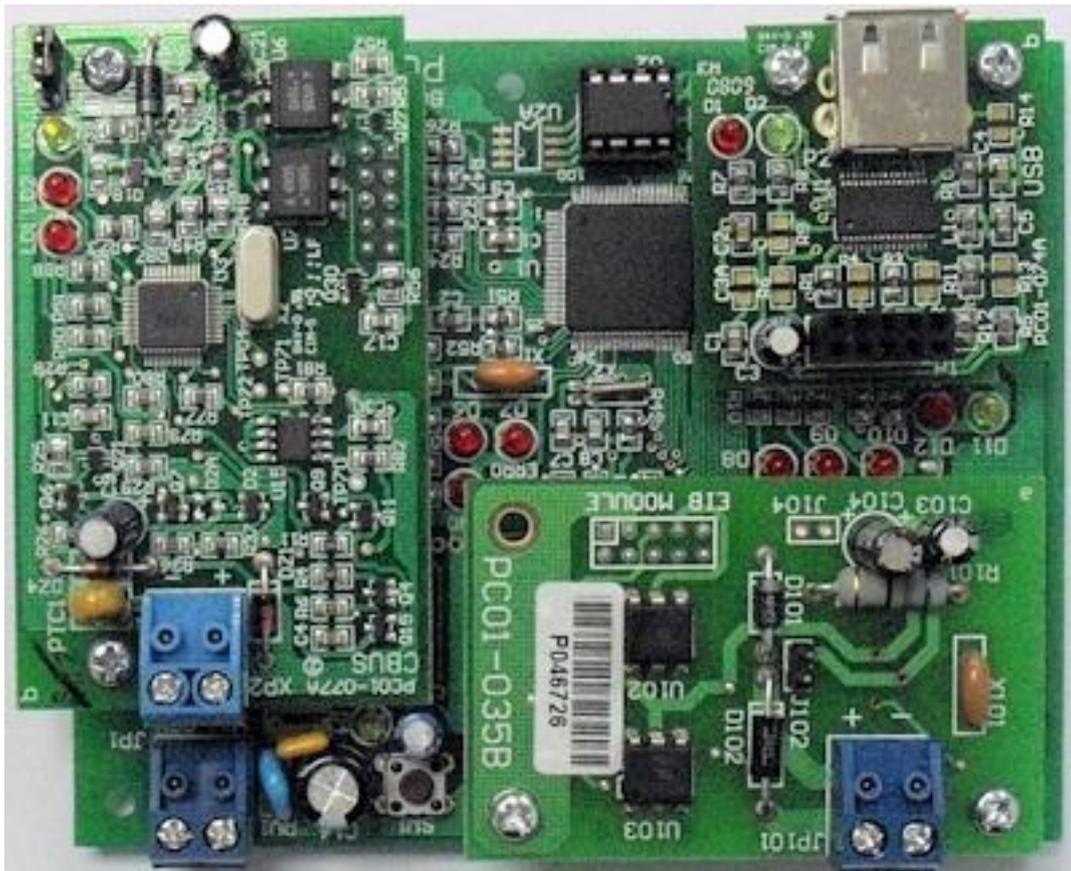# SECTION 1   SPECIFICATIONS

Part Number

CBUSKNX01 - CBUS to KNX Translator PCB

Function

To convert between CBUS and KNX signals so as to allow both Bus system devices to be installed in a single system.

Mechanical

PCB Size	108 x 88 mm
Weight	150 grams
Mounting	4 x mounting holes offset 5 mm from each corner

Power Supply

5 to 12 VDC 0.5 Amps regulated

Interfaces

- USB (A) - for PC Configuration using free Bus Translator software
- KNX - 2 pin removable terminal block for wire termination to KNX bus.
- CBUS - 2 pin removable terminal block for wire termination to CBUS bus

Accessories Supplied

- USB Cable 1 meter
- Mounting screws 4 x M3

- Terminal Blocks 2 x 2 way removable

Electrical Isolation

The CBUS and KNX busses are electrically isolated from each other as well as to the CBUS to KNX Translator power supply.

CBUS

- Number of CBUS Group Addresses: 3000
- Unit Address of CBUS Interface: 0 to 255
- Applications and Commands Supported
  - ❖ Lighting ($38)
  - ❖ Trigger ($CA)
  - ❖ Zones ($01)
  - ❖ Security ($D0)
  - ❖ Clock and Timekeeping ($DF)
  - ❖ Custom ($02 to $FE)

KNX

- Number of KNX group Addresses: 3000
- KNX Device Address of KNX Interface: Can be specified
- Telegrams Supported
  - ❖ 1 bit On/OFF - EIS 1
  - ❖ 4-bit Relative Dimming EIS 2
  - ❖ Time EIS 3
  - ❖ Date EIS 4
  - ❖ Floating Point - EIS 5
  - ❖ 1 byte (Scaling) - EIS 6

Principle of Operation

The product translates telegrams from CBUS to KNX and vice versa. This is done by mapping a CBUS telegram to KNX and vice versa.

