SIEMENS

Desigo™ PXC4, PXC5 & PXC7

Planning overview

Planning

Contents

1 PXC4, PXC5, and PXC7 automation stations

	PXC4.E16S-2 PXC4.M16S-2	PXC4.E16-2 PXC4.M16-2	PXC5.E003	PXC5.E24	PXC7.E400S	PXC7.E400M	PXC7.E400L
Data sheet A6V1xxxxxx	4651312 4651900	4651312 4651900	1646020	3187283	2505052	2505052	2505052
Number of inputs / outputs onboard	16	16	1	24	1	1	1
Maximum number of inputs / outputs onboard and TXM	40	40		80			
Maximum number of inputs / outputs via TXM				80	100	200	400
Maximum number of integration data points (M-bus, Modbus TCP, and Modbus RTU)		40	500	80	100	200	400
Maximum number of all TXM-I/Os and integration data points [1]	40	80	500	120	100	250	600
Maximum number of KNX PL-Link devices [1]		64	64	64	64	64	64
Number of built-in hardware interfaces for M-bus devices according to EN 13757-2			1	1	1	1	1
Maximum number of simple M-bus loads à 1.5 mA (see row above)			4	4	4	4	4
Maximum number of M-bus devices wired via level converters (RS485)		The maximum number of M-bus devices wired via level converters depends on available integration data points and the maximum of all TXM-I/Os and integration data points together (see above). Theoretically, per level converter 250 simple M-bus devices can be wired.					
Number of configurable field level networks, either for Modbus RTU, BACnet MS/TP, or M-bus using level converters/repeater with a maximum of 250 meters each.	-	1 [2]	2 [3]	2	1	2	4
Maximum number of BACnet MS/TP devices in a field level network [4] [5] (basic principle: 60 devices per trunk)			2 x 60	2 x 60	1 x 60	2 x 60	4 x 60
BACnet/SC support	Node [6]	Node [6]	Node, Hub [7]	Node, Hub [7]	Node, Hub [7]	Node, Hub [7]	Node, Hub [7]
Number of BACnet/SC devices supported as hub	-	-	Up to 100 [4]	Up to 100 [4]	Up to 100 [4]	Up to 100 [4]	Up to 100 [4]

[1] KNX PL-Link data points do not count as integration points. For KNX PL-Link, only the limits on BACnet objects are considered.

[2] Modbus RTU or M-bus only (no MS/TP).

[3] COM2 and MBUS interface cannot be used at the same time.

[4] These figures are based on system communication between the various units for typical systems. For additional information and details, e.g. on topology or communication, see: Application guide for BACnet networks in building automation and control, A6V11159798.

[5] Dependent on the behavior of the third-party MS/TP devices.

[6] Ethernet types only.

[7] Hubs with BACnet Secure Connect can also work as regular BACnet routers to non-BACnet/SC networks.

2 TXM I/O modules

Type TXM1.xxx [1), 2)]	8D	16D	8U	8U-ML	8X	8X-ML	6R	6R-M	6RL	8P	8T	4D3R
Data sheet CM2Nxxxx	8172	8172	8173	8173	8174	8174	8175	8175	8177	8176	8179	8188
Number of inputs / outputs	**8**	**16**	**8**	**8**	**8**	**8**	**6**	**6**	**6**	**8**	**8**	**7**
Number of universal inputs / outputs (UIO)			8	8								
Number of universal inputs / outputs (XIO)					8	8						
Number of relay outputs (DO)							6	6				3
Number of bistable relay outputs (DO)									6			
Number of digital inputs (DI)	8	16										4
Number of triac outputs (TRIAC)											8	
Number of sensor inputs (P)										8		
Local override				●		●		●				
LCD indication				●		●						
3-colored status LED	●							●				●
Green status LED		●	●	●	●	●	●		●	●	●	
Energy consumption per module in mA [3)]	53	65	59	84	230	235	68	78	97	43	42	42

[1)] Each TXM module requires an address key. It can be ordered as a set: TXA1.Kxx (see Type summary and documentation [➜ 44] or CM110562).

[2)] Module series B and higher. In following use cases only series D can be used (available as of 2012):
- I/O bus communication mode "Event"

[3)] Calculation of the necessary power supplies for the TXM modules:
- PXC4, PXC5.E24, and PXC7 automation station supply up to 300 mA
- TXS1.12F10 (data sheet CM2N8183) supply up to 1200 mA
- TXS1.12F4 (data sheet 149-476T) supply up to 1200 mA
- up to 4 power supplies TXS1.12... can be added per PXC7 automation station
- up to 1 power supplies TXS1.12... can be added per PXC4 automation station

UIO	Universal inputs and outputs support the following signal types:
	• Passive sensors LG-Ni 1000, 2x LG-Ni1000, Pt 1000 (375, 385), NTC 10k (Type II / Beta (0-50 °C) = 3892 K), NTC 100k
	• Resistance sensors 1000 Ohm, 2500 Ohm, 1000...1175 Ohm (for setpoint shift)
	• Voltage input analog DC 0…10 V
	• Binary potential-free contacts for signaling functions
	• Counters to 25 Hz (electronic switches to 100 Hz)
	• Analog outputs DC 0...10 V
XIO	Universal inputs and outputs support the following signal types:
	• The same as UIO, plus
	• Current inputs 4...20 mA or 0...20 mA
	• Current output 4...20 mA to outputs 5 to 8
DO	Relay outputs AC 250 V for binary control, changeover contact (NO, NC, impulse)
TRIAC	Permanent contact, impulse, pulse width modulation
DI	Binary contact, state signal (NO/NC), signal impulse, counter 10 Hz (DI 1-8)
P	Resistance sensor Pt100 4-wire, 0...250 Ohm, Pt1000 / 0...2500 Ohm, LG-Ni1000

# 3 Combination of PXC4, PXC5.E24, and PXC7 with TXM modules

General

| General aspects			
TXS power supply modules for TXM modules	For calculation of the necessary TXS power supply modules, see TXM I/O modules [→ 4]		
Panel layout	**Devices**	**Dimensions L x W x H**	
	PXC4...	124 x 198 x 70 mm	
	PXC5.E003	124 x 144 x 70 mm	
	PXC5.E24	124 x 270 x 70 mm	
	PXC7...	124 x 198 x 70 mm	
	TXM1... I/O modules	64 x 98 x 70 mm	
	TXS1.12... power supply module	96 x 98 x 70 mm	
	TXS1.EF bus connection module	32 x 98 x 70 mm	
	TXA1.IBE Island bus expansion module	32 x 98 x 70 mm	
Limitation in the number of TXM modules	The PXC4 and PXC7 automation stations support two communication modes for the TXM modules:		
	Polling mode (default mode)	Support of up to 64 TXM modules per automation station	
	Event mode	Support of up to 8 TXM modules per automation station	
Installation details	For installation details, see:		
	CM2N8183en_07	Power supply module	TXS1.12F10
	CM2N8183en_07	Bus connection module	TXS1.EF10
	CM2N8184en_05	Island bus expansion module	TXA1.IBE
	CM110562	TX-I/O engineering and installation manual	

Small plants powered by automation station (PXC4, PXC5.E24, and PXC7 supply up to 300 mA)
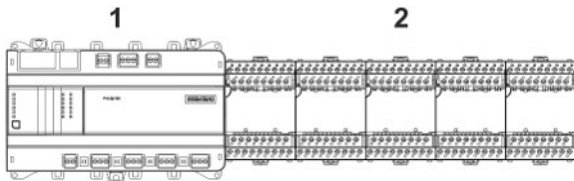
1 PXC7...   Automation station

2 TXM...   I/O modules
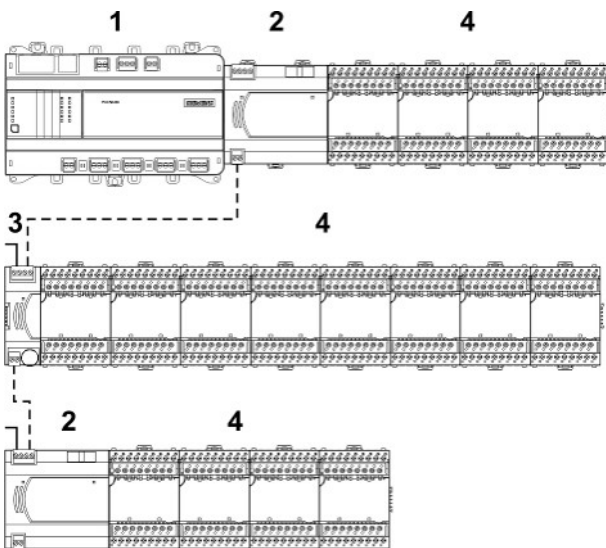
Example:
2 x TXM1.8U, 1 x TXM1.6R, 1 x TXM1.4D3R, 1 x TXM1.16D
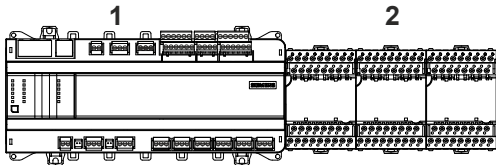
1 PXC5.E24   Automation station

2 TXM...   I/O modules

Example:
1 x TXM1.8U, 1 x TXM1.6R, 1 x TXM1.6D
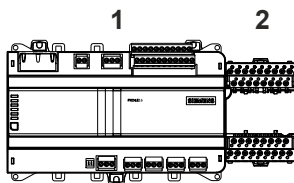
1 PXC4...   Automation station
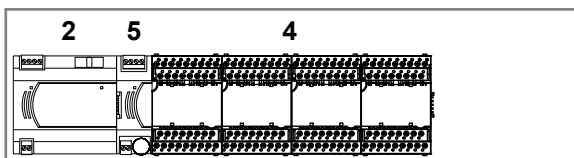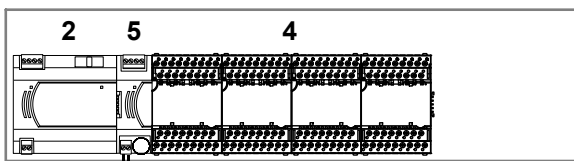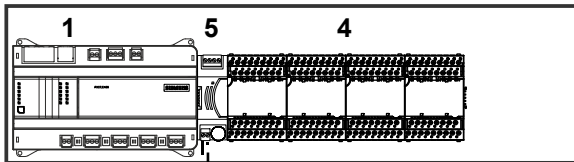
2 TXM...   I/O modules

Example:
1 x TXM1.4D3R

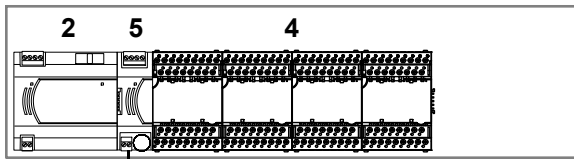## Medium to large plants

1 PXC...   Automation station

2 TXS1.12F10   Power supply module

3 TXS1.EF10   Bus connection module
                     (if no TXS12.EF in this rail)

4 TXM...   I/O modules

Example:
TXM1.8U, TXM1.6R

- - - -   Island Bus

-------   24 VAC (24 VDC)

All TXM modules need an address key TXA1.Kxx with a unique number.

Decentralized TXM Island

1 PXC...	Automation station
2 TXS1.12F10	Power supply module
3 TXS1.EF10	Bus connection module
4 TXM...	I/O modules
5 TXA1.IBE	Island bus expansion module
--- - --- -	Decentralized I/O Island: connection via Island bus expansion modules

Total distance of decentralized I/O Island:
2 x 200 m cable lengths from PXC5.E24 or PXC7 automation station

Total number of decentralized I/O Islands per PXC5.E24 or PXC7 automation station: 8

Use module series C and higher.

All TXM modules need an address key TXA1.Kxx with a unique number for each PXC7 automation station.

4 Desigo Control Point devices

Description	Type	Data sheet
BACnet touch panels with integrated data storage and web server functionality: 7.0 " 10.1 " 15.6 "	PXM30.E PXM40.E PXM50.E	A6V11664137
TCP/IP client touch panels with data storage in web server PXG3.Wx00-2: 7.0 " 10.1 " 15.6 "	PXM30-1 PXM40-1 PXM50-1	A6V11664139
BACnet/IP web server with standard functionality BACnet/IP web server with extended functionality	PXG3.W100-2 PXG3.W200-2	A6V12304192

Accessories	Type	Data sheet
Wall-mount frame for installing the PXM40 in hollow walls	PXA.V40	A6V11664137 A6V11664139
Wall-mount frame for installing the PXM50 in hollow walls	PXA.V50	A6V11664137 A6V11664139
Mounting set for wall-mounting (surface mounting) for the PXM30 or mounting on panel doors	PXA.S30	A6V11646070

5 Typical projects

Overview

The structure of the BACnet network in building automation projects depends on:

● topology
● type and number of devices
● requested functionality such as interaction in the whole site
● project IT infrastructure to be used.

This chapter is structured in small, medium, and large automation controls projects accordingly and covers the automation range PXC4…7 with integration of clients and up to 250 BACnet devices (PXC, DRA, and third-party).

