Smart Home and Intelligent Building Control

Energy Efficiency in Buildings with ABB i-bus® KNX

Power and productivity
for a better world™

Economically and ecologically essential
Energy savings in the double-figure percentage range

Optimisation of energy efficiency in buildings means for us

- Only use energy when it is really required
- Only use the amount of energy actually required
- Apply the energy that is used with the highest possible efficiency

Climate change and growing shortages of resources are the big challenges of our time. In addition, many countries around the world are dependent on imported energy – in the EU, for example, 50 % of energy consumed today is imported – a figure expected to reach 70 % by 2030. Efficient and sustainable energy usage is therefore an urgent necessity – fully in accordance with the motto coined by the European Commission “less is more”.

Following the areas of transport and power generation, building technology is the largest consumer of energy. Heating, cooling and lighting in residential and office buildings make up approximately 40 % of the energy consumed in the industrial nations – a share that leaves a lot of scope for efficient optimization.

On the European level, this fact has been met with the publication of a directive relating to the energy performance of buildings (2002/91/EC). The main demand that it incorporates is the issue of an energy certificate detailing the energy consumption of the building as well as analysis of the potential savings. To pave the way for these measures, a number of European Standards have been implemented – e.g. EN 15232 – and in Germany a DIN standard (DIN V 18599) confronts the issue.

The central role of intelligent building control
Building system engineering supported by intelligent and networked room and building controllers (lighting, sun protection, heating, ventilation and air conditioning as well as the other building engineering systems) contribute significantly to conservative and requirement-based energy use.
The worldwide standard for KNX technology enables energy savings in the double-figure percentage range and also provides enhanced flexibility with planning and implementation, a high level of investment protection and a high level of availability.

Various concepts and approaches are possible in the optimisation of energy efficiency in buildings. In this context, the use of intelligent building control provides a proven and interesting alternative or addition that is clearly set apart by its convincing cost-benefit ratio.

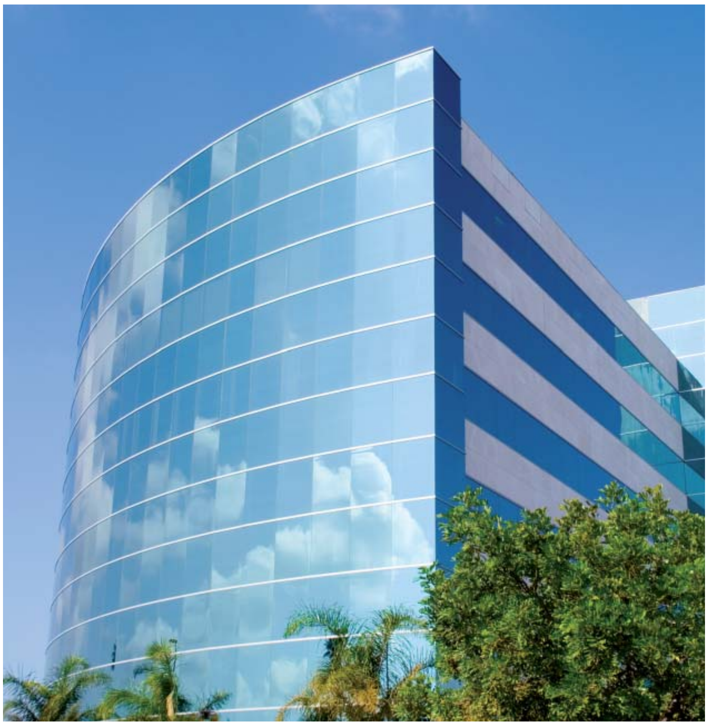
In this brochure, you will find figures, data and facts, which clearly indicate the high level of optimisation potential offered by using ABB i-bus® KNX intelligent building control.

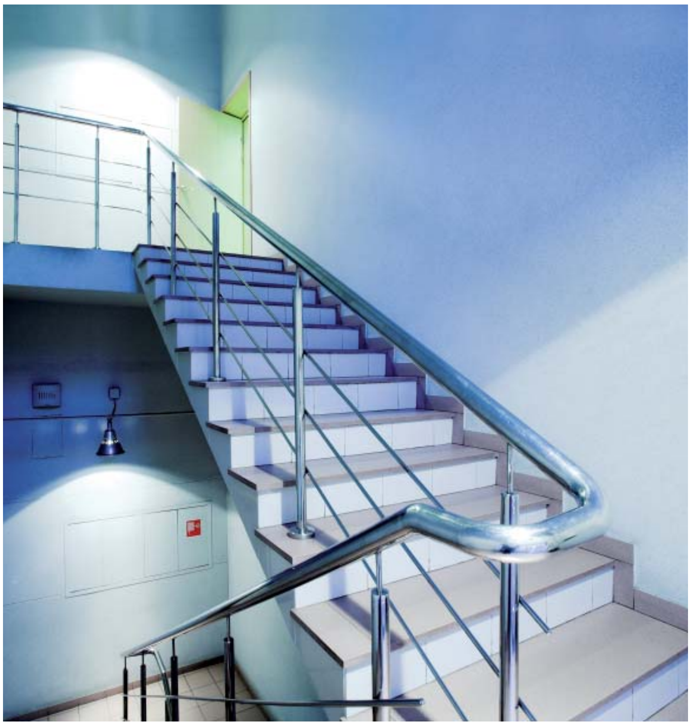
KNX Research literature
“Energy saving potential using modern electrical installation”

The Biberach University of Applied Sciences, Institute for Building and Energy Systems, specialising in building automation, carried out literature research on the topic of “Energy saving potential using modern electrical installations” in 2008. Headed by Prof. Dr.-Ing. Martin Becker, the most important sources of literature with the figures for potential savings they contained were compiled to an overall result. The study was commissioned by ZVEI – Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (German Electrical and Electronic Manufacturers’ Association).

In some of the sources examined, the technical basis – bus system or central control system – used to achieve the potential savings is not explicitly stated. However, bus systems such as KNX are featured repeatedly; in the majority of cases they are the technology on which the savings are based.

The wide spread of the values achieved in some areas can be ascribed to a number of factors – applications consisting of multiple functions, the field test character of the respective tests, differing function definitions, etc. Nevertheless, the research leaves the reader in no doubt – intelligent building control can make significant contribution to energy efficiency in buildings.