The Bus Translator software is used to configure the mapping of addresses between the Bus Systems. The software does not do any programming of CBUS and KNX; this must be done by the respective CBUS Toolkit and ETS tools.

In the CBUS to KNX mapping page, a CBUS Application and group address is mapped to a KNX Group address of telegram type On/Off (1-bit), Relative Dimming (4-bit), Time, Date. Floating Point (2-byte), and Scaling (1-byte) according to the requirements of the installer. When a CBUS message of the specified Application and Group address is received by the Translator, it sends a KNX telegram of the corresponding type to the KNX bus.

In the KNX to CBUS Mapping page, a KNX group address of a specified type (On/Off, Relative Dimming, Time, Date, Floating, Scaling) is mapped to CBUS Application and Group address. When a KNX telegram is received, the Translator will send a CBUS Message of the specified Application and Group Address to CBUS.

Up to 3000 group addresses can be added to the KNX to CBUS and CBUS to KNX tables.

The Date and Time can be synchronised between CBUS and KNX

SECTION 2   INSTALLATION

LED Indicators

- RDY (Green) - Indicates Power On.
- IN0 (Red) - Blinks when CBUS telegram is received from CBUS. Off when idle.
- OUT0 (Red) - Blinks when CBUS telegram is sent to CBUS. Steady when no acknowledgment is received from CBUS after outgoing telegram. Off when idle.
- ERR0 (Red) - Steady when CBUS is not connected or CBUS power supply is not on, or when the CBUS interface is not initialised or has an initialisation error. Flashes continuously if the U2 EEPROM is not present Off when idle.
- IN1 (Red) - Blinks when KNX telegram is received from KNX. Off when idle.
- OUT1 (Red) - Blinks when KNX telegram is sent to KNX. Steady when no acknowledgment is received from CBUS after outgoing telegram. Off when Idle.
- ERR1 (Red) - Steady when KNX is not connected or KNX power supply is not on, or when the KNX interface is not initialised or has an initialisation error. Flashes continuously if the U2 EEPROM is not present. Off when idle.
- D11 (Green) - blinks when data is received from the USB Port. Off when idle.
- D12 (Red) - blinks when data is sent to the USB Port. Off when idle.
- LD1 (Red) on CBUS Submodule. On when Burden is enabled
- LD2 (Red) on CBUS Submodule. ON Steady when idle, Blinks during CBUS communication
- LD3 (Green) on CBUS Submodule. OFF when Network Voltage is low or Clock is not present. ON Steady when Voltage and Clock are present. Flashing when Bus Voltage is marginal (15-20V)

Connections and Setup

1   Connect the 12V power supply to the Terminal Blocks marked 12V and GND, taking note of the correct polarity. The module is protected against reverse connection.

2   Connect the CBUS Bus Cable to the CBUS terminal blocks, taking note of the correct polarity. The positive wire of the CBUS signal has a DC voltage of over 20 volts. The module is protected against reverse connection of the CBUS Bus. A CBUS Power Supply or Dimmer must be present on the CBUS network in order for product to send and receive CBUS commands

3   Connect the KNX Bus   Cable to the CBUS terminal blocks, taking note of the correct polarity. The positive wire of the KNX signal has a DC voltage of over 20 volts. The module is protected against reverse connection of the KNX Bus. A KNX Power Supply must be present on the KNX bus in order for the product to send and receive KNX commands.

4   Turn on power to the module. The RDY green led should turn on and the other LEDS will blink for a few seconds while the Bus Interfaces are being initialised. After initialisation, only the RDY LED will be steady on provided both CBUS and KNX Buses are powered up. The module is now ready for operation if it has been programmed. If it has not been programmed, then use the Bus Translator Software to program the module.

SECTION 3 PROGRAMMING

Bus Translator Software

The Bus Translator software tool (for Windows) can be downloaded from http://www.cytech.biz/bus_translator.html.

USB Driver Installation

Connect the supplied USB cable between the PC and the CBUS to KNX Translator. If there is an available Internet connection, Windows 7 will silently connect to the Windows Update website and install any suitable driver it finds for the device. If the automatic installation takes place there is no need to continue with the procedure outlined below.

For Windows XP

1   If there is no available Internet connection or Windows XP SP 2 is configured to ask before connecting to Windows Update, the "Found New Hardware" screen appears. displayed. Select "No, not this time" from the options available and then click "Next" to proceed with the installation. Select "Install from a list or specific location (Advanced)" and then click "Next".

2   Select "Search for the best driver in these locations" and browse to the folder Program Files\Cytech\Bus Translator Configurator\USB Drivers\ Click next to proceed.

3   If the message dialogue that "the software has not passed Windows Logo Testing" appears, click on "Continue Anyway" to continue with the installation.

4   The Wizard will install the necessary driver files and show when the installation has been completed. Click Finish to complete the installation.

For Windows 7

1   If no suitable driver is automatically found then the following procedure should be followed.

2   Press the Windows start button to bring up the start menu and select "Control Panel".

3   From the Control Panel window select Hardware and Sound. At the next screen select Device Manager

4   In the Device Manager window there will be a device under Other Devices with a yellow warning symbol to indicate a problem i.e. no driver installed. The text next to this device will depend on the device attached. In this example the device was a TTL232R device. Right click on the other device (TTL232R in this example) to bring up a menu as shown below. From the displayed menu select "Update Driver Software..."

