Outside temperature compensated control of distribution network water temperature Partial interlock between heating and cooling control (dependent on HVAC system) 	<ul style="list-style-type: none"> Time dependent air flow control at room level Constant set point of supply temperature control Supply air humidity limitation 	<ul style="list-style-type: none"> Manual daylight control Manual on/off switch + additional sweeping extinction signal Manual on/off switch 	<ul style="list-style-type: none"> Motorized operation with manual blind control



ABB i-bus® KNX in Office Buildings

Basic configuration – LEED certification

- According to LEED certification the following credits can be achieved:

Sustainable Sites		
Code	Name	Score
SSc8	Light Pollution Reduction: Reduce the input power (by automatic device) of all nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) by at least 50% between 11 p.m. and 5 a.m. Afterhours override may be provided by a manual or occupant sensing device provided the override lasts no more than 30 minutes.	1
Maximum achievable score with contribution of KNX		1

ABB i-bus® KNX in Office Buildings

Advanced configuration

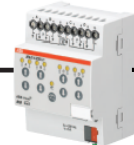
Digital lighting control by the use of DALI



Heating control via valve actuator



Blind control



Weather station e.g. for wind alarms



Radio / GPS time switch for time programs



230 V

i-bus® KNX



KNX Presence detectors in all rooms



Operation with KNX control elements



Room temperature controller

ABB i-bus® KNX in Office Buildings

Advanced configuration - Energy efficiency class

- Energy efficiency class according to European Standard EN 15232:

	Heating / Cooling control	Ventilation / Air conditioning control	Lighting	Sun protection
A	<ul style="list-style-type: none"> Individual room control with communication between controllers Indoor temperature control of distribution network water temperature Total interlock between heating and cooling control 	<ul style="list-style-type: none"> Demand or presence dependent air flow control at room level Variable set point with load dependent compensation of supply temperature control Room or exhaust or supply air humidity control 	<ul style="list-style-type: none"> Automatic daylight control Automatic occupancy detection manual on / auto off Automatic occupancy detection manual on / dimmed Automatic occupancy detection auto on / auto off Automatic occupancy detection auto on / dimmed 	<ul style="list-style-type: none"> Combined light/blind/HVAC control
B	<ul style="list-style-type: none"> Individual room control with communication between controllers Indoor temperature control of distribution network water temperature Partial interlock between heating and cooling control (dependent on HVAC system) 	<ul style="list-style-type: none"> Time dependent air flow control at room level Variable set point with outdoor temperature compensation of supply temperature control Room or exhaust or supply air humidity control 	<ul style="list-style-type: none"> Manual daylight control Automatic occupancy detection manual on / auto off Automatic occupancy detection manual on / dimmed Automatic occupancy detection auto on / auto off Automatic occupancy detection auto on / dimmed 	<ul style="list-style-type: none"> Motorized operation with automatic blind control
C	<ul style="list-style-type: none"> Individual room automatic control by thermostatic valves or electronic controller Outside temperature compensated control of distribution network water temperature Partial interlock between heating and cooling control (dependent on HVAC system) 	<ul style="list-style-type: none"> Time dependent air flow control at room level Constant set point of supply temperature control Supply air humidity limitation 	<ul style="list-style-type: none"> Manual daylight control Manual on/off switch + additional sweeping extinction signal Manual on/off switch 	<ul style="list-style-type: none"> Motorized operation with manual blind control



ABB i-bus® KNX in Office Buildings

Advanced configuration – LEED certification

- According to LEED certification the following credits can be achieved:

Sustainable Sites

Code	Name	Score
SSc8	Light Pollution Reduction: Reduce the input power (by automatic device) of all nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) by at least 50% between 11 p.m. and 5 a.m. Afterhours override may be provided by a manual or occupant sensing device provided the override lasts no more than 30 minutes.	1

Energy and Atmosphere

Code	Name	Score
EAc1	Optimize energy performance: Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating.	19

ABB i-bus® KNX in Office Buildings

Advanced configuration – LEED certification

Indoor Environmental Quality		
Code	Name	Score
EQc6.1	Controllability of systems – lighting: To provide a high level of lighting system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.	1
EQc6.2	Controllability of systems – thermal comfort To provide a high level of thermal system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.	1
Maximum achievable score with contribution of KNX		22

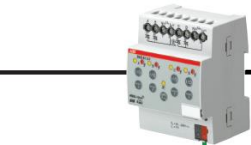
ABB i-bus® KNX in Office Buildings

Premium configuration

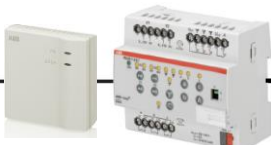
Digital lighting and constant light by the use of DALI and light sensor



Heating control via valve actuator



Fan coil unit control in meeting room in combination with air quality sensor



Blind control with automatic sun tracking and anti glare protection



Weather station e.g. for wind alarms



230 V

i-bus® KNX



Integration of window contacts



Presence detection in all rooms in combination with constant light control



Operation via KNX control elements



Room temperature controller



Touch display for central operation and monitoring



Energy metering for defined load circuits

ABB i-bus® KNX in Office Buildings

Premium configuration - Energy efficiency class

- Energy efficiency class according to European Standard EN 15232:



