



**Smart home and building solutions.
Global. Secure. Connected.**

Introduction



Introduction

More convenience, more safety, higher energy savings: The demand for building management systems is continuously increasing.

Whether in a single-family house or in an office complex, the demand for comfort and versatility in the management of e.g. air-conditioning, lighting and access control systems is growing.

At the same time, the efficient use of energy is becoming increasingly important. More convenience and safety coupled with lower energy consumption can however only be achieved by intelligent control and monitoring of all products involved.

This however implies more wiring, running from the sensors and actuators to the control and monitoring centres. Such a mass of wiring in turn means higher design and installation effort, increased fire risk and soaring costs.



The Answer: KNX

In order to transfer control data to all building management components, a system is required that does away with the problems of isolated devices by ensuring that all components communicate via one common language: in short, a system such as the manufacturer and application domains independent KNX Bus.

This system is based upon more than 27 years of experience in the market. Via the KNX medium (twisted pair, radio frequency, power line or IP/Ethernet-WIFI), to which all bus devices are connected, they are able to exchange information. Bus devices can either be sensors or actuators needed for the control of building management equipment such as: lighting, blinds / shutters, security systems, energy management, heating, ventilation and air-conditioning systems, signalling and monitoring systems, interfaces to service and building control systems, remote control, metering, audio / video control, white goods, etc. All these functions can be controlled, monitored and signalled via a uniform system without the need for extra control centres.



Meaning of the KNX slogan

Smart home and building solutions. Global. Secure. Connected.

Global means:

References all over the world: the world of home and building control “speaks” KNX. Several million successful KNX installations can be found not only all over Europe but also in Asia and North and South America – a proof of just how attractive the KNX approach is.

Over 400 KNX member companies worldwide offer almost 7,000 KNX certified product groups in their catalogues, from different application domains.

KNX is moreover approved as an International Standard (ISO/IEC 14543-3) as well as a European Standard (CENELEC EN 50090 and CEN EN 13321-1) and Chinese Standard (GB/T 20965).

KNX is therefore future proof. KNX products made by different manufacturers can be combined – the KNX trademark logo guarantees their interworking and interoperability. KNX is therefore the worldwide Standard for control in both commercial and residential buildings.

Secure means:

KNX provides the possibility to secure its communication through authentication and/or encryption, based on the internationally standardised AES128 algorithms.

Connected means:

Since over 10 years, KNX installations can be seamlessly coupled to IP networks through the KNXnet/IP protocol. Hundreds of solutions already exist in the market to make this possible: through the KNX IoT project, KNX hopes to further standardize these solutions.

Smart home and building solutions means:

A benefit in every type of building: From the office complex to the average household. Whatever the kind of building is, KNX opens up complete new opportunities for building control systems while keeping the costs at a manageable level. KNX can provide solutions that could only be realized with considerable effort with conventional installation techniques. Via a single touch panel, all applications in the home or building can be controlled. From heating, ventilation and access control to the remote control of all household appliances – KNX allows completely new ways of increasing comfort, safety and energy savings in a home or building.



KNX is approved as:

- International Standard (ISO/IEC 14543-3-1 to 7)
- European Standard (CENELEC EN 50090 and CEN EN 13321-1 and 13321-2)
- Chinese Standard (GB/T 20965)
- ANSI/ASHRAE Standard (ANSI/ASHRAE 135)
- Australian and New Zealand Technical Specification



Convergence of Batibus, EIB and EHS

The predecessor specifications to KNX: Batibus, EIB and EHS, came into being in the early 1990s. In 1997, the three consortia in charge of the above mentioned specifications decided to join forces. The KNX specification was published by the newly set-up KNX Association in the spring of 2002. It is based on the EIB specification, supplemented with new configuration mechanisms.

CENELEC

In December 2003, the KNX protocol as well as two of its media, TP (twisted pair) and PL (power-line) were approved by the European national standardization committees and ratified by the CENELEC Bureau Technique as the EN 50090 European Standard. The KNX Radio Frequency communication medium was approved in May 2006.

