



UNIVERSITATEA
Petru Maior
din
T Î R G U M U R E Ș

Raport privind Dezvoltarea competențelor și abilităților de interpretare și utilizare a standardelor de automatizare a clădirilor

CNFIS FDI 2017 0094

10/26/2017

Universitatea "Petru Maior" din Tîrgu Mureș

Conf. dr. ing. Mircea Dulău

ICADSI

**Îmbunătățirea calității activității didactice în științe inginerești la
Universitatea „Petru Maior” din Tîrgu Mureș**



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TÎRGU MUREŞ

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Îmbunătățirea calității activității didactice în științe
ingineresti la Universitatea „Petru Maior” din Tîrgu Mureş

Agenda



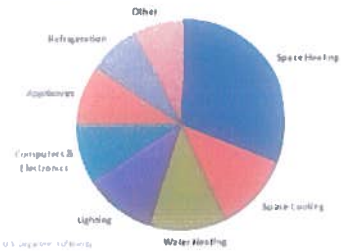
- De ce să automatizăm ?
- Ce putem automatiza într-o clădire
- Tipuri de automatizări în clădiri
 - Iluminat
 - Jaluzele
 - Climatizare
- Automatizări cu bus - Un pic de tehnică
- Design
- Studii de caz
- Referințe

De ce automatizări în clădiri?



Un procent important din energia necesară unui oraș este consumată în clădiri!

How Residential Energy is Used: U.S. Households



Distribuția
~ 38% comercial
~ 36% rezidențial
~ 26% industrial

Ce sunt automatizările în clădiri?



Automat = "Dispozitiv, aparat, mașină care efectuează o anumită operație fără intervenția omului". (DEX)

Cele mai frecvente automatizări sunt cele bazate pe:


- Temporizare
- Detectia miscarii
- Detectia prezentei
- Detectia conditiilor meteo: ploaie, vant, inghet, stralucirea soarelui
- Programe de timp (zilnic, saptamanal etc.)
- Detectia/mentinerea nivelului de iluminat din incapere

Automatizări în clădiri - tipuri




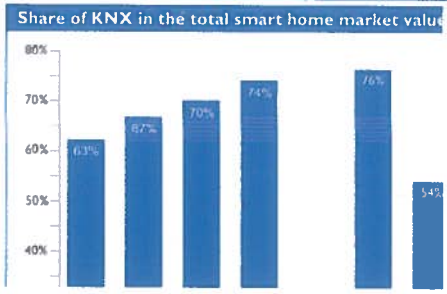
- Automatizări simple bazate pe un aparat de sine statator (senzor de mișcare, automat de casa scării, programator orar)
- Automatizări cu logică centralizată – alicatii simple sau mici bazate pe un singur computer/controler care gestionează întreaga clădire
 - ex. Honeywell a folosit până în anii '90 aproape în exclusivitate soluții cu logică centralizată)
- Automatizări cu logică descentralizată – aplicații complexe, clădiri mari – aparatele care compun sistemul au independența în funcționare iar, pentru realizarea funcțiilor și scenariilor acestea comunică prin intermediul unei magistrale (BUS)
 - Ex: BACnet – dezvoltat de ASHRAE, LON – dezvoltat de firma Echelon, KNX – dezvoltat în anii '80 de EIB Association

Ce este KNX?




- Solutie de automatizare pentru cladiri, bazata pe logica descentralizata
- Peste 25 de ani de experienta
- Standard international (ISO/IEC 14543-3, EN-50090)
- Solutia "KNX" este libera de orice patent sau marca, astfel astazi sunt:
 - >400 de producatori din 41 de tari ce folosesc KNX
 - ~7500 de produse certificate
 - >400 de centre de training in 66 de tari
 - ~70000 specialisti certificati din 158 de tari


Popularitatea standardului KNX

Share of KNX in the total smart home market value


Conform BSRIA, KNX este lider european al pietei "Smart Home"

Cladiri




KNX poate fi utilizat pentru cele mai diverse categorii de cladiri

- Noi sau existente
- Mici si mari
- Cu destinatie speciala (aeroporturi)




Instalatiile KNX pot fi uşor extinse şi adaptate noilor cerinţe, rapid şi cu investiţie mică (ex: când noi chiriaşi se mută într-o clădire comercială)

Integrare




- KNX poate fi interconectat cu multe alte solutii de automatizari
- Mai multi producatori KNX oferă o paleta larga de interfețe către alte protocoale, ca de exemplu:
 - alte sisteme de automatizare comunicante (Modbus, M-bus, LON, BACnet etc),
 - utilizand reţele dedicate si reţele IP
 - sau oferă posibilitatea de integrare cu solutii dedicate - de ex. DALI, Digital Addressable Lighting Interface

Avantajele automatizarilor pentru cladiri



- Un nivel crescut de:
 - Eficienta energetica
 - Confort
 - Siguranta
 - Flexibilitate
- Utilizand automatizari KNX puteti obtine, conform datelor statistice:
 - până la 40% economii la racire prin controlul jaluzelelor,
 - până la 50% economii la incalzire prin controlul individual al fiecărei camere,
 - până la 60% economii la iluminat prin controlul acestuia folosind detectia de prezenta coroborata cu functia "constant lighting".

Aplicatii



KNX - un standard complet care este utilizat pentru toate functiile/aplicatiile posibile în controlul casei şi clădirii:

- iluminat
- sisteme de umbrire
- securitate
- încălzire
- ventilatie
- aer conditionat
- monitorizare
- controlul apei
- managementul energiei
- controlizare
- inclusiv controlul aparatelor electrocasnice, audio
- şi multe altele.



Ce poate controla sistemul KNX

Clasele de eficienta energetica a cladirilor

• Din punctul de vedere al eficientei energetice, standardul EN15232 departajeaza cladirile in patru clase A,B,C,D

High energy performance BACS and TBM

A

Advanced BACS and some specific TBM functions

B

Standard BACS

C

Non energy efficient BACS

D

Cerintele claselor de eficienta energetica

prEN 15232:2007 (E)

Table 1 – Function list and assignment to energy performance classes

	Definition of classes							
	Residential				Non residential			
	D	C	B	A	D	C	B	A
AUTOMATIC CONTROL								
HEATING AND COOLING CONTROL								
Emission control								
The control system is installed at the emitter or room level for case 1 one system can control several rooms								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
DAYLIGHT CONTROL								
0								
1								
BLIND CONTROL								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								

Cerintele claselor de eficienta energetica - continuare

	Definition of classes							
	Residential				Non residential			
	D	C	B	A	D	C	B	A
LIGHTING CONTROL								
Occupancy control								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
DAYLIGHT CONTROL								
0								
1								
BLIND CONTROL								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								

Cerintele claselor de eficienta energetica - continuare

	Definition of classes							
	Residential				Non residential			
	D	C	B	A	D	C	B	A
VENTILATION AND AIR CONDITIONING CONTROL								
Air flow control at the room level								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
HOME AND BUILDING AUTOMATION SYSTEM								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								

Exemple de masuri necesare pentru clasificare – cont.

Clasa D

- Fara control de temperatura (robinele termostactice)
- Temperatura agentului termic este fixa
- Control manual al iluminatului
- Jaluzelele, daca sunt, cu comanda manuala

Clasa C

- Control centralizat al temperaturii
- Temperatura agentului termic ajustata in functie de temperatura exteroara
- Jaluzele motorizate, controlul poate fi manual

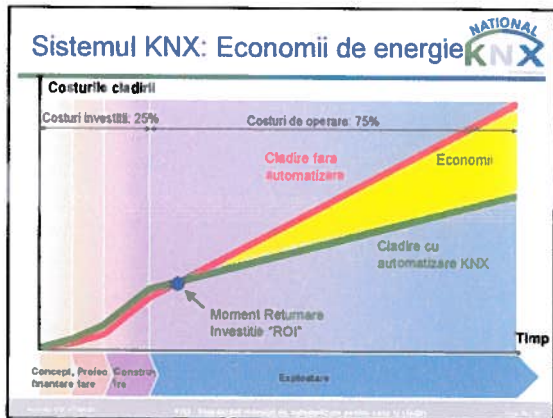
Exemple de masuri necesare pentru clasificare

Clasa B

- Termostate in fiecare camera
- Temperatura agentului termic ajustata in functie de temperatura exteroara
- Controlul iluminatului cu automat de casa scarilor
- Jaluzele cu actionare electrica automatizata

Clasa A

- Termostate in fiecare camera, comunicante
- Regimul de temperatura este modificat in functie de prezenta/cerere
- Controlul iluminatului dupa prezenta/cerere
- Jaluzele cu actionare electrica
- Control integrat si optimizat pentru jaluzele, iluminat si HVAC!



Aplicatii practice

Automatizarea iluminatului

Cele mai frecvente automatizari sunt cele bazate pe

- Detectia miscarii
- Detectia prezentei
- Conditile meteo:
 - stralucirea soarelui,
 - ploaie,
 - vant,
 - inghet,
- Programe orare/zilnice/anuale
- Detectia nivelului de iluminat din incapere

Sa vedem cateva exemple tipice!

Senzori de miscare – utilizarea pe coridoare

- Se evita accidentele
- Lumina se stinge automat dupa un timp
- Nu se aprinde daca este suficienta lumina naturala
- Economii pana la 90%

Senzori de miscare – alte exemple

- Holuri
- Scari
- Dressing...

Senzori de prezenta

NATIONAL KNX

- Confort
- Economie
- Lumina se stinge automat
- Lampile nu se aprind daca este suficienta lumina naturala dar...
- Porneste climatizarea!



Lumina si climatizarea pornesc automat... doar cafeaua ne-o luam singuri!