For system topologies with a higher number of primary controls automation stations PXC4…7 and/or room controllers (DRA/third-party) with more than 250 devices in total, see Application guide for BACnet networks in building automation and control, A6V11159798.

BACnet Secure Connect versus BACnet/IP

The topologies below illustrate the physical cabling structure of a typical BACnet/IP project. Projects using BACnet Secure Connect instead of BACnet/IP must also consider the following points:

● BACnet/SC devices also have a logical topology: Each BACnet/SC device ("node") must be logically linked to a dedicated BACnet/SC "hub".
● This node-hub-link is a purely logical concept with no direct 1:1 correlation to underlying structures for physical cabling. All BACnet/SC communication of nodes is routed through the hub. As a consequence, do not install hubs on low-bandwidth or high-latency points within the overall network.
● BACnet/SC is its own BACnet-datalink (similar in concept to BACnet MS/TP or BACnet/IP). As a result, BACnet/SC and non-BACnet/SC components of the network must be connected by a BACnet router in between. Any PXC5/7 automation station that supports BACnet/SC as a hub may act as a BACnet router.

For more information on BACnet/SC, refer to Application guide for BACnet networks in building automation and control, A6V11159798.

Small automation control projects

Small automation control projects with:

- Some primary plants
- Some touch panels
- Some KNX PL-Link field devices
- Total number of data points (physical and integration): 50 to 300
- Total number of devices (PXC, DRA, and third-party): up to 20
- Optional: Cloud connectivity to Building X for remote access and data points time series

Examples: Small schools, small office buildings, etc.
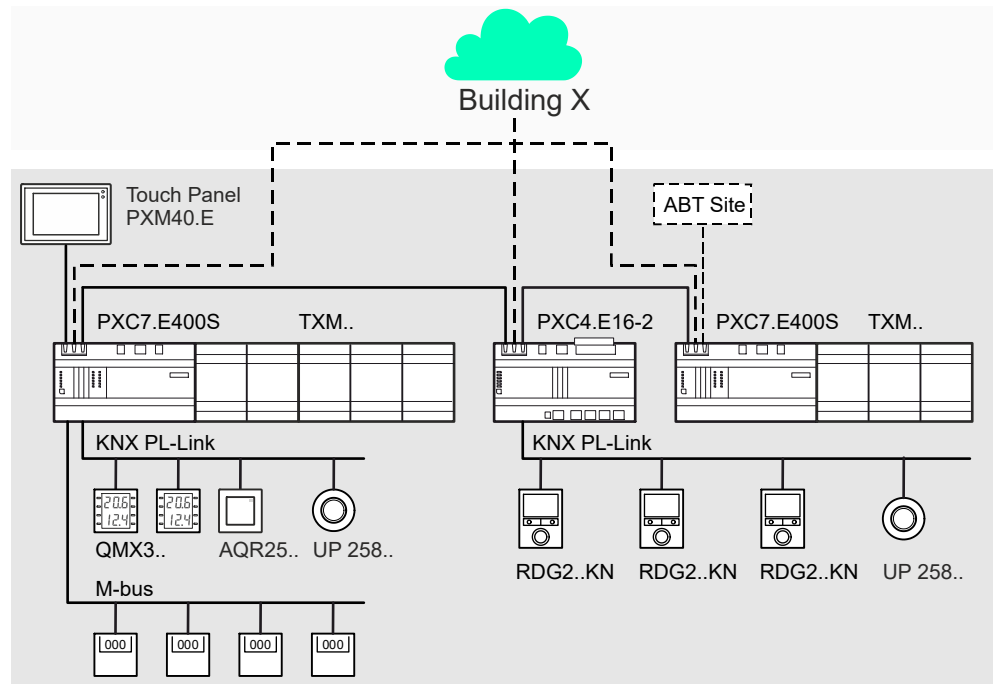
Installation

- Cabling: Patch cables (CAT5/6/7 up to 100 meters) between PXC devices. Each PXC4/5/7 device has a switch with two ports for easy connection. Protect cabling against unauthorized access.
- Connection to ABT Site Tool either as indicated on the onboard switch or via WLAN.

Set up network information for each device (via ABT Site Tool):

- Each PXC device needs a unique address
- IP port: Default value BAC0

Mid-size automation control project with Desigo Control Point

Mid-sized automation controls project with:

- Desigo Control Point embedded building operations with touch panel operation
- Primary plants
- KNX PL-Link field devices
- Integration
- Optional: A few room controllers
- Total number of data points (physical and integration): 200 to 1000
- Total number of devices (PXC, DRA, and third-party): 5 to 50
- Optional: Cloud connectivity to Building X for remote access and data points time series

Examples: Small to mid-sized schools, office buildings, retail buildings, etc.

Patch cables

Installation cables

Installation of local and distributed devices

- Cabling: Patch cables (CAT5/6/7 up to 100 meters) between PXC devices. Each PXC4/5/7 device has a switch with two ports for easy connection. Protect cabling against unauthorized access.
- Installation cables (shielded twisted pair (TP) cables with solid copper wiring).
  - BACnet IP network: Maximal length 90 m between patch panels.
  - Modbus RTU: Maximal length 800 m between PXC and last Modbus device.
- Installation cables (fiber optics).
  - BACnet IP network: Maximal length of 2000 m between patch panels. Refer to the manufacturer's specification.
- Other installation variants and additional technical information:

      – See Application guide for IP networks in building automation and control, A6V10630964.

Network setup (own IP network)

Set up of the network information for each device (via ABT Site Tool):

● Each PXC device needs a unique address
● IP port: Default value BAC0

Network setup (using existing IP network with DHCP server)

● Enable "DHCP" (an individual address for each PXC device is not necessary since the DHCP server assigns the addresses).
● IP port: Default value BAC0

Modbus TCP / RTU devices

The Modbus data points (register) for the different devices are mapped to BACnet input/output objects in the PXC4, PXC5, and PXC7 and time for the values are updated as per the selected polling time.

These objects are handled in the system as BACnet input/output objects similar to objects from other subsystems (e.g. TXM modules).

**Desigo Control Point** (embedded building operations and touch panels)

For details, see Desigo Control Point Basic documentation, A6V11170804.

Mid-size to large automation control projects with Desigo CC

Large automation controls project with:

- Desigo CC Management Platform
- Primary plants
- KNX PL-Link field devices
- Integration
- Optional: room controllers
- Total number of data points (physical and integration): 500 to 10,000
- Total number of devices (PXC, DRA, and third-party): Up to 250
- Optional: Cloud connectivity to Building X

Examples: Large schools, large office buildings, large retail buildings (shopping malls)
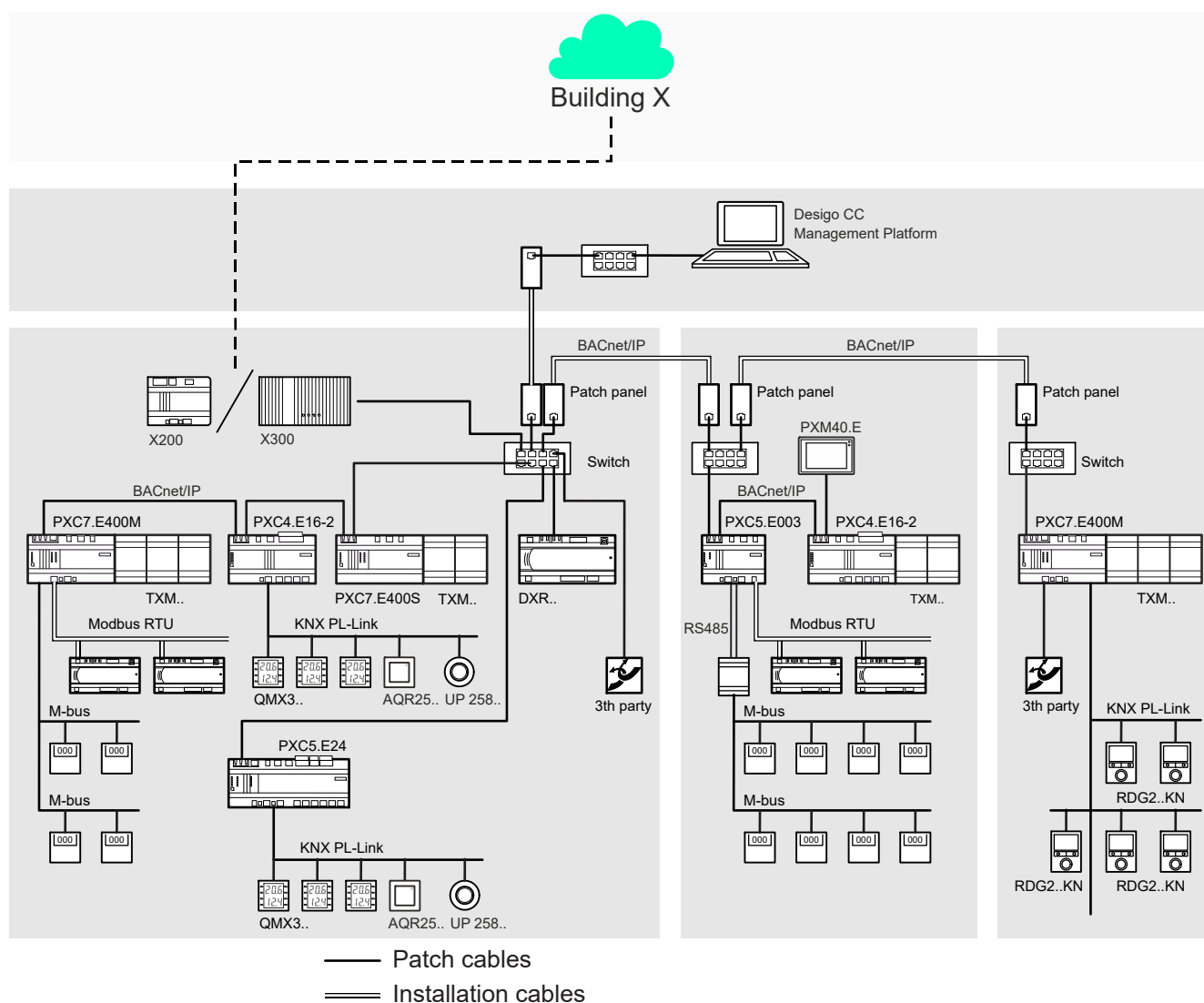

```
——— Patch cables
=== Installation cables
```

Installation of local and distributed devices

- Cabling: Patch cables (CAT5/6/7 up to 100 meters) between PXC devices. Each PXC4/5/7 device has a switch with two ports for easy connection. Protect cabling against unauthorized access.
- Installation cables (mechanically protected twisted pair (TP) cables with solid copper wiring).
  - BACnet IP network: Maximal length 90 m between patch panels.

- Modbus RTU: Maximal length 800 m between PXC and last Modbus device.
- Installation cables (fiber optics).
  - BACnet IP network: Maximal length up to 2000 m between patch panels. Refer to the specification of the manufacturer
- Other installation variants and additional technical information:
  - See Application guide for IP networks in building automation and control, A6V10630964.

Network setup (own IP network)

Set up of the network information for each device (via ABT Site Tool):

- Each PXC device needs a unique address
- IP port: Default value BAC0

Network setup (using existing IP network with DHCP server)

- Enable "DHCP" (an individual address for each PXC device is not necessary since the DHCP server assigns the addresses).
- IP port: Default value BAC0

Modbus TCP / RTU devices

The Modbus data points (register) for the different devices are mapped to BACnet input/output objects in the PXC4, PXC5, and PXC7 and time for the values are updated as per the selected polling time. These objects are handled in the system as BACnet input/output objects similar to objects from other subsystems (e.g. TXM modules).

Desigo Control Point (touch panels)

For details, see Desigo Control Point Basic documentation, A6V11170804.