Result of the study

The utilisable literature sources clearly indicate significant potential for optimisation regarding reduction of the energy consumption by the use of modern electrical installation systems:

The average value of all the sources results in a saving potential in the range of:

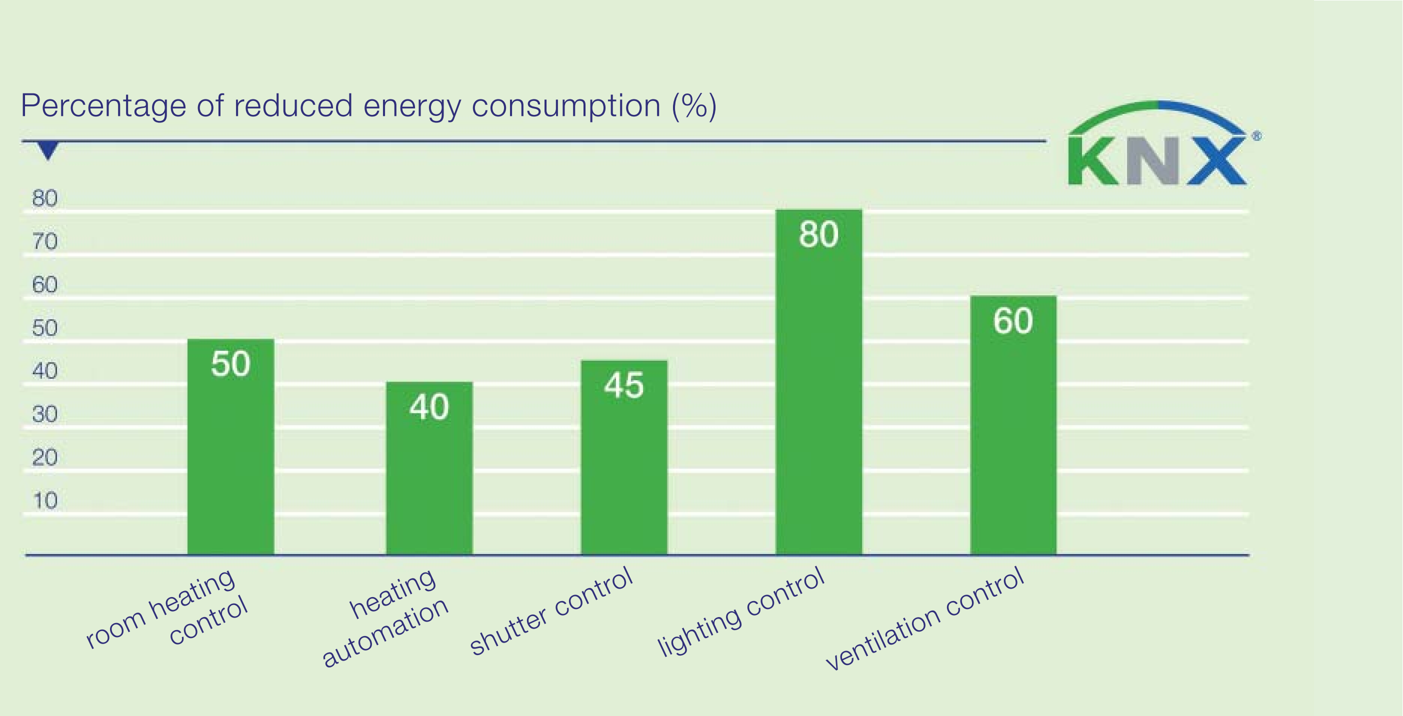
Room heating control:	approx. 14 - 25 %
Heating automation:	approx. 7 - 17 %
Shutter control:	approx. 9 - 32 %
Lighting control:	approx. 25 - 58 %
Ventilation control:	approx. 20 - 45 %

In total, this results in an average energy saving by general measures and optimisation of the control engineering in the order of approx. 11 to 31 %.

The corresponding maximum values of the different areas recorded in the literature in the study can be seen in the following diagram.

Reduced energy consumption through utilization of intelligent building control in houses and buildings

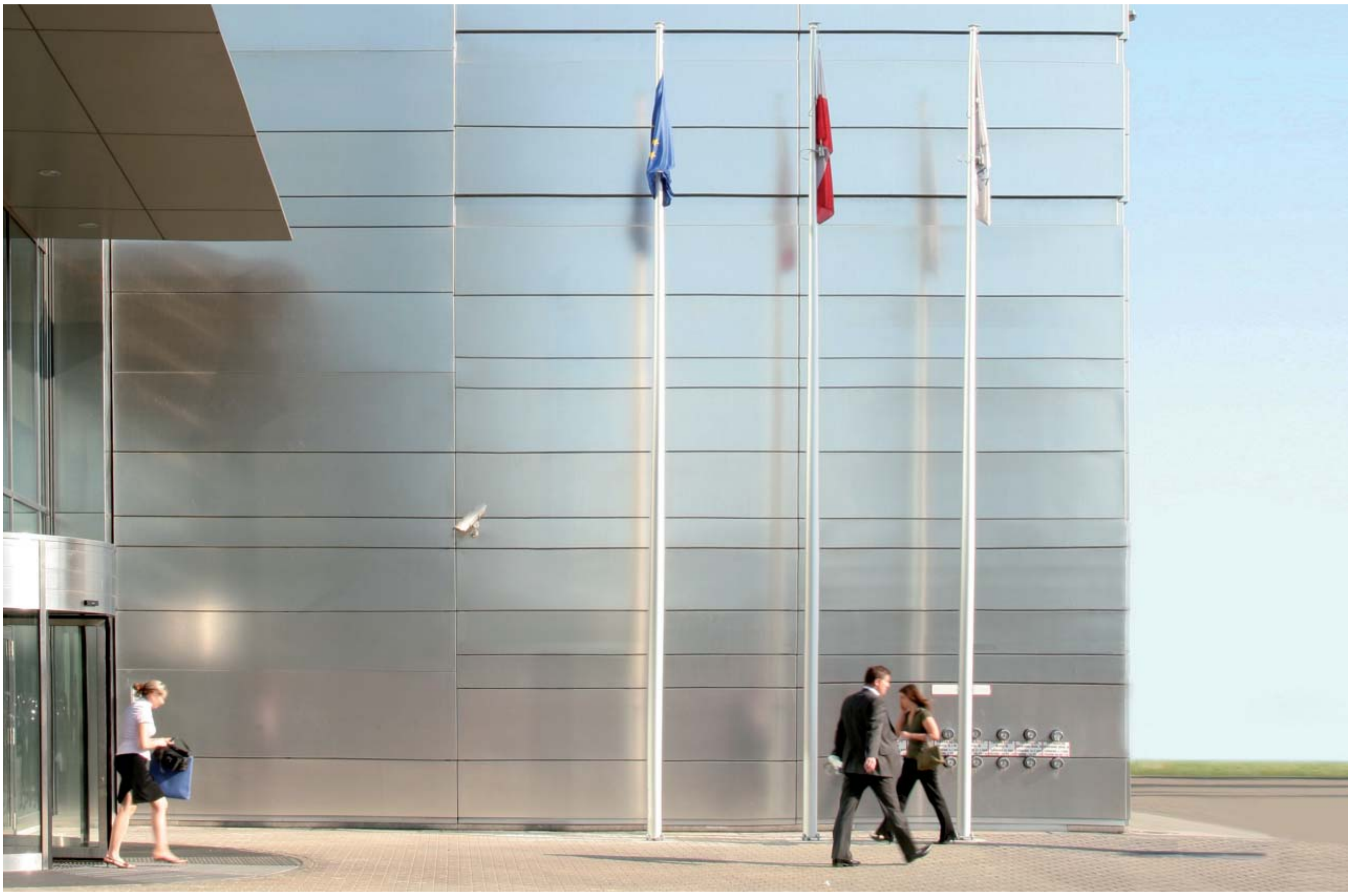
Maximum values in the study “Energy saving potential using modern electrical installations”



The European Standard EN 15232
A key contribution to worldwide energy efficiency

Around the world new legislation is promoting the use of energy efficient technologies. The European Standard EN 15232 ("Energy performance of buildings – Impact of Building Automation, Controls and Building Management") was compiled in conjunction with the Europe-wide implementation of the directive for energy efficiency in buildings (Energy Performance of Buildings Directive EPBD) 2002/91/EG. The standard describes methods for evaluating the influence of building automation and technical building management on the energy consumption of buildings.