5   This then displays the option for an automatic search or a manual search. Select the second option to browse manually. In the address box put the exact location where the drivers have been saved to.

6   After entering the address select "NEXT" to start the installation. When the installation has finished a completion screen is displayed.

Using the Bus Translator Software

The Bus Translator opens with a blank screen.
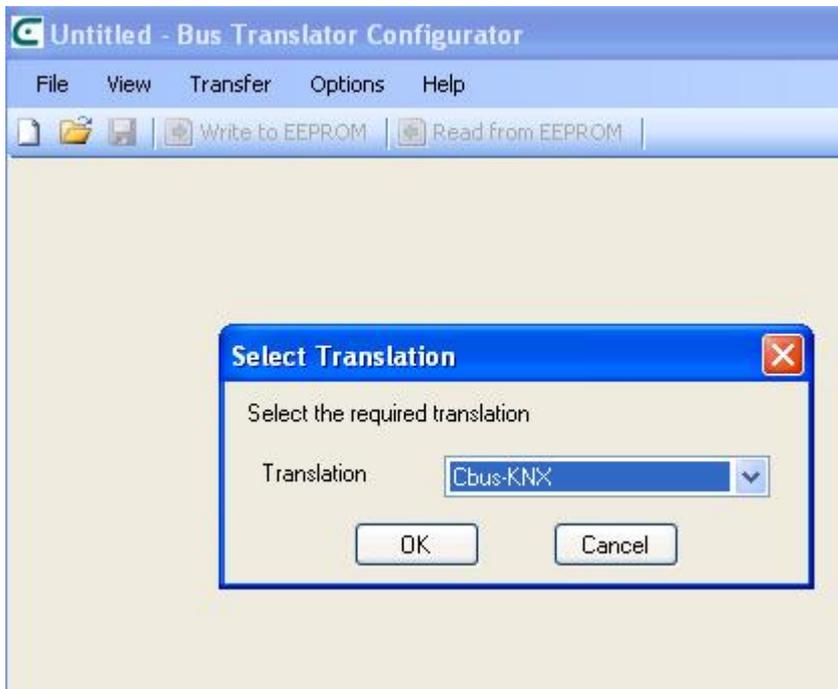
Click File > New and select CBUS-KNX.
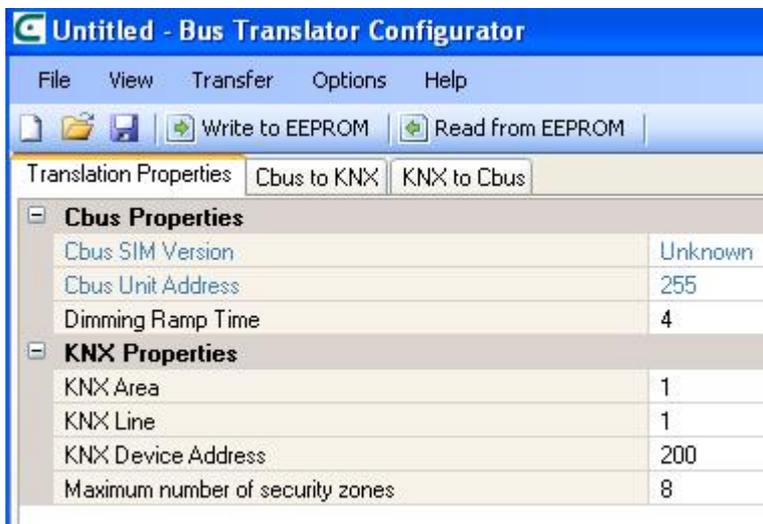
The top Menus are described below;

File Menu

New - Start a new File

Open.. - Open a saved .btxc file

Save - Save a file as .btcx

Save As.. - Save and enter file name for .btcx file

View > I/O Monitor

If I/O monitor is checked then the bottom window will show the messages between the software and the CBUS to KNX translator. This is useful for testing and diagnostic purposes.

Transfer

- System Information - Read System Information from the module including Type of Module and firmware version.
- Write to EEPROM - Write programmed Configuration to the module.
- Read from EEPROM - Read the programmed configuration from the module.
- Upgrade Firmware - Upgrade module firmware to a later version. This will be described later.

Options > Settings
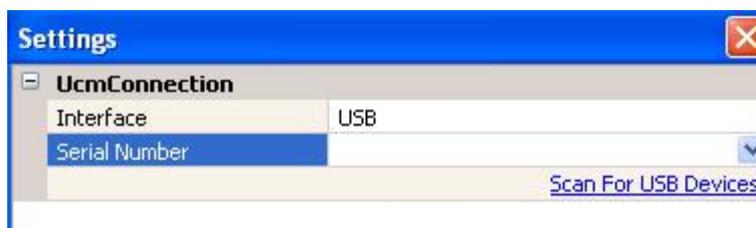
For Interface Choose USB (NOT RS232 or Ethernet). Click the handle to the right of Serial Number. You should see a serial number e.g. "A7007is3" in the dropdown box. If this is blank then the USB Driver may not have not been installed correctly or the USB cable has not been connected. Click the text "Scan for USB Devices", wait a few seconds and look for the dropdown box again. If it is not found, close and open Bus Translator software again. If the serial number still is not detected, the driver may be corrupt or an old version of the driver may be installed. Un-install the driver in Control Menu then reinstall it using the procedure described above.