BACnet networks with MS/TP trunks

- Details see chapter "BACnet networks with MS/TP trunks" in Application guide for BACnet networks in building automation and control, A6V11159798
- For additional information, see Ethernet, TCP/IP, MS/TP and BACnet technical principles, A6V10408751.
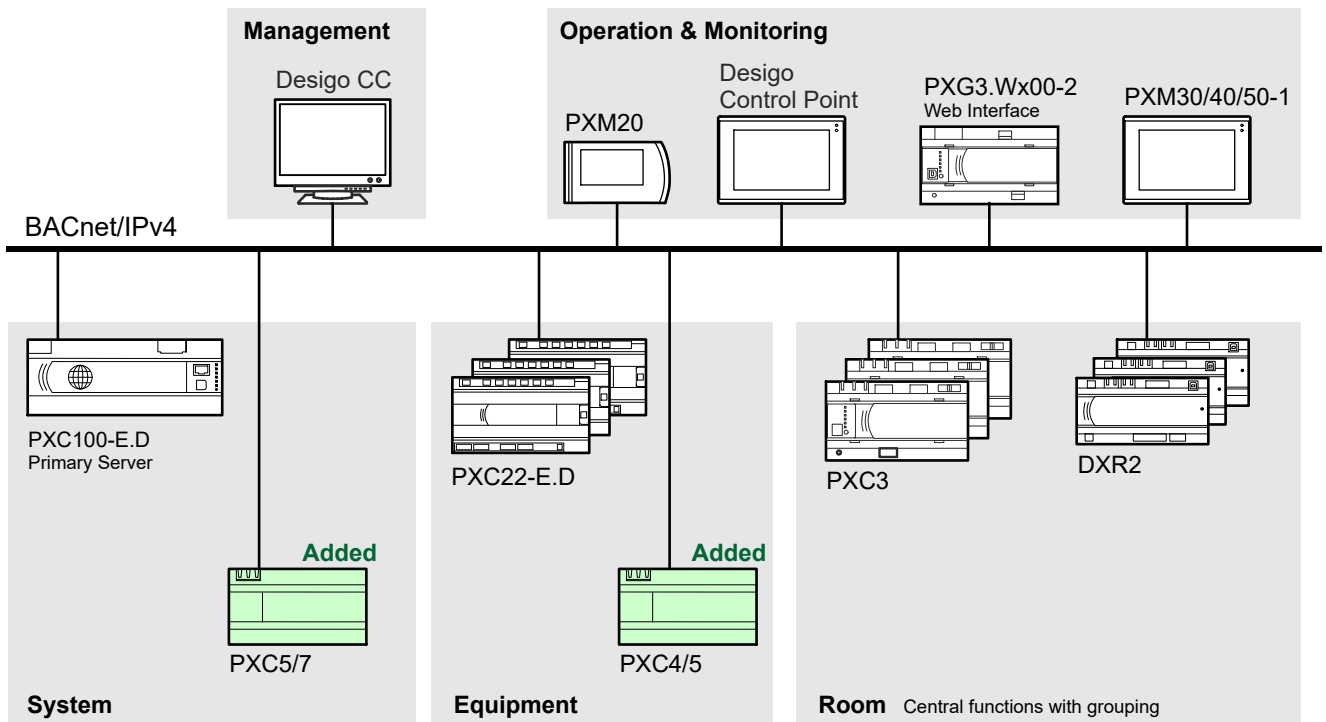
5.1 Extending existing XWP projects with PXC4, PXC5, and PXC7 automation stations

Existing Xworks Plus (XWP) projects with PXC64/128 and PXC00..200 devices can be combined and extended with PXC4, PXC5, and PXC7 automation stations. Below, four different scenarios are described for such an extension. These scenarios are examples and have to be adjusted to the project and the customer needs.

- **Scenario A**:
  Adding a single new PXC4/5/7 automation station and/or primary control unit.
- **Scenario B**:
  Adding a new floor or building part with new room automation and a primary control unit.
- **Scenario C**:
  Securing existing room automation from unsecure communication, adding a new hub.
- **Scenario D**:
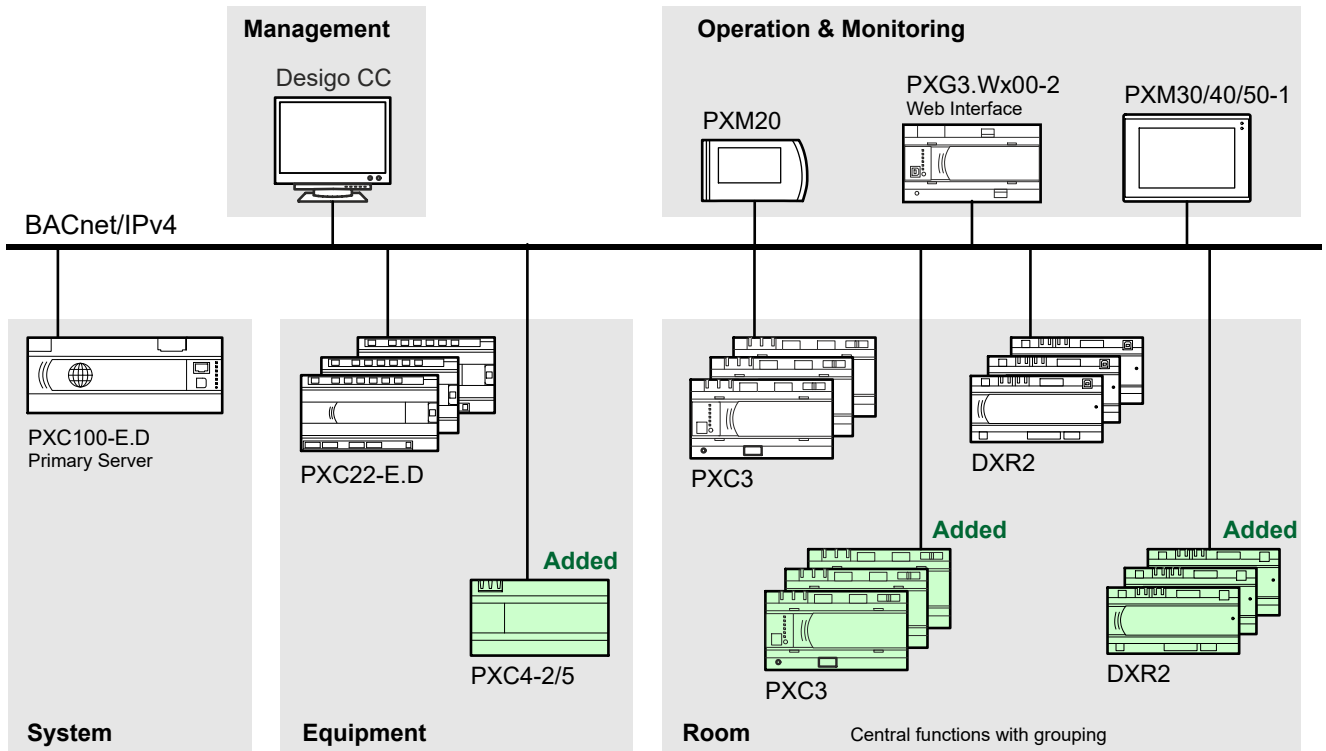 Extending and securing an existing installation (combination of scenario B and C).

Each scenario starts with a high-level topology followed by a summary about the required adaptations in the runtime system as well as in engineering and commisioning.

Scenario A: Adding a single new PXC4/5/7 automation station and/or primary device

Management

Desigo CC

Operation & Monitoring

PXM20

Desigo Control Point

PXG3.Wx00-2
Web Interface

PXM30/40/50-1

BACnet/IPv4

PXC100-E.D
Primary Server

PXC22-E.D

PXC3

DXR2

Added

PXC5/7

Added

PXC4/5

System

Equipment

Room Central functions with grouping

Runtime system	Engineering and commissioning
Automation	

• **BACnet referencing** (mixed BACnet revisions): Additional referencing from/to PXC4/5/7 devices.
 	
Primary server in PXC64/128 and PXC00..200:
 	
• **Time manager**: Keep PXC64/128 and PXC00..200 configuration. Options are:
 	
  – Keep Desigo CC as time manager (recommended).
 	
  – Configure PXC5/7 as new time master (NTP), provide time to PXC64/128 and PXC00..200 primary server(s) ("manager of primary server manager") (recommended).
 	
  – Add PXC4/5/7 as new recipient (third-party BACnet-browser required).
 	
• **Alarm routing**: Keep PXC64/128 and PXC00..200 as is.
 	
• **Global calendar**: Keep PXC64/128 and PXC00..200 structure and add PXC4/5/7 calendar (use one of the option described on the right side).
 	
• **Device supervision**: PXC64/128 and PXC00..200: Primary server or other PXC device does "life check" of backup servers, separate life check on new PXC4/5/7 devices.
 	
• System test necessary.
	• **XWP**:
	
	  Network: Update BBMD, BDT, etc.
	
	• **XWP-BOS**: Stays as is.
	
	• **ABT Site**: Define new PXC4/5/7 device, BACnet referencing with PXC64/128 and PXC00..200.
	
	Primary server in PXC64/128 and PXC00..200:
	
	• **Time manager**:
	
	  – **XWP**: No upload/RTE online recipient list lost (not recommended).
	
	  – Engineer time manager (NTP) in ABT Site and add primary server as recipient, no actions required in XWP.
	
	  – Add PXC5/7 as time recipient in Desigo CC.
	
	• **Alarm routing**: Setup independent new alarming for PXC4/5/7 devices (same [NC] in ABT).
	
	• **Global calendar**: Two options are available:
	
	  – Add calendar object from PXC4/5/7 to Desigo CC calendar management (recommended).
	
	  – If no Desigo CC: PXC4/5/7 calendar needs to be engineered independently.
	
	Note: New calendar solution in planning.
	
	• **Device supervision**: Define PXC5/7 as supervisor (not PXC4!) for PXC4/5/7 devices.

Room	
Installed Desigo room automation is not impacted, still communicates with central functions (grouping) and PXC64/128 and PXC00..200 primary control units (BACnet referencing).	
Operation and monitoring	
• Desigo Control Point can online discover and learn new PXC4/5/7 devices. • New PXC4/5/7 device with new alarming on Desigo Control Point. • PXM20 shows PXC4/5/7 devices as third-party devices.	• Learn PXC4/5/7 devices into Desigo Control Point with existing functionality in ABT Site and reload Desigo Control Point. • Alarming
Mangement	
• Online learning as is for PXC64/128 and PXC00..200 and PXC4/5/7 devices. – New alarm routing for newly added PXC4/5/7 devices. • Operation and monitoring as is for existing devices, add new devices.	• Offline import for newly added PXC4/5/7 devices. • **Life check**: add {PXC4/5/7 "supervisory" device} to Desigo CC. • Migrate Desigo Insight to Desigo CC.

Scenario B: Adding a new floor or building part with new room automation and a primary device
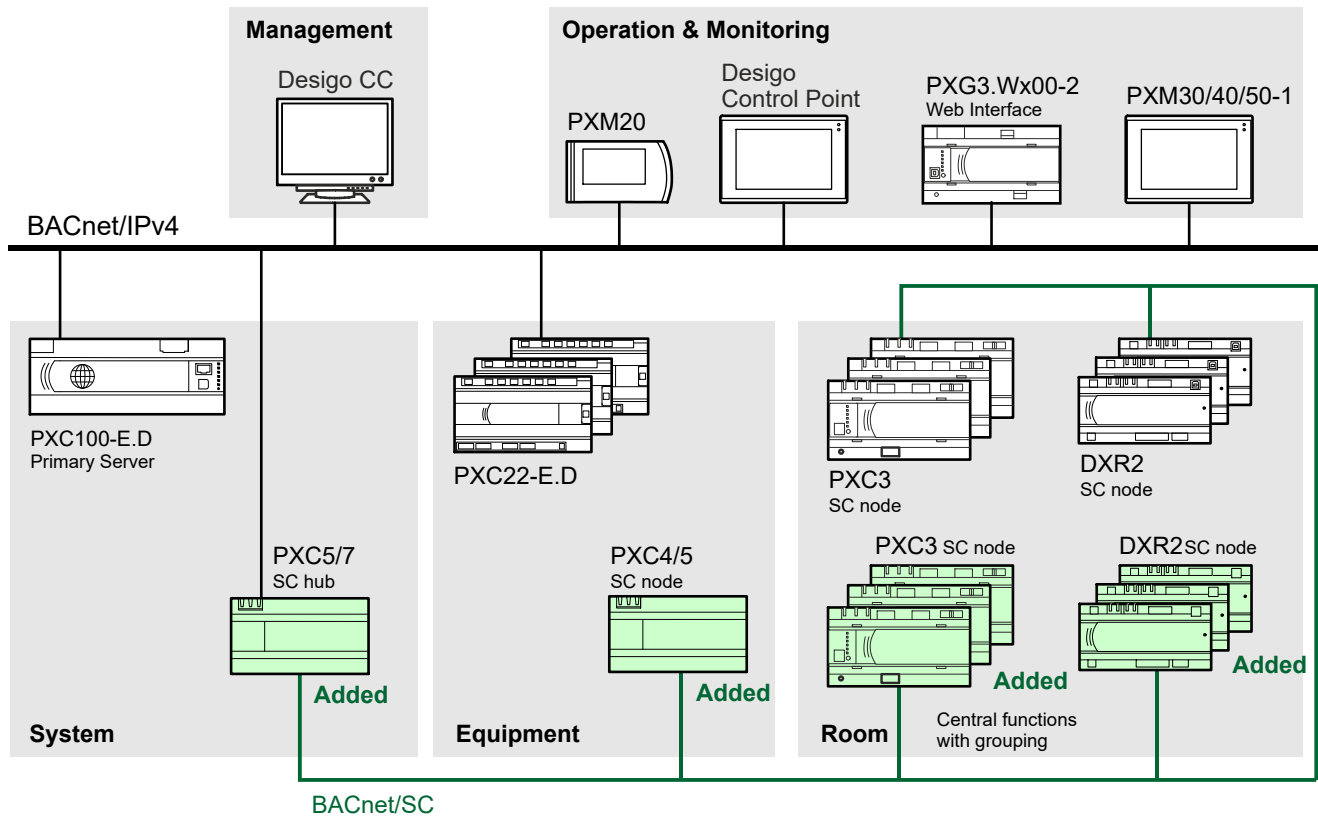
Runtime system	Engineering and commissioning
Automation	
● No change on installed system. Add coordination between existing and new automation devices according to customer requests, using BACnet references. ● Rest is the same as scenario A.	● **XWP**: No change. ● Rest is the same as scenario A.
Equipment	
● Existing PXC64/128 and PXC00..200 primary server stay as is. Coordination with existing room solution stays as is. ● New PXC4/5 devices as NTP time manager for new Desigo room automation (independent of existing installation). ● Rest is the same as scenario A.	● **ABT Site**: Add new primary control unit, engineer grouping for new room solution. ● **XWP**: No change (PXC4/5/7 devices not supported in network work manager). ● **XWP-BOS**: PXC4/5/7 check-in/out supported. ● Rest is the same as scenario A.
Room	
● Room automation, grouping. ● **Central functions**: Add new room devices to existing central functions (or define new groups). ● Rest is the same as scenario A.	● **ABT Site**: Add new room automation devices. ● Extend existing central functions with existing Desigo room automation. ● **XWP-BOS**: Check in new Desigo room automation in existing BOS. ● Rest is the same as scenario A.
Operation and monitoring	
● **Desigo Control Point**: Online learning of new devices. ● Rest is the same as scenario A.	● **ABT Site**: Offline learning of new device in Desigo Control Point. ● Rest is the same as scenario A.
Mangement	
● Support alarm management for existing PXC64/128, PXC00..200, and new devices. ● Rest is the same as scenario A.	● Import new devices (reuse existing features). ● Rest is the same as scenario A.

