
# LIVELINK ONE

## KNX INTERFACE

EN | 10522481

# CONTENT

# 1. INTRODUCTION

KNX is a standardised, wired bus system for building automation. Using the central software known as ETS, various areas of buildings can be controlled, linked together and coordinated. This includes for example controlling the lighting, blinds, heating, ventilation, air conditioning and many other applications.

KNX is an open standard: more than 500 manufacturers worldwide produce KNX products, which means KNX is a future-proof investment. All products must be certified by the KNX Association, and the KNX logo guarantees the connectivity and interoperability of all products.

# 2. LIVELINK ONE – KNX INTERFACE

The LiveLink KNX Gateway (TK 10469131, TOC 6001033500) connects the LiveLink Premium system to a KNX building management system and enables groups and scenes to be controlled from the KNX network level. The DALI sensors in the LiveLink Premium system can also be used to control other building systems.
LiveLink already uses KNX Secure (an extension of the KNX standard) to protect against cyber attacks.
The LiveLink KNX Gateway provides 1,000 data points which are allocated as follows.

- System fault: 1 data point
- Time/date: 4 data points
- Groups: 800 data points (from data point 6)
- Sensors: 50 data points (from data point 806)
- Scenes: 50 data points (from data point 856)
- Individual data points: 95 data points (from data point 906)


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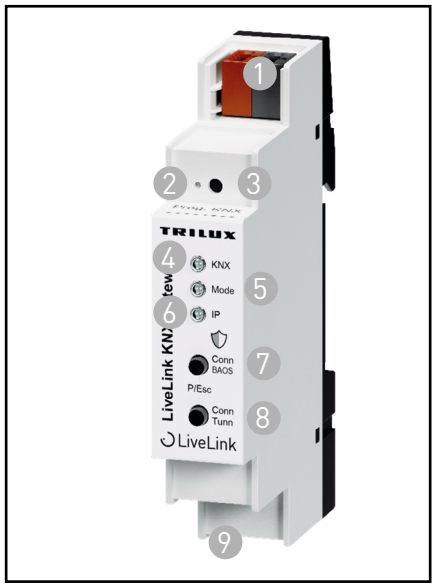
# 3. INSTALLATION AND COMMISSIONING

The LiveLink KNX Gateway is DIN rail-mounted and has a width of 1 module (18 mm).
It features the following operating elements and displays.




1. KNX bus connection
2. Programming LED (red)
3. Button for programming mode
4. KNX LED (multicoloured)
5. LED Mode (multicoloured)
6. IP LED (multicoloured)
7. Conn BAOS button
8. Conn Tunn button
9. LAN connection

## 3.1. KNX programming mode

KNX programming mode is enabled or disabled via the recessed KNX programming button (3) or by simultaneously pressing buttons (P/Esc) (7) and (8).

When programming mode is active, the programming LED (2) and the Mode LED (5) light up red.

The front-panel controls and display for the programming mode can be enabled or disabled in the ETS under 'General Parameters'.

## 3.2. Manual operation and status display

The KNX LED (4) lights up green when KNX bus voltage is present. Flickering of this LED indicates that telegram traffic is taking place on the KNX bus.

Communication faults (e.g. repeated telegrams or telegram fragments) are indicated by the colour briefly changing to red.

Summary of the KNX LED statuses (4):

| **LED behaviour** | **Meaning** |
|---|---|
| LED lights up green | KNX bus voltage present. |
| LED flickering green | Telegram traffic on the KNX bus. |
| LED briefly flashes red | Communication fault on the KNX bus. |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LED Mode (5) can be used to display the status of each BAOS and KNXnet/IP tunnelling connection.

The Conn BAOS button (7) can be used to select the relevant BAOS connection. Pressing the Conn BAOS button (7) increments the connection number. The current connection number is indicated by the Mode LED (5) flashing between 1 and 10 times. An available BAOS connection is shown in green; an occupied BAOS connection is shown in orange.

The Conn Tunn button (8) can be used to select the relevant KNXnet/IP tunnelling connection. Pressing the Conn Tunn button (8) increments the connection number. The current connection number is indicated by the Mode LED (5) flashing between 1 and 5 times. An available KNXnet/IP tunnelling connection is shown in green; an occupied KNXnet/IP tunnelling connection is shown in orange.

This display can be closed using the Escape function (Esc) by simultaneously pressing the Conn BAOS (7) and Conn Tunn (8) buttons.

If neither programming mode nor manual operation is active, the Mode LED (5) may indicate configuration faults.

| **LED behaviour** | **Meaning** |
|---|---|
| LED lights up green | The device is in normal operating mode. |
| LED lights up red | Programming mode is active. |
| LED flashes green 1-10 times | Programming mode is not active.<br>Manual operation (BAOS status display) active:<br>The selected BAOS connection (1-10) is free. |
| LED flashes orange 1-10 times | Programming mode is not active.<br>Manual operation (BAOS status display) active:<br>The selected BAOS connection (1-10) is occupied. |
| LED flashes green 1-5 times | Programming mode is not active.<br>Manual operation (Tunnel status display) active:<br>The selected Tunnel connection (1-5) is free. |
| LED flashes orange 1-5 times | Programming mode is not active.<br>Manual operation (Tunnel status display) active:<br>The selected Tunnel connection (1-5) is occupied. |
| LED flashes red | Programming mode is not active.<br>The device is not properly charged<br>e.g. after a download has been cancelled. |


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# 4. RESET TO FACTORY SETTINGS

It is possible to reset the device to factory settings.

- Disconnect the KNX bus connection (1) from the device.
- Press and hold the KNX programming button (3).
- Restore the KNX bus connection (1) to the device.
- Keep the KNX programming button (3) pressed for at least a further 6 seconds.
- A brief flashing of all LEDs (2, 4, 5, 6) indicates that the device was successfully reset to factory settings.

By default, the device has the physical address 15.15.255 and no group addresses are currently connected. Furthermore, KNX Data Security is not enabled and the initial key (FDSK) must be used to ensure secure commissioning.

## 4.1. Factory settings

Physical addresses and KNXnet/IP tunnelling connections

- Physical address: 15.15.255
- Active KNXnet/IP tunnelling connections: 1
- Physical address of the tunnelling connection: 15.15.240
- IP address allocation: DHCP

# 5. KNX SECURITY

The KNX standard has been extended to include KNX Security to protect KNX installations from unauthorised access. KNX Security reliably prevents both eavesdropping on communications and tampering of the system.

