

**KNX System Specification**

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GLOBAL STANDARDS
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AUSTRALIA/NZ TECHNICAL SPECIFICATION
SA/SNZ ISO/IEC TS : 14543.3 (Parts 1-6)

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# KNX Overview

KNX is an installation bus which provides a cost-effective and flexible solution for a wide range of different tasks in commercial and industrial buildings. KNX is approved by Standards Australia as SA/SNZ ISO/IEC TS 14543.3 (PARTS 1-6). Additionally KNX is an International Standard (ISO/IEC 14543-3) as well as an European Standard (CENELEC EN 50090 and CEN EN 13321-1) and Chinese Standard (GB/Z 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 world´s only open Standard for the control in both commercial and residential buildings. KNX devices from different manufacturers are checked for compliance with the standard, registered and certified by the KNX Association. Compliant devices will display the registered KNX Logo.

KNX device manufacturers (over 450) include ABB, Hager, Somfy, Daikin, Crestron, Schneider, Siemens, Wago, AMX and Miele (to name a few). For a complete list of KNX Members (Manufacturers) please refer to the KNX.ORG web site, the Australian KNX National Group or your locally factory trained Partner (refer to WWW.KNX.ORG).

KNX is used in a variety of different buildings, such as hospitals, commercial premises, banks, sports halls, administration buildings, museums, theatres, multipurpose facilities as well as detached houses and apartment buildings.

The system controls, switches and monitors numerous functions in these buildings. These include lighting control, energy metering/monitoring and reporting, maximum-demand monitoring, temperature control, emergency and standby power, ventilation control, control of blinds/shutters, time-dependent control, remote control, display, logging as well as monitoring and reporting. Weather data can be recorded and integrated in the building automation. With various gateways, it is possible to establish a connection to the Internet, telephone network or subsystems such as DALI, DSI or 1…10 V controllers.

3rd Party interfaces are available for the system which includes connections to OPC, LON and BACnet networks. Additionally, low level interface options are available for connection to legacy systems. These low-level interfaces include Universal Interface and low voltage outputs.

All the sensors (push buttons, touch screens, dimmers, shutter switches, brightness and temperature sensors, movement detectors etc.) are linked to the actuators (relays, lighting control devices, shutter motors etc.) via a two-core bus cable. A conventional KNX control cable PYCYM (2x2x0.8mm) is used as the bus cable, with which over 10,000 devices can be connected over areas (15), which can contain up to 12 lines.

The bus cable is used not only to transfer information (transmission rate 9.6 kbaud) but also to guarantee the power supply (30 V DC) of the bus devices. The bus cable is laid as a line, star or tree structure in the building, in a similar way to the electrical power installation.

Each bus device receives a physical address. The device is queried or programmed via this address. The bus management is a multi-master operation i.e. each bus device has the same rights. A control unit is not required. Collision detection and resolution is possible via the central access procedure CSMA-CA without loss of telegrams.

The installation bus operates with group addresses. A group address is assigned to one or more sensors and actuators and thus forms the association between the bus devices e.g. wall switch and binary output.

The programming of the system is carried out with the ETS parameterisation software via an RS232, USB or IP interface. They can be used in any location within the bus system. Programming of the KNX devices by the Ethernet is possible via a gateway.

The physical addresses and the assignments of the switch groups are stored by the bus devices in an EEPROM. Changes in the assignments of the bus devices or other system parameters can be modified by the user using a PC with the help of ETS (EIBA Tool Software), without having to engage with the device on-site. The power supplies are buffered so that short interruptions in the voltage up to 200 ms can be bridged. A longer bridging time is possible by connecting batteries.

Work on the KNX installation bus should only be carried out by KNX Factory Trained Integration Specialists. The laying and connecting of the bus cable and the operating devices must comply with the relevant guidelines in accordance with DIN-VDE. The KNX Integration Specialist must have an ETS training certificate and a current ETS licence.

# Documentation

Before commencement of the installation, the responsible contractor shall work with the Integration Specialist to produce detailed lighting control and/or building control system design documentation, shop drawings and test plans.

At project completion lighting control and/or building control system shop drawings shall be provided to the client as hard (printed) copies and software files (in PDF and either DWG or DXF format). These shall be updated to an “as installed” state prior to acceptance and signoff.

# Installation

Installation shall be performed by suitably licensed electrical contractors who has completed KNX training, or who are working under the supervision of KNX trained Integration Specialist.

# KNX Manufacturers

All products used within the system being specified shall be certified by the KNX Association and bear the KNX Logo. Manufacturers shall be represented within Australia and may include:

* ABB
* AMX
* Busch-Jaeger
* Crestron
* Daikin
* Hager
* mySmart
* Somfy
* WAGO

# KNX Products

KNX products available from the KNX Manufacturers shall interoperate as set down in the KNX International Standard ISO 14543. These product types may include;

* Relays & Dimmers
* Switches
* DSI, DALI and 0-10V Interfaces
* Motion Sensors
* Light Level Sensors
* Demand Management Controls (ie Load Shedding)
* Digital & Analogue Inputs and Outputs
* Touch Screens (both wired and wireless)
* Control (Visualisation) software
* OPC, BACnet, LON, M-Bus, Modbus, DMX Interfaces
* Energy Meters
* TCP/IP Interfaces
* GSM/GPRS Telephony Interfaces
* Appliance Interface (i.e. domestic devices)
* Weather Stations & Sun and Shade Control Interfaces
* Alarm Systems
* AV System Interfaces (i.e. AMX and Crestron)
* WiFi Interfaces (i.e. iPhone and iPAD)
* Thermostats and Temperature Sensors

# Programming & Commissioning

KNX programming shall be performed by Factory Trained KNX Integration Specialist. Programming shall be carried out in accordance with this Electrical Specification to be read in conjunction with any electrical schematics.

