ELAN® Integration Note

Manufacturer:	KNX Lighting
Model Number(s):	**(Various)**
Minimum Core Module Version:	5.4 8.3.761 for IP gateway support
Document Revision Date:	1/16/2020

OVERVIEW AND SUPPORTED FEATURES

KNX lighting systems are designed and built to the KNX specifications. Units that are available on the market have been certified and should have received the KNX logo.

For more information on using KNX climate, or Input/Output, refer to other KNX Integration Notes.

In KNX terminology, a "sensor" is the button on the wall that a user presses. An "actor" or "actuator" is the device that closes the circuit and controls current to the bulb. In this document and in the Configurator, the term "switch" refers to the actuator portion of the device, not to the sensor portion.

The term "keypad" describes a group of buttons or sensors. Keypads are supported in KNX systems, and can take the form of "room controllers" (which may also include thermostat control), or more traditional keypads that contain a grid of buttons or rockers. As mentioned above, these buttons or rockers are "sensors" in the KNX system, and are programmed by the dealer using ETS software to perform the desired operation.

IP GATEWAY INFORMATION

Supported IP Gateway : Tapco SIMip ; https://www.tapko.de/products/detail/simip/

A suggested source is direct from Tapco, using provided email of: **sales@tapko.de**

Note: Only add one KNX gateway in the Configurator. You also cannot have one IP gateway and one RS-232 gateway connected simultaneously as they both would have the same address in KNX by default

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RS-232 GATEWAY INFORMATION

IMPORTANT NOTE: The KNX integration requires the use of the Tapko SIM-KNX gateway. This part is available with several options: the suggested part numbers are shown below

For DIN rail mounting: SIM-KNX128-RS232-DIN-Rail

For other mounting: SIM-KNX-128-RS232

A suggested source is Opternus: **http://www.opternus.com/en/tapko/sim-knx-devices.html**

Only add one KNX gateway in the Configurator: the KNX Communication device will then automatically appear on all the tabs that support KNX.

KNX LIGHTING SUPPORTS THE FOLLOWING FEATURES:

Load Control: Control and feedback of actuators in the KNX system are supported.

Sensor Control: Control and feedback from individual sensors in the KNX system is supported, with sensors on room controllers or on wall mounted keypads.

Scene Control: Control and feedback of scenes is supported: in KNX, 1 bit (preset) and 8 bit scenes are supported.

Schedule Control: Multiple schedules can be set using the Viewer software, and are automatically tied to the System Mode.

Devices Supported: Any approved KNX sensor or actuator is supported, provided it exposes the Group Addresses referenced in this document.

KNX LIGHTING DOES NOT SUPPORT THE FOLLOWING FEATURES:

Auto-Detection: Auto detection of devices is not supported at this time.

Max Brightness: Some dimmers can be programmed to limit the maximum brightness to a level below 100%. In this release, when a user sets the dim level over this maximum, the g! interface is not correct.

Dim Level 0%: Some dimmers allow the user to set the level to 0% and still be in an "ON" state. The g! interface does not support this: in g!, a dim level of 0% is the same as "OFF". To work around this, do not program any buttons in the KNX system to set the dim level to 0% - use 1% instead, for example.

Other modes/functions: Any functions not specifically listed in this document are not supported. See the KNX Programming section for a list of the specific device types and control functions supported.

> Any feature not specifically noted as "supported" is not supported.

INSTALLATION OVERVIEW

1. Install the KNX system and verify that it runs properly as a stand-alone system.

IMPORTANT NOTE: By default, the Tapko gateway is set to a physical address of 15.15.255. During ETS programming, do not use this address for any other device.

2. Run a KNX bus wire from the KNX system to the KNX Gateway. Run a Cat5 cable from the KNX gateway back to the **g!** system controller.

3. Connect the **g!** system to the KNX system electrically. See the wiring diagrams for more information.

4. Configure the **g!** system for the desired lighting devices and confirm communication.

5. Test the system by turning lights on and off, changing dim levels, etc.

KNX PROGRAMMING

The configuration of a KNX system in g! first requires that the dealer fully commission the system so that it functions as a stand-alone KNX system. The software configuration tool that dealers use to program KNX systems is called ETS.

