COOLAUTOMATION
THE INTERNET OF CLIMATE (IoC)

CoolMasterNet KNX

User Manual

ETS Integration Guidelines for KNX Networks

Document Number: 1.2

Contact information: https://coolautomation.com/support

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Revision History

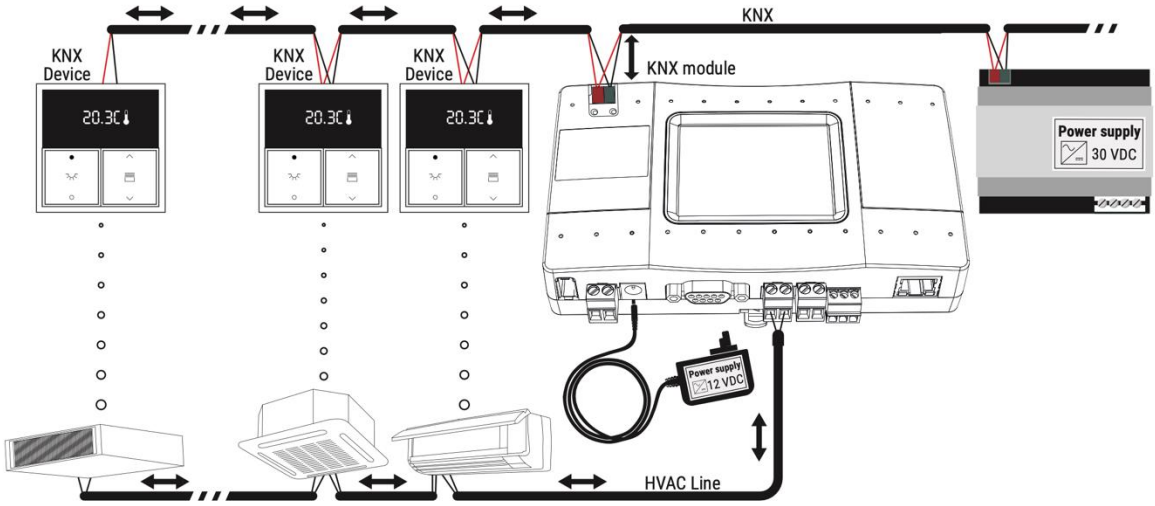
Version Number	Date	Author/Owner	Description of Change
1.0	19/01/2021	Eugene Gekhtman	Preliminary CoolMasterNet KNX User Manual
1.1	17/08/2021	Paul Grebeniuk	Changes of the integration process
1.2	24/09/2021	Nathan Samsonowitz	Review/changes Chapter 4; overall formatting

Acronyms and Abbreviations

Acronym	Literal Translation
CMN	CoolMasterNet
DPT	DataPoint Types
ETS	KNX software (Enterprise Test Software)
GO	Group Object
HVAC	Heating Ventilation and Air Conditioning
VDC	DC Voltage

1. Overview

CoolMasterNet KNX is connected directly to the KNX network. It uses ETS5 or higher for configuration of all objects, as explained in this document. The CoolMasterNet device is powered by a standard power adapter. The KNX bus should be powered separately from the KNX bus power supply.



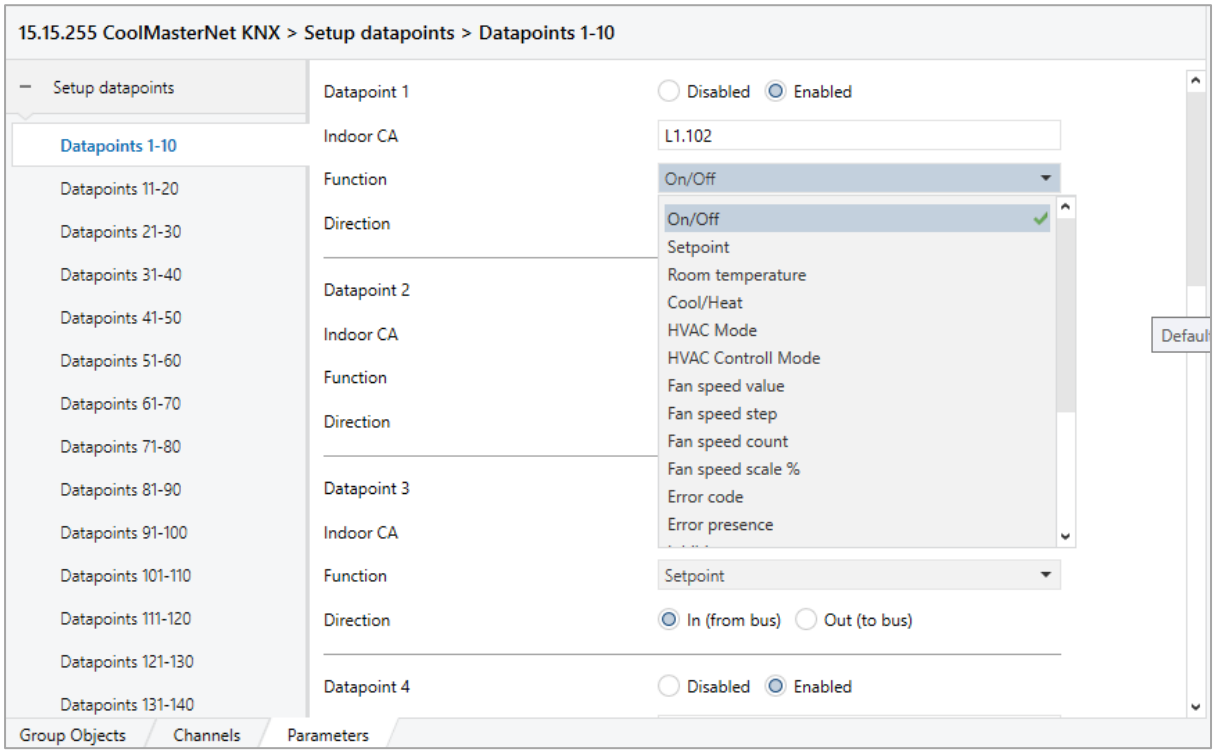
2. ETS5 database

2.1 ETS5 parameter dialog

The CoolAutomation device does not provide any additional setup via the ETS5 software beside the Datapoint setup. The final Group Object (GO) is “constructed” based on the following datapoint fields: Indoor CA, Function and Direction. The number of possible GO variations per datapoint is 34.

2.2 Datapoints N - M

10 datapoints are combined per page.



2.3 Datapoint activation

This parameter activates the KNX interface. The following options are available:

- Disabled
- Enabled

2.4 Indoor CA (Central Address)

Here the address of the HVAC device is configured.

CA format: **L<LINE NUMBER>.<INDOOR ADDRESS>**

LINE NUMBER range from 1...8

INDOOR ADDRESS range from 0...999

- In the above example the CA value for the tested device is **L1.102**

2.5 Function

This parameter defines the function of this datapoint. The following options are available:

- **On/Off**
- **Setpoint**
- **Room temperature**
- **Cool/Heat**
- **HVAC Mode**

  See table for encoding information.

- **HVAC Control Mode**

  Implemented Modes: 0-Auto, 1-Heat, 3-Cool, 9-Fan, 14-Dry

- **Fan speed value**

  See table for encoding information.

- **Fan speed step**

  The function takes current fan speed and increases it by one step (regardless of the value received from KNX telegram). If current fan speed is the maximum supported by the related Indoor Unit, the lowest possible fan speed will be taken. For example, if Indoor Unit supports Low, Medium, and High fan speeds Fstep changes the fan speed from Low to Medium, from Medium to High or from High to Low. This function only has one direction — from the KNX device to the KNX Module. (page 5)

- **Fan speed count**

  The function takes all supported fan speeds of the related indoor unit and gives them numbers starting from 1 (one).

- **Fan speed scale %**

  The function translates the fan speed encoding in % into HVAC fan speed modes and vice versa according to the table below.

  Supported Fan Speeds

Auto	Low	Medium	High	Top
0%		50%		100%
0%	33%	66%		100%
0%	25%	50%	75%	100%

- **Error code**

  See table for encoding information.

- **Error presence**
- **Inhibit**

  The function activates or deactivates (according to datapoint value 1 or 0) the inhibit of the indoor unit ON operation. Upon inhibit activation, the current On/Off status of the indoor unit is stored. The indoor unit is turned OFF after an ±8s delay. The indoor unit is forced OFF, until inhibit deactivation. On inhibit deactivation, the indoor unit is turned ON, if the ON status was previously stored, at inhibit activation. This function is designed to work with the window sensor to prevent HVAC operation while the window is open.

- **Filter**
- **Louver mode**

  This function and the Louver scale function below may have no effect if the requested louver position is not supported by an indoor unit. Not all indoor units support louver position options listed below or have louver position control at all. Louver control is a capability of the specific indoor unit type.

  See table for encoding information.

- **Louver scale**

  The value ranges from 0...FF hexadecimal

Auto	Vertical	30°	45°	60°	Horizontal
0x0	0x33	0x66	0x99	0xCC	0xFF

- **Cooling On/Off**

  The value 0x1 turns on Cooling mode. If it gets 0x0, it sets the A/C to Fan Mode at minimal speed.

- **Heating On/Off**

  The value 0x1 turns on Heating mode. If it gets 0x0, it sets the A/C to Fan Mode at minimal speed.

- **Fan Auto On/Off**

  The value 0x1 turns on Fan mode with Fan Auto speed. If it gets 0x0, it sets the A/C to Fan Mode at minimal speed.

2.6 Direction

The KNX specific communication direction is defined here:

- **In (from bus)**

  Datapoints with this direction support ‘Communicate’ and ‘Write’ configuration flags only.

- **Out (to bus)**

  Datapoints with this direction support ‘Communicate’, ‘Read’ and ‘Transmit’ configuration flags only.