Four efficiency classes A to D have been introduced to this purpose. After a building has been equipped with building automation and control systems, it will be assigned one of these classes. The potential savings for thermal and electrical energy can be calculated for each class based on the building type and building purpose. The values of the energy class C are used as the reference for comparing the efficiency.



The following diagram shows the differences in energy consumption for three building types in the energy efficiency classes A, B and D relative to the basis values in rating C. For example, by using class A, 30 % of the thermal energy can be saved in offices.

Building Automation and Control (BAC) efficiency classes to EN 15232	Efficiency factor for thermal energy			Efficiency factor for electrical energy		
	Office	School	Hotel	Office	School	Hotel
A High energy performance building automation and control system (BACS) and technical building management (TBM)	0.70	0.80	0.68	0.87	0.86	0.90
B Advanced BACS and TBM	0.80	0.88	0.85	0.93	0.93	0.95
C Standard BACS	1	1	1	1	1	1
D Non energy efficient BACS	1.51	1.20	1.31	1.10	1.07	1.07

Function list and assignment to energy performance classes (section from table 1 of the EN 15232:2007 [D])

	Heating / Cooling control	Ventilation / Air conditioning control	Lighting	Sun protection
A	– Individual room control with communication between controllers – Indoor temperature control of distribution network water temperature – Total interlock between heating and cooling control	– Demand or presence dependent air flow control at room level – Variable set point with load dependant compensation of supply temperature control – Room or exhaust or supply air humidity control	– 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	– Combined light/blind/ HVAC control
B	– 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)	– 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	– 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	– Motorized operation with automatic blind control
C	– 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)	– Time dependent air flow control at room level – Constant set point of supply temperature control – Supply air humidity limitation	– Manual daylight control – Manual on/off switch + additional sweeping extinction signal – Manual on/off switch	– Motorized operation with manual blind control
D	– No automatic control – No control of distribution network water temperature – No interlock between heating and cooling control	– No air flow control at room level – No supply temperature control – No air humidity control	– Manual daylight control – Manual on/off switch + additional sweeping extinction signal – Manual on/off switch	– Manual operation for blinds

Scientific study undertaken on the basis of the DIN V 18599

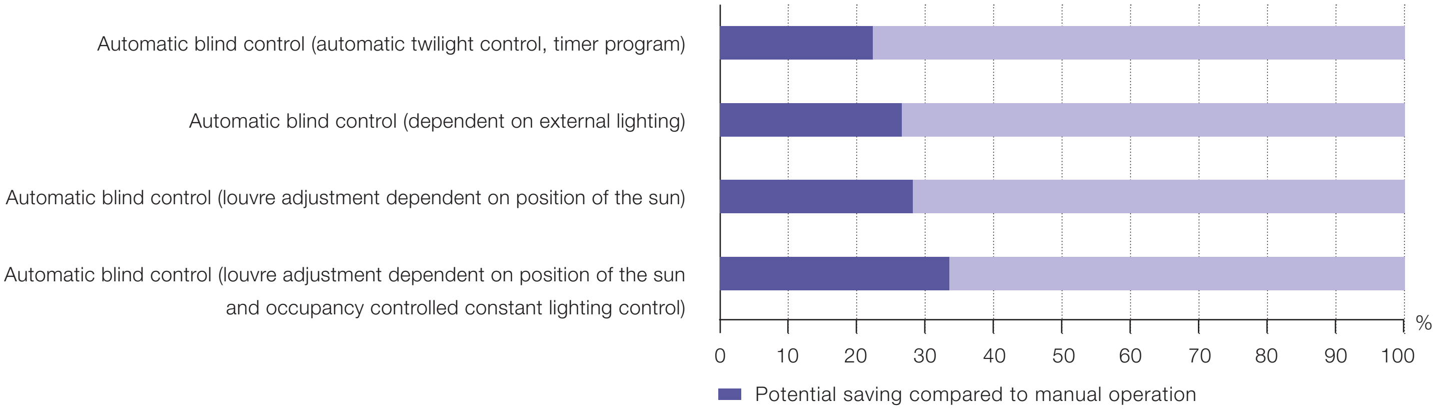
Data and facts relating to bus technology as well as room and building automation

In 2008, the Biberach University of Applied Sciences, commissioned by ABB, carried out a study on the issue of “Energy saving and efficiency potential through the use of bus technology as well as room and building automation”.

The efficiency of ABB i-bus® KNX components was scientifically studied on the basis of the DIN V 18599. The usage profile “open-plan office” in a classic example building served as the research project.

The DIN V 18599 was drawn up by the German DIN standards committee for heating and ventilation as well as lighting. The standard was introduced to implement the EC directive 2002/91/EC “Energy Performance of Buildings Directive”, and in Germany it serves as the basis for issuing energy certificates for buildings. From the 1st of July 2009, all non-residential buildings in Germany require an energy certificate, if they are re-let, sold or leased. The building owners must submit this document to any interested party on request. In public buildings with more than 1,000 square meters of floor space, the energy certificate must also be visibly displayed.

Potential savings for cooling using automatic blind control*



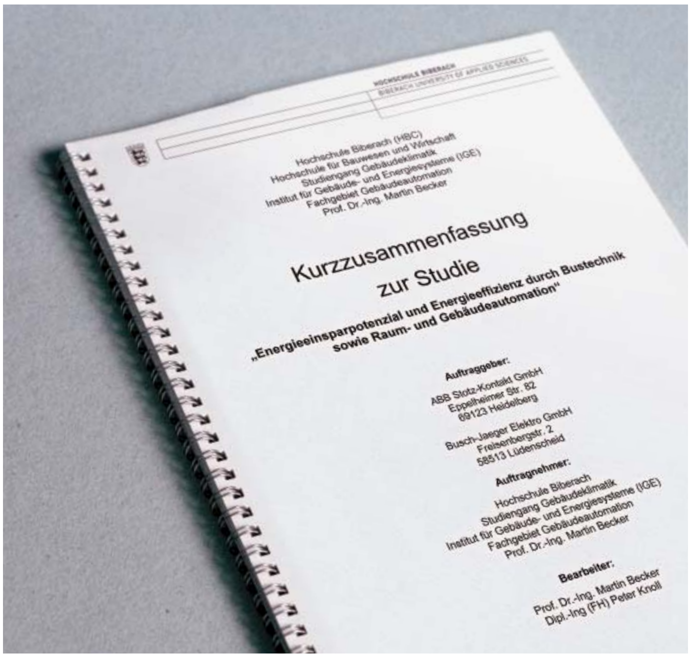
*Determined by the Biberach University of Applied Sciences with ABB i-bus® KNX components for usage profile “open-plan office” (usage profile 3 [DIN V 18599-10:2005-07]) in an example building (classical office building) with the 5S IBP:18599 program. The potential savings relate to the energy consumption.

