Basic / **Advanced** / Expert

Application note

Daikin HVAC system with spaceLYnk

Integration of spaceLYnk and DAIKIN HVAC with CoolMasterNet



Schneider Electric

Safety Information

Important Information



Read these instructions carefully before trying to install, configure, or operate this software. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



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⚠WARNING
WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

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- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

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1 Introduction

This application note (AN) describes seamless integration between spaceLYnk and Daikin HVAC systems via CoolMasterNet (CMN) communication bridge. This Application note allows you to control up to 64 Daikin devices remotely from your PC, tablet or mobile phone.

CMN communication bridge is compatible with following HVAC manufacturers:



A glossary is available in the appendix chapter of this document. Please refer to it whenever necessary.

Competencies

This document is intended for readers who have been trained on Wiser for KNX, spaceLYnk products. The integration should not be attempted by someone who is new to the installation of either product. It is also mandatory to have knowledge of CoolMasterNet device, CoolMasterNet settings and Modbus RTU or Modbus IP communication. Complete CoolMasterNet configuration is not included in this AN.

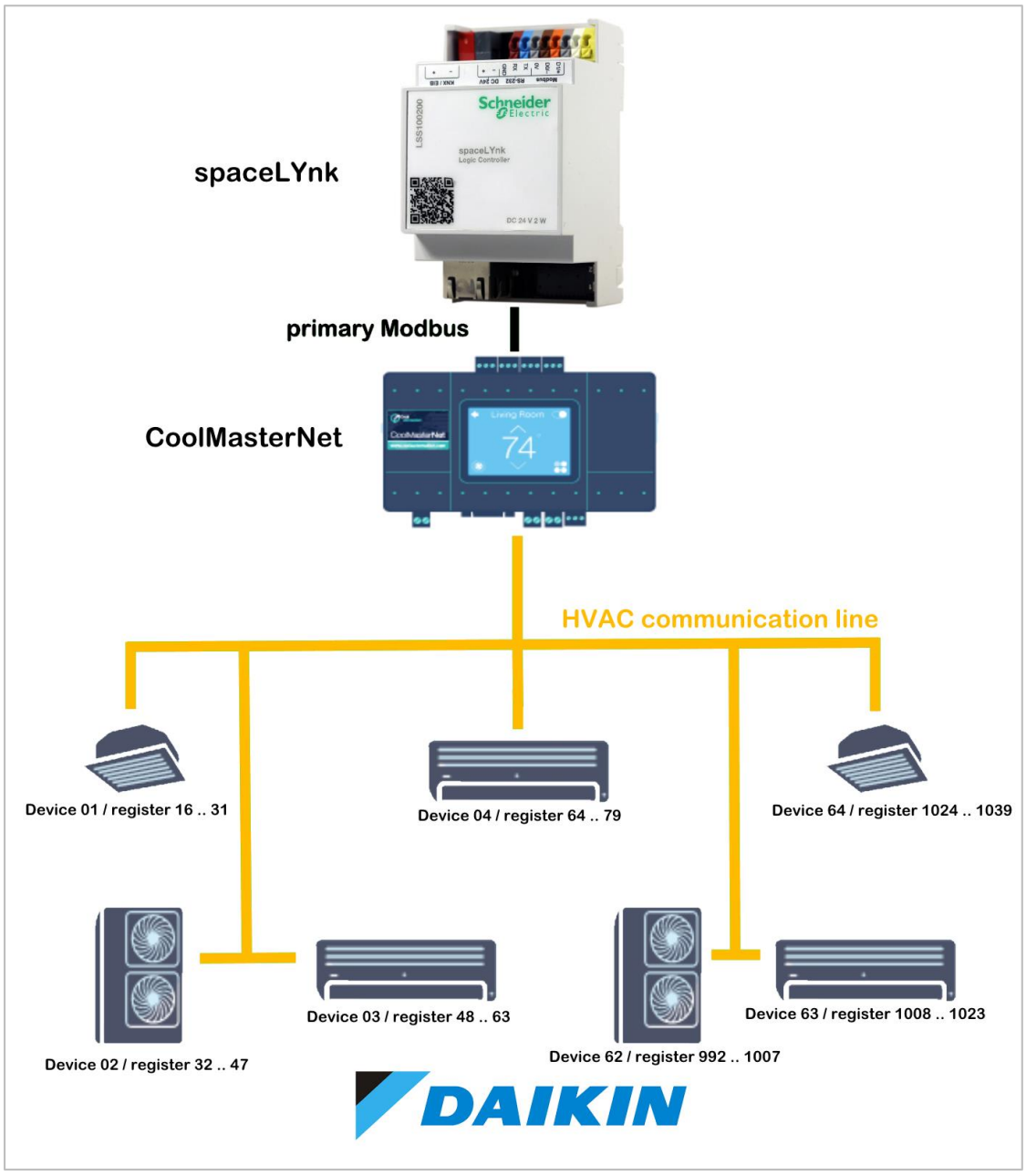
System prerequisites

Software	Version	Download
spaceLYnk	2.1 and newer	http://www.schneider-electric.com
PuTTy		http://www.putty.org
CoolMasterNet	V0.3.2 or higher	https://coolautomation.com/support/download