2.7 Group objects

All available GOs in datapoint1 are represented on the following table:

Row	Function	Direction	DPT	Size
1	On/Off	In (from bus)	1.1 Switch	1 bit
2		Out (to bus)		
3	Setpoint	In (from bus)	9.1 Temperature C	2 bytes
4		Out (to bus)		
5	Room temperature	In (from bus)	9.1 Temperature C	2 bytes
6		Out (to bus)		
7	Cool/Heat	In (from bus)	1.100 Heat/cool	1 bit
8		Out (to bus)		
9	HVAC Mode	In (from bus)	HVACOperMode Non-standard DPT	1 byte
10		Out (to bus)		
11	HVAC Control Mode	In (from bus)	20.105 HVACContrlMode	1 byte
12		Out (to bus)		
13	Fan speed value	In (from bus)	HVACFanMode Non-standard DPT	1 byte
14		Out (to bus)		
15	Fan speed step	In (from bus)	1.7 Step	1 bit
16	Fan speed count	In (from bus)	5.1 Scaling	1 byte
17		Out (to bus)		
18	Fan speed scale %	In (from bus)	5.1 Scaling	1 byte
19		Out (to bus)		
20	Error code	Out (to bus)	ErrorCode (Non-standard DPT)	2 bytes
21	Error presence	Out (to bus)	1.5 Alarm	1 bit
22	Inhibit	In (from bus)	1.11 Step	1 bit
23	Filter	In (from bus)	1.5 Alarm	1 bit

Row	Function	Direction	DPT	Size
24		Out (to bus)		
25	Louver mode	In (from bus)	HVACLouversPosition (Non-standard DPT)	1 byte
26		Out (to bus)		
27	Louver scale	In (from bus)	5.1 Scaling	1 byte
28		Out (to bus)		
29	Cooling On/Off	In (from bus)	1.1 Switch	1 bit
30		Out (to bus)		
31	Heating On/Off	In (from bus)	1.1 Switch	1 bit
32		Out (to bus)		
33	Fan Auto On/Off	In (from bus)	1.1 Switch	1 bit
34		Out (to bus)		

3. Non-standard DPTs

3.1 HVACOperMode

Encoding table:

0 = Cool

1 = Heat

2 = Auto

3 = Dry

4 = Fan

5 = HRV Auto - Heat Reclaim Ventilation automatic mode

6 = HRV Bypass - Heat Reclaim Ventilation bypass mode

7 = HRV Heat Exchange - Heat Reclaim Ventilation Heat Exchange

8 = HRV Normal Mode - Heat Reclaim Ventilation normal mode

9 = HRV Sleep Mode - Heat Reclaim Ventilation sleep mode

10-255 = not used, reserved

3.2 HVACFanMode

Encoding table:

0 = Low

1 = Medium

2 = High

3 = Auto

4 = Top

5 = Very Low

6 = Super High

7 = HRV Low Freshup - Heat Reclaim Ventilation low fresh incoming airflow

8 = HRV High Freshup - Heat Reclaim Ventilation high fresh incoming airflow

9 = HRV Super High - Heat Reclaim Ventilation super high incoming airflow

10-255 = not used, reserved

3.3 HVACLouversPosition

Encoding table:

0=Vertical

1=30°

2=45°

3=60°

4=Horizontal

5=Auto/Swing

6=Stop

7-255=Unused, reserved

3.4 ErrorCode

The datapoint value represents an error code as sent by the HVAC system per the manufacturer's description.

4. Integration with KNX and ETS5

4.1 Brief introduction to CoolMasterNet KNX characteristics

The communication characteristics of datapoint as a GO are defined by six Communication flags: Communication, Read, Write, Transmit, Update and Read On Init. CoolMasterNet currently uses, only the first four flags:

Communication is a flag that determines if the GO can communicate with the bus. This is the "enable/disable GO" flag.

Read - the value is available for read requests from the bus. A GO with this flag must send the current value to the group as a response to the GroupValueRead message.

Write - the value is available for write requests from the bus. A GO with this flag must change its value as a response to the GroupWriteValue message.

Transmit - GO sends a GroupWriteValue message to the group with a new value. (Update - GO sends a GroupValueRead and changes its value to the one sent in the response message.)

Currently, the manufacturer's application, which determines the characteristics of the device in the system, only provides the default value of communication flags and DPTs, which the user can change at his discretion. In other words, for a regular KNX datapoint, you can enable all the flags at the same time.

Datapoints in CoolMasterNet are strictly divided into two groups: input (work only with the Write flag) and output (work only with the Read and Transmit flags). Turning on other flags has no effect on them.

4.2 Example of CoolMasterNet Integration

The following example of CoolMasterNet integration (in mode for one HVAC device connected to line L1) with “push button” (pad panel by Schneider Electric) connected to address groups 10/0/0 and 10/0/1.

Before you start

1. Connect CoolMasterNet to the KNX bus connector (connector 1 on Figure 1)

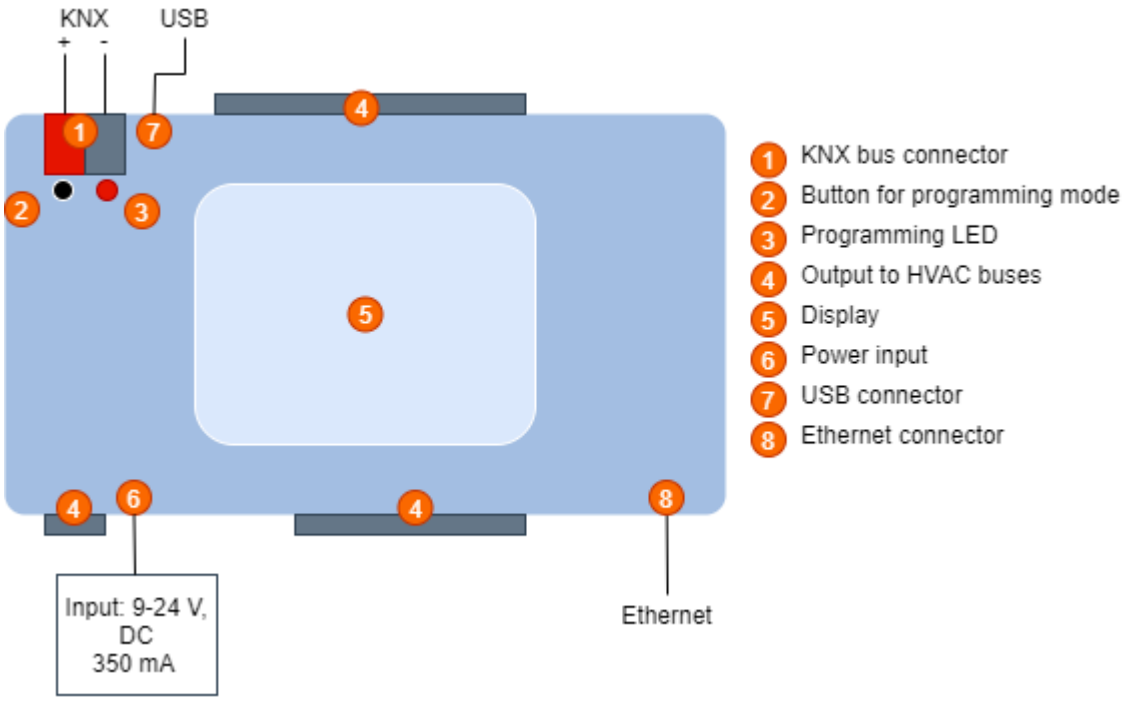


Figure 1

2. Open an ETS5 SW. (**Note:** A KNX USB dongle is required for operation with ETS5.)

4.3 Connect the KNX IP interface

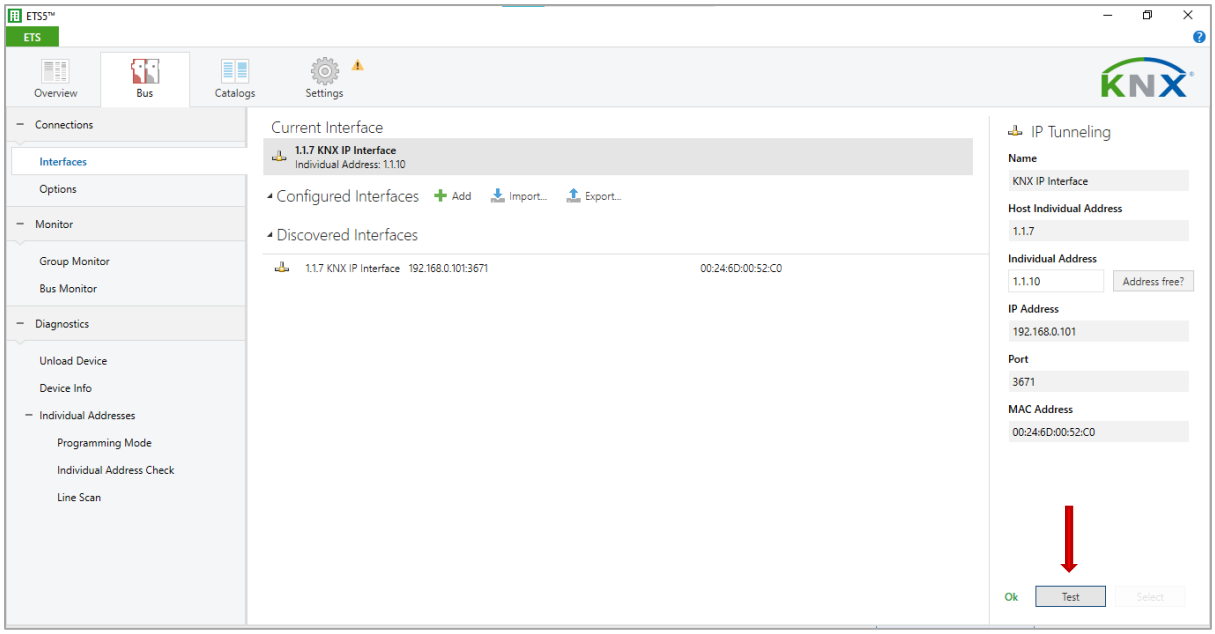
Open a Bus tab => interfaces.

Once the Bus is enabled and the subnet of PC and KNX IP interface is configured properly, the KNX IP interface is discovered automatically and populated on the Discovered Interface tab.

Once the KNX IP interface is the only device in the subnet, it is discovered automatically and populated on the Current Interface tab.

