SIEMENS

Technical Specification Sheet
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PXC Compact Series for BACnet Networks

Figure 1. PXC Compact Series Controllers (PXC-24 and PXC-36 shown).

Description

The PXC Compact Series (Programmable Controller–Compact) for BACnet networks is a high-performance Direct Digital Control (DDC) supervisory equipment controller, which is an integral part of the APOGEE Automation System. The controllers are classified as either a BACnet Building Controller (B-BC) with support for BACnet/IP or BACnet MS/TP protocols.

The PXC Compact Series offers integrated I/O based on state-of-the-art TX-I/O™ Technology, which provides superior flexibility of point and signal types, and makes it an optimal solution for Air Handling Unit (AHU) control. The PXC Compact operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher-level processor.

The PXC Compact Series communicates with other field panels or workstations on a peer-to-peer Automation Level Network (ALN), or on the Field Level Network (FLN), and supports the following communication options:

- Native BACnet/IP communications over 10/100 MB Ethernet networks
- Native BACnet MS/TP on RS-485

The PXC Compact is available with 16, 24, or 36 point terminations. Selected models in the Compact Series provide the following options:

- Supervision for FLN devices.
- An extended temperature range for the control of rooftop devices.
- Support for Island Bus, which uses TX-I/O modules to expand the number of point terminations for high-speed loop control.

Features

- BACnet Testing Laboratories (BTL) certified Classified as BACnet Building Controllers (B-BC) using the BACnet/IP protocol and/or BACnet MS/TP.
- DIN rail mounted device with removable terminal blocks simplifies installation and servicing.
- Proven program sequences to match equipment control applications.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control, and monitoring functions.
- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes.
- Message control for terminals, printers, pagers, and workstations.
- Highly configurable I/O using Siemens state-of-the-art TX-I/O™ Technology.
- HMI RS-232 port, which provides laptop connectivity for local operation and engineering.
- Extended battery backup of Real Time Clock.
- Persistent database backup and restore within the controller.
- HOA (Hand/Off/Auto) module for swappable and configurable HOA capability (optional).
- Extended temperature range for rooftop installation (optional).
- Support for RS-485 P1 or MS/TP devices (optional).
- P1 Wireless FLN support (optional).
- Auto Save.
- PXM10T and PXM10S support: Optional LCD Local user interface with HOA (Hand-off-auto) capability and point commanding and monitoring features.
- MS/TP Point Pickup Module (PPM) support: Universal Inputs can be configured for analog or digital input. Input/Output type is configured by writing to BACnet object properties.
- BACnet Field Panel Web Server support: Web-based Graphical User Interface (GUI) compatible with BACnet® networks. Ideal for small or remote facilities to monitor and control the Building Automation System.
- The Simple Network Management Protocol (SNMP) Agent allows points in the field panel to communicate with an SNMP manager over Ethernet.

The Compact Series

In addition to building and system management functions, the Compact Series includes several styles of controllers that flexibly meet application needs.

PXC-16

The PXC-16 provides control of 16 points, including 8 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 5 Universal I/O (U), 2 Digital Input (DI), 3 Analog Output (AOV), and 3 Digital Output (DO).

PXC-24

The PXC-24 provides control of 24 points, including 16 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 9 Universal I/O (U), 4 Super Universal I/O (X), 3 Analog Output (AOV), 5 Digital Output (DO).

PXC-36

The PXC-36 provides control of 36 local points, including 24 software-configurable universal points.

Point count includes: 18 Universal I/O (U), 6 Super Universal I/O (X), 4 Digital Input (DI), and 8 Digital Output (DO).

The PXC-36 offers the flexibility of expanding the total point count through a self-forming Island Bus. With the addition of a TX-I/O Power Supply, up to four TX-I/O modules can be supported. For more information, see the *TX-I/O Product Range Technical Specification Sheet* (149-476).

Hardware

The PXC Compact Series consists of the following major components:

- Input/Output Points
- Power Supply
- Controller Processor

Input/Output Points

- The PXC Compact input/output points perform A/D or D/A conversion, signal processing, point command output, and communication with the controller processor. The terminal blocks are removable for easy termination of field wiring.
- The Universal and Super Universal points leverage TX-I/O™ Technology from Siemens Building Technologies to configure an extensive variety of point types.
- Universal Input (UI) and Universal Input/Output (U) points are software-selectable to be:
  - 0-10V input
  - 4-20 mA input
  - Digital Input
  - Pulse Accumulator inputs
  - 1K Ni RTD @ 32°F (Siemens, Johnson Controls, DIN Standard)
  - 1K Pt RTD (375 or 385 alpha) @ 32°F
  - 10K NTC Thermistor (Type 2 and Type 3) @ 77°F
  - 100K NTC Thermistor (Type 2) @ 77°F
  - 0-10V Analog Output (Universal Input/Output (U) points only)
- Super Universal (X) points (PXC-24 and PXC-36 only) are software-selectable to be:
  - 0-10V input
  - 4-20 mA input
  - Digital Input
  - Pulse Accumulator inputs
  - 1K Ni RTD @ 32°F (Siemens, Johnson Controls, DIN Standard)
  - 1K Pt RTD (375 or 385 alpha) @ 32°F
  - 10K NTC Thermistor (Type 2 and Type 3) @ 77°F
  - 100K NTC Thermistor (Type 2) @ 77°F
  - 0-10V Analog Output
  - 4-20 mA Analog Output
  - Digital Output (using external relay)
- Dedicated Digital Input (DI) points (PXC-16 only) are dry contact status sensing.
- Digital Output (DO) points are 110/220V 4 Amp (resistive) Form C relays; LEDs indicate the status of each point.
- All PXC Compact Series models support 0-10 Vdc Analog Output circuits.
- On PXC-24 and PXC-36 models, the Super Universal points may be defined as either 0-10 Vdc or 4-20 mA Analog Output circuits.

Power Supply

- The 24 volt DC power supply provides regulated power to the input/output points and active sensors. The power supply is internal to the PXC Compact housing, eliminating the need for external power supply and simplifying installation and troubleshooting.
- The power supply works with the processor to ensure smooth power up and power down sequences for the equipment controlled by the I/O points, even through brownout conditions.

Controller Processor

- The PXC Compact Series includes a microprocessor-based multi-tasking platform for program execution and communications with the I/O points and with other PXC Compacts and field panels over the ALN.
- A Human Machine Interface (HMI) port, with a quick-connect phone jack (RJ-45), uses RS-232 protocol to support operator devices (such as a local user interface or simple CRT terminal), and a phone modem for dial-in service capability.
- A USB Device port supports a generic serial interface for an HMI or Tool connection, or used for memory expansion in select models. The USB Device port does not support firmware flash upgrades.
- The program and database information stored in the PXC Compact RAM memory is battery-backed. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure.
- The firmware, which includes the operating system, is stored in non-volatile flash ROM memory; this enables firmware upgrades in the field.
- Brownout protection and power recovery circuitry protect the controller board from power fluctuations.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.

Available Options

The following options are available to match the application:

FLN Support

- The PXC-16 and PXC-24 “F32” models provide support for up to 32 RS-485 P1 or MS/TP devices.
- The PXC-16 and PXC-24 “F” models with the addition of a FLN license support up to 32 RS-485 P1 or MS/TP devices.
- The PXC-36 with an FLN license supports up to 96 RS-485 P1 or MS/TP devices.
- A Wireless FLN may also be used to replace the traditional P1 FLN cabling with wireless communication links that form a wireless mesh network. Additional hardware is required to implement the Wireless FLN.

For more information about FLN support, contact your local Siemens Industry representative.

Extended Temperature Operation

PXC-24 "R" models support extended temperature operation, allowing for rooftop installations.

Web Server and Web Services

The PXC Compact Series supports Web Server and Web Services functionality. The Web Server license provides an HTML Web-based user interface for your APOGEE Building Automation System. It is an ideal

solution for small or remote facilities with field panels on a BACnet/IP Automation Level Network (ALN).

The Web Server/Web Services is a licensable option on the PXC Compact.

The Web Services must be used in conjunction with Web Server located on a PXC-36 or PXC Modular, and provides Web access to database information in PXC-24 and PXC-16 BACnet/IP controllers.

This solution provides the user the following features: Web-based graphics and user interface; command, monitor, alarm, trend, and generate reports on BACnet objects within the controller database including supervised FLN device information; schedule BACnet objects within the controller database including supervised FLN devices; and remote notification.

Programmable Control with Application Flexibility

The PXC Compact Series of high performance controllers provides complete flexibility, which allows the owner to customize each controller with the exact program for the application.

The control program for each PXC Compact is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a text-based programming structure like BASIC, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

Global Information Access

The HMI port supports operator devices, such as a local user interface or simple CRT terminal, and a phone modem for dial-in service capability. Devices connected to the operator terminal port gain global information access.

Multiple Operator Access

Multiple operators can access the network simultaneously. Multiple operator access ensures that alarms are reported to an alarm printer while an operator accesses information from a local terminal. When using the BACnet/IP ALN option, multiple operators may also access the controller through concurrent Telnet sessions and/or local operator terminal ports, plus optional Web interface using the Web or Web Services option.