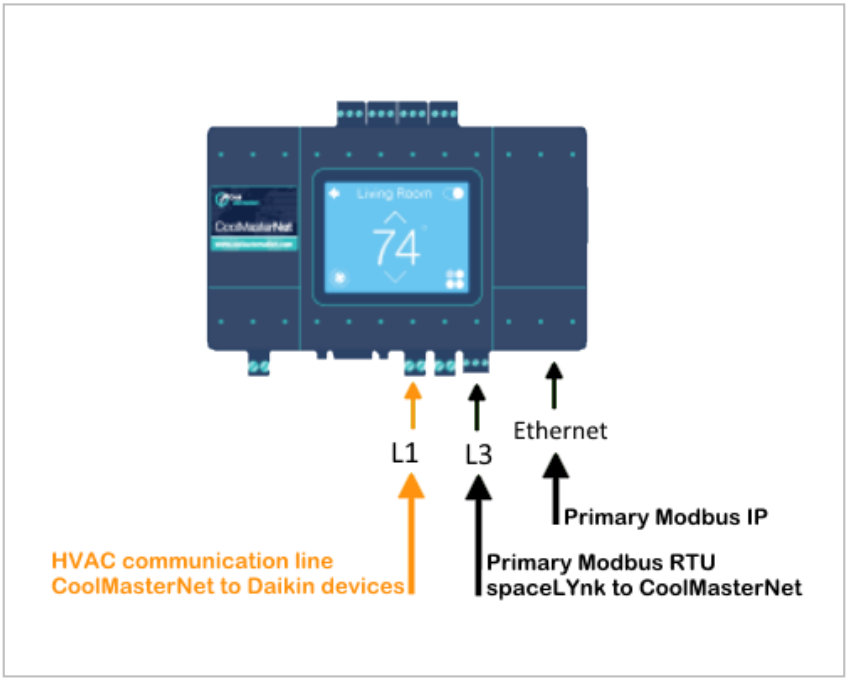
Table 1: Software versions of used software

2 Design

CMN is a unique communication bridge which integrates advanced VRF / Split Air Conditioning Systems and home automation / Building Management Systems (BMS) controllers. Integrators can easily connect HVAC systems without deeper knowledge of their communication protocols.



Picture 1: spaceLYnk and CMN communication topology



Picture 2: CMN line specification

Connect up to 64 Daikin HVAC devices to CMN bridge. Each of Daikin HVAC devices is controlled through group of Modbus registers.

Note: Cool Automation adds support for future Daikin devices by firmware update remotely over internet.

Note: Use Modbus RTU **or** Modbus IP connection to CMN communication bridge.

3 Configuration

3.1 Configuration of CoolMasterNet bridge

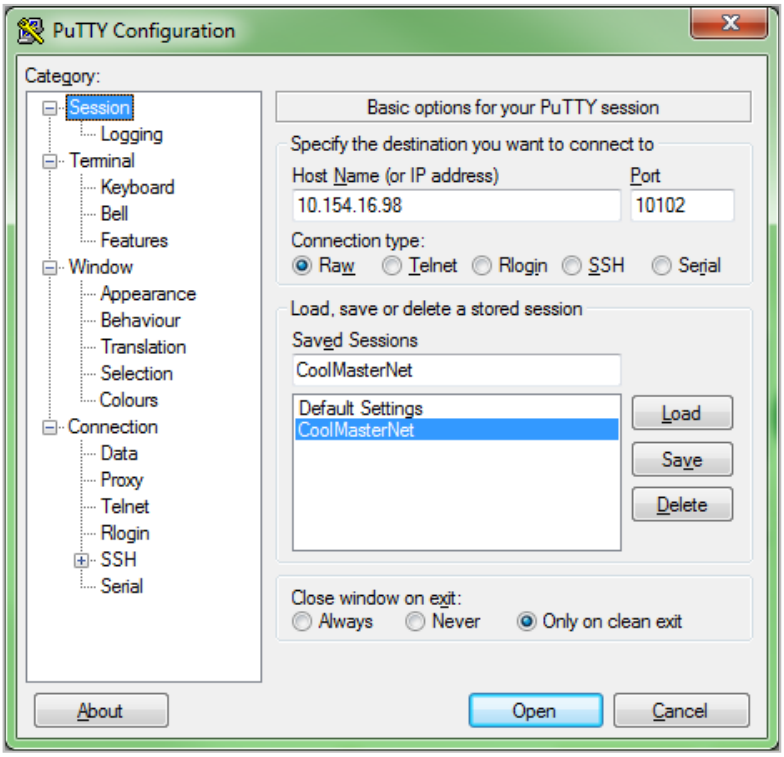
You have to finish configuration of CMN to be able to control Daikin HVAC systems from spaceLYnk.

Basic configuration of CMN:

1) Download PuTTy console application and configure IP connection to CMN device
2) Setup dip switches for VRV/VRF HVAC systems on L1 according to CMN Quick Installation Guide
3) Enable and configure CMN Modbus RTU communication at Line 3 (L3)
4) Enable and configure CMN Modbus IP communication at Ethernet
5) Create and preview Virtual Addresses (VA) for connected Daikin device

3.1.1 Download PuTTy and connect to CoolMasterNet device

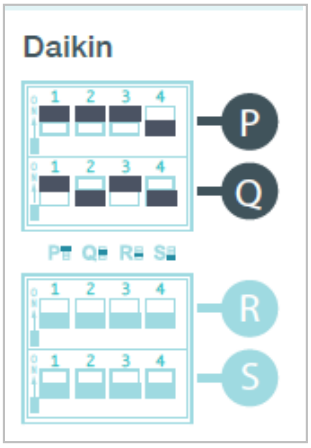
Free PuTTy application can be downloaded directly from PuTTy web page
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
Application does not require installation. Configure PuTTy according to CMN FAQ
http://www.coolautomation.wiki/index.php?title=CoolMasterNet_FAQ#How_to_make_connection_from_PC