KNX systems are configured in g! by adding the desired devices and then specifying in the Configurator the Group Addresses that are setup in the KNX installation. Once the g! system knows the Group Addresses for the desired devices in the KNX system, the g! controller is able to communicate with those devices.

The term Group Address should be thought of as a variable that can be shared by several devices in the KNX system. Each Group Address contains exactly one piece of data (one variable), but KNX supports different data types. One Group Address might contain a TRUE or FALSE variable (on or off), while another Group Address might contain an 8 bit number (a dim level).

A dealer setting up a light in an entryway could create a Group Address named "Entry Light". This Group Address would be a data type "bit" meaning that it stores a TRUE or FALSE value. When the user presses the button to turn on the light, the sensor "sets" the Group Address to TRUE. The relay that controls the load receives the message that the Group Address is now TRUE, and closes the relay to turn on the light.

There are two forms for displaying Group Addresses, and it is straight forward to map between them. The first form uses three numbers separated by "/", such as 1/1/5. The second form uses just two numbers, such as 15/55. In g!, only the first form is used.

With the three digit Group Address form, the first digit can be between 0 and 31 (only 0 and 15 using ETS 3), the second digit can be between 0 and 7, and the third digit can be between 0 and 255. Typically, the first digit is used to specify a location (building, wing, floor), the second a type of activity (lighting, climate, etc), and the third is an index. However, there are no requirements covering how the Group Addresses are selected, so dealers can really choose any numbers they want.

KNX Gateway Programming: The g! System communicates with the KNX bus using the Tapko Gateway product. All configuration of the Tapko Gateway is performed by the g! System over RS-232, and no special programming of this device is required. The only requirements for the Tapko Gateway are that is wired correctly to the KNX bus, and no other device uses the same physical address (15.15.255).

IMPORTANT NOTE: In ETS, be sure to check that any Group Address that g! needs to read has the **Read** flag set. Not all devices enable this setting by default.

In the Configurator, you can add the following devices to interface to a KNX lighting system: **KNX Switch**, **KNX Dimmer**, **KNX 1 Bit Scene** and **KNX 8 Bit Scene**. In the paragraphs that follow, each is described in more detail, along with the Group Addresses that pertain to each.

KNX Switches: KNX switches support basic on and off control, which is accomplished with two Group Addresses: one for control, and a second for status. For devices that support both read and write with a single object, only the first Group Address is needed. For devices that use two objects (one for control and a second for status), use both Group Addresses.

- **Switch Control/Status:** 1 bit: on / off

- **Switch Status:** 1 bit: on / off

In the g! UI, KNX switches can be controlled with Light Switch Control, Light Toggle Control, as well as from buttons on a custom keypad.

KNX Dimmers: KNX dimmers support basic on and off control, as well as dimming control. The following list shows the available Group Addresses for dimmers. As above, a second optional Group Address is available for switch status and dim value, for devices that require two separate Group Addresses for those objects.

- **Switch Control/Status:** 1 bit: on / off.

- **Switch Status:** 1 bit: on / off.

- **Brightness Control/Status:** 8 bit: percentage or 0-255. This Group address is used to directly read and write the current dim level.

- **Brightness Status:** 8 bit: percentage or 0-255.

- **Relative Dim:** DPT Control Dimming: this is a special 3 bit value specifically used for dimming control.

In the g! UI, KNX dimmers can be controlled with Light Dimmer Control, Light Rocker Control, Light Rocker Control (One-Way), as well as from buttons on a custom keypad. The Light Dimmer Control and the Light Rocker Control (One-Way) will track dynamically, while the standard Light Rocker Control waits until the user releases the button on the UI to send the new lighting dim level. Note the Light Rocker (One-Way) does not track current level.

KNX 1 Bit Scene: The 1 Bit Scene control enables presets in KNX. Presets in KNX can be setup by the dealer using ETS and saved in the KNX devices. In addition, some devices support both "save" and "recall", so that a preset can be changed by the end user.

- **1-bit Scene Recall:** 1 bit: selects from two scenes (typically A and B in KNX documentation). This Group Address is used activate the desired scene.