Programatoare orare si temporizatoare

NATIONAL KNX

- Asigura iluminatul spatilor comune
- In diferite intervale orare pot fi nivelun de iluminare difente
- Economie de energie




Scenarii

NATIONAL KNX

- Focalizarea atentiei la conferinta
- Confort
- Optimizarea consumului
- Includ comanda climatizarii, a jaluzelelor, ecranului, proiectorului, instalatiei audio etc



Ex scenarii: Discute, Prezentare Power Point, Film, Pauza

Automatizarea jaluzelelor

NATIONAL KNX

- Tipuri de jaluzele

Roller blinds	Slat shutters	Roof windows
Pool covers	Home video screens	Garage doors (Gates)



Controlul automat al jaluzelelor

NATIONAL KNX

- Jaluzelele coboara automat cand soarele radiaza prea puternic asigurand un nivel de iluminat placut si racoare in cladire
- Unghiul lamelelor se ajusteaza in functie de pozitia soarelui asigurand umbra (economii la racire) dar pastrand iluminatul natural
- La vant puternic, jaluzelele sunt retrase pentru a nu fi distruse



Controlul centralizat din holul de intrare
Control individual
Includerea in Scenarii

Controlul temperaturii

NATIONAL KNX

- Comutarea incalzire-racire se realizeaza in mod automat
- Controlerele KNX performante moduleaza permanent puterea de incalzire sau racire
- Daca o incapere este parasita senzorul de prezenta comanda trecerea in nivel "Stand-by"





Posibilitati de vizualizare si control



www.national-knx.com

Vizualizare: Touch panel



www.national-knx.com

Control de la distanta



www.national-knx.com

Aparate KNX – Tastere, senzori, actuatori




www.national-knx.com

Butoane si interefe



www.national-knx.com

Buton pe sticla si pe sub tencuiala



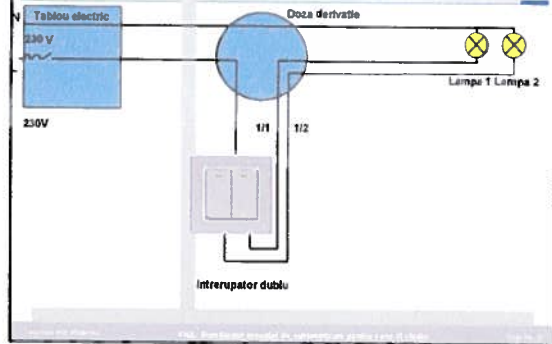
www.national-knx.com



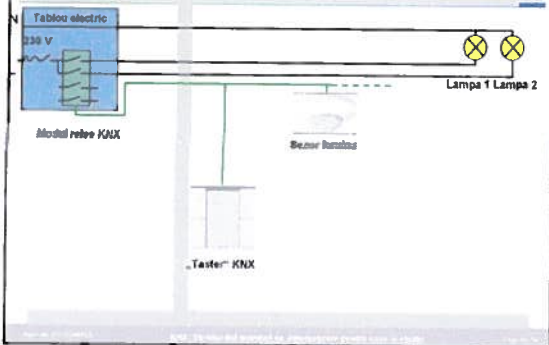
Un pic de tehnica



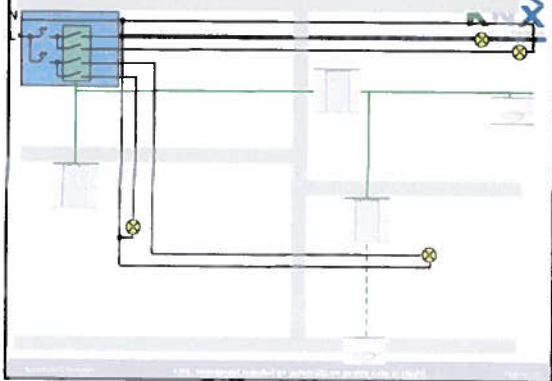
Instalatie clasica



Instalatie KNX



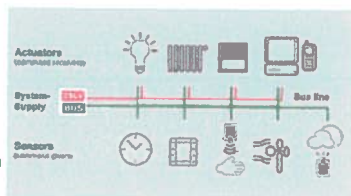
Exemplu instalarete KNX



Componentele sistemului KNX



- Cablu bus
- Senzori
- Actuatore
- Componente de baza



Cablul bus-ului



- Recomandam utilizarea cablurilor certificate KNX
- Functionalitate alimentare si transmisie telegrame
- Cablu: YCYM 2 x 2 x 0,8 sau J-Y (St) Y 2 x 2 x 0,8 EIB version



Topologia bus-ului

Note:
Nu se vor forma bucle inchise!
Nu sunt necesare rezistente de "inchidere" la capetele liniei KNX.

Lungimea liniei

Componentele sistemului KNX

Un sistem: 15Ari x 15 linii x 64elemente = ~14400 elemente!

Senzori

Push butoane, senzori (miscare, prezenta, crepuscul etc) intran binare sau analogice etc.
Funcionalitate: Pe baza informatiilor primite genereaza telegrame in sistem.

Actuatoare – elemente de executie

Module de releu, dimmere, module de control 1-10V, DALI, DMX
Funcionalitate: asculta telegramele pe care le convertesc in actiuni: aprind lumina, actioneaza jaluzelele, produc vizualizari

Actuatoare – elemente de executie

• De la 2 la 24 releu


Studiu de caz




Studiu de caz: Universitatea tehnica din Bremen




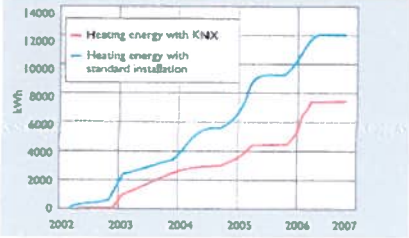

Studiu de caz: Universitatea din Bremen



- Cladirea are un consum specific de 60-75 kWh/m²
- Doua sali identice au fost selectate pentru studiu
- Prima are instalatie conventionala cu robinete termostatica pe radiatoare, iar cea dea doua este echipata are controlere de temperatura KNX, vane motorizate pe calorifere, microintrenupatoare la geamuri



Economii la incalzire


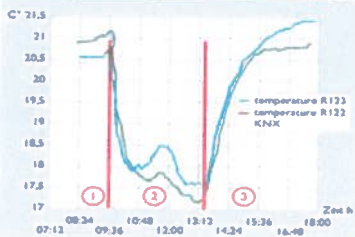



An	Heating energy with KNX (kWh)	Heating energy with standard installation (kWh)
2002	~1000	~1000
2003	~1500	~2500
2004	~2500	~4500
2005	~3500	~7500
2006	~5500	~10500
2007	~7500	~12500

- Economii de pana 50% s-au obtinut in conditiile in care temperatura a fost identica, chiar un pic mai mare (in medie cu 0,3 grade)
- Variatiile de temperatura fata de cea cea reglata au fost minime

Sursa: Universitatea din Bremen (Germania)

Confort – acuratetea temperaturii


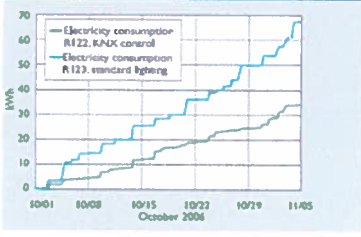



Zora h	temperatura R123 KNX (C)	temperatura R123 standard (C)
07-12	~18.5	~18.5
08-34	~19.5	~19.5
09-36	~18.5	~18.5
10-48	~18.5	~18.5
12-00	~18.5	~18.5
12-12	~18.5	~18.5
14-34	~18.5	~18.5
15-36	~19.5	~19.5
18-00	~20.5	~20.5

- Temperatura in sala cu KNX a fost in medie cu 0,3 grade mai mare
- Variatiile de temperatura fata de cea cea reglata au fost mai mici

Sursa: Universitatea din Bremen (Germania)

Economii la iluminat

Time	Electricity consumption R123 KNX control (kWh)	Electricity consumption R123 standard lighting (kWh)
00:01	~5	~5
00:08	~10	~10
00:15	~15	~15
10:22	~20	~20
10:29	~25	~25
11:05	~30	~30

- Doi senzori de lumina si doua variatoare controleaza cele doua randuri de lampi
- Detectia de prezenta a fost utilizata deasemenea


Sursa: Universitatea din Bremen (Germania)



Studiu de caz: Iluminat public Salzburg

NATIONAL KNX

- Datele instalatiei: 19,000 lampi, 2,9 megawatt,
- Suprafata: 65,65 km², 150000 locuitori
- Lampile sunt aprinse automat la 140lx (seara)
- Lampile sunt stinse automat la 40lx (dimineata)
- Cu 4 minute inainte de a se stinge toate lampile - fumizorul de energie electrica este informat automat
- Protectie impotriva comutarilor ON/OFF accidentale dese - se obtine o prelungire a duratei de viata al lampilor



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Studiu de caz: Iluminat public la Salzburg

NATIONAL KNX

Avantaje:

- Nivelul de iluminat și consumul de energie sunt optimizate
- Durata de viață a lampilor este prelungită
- Posibilitate de aprindere/stingere în regim manual, dacă este cazul - de ex. pentru intervenții, întreținere




Sursa: Asociația KNX

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Alte exemple

NATIONAL KNX



Terminal 5 – Aeroportul Heathrow
Soluția aplicată: Control automat al iluminării (KNX – DALI)


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Alte exemple

NATIONAL KNX

Hotel Garmisara – Geoagiu Bai

- Automatizarea include climatizarea și controlul de iluminat al camerelor
- Automatizarea camerelor este integrată la recepție



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Alte exemple

NATIONAL KNX

Hotel Cautis – Azuga

- Automatizarea include climatizarea camerelor și alimentarea cu energie electrică precum și "sincronizarea" regimului acestora cu "rezervările" din sistemul de management hotelier
- Importanță economii la gaz și energie electrică
- Soluția permite cantonizarea consumurilor și vizualizarea defectiunilor făcând astfel operarea mult mai facilă în condițiile utilizării unui personal calificat redus




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Alte exemple

NATIONAL KNX

Hotel Concordia – Tîrgu Mureș

- Automatizarea climatizării
- Controlul iluminatului
- Scenarii




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Alte exemple

NATIONAL
KNX

Stadionul National Arena

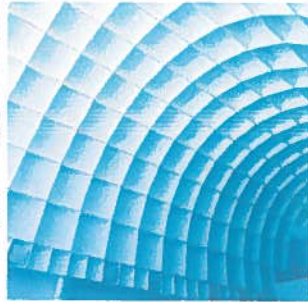
- Automatizarea include automatizarea iluminatului anumitor camere si spatii comune



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Intrebari ?