For Gate test, press the **Test** button. If the test is successful, go to the next step.

If the test is not successful, check if both LEDs (bus power and network settings) on the IP Interface are lit up.

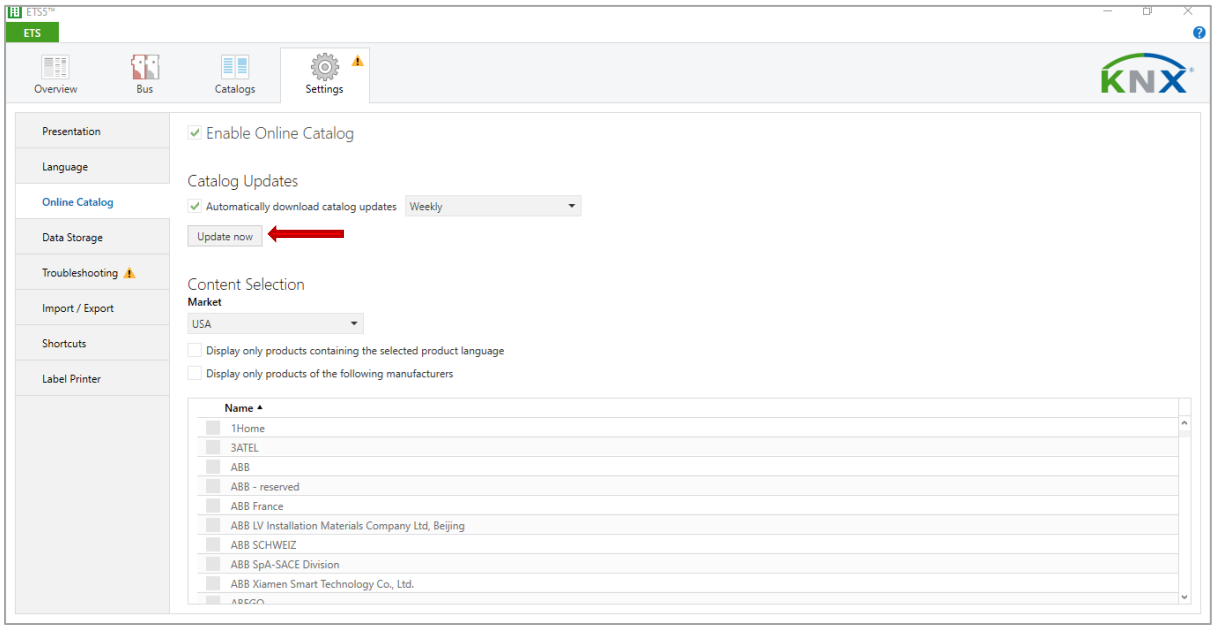

ETS5™
ETS
Overview
Bus
Catalogs
Settings
KNX
Connections
Interfaces
Options
Monitor
Group Monitor
Bus Monitor
Diagnostics
Unload Device
Device Info
Individual Addresses
Programming Mode
Individual Address Check
Line Scan
Current Interface
1.1.7 KNX IP Interface
Individual Address: 1.1.10
Configured Interfaces
Add
Import...
Export...
Discovered Interfaces
1.1.7 KNX IP Interface 192.168.0.101:3671 00:24:6D:00:52:C0
IP Tunneling
Name
KNX IP Interface
Host Individual Address
1.1.7
Individual Address
1.1.10
Address free?
IP Address
192.168.0.101
Port
3671
MAC Address
00:24:6D:00:52:C0
Ok
Test
Select

4.4 Connect online Catalog

For a new ETS5 or higher installation, connect online KNX Catalog Settings=>Online Catalog.

Mark the check box parameters - Enable Online Catalog and (optional) Automatically download Catalog updates (weekly, etc.).

Select region. Click **Update** now.



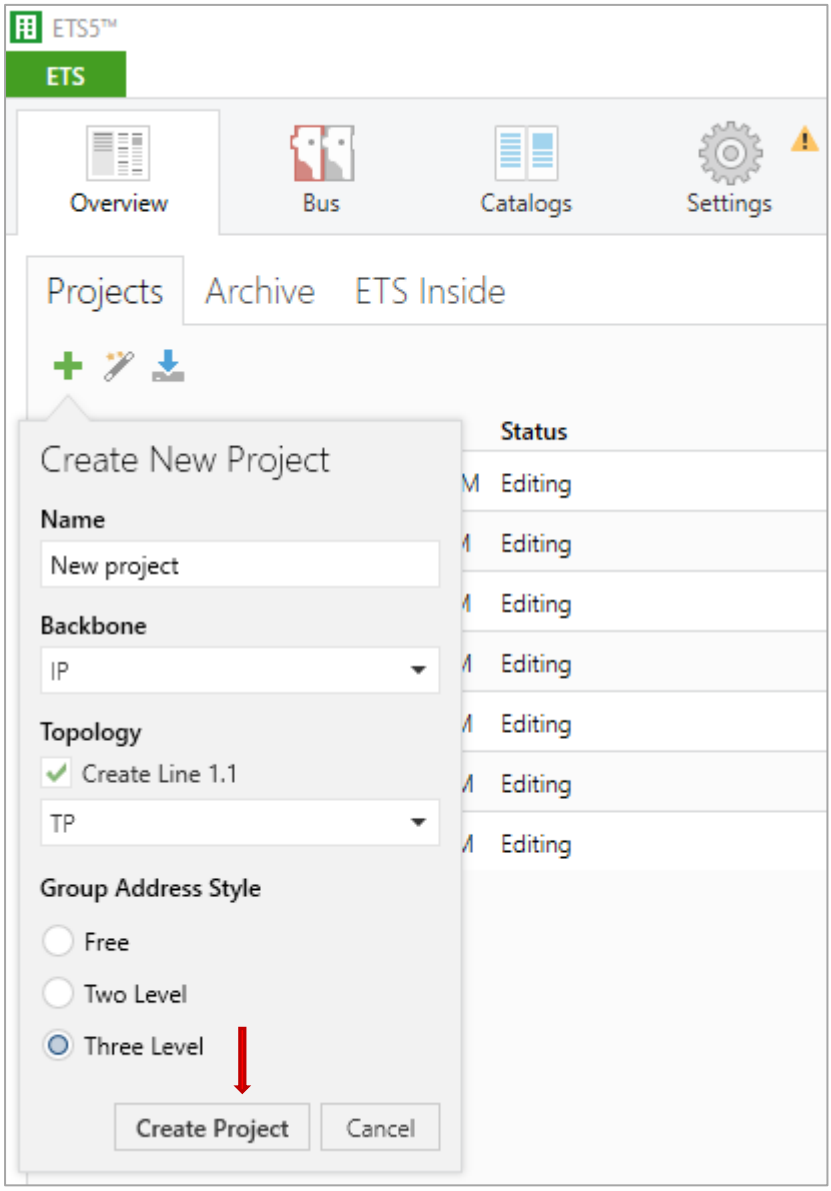
4.5 Create a new project

Open Overview=>Projects. Click **+** button. Fill the Name.

Set the following parameters:

- Backbone: IP
- Topology: Create Line 1.1, mark the checkbox and select **TP**
- Group Address Style: Select the **Three Level** radio button (Our “push button” test)

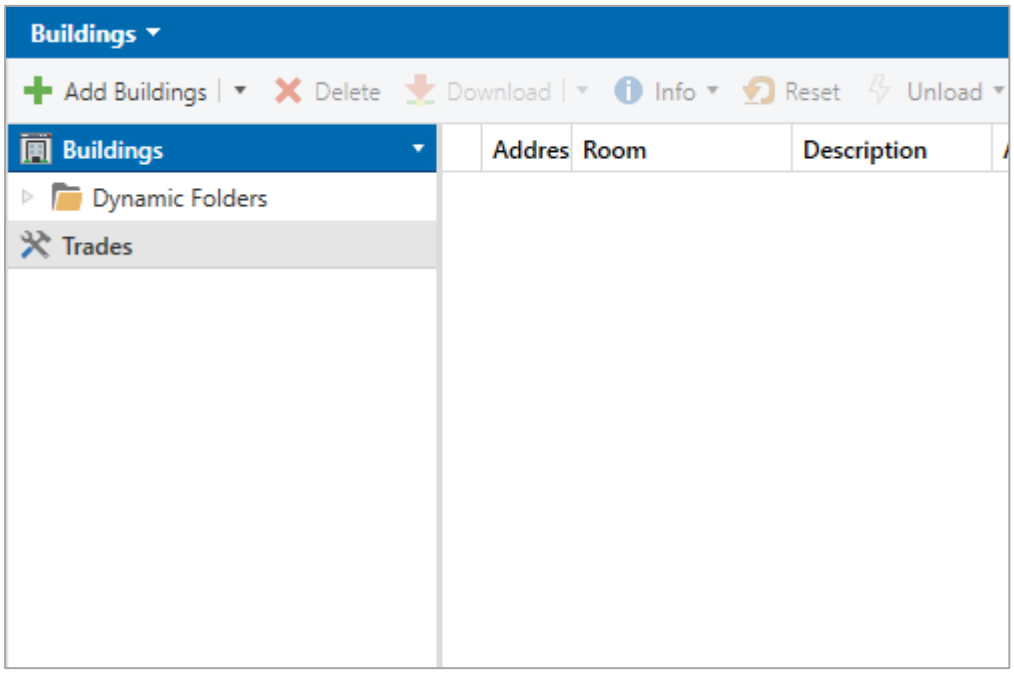
Click **Create Project**.