CEN

As KNX increasingly provides specifications that are not only used for the automation of electrical installation equipment, but also for HVAC applications, KNX Association also proposed its specifications to CEN for publication as a European standard for building automation control systems. CEN accepted the proposal and the KNX specifications were published by CEN as EN 13321-1 and EN 13321-2.

ISO/IEC

In view of the large interest in KNX compatible products outside European countries and its proven technology, KNX Association also initiated the necessary steps to have the KNX standard approved on an international level. Countries active in CENELEC proposed the European EN 50090 norm for standardization by ISO/IEC at the end of 2004. In November 2006 the KNX protocol, including the transmission media TP, PL and RF, was approved for publication as the ISO/IEC 14543-3-1 to 7 International Standard. This makes KNX the worldwide standard for home and building control.

SAC

The great interest in China in compatible KNX products and KNX technology was the main reason for KNX Association to have the international ISO/IEC 14543 standard translated into Chinese. The Chinese standardisation committee SAC TC 124 introduced the KNX standard in China and adopted it as standard GB/T 20965 in May 2013.

ANSI/ASHRAE

Also the coupling of KNX to other automation systems is internationally standardized: both the US ANSI/ASHRAE standard 135 as well as the ISO 16484-5 include mapping between KNX and BACnet.

Standards Australia

Also in Australia and New Zealand, local standardization investigated ways to adopt the KNX standard locally. In 2017, KNX became a Technical Specification Down Under.

10 Advantages of KNX

1 International Standard, therefore future proof

KNX complies to

- The International Standard ISO/IEC 14543-3-1 to 7,
- The European Standard series EN-50090 (CENELEC),
- The European Standards EN 13321-1 and EN 1332-2 (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).

2 Through product certification, KNX guarantees interoperability and interworking of products

The KNX certification process ensures that different products of different manufactures used in different applications operate and communicate with each other. This ensures a high degree of flexibility in the extension and in the modification of installations.

3 KNX stands for high product Quality

KNX Association requires a high level of production and quality control during all stages of the product's life. Therefore all manufacturing members have to show compliance with ISO 9001.

4 A Unique Manufacturer Independent Engineering Tool Software: ETS®

The PC software tool ETS allows the design, engineering and configuration of installations based on KNX certified products. The tool is moreover manufacturer independent: the system integrator is able to combine products of different manufacturers into one installation.

5 KNX can be used for All Application Areas in home and building control

KNX can be used for all possible functions / applications in home and building control ranging from lighting and shutter control to security, heating, ventilation, air conditioning, monitoring, water control, energy management, metering as well as household appliances, audio and lots more.

6 KNX is fit for use in different kind of buildings

KNX can be used in both new as well as existing buildings. KNX installations can therefore be easily extended and adapted to meet new requirements, with little time and financial investment (e.g. when new tenants move into a commercial building).

7 KNX supports different configuration modes.

- Easy installation (E-mode): Configuration is done without the help of a PC but with for instance a central controller or via push buttons located on the products.
- System installation (S-mode): Planning of the installation and configuration is done via a PC with the installed ETS Software.



8 KNX supports several communication media

- KNX TP (separate bus cable)
- KNX PL (existing mains network)
- KNX RF (via radio signals)
- KNX IP (via Ethernet or WIFI)

9 KNX can be coupled to other systems

Several KNX manufacturers offer gateways to other networks, i.e. to other building automation systems, telephone networks, multimedia networks, IP networks, etc. KNX systems can be mapped to BACnet objects (as documented in the international standard ISO 16484-5) or offer the possibility to interface with the DALI technology.

10 KNX is independent from any hard- or software technology

KNX can be realized on any microprocessor platform. KNX can be implemented from scratch, but for easy market entrance, KNX manufacturers can also take recourse to providers of KNX system components. For KNX members, the use of the KNX standard is completely FREE of additional royalty fees.