Allow sufficient time to provide a fully working system. Allow time at the projects completion to complete final commissioning to provide a fully functioning system.

# Operations and Maintenance Manual

Prior to project completion the KNX Integration Specialist shall provide an operation and maintenance manual. The KNX Operation and Maintenance Manual may include the following information:

* KNX system architecture diagram
* KNX switchboard layout drawings
* KNX programming files
* Floor plans showing KNX devices
* Recommended scheduled maintenance procedures
* Technical literature for each type of KNX device used in the project

# System Design

It is important to realise that KNX is a totally open protocol allowing products from any KNX Manufacturer to inter-communicate. The cable platform is based on the KNX standard and shall remain constant regardless of the brand of equipment being used. The System Design shall be completed by the KNX Integration Specialist.

# Bus Protocol

The KNX control system shall use distributed intelligence where individual units update their status across the network.

The system shall be capable of providing constant feedback on the operational status of inputs and outputs and be capable of interrogating the status of specific devices.

# Network Topology

The network topology of the KNX control system shall be flexible and allow devices to be connected in a star, tree, daisy chain or combination of star, tree and daisy chain configuration. The network topology is made up of Lines, Main Lines and Areas.

* Line: A Line is a local network that supports 64 bus devices and 255 address. It requires a power supply. It is connected up-stream by either Line couples or IP Routers.
* Mail Line: A main line will connect up to 12 Lines together via Line Couplers. The Main Line also supports up to 64 bus devices. Each Main Line must have its own power supply. A group of Lines connected to a Main Line is known as an Area.
* Multiple Areas: Multiple Areas can be linked together using a Backbone Coupler on each Mail Line. Up to 15 Area can be linked together on one Backbone.
* IP Connectivity: An IP Router can be used to in place of either Line Couplers or Backbone Couplers to create a fully IP router KNX network with support for over 14,000 bus devices.

# Cabling

TECHNICAL DATA

* Installation bus 2-wire, event-controlled, multi-master system
* Transmission type serial, with distributed bus access procedure CSMA-CA
* Transmission speed 9.6 kbaud
* System voltage 30 V DC
* KNX control cable: PYCYM 2 x 2 x 0.8 mm (4 kV)

# System Programming

Individual components of the KNX control system shall be configurable across the network using PC software with a Windows® operating system. Each unit that communicates on the network shall be given an address unique to the specific network, and have a serial number which may be retrieved by the configuration software. All units shall provide feedback across the network as to their status.

# System Head End Software

The KNX control system shall have the option of a comprehensive head end control software. The software shall be multi user with user access control via passwords. The software shall reside on a PC and connect via Ethernet. The system shall provide a graphical representation of the system with indictors showing the status of the inputs and outputs. Should communications with a connected device fail a coloured indicator will be displayed, an alert will be raised, and record of the event will be stored.

# High Level 3rd Party Integration

The KNX control system shall be capable of integrating with third party systems including DALI, DSI, HVAC, Audio/Visual and Building Management Systems (BMS) via various mediums and protocols including Ethernet, RS-232, OPC, BACnet and LON.

# Low Level 3rd Party Integration

The KNX control system shall be capable of integrating with 3rd party systems by initiating and detecting the closure of voltage free contacts using relays or universal interface input devices.

# Building Management System

The KNX control system shall communicate device status information to the building management system (BMS).

The KNX control system shall provide individual channel load information in real time (ie the current being drawn) as requested by the BMS.

# Energy Metering

The KNX control system shall support energy meters from various KNX manufacturers. Meters shall connect directly to the KNX bus and provide full energy data in real time. The meters shall provide an LCD display on the meter.

# Remote Access

The KNX control system shall have the ability to link and monitor multiple sites for the purpose of logging energy consumption information. It shall be possible to re-program and customise multiple sites from one physical location. Multiple sites shall be linked by Ethernet using the Internet or a virtual private network (VPN).

# Monitoring

The KNX control system shall be capable of integration with a BMS, providing information on load states, current consumption and system status. This shall allow the BMS to compile reports on energy usage patterns and system outages.

# Backup Batteries (UPS)

The KNX control system shall have the ability to have batteries connected directly to it enabling the Line to remain operational should a power failure occur. The batteries shall be integrated into the system and be DIN mounted next to the Line power supply. The system shall provide alerting if the backup batteries are being used.

The use of 3rd party UPS’s is not acceptable.

# Redundant Power Supply

The KNX control system shall have the ability to have a second standby power source connected directly to the Line power supply. The power supply that will enable this connectivity shall provide alerting if the primary power source fails.