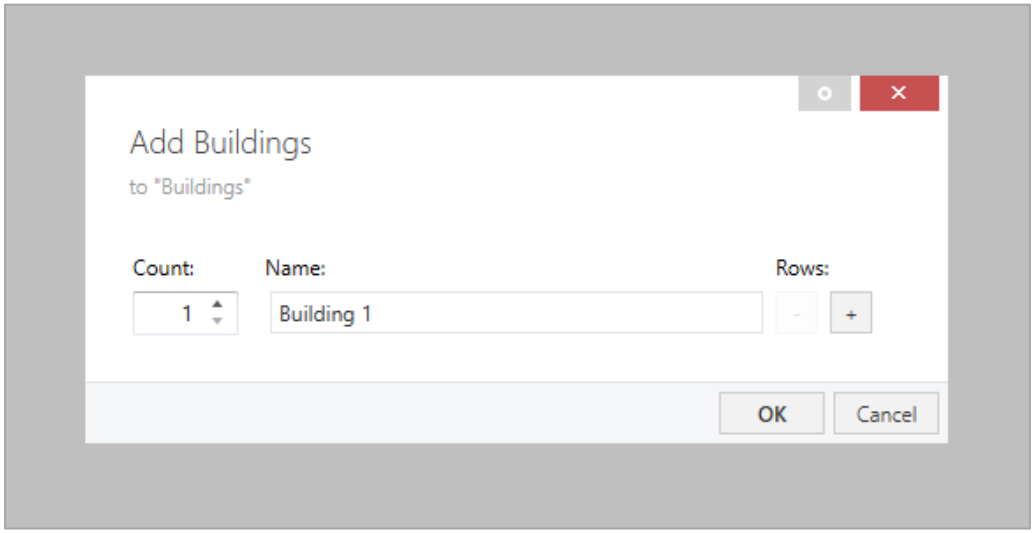
4.6 Add device to the project

Let's assume you have to add a CoolMasterNet device to the project like this:
Building 1 => **Floor 1** => **Room 1**.

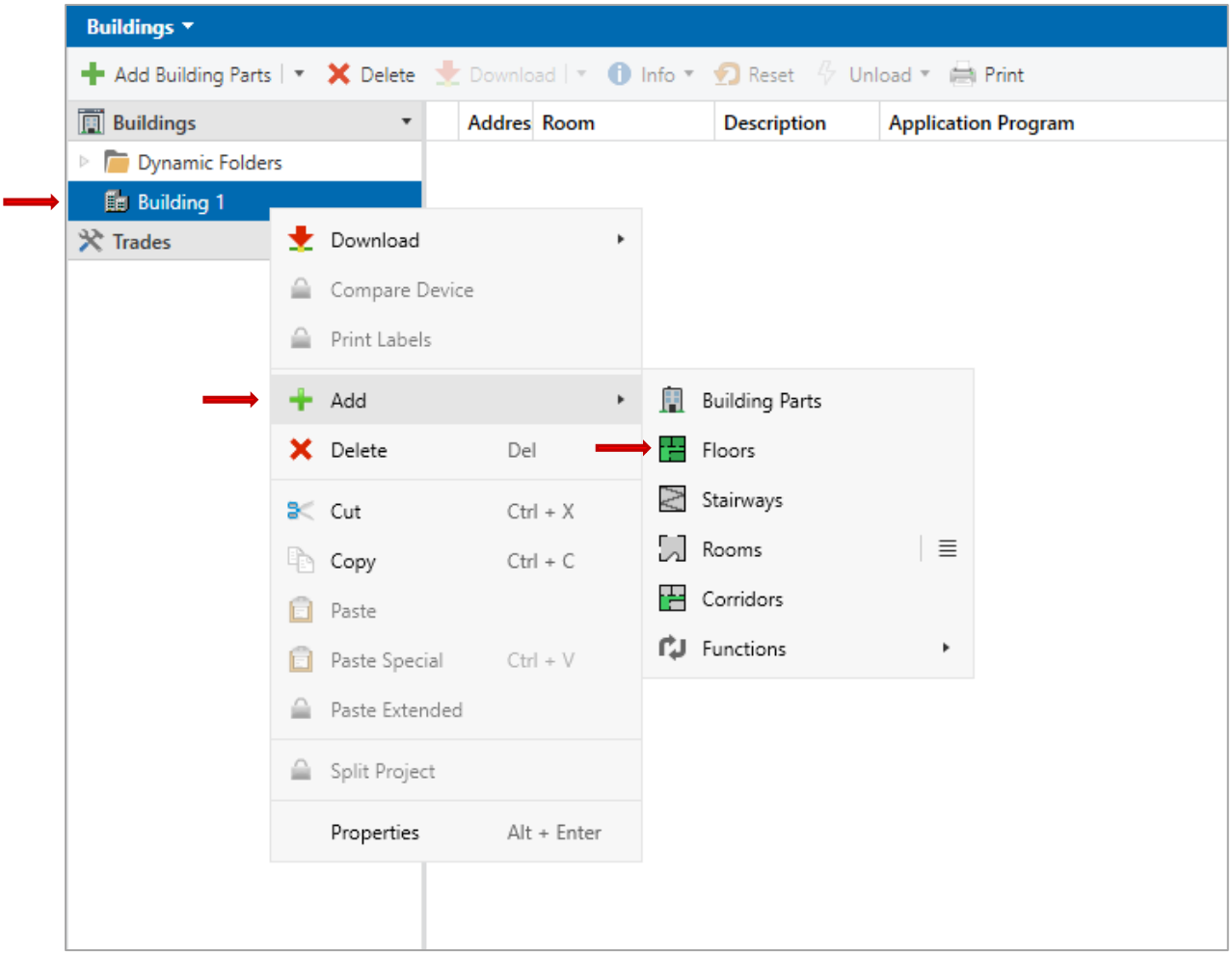
Select **Workplace** => **Open New Panel** => **Buildings** panel. In the **Buildings** panel, click the **Add Buildings** button to add the area you want to place your device. Note that you can place the device only at the endpoint location such as a room, stairways, or corridor.



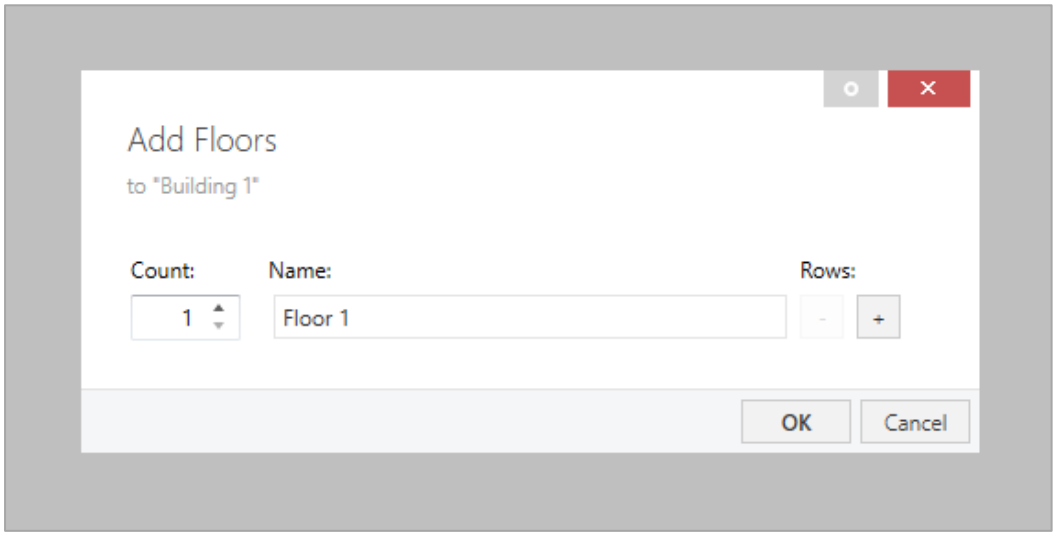
In the window **Add Buildings** enter the building name **Building 1** and click the **OK** button.



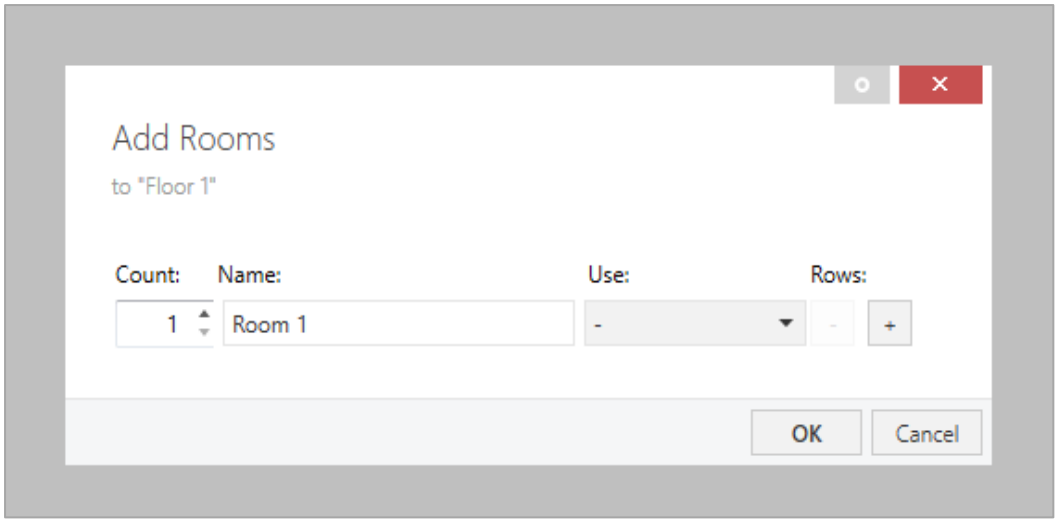
Select **Building 1**. Press the right mouse button. Select **Add** => **Floors**.