The research results are included in the study “Energy saving and efficiency potential through the use of bus technology as well as room and building automation”, which was undertaken in 2008 for ABB.

The ABB i-bus® KNX system is based on KNX technology which is the worldwide standard for intelligent building control in houses and buildings (ISO/IEC 14543).
This system from ABB offers a comprehensive range of products and solutions that enables verifiable, energy optimised applications in new and existing buildings.

This study demonstrates with its calculations and investigations that a significant energy saving potential is present through the usage of bus technology as well as room and building automation. The level of potential savings depends on the respective function or the combination of functions.

Overall conclusion: "This study demonstrates that potential savings in energy consumption of up to 40 % in office buildings through the combination of several functions are possible."



HOCHSCHULE BIBERACH
BIBERACH UNIVERSITY OF APPLIED SCIENCES

Hochschule Biberach (HBC)
Hochschule für Bauwesen und Wirtschaft
Studiengang Gebäudeklimatik
Institut für Gebäude- und Energiesysteme (IGE)
Fachgebiet Gebäudeautomation
Prof. Dr.-Ing. Martin Becker

Kurzzusammenfassung
zur Studie
„Energieeinsparpotenzial und Energieeffizienz durch Bustechnik sowie Raum- und Gebäudeautomation"

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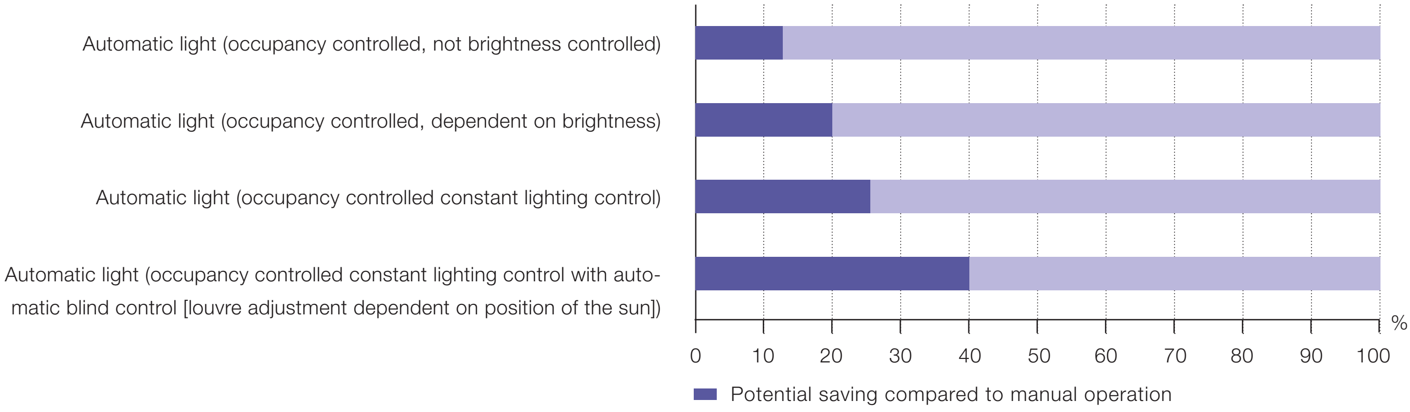
A summary of the results of the study can be downloaded free-of-charge using the following link: http://www.abb.com/knx

Potential savings for automatic lighting control *



The research results are included in the study "Energy saving and efficiency potential through the use of bus technology as well as room and building automation", which was undertaken in 2008 for ABB.

* Determined by the Biberach University of Applied Sciences with ABB i-bus® KNX components for usage profile "open-plan office" (usage profile 3 [DIN V 18599-10:2005-07]) in an example building (classical office building) with the 5S IBP:18599 program.
The potential savings relate to the energy consumption.

ABB field studies
Our own experience with constant lighting control

In almost all the technical literature, constant lighting control is frequently accredited with a high level of potential savings for electrical energy. ABB examined the accuracy of these statements and the specific potential saving values in its own series of tests. The measurements were performed in an office building with seminar rooms.

Using constant lighting control – in contrast to a lighting that is fully switched on – the required lighting intensity in the room is achieved by the continuous and controlled addition of "artificial lighting" required to maintain a defined level of brightness (in these measurements: 500 Lux). Only the amount of energy that is necessary for the artificial lighting is therefore consumed.

Measurement 1, October 2008

Training room, ground floor, cloudy day, open blinds, test and usage period from 8:00 a.m. to 3:30 p.m.: Additional lighting of 2,707 lxh was required. If the lighting had been switched on without control, it would have resulted in a consumption of 3,750 lux hours (lxh).

Calculation of the additional lighting requirement:

Time	Measured lighting intensity*	Required additional lighting
08:00 – 08:30	25 lx	237 lxh
08:30 – 09:00	90 lx	205 lxh
09:00 – 09:30	120 lx	190 lxh
09:30 – 10:00	190 lx	155 lxh
10:00 – 10:30	210 lx	145 lxh
10:30 – 11:00	140 lx	180 lxh
11:00 – 11:30	150 lx	175 lxh
11:30 – 12:00	180 lx	160 lxh
12:00 – 12:30	220 lx	140 lxh
12:30 – 13:00	200 lx	150 lxh
13:00 – 13:30	180 lx	160 lxh
13:30 – 14:00	170 lx	165 lxh
14:00 – 14:30	120 lx	190 lxh
14:30 – 15:00	40 lx	230 lxh
15:00 – 15:30	50 lx	225 lxh
Potential savings for this room:		**approx. 28 %**