NATIONAL
KNX



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Va multumim!





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Agenda



- Basic arguments
- Topology
- Installation
- Communication
- Exercises
- Bus devices
- KNX and DALI
- Hotel applications
- Planning the installation
- ETSS – opt.
- Commissioning – opt.
- Documentation – opt.
- KNX trainings

Basic arguments



What is KNX?

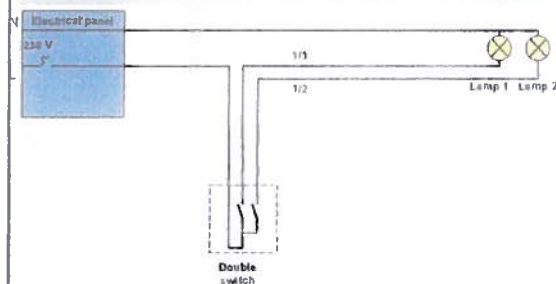


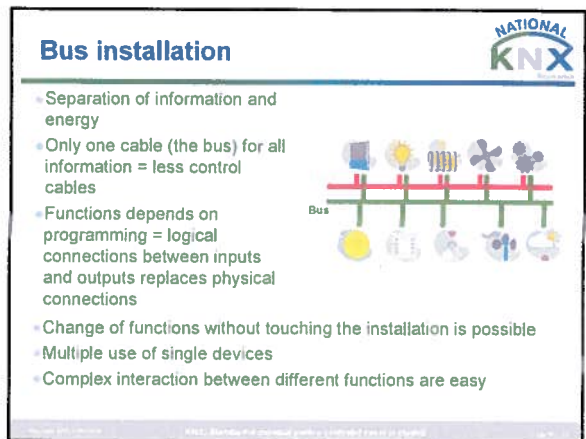
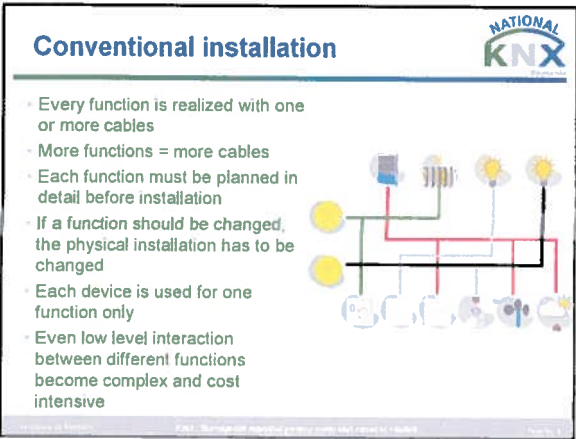
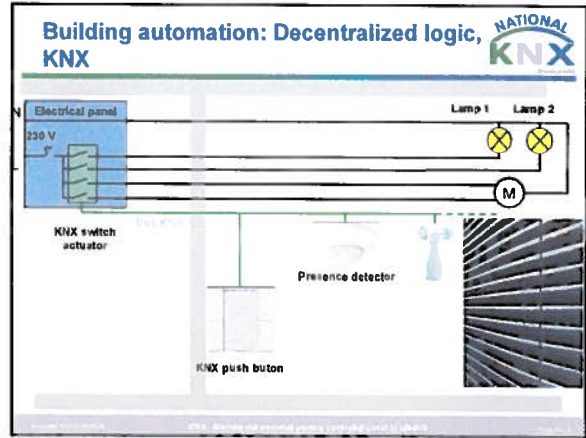
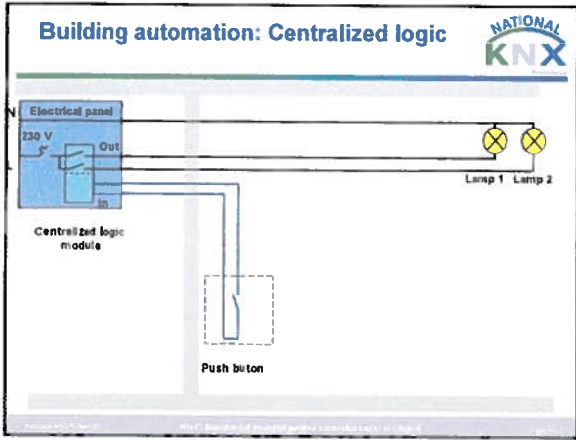
- The three letters “KNX” stands for:



- However....
- KNX is a bus system
- KNX is a world standard
- KNX brings building functions together
- KNX offers flexibility, safety, comfort and cost efficiency

Building automation: Traditional installation





KNX interworking

Transmission medium

- TP Twisted pair
- PL Power Line
- RF Radio frequency
- Ethernet KNX IP

Bus coupling unit

Application module

Application software

Planning commissioning service diagnostics

Installation of various functions

ETS

Building functions

Generally handled by KNX

Energy efficiency

Comfort

Flexibility

Safety & security

Benefits bus system, standard, multi-trade

- Flexibility**
Planning, Installation, Adaptation, Use, Multi-vendor
- Safety and security**
Monitoring, Alarm, Fire load, Technology
- Comfort**
Easiness, Automatic, Scenes, Design
- Cost efficiency**
Energy efficiency, Adaptations, Maintenance, Multi-vendor

Topology

KNX topology Twisted pair only - symbols

KNX Power Supply

Push Button

Line Coupler

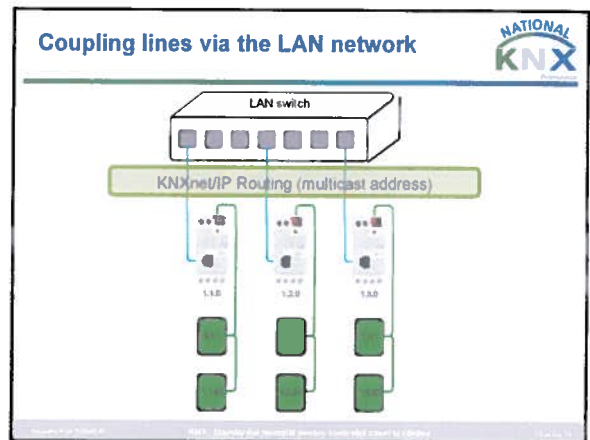
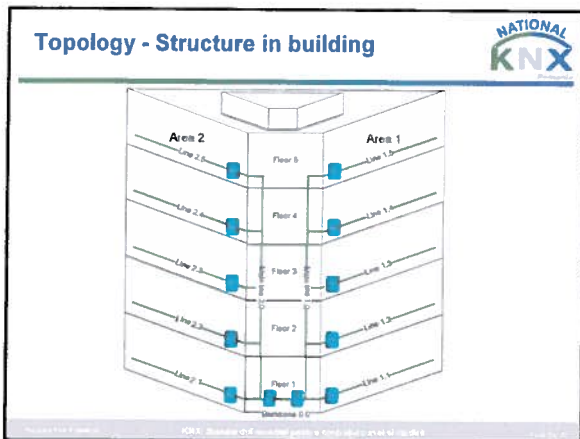
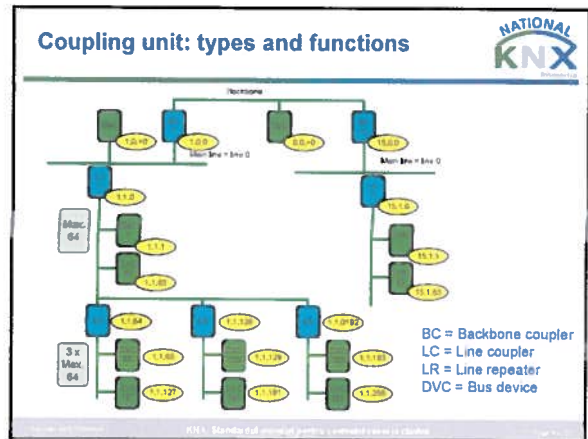
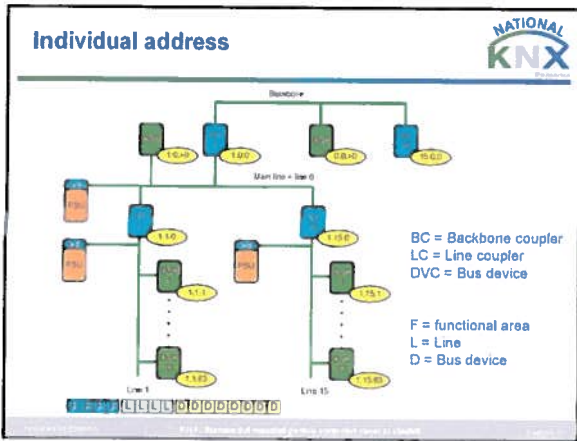
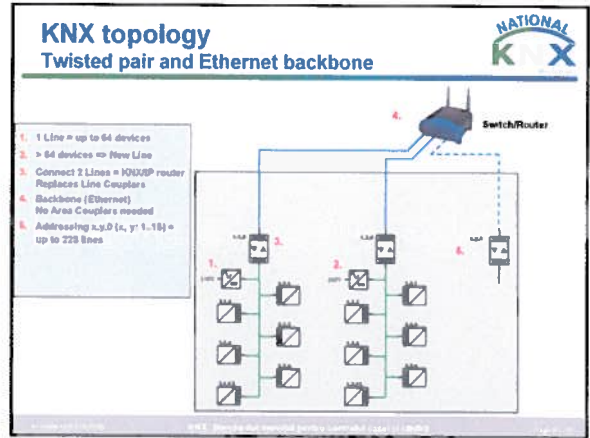
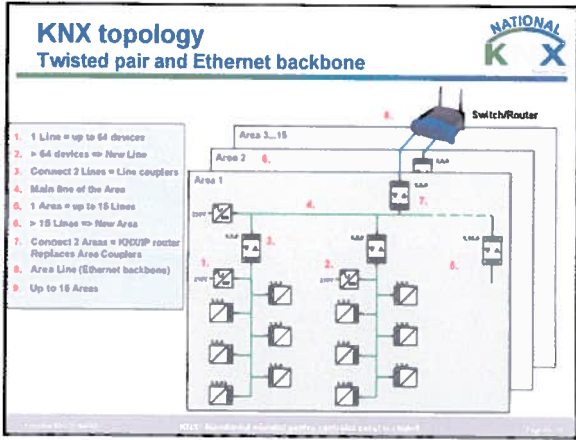
Switch Actuator