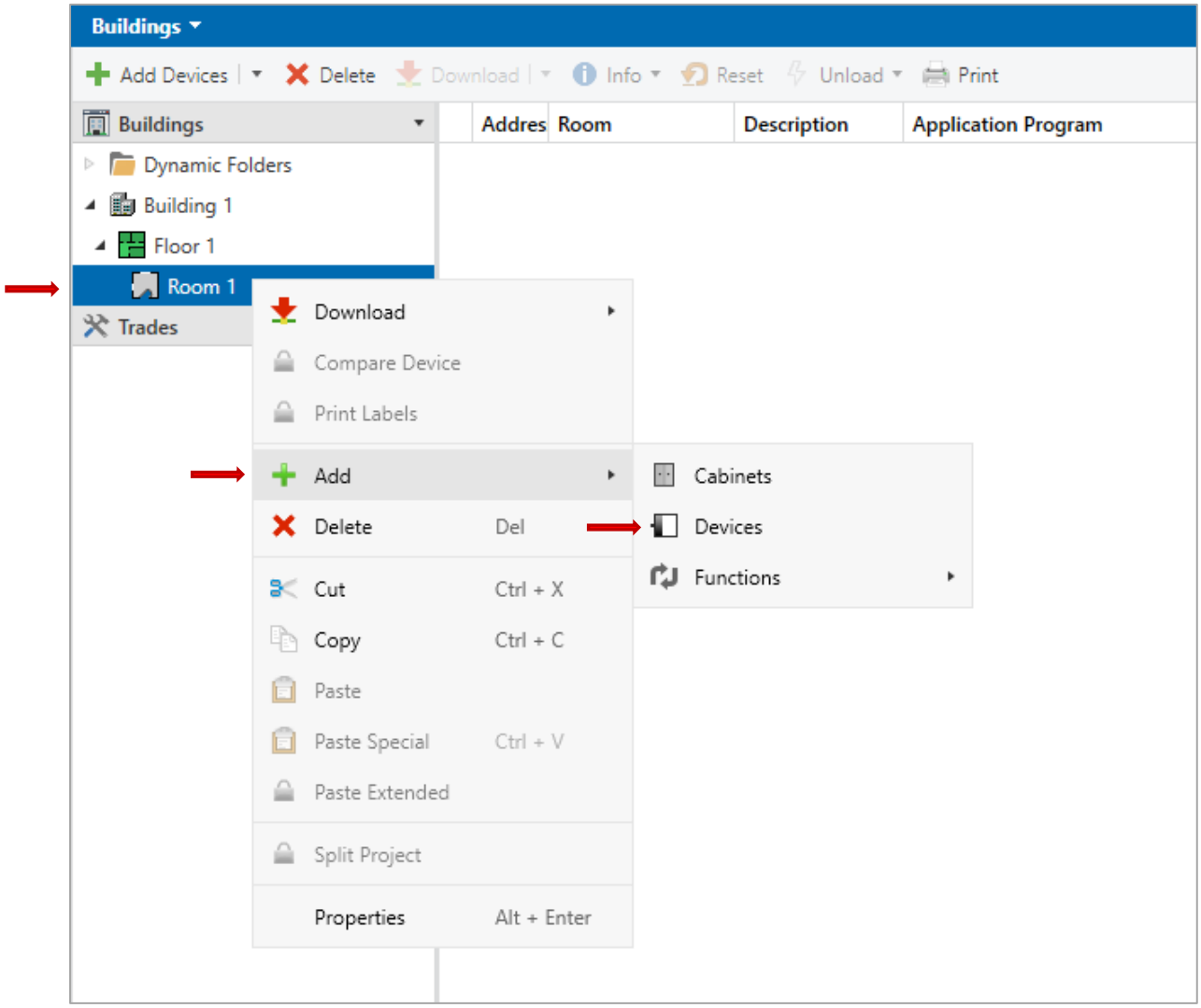
In the window **Add Floors** enter the floor name: **Floor 1.** Click the **OK** button.



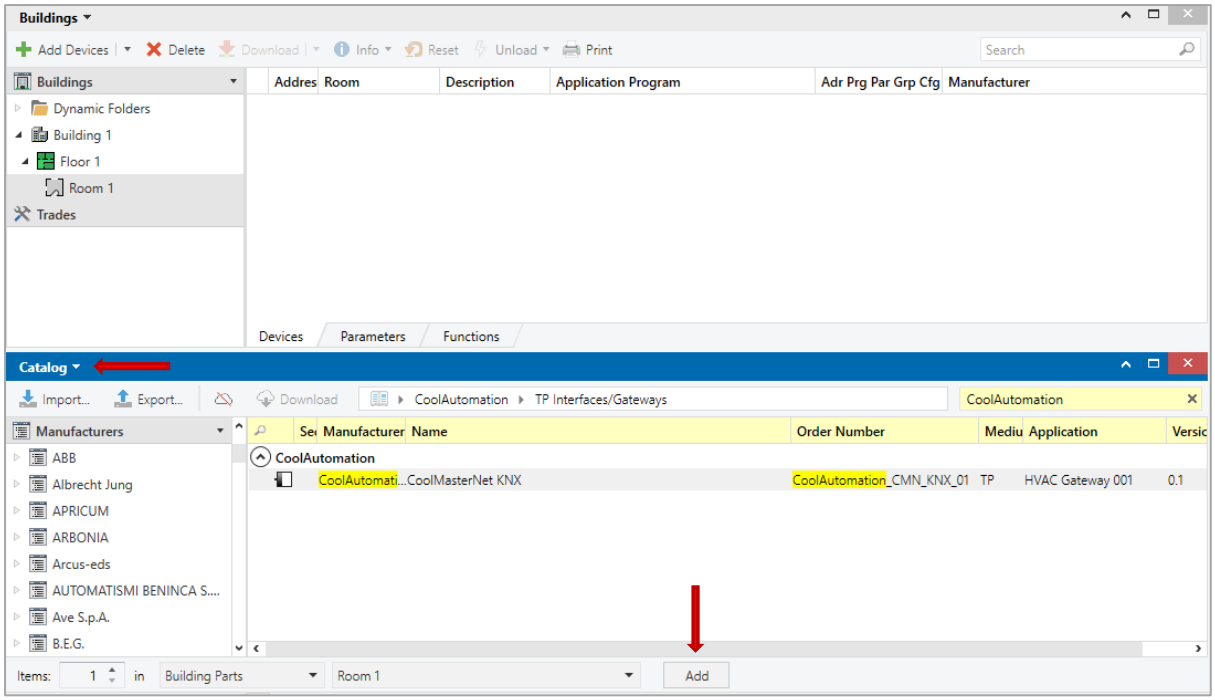
Select **Floor 1**. Press the right mouse button. Select **Add** => **Rooms**.
In the window **Add Rooms** enter the room name: **Room 1.** Click the **OK** button.



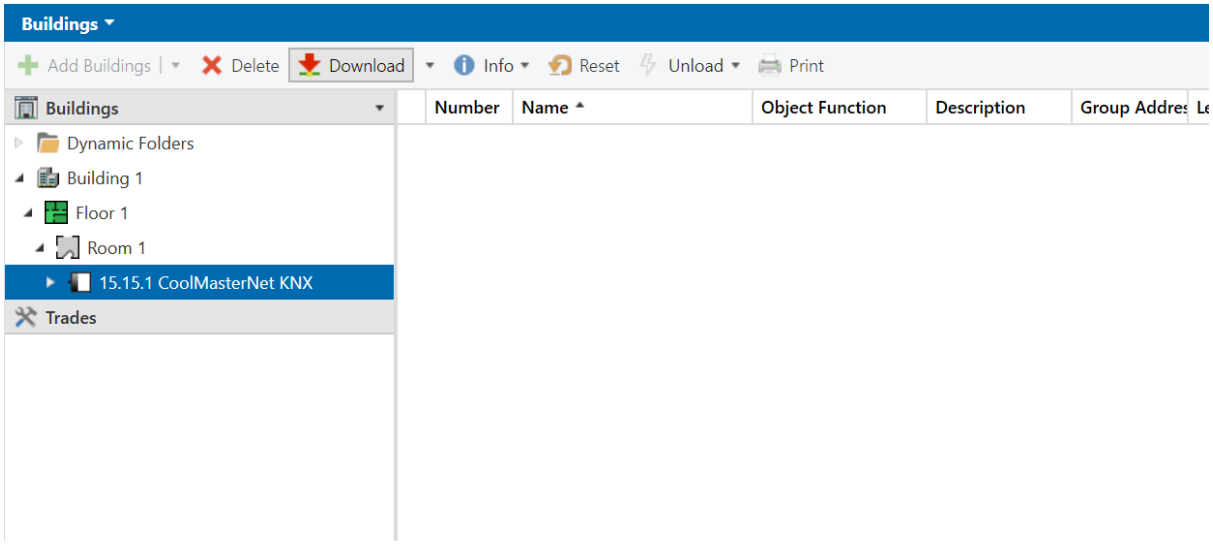
Our location is ready. Press the right mouse button on the '**Room 1**' item. Select **Add** => **Devices**.



The **Catalog** tab is displayed. Select **CoolAutomation** from the manufacturer list or find the device by typing its order number **CoolAutomation_CMN_KNX_01** in the **Search** field. Push the **Add** button below the catalog panel. Wait until the data import is completed.



Select the added CoolMasterNet device. The CoolMasterNet's default address is 15.15.255. You have to change this address to a unique one to avoid collisions. Set the new individual address in the **Properties** tab. Press the **programming button** on the device (the **programming mode LED** must be on!) *(see Sec. 4.9)*, then press the **Download** button. After the download is complete the CoolMasterNet device is fully operational.

