SIEMENS

PXC Compact Series

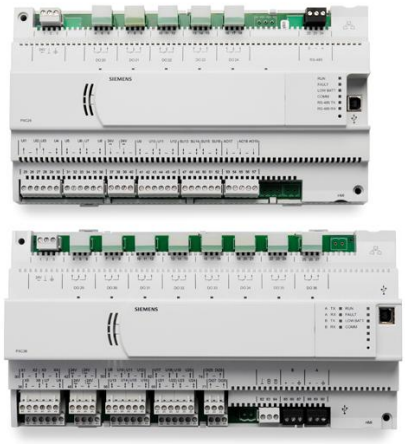

Figure 1. PXC Compact Series Controllers (PXC-24 and PXC-36 shown.)

Description

The PXC Compact Series (Programmable Controller–Compact) is a high-performance Direct Digital Control (DDC) supervisory equipment controller, which is an integral part of the APOGEE® Automation System.

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) and supports the following communication options:

- Ethernet TCP/IP
- P2 RS-485

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

- Support 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.

Features

- 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.
- Optional HOA (Hand/Off/Auto) module for swappable and configurable HOA capability.

- Optional extended temperature range for rooftop installation.
- Optional peer-to-peer communications over industry-standard 10Base-T/100Base-TX Ethernet networks.
- Optional support for FLN devices.
- Optional support for P1 Wireless FLN.
- Optional operation as a P1 FLN device with default applications.
- Optional support for Virtual AEM.
- PXM10T and PXM10S support: Optional LCD Local user interface with HOA (Hand-off-auto) capability and point commanding and monitoring features.

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 4 TX-I/O modules can be supported. For more information, see the *TX-I/O Product Range Technical Specification Sheet* (149-476).

Available Options

The following options are available to match the application:

Ethernet or RS-485 ALN

Support for APOGEE P2 ALN through TCP/IP or RS-485 networks.

FLN Support

- The PXC-24 “F32” models support up to 32 P1 FLN devices when the ALN is connected to TCP/IP.
- The PXC-24 “F” models with an FLN license support up to 32 P1 FLN devices when the ALN is connected to TCP/IP.
- The PXC-36 with an FLN license supports up to 96 P1 FLN devices when the ALN is connected to RS-485 or TCP/IP.
- 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.

P1 FLN Operation

The PXC-16 and PXC-24 can be configured as a programmable P1 FLN device. In the P1 FLN mode, the PXC Compact functions as an equipment controller with customized programming and default applications.

Virtual AEM Support

The Virtual AEM license allows the PXC Compact to connect an RS-485 APOGEE Automation Level Network or individual field panels to a P2 Ethernet network without additional hardware.

Extended Temperature Operation

The "R" models of the PXC Compact Series support extended temperature operation, allowing for rooftop installations.

Field Panel GO

The PXC-36 supports Field Panel GO.

The Field Panel GO license provides a Web-based user interface for your APOGEE® Building Automation System. It is an ideal solution for small or remote facilities with field panels on an Ethernet Automation Level Network (ALN).

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 Industry 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 and PXC-36 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 Voltage Analog Output circuits.
- On PXC-24 and PXC-36 models, the Super Universal circuits may be defined as 4-20 mA current AO.

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.
- 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.

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 Ethernet TCP/IP ALN option, multiple operators may also access the controller through concurrent Telnet sessions and/or local operator terminal ports.

Menu Prompted, English Language Operator Interface

The PXC Compact field panel 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. The controller receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available:

- 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)
- Start-Stop Time Optimization (SSTO)
- Temperature-compensated duty cycling
- Temporary schedule override

Specifications

Dimensions (L × W × D)

PXC-16 and PXC-24	10.7 in. × 5.9 in. × 2.45 in. (272 mm × 150 mm × 62 mm)
PXC-36	11.5 in. × 5.9 in. × 3.0 in. (293 mm × 150 mm × 77 mm)

Processor, Battery, and Memory

Processor and Clock Speed	*PXC-16 and PXC-24:* Motorola MPC852T, 100 MHz *PXC-36:* Motorola 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)	*Non-rooftop Models:* 60 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 *Rooftop (Extended Temperature) Models:* 18 months

Communication

A/D Resolution (analog in)	16 bits
D/A Resolution (analog out)	10 bits
Ethernet/IP Automation Level Network (ALN)	10Base-T or 100Base-TX compliant
RS-485 Automation Level Network (ALN)	1200 bps to 115.2 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 Input/Output (U)	**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 (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 (except rooftop models) UL864 UUKL7 (except rooftop models) CAN/ULC-S527-M8 (except rooftop models) UL916 PAZX (all models) UL916 PAZX7 (all models)
Agency Compliance	FCC Compliance Australian EMC Framework European EMC Directive (CE) European Low Voltage Directive (LVD) RoHS Compliant
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

Product Number	Description
PXC16.2-P.A	PXC Compact, 16 point, RS-485 ALN
PXC16.2-PE.A	PXC Compact, 16 point, Ethernet/IP ALN
PXC24.2-P.A	PXC Compact, 24 point, RS-485 ALN
PXC24.2-PE.A	PXC Compact, 24 point, Ethernet/IP ALN
PXC24.2-PR.A	PXC Compact, 24 point, RS-485 ALN, rooftop option
PXC24.2-PER.A	PXC Compact, 24 point, Ethernet/IP ALN, rooftop option
PXC24.2-PEF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN. P1 FLN or Remote Ethernet/IP (Virtual AEM) option.
PXC24.2-PEF32.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN. P1 FLN enabled
PXC24.2-PERF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN, rooftop option. P1 FLN or Remote Ethernet/IP (Virtual AEM) option.
PXC36-PE.A	PXC Compact, 36 point, Ethernet/IP or RS-485 ALN.
PXC36-PEF.A	PXC Compact, 36 point, Ethernet/IP or RS-485 ALN, Island Bus, P1 FLN.

Optional Licenses

Product Number	Description
LSM-FLN	License to enable FLN support on PXC-16 or PXC-24 “F” models
LSM-VAEM	License to enable Virtual AEM support when the ALN is connected to RS-485
LSM-FLN36.A	License to enable FLN support on model PXC36-PE.A
LSM-FPGO	License to enable Field Panel GO on models PXC36-PE.A and PXC36-PEF.A
LSM-IB36.A	License to enable the Island Bus on model PXC36-PE.A
LSM-36.A	License to enable both FLN and Island Bus support on model PXC36-PE.A

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	Powers Process Control Language (PPCL) User’s Manual

Siemens Industry, Inc.
Building Technologies Division
1000 Deerfield Parkway
Buffalo Grove, IL 60089-4513
USA
+ 1 847-215-1000