- **1-bit Scene Save:** 1 bit: selects from two scenes (typically A and B in KNX documentation). This Group Address is used to save the current dim levels into the selected scene.

In the g! UI, KNX 1 bit scenes can be controlled with Light Scene Button (Recall/Save) and from a button on a custom keypad. A momentary press on the Light Scene Button (Recall/Save) will set the "recall" Group Address, and thus cause the lights to go to the preset level. Pressing and holding the Light Scene Button (Recall/Save) will instead set the "save" Group Address, which then saves the current dim levels. When a custom keypad button is used, the press and hold for saving is not available.

KNX 8 Bit Scene: The 8 Bit Scene control enables the 8 bit scene functions on supported actuators.

- **8-bit Scene:** 8 bit: 1 bit to save or recall, and 6 bits for scenes: numbers 1-64.

Like the 1 bit scenes, 8 bit scenes can be controlled from the g! UI with the Light Scene Button (Recall/Save) and with buttons on custom keypads.

SHADE PROGRAMMING

Shades can be installed in a KNX system, and are accessed in g! through the Lighting tab, consistent with other lighting systems in g!.

In the Configurator, you use the **KNX Shade** device to add shades. In addition, the **KNX 1 Bit Scene** and the **KNX 8 Bit Scene** discussed above are also supported by most shade controllers, and can be an effective way to handle shade position control.

For the **KNX Shade**, the following Group Addresses are available:

- **Shade Up/Down:** 1 bit: up / down. This Group Address starts the shade motion.

- **Louvre Adjust/Stop:** 1 bit: DPT Shutter/Blinds Mode. This Group Address stops the shade and is used for louvre adjustment.

- **Brightness Control/Status:** 8 bit: 0-100% or 0-255. This Group Address controls the shade position.

Note: There is no Group Address available to set the louver position directly. If this feature is required, then add a second KNX Shade device, and leave the first two Group Addresses blank. Provide the proper Group Address for the louver control in the Brightness field. This will then expose a louver item that you can connect to one of the position controls listed below.

For the **KNX 1 Bit Scene** and the **KNX 8 Bit Scene**, use the same approach described above for lighting. Each 1 bit scene will allow you to recall two positions (just like scene A and B). Some shade controllers also support the "save" function, so that you can push and hold the button on the g! UI to remember the shade position. Each 8 bit scene will allow you to save or recall 1 position.

In the g! UI, there are several controls that you can use to control shades.

Shade Control (Momentary): This control is intended to move the shade up and down. You press on the up or down button and hold it for the duration of travel. When you let go, the shade stops.

Shade Button (Latching): This control also moves the shade, but the up and down buttons start motion, and motion is stopped by pressing either button (or when the shade reaches the end position).

Shade Louvre Control: This control adjusts the louvers. It is a momentary, and each press moves the louvers one step (this step size is configured in KNX with ETS).
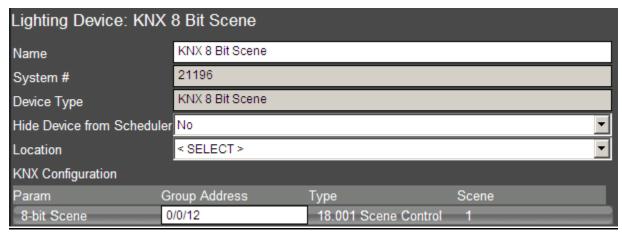
Scene Buttons (Recall/Save): These behave like the light dimmers described above. Momentary press sends the shade to the preset level, press and hold memorizes the new level. This control is also good to set all the shades in a room to a desired preset level with one button press (requires that each shade be programmed for the same Group Address for the desired presets).

Scene buttons on custom keypads: These are also used to set a specific shade position. For example, a custom keypad could contain buttons for 0%, 25%, 50%, 75% and 100% shade position. Recalling that buttons on custom keypads can store levels for multiple devices, a custom keypad button is therefore able to set multiple shade positions with one button press.