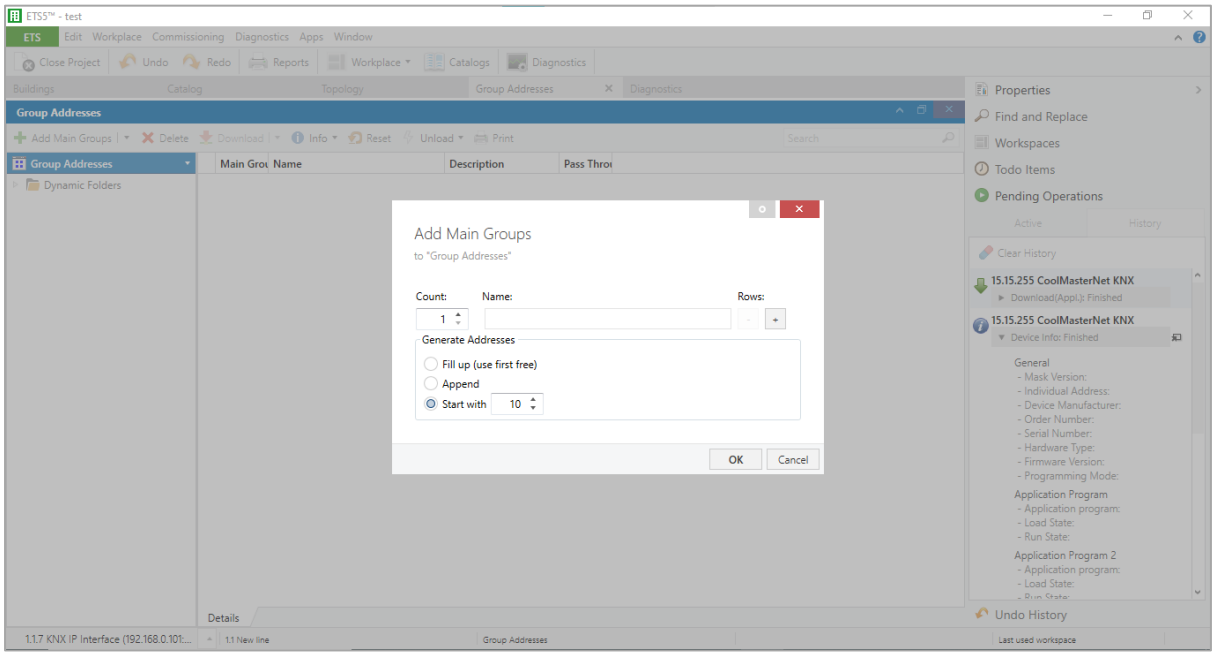


Now you can create group objects and link them to group addresses.

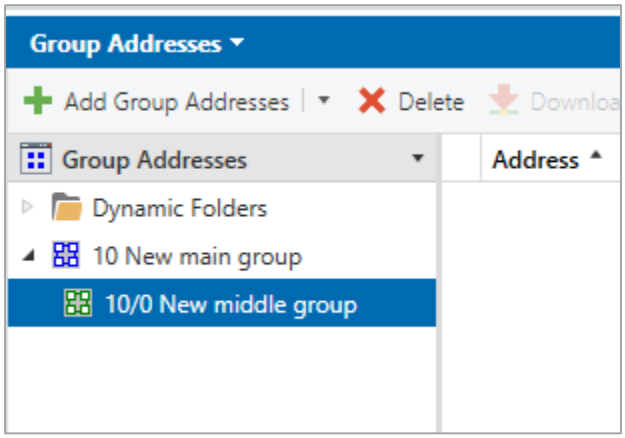
4.7 Create a group

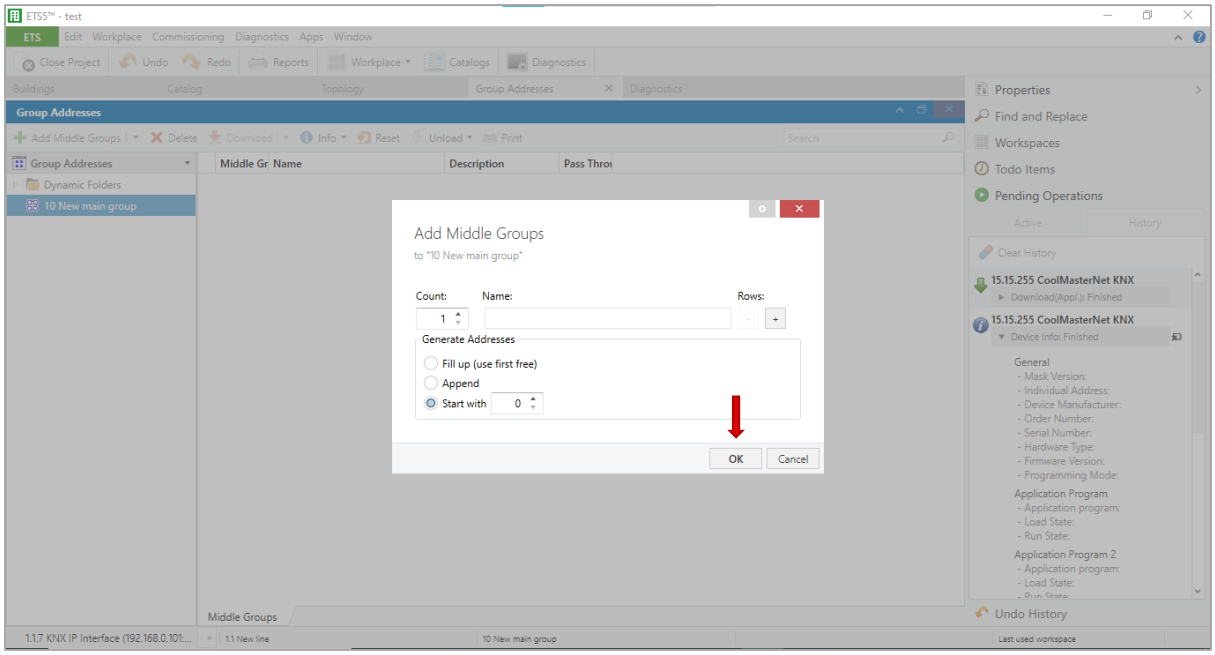
On the project window, select the Workplace tab => Open New panel => Group Addresses.

Click **Add Main Group**.

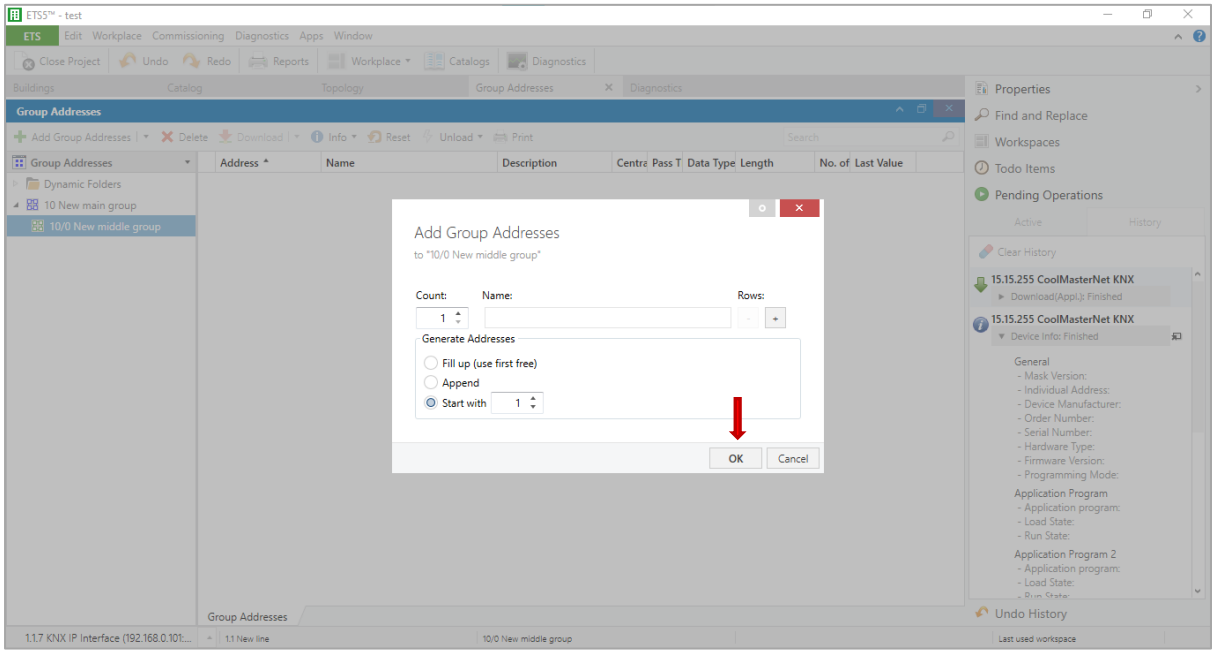


Our test button is set to Group Address 10/0/0 and 10/0/1, so on the displayed window, select **Start with**, enter **10**. Click the **OK** button. Go to the new Main Group and click **Add Middle Group**.



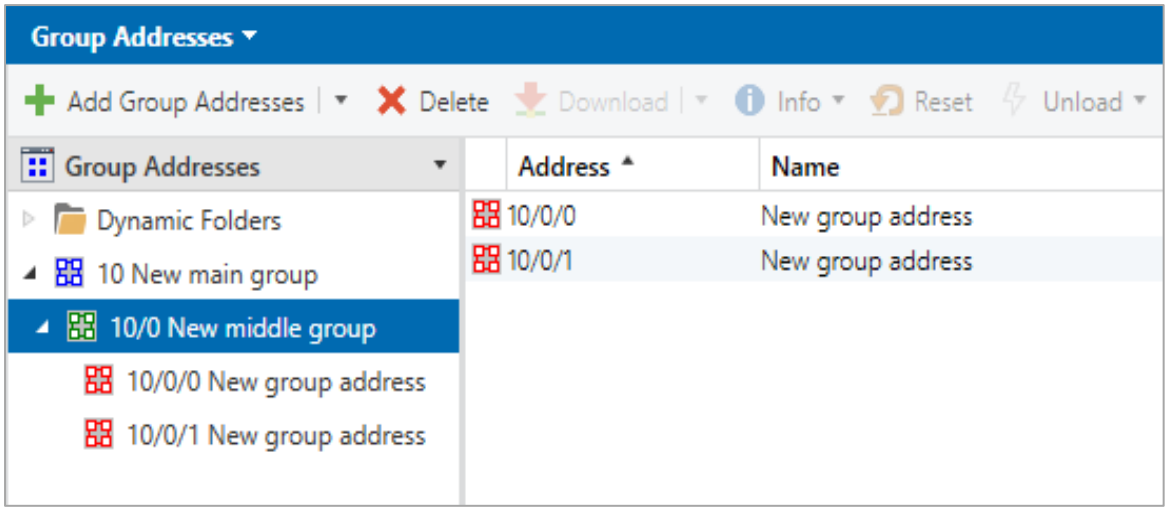


On the displayed window, select **Start with**, enter **0**. Find Middle Group 0 on the list on the left, select it, click **Add Group Addresses**.



Create two addresses at once. On the displayed window, select **Count 2**. Select the radio button **Fill up**. Click the **OK** button.