Help > About

Displays the version of the software.

Programming

The 3 tabs below the toolbar are Translation Properties, CBUS to KNX and KNX to CBUS, shown below.
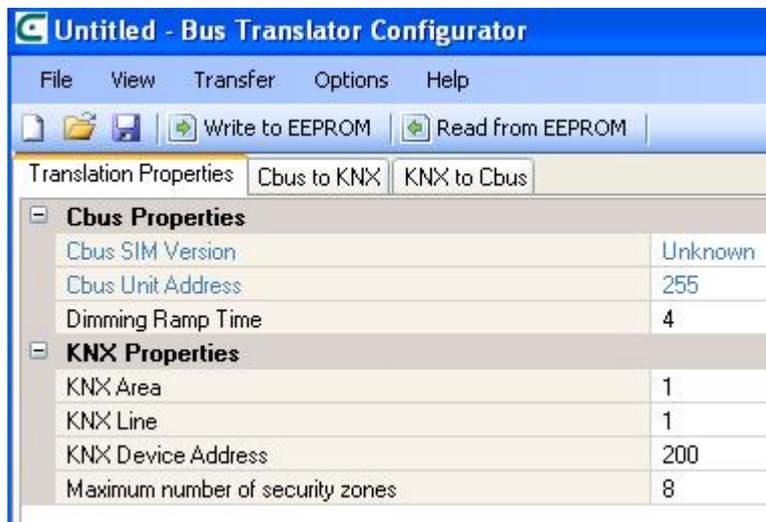
Translation Properties

CBUS Properties

- CBUS SIM Version - This is the firmware version of the CBUS Interface (SIM). This number is seen only after a Read from EEPROM and is a write-only field.
- CBUS Unit Address - This shows the CBUS Unit address of the CBUS Interface (SIM). This number is seen only after a Read from EEPROM and is a write-only field. The Unit Address can be changed only using the CBUS Toolkit software.
- Dimming Ramp Time - This is the time to ramp from maximum to minimum brightness and vice versa. In order for dimming commands to be synchronised between CBUS and KNX, both bus systems should be programmed with the same value using their respective software tools, otherwise dimming rates will be different when two lights on both busses are dimmed or brightened.

KNX Properties

- KNX Area - This is the KNX Area number 1 to 15.

- KNX Line - This is the KNX Line number 1 to 15.
- KNX Device Address - This should be 1 to 255.
- Maximum number of Security Zones - This is the number of security zones that should be mapped to a consecutive range of KNX Group addresses, e.g. 1/6/1 to 1/6/64 for 64 zones. The security system is assumed to be on the CBUS Side e.g. Comfort and MinderPro are the best examples of CBUS-enabled security systems.

CBUS to KNX

The screenshot below is an example of the CBUS to KNX page. Each line shows a mapping between a received CBUS telegram and a KNX telegram to be sent to the KNX Bus.

The top menu in the CBUS to KNX screen has the following items;

- Add Group Address - Add a CBUS Group address and Application manually to the table.
- Delete Group Address - Delete highlighted line from the table.
- Learn - Add a received CBUS message Application ID and Group address to the table, instead of "Add group address"
- Reset to Default - Clear the CBUS to KNX Table. This does not clear the table in the Bus Translator EEPROM. Write to EEPROM is required.


On the first line, CBUS Lighting Application (application ID 56) with Lighting Group Address 1 is mapped to KNX group address 0/0/1 as a 1-bit telegram or On/Off Type. This means that when a CBUS lighting group 1 on or off message is seen by the CBUS to KNX translator, it will send 1 KNX 1-bit telegram to group address 0/0/1.

On the second line, CBUS Lighting Group address 1 is mapped to KNX group address 0/0/2 as Relative Dimming or 4-bit type of telegram. This means that if a CBUS lighting group address 0/0/1 Ramp to level command is seen by the module, it will send a 4-bit telegram to KNX group address 0/0/2 to ramp to the level. CBUS telegrams have ramp time information but not so for KNX telegrams, This is why the Dimming Ramp Time Parameter in Translation Properties Tab is needed.