The KNX Security specification distinguishes between KNX IP Security and KNX Data Security. KNX IP Security protects communication over IP, while communication via KNX TP remains unencrypted. This means that KNX IP Security can also be used in existing KNX installations and with non-Secure KNX TP devices.

Note: encrypted telegrams are longer than the previous unencrypted ones. It is therefore essential for secure programming via the bus that the interface used (e.g. USB) and, where applicable, any intermediate line couplers support so-called KNX long frames.


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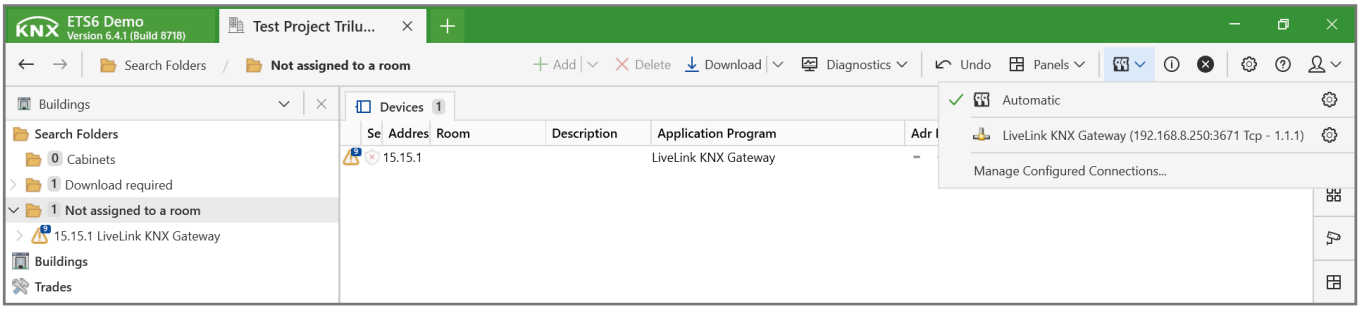
# 6. INTERFACE SETTINGS IN THE ETS

## 6.1. ETS 5

In ETS 5, interfaces can be selected and configured via the ETS menu 'Bus – Interfaces'. All available connections are listed under 'Interfaces found'. After clicking on the desired connection, connection-specific information and options are shown on the right-hand side of the ETS window. Use the 'Select' button to set the selected connection as the 'Current interface'.

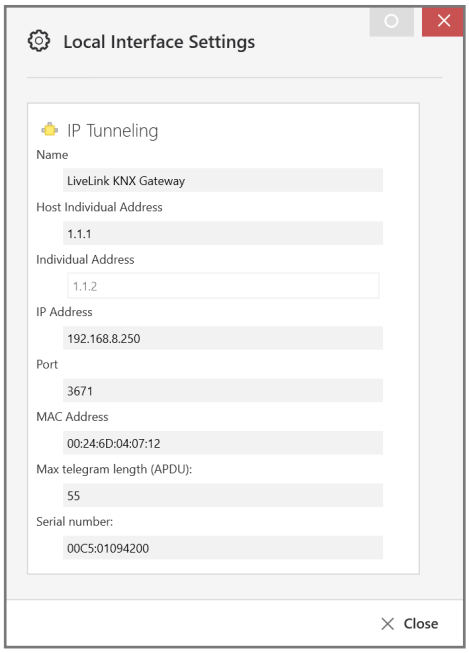
## 6.2. ETS 6

In ETS 6, interfaces can be selected and configured in the ETS project using the 'Interface' button. All available connections are listed here.




Clicking on a connection selects it as the desired interface.

Clicking on the cog icon next to the desired connection shows the connection-specific information and options.





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## 6.3. General

The device name displayed and the 'Host Physical Address' (physical address of the device) can be changed via the database entry in your ETS project.

The LiveLink KNX Gateway supports up to 8 simultaneous connections. A separate physical address is used for each connection.

The ETS can also access configured IP interfaces without a database entry. If the configuration does not match the installation conditions it has to be adjusted via the database entry in the ETS project.

The physical KNX device address and the physical KNX addresses for the additional tunnelling connections can be changed via the database entry within the ETS project after the device has been added to the project. See also the section 'ETS database – Additional physical addresses'.

Like all programmable KNX devices, the LiveLink KNX Gateway has a physical address that can be used to communicate with the device. This is used by the ETS for example when downloading the interface via the KNX bus.

For the interface function, the device uses additional physical addresses which can be configured in the ETS (as of version ETS 5.7). If a client (e.g. the ETS) sends telegrams to the KNX bus via the LiveLink KNX Gateway, these telegrams contain one of the additional addresses as the sender address. Each address is assigned to a connection, thus ensuring that reply telegrams can be forwarded unambiguously to the relevant client.

The additional physical addresses must be within the address range of the bus line on which the interface is located and must not be in use by any other device.

Example:

| | |
|---|---|
| Physical address: | 1.1.10 (device address in the topology) |
| KNXnet/IP tunnelling connection 1: | 1.1.240 (1st additional physical address) |
| KNXnet/IP tunnelling connection 2: | 1.1.241 (2nd additional physical address) |
| KNXnet/IP tunnelling connection 3: | 1.1.242 (3rd additional physical address) |
| KNXnet/IP tunnelling connection 4: | 1.1.243 (4th additional physical address) |
| KNXnet/IP tunnelling connection 5: | 1.1.244 (5th additional physical address) |
| KNXnet/IP tunnelling connection 6: | 1.1.245 (6th additional physical address) |
| KNXnet/IP tunnelling connection 7: | 1.1.246 (7th additional physical address) |
| KNXnet/IP tunnelling connection 8: | 1.1.247 (8th additional physical address) |

# 7. INTEGRATION OF THE GATEWAY

If a LiveLink KNX Gateway is to be integrated into an ETS project, it needs a connection to the computer on which the ETS project is running. The connection can be set up in different ways.

## 7.1. Via the KNX bus

One option is connecting the relevant computer to the KNX bus to which the gateway is also connected. This can be done using a USB-KNX interface for example, or in larger networks via KNXnet/IP routing. Via the KNX bus, it is possible within the ETS project to assign the physical address, load the application and then run it. Access via the KNX bus is recommended if there is no IP connection. The gateway's IP configuration can be carried out via the KNX bus.