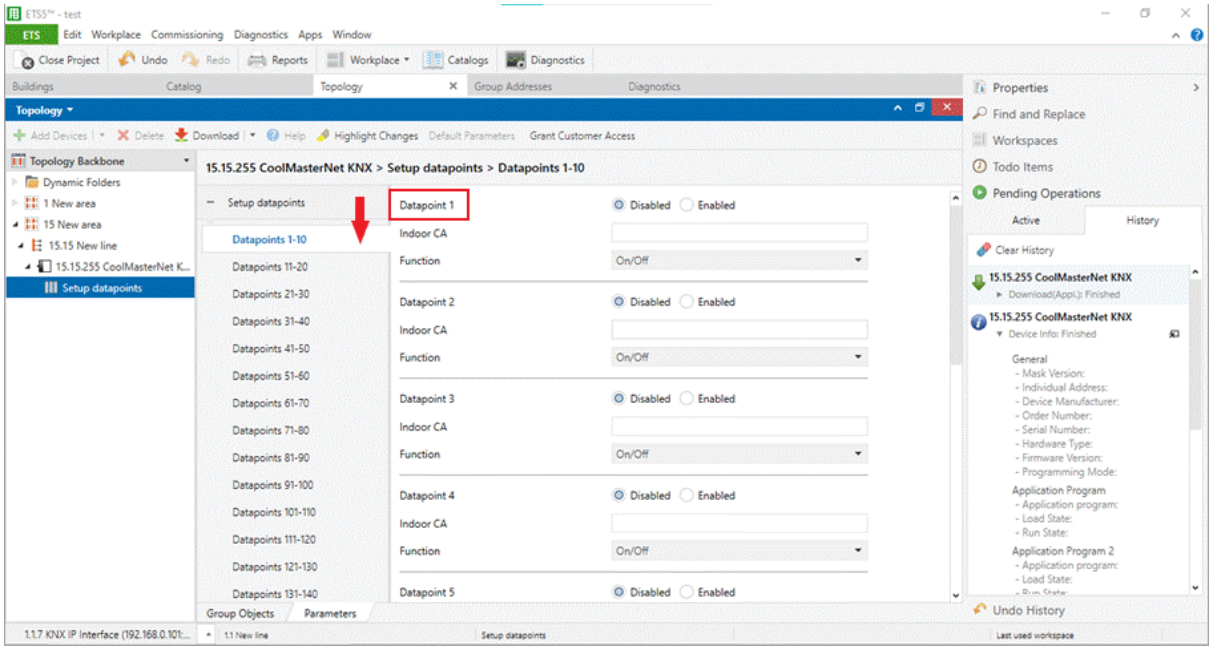
Now we have created two Group Addresses 10/0/0 and 10/0/1.



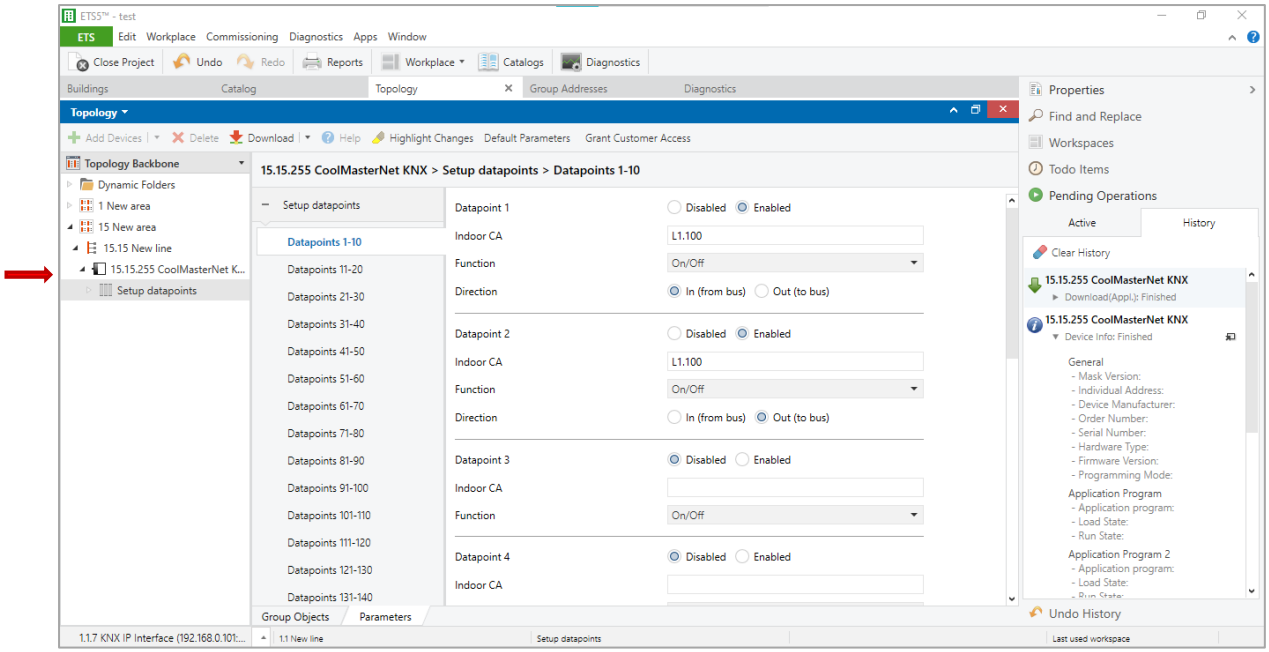
4.8 Creating two GOs: for On/Off input and On/Off output

Go to the **Buildings** panel. Find **CoolMasterNet**. On the right panel below, select the **Parameters** tab. Select **Datapoint 1**.

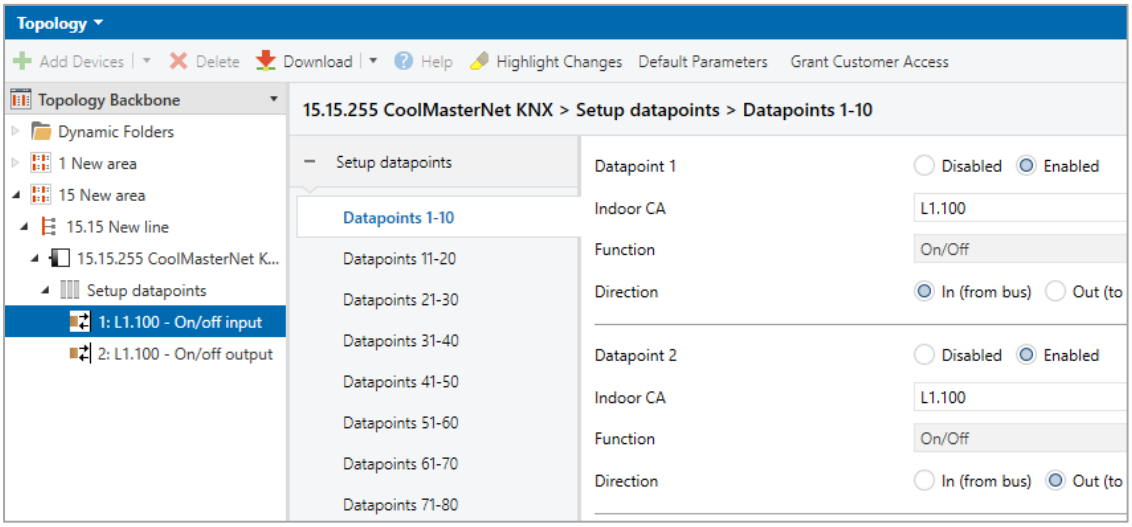
Select **Enabled**. Fill the **Indoor CA** field with **simulated HVAC address L1.100**. Select Function: **On/Off**.

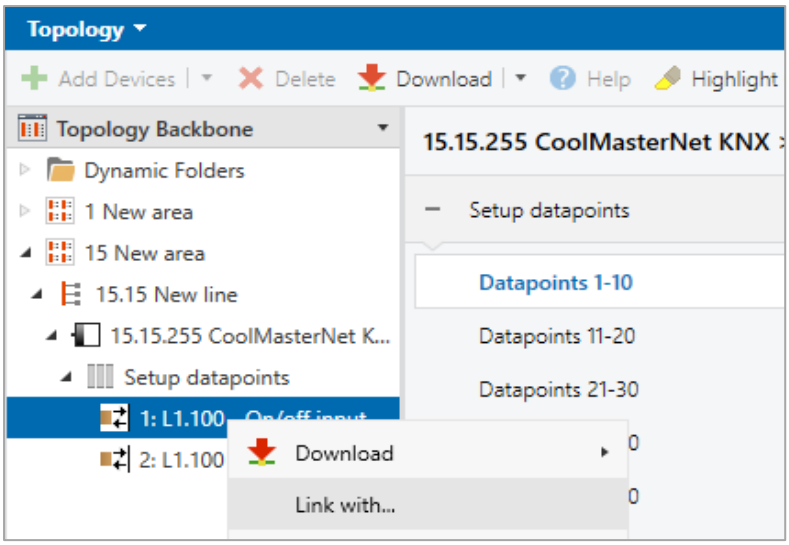


Select Direction: in (from bus). Do the same for Datapoint 2 but select the out (to bus) direction (see image below).