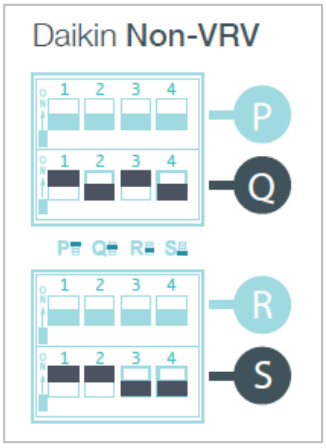
Picture 3: PuTTy application configuration

DIP switches setup

DIP switches setup for Daikin HVAC systems at Line 1 is following:



Picture 4: DIP switches setup



Picture 5: DIP switches setup – Non-VRV HVAC configuration

Follow CMN Quick Installation Guide for integration of alternative manufacturers:
https://coolaut.wpengine.com/lib/doc/quickstart/CoolAutomation-QuickStartGuide-CoolMasterNet-v2.6.pdf

3.1.2 Enable and configure CoolMasterNet Modbus RTU communication

Enable CMN Modbus RTU communication in PuTTy console.

Modbus RTU communication enabling is specified here:

http://www.coolautomation.wiki/index.php?title=CoolMasterNet_FAQ#Modbus_RTU

a) For enabling Modbus RTU functionality on L3 send command below

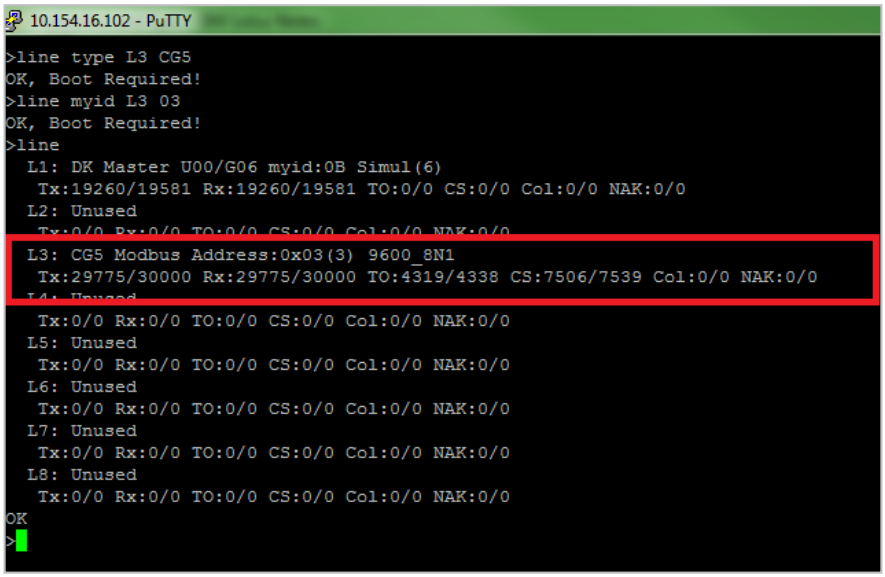
>line type L3 CG5

This command sets L3 to Modbus RTU communication.

b) Command below

*>line myid L3 **03***

changes Modbus RTU address to 0x**03**(hexadecimal). Both commands required reboot of CMN device.



Picture 6: CMN Modbus RTU communication is enabled

3.1.3 Enable and configure CoolMasterNet Modbus IP server communication

Enable CMN Modbus IP server communication in PuTTy console.

Modbus IP server communication enabling is specified here:

http://www.coolautomation.wiki/index.php?title=Modbus_IP

a) For enabling Modbus IP functionality on Ethernet send command below

>modbus IP enable

This command enable Modbus IP server communication

```
>modbus IP enable
OK, Boot Required!
>
```

Picture 7: CMN Modbus IP server communication is enabled

b) To acquire current Modbus IP server communication use command bellow

>modbus

```
>modbus
ModBus IP   : enabled
server port   : 502
CG4 ignore   : none
OK
>
```

Picture 8: CMN Modbus IP server communication

b) Modbus IP default TCP/IP port is 502. This is one of the so called well-known Ethernet ports. If required, port number can be changed with:

>modbus server port 500

```
>modbus server port 500
OK, Boot Required!
>
```

Picture 9: CMN Modbus IP server change

3.1.4 Create and preview Virtual Addresses

In order to simplify translation of the UID (like L1.102) into Modbus RTU object address, CMN uses Virtual Addresses (VA), associated with UID. Each UID can have none, one or a number of associated VA's. VA's are plain numbers starting from 001 (decimal).

http://www.coolautomation.wiki/index.php?title=Modbus_IP#ModbusIP_VA

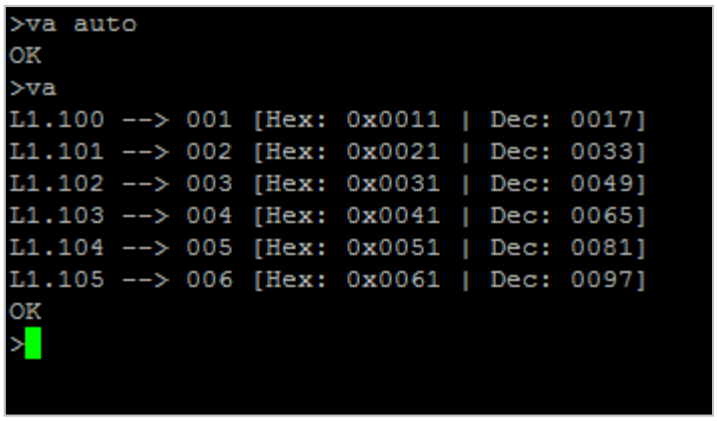
Command

>va auto

will delete all existing associations and will create new associations one to one (one UID to one VA).