Scenario C. Securing existing room automation from unsecure communication, adding a new hub

Runtime system	Engineering and commissioning
Automation	
- Add new PXC5/7 devices: – BACnet/SC with hub. – BACnet routing, keep BACnet IPv4 port open. - Rest is the same as scenario A.	**ABT Site**: – Add hub, create and load certificates to PXC5/7 devices (hub). – Setup BACnet routing for Desigo room automation devices from BACnet Secure Connect to IPv4. - Rest is the same as scenario A.
Equipment	
- No change on PXC64/128 and PXC00..200. - BACnet referencing to Desigo room automation stays unchanged (communication via PXC5/7 router and hub).	**XWP**: No actions required.
Room	
- Load new firmware, upgrade device (large root-fs). - Configure DXR2/PXC3 device as BACnet Secure Connect node. - DXR2/PXC3 devices keep device name, number, IP address, etc.	**ABT Site**: Change from IPv4 to BACnet Secure Connect node, assign hub, create and load certificates to DXR2/PXC3. **XWP**: DXR2 and PXC3 still visible in project and network manager, but no BACnet Secure Connect properties. **XWP-BOS**: Check-in/-out stays as is.
Operation and monitoring	
Same as scenario A.	Same as scenario A.
Mangement	
Same as scenario A.	Same as scenario A.

Scenario D: Extending and securing an existing installation

Runtime system	Engineering and commissioning
Automation	

● Add new PXC5/7 devices:
  – BACnet/SC with hub.
  – BACnet routing, keep BACnet IPv4 port open.
	● **ABT Site**:
	  – Add hub, create and load certificates to PXC5/7 devices (hub).
	● Setup BACnet routing for Desigo room automation devices from BACnet Secure Connect to IPv4.

Equipment	
● Same as scenarios B and C.	● Same as scenarios B and C.
Room	
● Load new firmware, upgrade device (large root-fs).	● **ABT Site**: Change from IPv4 to BACnet Secure Connect node, assign hub, create and load certificates to DXR2/ PXC3. ● **XWP**: PXC5/7 not visible in network manager.
Operation and monitoring	
● Same as scenarios B and C.	● Same as scenarios B and C.
Mangement	
● Same as scenarios B and C.	● Same as scenarios B and C.

6 System functions and configurations

System functions of PXC4/5/7 devices on BACnet/IP

System functions	PXC4.E16-2 PXC4.E16S-2		PXC5.E003	PXC5.E24	PXC7.E400S	PXC7.E400M	PXC7.E400L
BACnet profile (Rev. 1.16)	B-BC		B-BC	B-BC	B-BC	B-BC	B-BC
AMEV profile (BACnet 2017)	AS-A / AS-B		AS-A / AS-B	AS-B	AS-B	AS-B	AS-B
KBOB profile (BACnet 2017)	AS-CH [1]		AS-CH [1]	AS-CH [1]	AS-CH [1]	AS-CH [1]	AS-CH [1]
Time manager RTC (Real Time Clock) or NTP (Network Time Protocol)	Yes		Yes	Yes	Yes	Yes	Yes
BBMD (Broadcast Management Device)	Yes		Yes	Yes	Yes	Yes	Yes
Device monitoring: Life check of other BACnet devices	No		Yes	Yes	Yes	Yes	Yes
Web interface (via IP network, local WLAN access point, and cloud)	Yes		Yes	Yes	Yes	Yes	Yes
Number of alarms	100		1,500 [2]	1,200 [2]	1,000 [2]	2,000 [2]	5,000 [2]
Number of trend blocks [3]	40		200	200	600	600	600
Number of trend entries	20,000		200,000	200,000	500,000	500,000	500,000
Number of schedulers	5		20	20	50	50	50
Schedulers: Number of switching points per day	20		20	20	20	20	20
Number of calendars	5		20	20	50	50	50
Number of BACnet objects	PXC4.E16-2: 400 PXC4.E16S-2: 250		1,500	1,200	1,000	2,000	5,000
Web interface - Local operation	Yes		Yes	Yes	Yes	Yes	Yes
Web interface - System-wide operation (for assigned devices)	No		Yes	Yes	Yes	Yes	Yes
Building X cloud connectivity	Yes [4]		Yes	Yes	Yes	Yes	Yes
Number of data points time series (active data points per device)	PXC4.E16-2: 130 PXC4.E16S-2: 70		400	400	400	700	1400

[1] AS-CH pending

[2] No alarm limitation check in ABT Site.

[3] Number of total trend blocks include the offline created and the dynamically created trend log objects.

[4] PXC4 has only limited Building X cloud connectivity. PXC4-2 has extended Building X cloud connectivity.

Number of devices per network range (on BACnet/IP)

Number of devices per network range	Recommended and tested limits [1]
Number of devices per BACnet Internetwork	Up to 1500 [1]
Number of IP segments per BACnet Internetwork	Up to 10 [1]
Number of devices per ABT Site project	500
Number of PXC4/5/7 and DXR devices per IP segment in mixed combinations	Up to 250 [2]
Number of PXC4/5/7 and DXR devices via integrated IP switch (Daisy chain)	Up to 20 in any combination
Number of MS/TP networks per BACnet Internetwork	Up to 50
Number of PXM30.E/40.E/50.E touch panels or PXG3.W100-2/W200-2 web interfaces per IP segment	Up to 10
Number of PXM30-1/40-1/50-1 touch panels per IP segment	Up to 30
PXM30/40/50 and PXG3.W100-2/W200-2: Max. number of assigned devices BACnet/IP devices MS/TP devices	 50 10
Max. number of assigned devices for web interface operation on PXC5.E003, PXC5.E24, and PXC7.E400.. BACnet/IP devices MS/TP devices	 50 10
Number of assigned devices for supervisory functions (time sync, life check etc.) per PXC5.E003/PXC5.E24/PXC7.E400x	500
Number of Desigo CC management platforms	1

[1] These figures are based on system communication between the various units for typical systems. For additional information and details, e.g. on topology or communication, see: Application guide for BACnet networks in building automation and control, A6V11159798.

[2] When the system only exists of one segment, the number of PXC 4/5/7 and DXR devices can be increased to 500. For details, see Application guide for BACnet networks in building automation and control, A6V11159798.
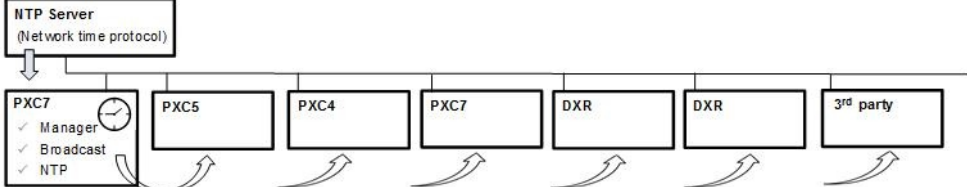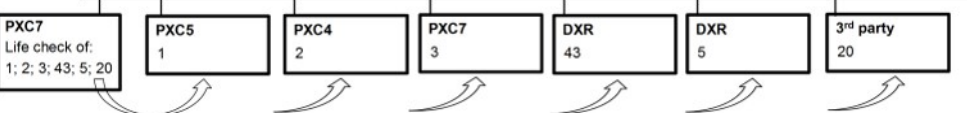
System functions of PXC4-2 devices on BACnet MS/TP

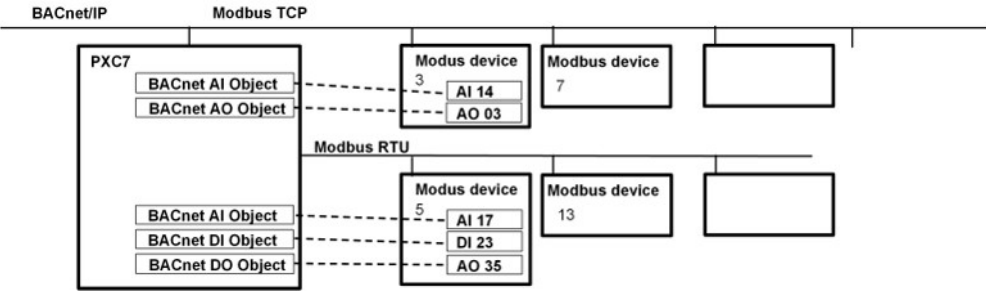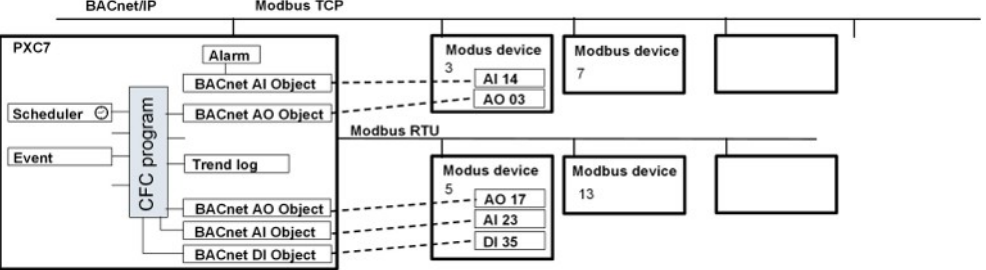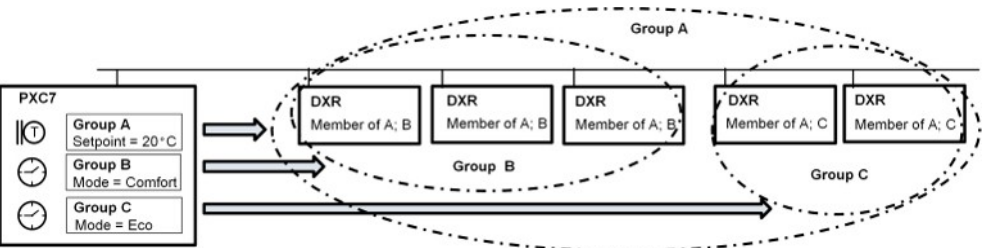| System functions	PXC4.M16-2, PXC4.M16S-2
BACnet profile (Rev. 1.16)	B-BC
Time manager RTC (Real Time Clock)	Yes
Web interface (via local WLAN access point)	Yes
Number of alarms	100
Number of trend blocks	40
Number of trend entries (local only, not for upload to the system due to limitations of the MS/TP network)	20,000
Number of schedulers	5
Schedulers: Number of switching points per day	20
Number of calendars	5
Number of BACnet objects	PXC4.M16-2: 400 PXC4.M16S-2: 250

Building X cloud connectivity

Enable a secure direct connectivity between the PXC devices to the cloud, leveraging the Building X platform functionalities.

For details, see Buildings X Operations Manager User Guide, A6V11881696 and Building X Energy Manager User Guide, A6V12503191.