Configuration Modes

The KNX standard allows each manufacturer to select the most ideal configuration mode according to the target market, allowing each manufacturer to choose the right combination of target market segment and application.

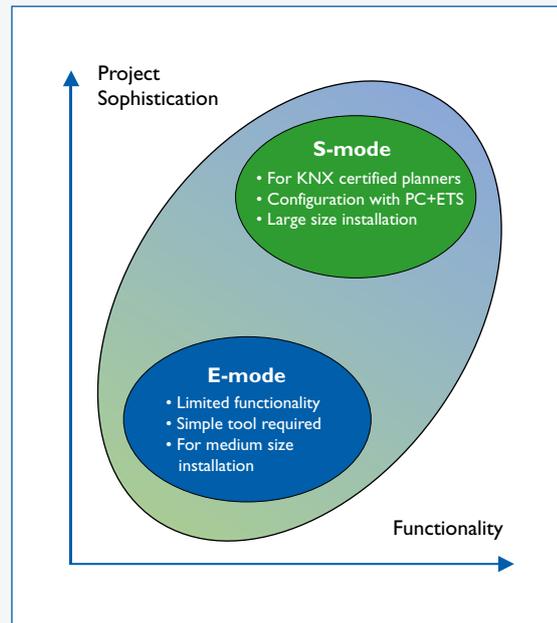
The KNX Standard includes two different configuration Modes:

S-Mode (System Mode)

This configuration mechanism is intended for qualified KNX installers to realise sophisticated building control functions. An installation consisting of “S-Mode” components can be planned by a common software tool (ETS® Professional) on the basis of product descriptions provided by S-Mode product manufacturers: ETS is also used to link the products and configure them (i.e. set the available parameters as required by the installation and download). “S-Mode” offers the highest degree of flexibility for the realisation of building control functions. Since 2017, KNX also offers the ETS Inside software, which allows to design, commission and diagnose installations with the help of mobile devices (e. g. tablets). The intuitive user interface helps KNX newcomers to manage smaller size installations without much prior training.

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. E-Mode components



are already pre-programmed and loaded with a default set of parameters. With a simple configurator, each component (mainly its parameter settings and communication links) can be partly reconfigured.

Communication Media

Apart from the two configuration modes, the KNX standard includes several communication media. Each communication medium can be used in combination with one or more configuration modes, which allows each manufacturer to choose the right combination for the target market segment and application.

TP (Twisted Pair)

This communication medium, twisted pair, bitrate 9600 bits/s, succeeded EIB. The EIB and KNX TP certified TP products will operate and communicate with each other on the same busline.

PL (Powerline) • PLI I0 FSK, PLI I0 OFDM

This communication medium, power line, bitrate 1200 bits/s, is also a successor to EIB. EIB and KNX PLI I0 certified products will operate and communicate with each other on the same electrical distribution network.

RF (Radio frequency)

KNX devices supporting this communication medium use radio signals to transmit KNX telegrams. Telegrams are transmitted in the 868 MHz (Short Range Devices) frequency band, with a maximum radiated power of 25 mW and bitrate of 16.384 kbps. Other frequencies are defined in the KNX standard for regions other than Europe. The KNX RF medium can be developed with off the shelf components, allows uni- and bidirectional implementations, is characterized by low power consumption, and for small and medium size installations only requires retransmitters in exceptional cases. It is available as a single and a multi channel solution.

IP (Ethernet/WIFI)

As documented in the KNXnet/IP specifications, KNX telegrams can also be transmitted encapsulated in IP telegrams. In this way, LAN/WIFI networks as well as the Internet can be used to route or tunnel KNX telegrams. As such, IP routers are an alternative to USB data interfaces or TP line or backbone couplers. In the latter case, the normal TP backbone is replaced by a fast Ethernet based line.

Tools

ETS (Engineering Tool Software) is the only software for the design, startup and operation of KNX systems that is manufacturer independent and compatible with all KNX products.