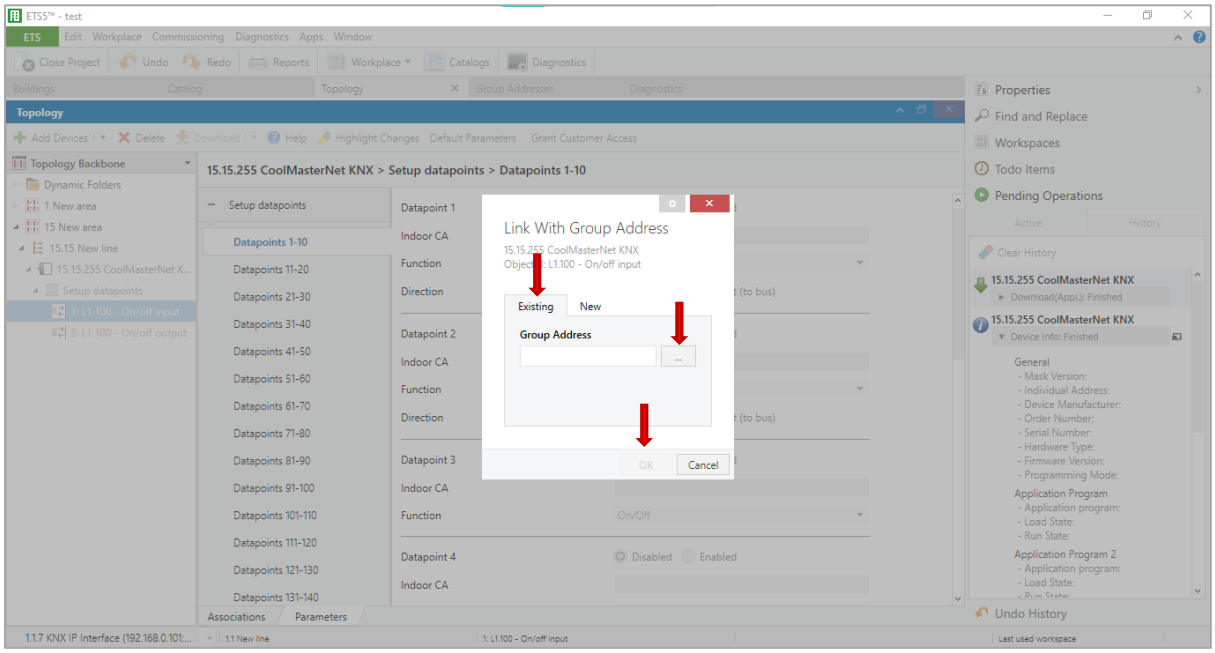
Go to the left side of the panel. Find CoolMasterNet => Setup Datapoints. Select the first datapoint **On/Off** input. Click the right mouse button => Link with.



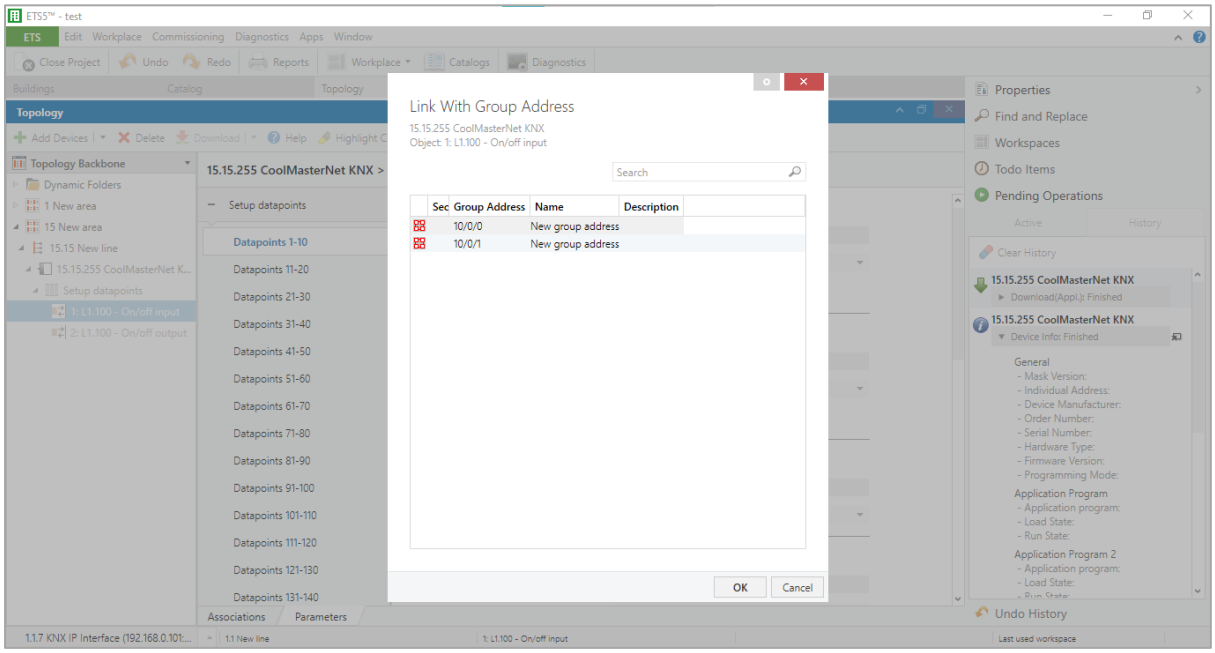


Select the ‘Existing’ tab on the window below. Click the grey button on the right side. Select group address 10/0/0 on the displayed window.

Click the **OK** button.



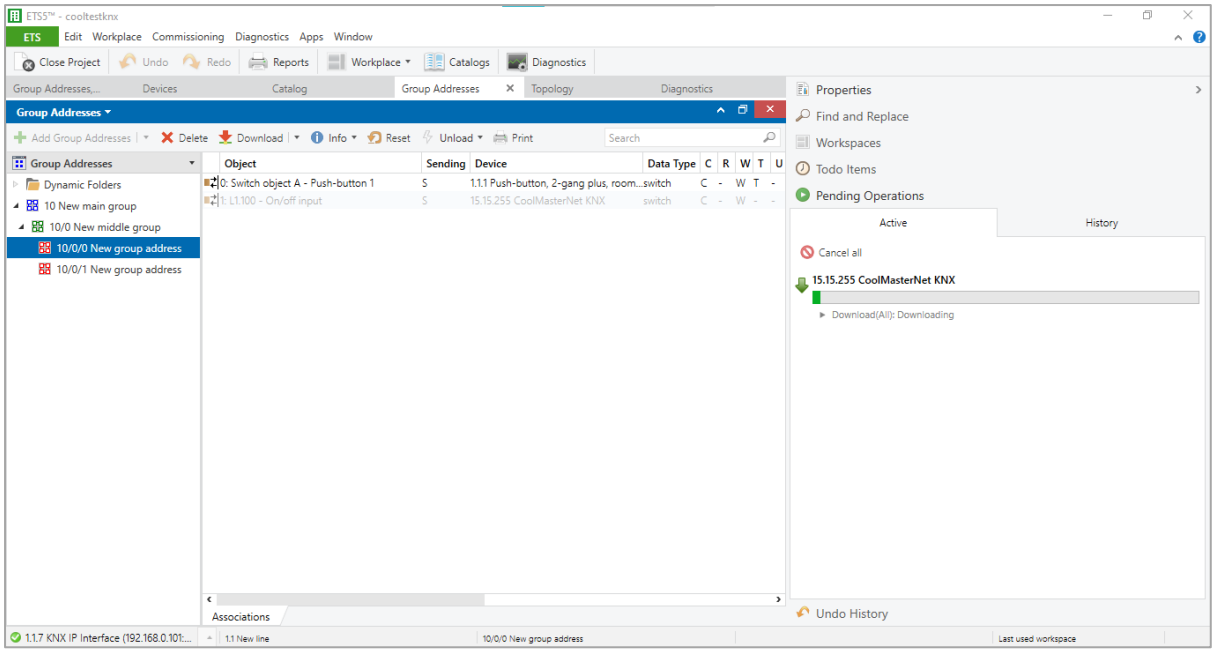
Repeat the action for the second datapoint (**On/Off output**).



After the configuration is created, it must be uploaded to the device's memory. Switch the CoolMasterNet device into the **programming mode** *(see Sec. 4.9)*. Select CoolMasterNet in the **Buildings** panel. Click the right mouse button or find the **Download** button on the menu and press **Download All.**

You can now test the On/Off operation.

Go to the **Group Addresses** panel. Middle Group 10/0. On the right pane, select the address 10/0/0. Click the right mouse button => Write Value => On (or Off).



The value of 'Last value' must be changed. On the group 10/0/1, the value of 'Last value' must be changed also. Check if the On/Off unit status has changed on the CoolMasterNet touchscreen.

4.9 Programming mode

To switch the CoolMasterNet device to programming mode, press the **programming mode button (2)** on the device's upper left-hand side. The **programming LED (3)** (red) must turn on.

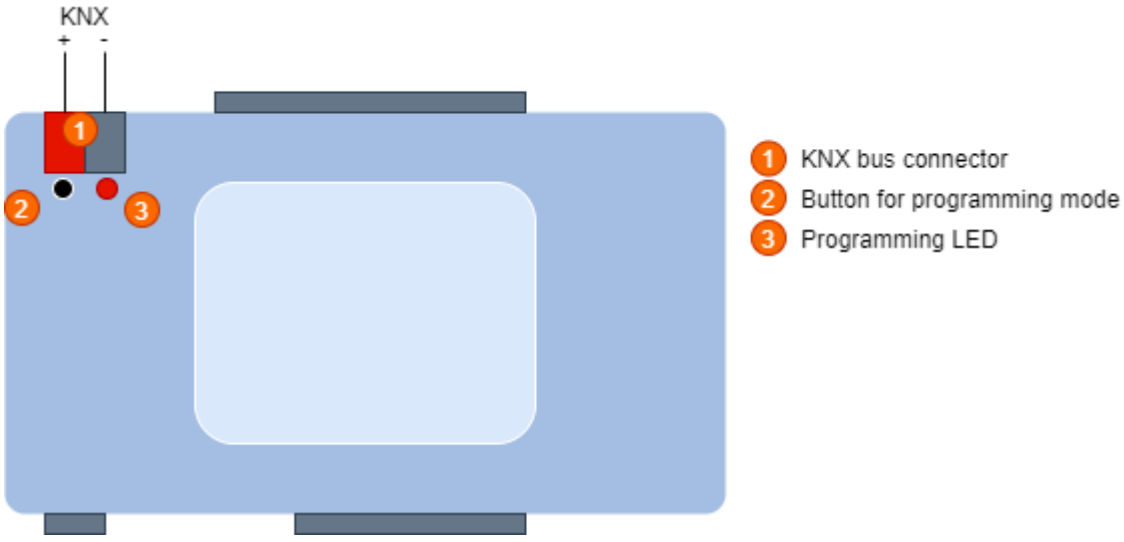


Figure 2

Wait until the LED turns off after downloading operation is complete.

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