# 7.2. Via KNXnet/IP tunnelling

Access via KNXnet/IP tunnelling is possible if a valid IP configuration has already been set up on the gateway (e.g. via DHCP). In this case the device is detected by the ETS and can be selected in the display of interfaces. The application is loaded and run from within the ETS project, as with other devices.

# 7.3. Via direct IP connection

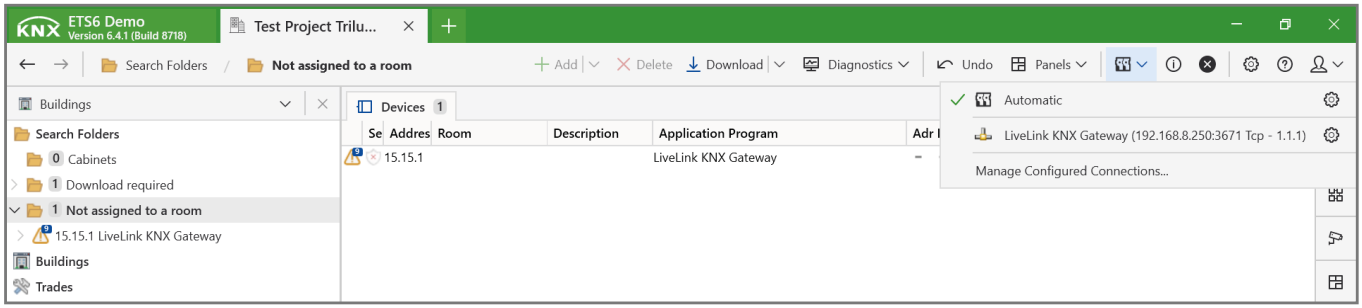
If the gateway already has a valid IP configuration and a physical address, it can be integrated into the ETS project via a direct IP connection. The application can be loaded at high speed via the direct IP connection, whereas both KNXnet/IP tunnelling and KNXnet/IP routing are limited to the speed of KNX TP.

**Tip:** Due to the significantly shorter transfer times, it is recommended to implement downloads via IP.

The procedure for setting up a direct IP connection differs between software versions ETS 5 and ETS 6.

- **ETS 5**
  In ETS 5, under 'Bus – Connections – Options', you can select the 'Use direct IP connection if available' option. The download then takes place directly onto the device and cannot be seen in the ETS Group Monitor.

- **ETS 6**
  In ETS 6, interfaces in the ETS project can be selected and configured using the 'Interface' button. All available connections are listed here.




Clicking on 'Automatic' selects 'Automatic bus connection'.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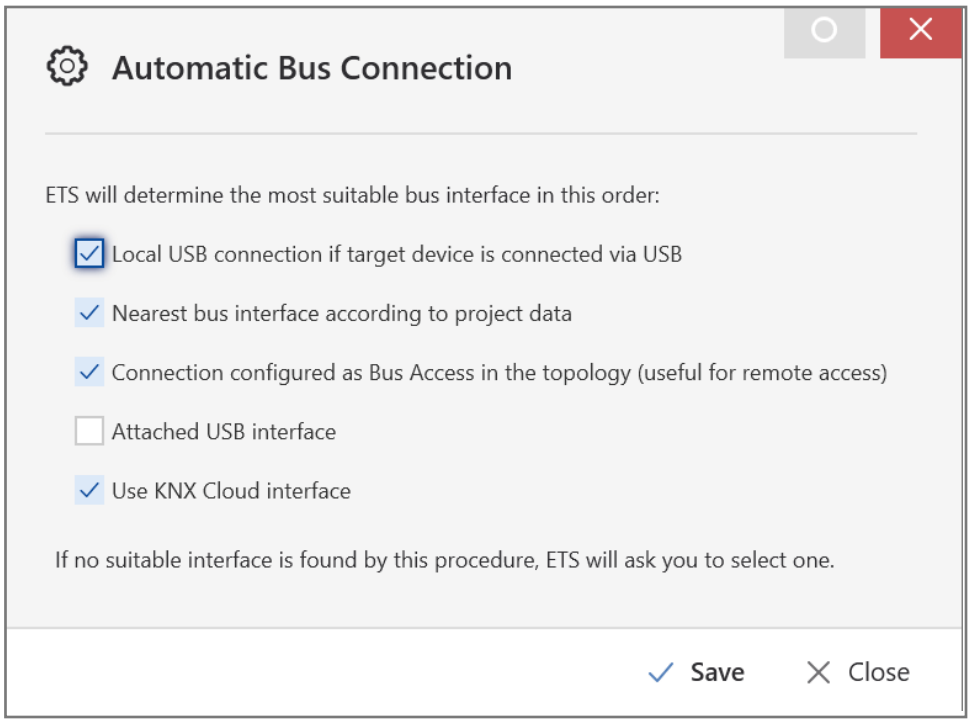


Here, you can select 'Direct IP connection if supported by the target device'. The download then takes place directly onto the device and cannot be seen in the ETS Group Monitor.

# 8. REGISTRATION AND COMMISSIONING

The LiveLink KNX database (ETS registration document) can be downloaded from the TRILUX website (LiveLink Downloads | TRILUX).

## 8.1. Secure commissioning

When the first product with KNX Security is added to a project, the ETS prompts the user to enter a project password.

This password protects the ETS project from unauthorised access. The password is not a key used for KNX communication. You can skip entering your password by clicking 'Cancel' – however, this is not recommended for security reasons.

For every device with KNX Security created in the ETS, the ETS requires a device certificate. This certificate contains the device's serial number and an initial key (FDSK = Factory Default Setup Key).

The certificate is printed in text form on the device. It can also be scanned using a webcam via the printed QR code.

The list of all device certificates can be managed in the ETS window 'Reports – Project Security'.

The initial key is required to securely commission a device from the beginning. Even if the ETS download is intercepted by a third party, they will not then gain access to the secured devices. During the first secure download the initial key is replaced by the ETS with a new key which is generated individually for each device. This prevents any individuals or devices that may know the initial key from gaining access to the device. The initial key is reactivated when the device is reset to factory settings.
The serial number in the certificate enables the ETS to assign the correct key to a device during a download.