Menu Prompted, English Language Operator Interface

The PXC Compact includes a simple, yet powerful, menu-driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Event scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

Built-in Direct Digital Control Routines

The PXC Compact provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and

comprehensive information about system operation. It receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available in the PXC Compact:

- Adaptive Control, an auto-adjusting closed loop control algorithm, which provides more efficient, adaptive, robust, fast, and stable control than the traditional PID control algorithm. It is superior in terms of response time and holding steady state, and at minimizing error, oscillations, and actuator repositioning.
- Closed Loop Proportional, Integral and Derivative (PID) control.
- Logical sequencing.
- Alarm detection and reporting.
- Reset schedules.

Built-in Energy Management Applications

The following applications are programmed in the PXC Compact Series and require simple parameter input for implementation:

- Automatic Daylight Saving Time switchover
- Calendar-based scheduling
- Duty cycling
- Economizer control
- Equipment scheduling, optimization and sequencing
- Event scheduling
- Holiday scheduling
- Night setback control
- Peak Demand Limiting (PDL)
- Temperature-compensated duty cycling
- Temporary schedule override

BACnet Compact Series Specifications

Dimensions (L × W × D)	
PXC-16 and PXC-24	10.7" × 5.9" × 2.45" (272 mm × 150 mm × 62 mm)
PXC-36	11.5" × 5.9" × 3.0" (293 mm × 150 mm × 77 mm)

Processor, Battery, and Memory	
Processor and Clock Speed	PXC-16 and PXC-24: Freescale MPC852T, 100 MHz PXC-36: Freescale MPC885, 133 MHz
Memory	PXC-16 and PXC-24: 24 MB (16 MB SDRAM, 8 MB Flash ROM) PXC-16 and PXC-24 “F” and “F32”: 40 MB (32 MB SDRAM, 8 MB Flash ROM) PXC-36: 80 MB (64 MB SDRAM,16 MB Flash ROM)
Battery backup of Synchronous Dynamic (SD) RAM (field replaceable)	PXC-16 and PXC-24 Non-rooftop Models: 60 days (accumulated) AA (LR6) 1.5 Volt Alkaline (non-rechargeable) PXC-36: 28 days (accumulated) AA (LR6) 1.5 Volt Alkaline (non-rechargeable) Rooftop (Extended Temperature) Models: 90 days (accumulated) AA (LR6) 3.6 Volt Lithium (non-rechargeable)
Battery backup of Real Time Clock	Non-rooftop Models: 10 years Coin cell (BR2032) 3 Volt lithium Rooftop (Extended Temperature) Models: 18 months Coin cell (BR2032) 3 Volt lithium

Communication	
A/D Resolution (analog in)	16 bits
D/A Resolution (analog out)	10 bits

BACnet/IP Automation Level Network (ALN)	10Base-T or 100Base-TX compliant
BACnet MS/TP Automation Level Network (ALN)	RS-485, 9600 bps to 115.2 Kbps
BACnet MS/TP Field Level Network (FLN) *on selected models, license required*	RS-485, 9600 bps to 76.8 Kbps
RS-485 P1 Field Level Network (FLN) *on selected models, license required*	4800 bps to 38.4 Kbps
Human-Machine Interface (HMI)	RS-232 compliant, 1200 bps to 115.2 Kbps
USB Device port (for non-smoke control applications only)	Standard 1.1 and 2.0 USB device port, Type B female connector.
USB Host port *on selected models* (for ancillary smoke control applications only).	Standard 1.1 and 2.0 USB host port, Type A female connector.

Electrical	
Power Requirements	24 Vac ±20% input @ 50/60 Hz
Power Consumption (Maximum)	PXC-16: 18 VA @ 24 Vac PXC-24: 20 VA @ 24 Vac PXC-36: 35 VA @ 24 Vac
AC Power and Digital Outputs	NEC Class 1 Power Limited
Communication and all other I/O	NEC Class 2
Digital Input	Contact Closure Sensing Dry Contact/Potential Free inputs only Does not support counter inputs
Digital Output	Class 1 Relay
Analog Output	0 to 10 Vdc
Universal Input (UI) and Universal	**Analog Input**

Electrical	
Input/Output (U)	Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or Type 3 Thermistor @ 77°F 100K NTC Type 2 Thermistor @ 77°F **Digital Input** Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz **Analog Output (Universal Input/Output (U) points only)** Voltage (0-10 Vdc)
Super Universal (X)	**Analog Input** Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or Type 3 Thermistor @ 77°F 100K NTC Type 2 Thermistor @ 77°F **Digital Input** Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz **Analog Output** Voltage (0-10 Vdc) Current (4-20 mA) **Digital Output (requires an external relay)** 0 to 24 Vdc, 22 mA max.