At any time VA associations list can be retrieved with plain command:

>va .



Picture 10: CMN create Virtual addresses

3.2 Configuration of spaceLYnk

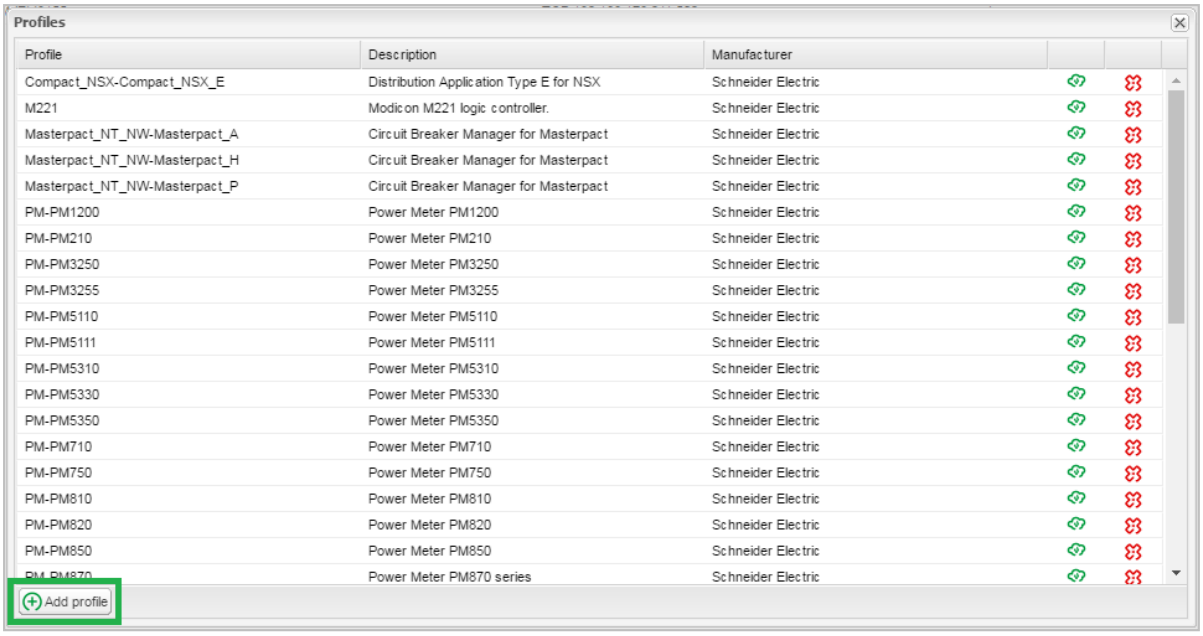
Follow spaceLYnk User Guide to configure spaceLYnk.

CMN bridge is controlled trough Modbus RTU. Following steps are necessary for control:

1) Install Modbus profile for CMN communication bridge
2) Add Modbus RTU device
3) Map Modbus registers to KNX objects
4) Create visualization (optional)

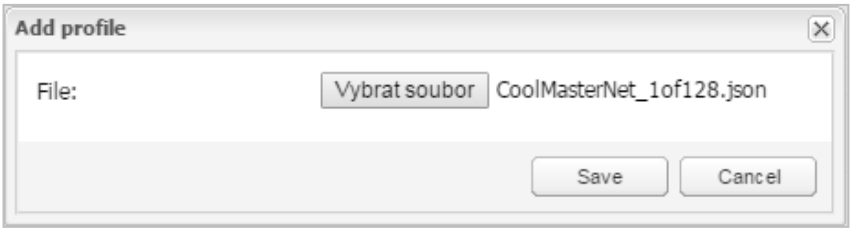
3.2.1 Install Modbus profile for CMN communication bridge

a) In order to install new Modbus profile to spaceLYnk configuration **press** Profiles button. Below the table of Modbus profiles is button *Add Profile* (in green frame).



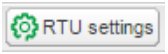
Picture 11: Modbus profiles table

b) Upload .json file included in this Application Note via pop up window below.



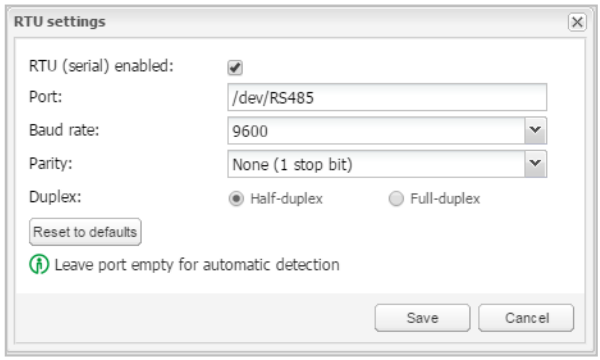
Picture 12: Add profile

3.2.2 Add Modbus RTU device

a) Modbus RTU settings. 

.

In order to communicate with Modbus slaves connected over Modbus RTU (serial), it is necessary to enable the communication and set the connection details.