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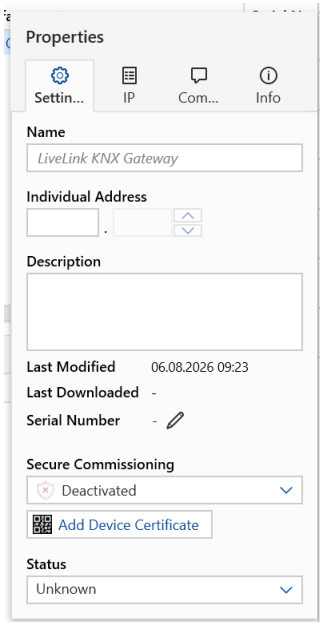
In the ETS project under the device's properties, secure commissioning can be enabled and the device certificate added:




## 8.2. Secure group communication

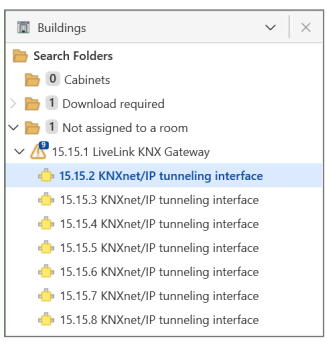
Each object on the device can communicate either in encrypted or unencrypted form. Encryption is configured in the properties of the group address being used, under 'Security'.

The 'Automatic' setting enables encryption if both objects to be connected are capable of encrypted communication. Otherwise, no encrypted communication between the objects is possible. In the overview of communication objects in the ETS project, secured objects can be identified by a shield icon.

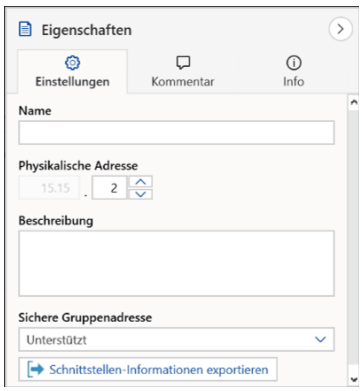
The ETS automatically generates a unique key for each secured group address. These keys can also be checked in the ETS window 'Reports – Project Security'. For all devices to communicate using a secured group address, the corresponding key must be known to every device. Therefore, whenever a key is created or changed, it must be downloaded to all devices that use this group address. The ETS changes a key for example when the encryption for a group address has been disabled and then re-enabled.

## 8.3. Additional physical addresses

The additional physical addresses appear in the topology view.



To change individual addresses, select the relevant entry in the list and enter the desired address in the text field under ‘Properties – Settings’. If the border of the text box turns red after entering, this indicates that the address entered is already in use. The changes are only applied to the device after the download has been completed.

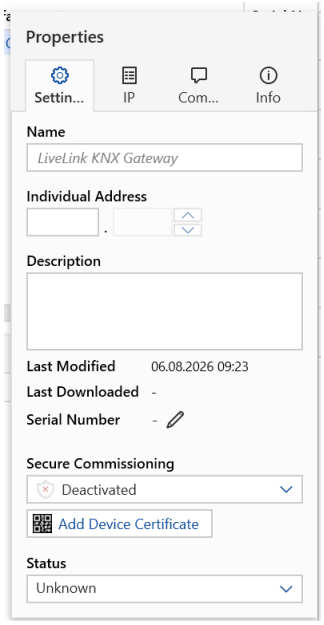



Note: ensure that none of the addresses specified are already being used in your KNX installation.

# 8.4. Settings, device name

When you select the LiveLink KNX Gateway in the tree structure of the Topology view of the ETS project, the ‘Properties’ overview is shown on the right-hand side of the ETS window.

The device name of the LiveLink KNX Gateway can be changed under ‘Properties – Settings’. The first 30 characters are used.




Note: the implemented change only takes effect after an ETS download.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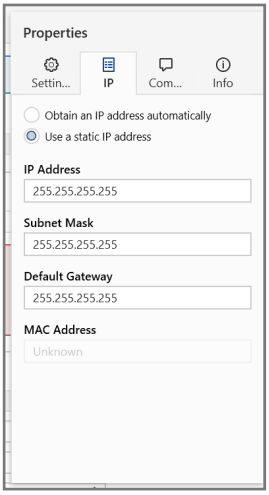
# 8.5. IP configuration

The IP-specific settings of the LiveLink KNX Gateway can be changed under ‘Properties – IP’.




Note: the implemented change only takes effect after an ETS download.

By switching from ‘Obtain IP address automatically’ (via DHCP) to ‘Use fixed IP address’ (static IP address), the IP address, subnet mask and default gateway can be selected as required.

- **IP address**
  Enter the IP address of the LiveLink KNX Gateway here. This is used to address the device via the IP network. IP addressing should be agreed with the network administrator.
- **Subnet mask**
  Enter the subnet mask here. This mask enables the device to determine whether a communication partner is on the local network. If a partner is not on the local network, the device does not send the telegrams directly to the partner but to the default gateway, which forwards them.
- **Default gateway**
  Enter the IP address of the default gateway here, e.g. the access point of the installation.

To ensure a stable connection, a static IP address is recommended.

# 8.6. Example of IP address allocation

The LiveLink KNX Gateway is to be accessed via a PC.

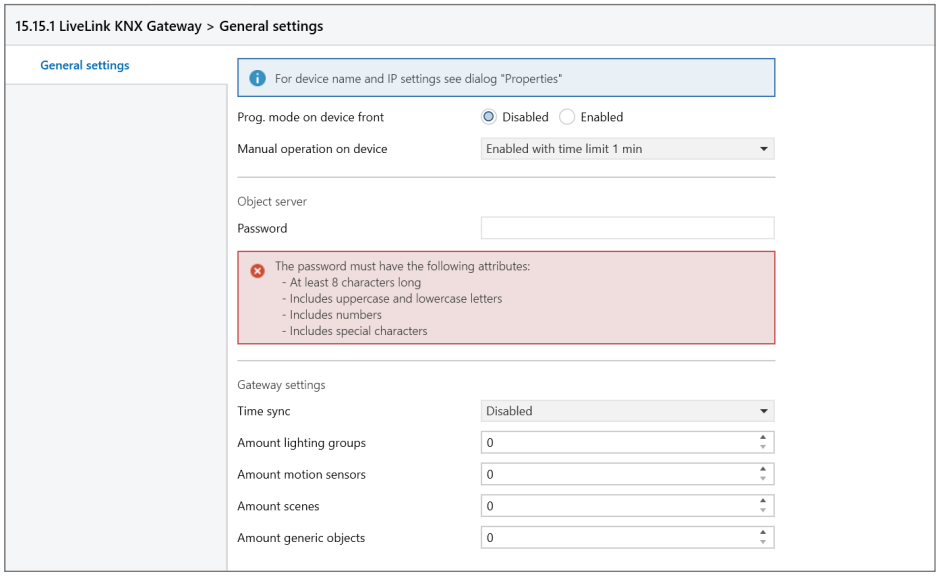
- **IP address of the PC: 192.168.1.30**
- **Subnet mask of the PC: 255.255.255.0**