Alongside ETS, KNX Association offers additional tools for installers and developers for the universal

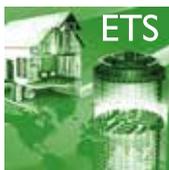
application of KNX. For KNX installers, ETS Apps are offered, which allow to extend the functionality of the ETS program. For developers these are the Falcon Library and the EITT Analysis and Simulation tools.

You can find all the KNX tools at: www.knx.org/knx-en/software/



ETS® – Project planning, Design & Commissioning of KNX Installations, Manufacturer and Product Independent

ETS means Engineering Tool Software; a manufacturer and product independent configuration tool Software to design and configure intelligent home and building control installations based on the KNX system. ETS is a software that runs on Windows® platform based computers. KNX Association as founder and owner of the KNX Standard offers in ETS a configuration tool that is de facto a part of the KNX Standard. Since 2017, the ETS offer is extended with the ETS inside, a version of ETS that can run on mobile platforms like tablets.



ETS Apps – Extensions to the functionality of the ETS Software tailored to the specific needs of KNX system integrators

An ETS App is an add-on software program that is used together with ETS Pro/Lite. The purpose of an ETS App is to extend the functionality of the ETS Software according to the specific needs of KNX system integrators. Any existing software can be adapted to the ETS App interface by using the ETS SDK. Moreover, when a new ETS App is created and is available to the users, there is no need to recompile ETS. It is plug & play software! An ETS App is similar to add-ons for internet browsers or apps for smartphones.



Falcon Driver Library – Full Bus Access guaranteed

The Falcon Driver Library is the high performance. NET based Windows library for accessing the KNX network (KNX bus). Falcon allows by default bus access via LAN, but also via other interfaces like USB.

As the standard access module to the KNX network, Falcon is also used by ETS and EITT as well.



KNX Manufacturer Tool

The KNX Manufacturer Tool is the central and manufacturer independent tool for the creation of KNX compliant product descriptions. KNX manufacturers need the tool in order to:

- create and test ETS product descriptions
- have these product descriptions certified by KNX Association

After certification, KNX manufacturers offer their product descriptions as downloadable product catalogues, mostly through the Internet or via the ETS “Online Catalogue App”.



EITT – Putting KNX Devices Through their Paces

EITT is a special analysis tool for KNX devices and installations. It is primarily used by manufacturers and test laboratories for testing, trouble shooting and monitoring. EITT is also a powerful tool for the analysis and simulation of the KNX device network protocol. EITT supports tests through multiple interfaces at the same time. KNX telegrams are recorded online and can be analysed based on a multitude of filter criteria.

Be part of an International Community

KNX is the global organization for:

- **KNX Members:** manufacturers providing KNX solutions in the market.
- **KNX National Groups:** KNX country organizations grouping local representatives of KNX members (and in some cases also KNX users) in a given country.
- **KNX Training Centres:** conveying knowledge on the KNX system to interested parties according to the requirements established by KNX Association. Only KNX certified training centres are able to grant persons a KNX Partner certificate.
- **KNX Partners:** are KNX certified contractors/system integrators, having successfully passed the KNX exam at a KNX certified training centre.
- **KNX Scientific Partners:** are technical institutes such as universities and/or research bodies collaborating with KNX in order to enhance the teaching of home and building control in general and KNX in particular to the institute's students and to carry out Research on KNX related matters.



- **KNX Associated Partners:** strategic alliances forged by KNX with other International Associations.
- **KNX Professionals / User Clubs:** official national clubs grouping representatives of system integrators working with KNX devices in a given country.
- **KNX Test Labs:** Accredited KNX Test Labs that carry out the software testing of a KNX device. These are neutral Test Laboratories that work independently from the manufacturers.