Picture 13: Modbus RTU settings

Note: Default settings for CoolMasterNet communication bridge:

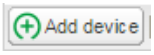
Baud rate – 9600

Data bits – 8

Parity control – none

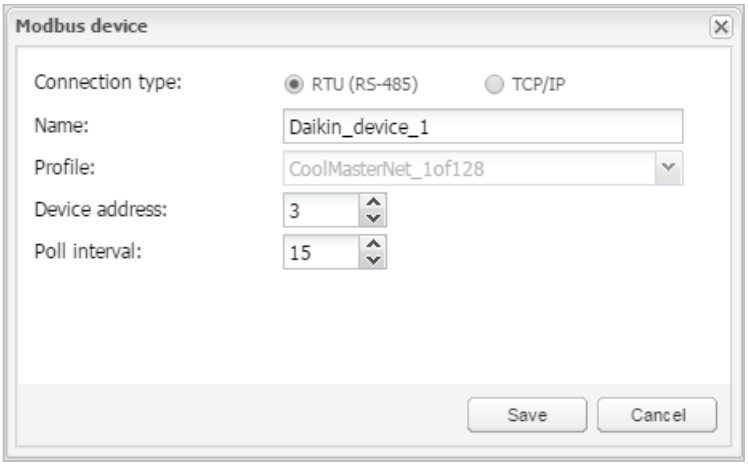
Stop bits – 1

Flow control - none

b) In order to add a new Modbus RTU device to spaceLYnk configuration **press** 

button.

c) Modbus RTU device configuration:



Picture 14: Adding Modbus RTU device

Connection type – select connection type RTU (RS-485)

Name – User define name of Modbus device.

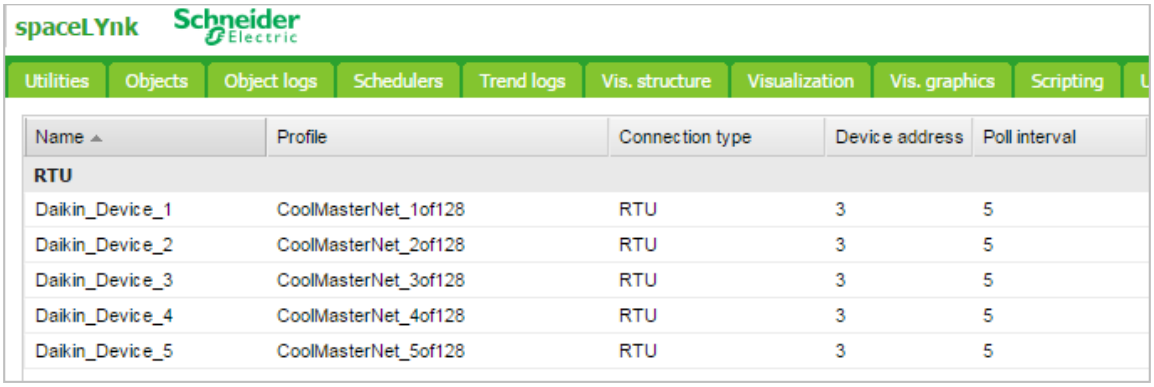
Profile - Select installed Modbus profile for CMN communication bridge (see chapter 3.2.1). Procedure of device profile creation is described in User Guide section 5.4.7.

Device address – Set slave address to 3. As set out in chapter 3.1.2 b).

Pool interval – Set how often the values are polled from Modbus slave device. Set pool interval to 15.

Note: Value 15 in parameter **Pool interval** is recommended settings and means that new values are read every 15 seconds. If **Pool interval** value is less than 15, CMN communication bridge could not follow set **Pool interval**. Lower **Pool interval** value and number of connected devices can increase CPU load. CPU load should be below recommended value 0.7.

Note: CMN communication bridge can be connected with up to 64 Daikin HVAC devices. Each of this Daikin HVAC systems have dedicated Modbus registers group (see http://www.coolautomation.wiki/index.php?title=Modbus_IP#Discrete_Inputs.2C_Coils_and_Registers column “Holding Registers”). spaceLYnk’s Modbus RTU line have only one CMN communication bridge with register count depending on number of connected Daikin HVAC systems (16 up to 1024 registers, each Modbus register group containing 16 registers for one Daikin HVAC device).



Name	Profile	Connection type	Device address	Poll interval
RTU				
Daikin_Device_1	CoolMasterNet_1of128	RTU	3	5
Daikin_Device_2	CoolMasterNet_2of128	RTU	3	5
Daikin_Device_3	CoolMasterNet_3of128	RTU	3	5
Daikin_Device_4	CoolMasterNet_4of128	RTU	3	5
Daikin_Device_5	CoolMasterNet_5of128	RTU	3	5

Picture 15: Modbus RTU devices overview

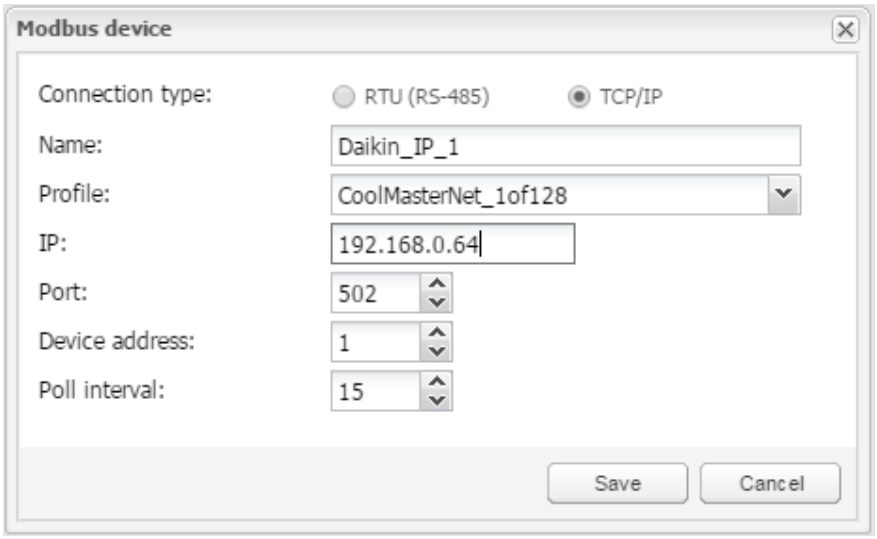
3.2.3 Add Modbus IP device

Note: Default Modbus IP settings for CoolMasterNet communication bridge:

Port: 502

a) In order to add a new Modbus IP device to spaceLYnk configuration **press** Add device button.

b) Modbus IP device configuration:



Picture 14: Adding Modbus IP device

Connection type – select connection type TCP/IP

Name – User define name of Modbus device.