The LiveLink KNX Gateway is on the same local network, i.e. it uses the same subnet. The subnet restricts the allocation of IP addresses, i.e. in this example, the IP address of the IP interface must be 192.168.1.xx, where xx can be any number from 1 to 254 (except 30, which has already been used). Care must be taken not to assign the same address twice.

- **IP address of the LiveLink KNX Gateway: 192.168.1.31**
- **Subnet mask of the LiveLink KNX Gateway: 255.255.255.0**

# 9. PARAMETERISATION IN THE ETS APPLICATION

## 9.1. General settings




In addition to the standard programming button (3), the device allows the programming mode to be enabled from the front of the device without opening the cover of the control panel. Programming mode can be enabled and disabled by simultaneously pressing buttons (7) and (8).

This function can be switched on or off using the 'Programming mode' parameter on the device front. The recessed programming button (3) (next to the programming LED (2)) is always active and is not affected by this parameter.

**Manual operation on the device**
This parameter is used to configure the manual operation on the device. Manual operation can be enabled or disabled. Once the set time has elapsed, the system automatically returns to normal operating mode.

**Password for access via the LiveLink ONE app**
Here, you can set the password required to access the LiveLink KNX Gateway from within the LiveLink Premium system.

**Gateway settings**
The Gateway settings are used to specify the number of data objects per luminaire group, motion sensor, scene and generic object. The transmission of the time from the KNX system to the LiveLink system can also be enabled. This enables continuous time synchronisation of the LiveLink system. The date and time can be transmitted either as one object or as two separate objects.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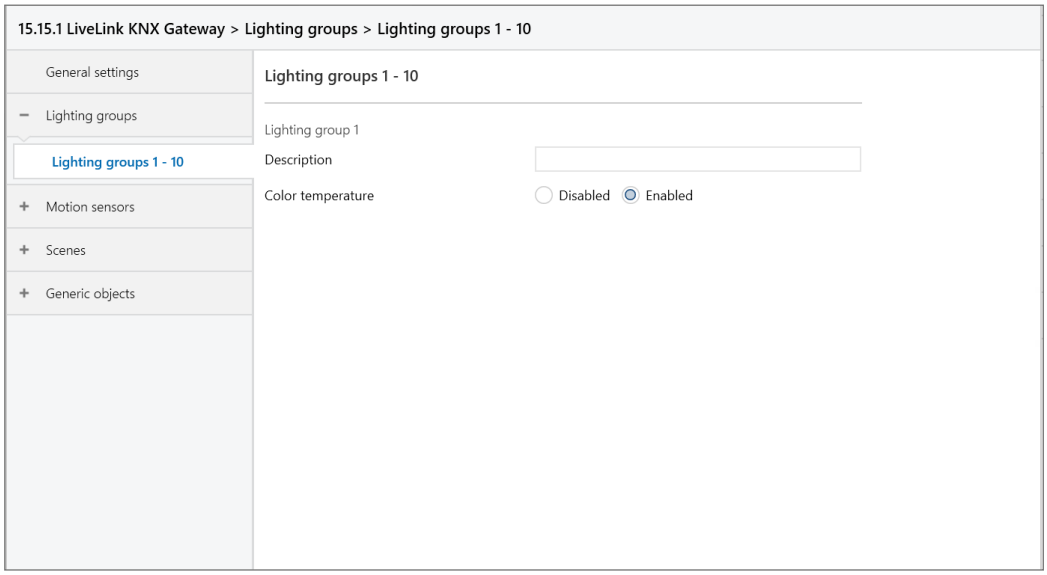
# 9.2. Luminaire groups




In total, up to 100 luminaire groups can be created, each of which occupies eight data points. For each luminaire group, you can assign a name (max. 30 characters) and, if desired, enable the colour temperature.

The following data points are available for each luminaire group:

- On/Off: switching
- On/Off: status
- Dimming: relative
- Dimming: absolute
- Dimming: absolute status
- Colour temperature: relative
- Colour temperature: absolute
- Colour temperature: absolute status

| Data point | Communication | Read | Write | Transfer | Data type | Description |
|---|---|---|---|---|---|---|
| On/Off: switching | x | | x | | 1-bit (1.001, switching) | 1-bit data point for switching the group (On/Off, True/False). |
| On/Off: switching | x | x | | x | 1-bit (1.001, switching) | 1-bit data point for reading out the group switching status (On/Off, True/False). |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| Data point | Communication | Read | Write | Transfer | Data type | Description |
|---|---|---|---|---|---|---|
| Dimming: relative | x | | x | | 4-bit (3.007, dimmer step) | 4-bit data point for relative dimming of a group (brighter/ darker).<br>• Bit 3 (direction)<br>o 0 -> Reduce brightness<br>o 1 -> Increase brightness<br>• Bits 2 to 0 (increment 1-7)<br>o 000 -> Stop<br>o 001 -> 1 step<br>o 010 -> 2 steps<br>o 011 -> 3 steps<br>o 100 -> 4 steps<br>o 101 -> 5 steps<br>o 110 -> 6 steps<br>o 111 -> 7 steps<br>One step corresponds to 17 DALI steps and each dimming operation is executed in 500 ms. |
| Dimming: absolute | x | | x | | 8-bit (5.001, per cent 0-100%) | 8-bit data point (8-bit unsigned value), to set a percentage value for the group (0 to 100%). |
| Dimming: absolute status | x | x | | x | 8-bit (5.001, per cent 0-100%) | 8-bit data point (8-bit unsigned value), to read the group value in percent (0 to 100%). |
| Colour temperature: relative | x | | x | | 4-bit (3.007, dimmer step) | 4-bit data point for relative adjustment of the colour temperature of a group (cooler/warmer).<br>• Bit 3 (direction)<br>o 0 -> Cooler colour temperature<br>o 1 -> Warmer colour temperature<br>• Bits 2 to 0 (increment 1-7)<br>o 000 -> Stop<br>o 001 -> 1 step<br>o 010 -> 2 steps<br>o 011 -> 3 steps<br>o 100 -> 4 steps<br>o 101 -> 5 steps<br>o 110 -> 6 steps<br>o 111 -> 7 steps<br>One step corresponds to 380 Kelvin and each colour temperature change is executed in 500 ms. |
| Colour temperature: absolute | x | | x | | 2-byte (7,600, absolute colour temperature in K) | 2-byte data point for setting the colour temperature of a group (0 to 65,535 K). |
| Colour temperature: absolute status | x | x | | x | 2-byte (7600, absolute colour temperature in K) | 2-byte data point for reading the colour temperature of a group (0 to 65,535 K). |