Add a CBUS to KNX Group Address

To add a new CBUS group address to the table, use either "Add Group Address" or "Learn" buttons. "Add Group Address" will manually add a CBUS Group Address and Application on a new line.
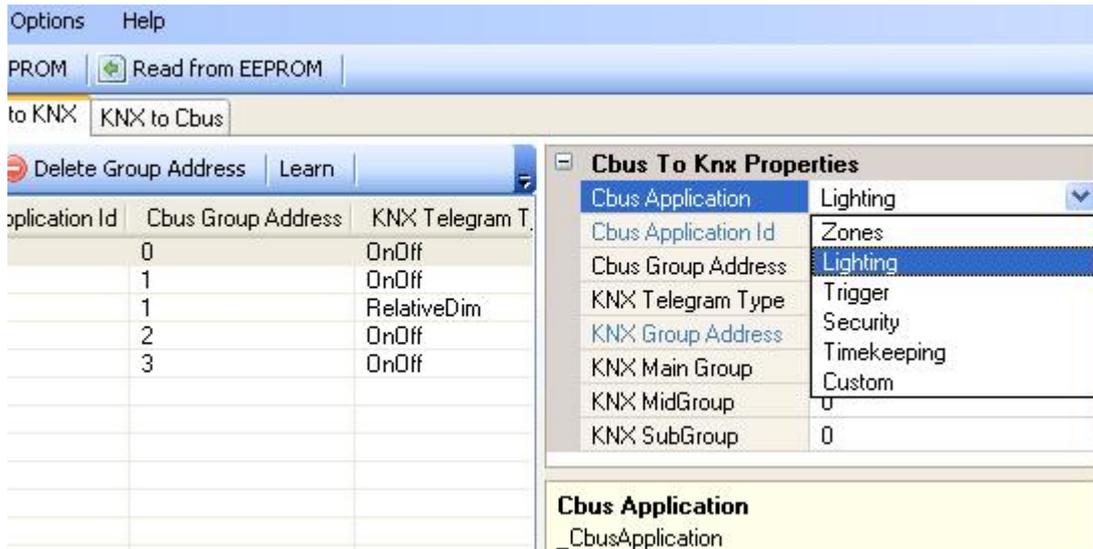
Select an application from the list; Zones, Lighting, Trigger, Security, Timekeeping, Custom..

The "Learn" button will wait for a CBUS message from CBUS to be detected and will show the received group address and Application ID on a new line.

When the CBUS application and group address have been selected using one of the above methods, you will need to select a KNX Group address and KNX Type.
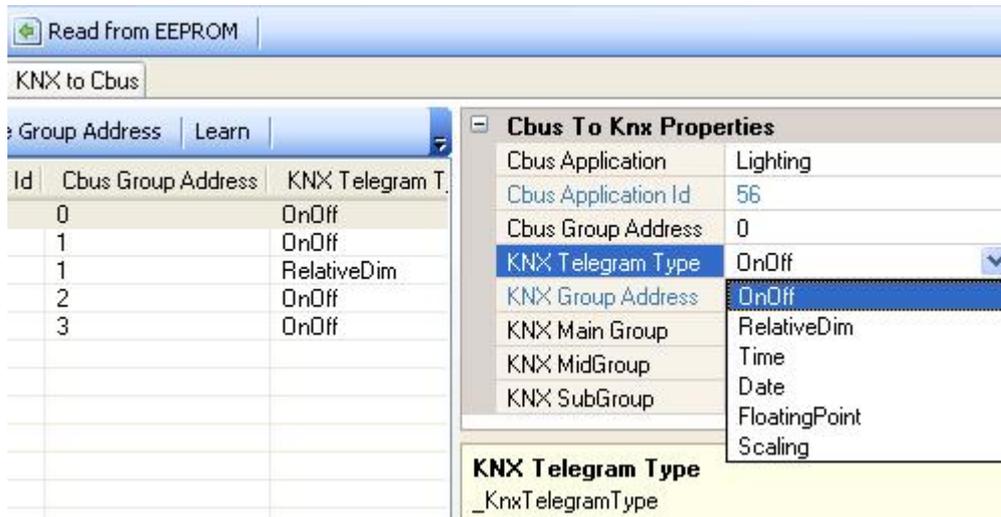
Select a KNX Telegram Type from the dropdown list which corresponds to the type of CBUS and KNX telegram.

- On/Off means a 1-bit KNX telegram corresponding to a CBUS On/Off message.
- RelativeDim means a 4-bit KNX telegram which corresponds to a CBUS Relative Dimming command.
- Time means a Time KNX telegram corresponding to a CBUS Time message.
- Date means a Date KNX telegram corresponding to a CBUS Date message.
- FloatiingPoint means a KNX Floating Point telegram. The incoming CBUS message has its object value converted to a floating point ("EIS 5") 2-byte telegram.

- Scaling means a the CBUS object value is sent as a KNX 1-byte ("EIS 6") telegram. For example CBUS Lighting application ON value is transmitted to the KNX mapped group address as a 1 byte value of 255, and CBUS Off signal is translated to a 1-byte telegram value of 0