Profile - Select installed Modbus profile for CMN communication bridge (see chapter 3.2.1). Procedure of device profile creation is described in User Guide section 5.4.7.

IP – IP address of CMN device. Set IP address to address you see at CMN LDC display.

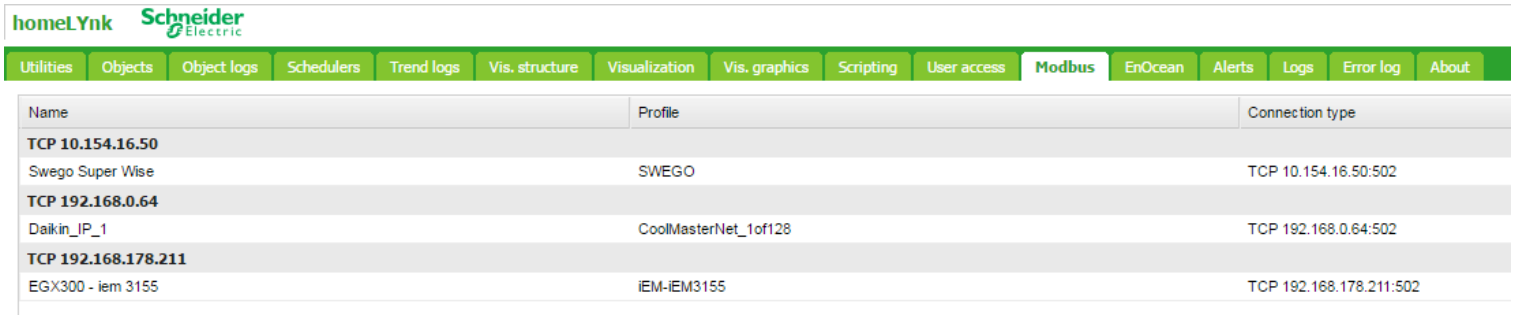
Port – Set port to 502.

Device address – Set slave address to 1.

Pool interval – Set how often the values are polled from Modbus slave device. Set pool interval to 15.

Note: Value 15 in parameter **Pool interval** is recommended settings and means that new values are read every 15 seconds. If **Pool interval** value is less than 15, CMN communication bridge could not follow set **Pool interval**. Lower **Pool interval** value and number of connected devices can increase CPU load. CPU load should be below recommended value 0.7.

Note: CMN communication bridge can be connected with up to 64 Daikin HVAC devices. Each of this Daikin HVAC systems have dedicated Modbus registers group (see http://www.coolautomation.wiki/index.php?title=Modbus_IP#Discrete_Inputs.2C_Coils_and_Registers column “Holding Registers”). spaceLYnk’s Modbus IP line have only one CMN communication bridge with register count depending on number of connected Daikin HVAC systems (16 up to 1024 registers, each Modbus register group containing 16 registers for one Daikin HVAC device).