System and supervisory controller functions on PXC5/PXC7 devices

Full flexibility	PXC5/7 devices are freely programmable and is a flexible system with supervisory controllers to control, monitor, and supervise technical plants in all building types and to cover all the functionalities required to efficiently operate user centric buildings.
Time sync	A PXC5/7 automation station can be configured as a time manager for other PXC4/5/7 and DXR devices and as well for third-party devices (if they allow this functionality). (Devices on BACnet IP, BACnet/SC, and BACnet MS/TP) A time manager is a dedicated device that defines and distributes the common time for the assigned devices. A common system time is important for synchronized actions (e.g. schedulers or trended data). Time distribution itself is a standardized BACnet service. The time source of the time manager is either NTP (Network Time Protocol) or built in RTC on the device. The time manager can be configured on each device. ● Recommended number of devices for time synchronization in a PXC5/7: Up to 250 (on the same IP segment) ● Time synchronization interval: 150 minutes (default) ● Time synchronization interval value range: 1 to >1000 minutes
Life check Supervision	A life check device is a dedicated PXC5/7 device that checks the reachability of other BACnet devices and generates an alarm if assigned devices cannot be reached. The devices to be supervised by the PXC5/7 device must be added to the life check list. The table contains the device instance number for PXC4/5/7 and DXR devices. Only the device instance number is available for third-party devices. ● Recommended number of devices for life check: Max. 250 (on the same IP segment and/or in the MS/TP subnet connected to this PXC5/7 device) ● Life check time interval: 5 minutes

Integration of Modbus devices	The PXC5/7 device integrates Modbus TCP and RTU devices and maps Modbus data points (register) to BACnet I/O objects. Mechanism: PXC5/7 receive the Modbus data via polling. The update time of the values depends on baud rate, number of engineered data points, and traffic on the Modbus network. ● Polling time: 5 seconds to 5 minutes (5 minutes default).
Integration Adding alarming, trending, scheduling to Modbus devices	The PXC5/7 device can add system functionality (alarming, trending, scheduling) to third-party Modbus devices (either Modbus TCP and/or Modbus RTU) System functionality can be added via the CFC program to the BACnet input/output objects mapped from the different Modbus devices.
Grouping function Common setpoint and room operating mode (common schedulers)	Group manager objects for HVAC allow to set: ● common setpoints ● common room operating mode (based on group scheduler and/or calendar) for a group of DXR room controllers. ● Recommended number of group manager objects per PXC5/7 device: Max. 50 ● Recommended number of group members per group manager: Max. 250 Place the members on the same IP segment as the group manager. Assign the group members to a group manager object. The group assignment can be changed online as well (e.g. via Desigo CC).

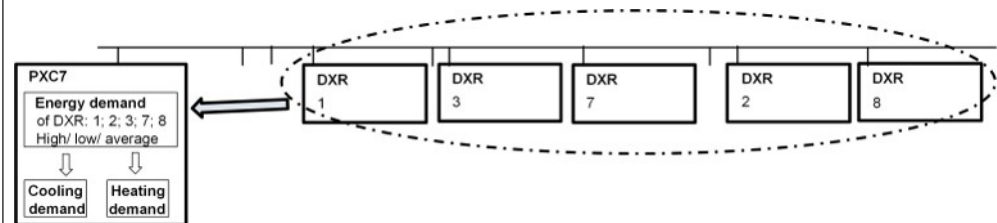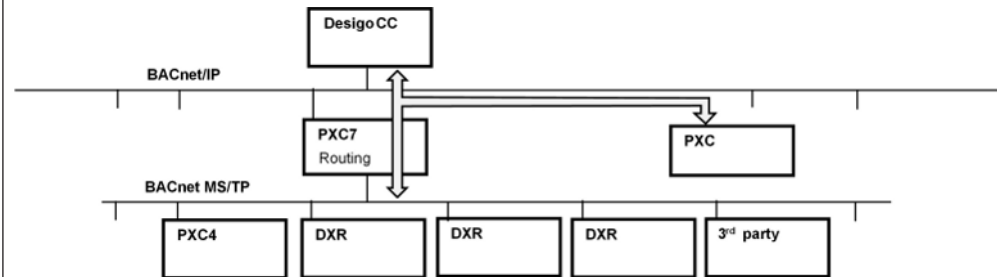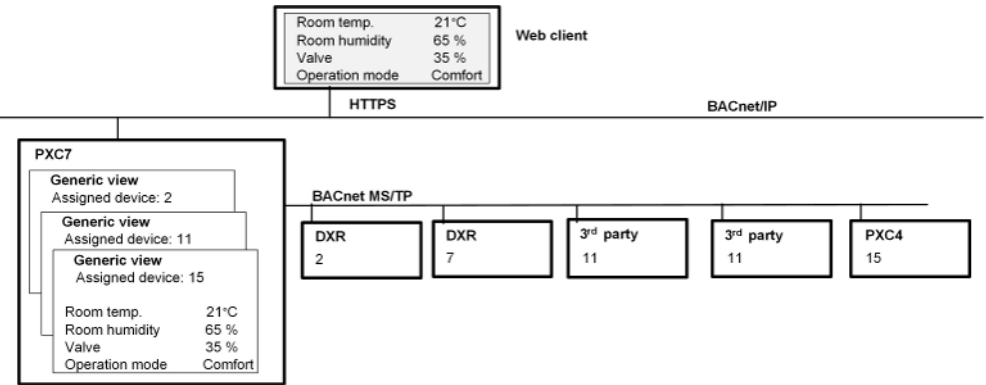|	
Grouping function Supply chain function for hot/cold water and air	Group manager objects "supply chain" can: ● collect energy demand for heating/cooling ● evaluate the average or highest/lowest demand value for a group of DXR room controllers. ● Recommended number of group manager objects per PXC5/7 device: Max. 20 ● Recommended number of group members per group manager: Max. 250 Place the members on the same IP segment as the group manager. Enter the group members to the list in the group manager object.
BACnet MS/TP devices Routing functionality	The PXC5/7 device routes BACnet messages from connected BACnet MS/TP devices to and from BACnet/IP devices (without engineering data points on the PXC5/7 device). The B-BC functionality is available between BACnet/IP networks and BACnet MS/TP devices. Be careful not to overload the BACnet MS/TP network which has a lower performance. In addition, refer to the additional limits of number of MS/TP devices per trunk.
BACnet MS/TP devices Adding system functions to third-party MS/TP devices and adding additional functionality to DXR/PXC4 on MS/TP	In addition to the routing functionality for BACnet MS/TP devices described above, PXC5/7 devices can add system functionality (alarming, trending, scheduling) to third-party BACnet MS/TP devices, e.g. to thermostats or air handling unit controllers. The PXC5/7 device adds additional functionality as defined in the CFC program to the DXR/PXC4/third-party devices on BACnet MS/TP via the BACnet IO connection.
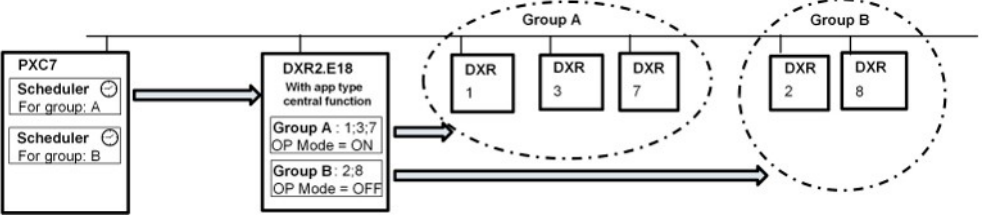
Web interface for assigned devices	The PXC5/7 device provides generic operation via the embedded web interface on the assigned devices without additional engineering or mapping.
	All BACnet input/output/value objects, scheduler/calendar, local alarms/events are listed in the Generic view.
	Add the devices to the list of assigned devices.
	The table contains device instance numbers and device names of PXC4/5/7 and DXR devices. Only the device instance numbers are available for third-party devices.
BBMD BACnet broadcast messages	On medium to large projects, the IP networks are structured into different IP segments via IP routers.
	The IP routers limit the network traffic by blocking BACnet broadcast messages.
	The PXC5/7 device can serve as BBMD (BACnet Broadcast Management Device).
	The main purpose of BBMDs is to redistribute the broadcast messages that BACnet/IP requires for discovery of BACnet/IP devices on IP networks interconnected via IP routers.
	For details on how to structure the network, see Application Guide for BACnet Networks in Building Automation, A6V11159798.
Central functions for lighting and blinds (and HVAC)	The group manager objects for light and blinds for a group of DXR room automation stations are placed in a DXR2.E18 automation station with app type "Central functions".
	DXR2 room automation stations with central functions can be used for the HVAC grouping functions and, if required, also for the grouping function "Seasonal compensation" for HVAC.
	In this use case, the PXC5/7 device hosts the scheduler/calendar for different groups of room automation stations engineered in the central function DXR automation station.
	For details on how to structure the network, see Application Guide for BACnet Networks in Building Automation, A6V11159798.

Remark: PXC4 on IP also supports some of the above-mentioned functionality but PXC4 focuses on controlling plants including the necessary system functionality. Comply with the system limits listed in the tables of this document.

7 KNX PL-Link field bus

7.1 Engineering and commissioning of devices on KNX PL-Link

Connecting field devices or even communicating room thermostats for HVAC room automation to PXC4/5/7 automation stations on KNX PL-Link is fast, simple, and reliable. For initial commissioning and in service cases, you can rely on a powerful "plug and play" mechanism. For engineering and commissioning, only ABT Site is required.

Step 1: Engineering of KNX PL-Link network with ABT Site

1. Add devices from the library and configure and rename them according to your project guidelines. For a list of available device types, refer to the sections "RDG200KN thermostat range on KNX PL-Link" and "HVAC room operator units and sensors on KNX PL-Link" in: A6V13054432 (PXC4, PXC5 & PXC7 Range Description).

2. Add a KNX bus power supply if the built-in power supply of 50 mA is not sufficient. By adding an external power supply, the onboard power supply is turned off automatically.
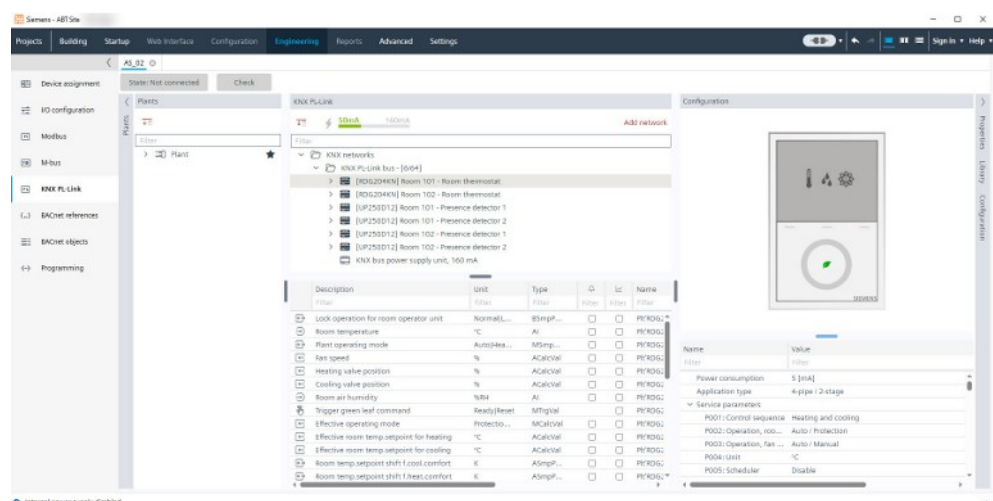
Step 2: Programming

1. Device charts are automatically provided for room units QMX2/QMX3 and room thermostats RDG200KNX. Remove chart elements that are not needed.

2. To add more logic to your integration, add programming patterns. For details, refer to the ABT Site online help.

3. For RDG200KN, add primary functions like change-over group commands, central seasonal compensation (CenSsnCmp24), or central operating mode (CenOpMod24). Each device delivers on BACnet control signal outputs to collect the energy demands.

Step 3a: Offline device assignment

1. If a device type is unique in the network, no assignment is required.

2. The KNX serial number is provided on a sticker with each device. Enter this number manually or with a barcode scanner directly into the network view in ABT Site.

Step 3b: Online device assignment

1. After connecting ABT Site with your automation station, switch every device separately into pairing mode and press the programming button on the KNX PL-Link device to send the KNX serial number to the automation station.

2. Alternatively, use ABT Go to assign the devices by pressing the programming button.
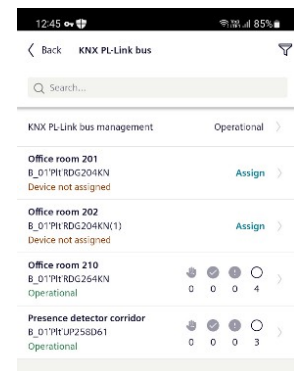
Step 4: Device commissioning

1. After the automation stations have been loaded and the KNX serial numbers are defined, the devices are commissioned automatically. There is no additional tool required.

2. In case you are using RDG200KN room thermostats, all DIP switches must be set to "Off". The configuration of pre-configured RDGs (e.g. by PCT Go) will be overwritten.

3. If you have a 6-port Pressure Independent Control Valves (PICV) application in use, you need to define the maximum control signal output. Use the calculator in the PCT Go app to calculate the maximum control signal output.

   Comment about a temporary restriction for RDG260KN using FW Version 5.6.0 (will be corrected in the next FW version): Parameters P260 and P261 to define maximal position for PICV, can only be set by PCT Go mobile application even when they are visible in ABT Site. After re-configuring the RDG device by ABT Site, these parameters must be set again by PCT Go. We are really sorry about this inconvenience. The RDG264KN is not affected by this restriction.

Replacing KNX PL-Link devices

- One-by-one device replacements are performed automatically, including configuration. This is the case when only one device is missing on the bus and a new device with the same device type is connected to the network.

- If more than one device must be replaced on the same network, the devices have to be assigned by ABT Site or PCT Go.