*averaged over the usage period

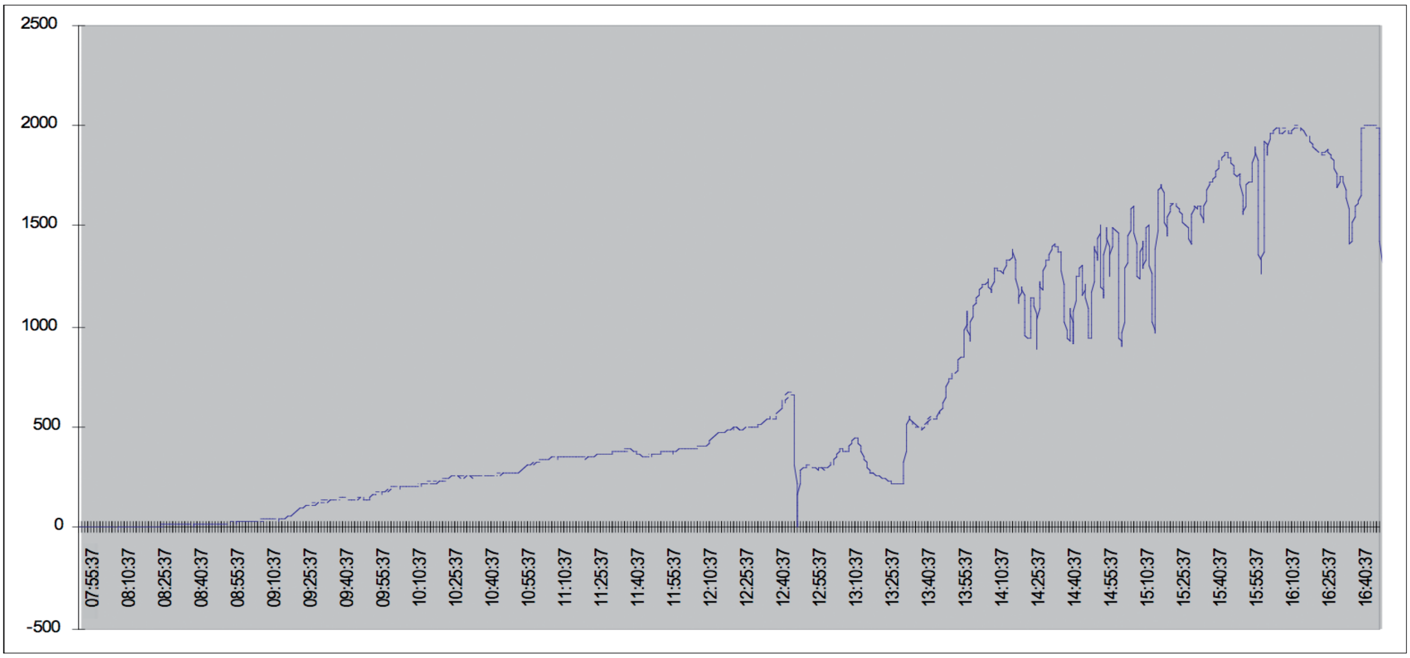
Measurement 2, October 2008

Conference room, first floor, very cloudy day, open blinds, test and usage period from 8:00 a.m. to 5:00 p.m.: Additional lighting of 2,820 lxh was required. If the lighting had been switched on without control, it would have resulted in a consumption of 4,500 lxh.

Calculation of the additional lighting requirement:

Time	Measured lighting intensity*	Required additional lighting
08:00 – 08:30	12 lx	244 lxh
08:30 – 09:00	35 lx	232 lxh
09:00 – 09:30	50 lx	225 lxh
09:30 – 10:00	65 lx	218 lxh
10:00 – 10:30	90 lx	205 lxh
10:30 – 11:00	100 lx	200 lxh
11:00 – 11:30	140 lx	180 lxh
11:30 – 12:00	265 lx	118 lxh
12:00 – 12:30	350 lx	75 lxh
12:30 – 13:00	370 lx	65 lxh
13:00 – 13:30	370 lx	65 lxh
13:30 – 14:00	350 lx	75 lxh
14:00 – 14:30	315 lx	92 lxh
14:30 – 15:00	265 lx	118 lxh
15:00 – 15:30	235 lx	132 lxh
15:30 – 16:00	160 lx	170 lxh
16:00 – 16:30	100 lx	200 lxh
16:30 – 17:00	87 lx	206 lxh
Potential savings for this room:		**approx. 37 %**

*averaged over the usage period



Measured values for the lighting intensity in the laboratory under examination [Lux]

Measurement 3, October 2008

Laboratory, second floor, sunny day, open blinds, test and usage period from 8:00 a.m. to 5:00 p.m.: Additional lighting of 1,517 lxh was required. If the lighting had been switched on without control, it would have resulted in a consumption of 4,500 lxh.

Calculation of the additional lighting requirement:

Time	Measured lighting intensity*	Required additional lighting
08:00 – 08:30	7 lx	246 lxh
08:30 – 09:00	21 lx	240 lxh
09:00 – 09:30	44 lx	228 lxh
09:30 – 10:00	147 lx	176 lxh
10:00 – 10:30	217 lx	141 lxh
10:30 – 11:00	265 lx	117 lxh
11:00 – 11:30	352 lx	148 lxh
11:30 – 12:00	371 lx	129 lxh
12:00 – 12:30	429 lx	71 lxh
12:30 – 13:00	633 lx	0 lxh
13:00 – 13:30	458 lx	21 lxh
13:30 – 14:00	547 lx	0 lxh
14:00 – 14:30	1276 lx	0 lxh
14:30 – 15:00	1263 lx	0 lxh
15:00 – 15:30	1508 lx	0 lxh
15:30 – 16:00	1830 lx	0 lxh
16:00 – 16:30	1988 lx	0 lxh
16:30 – 17:00	2000 lx	0 lxh
Potential savings for this room:		**approx. 66 %**

*averaged over the usage period

Results:

1. **A high-level of potential savings with regard to the electrical energy are possible with constant lighting control.**

2. **A generally valid statement concerning the level of savings is difficult. The result depends on several individual factors, e. g. daylight factors, alignment of the room, surrounding buildings, etc.**

In the ABB field studies the constant light control always yielded savings of more than 25 % in comparison to manual lighting operation.

A clear result

Proven energy efficiency in buildings with ABB i-bus® KNX

The overall result of the tests presented in this brochure is unequivocal. There may be differences in the results of the study regarding the concrete figures – but the underlying trend is irrefutable:

- Energy is saved with intelligent building control in comparison to conventional technology.
- The level of potential savings depends to a high degree on the building parameters and the usage profiles.
- The maximum energy saving potential is achieved using a combination of different automation functions.
- The savings are fundamentally in the double-figure % range.
- The required investment in intelligent building control is generally low in comparison to structural modifications to buildings.
- The amortization periods are relatively short and are generally within one to five years.

Optimisation example 1
Lighting control

Measures are to be undertaken in an office building to reduce the energy consumption.

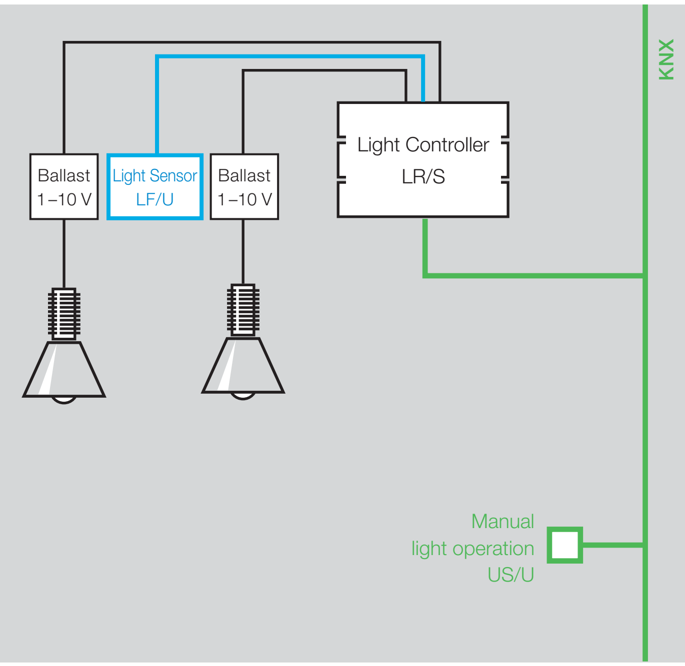
In the first step, the lighting system is modernised. The conventional ballasts of the fluorescent lamps are replaced by **electronic ballasts**. Accordingly, the electrical power consumption of the fluorescent lamps is reduced by about 30 %.

In order to further optimise the energy consumption, an additional **constant lighting control** is introduced. The intention is to provide a constant lighting intensity of 500 Lux on the working surfaces. The brightness sensor measures the current lighting intensity for this purpose. Using the current value and the difference to the required lighting intensity, the light controller calculates a brightness setting for the dimming actuators. Between 28 % and 66 % of electrical energy used for the lighting can be saved with this control method – depending on the season, the weather and the location of the building (see ABB field study on pages 10 and 11).