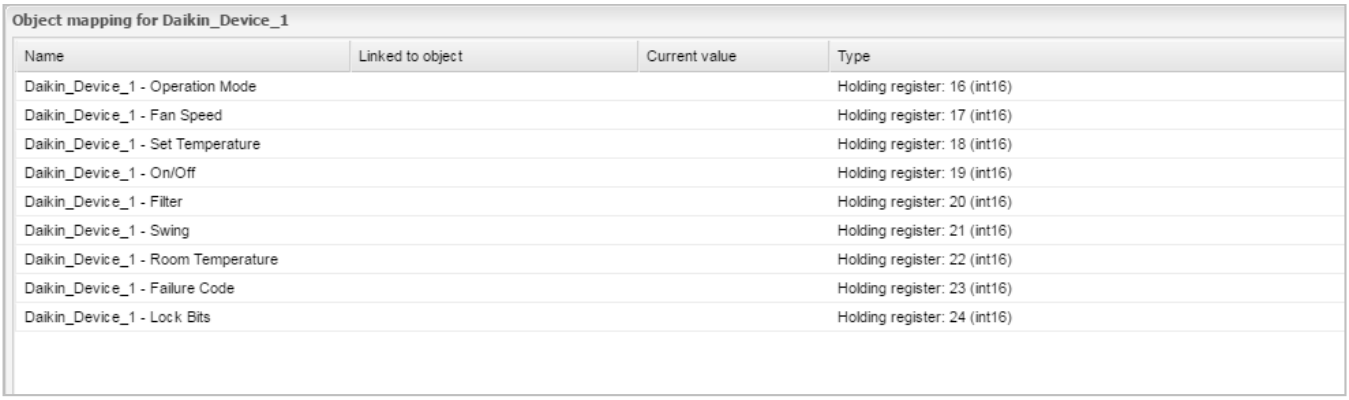


Picture 15: Modbus IP devices overview

3.2.4 Map Modbus registers to object

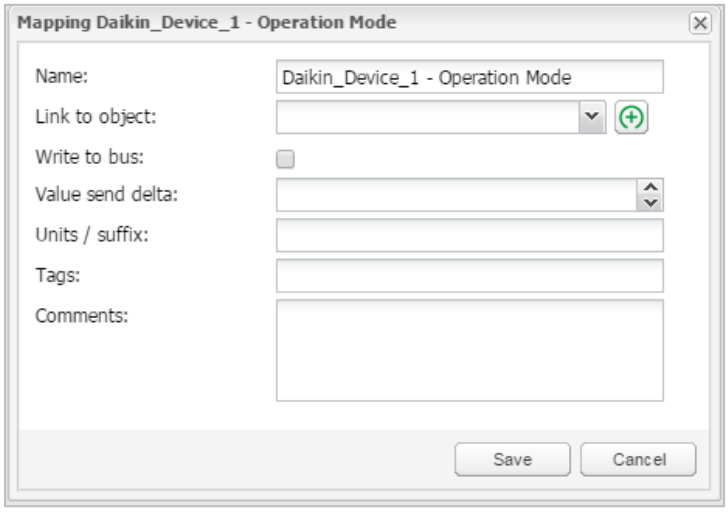
a) Once the Modbus device has been added as described in User Guide chapter Modbus Mapping it is necessary to set the register mapping.

1) Configurator -> Modbus
2) **Click** Device
3) Map registers



Picture 16: Modbus registers' mapping

b) Click selected line (e.g. Operation Mode) and Mapping window is shown.



Picture 17: Modbus registers Mapping window

Link to object – Select the spaceLYnk object, where the value read from Modbus register will be saved. You can select existing object from drop down menu or **click**  and create new one.

Write to bus – Enable sending data to KNX TP bus.

Note: If this option is disabled, telegrams to KNX TP bus are not sent, when Modbus value is changed. Telegrams are sent to KNX IP anyway. In case you do not want to share the values through KNX IP, it is important to set the filtering table properly.

Value send delta – Set the value of delta. If the change of value read from Modbus register is bigger than this delta, value is send to KNX bus. In case of KNX TP, *Write to bus* option needs to be enabled.

Unit / suffix – Unit of the Modbus value. This setting is applied to selected group object in spaceLYnk. This parameter is optional.

Tags – Select a tag, which is applied to selected group object in spaceLYnk. This parameter is optional.

Comments – Select a comment, which is applied to selected group in spaceLYnk. This parameter is optional.

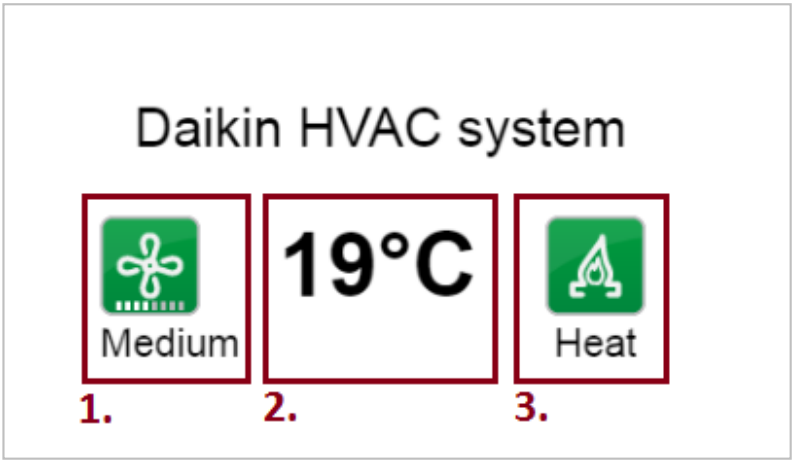
Object mapping for Daikin_Device_1

Name	Linked to object	Current value	Type
Daikin_Device_1 - Operation Mode	1/1/12 (Daikin_Device_1 - Operation Mode)	Heat	Holding register: 16 (int16)
Daikin_Device_1 - Fan Speed	1/1/14 (Daikin_Device_1 - Fan Speed)	High	Holding register: 17 (int16)
Daikin_Device_1 - Set Temperature	1/1/41 (Daikin_Device_1 - Set Temperature)	21°C	Holding register: 18 (int16)
Daikin_Device_1 - On/Off	1/1/13 (Daikin_Device_1 - On/Off)	ON	Holding register: 19 (int16)
Daikin_Device_1 - Filter	1/1/42 (Daikin_Device_1 - Filter)	0	Holding register: 20 (int16)
Daikin_Device_1 - Swing	1/1/43 (Daikin_Device_1 - Swing)	45 deg	Holding register: 21 (int16)
Daikin_Device_1 - Room Temperature	1/1/44 (Daikin_Device_1 - Room Temperature)	24°C	Holding register: 22 (int16)
Daikin_Device_1 - Failure Code	1/1/45 (Daikin_Device_1 - Failure Code)	0	Holding register: 23 (int16)
Daikin_Device_1 - Lock Bits	1/1/46 (Daikin_Device_1 - Lock Bits)	0	Holding register: 24 (int16)

Picture 18: Mapped registers

3.2.5 Create visualization

Object specified and used in scripts can be linked with visualization. Widget form is used in sample visualization.