7.2 RDG200KN thermostat range on KNX PL-Link

Applications and devices

Inputs

1)

Fan coil applications
- 2-pipe fan coil, electric reheater, radiator, 1- or 2-stage
- 4-pipe fan coil, electric reheater, 1- or 2-stage

Universal applications
- Chilled/heated ceiling 1- or 2-stage
- Chilled/heated ceiling & radiator
- Chilled/heated ceiling with 6-port control ball valve or 6-port PICV
- Chilled ceiling, radiator, cooling by air

Heat pump applications
- Heating or cooling, 1- or 2-stage
- Heating or cooling & electrical heater
- Heating and cooling

Control outputs
PWM
3-position   RDG20...KN
On/Off
DC 0...10 V   RDG26...KN

Fan outputs
1-, 3-speed fan
DC 0...10 V fan

1) RDG204KN / RDG264KN only

To find more information about RDG2xx room thermostat applications, refer to the Basic Documentation about room thermostats: A6V11545892

The following minimal firmware versions are required on RDG2xx room thermostat devices that they can be integrated into PXC4/5/7 automation stations via KNX PL-Link:

RDG200KN / RDG260KN	V5.6 / Index D and higher
RDG204KN / RDG264KN	V7.4 / Index B and higher

Typical configuration and integration use cases

Commercial Building:
- Coordination / synchronization of user modes between RDG2xx room thermostat devices
- Integration of room temperature, humidity, air quality, window status, presence, dew point sensor, supply air temperature sensor information
- Scheduler on PXC4/5/7 automation stations sending resulting HVAC Mode to RDG2xx room thermostat devices
- Distribution of HVAC Controller Mode, Changeover Mode, Outside Temperature and Clock Synchronization by PXC4/5/7 automation stations
- Automatic room temperature setpoint H/C shift by system controller for summer / winter compensation
- Green leaf functionality (reset to optimized setpoints by PXC4/5/7 automation stations)
- Integration of energy demands based on control outputs into PXC4/5/7 automation stations

Managed Residential Building:

- Keep functionalities local on RDG2xx room thermostat devices (limited access by PXC4/5/7 automation stations due to privacy reasons):
  - Scheduler for room-/apartment usage
  - HVAC Mode and room setpoints
- Distribution of Changeover Mode, Outside Temperature, and Clock Synchronization by PXC4/5/7 automation stations
- Automatic room temperature setpoint H/C shift by system controller for summer / winter compensation
- Integration of dew point sensor and supply air temperature sensor information
- Integration of energy demands based on control outputs into PXC4/5/7 automation stations

Configuration examples for BACnet object generation

By adding RDG2xxKN devices to your control unit, BACnet objects are generated automatically. To get an impression how many of these BACnet objects need to be considered in the overall system limitation calculation, the following list shows four typical configurations. Keep in mind that KNX PL-Link data points do not count as integration points. For further details, refer to the system limitations in this document "PXC4, PXC5, and PXC7 automation stations [➜ 3]".

Device type	Application configuration	BACnet objects	Data points[1]
RDG200KN	● Chilled ceiling and radiator ● Window contact	26	3
	● 2-pipe fan-coil with changeover (auto)	28	2
	● 4-pipe fan-coil heating and cooling ● Window contact	29	3
RDG204KN	● Chilled ceiling and radiator ● Indoor air quality control and cooling by air (damper 0..10V)	28	3
RDG260KN	● 4-pipe fan-coil heating and cooling with 6-port ball valve PICV	28	3
RDG264KN	● 2-pipe fan-coil with radiator/floor heating ● Air quality sensor ● Window contact	32	4
	● 4-pipe fan-coil / 2-stage ● Indoor air quality control (damper 0..10V) ● Presence detector ● Window contact	35	5

[1] Data points to be considered for Desigo CC license.

7.3 Installation and technical details for KNX

- **The KNX PL-Link bus must be inside the building.**
- The KNX PL-Link bus allows communication from PXC4, PXC5, and PXC7 automation stations to a maximum of 64 devices on the KNX bus.
- The number of devices is limited by the number of BACnet objects on the automation station, see System functions and configurations [➜ 21] and the available bus power. Bus power is incremented during engineering with the ABT Site tool.
- The KNX PL-Link bus basic version comprises one cable and two stranded bus wires.
- The PXC4, PXC5, and PXC7 automation station has one internal bus power supply of 50 mA.
- The KNX PL-Link is physically based on the KNX bus (Konnex) .
- In KNX PL-Link networks area/line couplers and IP routers are not allowed.
- Interconnection of automation stations via KNX PL-Link is not admissible. The connection is done exclusively via Ethernet switches or MS/TP.
- The polarity of the KNX PL-Link bus conductors must be correct (KNX terminals + and –).
- The PXC4, PXC5, and PXC7 automation stations do not support third party devices integrated via S-Mode (ETS engineering).

Bus power supply

A bus power supply is required for KNX bus communications. Throttled voltage DC 29 V is used.

Internal KNX PL-Link power supply

The automation stations have an internal bus power supply. It is switched on by default.

PXC4, PXC5, PXC7: 50 mA to supply approximately 5 KNX PL-Link devices

Important note: If an external supply is used, the internal supply must be switched off via ABT Site tool.

External bus power supply

If the power supply of 50 mA is insufficient to cover the power demand of the connected devices, the internal bus power supply must be switched off via ABT Site tool and replaced by an external bus power supply unit (PSU).

Power supply units for **80,160, 320, and 640 mA** are available in specialty stores. The total power supply for the devices must be calculated to determine the appropriate power supply size. Comply with the corresponding details in the datasheet.

A 640 mA power supply unit is sufficient to supply 64 devices on the KNX bus with an average power demand of 10 mA each.

Parallel operation:

- Parallel operation of external bus supplies with the internal bus supply of an automation station is NOT allowed.
- In theory, parallel operation of external bus supplies is possible. However, check if the specific PSU is allowed to be operated in parallel with other PSUs.
- Depending on the type, a minimum cable distance is required between two PSUs.

Siemens power supply units:

We recommend the following Siemens power supply units for KNX networks:

Description	Power	Details
5WG1 125-4AB23, short designation RL125/23	**80 mA**	With integrated throttle. Parallel operation with other PSUs is allowed.
5WG1 125-4CB23, short designation JB 125C23	**80 mA**	With integrated throttle. Parallel operation with other PSUs is allowed.
5WG1 125-1AB02, short designation N125/0**2**	**160 mA**	With integrated throttle. Parallel operation with other PSUs is allowed.
5WG1 125-1AB12, short designation N125/**12**	**320 mA**	With integrated throttle. Parallel operation with other PSUs is allowed.
5WG1 125-1AB22, short designation N125/**22**	**640 mA**	With integrated throttle. Parallel operation with other PSUs is allowed.

Data:

● Operating voltage AC 120…230 V, 50…60 Hz.
● Bus supply output DC 29 V (21…30 V, throttled)

Bus topologies

64 devices on one line:

Up to 64 devices with KNX PL-Link can be installed on one line (main line as well). No restrictions apply to the type mix.

● There is no need to calculate the bus load number E for up to 64 devices.
● The maximum of 64 devices is also valid when devices requiring less power are used.
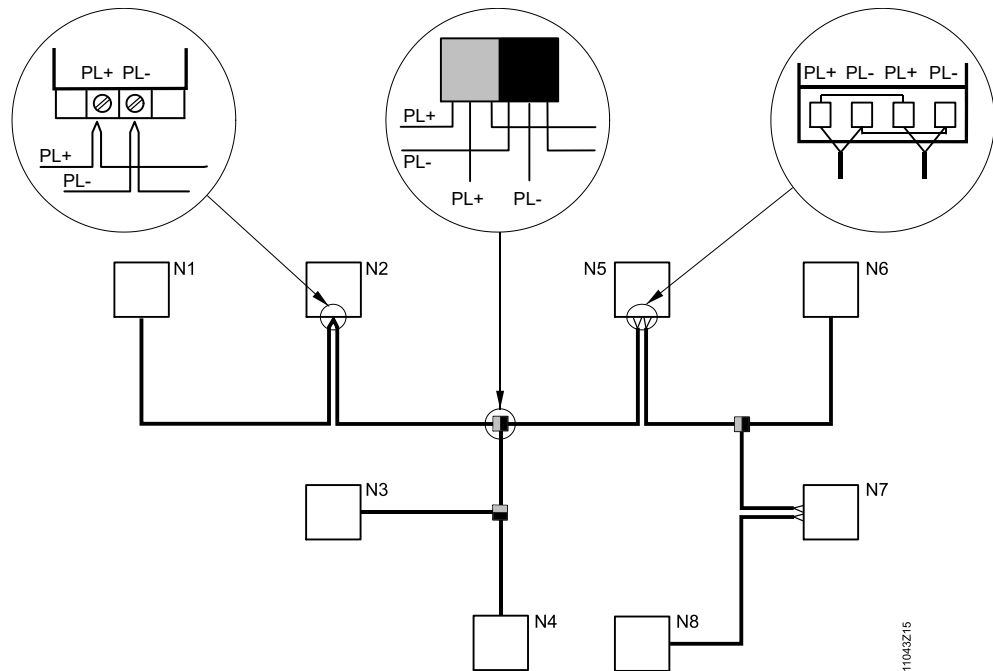
Permitted bus topologies:

Permitted bus topologies are: Tree, line, and star topologies. These topologies can be mixed as needed. However, ring topologies are not allowed.

Tree topology:

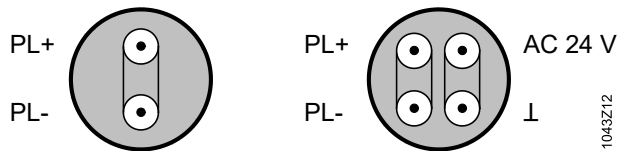The tree topology is preferred if a large network must be created.

Branching and connection variants:

N1 .. N8 Devices:

1   Device with screw terminals

2   T branch with bus terminals

3   Device with spring cage terminals

Cables

Bus lines:

The bus lines (= twisted pair) are connected via PL+ (red) and PL– (black).

Bus cable selection:

Choose the bus cable as per country-specific offerings. Comply with the indicated values in section "Technical data KNX PL-Link".

AC 24 V for field supply can be provided in the same (2 x 2 stands) or in a separate cable.

Recommended bus cables are available on the KNX homepage:

https://www.knx.org/knx-en/for-professionals/certified-products/?productfamily=Cable

Recommended cable types:

- 1 x 2 x 0.8 mm (e.g. Belden YE00819 or YE00905 - non-halogen).
- 2 x 2 x 0.8 mm (e.g. Belden YE00820 or YE00906 - non-halogen).

Bus cable screening:

Bus cables **without screen** are permitted. The screens available for bus cables do not need to be connected.

If interference is expected on the KNX bus, use a cable with screen. Connect the screen as per standard installation rules.

Bus cables specified by KNX:

The indications for distances and line lengths in a network are designed for bus cables specified by KNX.

Admissible cable lengths:

Comply with the following distances:

Network with internal power supply from the primary stations

	PXC4, PXC5, PXC7
Distance between device and internal supply	Max. 80 m (260 ft)
Distance between devices	Max. 80 m (260 ft)
Total length of all lines on one line	Max. 80 m (260 ft)

Network with external power supply (PSU)

Distance PSU to PXC with switched off internal supply	Min. 0 m
Distance device to next PSU	Max. 350 m (1150 ft)
Distance between two PSU operated in parallel Min. 0 m for the Siemens power supply modules recommended in section "Bus power supply"	Min. 200 m (650 ft)
Distance between devices	Max. 700 m (2300 ft)
Total length of all lines on one line	Max.1000 m (3280 ft)

Polarity:

Important: The bus conductors must NOT be inverted (KNX terminals + and –).

● At least one supply (internal or external) is required for each line and max. two supplies (external) are allowed per line.

● Install the power supply unit as close to the network center as possible to achieve maximum line size.

● The distance between the device and the next neighboring PSU may not exceed 350 m (1100 ft).
  Even if the power demand from the devices does not require it, two power units must be used depending on the line length.

Commissioning

Wiring KNX bus polarity:

Check the bus wiring prior to commissioning and make sure that the bus line polarity is not interchanged (KNX terminals + and –).

Operating voltage:

Check the operating voltage wiring to make sure that the devices are connected to AC 24 V or AC 230 V (as per technical device information). Apply operating voltage only after this check.

Bus power supply:

After switching on operating voltage, check whether bus power from the automation station or the PSU is available.

Technical data KNX PL-Link

KNX bus:

Transmission medium (bus cable)	TP (twisted pair)
Baud rate	9.6 kbps (fixed for TP)
Bus line polarity	PL+, PL– (not interchangeable)
Bus terminating resistor	Not required

Communication signal:

The communication signal is transferred symmetrically, i.e., as a voltage difference between the two bus lines (and not as a voltage difference to the earthing potential). The sign preceding the voltage between PL+ and PL– determines signal values 0 and 1.

KNX bus cable:

|	
Cable type	2-wire, stranded (one wire pair) or 2x2-wire, stranded or spiral quad
Wire diameter	Min. 0.8 mm (AWG20) Max. 1.0 mm (AWG18)
Line resistance	20 … 75 Ω/km
Specific capacity	10 …100 nF/km at 10 kHz
Specific inductivity	450 …850 µH/km at 10 kHz
Screens	Not required

PXC4, PXC5, and PXC7 devices do not have a connection for bus cable screens.