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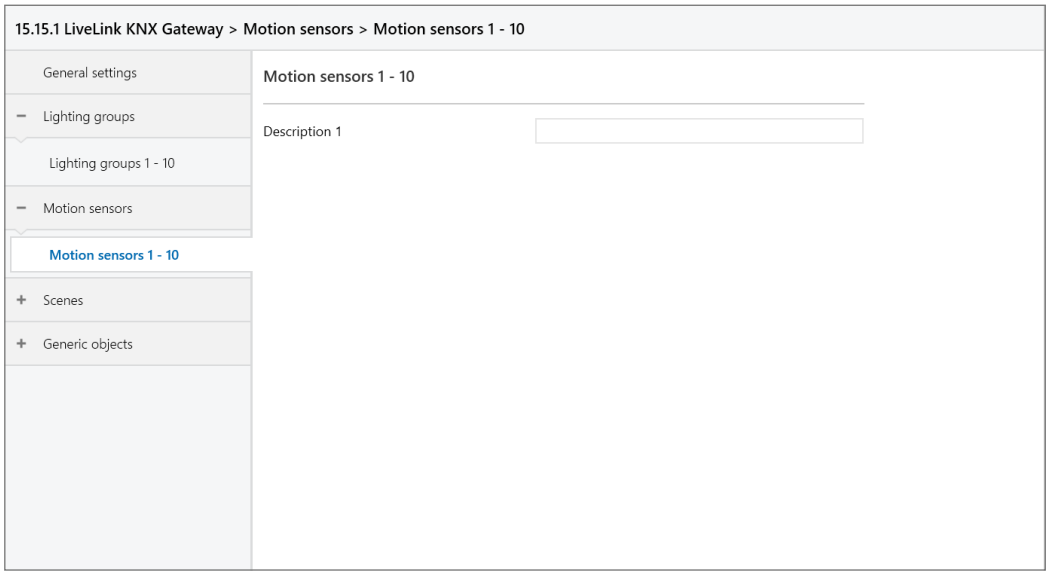
Notes:

- The absolute brightness is set as a percentage. The DALI curve is approximately linearised internally here, so the brightness can be adjusted continuously and almost linearly from 1% to 100%.
- For relative brightness the increment is 17 DALI values (1%: DALI value 85, 100%: DALI value 255). The relative brightness can be used for e.g. button dimming.
- The absolute colour temperature is set as a percentage. TRILUX Tunable White luminaires can usually be adjusted in a range of 2,700 to 6,500 Kelvin.
- For the relative colour temperature, the increment is 380 Kelvin. This can be used for e.g. a colour temperature button.

# 9.3. Motion sensors




Up to 50 motion sensors can be set up in the LiveLink KNX Gateway and linked to the LiveLink system. Each sensor can be assigned a name (max. 30 characters) for easier identification.

| Data point | Communication | Read | Write | Transfer | Data type | Description |
|---|---|---|---|---|---|---|
| Motion status | x | x | | x | 1-bit (1.001, switching) | 1-bit data point for reading the status of a motion sensor (motion/no motion, True/False). |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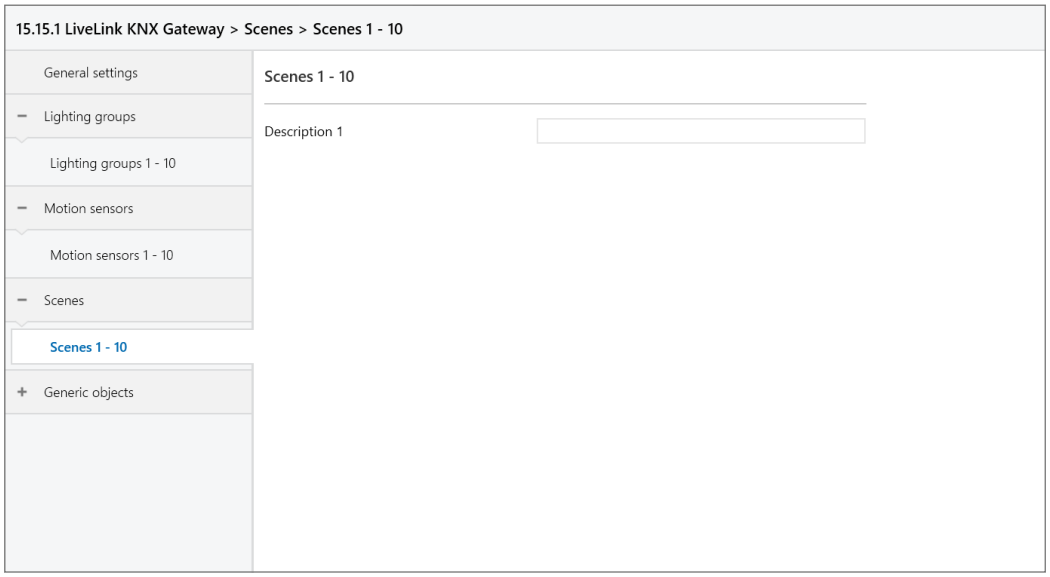
# 9.4. Scenes




Up to 50 scenes can be created and labelled with a name (max. 30 characters).