Operating Environment	
Ambient operating temperature	32°F to 122°F (0°C to 50°C)
Ambient operating temperature *with rooftop (extended temperature) option*	-40°F to 158°F (-40°C to 70°C)
Relative Humidity	PXC-*16 and* PXC-*24:* 5% to 95%, non-condensing PXC-*36:* 5% to 95%, non-condensing
Mounting Surface	PXC-*16 and* PXC-*24:* Direct equipment mount, building wall, or structural member PXC-*36:* Building wall or a secure structure

Agency Listings	
UL	UL864 UUKL Smoke Control Equipment (except rooftop models) UL864 UUKL7 Smoke Control Equipment (except rooftop models) CAN/ULC-S527-M8 (except rooftop models) UL916 PAZX (all models) UL916 PAZX7 (all models)
CSA	CSA 22.2 No. 205-M1983 SIGNAL EQUIPMENT
Agency Compliance	FCC Compliant CFR47 Part 15, Subpart B, Class B Australian EMC Framework European EMC Directive (CE) European Low Voltage Directive (LVD) RoHS Compliant
BTL	BACnet Testing Laboratories (BTL) Certified, Firmware Revision 3.0 and later
OSHPD Seismic Certification	Product meets OSHPD Special Seismic Preapproval certification (OSH-0217-10) under California Building Code 2010 (CBC2010) and International Building Code 2009 (IBC2009) when installed within the following Siemens enclosure part numbers: PXA-ENC18, PXA-ENC19, or PXA-ENC34.

Ordering Information

PXC Compact Series

Part Number	Description
PXC16.2-E.A	PXC Compact, 16 point, BACnet/IP ALN
PXC16.2-EF.A	PXC Compact, 16 point, BACnet/IP ALN, P1 or MS/TP FLN
PXC16.2-EF32.A	PXC Compact, 16 point, BACnet/IP ALN, P1 or MS/TP FLN Enabled
PXC24.2-E.A	PXC Compact, 24 point, BACnet/IP ALN
PXC24.2-ER.A	PXC Compact, 24 point, BACnet/IP ALN, rooftop
PXC24.2-EF.A	PXC Compact, 24 point, BACnet/IP ALN, P1 or MS/TP FLN
PXC24.2-EF32.A	PXC Compact, 24 point, BACnet/IP ALN, P1 or MS/TP FLN Enabled
PXC24.2-ERF.A	PXC Compact, 24 point, BACnet/IP ALN, rooftop, P1 or MS/TP FLN
PXC36-E.A	PXC Compact, 36 point, BACnet/IP or MS/TP ALN
PXC36-EF.A	PXC Compact, 36 point, BACnet/IP or MS/TP ALN, Island Bus, P1 or MS/TP FLN

Optional Licenses

Product Number	Description
LSM-FLN	License to enable FLN support on PXC-16 or PXC-24 "F" models
LSM-FLN36.A	License to enable FLN support on models PXC36-E.A and PXC36-PE.A
LSM-IB36.A	License to enable 4 TX-I/O modules on the Island Bus on models PXC36-E.A and PXC36-PE.A
LSM-36.A	License to enable 4 TX-I/O modules on the Island Bus and FLN support on models PXC36-E.A and PXC36-PE.A
LSM-FPWEB	License to enable BACnet Field Panel Web Server (PXC-36) or Web Services (PXC-16/24) (Option enables HTTP Change of Value needed for field panel hosted graphics.)
LSM-SNMP	License to enable SNMP Agent License to enable SNMP Agent

Accessories

Product Number	Description
PXM10S	Controller mounted Operator Display module with point monitor and optional blue backlight
PXM10T	Controller mounted Operator Display module
PXA8-M	8-switch HOA (UL864)
PXA16-M	16-switch HOA (UL864)
PXA16-MR	16-switch HOA (extended temp, UL 916) with HMI cable
PXA-HMI.CABLEP5	Serial cable required for HOA or PXM10T/S connection to non-rooftop variants of the 16-point and 24-point Compact Series (pack of 5)
TXA1.LLT-P100	Labels for HOA and TX-I/O Modules, pack of 100, letter format

Service Boxes and Enclosures

Product Number	Description
PXA-SB115V192VA	PX Series Service Box—115V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB115V384VA	PX Series Service Box—115V, 24 Vac, 50/60 Hz, 384 VA
PXA-SB230V192VA	PX Series Service Box—230V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB230V384VA	PX Series Service Box—230V, 24 Vac, 50/60 Hz, 384 VA
PXA-ENC18	18" Enclosure (Utility Cabinet) (UL Listed NEMA Type 1 Enclosure)
PXA-ENC19	19” Enclosure (UL Listed NEMA Type 1 Enclosure)
PXA-ENC34	34” Enclosure (UL Listed NEMA Type 1 Enclosure)

Documentation

Product Number	Description
553-104	PXC Compact Series Owner's Manual
125-1896	APOGEE Powers Process Control Language (PPCL) User's Manual

Disposal

The devices are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the devices through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

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