420 KNX Members in 44 countries



44 KNX National Groups



440 Training Centres in 68 countries



+ 74,000 KNX Partners in 190 countries



140 Scientific Partners in 33 countries

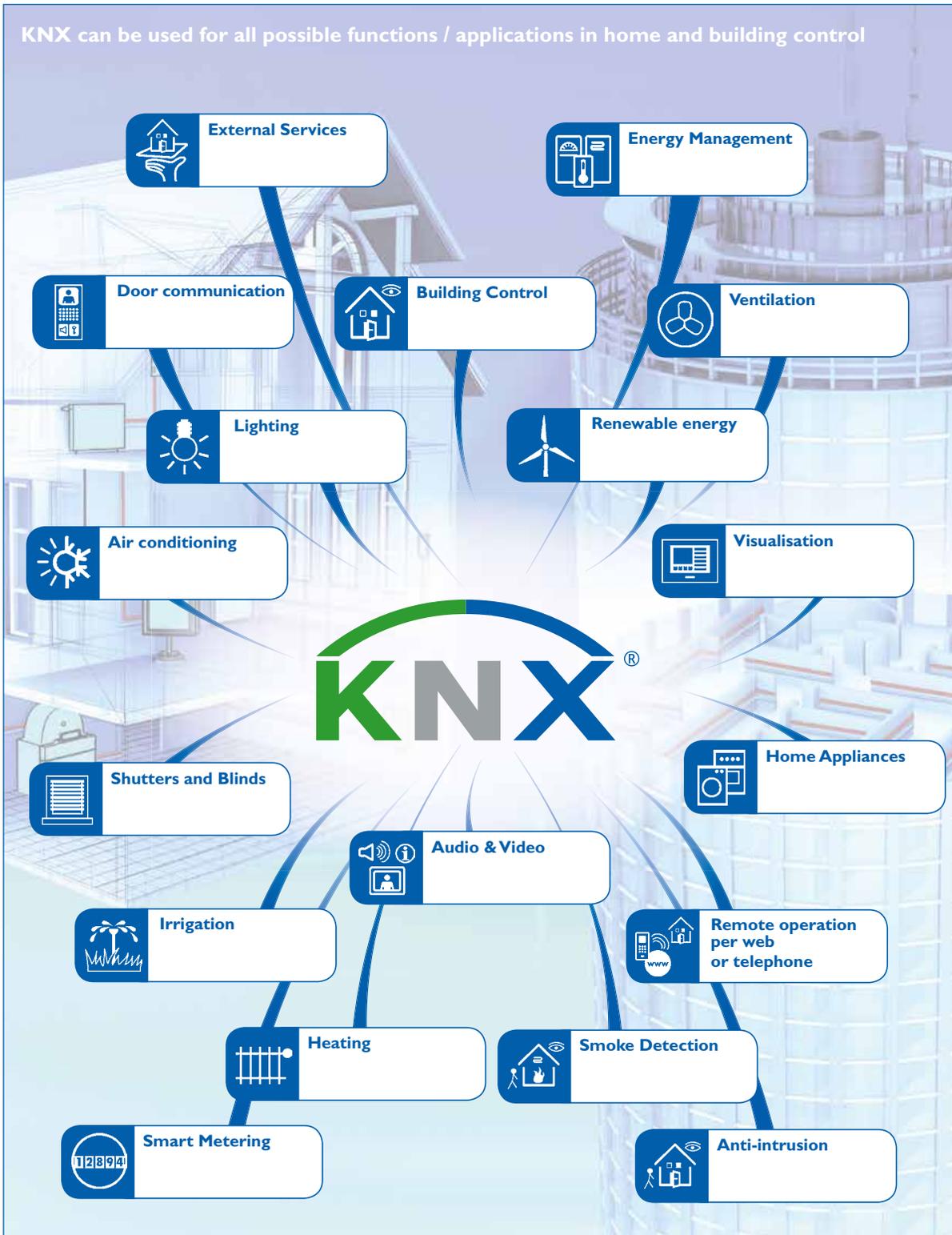


21 Userclubs & Professionals in 19 countries



Applications

KNX can be used for all possible functions / applications in home and building control



ISO/IEC 14543 • CENELEC EN 50090 • CEN EN 13321



KNX MEMBERS | 420 Manufacturers from 44 Countries



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