Finally, it is possible to detect the occupancy of the room using a presence detector and to implement an **occupancy dependent lighting control system**. If the room is not occupied, the lighting can be switched off automatically if someone has neglected to switch it off manually.
The automatic presence-dependent control can yield a further 13 % of savings.

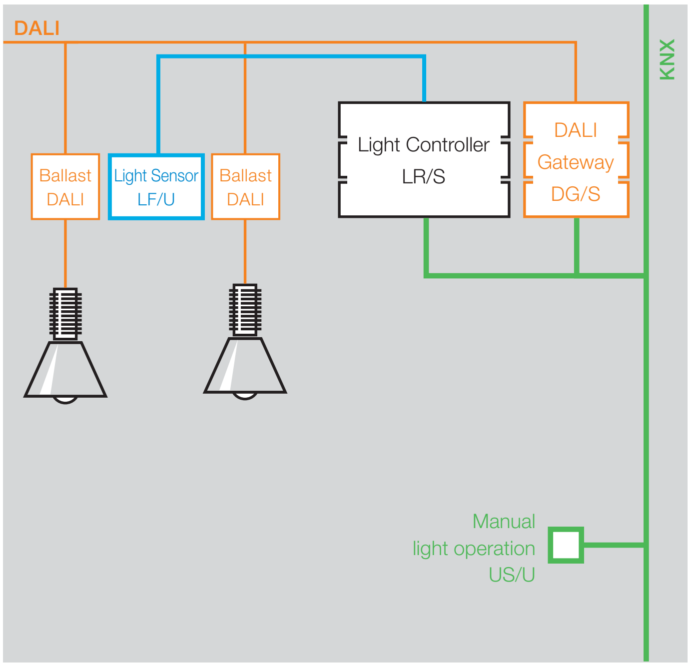
Optimisation variant 1a:

Lighting control using constant lighting control via a ballast with 1 – 10 V technology and manual light operation.



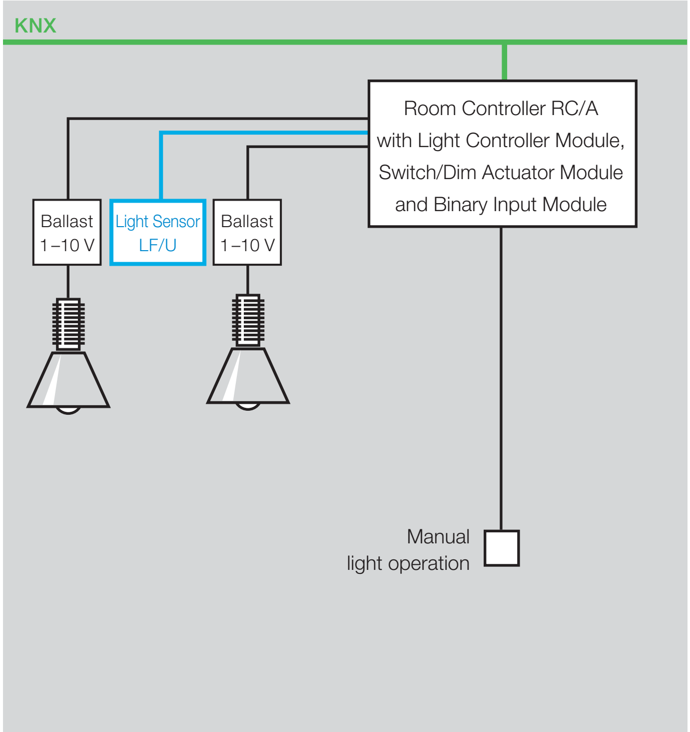
Optimisation variant 1b:

Lighting control using constant lighting control via a ballast with DALI technology and manual light operation.



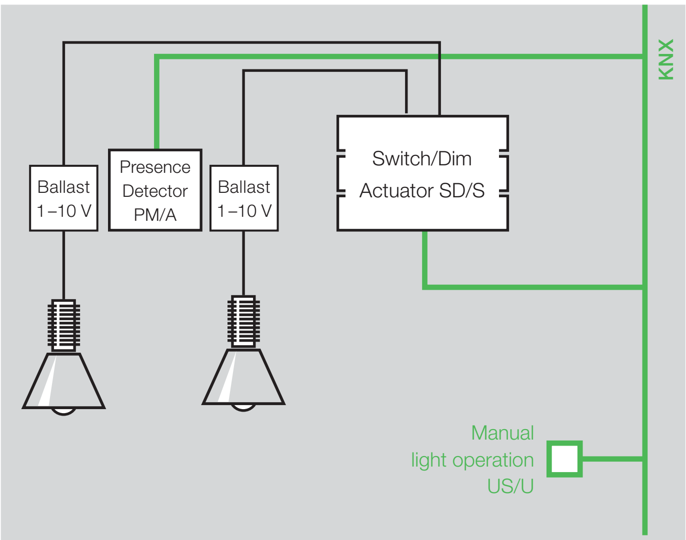
Optimisation variant 1c:

Lighting control using constant lighting control via a ballast with 1 – 10 V technology and manual light operation. All the required devices are installed in a Room Controller that is mounted in the ceiling or under the floor.



Optimisation variant 1d:*

Presence-dependent lighting control using constant lighting control via a ballast with 1 – 10 V technology.



* With this variant, the light sensor is not required as the brightness measurement and the lighting controller is integrated in the presence detector. The dimming values are sent via KNX to the Switch/Dim Actuators. In larger systems this can lead to high data transfer rates on the KNX line. Presence-dependent control is also possible for variants with DALI ballasts or with Room Controllers.

Optimisation example 2
Blind control

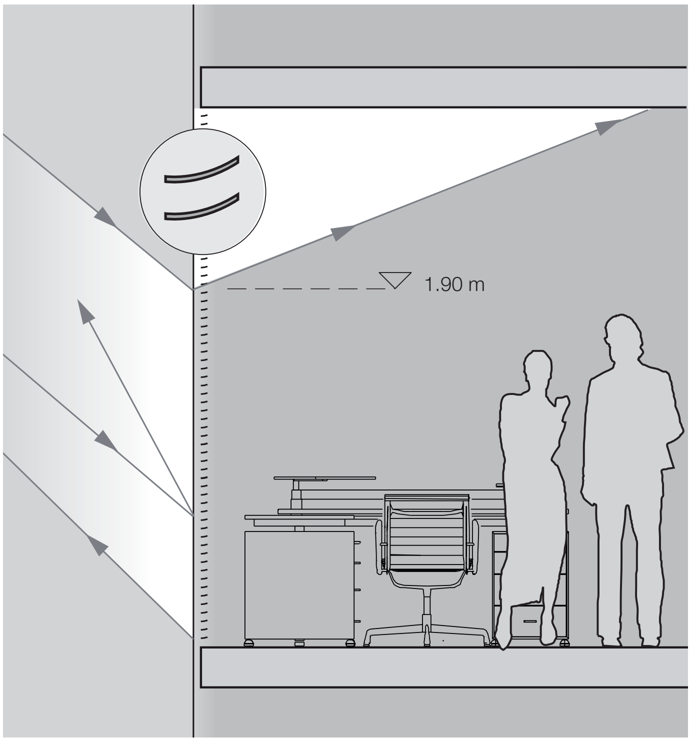
Optimisation variant 2a: Blind control for optimised daylight usage

Blind systems are used in functional buildings primarily for shade and sun protection. They prevent the incidence of direct sunlight into the working area.