| Data point | Communication | Read | Write | Transfer | Data type | Description |
|---|---|---|---|---|---|---|
| Call up scene | x | | x | | 1 byte (17.001, scene number) | 1-byte data point for calling up a scene (0 to 63). |

Note:
To call up a LiveLink scene, the corresponding scene number is written to the data point.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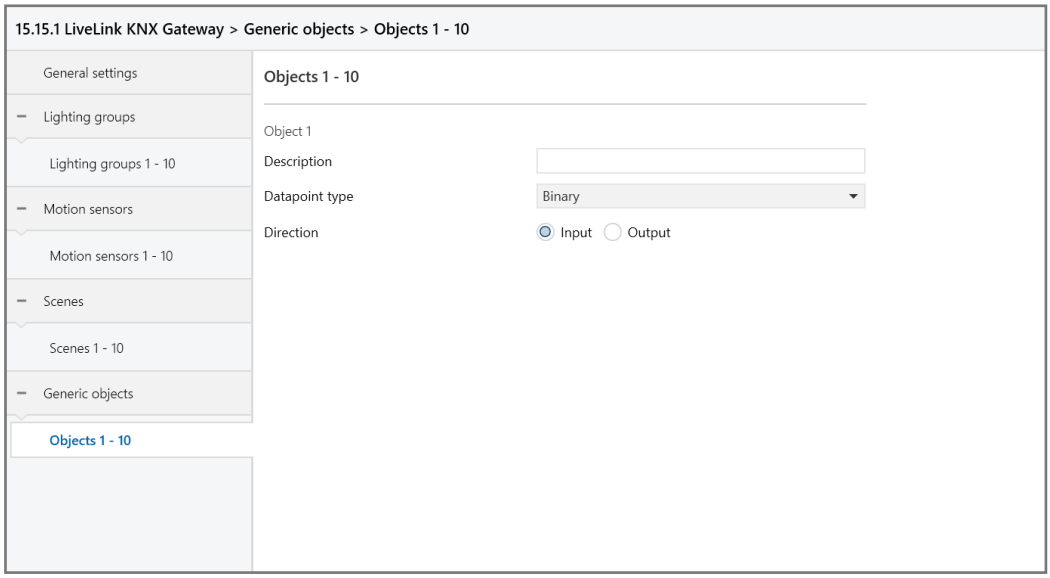
# 9.5. Generic objects




95 generic objects are available for free use. The object is defined by a description (max. 30 characters), the data type and the communication direction (input or output).

The following data types are available:

- Binary
- Relative
- 1 byte (unsigned)
- 2 bytes (unsigned)
- 2 bytes (floating-point)
- Call up scene

The generic objects can be used for links to various sensors, e.g. light, temperature or humidity sensors, or for linking a KNX button to calling up a scene.

| Data point | Communication | Read | Write | Transfer | Data type | Description |
|---|---|---|---|---|---|---|
| Binary (input) | x | | x | | 1-bit (1.001, switching) | 1-bit data point for reading out a switching status (On/Off, True/False). |
| Binary (output) | x | x | | x | 1-bit (1.001, switching) | 1-bit data point for writing a status (On/Off, True/False). |
| Relative (input) | x | | x | | 4-bit (3.007, dimmer step) | not implemented |
| Relative (output) | x | x | | x | 4-bit (3.007, dimmer step) | not implemented |
| 1 byte (unsigned, input) | x | x | | | 8-bit (5.001, percent 0-100%) | 8-byte data point for reading a percentage value (0 to 100%). |

| Data point | Communication | Read | Write | Transfer | Data type | Description |
|---|---|---|---|---|---|---|
| 1 byte (unsigned, output) | x | x | | x | 8-bit (5.001, percent 0-100%) | 8-byte data point for writing a percentage value (0 to 100%). |
| 2 byte (unsigned, input) | x | | x | | 2-byte (7.001, pulse) | 2-byte data point for reading an integer counter value (0 to 65,535). |
| 2 byte (unsigned, output) | x | x | | x | 2-byte (7.001, pulse) | 2-byte data point for writing an integer counter value (0 to 65,535). |
| 2 bytes (floating-point, input) | x | | x | | 2-byte (9.001, temperature °C) | 2-byte data point for reading a temperature value in degrees Celsius (°C). |
| 2 bytes (floating-point, output) | x | x | | x | 2-byte (9.001, temperature °C) | 2-byte data point for writing a temperature value in degrees Celsius (°C). |
| Call up scene | x | | x | | 1 byte (17.001, scene number) | 1-byte data point for calling up a scene (0 to 63). |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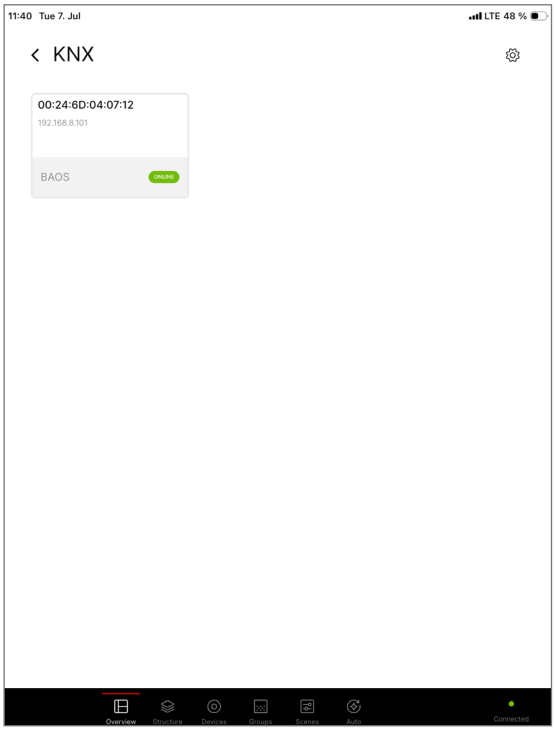
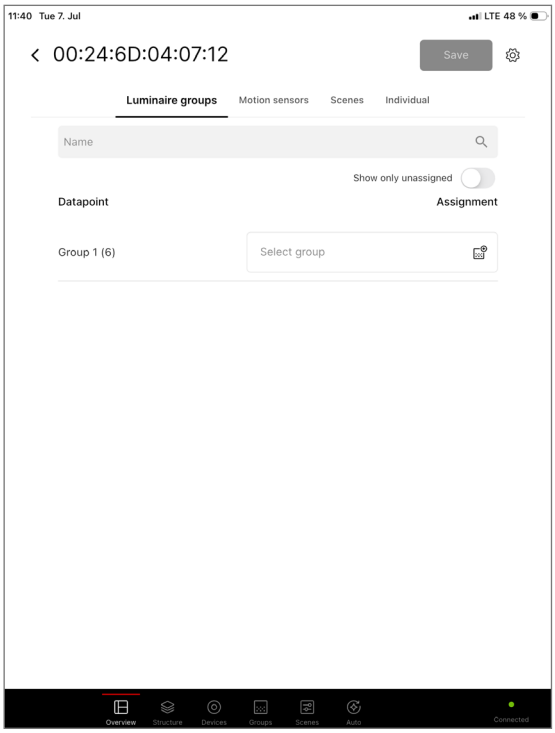
# 10. CONFIGURATION OF THE KNX INTERFACE IN THE LIVELINK ONE APP