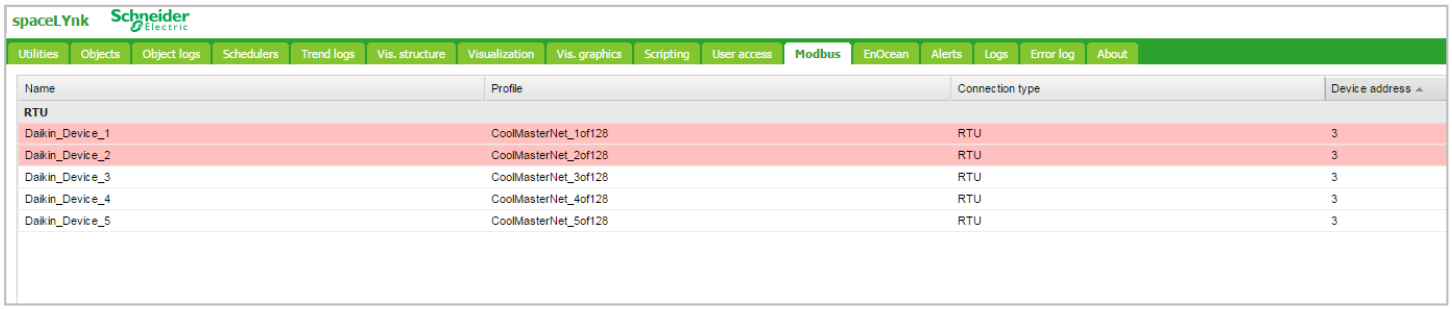
Picture 19: Basic visualization widget

1. Fan speed control. Button value linked to Daikin_Device_1 – Fan Speed object (1/1/14)
2. Set room temperature. Value lined to Daikin_Device_1 – Set Temperature object (1/1/41)
3. Operation mode control. Button value linked to Daikin_Device_1 – Operation Mode object (1/1/12)

4 Troubleshooting

4.1 Modbus RTU primary line communication issue

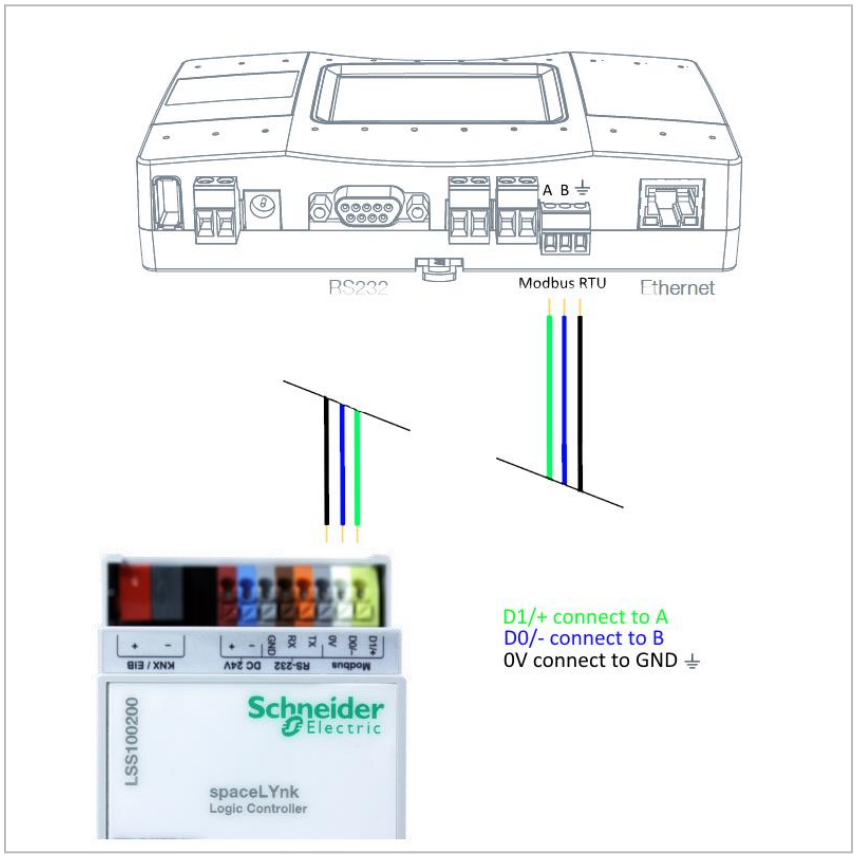
In case of error in connection between Modbus RTU primary line and CMN communication bridge device is highlighted red.



Picture 20: Trouble at Modbus RTU primary line

Follow steps below to fix Modbus RTU communication issue:

1) Check if device at Modbus RTU primary line is connected properly and switched on.



Picture 21: Modbus RTU primary line connection

2) Check Modbus RTU settings (see chapter 3.2.1 c) in this document).
   CMN communication bridge default Modbus RTU settings:

   Baud rate – 9600
   Data bits – 8
   Parity control – none
   Stop bits – 1
   Flow control – none

Note: Use Error log tab for deeper analysis of the issue.

3) Check if CMN communication bridge Line 3 is set to Modbus RTU.
   Check settings of Line 3 at CMN LCD. There should me CG5 icon in Line 3 position at the top of LCD.

5 Conclusion

Document describes how to interconnect Daikin HVAC systems and spaceLYnk via CoolMasterNet communication bridge. Values obtained from Modbus RTU registers can be used to remote control each of connected Daikin devices.

Cool Automation adds support for future Daikin devices by firmware update remotely over internet.

Be aware that all the CoolMasterNet settings depend on IP or RS 232 connection to PuTTy console. When you add a new Daikin device to HVAC communication line, you have to create new VA (described in chapter 3.1.4 Create and preview Virtual Addresses).

6 Appendix

6.1 Glossary

The following table describes the acronyms and defines the specific terms used in this document.

Abbreviation	Description
HVAC	Heating, ventilating, air-conditioning
VRF	Variable refrigerant flow
VRV	Variable refrigerant volume
VA	Virtual address
SE	Schneider Electric
CMN	CoolMasterNet

Table 2: glossary

Schneider Electric Industries SAS

Head Office
35, rue Joseph Monier
92506 Rueil-Malmaison Cedex
FRANCE

www.schneider-electric.com