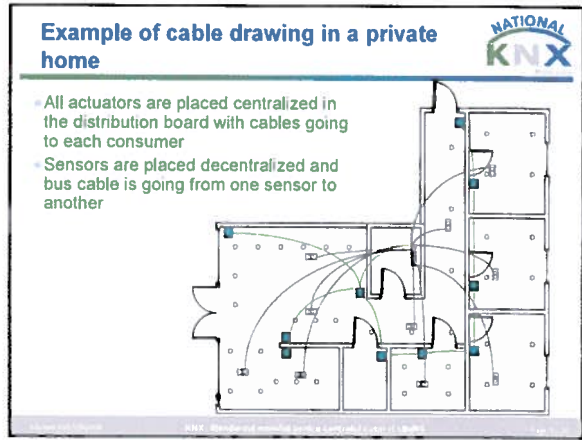
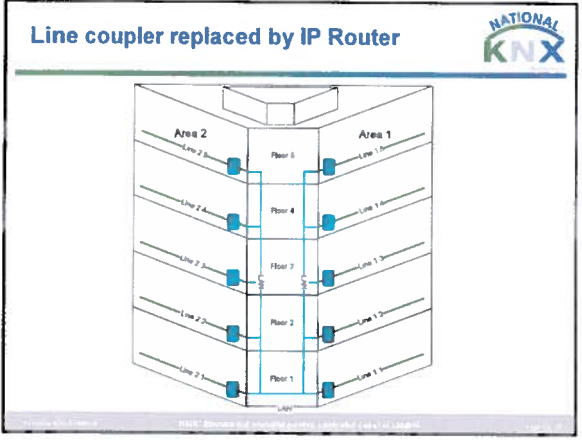
KNX Generic Device

Dimming Actuator

KNX topology Twisted pair only

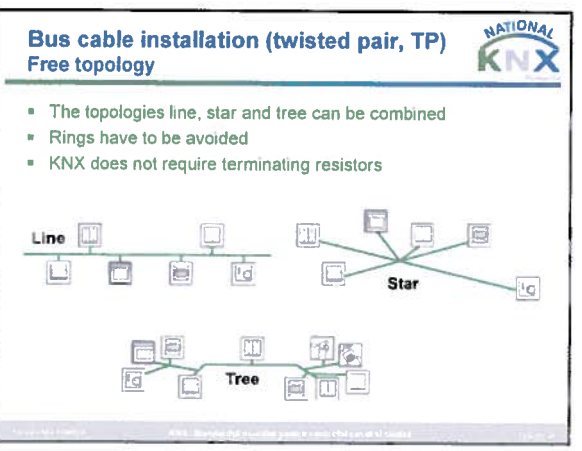
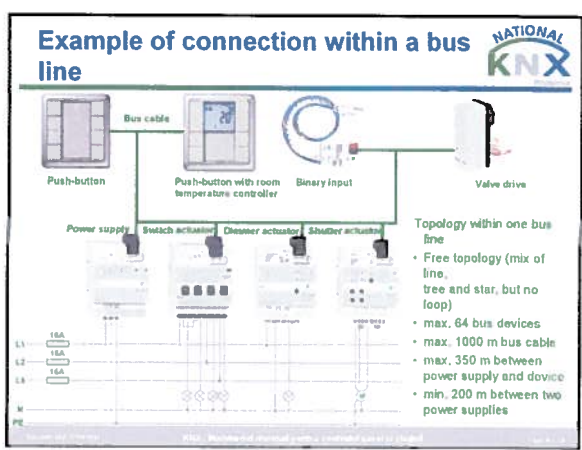
- 1 Line = up to 64 devices
- > 64 devices => New Line
- Connect 2 Lines = Line couplers
- Main line of the Area
- 1 Area = up to 16 Lines
- > 16 Lines => New Area
- Connect 2 Areas = Area couplers
- Area Line (Backbone)
- Up to 16 Areas





Installation

NATIONAL KNX



Bus cable

- Data transfer and power supply via 2 twisted wires (red/black)
- Spare pair (yellow/white), usable for example for extra power supply or cable breakdown supervision
- Installation together with 230/400 V permitted
- It is strongly recommended to use an KNX/EIB-certified bus cable, for example

Type	Structure	Cabling
YC 1M 2 x 2 + 0.8	HDCA guideline (Bare: DIN VDE 8007 and 0815) Cores: red (+EIB), black (-EIB), yellow (free), white (free)	Free cabling in dry, damp and wet rooms for surface mounting, flush mounting in pipes. Outdoors if protected from direct sunlight.
3-F (B) Y 2 x 2 + 0.8 EIB version	DIN VDE 0815 Cores: red (+EIB), black (-EIB), yellow (free), white (free)	Fixed cabling in dry and damp operating areas: surface mounting, flush mounting in pipes outdoors, in and beneath plaster.

NATIONAL KNX

SELV Safety Extra Low Voltage Network

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 KNX: Standard for intelligent systems (European Council of Experts)
 Page 20 of 20

Bus cable installation

- SELV System allows installation close to mains
- It is allowed to install the bus cable in the same pipe as power cables / min 19 mm pipes
- Bus and power cable cores may be present in the same installation box if the safety separation of the bus and power cable cores in the installation box is guaranteed by the installation. E.g. boxes with fixed terminals or partition wall

Fig 2: Distance between KNX cable and mains

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 KNX: Standard for intelligent systems (European Council of Experts)
 Page 20 of 20

Bus cable installation

The metal foil shield is removed. The shield/drain wires are not earthed and are not integrated in the equipotential bonding. The shields are not interconnected in the cable run either.

Example of labelling KNX line 1,1
The drain wire and the yellow/white wires (unless they are used) are bent back and isolated (not cut)

Example of connection of a push-button interface

Source: KNX Handbook, section 6.6

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 KNX: Standard for intelligent systems (European Council of Experts)
 Page 20 of 20

Bus connection terminal/ Spare pair branch terminal

Red/Black

- Supplied with almost all bus devices
 - Disconnection of device without breaking the bus line
- 4 plug-in terminals per wire
- Can be used for branch off in a conjunction box

Yellow/White

- Branch terminal for the spare pair
- 4 plug-in terminals per wire

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 KNX: Standard for intelligent systems (European Council of Experts)
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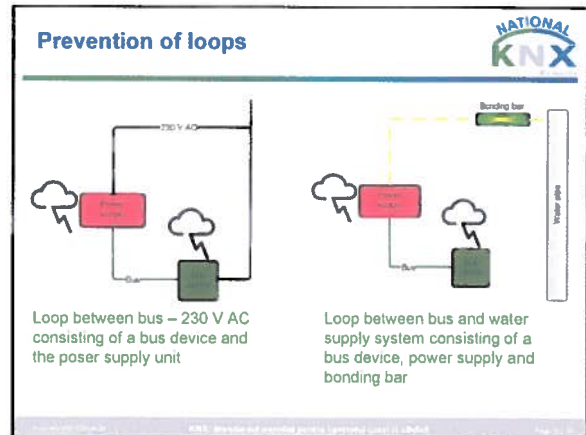
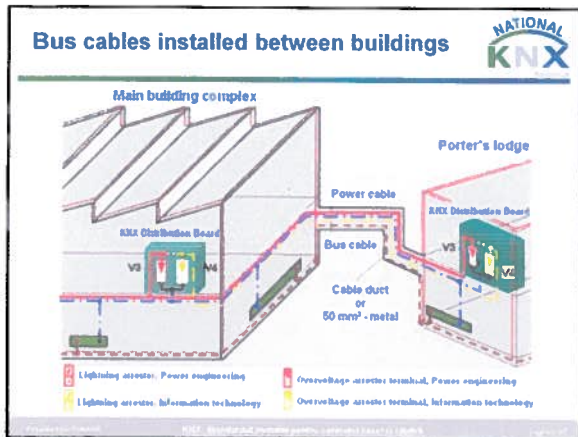
Cable lengths to be considered

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 KNX: Standard for intelligent systems (European Council of Experts)
 Page 20 of 20

Lightning protection of TP1

Lightning Protection - Equipotential Bonding

© 2014 KNX Association
 KNX: Standard for intelligent systems (European Council of Experts)
 Page 20 of 20



Bus devices on cable ends

- Recommended usage
 - To bus devices with 230 V mains connection
 - To line couplers on both lines
 - To bus devices installed in conductive walls or in the vicinity of water pipes, gas pipes etc
 - To bus cable ends
 - At the edge of buildings

KNX - Standard technical safety certificate (certified) (certified) (certified)

Checking an installation


- ✓ Check whether permitted cable lengths have been observed
- ✓ Run a visual check of the marking of the bus cable ends
- ✓ Check installation for inadmissible cable connections
- ✓ Measure the insulation resistance of the bus cables
- ✓ Check polarity of all bus devices
- ✓ Measure voltage at each bus cable end (minimum 21 V DC)
- ✓ Record your test results

KNX - Standard technical safety certificate (certified) (certified) (certified)


Break

Communication


Bus access and data exchange



- KNX is a decentralized and event-controlled bus system i.e. no central unit, and the bus is idle (free) if nothing happens or changes
- All connected bus devices can exchange data between each other, packed into telegrams and sent over the bus (serial transmission of "1" and "0", e.g. from a sensor (the command output) to one or more actuators (the command receiver).
- CSMA/CA (Carrier Sense Multiple Access / Collision Avoidance) is used for bus access and collision handling
- Transmission rate: 9600 bit/s
- Average transmission time for sending and confirmation of a telegram is approx. 25 ms



Group Address



Main group / Sub group

1/100

0 - 15 0 - 2047

structure:	functions:
0 = central function	1 = E1 switching
1 = light	2 = E2 switching
2 = heating	3 = E1+E2 switching
3 = shutter	...