The KNX interface is configured to link data points in the building automation system with objects from the Live-Link configuration. The function is located in the central Settings menu on the overview screen, in the Interfaces category.




Adding LiveLink KNX Gateways by entering the IP address and the password assigned in the ETS.

After being successfully added to the LiveLink system, all data points created in the ETS are imported and can then be linked in LiveLink ONE.




In the Luminaire groups section, all groups created in the ETS are linked to the LiveLink luminaire groups.

Via this link, the luminaire groups can be controlled via KNX in terms of brightness and colour temperature.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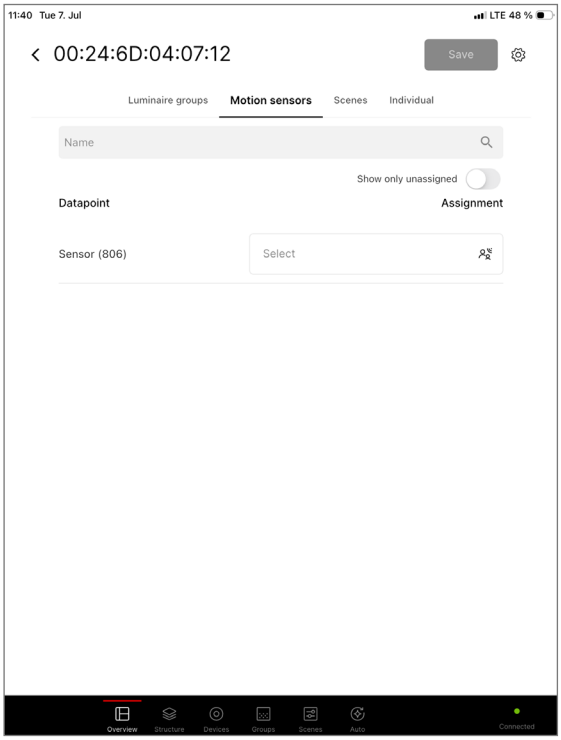
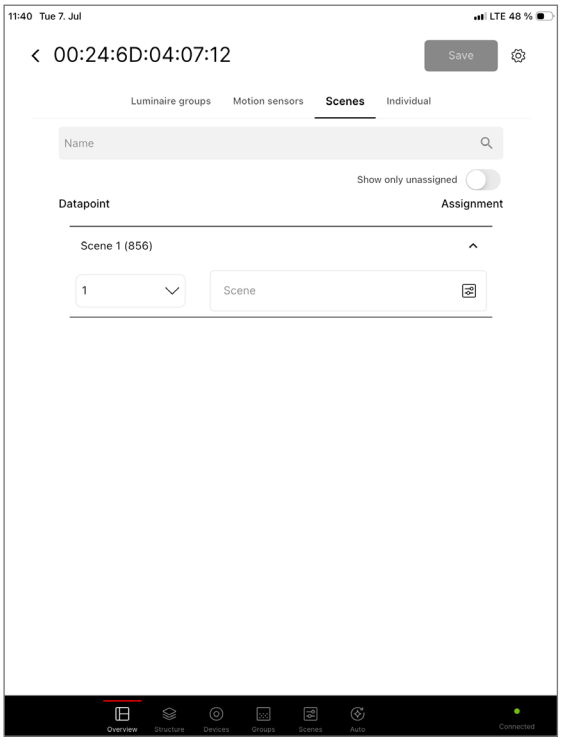



Under Motion sensors, all motion sensors created in the ETS are linked to the LiveLink sensors.

This link enables the KNX system to read and utilise the status changes of a motion sensor.




In the Scenes category, all scenes created in ETS are linked to the LiveLink scenes.

This link enables scenes in the LiveLink system to be called up via KNX.



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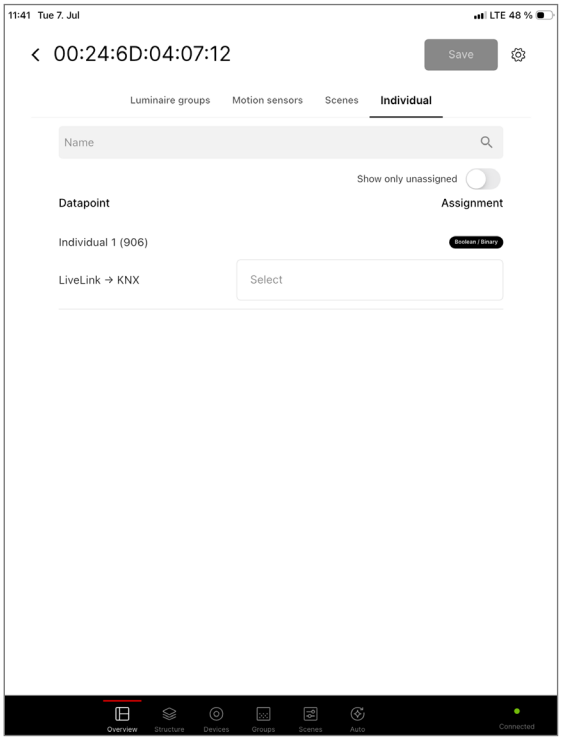


The Individual section allows generic data points to be linked. These could be e.g. light, temperature and humidity sensors or similar devices. The values can be configured as input (KNX -> LiveLink) or output (LiveLink -> KNX) parameters.

An individual data point can also be used to e.g. link a scene button.


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