Next enter a KNX Main Group, MidGroup and SubGroup from each pulldown list,

☎ You will not be allowed to select a KNX group address which already exists in either the CBUS to KNX or KNX to CBUS Table. However a CBUS Group address/Application can occur more than once in the CBUS to KNX or KNX to CBUS tables. This is because a single CBUS group address may have 1 byte or 1 bit representations while this is not the case for KNX.
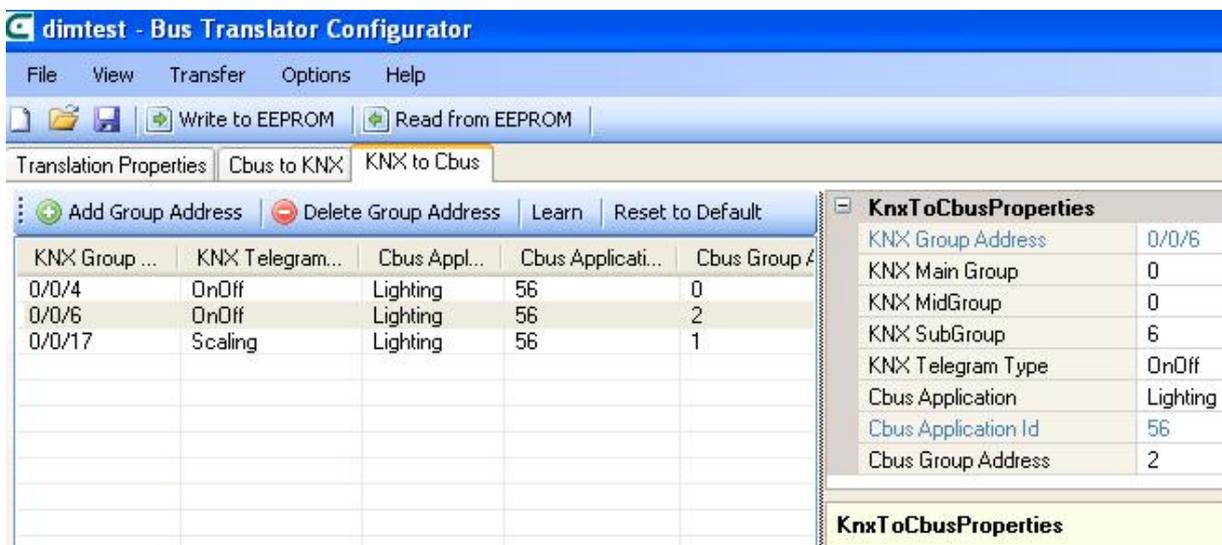
The "Delete Group Address" button will delete a line from the CBUS to KNX table.

KNX to CBUS

The screenshot below shows a typical example of the KNX to CBUS table. Each line shows a mapping between a received KNX telegram and a KNX telegram to be sent to CBUS.

The top menu in the KNX to CBUS screen has the following items;

- Add Group Address - Add a KNX Group address in 3-level format manually to the table.
- Delete Group Address - Delete highlighted line from the table.
- Learn - Add a received KNX Group address to the table, instead of "Add group address"
- Reset to Default - Clear the KNX to CBUS Table. This does not clear the table in the Bus Translator EEPROM. Write to EEPROM is required.

In the 1st line in the above table, a KNX group address 0/0/4 has been defined as On/Off or 1-bit type. It is mapped to a CBUS Lighting application Group address 0.

In the 3rd line, a KNX Group address 0/0/17 defined as "Scaling" is mapped to a CBUS lighting application 1. Scaling type for KNX is a 1 byte value, hence the 1 byte object is mapped as an absolute value in the CBUS lighting application using the RAMP to level command with NO Delay i.e. instantaneous ramp.

If the KNX Telegram type is defined as Relative Dimming or 4-bit, the relative value is translated to a CBUS Lighting application Ramp to Level message.

You can use "Add Group Address" or Learn button to add a KNX group address manually or to add the received group address to the table.

Select a Telegram Type for KNX. Note that the KNX telegram type which has been programmed must be known.

Next map the KNX group address to a CBUS Application and Group address.

☎ You will not be allowed to select a KNX group address which already exists in either the CBUS to KNX or KNX to CBUS Table. However a CBUS Group address/Application can occur more than once in the CBUS to KNX or KNX to CBUS tables. This is because a single CBUS group address may have 1 byte or 1 bit representations while this is not the case for KNX.

Write and Read to EEPROM

After the CBUS to KNX tables have been completed, you must do a WRITE to EEPROM. Before doing so ensure that the Options > Settings USB port has been set correctly as described in an earlier section.

READ from EEPROM reads the programmed configuration from the CBUS to KNX translator to the screen.

Dimming Group Addresses

This section explains how to configure dimming between CBUS and KNX group addresses. It is possible to have a CBUS button dim KNX lights as well as CBUS lights, and also the converse, i.e. a KNX button dim CBUS and KNX lights.

It is necessary to understand how CBUS and KNX dimming works and the differences between them

Dimming in CBUS

When a CBUS button programmed for dimming by press and hold is pressed and held longer than a short press, a RAMP to 100% or 0% with DELAY message is sent to the dimmer. There is a RAMP time associated with the message from the switch, which is the time taken to ramp full scale i.e. 0 to 100% or 100% to 0%. This starts the ramp from the current level. When the button is released, the button sends an Instantaneous Ramp to Level command to the dimmer group address. Note that the CBUS switch does NOT send a stop dimming command, unlike a KNX button.

The button may also be programmed for on and off, in which case it sends an on or off message to the dimmer.