Through blind control it is possible to influence the incidence of external light into the room. Therefore there is a direct interdependence of lighting control and blind control. If it becomes too dark in an office because a blind is closed, for example, the lighting is switched on to compensate for the lack of brightness. As a result, electrical energy is consumed by the lighting at a time when there is actually enough daylight available. A more efficient solution is the automatic control of the angle of the louvres to take account of the position of the sun.

The louvres are opened just enough to ensure that sufficient daylight enters the room and direct glare is prevented. Using special light-guiding louvres the incidence of light is improved. In conjunction with a constant lighting control, which ensures that the minimum of lighting is used to maintain the required brightness, a large share of the electrical energy can be conserved. From the studies mentioned previously in this brochure, an automatic blind control can be implemented in conjunction with a presence dependant constant light control providing potential savings up to 40 % compared to manual operation of the lighting system.

Blind control with Shutter Control Unit (JSB/S):
An optimum incidence of external light with minimum glare results from the sun position-dependent control and the opening angle of the louvers.



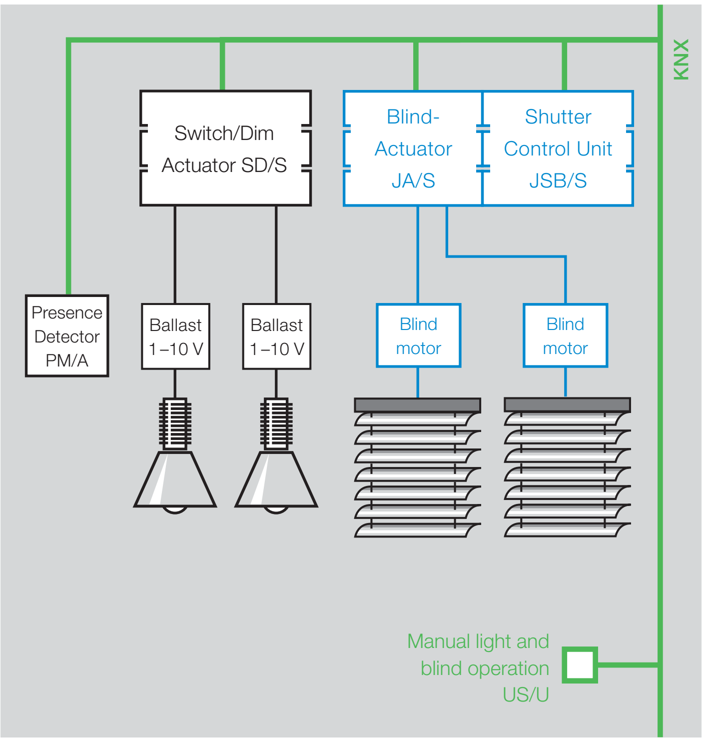
Optimisation variant 2b: Blind control for optimised climate control

Concerning the question of energy efficiency in buildings, blind control also plays an important role with regard to climate control. An intelligent blind control system has an optimising effect on building climate control and supports the user in a conservative and cost-optimised energy usage. The best results are achieved by networking the blind control with the systems for room climate control.

Closing the blinds on the facades of the building on which the sun is shining in summer, can prevent the rooms from heating up – saving energy that would be needed to cool the working areas. In winter the opposite is true. Here it is useful to capture as much solar heat as possible in the rooms – this saves energy when heating rooms.

In both cases it is necessary to balance the “climate control” of the blinds with the presence of people in a room. As long as someone is working in a room, the light-dependent blind control should have priority, particularly with PC workstations, but also in schools or conference rooms. All ABB i-bus® KNX blind actuators feature a heating/cooling automatic as standard for climate control of the blinds. For optimisation of the usage of daylight, an additional Shutter Control Unit JSB/S can be used. As is evident in the study from the Biberach University of Applied Sciences (see page 8), a climate control involving the blinds reduces the electrical energy required by the air conditioning system by up to 30 %.

Optimisation variant 2b



Optimisation example 3

Heading, ventilation, cooling

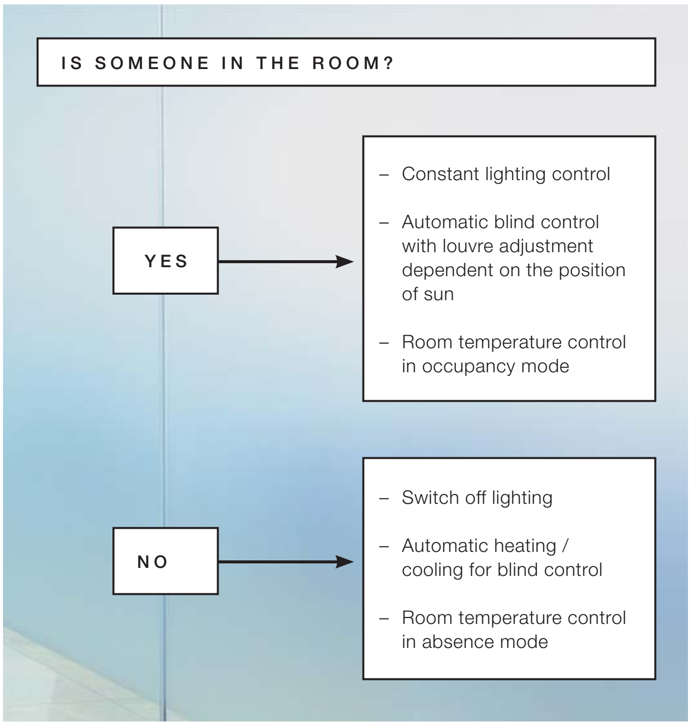
The technical systems for controlling room temperature and air quality consume the largest share of energy in a building. Accordingly, the largest savings can be made here. Incorrect operation can lead to an expensive waste of energy. Energy consumption can be greatly reduced by optimisation of a building with regard to the architecture, construction and installation engineering.

On a room level, ABB i-bus® KNX intelligent building control supports the user in optimisation of the energy consumption and provides information to the installation engineering or the building control engineering for optimisation of the setting parameters. A presence detector used for control of the room lighting can simultaneously switch the room thermostat to absent mode as soon as the room is unoccupied for an extended period. Heating or cooling energy can be conserved in this way.

Practical experience has shown that the reduction of the room temperature by 1 °C can reduce the consumption of heating energy by 6 %. If the room temperature is reduced by 3 °C during absence, 18 % of the heating energy can be saved in a non-occupied room. As the temperature level typically reacts slowly, this form of control is only useful for prolonged absences.

Linking the control to a seasonal blind control provides further savings in energy, as described in the optimisation example for blind control (see pages 16 and 17).