Main group / middle group / sub group


1/4/100

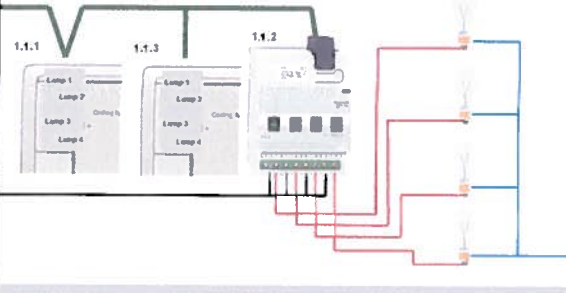
0 - 15 0 - 7 0 - 255

floor:	structure:	functions:
0 = EG	0 = central function	1 = E1 switching
1 = OG1	1 = light	2 = E2 switching
	2 = heating	3 = E1+E2 switching
	3 = shutter	

Practical example


Physical connections - cable





Practical example

Logical connections - software inside products



Push-button 2-gang

Button 1 Switch object 1 Bit	1/1/1
Button 2 Switch object 1 Bit	1/1/2
Button 3 Switch object 1 Bit	1/1/3
Button 4 Switch object 1 Bit	1/1/4

Switch actuator 4-gang

Channel 1 Switch object 1 Bit	1/1/1
Channel 2 Switch object 1 Bit	1/1/2
Channel 3 Switch object 1 Bit	1/1/3
Channel 4 Switch object 1 Bit	1/1/4


Command sender

- When Button 1 is pressed a telegram with group address 1/1/1 will be sent on the bus via the Switch object
- The function and thereby the value in the telegram is pre-defined in the parameters, e.g. toggle-function = the actual object value is inverted and sent on the bus, i.e. every press sends alternately ON/OFF-telegrams
- The telegram will be received by all the sensors and actuators on the bus

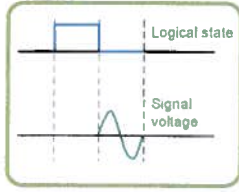
Command receivers

- When telegram 1/1/1 comes to the actuator it will be evaluated and control the relay of Channel 1. If the value is 1 (ON) the relay will close and if the value is 0 (OFF) the relay will open.
- The actuator sends an acknowledge telegram
- Other actuators and sensors which do not have the group address 1/1/1 assigned will not evaluate and acknowledge the telegram

TP1 Bit structure




„0“ and „1“ are the two logical states a bit can have

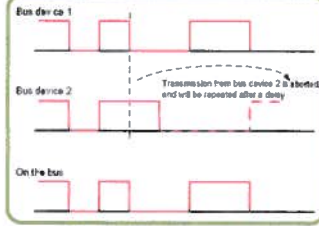


Technical logic in KNX TP1:
During a logic 1, no current drawn
During logic 0, current drawn

➔ This implies that – when several devices are sending simultaneously, the one sending a „0“ may continue to send.

Telegram Collision





The bus devices listen to the bus while transmitting.

As soon as a bus device with the logical state "1" detects the logical state "0" (=flow of current on the line), it stops transmitting to give way to the other sending device.



Exercise



Exercise



Using the symbols below draw a KNX line and imagine a few functions

KNX Power Supply KNX Push Button KNX Switch actuator KNX Dimming Actuator



Questions

- What is the maximum number of devices?
- How many KNX Power Supply can be used?
- What are the physical limitations of the KNX BUS (cable)?

Bus devices



System components



- Power Supply
- Line Couplers
- IP Router
- USB Interface

Power supplies



- One PS needed for each line segment
- Normally one use 640mA, but
- 320mA and 160mA versions are also available

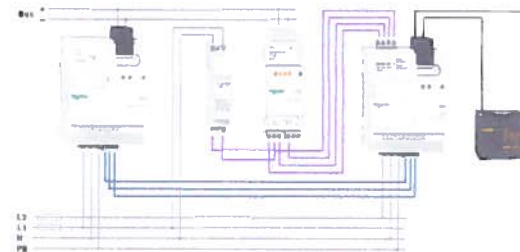


KNX Power supplies Emergency power supply



Connection example


KNX Power supply 640mA Power supply DC 24 V Binary input 4x24 Emergency power supply Lead gel battery



Couplers

NATIONAL KNX

- Line coupler, backbone coupler and line repeater in one device
- The placement in the network decides the name of the device
- Two tasks:
 - Filter data traffic
 - Electrical divider between two PS




Zennio
LINE COUPLER

KNX/IP router

NATIONAL KNX

- Can replace couplers as both line and backbone coupler
- Can be programming interface for KNX
- Communication interface for BMS
- Remote programming over Internet




Wählzeit
KNX
Ethernet
6/20 CE
KNX / IP
Router
750

Programming interface USB

NATIONAL KNX

- Used mostly for programming the KNX
- DIN rail mounting and flush mounting




Sensors

NATIONAL KNX

- Push buttons
- Movement sensors
- Presence sensors
- Binary input

KNX Push-buttons Designs

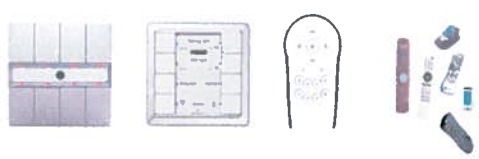
NATIONAL KNX



KNX Push-button plus with IR receiver IR receiver function

NATIONAL KNX

- Different IR remote controls for TV, satellite or video systems, for example, can be taught into the push-button




Binary inputs



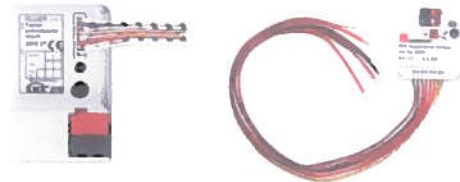
- For gathering information to send on the bus or use in a function
- DIN rail mounting and flush mounting



Push button interface



- Transform standard push buttons into KNX push buttons
- Same function as binary input or push button



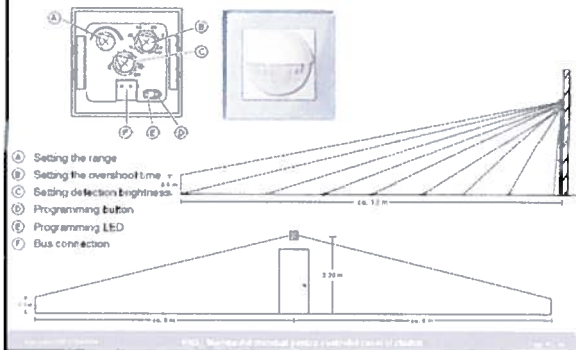
KNX movement detectors



Indoor, 1,1 m height Indoor, >2 m height Outdoor



KNX Movement detector 180/2,2 m



KNX ARGUS Presence detectors



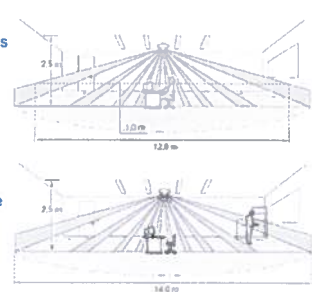
- Same PIR (Passive Infra Red) technology
- Wall or ceiling mounting



KNX Presence detectors Example



- Angle of detection : 360°
- Number of movement sensors : up to 4
- Max range (mounting height 2.50) : radius 7 m
- Number of levels : 6
- Number of zones : 136 with 544 switching elements
- Light sensor : threshold value 10-2000 Lux via ETS
- IR-channels 10 for KNX-telegram and 10 for configuration



KNX Actuators



- Switch actuator
- Blind actuator
- Dimming actuator
- Heating actuator
- Fan coil actuator
- Analog actuator

Switch actuators



- Switching of lights, outlets etc
- 6, 10 and 16 amps
- All but 6A with manual control in front
- 16A also in version with current detection
- Logic functions
- Locking functions



Switch actuators



- Flush mounted in 60mm installation box version



Blind actuators



- 1, 2, 4 and 8 up to 12 channels
- Manual control in front
- Alarm functions
- 6 or 10A relays
- Locking functions
- Running time adjust



230V dimmers



- Universal dimmer (L, R, C)
- Detects automatically the load at first connection
- Manual control in front
- 1, 2 and 4 channels
- At some versions the channels can be connected to different phases




LED dimmers




- Designated for LED strips dimming
- PWM dimming technology
- External power supply (12/24V DC) is necessary
- RGB or RGBW versions




1-10V dimming




- For lamps with 1-10V ballast
- 1-10V controller is equivalent with an "electronic potentiometer"
- Not to be confused with "0-10V" analogue output
- Usually available in 1-4 channels
- Up to 50 lamps per channel (100mA)
- Usually with 16A strong relay to cut off power at switch OFF




KNX-DALI Gateway




- Switching and dimming of 64 DALI ballasts
 - 16 groups
 - 16 scenes
 - Individual control of all 64 ballasts
- 4 Different Operating Modes (Permanent, Emergency*, Night and Staircase function Mode) individual for every group or ballast.
- Individual Burn-In time for every ECG adjustable with the ETS.
- Test Mode for Emergency ECGs with high priority.
- Error messages from DALI ballasts
- Integrated web server
- Connection of PDA, PC or LAN via RJ45




KNX DALI-Gateway Functions of the Web server



- Identification of ECG's
 - All ON/OFF, All
 - Group ON/OFF
 - ECG ON/OFF
- New installation
 - Assignment of groups
- Reinstallation
- Change of physical addresses (swap)
- Configuration and download of scenes



KNX and DALI




Available DALI products



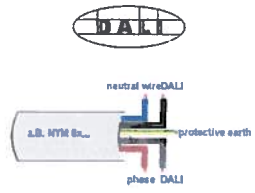
- Flourescent lights with built in DALI ballasts
- LED transformers
- Transformers for Downlights
- Dimmer for light bulbs
- Relays
- Push buttons and movements sensors



Control by lighting bus:



- DALI Bus – What is it?
 - DALI stands for: Digital Addressable Lighting Interface
 - An open protocol set out in the technical standard EN/IEC 60929
 - Developed by all leading ballast manufacturers, for building installations.
 - Growing technology in buildings → Schneider has to manage it →
 - Schneider Electric offers gateway KNX/Dali
 - Electronic ballast for fluorescent tubes, HID, LED, and transformers for LV halogen.