Note: The g! user interface is not intended to show two-way feedback for shade control position. So, while the lighting controls listed in the lighting section may be configured to control shade levels, they are not recommended because the dim level will not show correctly when shades are adjusted outside of g!

g! CONFIGURATOR SETUP

1. Add the Communication device and Tapko SIM-KNX Lighting Interface.

2. Add each KNX device to Configurator.

3. Enter the KNX Group Address and Type Information for each object by clicking the fields:

Lighting Device: KNX 8 Bit Scene			
Name	KNX 8 Bit Scene		
System #	21196		
Device Type	KNX 8 Bit Scene		
Hide Device from Scheduler	No		
Location	< SELECT >		
KNX Configuration			
Param	Group Address	Type	Scene
8-bit Scene	0/0/12	18.001 Scene Control	1

4. Enter the Group Address for each control object
   a. Note that if you will not use a mode or other object, leave the Group Address fields *blank*.

Lighting Device: KNX Shade		
Name	KNX Shade	
System #	21611	
Device Type	KNX Shade	
Hide Device from Scheduler	No	
Location	< SELECT >	
KNX Configuration		
Param	Group Address	Type
Shade Up/Down		1.008 Up/Down
Louvre Adjust/Stop		1.023 DPT_ShutterBlinds_Mode
Brightness Control/Status	0/0/15	5.001 Percentage (0..100%)

5. Select the correct Type for each KNX control object.

Lighting Device: KNX Shade

Name	KNX Shade
System #	21611
Device Type	KNX Shade
Hide Device from Scheduler	No
Location	< SELECT >

KNX Configuration

Param	Group Address	Type
Shade Up/Down		1.008 Up/Down
Louvre Adjust/Stop		1.023 DPT_ShutterBlinds_Mode
Brightness Control/Status	0/0/15	✔ 5.001 Percentage (0..100%)
		5.004 Percentage (0..255%)

6. For 1-Bid and 8-Bit Scenes, select the Preset or Scene number.

Lighting Device: KNX 8 Bit Scene (Dimmer)

Name	KNX 8 Bit Scene (Dimmer)
System #	17949
Device Type	KNX 8 Bit Scene
Hide Device from Scheduler	No
Location	< SELECT >

KNX Configuration

Param	Group Address	Type
8-bit Scene	0/0/7	18.001 Scene Control

Scene number dropdown: ✔ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

7. ***Ensure all desired fields have Group Addresses entered and Type selected.***

Lighting Device: KNX Dimmer

Name	KNX Dimmer
System #	17929
Device Type	KNX Dimmer
Hide Device from Scheduler	No
Location	< SELECT >

KNX Configuration

Param	Group Address	Type
Switch Control/Status	0/0/2	1.001 On/Off
Switch Status	0/0/12	1.001 On/Off
Brightness Control/Status	0/0/3	5.004 Percentage (0..255%)
Brightness Status	0/0/14	5.004 Percentage (0..255%)
Relative Dim	0/0/4	3.007 DPT_Control_Dimming

CONNECTION DIAGRAM

Note: Diagram shows TP connection as KNX bus medium for example. Other bus types exist and may be used.

BILL OF MATERIALS FOR RS-232 CONNECTIONS

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	KNX Sensors (Room Controller, etc)	Various	Various	KNX	Screw Terminals	
2	TP Cable	Installer	N/A	KNX	Bare lead	
3	KNX Devices (Ex. Relay Module)	Various	Various	KNX	Screw Terminals	
4	Tapko Gateway	Tapko	SIM-KNX128-RS232	KNX x RS-232	Screw Terminals X DB9	
	Tapko Gateway - DIN Mount	Tapko	SIM-KNX128-RS232-DIN-RAIL	KNX x RS-232	Screw Terminals X DB9	
5	DB9 to RJ45 adapter	Elan	HA-CB-307	RS-232	DB-9 Male X RJ-45 Female	
6	Category 5 cable	Installer	N/A	RS-232	RJ45 Male	
7	g! Controller	Elan	Various (Ex. HC-12)	RS-232	RJ45 Female	

g! CONFIGURATION DETAILS

The following table provides settings used in the g! Configurator. Please refer to the Configurator Reference Guide for more details.