Electrical control valves – such as Electromotor Valve Drives (ST/K) with direct KNX connection or Electrothermal Valve Drives (TSA/K), which are controlled noiselessly via Electronic Switch Actuators (ES/S) – are used as control elements for automatic adjustment of the room temperature to the required temperature level. To avoid unnecessary energy consumption during ventilation, the control valves are closed automatically as long as a window is opened. The position of the valves can be used for feedback purposes as an indication of heating or cooling requirement in the building. The relevant systems can set their output to suit the current requirements.



- Constant lighting control
- Automatic blind control with louvre adjustment dependent on the position of sun
- Room temperature control in occupancy mode

- Switch off lighting
- Automatic heating / cooling for blind control
- Room temperature control in absence mode

If blower convectors or fan coils are used for room temperature and air quality control, they can also be controlled via KNX with the assistance of the Fan Coil Actuator (FCA/S).

Many optimisation possibilities in new and renovated buildings are provided by ABB i-bus® KNX through networking of all the building engineering systems.

The calculations on which the European Standard EN 15232 is based, spectacularly prove this fact with the demonstrated potential savings of thermal energy (see page 7).

Control and optimisation

It is only really useful to implement optimisation measures if you are aware of how much energy you are consuming. The ABB i-bus® KNX Meter Interface Module (ZS/S) enables the recorded meter values to be evaluated and visualised. The KNX technology is extended further by the use of electronic energy meters. The building operator can simply read the energy consumption values and quickly optimise them.

Busch ComfortPanel® 16:9 Touch display

Electronic energy meters in conjunction with the KNX Meter Interface Module ZS/S deliver real time energy consumption values onto the KNX bus system

References from ABB
ABB i-bus® KNX setting concrete efficiency benchmarks

Bezau Secondary School in Vorarlberg, Austria: Reduction of the energy consumption from 160 to 25 kWh

Via ABB i-bus® KNX the lighting of the school is controlled using presence detection, external brightness and timer programs.

The heating saves energy through individual room temperature control utilising a central timer and visualisation system.

The blind control has been praised by teaching staff and students alike, because it prevents unnecessary heating-up of the rooms using automatic shading and provides a tangible level of comfort.

All room states are visualised at a central point via KNX.

Through utilising ABB i-bus® KNX and modernising the building shell, the energy consumption of the school is now just over 25 kWh per square metre annually – 84 % less than before!

School Centre in Neckargemünd, Baden, Germany: Only a third of the previous energy consumption levels

Following a fire in 2003, the school centre was rebuilt to passive house standard.

The new building is about 14,000 square metres extending over three floors. It incorporates 206 rooms, 42 of which are class rooms, 51 are used as specialist rooms.

The KNX installation consists of 14 lines with a total of 525 KNX components.

The individual applications are:
- Timer control of the lighting
- Presence detection in the toilets
- Blind control with automatic heating / cooling function (When a room is not in use, the blinds remain open in winter and closed in summer)

The use of construction measures and the introduction of an intelligent building control has reduced the energy consumption in the new building to about a third of the "old" consumption figure.

ABB Centre in Odense, Denmark: 13 % energy savings through KNX technology

The building incorporates 123 rooms on three floors.

The KNX installation consists of 14 lines with a total of 645 ABB i-bus® KNX components.

In addition to automation of the heating and cooling systems (presence-dependent, time controlled), particular emphasis was placed on constant lighting control.

Proven facts after one year of operation:
In the open-plan offices, a saving of 13 % of the electrical energy could be verified for the lighting after a comparison of the previous and current consumption measurements. In the measured area, this corresponds to a saving of 29 kWh per day or (at a kWh price of 0.15 €) 4.35 Euro per day!

Museum “Arte Moderna” in Rovereto, Italy: About 28 % energy savings through KNX technology

The museum is one of the most important exhibitors of contemporary art in Italy. ABB i-bus® KNX technology is used primarily for control of the lighting. The individual functions are automatic lighting control, timer control and light scenes.

In a comparison to 2006 and after installation of KNX in 2007, an energy saving of about 28 % can be seen.
The power consumption values have been reduced by more than 38,000 kWh per month.

The museum has saved almost 80,000 Euro in the first year of usage of the KNX system.

Pioneers of KNX technology
ABB – a worldwide leader in power and automation technologies

The ABB Group of companies operates in around 100 countries and employs about 100,000 people. The business fields – Power Products, Power Systems, Automation Products, Process Automation and Robotics – enable customers to improve performance while lowering environmental impact.

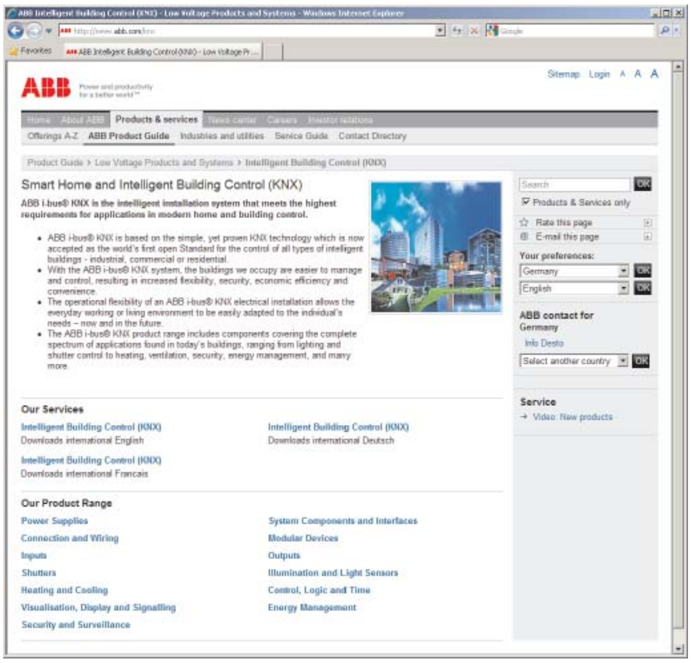
Almost 30 years of experience in intelligent building control are the hallmark of our range in this area. We develop, produce and distribute a wide range of products for building installation.

The development and further improvement of ABB i-bus® KNX technology demonstrates the resourcefulness and dedication of our engineers in many areas. ABB plays a leading role in the KNX Association, an organisation of more than 150 international manufacturers promoting the intelligent building control standard KNX.

With the ABB i-bus® KNX, we provide leading-edge technology, which continually sets benchmarks on a global scale.

Further information about the ABB i-bus® KNX can be found on the Internet at:

http://www.abb.com/knx



Smart Home and Intelligent Building Control (KNX)

ABB i-bus® KNX is the intelligent installation system that meets the highest requirements for applications in modern home and building control.

- ABB i-bus® KNX is based on the simple, yet proven KNX technology which is now accepted as the world's first open Standard for the control of all types of intelligent buildings - industrial, commercial or residential.
- With the ABB i-bus® KNX system, the buildings we occupy are easier to manage and control, resulting in increased flexibility, security, economic efficiency and convenience.
- The operational flexibility of an ABB i-bus® KNX electrical installation allows the everyday working or living environment to be easily adapted to the individual's needs – now and in the future.
- The ABB i-bus® KNX product range includes components covering the complete spectrum of applications found in today's buildings, ranging from lighting and shutter control to heating, ventilation, security, energy management, and many more.

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