More info on DALI?
- See <http://www.dali-gg.org/>

DALI - Flexibility

- Individual control of fixtures
- Multi-channelling by only one pair of control cables
- No mains switching needed
- Back channelling
- Simple DALI two-wire cable
- Easy system re-configuration
- Easy to add new components

DALI addressing, example

DALI cable installation

KNX Lighting Solution with DALI gateway

Heating and cooling control

RTC with push buttons

- Room Temperature Controller
- Proportional-Integral Algorithm (PI)
- Heating and cooling and fancoil control
- 4 or 8 freely programmable buttons
- Some have scenes module
- Optional multi-channels timed control
- Large variety of design and finishes

Comfort and control

Three-Point-Setpoint Control Algorithm

Temperature

Time

Setpoint (comfort temperature)

Electronic controls do not waste energy

NATIONAL KNX

Heating actuator

- For actuation of thermoelectric valve drives for heating or cooling ceilings.
- The heating actuator has 1-8 electronic outputs
- Up to 4 valve drives can be connected to each output

NATIONAL KNX

Automatizarea incalzirii cu radiatoare si centrala termica - exemplu

Termostat Zona 1

Termostat Zona 2

Termostat Zona 3

Statie meteo

Power supply

Switch actuator

Centrala Termica

Bucina termostat ambient

L1 16A

L2 16A

L3 16A

N

PE

NATIONAL KNX

Fan coil actuator REG-K

- Actuator for controlling a fan coil unit with a heating / cooling valve, up to 3 fan speeds
- Usual features:
 - 2- or 4-pipe systems can be used
 - 2- or 3-point or 0-10V valve drives can be used
 - Can be controlled by the multi-function push-button with RTC
 - 2 inputs: for window contact or temperature measurement and drip tray monitoring
 - Auxiliary switch output 16 A for additional functions
 - Test mode to check the system during commissioning or trouble shooting

NATIONAL KNX

Weather stations

- Measuring
 - Wind
 - Temperature
 - Rain
 - Light level
- Used for controlling blinds and outdoor lighting

NATIONAL KNX

Touchpanel KNX

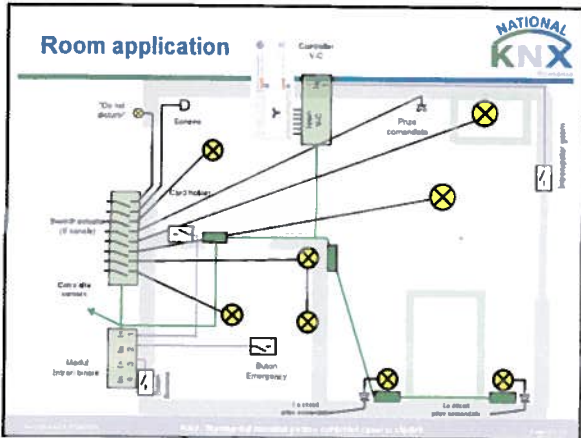
- Large variety of screen sizes
- Programming from ETS or with separate software
- Communication via TP and/or IP

NATIONAL KNX

iOS & Android applications

Note: KNX-IP gateway is needed!

Hotel applications and solutions



Room access & temperature control

Inside guest room: Card holder and RTC

- DND and MUR management signals integrated.
- Welcome scene, restore scene and other useful easy-to-use hotel oriented functionalities.

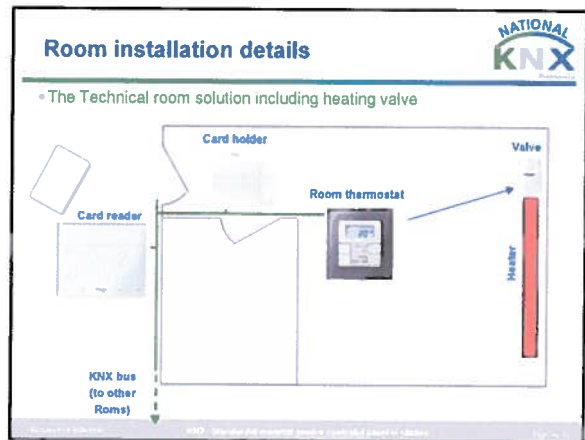
Room thermostat

Card holder (with card recognition)

Room access & temperature control

Outside the guest room: Transponder reader:

- Real-time encoding for high security system.
- High-tech for guest
- Decentralized runtime system, no PC dependent
- One card gives access to selected services.



KNX Access Control

The Technical "Access control only" room solution

Max. 40 V AC/DC

- Aprox. cost 30-70 €
- Supplied by third party

Other I/OC devices in the room

Fuse

230V 24 V AC/DC

Reception equipment

On the reception: "eSuite" + PC (server)

- Small server with preinstalled software suite
- Ready to connect to the hotel's technical network
- Possibility of integration with third-party PMS systems (Property Management System) like Fidelio.

KNX Access USB Card Programmer

KNX Access eSuite + PC

KNX Access Control

The Technical reception solution

- Integration with Fidelio ERP is implemented and optional
- Visualization and remote control at room level also available

Workstation Workstation Workstation

Router / Switch

eSuite server

230V

Recap

Instalatie de iluminat clasica

Tablou electric

230 Vca

Disjuncteur

Doza derivatie

1/1

Conductor

Lampa 1 Lampa 2

Intreupator dublu

Instalatie cu logica centralizata

Tablou electric

230 Vca

Disjuncteur

Doza derivatie

1/1

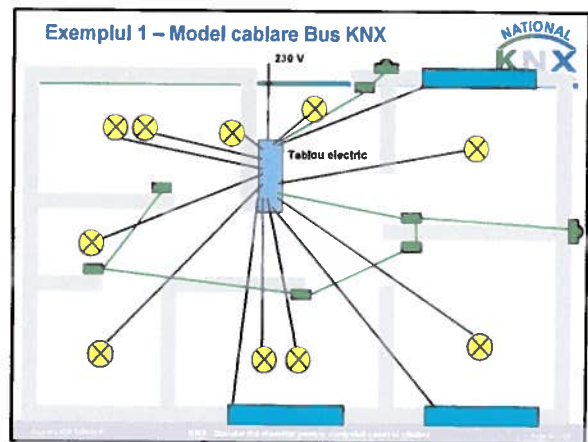
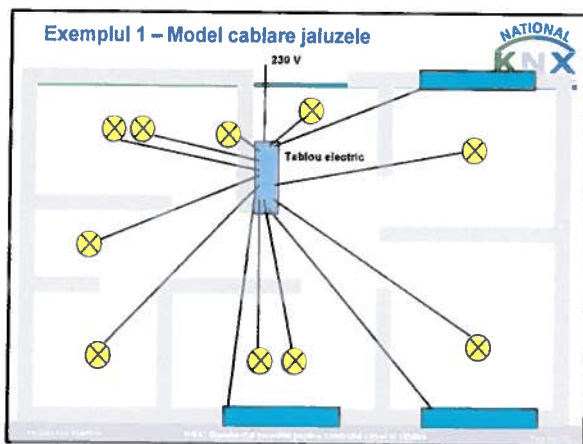
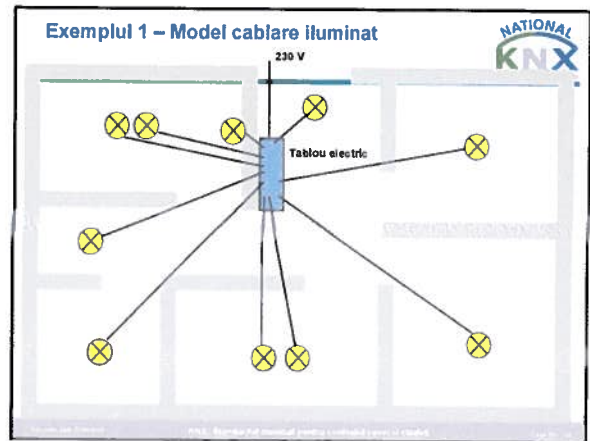
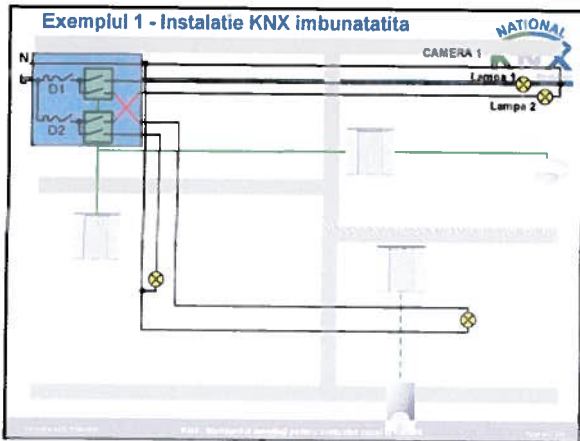
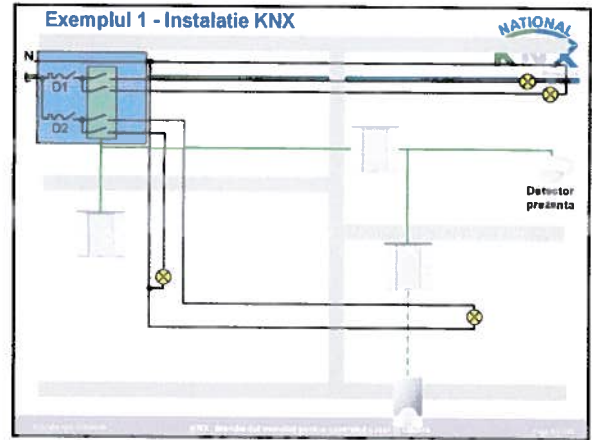
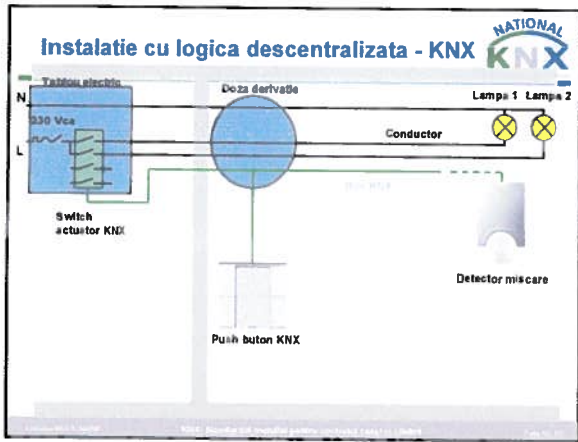
Conductor