	Heating / Cooling control	Ventilation / Air conditioning control	Lighting	Sun protection
A	<ul style="list-style-type: none"> Individual room control with communication between controllers Indoor temperature control of distribution network water temperature Total interlock between heating and cooling control 	<ul style="list-style-type: none"> Demand or presence dependent air flow control at room level Variable set point with load dependent compensation of supply temperature control Room or exhaust or supply air humidity control 	<ul style="list-style-type: none"> Automatic daylight control Automatic occupancy detection manual on / auto off Automatic occupancy detection manual on / dimmed Automatic occupancy detection auto on / auto off Automatic occupancy detection auto on / dimmed 	<ul style="list-style-type: none"> Combined light/blind/HVAC control
B	<ul style="list-style-type: none"> Individual room control with communication between controllers Indoor temperature control of distribution network water temperature Partial interlock between heating and cooling control (dependent on HVAC system) 	<ul style="list-style-type: none"> Time dependent air flow control at room level Variable set point with outdoor temperature compensation of supply temperature control Room or exhaust or supply air humidity control 	<ul style="list-style-type: none"> Manual daylight control Automatic occupancy detection manual on / auto off Automatic occupancy detection manual on / dimmed Automatic occupancy detection auto on / auto off Automatic occupancy detection auto on / dimmed 	<ul style="list-style-type: none"> Motorized operation with automatic blind control
C	<ul style="list-style-type: none"> Individual room automatic control by thermostatic valves or electronic controller Outside temperature compensated control of distribution network water temperature Partial interlock between heating and cooling control (dependent on HVAC system) 	<ul style="list-style-type: none"> Time dependent air flow control at room level Constant set point of supply temperature control Supply air humidity limitation 	<ul style="list-style-type: none"> Manual daylight control Manual on/off switch + additional sweeping extinction signal Manual on/off switch 	<ul style="list-style-type: none"> Motorized operation with manual blind control

ABB i-bus® KNX in Office Buildings

Premium configuration – LEED certification

- According to LEED certification the following credits can be achieved:

Sustainable Sites

Code	Name	Score
SSc8	Light Pollution Reduction: Reduce the input power (by automatic device) of all nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) by at least 50% between 11 p.m. and 5 a.m. Afterhours override may be provided by a manual or occupant sensing device provided the override lasts no more than 30 minutes.	1

Energy and Atmosphere

Code	Name	Score
EAc1	Optimize energy performance: Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating.	19
EAc5	Measurement and Verification: Measurement and verification (M&V) involves recording actual energy use over the course of occupancy, and comparing that data with the estimated energy use seen in the design.	3

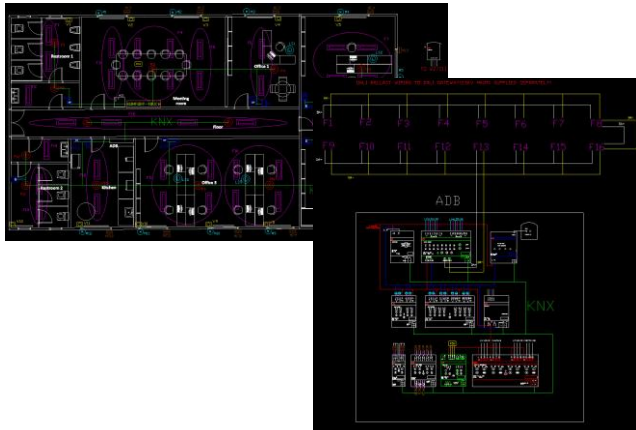
ABB i-bus® KNX in Office Buildings

Premium configuration – LEED certification

Indoor Environmental Quality		
Code	Name	Score
EQc1	Monitor CO2 concentrations within all naturally ventilated spaces. CO2 monitors must be between 3 and 6 feet (between 1 and 2 meters) above the floor	1
EQc6.1	Controllability of systems – lighting To provide a high level of lighting system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.	1
EQc6.2	Controllability of systems – thermal comfort To provide a high level of thermal system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.	1
EQc7.2	Thermal comfort – verification Provide a permanent monitoring system to ensure that building performance meets the desired comfort criteria as determined by IEQ Credit 7.1: Thermal Comfort – Design	1
EQc8.1	Daylight and views – daylight Demonstrate through records of indoor light measurements that a minimum daylight illumination level of 10 fc (108 lux) and a maximum of 500 fc (5400 lux) has been achieved in the applicable spaces. Measurements must be taken on a 10-foot (3-meter) grid and shall be recorded on building floor plans.	1
Maximum achievable score with contribution of KNX		28

ABB i-bus® KNX in Office Buildings

Specification toolbox



- The ABB i-bus KNX Specification Toolbox comes with a variety of documents for your support:
 - Functional specification texts available in three different design levels: Basic, Advanced and Premium
 - Device lists including KNX devices to fulfil requirements of functional specification
 - CAD drawings containing floor plan and wiring of appropriate KNX devices

Disclaimer

Note:

The information in this Document contains general information about the applications and technology of KNX and furthermore show example solutions for a specific building segment.

We reserve the right to make technical changes or modify the contents of the Document without prior notice. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in the Document.

We reserve all rights in the Document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

©Copyright 2015 ABB. All rights reserved.

Warranty, Liability:

The user shall be solely responsible for the use of the content of this Document.

ABB shall be under no warranty whatsoever. ABB's liability in connection with the Document, irrespective of the legal ground, shall be excluded. The exclusion of liability shall not apply in the case of intention or gross negligence. The present declaration shall be governed by and construed in accordance with the laws of Switzerland under exclusion of its conflict of laws rules and of the Vienna Convention on the International Sale of Goods (CISG).

Power and productivity
for a better world™