In the table below:

- o   "<Select>", "<Select Scene>"   Select the appropriate item from the list (or drop-down) in the Configurator.
- o   "<User Defined>", etc.   Type in the desired name for the item.
- o   "<Auto Detect>", etc.   The system will auto detect this variable.
- o   "<Type in Group Address>"   Enter appropriate Group address in format *00/00/00*

Devices	Variable Name	Setting	Type/Scene Number	Comments
Communication Devices	**Device Name**	<User Defined> (Default: New Device)		Elan recommends renaming for clarity
	Type	**Serial Port**		
	Communication Type	**Tapko SIM-KNX**		
	Location	<User Defined> (Not Required)		
	Com Port	<Select>		COM1, 2, 3 etc.
				See Note 1
Lighting Interface	**Name**	<User Defined>		
	Device Type	**Tapko SIM-KNX**		
	COM Device	<Select from list>		
Lighting Devices	**Name**	<User Defined>		Elan recommends renaming for clarity
	System #	<Auto Detect>		
	Device Type	<Select from list>		
	Hide Device from Scheduler	<User Defined> (Default: No)		
	Location	<Select from list> (Not Required)		
	KNX Switch			**Set the Group Address for applicable parameters**
	Switch Status	<Type in Group Address>	<Select from list>	1 bit: On / off
	Switch	<Type in Group Address>	<Select from list>	1 bit: On / off
	KNX Dimmer			
	Switch	<Type in Group Address>	<Select from list>	1 bit: On / off
	Switch Status	<Type in Group Address>	<Select from list>	1 bit: On / off
	Brightness	<Type in Group Address>	<Select from list>	8 bit: Percentage or 0-255
	Brightness Status	<Type in Group Address>	<Select from list>	1 bit: On / off
	Relative Dim	<Type in Group Address>	<Select from list>	DPT Control Dimming
	KNX Shade			
	Shade Up/Down	<Type in Group Address>	<Select from list>	1 bit: Up/Down
	Louvre Adjust/Stop	<Type in Group Address>	<Select from list>	DPT Shutter/Blinds Mode
	Brightness Control/Status	<Type in Group Address>	<Select from list>	8 bit: Percentage or 0-255
	KNX 1 bit Scene			
	1-bit Scene Recall	<Type in Group Address>	<Select from list>	1 bit: scene A or B
	1-bit Scene Save	<Type in Group Address>	<Select from list>	1 bit: scene A or B
	KNX 8 bit Scene			
	8-bit Scene	<Type in Group Address>	<Select from list>	Select the desired scene number: 1-64
Keypad Interfaces	**Name**	<User Defined>		
	Interface Device	**Virtual Keypad**		
	Keypad Type	<Select from list> (Select applicable template)		Configure commands for each button as desired
And / Or:				
Custom Tab		Create Custom Lighting Interfaces to actuate scene buttons, individual loads, etc.		

NOTE 1: Only **one** Comm Device is required for all subsystems if using only **one** KNX bus/Tapko SIM-KNX. The Comm Device will automatically populate on all tabs.

COMMON MISTAKES

1. Incorrect KNX programming. KNX must be fully programmed and functional as a standalone system prior to integration with the g! system. In addition, the following particular items must be set correctly:

   a. The correct KNX Objects must be associated with KNX Group Addresses, and the correct Group Address must be specified for each specific function in the g! Configurator.

   b. Certain objects may need to have the Read flag set on them in ETS software, as this may not be the default setting.

   c. Some objects may need a unique Group Address for 2-way feedback. See Lighting System Programming above for full details.

   d. All Group Addresses must be the three digit type (00/00/00), and the two digit (00/00) type is not supported.

   e. All KNX programming must be downloaded to physical devices. Ensure you have not performed programming/changes offline that are not downloaded to the physical devices.

2. Programming any device in your KNX bus with the same address as the Tapko SIM KNX. The SIM KNX utilizes 15.15.255 by default.

3. Failing to enter data in all fields for desired functions. Note that each KNX device Parameter used should have a Group Address, Type, and (if applicable) Scene number selected.

4. Adding multiple communication devices. If you have **ONE** Tapko SIM-KNX (one KNX bus) that you are using for multiple subsystems (example: Lighting & Climate), then you only need **one** Communication Device. Adding the Tapko SIM-KNX to one Subsystem in Configurator will automatically populate it on all supported subsystem tabs.