Lampa 1 Lampa 2

Modul logic (PLC)

Push buton

* PLC = Programmable Logic Computer



Exemplu de proiectare: 1

1. Se alege aplicația – ex. controlul iluminatului dintr-un spațiu
 2. Se alege tipul dispozitivului de comandă – ex. un senzor de mișcare

NATIONAL KNX

Exemplu de proiectare: 1

2. Se alege tipul dispozitivului de comandă – ex. un senzor de mișcare

NATIONAL KNX

Exemplu de proiectare: 1

3. Pentru programare folosim softul ETS, calculat și conectarea prin intermediul USB (4)

NATIONAL KNX

Exemplu de proiectare: 2

1. Se alege aplicația – ex. controlul aerului condiționat

NATIONAL KNX

Exemplu de proiectare: 2

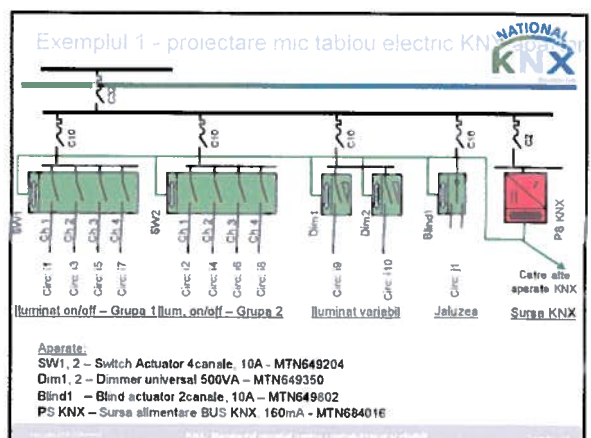
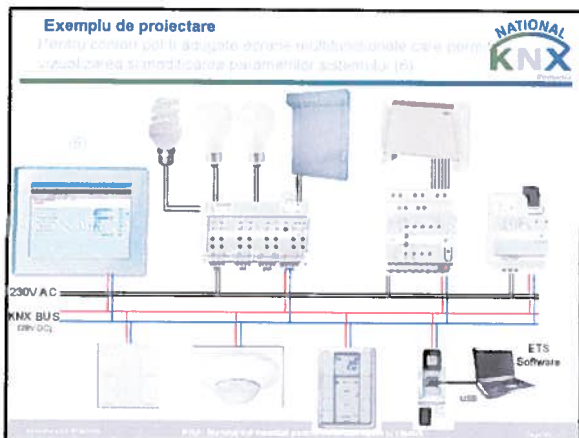
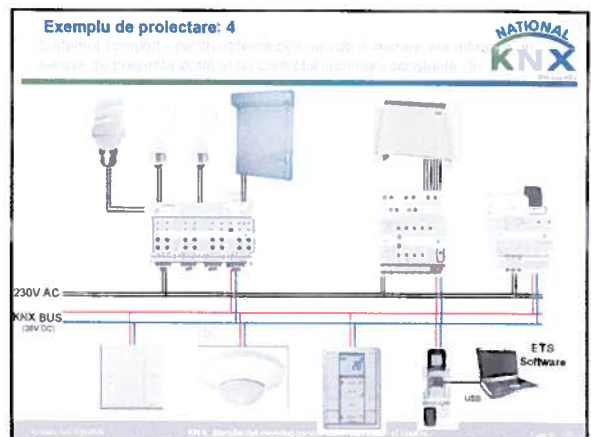
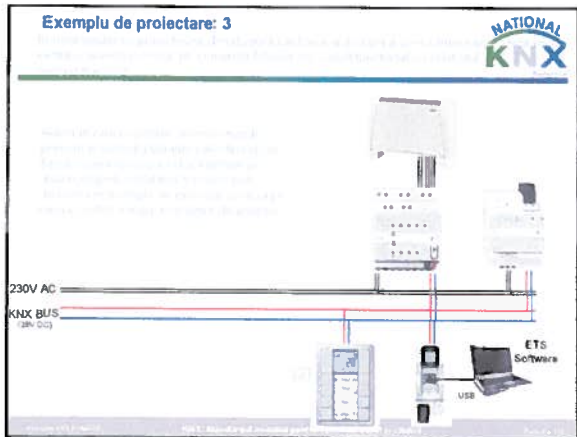
2. Se alege un modul de comandă aerului condiționat BUS 230V AC (3)

NATIONAL KNX

Exemplu de proiectare: 2


3. Pentru programare folosim softul ETS, calculat și conectarea prin intermediul USB (4)

NATIONAL KNX




Va multumim!





ETS Inside

KNX Evolution and Future




www.knx.org



KNX Evolution and future

1990 – Foundation of European Installation Bus Association



- 15 well-known European manufacturers of the electrical industry founded the European Installation Bus Association „EIBA“
- Their idea was to make electronic installations with Bus Technology fit for the future

KNX Evolution and future

1992 – The First EIB Device on the Market



- The first Bus Coupler got certified by EIBA.
- This Bus Coupler was the first product which used the Open System "EIB"

KNX Evolution and future

1993 – Release of ETS 1



For configurations of EIB Devices and EIB Installations, the Manufacturer-Independent EIB Tool Software has been available

KNX Evolution and future

1996 – Release of ETS 2


Due to the high number of orders for updates, new programs and the positive feedback EIB released in 1996 ETS 2





KNX Evolution and future

1997 – Beginning of convergence process


- 1997 the Solutions Batibus, EHS and EIB merged
- 2001 the new founded Konnex Association published the KNX Standard with EIB as Basis





KNX Evolution and future 

2002 – First Version of the KNX Specifications were published


In May 2002 the first version of the KNX specification were published amongst the KNX members and the KNX Certification Scheme for products started




KNX Evolution and future 

2004 – ETS 3 released

- The most important improvements: USB support, Multitasking including simultaneous download of devices, design while downloading, etc.
- With ETS 3 Professional it is possible to customise the user interface to your own wishes. The focus was the user friendliness




KNX Evolution and future 

2006 – KNX got approved as worldwide STANDARD for home and building control


- After the presentation of KNX at the 2005 March ISO/IEC meeting, the KNX Stack parts were submitted.
- In October of 2006, the document was approved in the Formal Draft for an International Standard version




KNX Evolution and future 

2010 – Release of ETS4


- 24 countries participated in the launch of the ETS4 in October 2010
- ETS4 is, compared to its predecessors, faster, more user friendly and easier in usage



KNX Evolution and future 

2014 – Release of ETS5

- ETS5 solely as PC-independent version
- Integration of KNX RF, database free, embedded solution







Thank you very much for your attention

www.knx.org






ETS Inside Product Launch

New and broader perspectives with KNX




www.knx.org




Agenda

1. KNX Evolution and future
2. The new ETS Inside
 - Introduction
 - Benefits
 - FAQs
3. ETS Inside – Let's get started:
 - ETS Professional vs. ETS Inside
 - First steps
 - Hands-on Session




ETS Inside

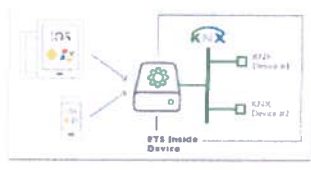
The new ETS Inside




www.knx.org



ETS Inside – Introduction





The ETS Inside –
Smart, Simple, Safe



ETS Inside – Introduction

Smart – Finger tap instead of mouse click:


- New minimalistic user interface with intelligent design for iPads, iPhones, Android tablets and Windows tablets.
- Flat buttons with easily understandable symbols for intuitive operation.
- Parameterisation is very simple even with smartphones because ETS Inside is touch sensitive.





ETS Inside – Introduction

Simple – A Tool for Installers and End Users:

- KNX projects realised easily and cost-efficiently
- Full synchronisation between ETS Professional and ETS Inside device.
- Modifications of enabled functions by the end user (e.g. dimming values, time schedules, light scenes etc.)





ETS Inside – Introduction 

Safe – No unauthorized access:

ETS Inside offers a triple protection.