There is only one group address in CBUS which is associated with the dimming and on/off actions. CBUS Dimmers and Relays do not send feedback status

Dimming in KNX

When a KNX dimmer button is pressed longer than a short press, a 4 -bit relative dimming command to 100% or 0% is sent to the dimmer. Unlike CBUS the telegram from the switch does not contain a ramp time - this has been programmed in the dimmer using ETS. Hence there is no information in a KNX telegram regarding the ramp time which the CBUS message can use.

When the KNX button which has been pressed and held is then released, a STOP dimming telegram is sent to the KNX dimmer. The KNX dimmer may then send a telegram on a different feedback group address as a 1 byte telegram with the final value of the dimming level. Note that in KNX it is not the switch but the dimmer which sends the absolute level. If the device is programmed for ON/OFF using a short press then the 1-bit telegram will have a different group address from the dimming group address unlike the case with CBUS. The Dimmer also sends the feedback group address on a different 1-bit group address than the command and the 4-bit dimming group address.

CBUS to KNX Dimming

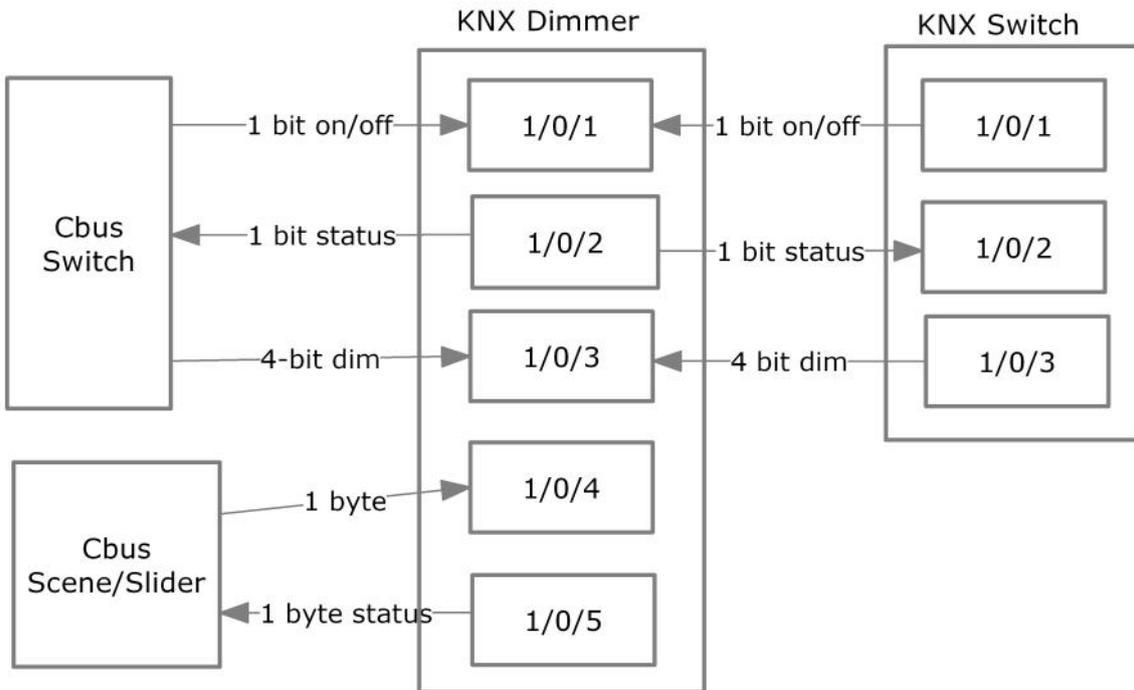This section explains how to use a CBUS switch to control a KNX Dimmer.

When the CBUS dimmer button is pressed the CBUS ramp to full scale message is translated to a 4-bit brighten or dimming to 100% or 0% KNX message. The CBUS lighting group address should be mapped to a KNX 4-bit group address.

When the button is released, the CBUS button sends an immediate ramp (i.e. with no ramp time) to level to KNX. This will send a Stop dimming command to the 4-bit relative dimming group address so the KNX dimmer will stop at the last level. The dimmer may send a 1 byte feedback value. This can be mapped in the KNX to CBUS screen to the sending CBUS group address as 1 byte (scaling); however take note that the absolute value sent by the KNX dimmer may not be the same value stored at the CBUS switch, due to different dimming rates. This effect may be seen if the CBUS switch controls both a CBUS Dimmer and a KNX dimmer. Hence this situation is best avoided.

If the CBUS button is programmed to switch the light on and off the CBUS group address is mapped to a different KNX 1-bit group address on the dimmer. In this case a single CBUS group address is mapped to a 1-bit group address, a 4-bit group address and a 1-byte group address on KNX. This is why duplicate CBUS group addresses are allowed but not for KNX.

The diagram below shows how a CBUS switch can control a KNX dimmer.