8 M-Bus integration for metering systems

8.1 Options to connect M-bus devices

The Desigo building automation and control system offers multiple options to integrate M-bus devices. M-bus devices and their data points are mapped to BACnet objects. In this way, M-bus meter data points can be made available to other controls and BACnet clients. The system offers different ways to integrate M-bus devices for online and offline engineering.
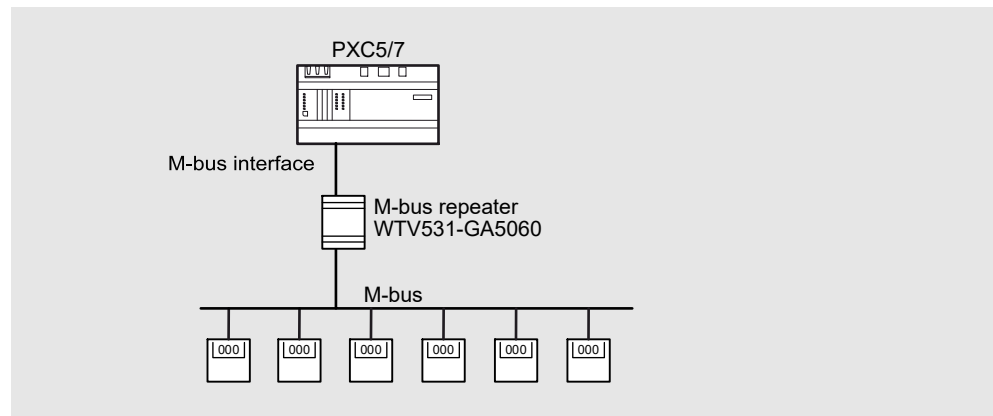
Onboard M-bus interface
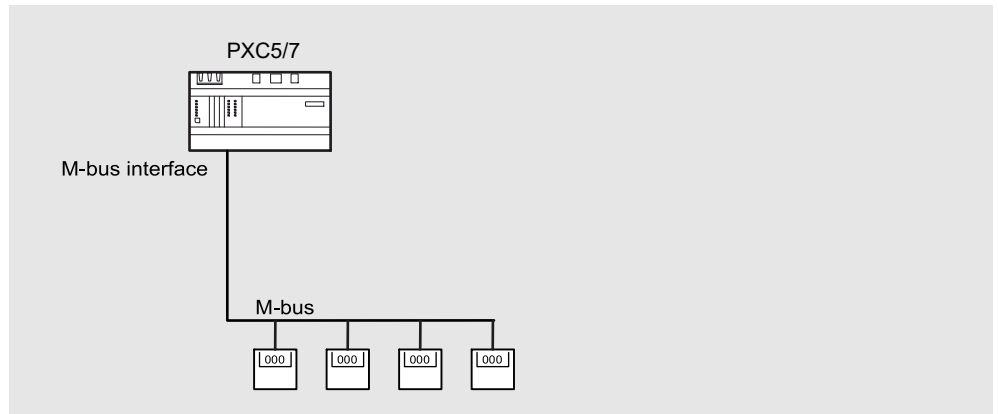
Connect up to 4 M-bus devices to your automation station directly. The onboard interface is compliant to EN 13757-2. Baud rates of up to 9600 bit/s are supported.

The following system controller and automation stations can be used as M-bus manager to integrate M-bus devices directly:

- PXC5.E003
- PXC5.E24
- PXC7.E400

Onboard M-bus interface in combination with M-bus repeater

Connect up to 60 M-bus devices to your automation station via an M-bus repeater. The onboard interface is compliant to EN 13757-2. Baud rates of up to 9600 bit/s are supported.

The following system controller and automation stations can be used as M-bus manager to integrate M-bus meters connected via an M-bus repeater:

- PXC5.E003
- PXC5.E24
- PXC7.E400

M-bus repeater used in the configuration example: Siemens, WTV531-GA5060 (A6V10923897)
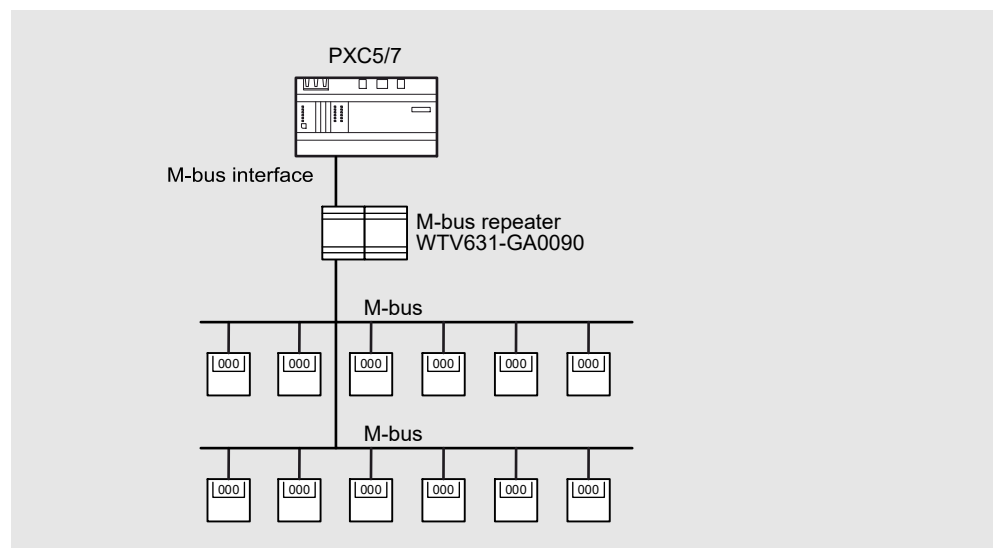

Connect up to 250 M-bus devices to your automation station via an M-bus repeater. The onboard interface is compliant to EN 13757-2. Baud rates of up to 9600 bit/s are supported.

The following system controller and automation stations can be used as M-bus manager to integrate M-bus meters connected via an M-bus repeater:

- PXC5.E003
- PXC5.E24
- PXC7.E400

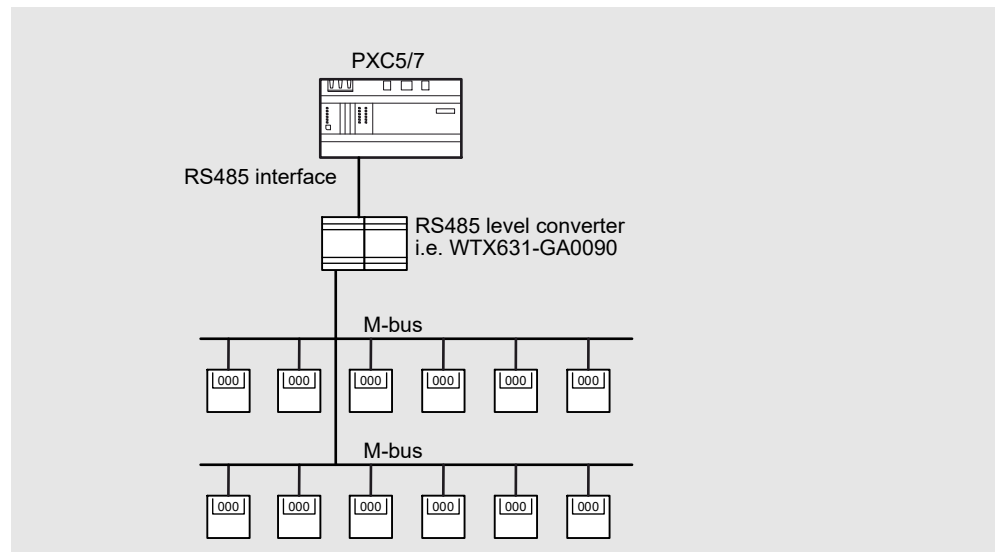M-bus repeater used in the configuration example: Siemens, WTX631-GA0090 (A6V11877785)

M-bus devices integration via RS485 level converter

Connect up to 250 M-bus devices to your automation station via an RS485 level converter. The highest available baud rate depends on the limitations of the level converter and the connected M-bus devices. The RS485 interface for M-bus supports baud rates of up to 38400 bit/s.

The following system controller and automation stations can be used as M-bus manager to integrate M-bus meters connected via an M-bus repeater:

- PXC4.E16
- PXC4.E16-2
- PXC4.M16
- PXC4.M16-2
- PXC5.E003
- PXC5.E24
- PXC7.E400

Configuration examples for different RS485 level converters:

STV Electronic, MPW-2	2 M-bus devices
STV Electronic, MPW-6	6 M-bus devices
Relay GmbH, PW60	60 M-bus devices
Siemens, WTX631-GA0090	250 M-bus devices

To be considered for all M-bus configurations listed above:

The ABT Site engineering tool checks the number of data points and not the number of M-bus devices (for details, refer to the system limitations in this document "PXC4, PXC5, and PXC7 automation stations [➜ 3]"). The maximal number of devices per network depends on the individual load of each device and the given power supply by the M-bus manager or level converter. The maximum number of M-bus devices is usually defined as "simple M-bus loads à 1.5 mA".

For further information about M-bus (Meter-Bus), see https://m-bus.com/.

8.2 Project engineering overview in ABT Site

For engineering and commissioning of M-bus networks, only ABT Site is required. The way of engineering in ABT Site is fully consistent to other system integrations (KNX PL-Link, Modbus, etc.). For more information about project engineering with M-bus refer to the ABT Site online help.
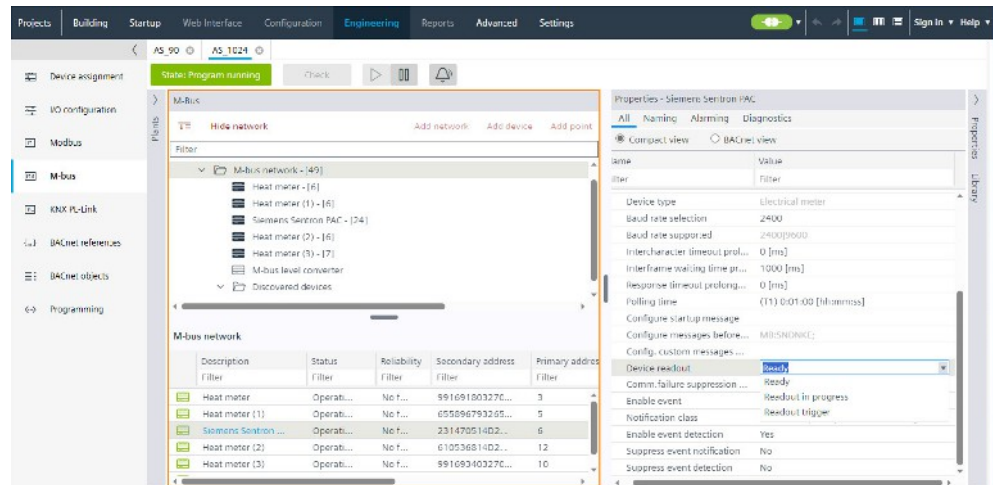
Step 1: Creation of an M-bus network

Depending on the type of automation station, the following physical ports can be used to create one or more M-bus networks (for details, refer to the system limitations in this document "PXC4, PXC5, and PXC7 automation stations [➔ 3]"):

● Onboard hardware interface for M-bus according to EN 13757-2
● RS485 (level converter required)

If applicable, M-bus networks can be combined in parallel with other RS485 based subsystem integrations like Modbus RTU or BACnet MS/TP on the same automation station.

Step 2: Creation of a M-bus devices

M-bus devices can be created in multiple ways:

● **Creation with library or device template**
Create M-bus devices including their data points from the library. Different meter types can be used and further configured, like heat meter, cold meter, electrical meter, gas meter, water meter, etc.

The following standard meter types from Siemens are covered by these templates:

– AEW310
– PAC1600
– PAC2200
– PAC3120
– UH50
– WFM
– WFZ31
– WSM
– WSN

M-bus devices can be created as well by using device templates (i.e. IOOPT-Files from the former TX-Open tool).

- **Online creation**
  ABT Site offers an easy way to read out the whole M-bus network and all devices by connecting physically to the network. The data points from each individual device can be read out. After selecting the required data points, the BACnet objects are generated automatically.

- **Manual creation**
  Create M-bus devices manually using the primary or secondary address. All required data points can be added manually. The following parameters can be applied: Measured value, unit, data type, DIF/DIFE, VIF/VIFE.

Step 3: Assignment of M-bus devices

The M-bus devices can be assigned online or offline:

- **Online assignment**
  Online with ABT Site, devices can be discovered on the network automatically. Device assignment is done from the orphan list using "drag and drop" . Primary and secondary addresses are handled automatically.

- **Offline assignment**
  If you know at least one address (primary or secondary), the devices can be assigned offline.

8.3 Reporting, diagnostic, and maintenance

ABT Site offers multiple options for reporting, diagnostic, and maintenance.