- No access to ETS Inside by unauthorised persons.
- Critical security functions are not available for modifications by the end user.
- ETS Inside supports KNX Secure. Thus hackers have not got a chance even here.




ETS Inside – Introduction 

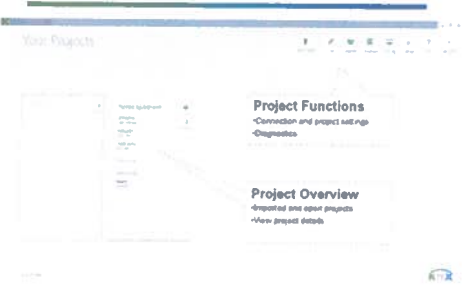
The new ETS Inside



ETS Inside opens up exciting perspectives in the growing smart home market




Your Projects




Project Functions
 -Connection and project settings
 -Diagnostics


Project Overview
 -Projected and open projects
 -View project details

ETS Inside – Introduction 


The new ETS Inside:



Intelligent design, minimalist layout, understandable symbols – via the new user interface parameters can be set by a simple touch.

ETS Inside – Introduction 


The new ETS Inside:




Building Browser
 -Easy overview of building data!

Device View
 -Overview of devices installed in this

End Users can become active by adapting functions to their own needs

ETS Inside – Benefits 

ETS Inside is "Your ETS, stored in a KNX device"




- Create KNX installations with ETS "inside" for your home/building
- Use ETS Inside on any device (your tablet/ smartphone)
- Store your ETS "inside" in your home/building



ETS Inside – Benefits


Benefits for the integrator



- Easier market entry
- Reduced start-up effort
- Use of standard KNX devices
- Exchange data with ETS Professional

ETS Inside – Benefits

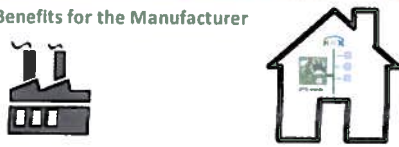
Benefits for the Users



- Have remote access to your installation
- Use ETS Inside on any device, e.g. own tablet/ computer with iOS, Windows or Android
- Change individual parameters yourself
- Store your KNX project inside your home/building

ETS Inside – Benefits

Benefits for the Manufacturer



- All certified KNX devices usable (no need for gateways)
- Identical product training for customers as with ETS Professional
- KNX Secure supported also by ETS Inside

ETS Inside – FAQs

Q: If my project contains devices that are plug-in will I be able to import it?

A: Yes! However it will not be possible to configure these devices.

Q: Can I install ETS Inside on my PC?

A: Yes! It is possible to install it on a regular PC, but also on a small PC with Windows 10 and KNX but connectivity available.

Q: Can I transfer data to the ETS Inside on another Professional?

A: Yes. However, please note that ETS Inside can handle only one project, therefore you have to export your project somewhere safely for synchronization it with ETS Professional, delete the old project from the ETS Inside and then create a new project.

Q: It remains a project with ETS Inside when is it saved?

A: Yes, however, please note that ETS Inside can handle only one project, therefore you have to export your project somewhere safely for synchronization it with ETS Professional, delete the old project from the ETS Inside and then create a new project.

Q: Is stored in the PC where the ETS Inside runs.

A: Why do I save them the App when a store? (e.g. App Store)

Q: Can I as home owner have an ETS Inside software installed on my home where KNX is installed and have it automatically synchronized?

A: In order to have your ETS Inside software synchronized with your home's configuration you have to ask your KNX integrator to make a first synchronization. Then it will always be available in your ETS Inside software.

Q: You can imagine the ETS Inside as the "server" software that runs on a PC and the App from the App Store as the "client" to access it.

ETS Inside – FAQs

Q: Will ETS Inside be able to be updated?

A: Yes, the PC where ETS Inside is installed will need to be connected to an active internet connection in order to be updated.

Q: How many devices can I configure with the ETS Inside in one project?

A: ETS Inside can configure devices of a full line (SSS device).

Q: How can I license my ETS Inside?

A: You need to buy an ETS license from MyKNX and use it together with the KAD device. See in the ETS Professional.

Q: I am a KNX Manufacturer and I would like to use an ETS Inside device. What do I have to do?

A: As a KNX Manufacturer you can get a special version of the ETS Inside software that can be installed on your device(s) that will not require a web server to be "connected".

Q: I am a KNX Manufacturer I already have a manufacturer gateway where I want to integrate ETS Inside, how followed to do so?

A: Yes, you are allowed.

Q: Do I need internet connection necessarily in my project to access ETS Inside to "save"?

A: No, internet connection is not necessary. Only if you would like to update the ETS Inside version you will need an internet connection to download the update.

Q: How much does an ETS Inside license cost?

A: It costs €150, double included.

ETS Inside – FAQs

Q: I am a KNX Manufacturer I already have an integrated device for remote access and KNX/PC integration, will I be able to integrate the ETS Inside in it and with it?

A: As a KNX Manufacturer you can of course do, with the condition that your device runs Windows 10 as operating system and has a USB slot available for licensing purposes.

Q: I am a KNX Manufacturer and I would like to offer an ETS Inside device. How I can get ETS Inside license?

A: No, according to the license agreement, you are not entitled to resell ETS Inside licenses. These have to be bought by MyKNX.

Q: I am a KNX Manufacturer and I would like to integrate ETS Inside in one of my certified devices. Do I need to have them re-certified or pass a special verification?

A: No, you do not need to have them re-certified if you do not modify the Application Program of a standard KNX functionality. Integrating the ETS Inside does not require additional certification as it does not affect the standard KNX functionality of the device.






ETS Inside Product Launch

New and broader perspectives with KNX




www.knx.org




Agenda

1. KNX Evolution and future
2. The new ETS Inside
 - Introduction
 - Benefits
 - FAQs
3. ETS Inside – Let's get started:
 - ETS Professional vs. ETS Inside
 - First steps
 - Hands-on Session




ETS Inside

Let's get started





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ETS Inside – ETS Professional vs. ETS Inside

Characteristics ETS Professional



- Software tool for PC (Windows 7, 8, 10)
- Commissioning of unlimited projects
- No restriction to amount of devices and lines in a project
- Suitable for any project (small or large)
- Supports Plug-ins
- Extendable via Apps
- Licensing: Dongle
- To be used only by professional system integrator
- Connection to installation: KNX Bus Interface

ETS Inside – ETS Professional vs. ETS Inside


Characteristics ETS Inside

- ETS Inside as part of the installation (Server version on Mini-PC with Windows 10/Windows 10 IoT)
- 1 Project per ETS Inside device
- Configuration of a full line (TP/LRF: Up to 255 devices; IP: Up to 6093 devices)
- Suitable for small projects
- Licensing: Dongle
- To be used by installer and end-user
- Connection to installation:
 - ✓ IOS/Android/Windows handheld
 - ✓ Connection to ETS Inside via Client-App





ETS Inside – ETS Professional vs. ETS Inside

2 Tools for KNX project commissioning



- For any project size
- For any project sophistication
- Supports plug-ins and ETS Apps
- Only used by System Integrator



- For residential or smaller commercial projects
- Basic functions
- Client version for handhelds
- Used by system integrator and end-user



ETS Inside – ETS Professional vs. ETS Inside

Possibility to synchronise ETS Inside and ETS Professional

The diagram illustrates a bidirectional synchronization process between ETS Professional (left) and ETS Inside (right). A central circular arrow indicates the flow of data between the two software versions.

ETS Inside – First Steps

Step 1: Integrate ETS Inside in your installation

The diagram shows a mini-computer connected to a KNX installation via USB or KNXnet/IP. A tablet is also shown connected to the installation via Wi-Fi.

- Install ETS Inside on a mini-computer (e. g. raspberry pi, Intel NUC, etc.)
- Connect it to your installation via USB or KNXnet/IP.
- Alternatively, you can install ETS Inside on a KNX device, with ETS Inside functionality

ETS Inside – First Steps

Step 2: Install the ETS Inside client on your handheld

The screenshot shows the ETS Inside app available for download on an app store.

- ETS Inside is available for Android, iOS and Windows free of charge
- Once installed, you can get started with commissioning of your installation

ETS Inside – First Steps

Step 3: Connect your mobile or tablet with the ETS Inside device in the installation

The screenshot shows the 'WLAN to ETS Inside' connection screen with a progress bar.

- Establish a connection between your mobile device and the KNX installation.
- Easiest way: Set the connection to "Auto", choose the shown connection
- Alternatively, you can also connect to the installation manually

ETS Inside – First Steps

Step 4: Log in to the project

The screenshot shows the login screen for the ETS Inside Server with the text 'ETS Inside Server - "Erfa-Verbaust"'. There are fields for username and password, and a 'Log in' button.

- Log on to the installation
- Installer – Mode: Full functionality
- User – Mode: Functionality, priority enabled by System Integrator

ETS Inside – First Steps

Step 5: Create your project

The screenshot shows the 'Project overview' screen with a 'Project overview' button highlighted.

- Give your ETS Inside project a name, choose the project's status and add comments to your project.
- Proceed to the Project Overview by either tapping on the highlighted project or by tapping on the "Open project" button.

A handwritten signature in blue ink, located in the bottom right corner of the page.

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ETS Inside – First Steps

Step 6: Add Building parts to your project



- Add building parts to your project, such as "Cabinets", "Floors", "Corridors", "Rooms", etc.

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ETS Inside – First Steps

Step 7: Add & configure devices from the KNX Online Catalogue




- Add devices to each of your rooms.
- Use the KNX Online Catalogue, which contains all certified KNX devices.

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ETS Inside – First Steps

Step 8: At last...



- At last, since all devices have now been properly allocated, we can now start with the linking of the channels with functions or groups.
- You can also use the ETS Inside to adjust parameters during the first commissioning or also after the project has been finalised.

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**Thank you very much for
your attention**

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