CBUS to KNX Dimming

KNX to CBUS Dimming

This section explains how to use a KNX switch to control a CBUS Dimmer. When the KNX dimmer button is pressed the KNX ramp to full scale 4-bit telegram is translated to a RAMP to 100% or 0% CBUS message. A STOP dimming message from KNX is translated to STOP dimming command on CBUS when the KNX button is released. The KNX lighting 4-bit group address is mapped to a CBUS Lighting application group address.
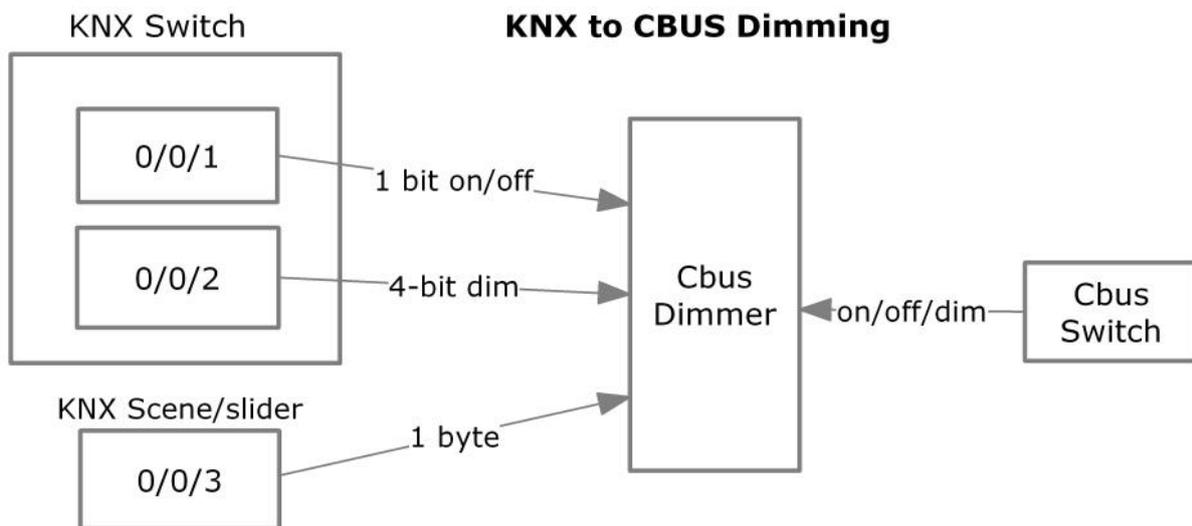
The KNX switch does not control the dimming rate, as this is programmed in the dimmer for KNX. This is where the Dimming Ramp Time in Properties is used. The command to CBUS will use the Dimming Ramp time so the CBUS dimmer will ramp with the specified Ramp Time. A KNX switch can dim a KNX dimmer as well as a CBUS Dimmer if the dim ramp time in CBUS matches the ramp time programmed in KNX

The CBUS dimmer will not send a feedback status back to KNX.

1-bit group address, a 4-bit group address and a 1-byte group address on KNX can be mapped to a single CBUS group address. This is why duplicate CBUS group addresses are allowed but not for KNX.

The diagram below illustrates how a KNX switch can control a CBUS dimmer

KNX to CBUS Dimming

KNX Switch

0/0/1 ——1 bit on/off——▶

0/0/2 ——4-bit dim——▶

KNX Scene/slider

0/0/3 ——1 byte——▶

Cbus Dimmer ◀—on/off/dim—— Cbus Switch

SECTION 4 FIRMWARE UPGRADING

The firmware of the CBUS to KNX Translator can be upgraded. Firmware upgrading may be done to introduce new features or fix bugs in exiting firmware. This can be done using the Bus Translator software.

Firmware Upgrading Procedure

The firmware file has the extension .cbf which is an encoded binary file, e.g. Cbusknx1_00.cbf. The firmware file can be downloaded from http://www.cytech.biz/product_details.php?item_id=332

Unzip the cbf file after download.

1   Run the Bus Translator software.
2   Specify the USB connection and serial number in Options > Settings as described earlier for connection to the module.
3   Select Transfer > Upgrade Firmware.
4   A window to select the file will open. Browse to the folder containing the cbusknx cbf file and press OK
5   The firmware upgrade will start. A progress window shall appear showing the progress of the upgrade. This process takes less than 1 minute

☎ DO NOT interrupt the firmware upgrade, disconnect power or reset the CBUS to KNX module during the procedure. If there is any error, immediately attempt the upgrade procedure again as described above. After the upgrade is completed the module will reset itself and the indicator LEDs will behave as described earlier in this document.

Document Revision History

- 1 November 2011 - Initial Release 1.01
- 16 December 2011 - Updated 1.02 for firmware 1.004, added diagrams
- 12 Dec 2103 - Corrected error in range for KNXArea and Line

Important Note

The printed manual may not always be the most current version. Please check and download the latest version from http://www.cytech.biz/manuals.html

This manual is in A4 format. To print this manual as an A5 Booklet, on HP PCL printers select Page Scaling = Fit to Printable Area. Select Properties > Finishing Tab, Document Options = Print on Both Sides, Booklet Layout = Left Side Binding. Other printers may have different settings to achieve the same result.

Document Title	**CBUS to KNX Translator**

web site:	*http://www.cytech.biz*
Email:	*support@cytech.biz*
User Group/Tech Support:	*http://www.comfortforums.com*

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Applicable firmware	**cbusknx 1.004**
Date Last Modified	**12 December 2013**