The following reports are available for M-bus:

- Commissioning report
- Data point configuration report
- CAD export
- Subsystem report

For troubleshooting, use the online tracing in ABT Site. Recorded tracing values are exported as Wireshark file (.pcapng). Use the network protocol analyzer Wireshark for in-depth analysis (expert task).
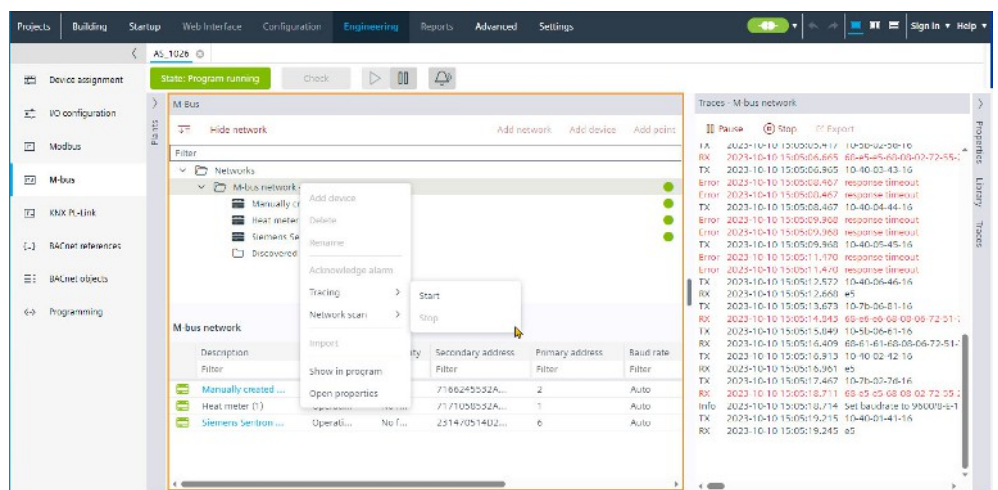
9 KNX S-Mode integration by BACnet referencing (configuration example)

This is a configuration example using the IP Gateway KNX/BACnet N143/01 from the Siemens GAMMA portfolio to integrate KNX S-Mode networks into Desigo systems.
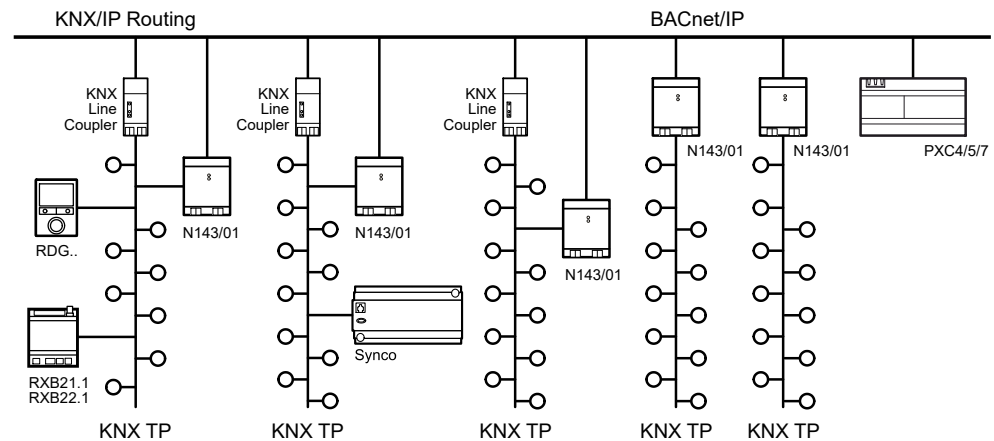
The KNX/BACnet Gateway N 143/01 on IP offers an easy way to integrate KNX S-Mode devices via simple group addressing into Desigo PXC4/5/7 automation stations. As BACnet-application specific controller (B-ASC), the gateway acts between KNX TP and BACnet IP for up to 250 BACnet objects and up to 455 BACnet COV subscriptions. If a communication across the KNX segments is required, KNX Line coupling units have to be used (see graphic above).

Project engineering

Mapping of KNX communication objects to BACnet
The following BACnet object types are supported by this gateway:
● Binary Input
● Binary Output
● Binary Value
● Analog Input
● Analog Output
● Analog Value

In ETS, the following object types can be configured and mapped to BACnet (for more details, see A6V10466141)
● 1 bit
● 1 Byte unsigned, signed
● 2 Byte unsigned, signed, or float
● 4 Byte unsigned, signed value, or float

Engineering with ETS and ABT Site

1. Add the IP Gateway KNX-BACnet N 143/01 as device to your ETS project.

2. Define a proper device name and a device description in "Optional settings".

3. Define objects on the gateway with a proper naming (do not use generic names). Important: Independently of having an input or output signal, set "Transmission direction" always as bidirectional KNX <--> BACnet (value).

4. Generate the EDE file via the web interface of the IP Gateway.

5. In ABT Site, import "BACnet references" using the EDE file.
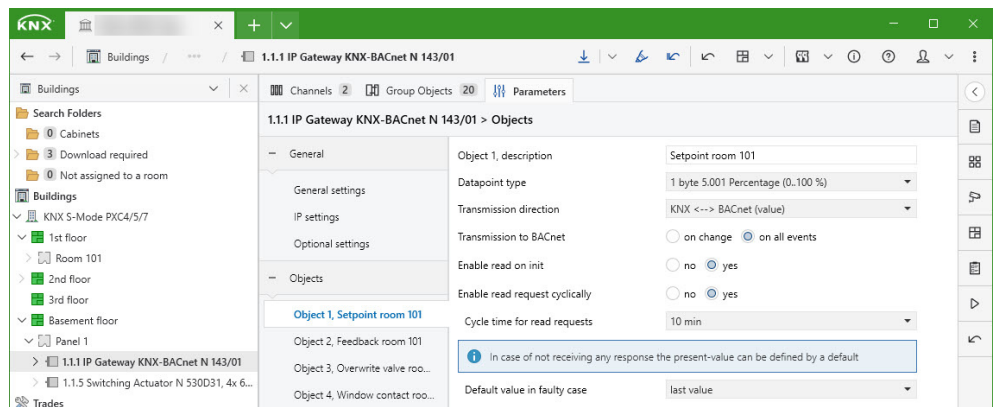
10 Type summary and documentation

Type summary

Type	Type (ASN No.)	Description	Document
PXC automation station (on BACnet/IP)	PXC4.E16-2 PXC4.E16S-2	Automation station, 16 inputs / outputs onboard	A6V14651312 [1]
	PXC5.E003	System controller	A6V11646020
	PXC5.E24	Automation station, 24 inputs / outputs onboard	A6V13187283
	PXC7.E400S PXC7.E400M PXC7.E400L	Automation station, modular	A6V12505052
PXC automation station (on BACnet MS/TP)	PXC4.M16-2 PXC4.M16S-2	Automation station, 16 inputs / outputs onboard	A6V14651900 [2]
TXM modules	TXM1.8D	Digital input module, 8 I/O data points	CM2N8172
	TXM1.16D	Digital input module, 16 I/O data points	CM2N8172
	TXM1.8U	Universal module	CM2N8173
	TXM1.8U-ML	Universal module with local override facility and LCD	CM2N8173
	TXM1.8X	Super universal module	CM2N8174
	TXM1.8X-ML	Super universal module with local override facility and LCD	CM2N8174
	TXM1.8P	Resistance measuring module	CM2N8176
	TXM1.6R	Relay module	CM2N8175
	TXM1.6R-M	Relay module with local override facility	CM2N8175
	TXM1.8T	Triac module	CM2N8179
	TXM1.4D3R	Digital input (4) and relay module (3)	CM2N8188
TXM power supply	TXS1.12F10 TXS1.12F4	Power supply module 1.2 A Power supply module 1.2 A	CM2N8183 149-476T
TXM bus connect.	TXS1.EF10 TXS1.EF4	Bus connection module Bus connection module	CM2N8183 149-476T
TXM remote input/ output island	TXA1.IBE	Island bus expansion module (compatibility, see CM110562)	CM2N8184
TXM address keys	TXA1.K12	Address keys 1 ... 12 + reset key	CM110562
	TXA1.K24	Address keys 1 ... 24 + 2 reset keys	
	TXA1.K-48	Address keys 25 ... 48 + 2 reset keys	
	TXA1.K-72	Address keys 49 ... 72 + 2 reset keys	
	TXA1.K-96	Address keys 73 ... 96 + 2 reset keys	
	TXA1.K-120	Address keys 97 ... 120 + 2 reset keys	
	TXA1.5K120	Address keys 5, 10, 15 ... 120 + 2 reset keys	
TXM address labels	TXA1.LA4 TXA1.LLT	Address label sheets A4 (100 pcs. per box) Address label sheets Letter (100 pcs. per box)	CM110562
	TXA1.LH	Spare transparent label holders (10 pcs. per box) (for modules manufactured before fall 2010)	CM110562
	TXA1.LH2	Spare transparent label holders (10 pcs. per box) (for modules manufactured as of fall 2010)	CM110562

[1] For PXC4.E16 and PXC4.E16-S, refer to data sheet A6V11646018.

[2] For PXC4.M16 and PXC4.M16-S, refer to data sheet A6V11937668.

Type	Type (ASN No.)	Description	Document
KNX PL-Link devices	QMX3.P30	Wall-mounted temperature sensor	CM2N1602
	QMX3.P40	Wall-mounted temperature and humidity sensor	
	QMX3.P70	Wall-mounted temperature, humidity, and CO_2 sensor	
	QMX3.P34	Wall-mounted temperature sensor and room operator unit	
	QMX3.P44	Wall-mounted temperature and humidity sensor and room operator unit	
	QMX3.P74	Wall-mounted temperature, humidity, and CO_2 sensor and room operator unit	
	QMX2.P33	Wall-mounted temperature sensor and room operator unit	A6V10733768
	QMX2.P43	Wall-mounted temperature and humidity sensor and room operator unit	
	AQR2570NF	Flush-mounted room sensor Base module for temperature and / or humidity measurement	CE1N1411
	AQR2576NF AQR2576NH AQR2576NG AQR2576NJ	Flush-mounted room sensor Base module for CO2 measurement	
	AQR2530NNW	Flush-mounted room sensor Front module for base module without sensor	
	AQR2532NNW	Flush-mounted room sensor Front module for base module with temperature sensor	
	AQR2535NNW	Flush-mounted room sensor Front module for base module with humidity and temperature sensor	
	AQR2535NNWQ	Flush-mounted room sensor Front module for base module with humidity, temperature sensor and CO2 indicator LED	
	UP 258D12	Passive infrared presence detector	A6V10489489
	UP 258D31	Presence detector WIDE with temperature sensor	A6V11894530
	UP 258D41	Presence detector WIDE with temperature and humidity sensor	
	UP 258D51	Presence detector WIDE with temperature, humidity and CO2 sensor	
	UP 258D61	Presence detector WIDE with temperature sensor and ultrasound	
	RDG200KN RDG260KN	Room thermostat with temperature and humidity sensor	A6V11545853
	RDG204KN RDG264KN	Room thermostat with temperature, humidity, and CO2 sensor	
Touch panels (BACnet)	PXM30.E PXM40.E PXM50.E	BACnet touch panels with integrated data storage and web functionality: 7.0 ", 10.1 ", 15.6 "	A6V11664137
Web interface	PXG3.W100-2 PXG3.W200-2	BACnet/IP web interface with standard functionality with extended functionality	A6V12304192
Touch panels (Client)	PXM30-1 PXM40-1 PXM50-1	TCP/IP client touch panels with data storage in web server PXG3.Wx00-2: 7.0 ", 10.1 ", 15.6 "	A6V11664139
Accessories	PXA.V40	Wall-mount frame for installing the PXM40 in hollow walls	A6V11664137 A6V11664139
	PXA.V50	Wall-mount frame for installing the PXM50 in hollow walls	A6V11664137 A6V11664139
	PXA.S30	Mounting set for wall-mounting (surface mounting) of the PXM30 or mounting on panel doors	A6V11646070

Documentation: Range description, planning overview, engineering and commissioning

Description	Documentation
Desigo PXC4...PXC7 range description	A6V13054432
Desigo PXC4...PXC7 planning overview	A6V13054435
Engineering and commissioning Desigo PXC4... PXC7	
ABT Site online help	Part of ABT
Application libraries online help	Part of ABT
TXM Planning, operation, and installation	
TXM Planning and installation manual	CM110562
TXM Functions and operation	CM110561
Desigo Control Point	
Basic documentation (Desigo)	A6V11170804
Desigo Touch panel client commissioning	A6V11604303
User's guide	A6V11211557
Engineering manual (Desigo)	A6V11211560
Detailed technical documentation	
Application guide for BACnet networks in building automation and control	A6V11159798
Application guide for IP networks in building automation and control	A6V10630964
Ethernet, TCP/IP, MS/TP and BACnet technical principles	A6V10408751
IT security in Desigo systems	A6V10437207
IT security checklist for Desigo systems	A6V10863845
Desigo room automation DXR	
Desigo Room automation Product range description	A6V10866237
Desigo Room automation Engineering, mounting, and installation	CM111043
Onboard I/O functions for DXR2 room automation stations	CM110569

Issued by
Siemens Switzerland Ltd
Smart Infrastructure
Global Headquarters
Theilerstrasse 1a
CH-6300 Zug
+41 58 724 2424
www.siemens.com/buildingtechnologies