TECHNICAL DATA SHEET
DS0124 rev 31

Cylon® CBXi Series

DESCRIPTION

The **CBXi Series** is a freely programmable range of BACnet® Controllers with native BACnet/IP communications support. The controllers are BTL listed BACnet Building Controller (B-BC) and are ideally suited for a wide range of applications for intelligent control of HVAC equipment, and electrical systems including lighting control and metering applications. The **CBXi-8R8** and **CBXi-8R8-H** controllers support multi-protocol communications simultaneously including BACnet/IP, BACnet MS/TP, Modbus® TCP and Modbus RTU.

Part of Cylon's **CB Line** of BACnet field controllers, the **CBXi-8R8** controller features 8 UniPuts™ with Relay, 8 Universal Inputs, as well as support for up to five FLX (Field Level e*X*pansion) series extension modules providing up to 96 points of control, and a dedicated input for Cylon's **CBT-STAT** or **UCU Room Display** intelligent room sensors. The **-H** variant provides local override function through HOA switches. **FLX** I/O expansion modules are available in a variety of options to allow maximum flexibility in achieving the required point configuration.

APPLICATION

The **CBXi Series** is designed for a wide range of energy management applications for intelligent control of:

- HVAC equipment such as Central Plant, Boilers, Chillers, Cooling Towers, Pump Systems, Air Handling Units (Constant Volume, Variable Air Volume and Multi-zone), and Rooftop Units,
- Electrical systems such as lighting control, variable frequency drives and metering.

The **CBXi Series** can be used as an integration platform and natively supports the routing of either BACnet MS/TP to BACnet/IP or Modbus RTU to Modbus TCP without the need for gateways or additional hardware.

The controller accommodates available pre-engineered strategies or can be tailored to custom applications using **CXpro**^{HD} programming software.

CBXi-8R8

8 UniPuts + Relays

Hardware connections that can be used as inputs, outputs or relays (software selectable)

8 Universal Inputs

(supports a variety of thermistors and RTDs that range from 0 to 450 kΩ)

CBXi-8R8-H

Additionally includes Hand/Off/Auto Local Override Function

Flexible onboard UniPut technology

allows expandable I/O configurations from 16 to 64 points through connected FLX modules

BACnet/IP communications

with dual port Ethernet switch (star or daisy chain topology) and support for both DHCP and Static IP

Network Time Protocol (NTP) support

Multi-protocol communications support

for BACnet MS/TP, Modbus TCP, Modbus RTU, HTTP, HTTPS and SSH

Cylon Intelligent Room Sensor support

LED status on all I/O channels

provides indication of fault or override status

Compact form factor

to maximize enclosure space requirement

Uses FLX I/O expansion Modules

Interchangeable with the CBX Series BACnet MS/TP controllers

Accessories

Field Level eXpansion (FLX) I/O Modules (-H variants include Hand/Off/Auto Local Override Function)

FLX-4R4(-H) 4 UniPuts with Relay, 4 Universal Inputs
FLX-8R8(-H) 8 UniPuts with Relay, 8 Universal Inputs
FLX-16DI 16 Digital Inputs
FLX-PS24 Power Supply Module
FLX-RMC Remote Module Connector

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PRODUCT SELECTION CHART

		CBXi-8R8	CBXi-8R8-H	FLX-4R4	FLX-4R4-H	FLX-8R8	FLX-8R8-H	FLX-16DI
Service		Main Controller	Main Controller	Expansion Module	Expansion Module	Expansion Module	Expansion Module	Expansion Module
I/O Point Qty	UniPuts with Relay[1]	8	8	4	4	8	8	0
	Universal Inputs	8	8	4	4	8	8	0
	Digital Inputs	0	0	0	0	0	0	16
Input Options	Voltage 0 ... 10 V @ 40 kΩ	✓	✓	✓	✓	✓	✓	
	Resistance 0 ... 450 kΩ	✓	✓	✓	✓	✓	✓	
	Temperature -40 °C ... +110 °C (-40 °F ... +230 °F)	✓	✓	✓	✓	✓	✓	
	Current 0 ... 20 mA @ 390 Ω	✓	✓	✓	✓	✓	✓	
	Digital Volt-Free contact	✓	✓	✓	✓	✓	✓	✓
	Digital 24 V AC detect	UniPuts only	UniPuts only	UniPuts only	UniPuts only	UniPuts only	UniPuts only	
	Pulse counting	✓	✓	✓	✓	✓	✓	✓
Output Options	Analog 0 ... 10 V	✓	✓	✓	✓	✓	✓	
	Digital 0 ... 10 V	✓	✓	✓	✓	✓	✓	
	Relay Contacts 24 V AC	✓	✓	✓	✓	✓	✓	
HOA Switch & Pot.			✓		✓		✓	
18 V Aux Power		✓	✓	✓	✓	✓	✓	✓
BACnet MS/TP-to-IP Routing		✓	✓					
Modbus TCP[2]		✓	✓					
RS-485 Port[3]		BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU					
CBT-STAT Bus (UCU Room Display)		✓	✓					

Note (1) : UniPuts are software configurable for point types AI, DI, AO or DO-R.

Note (2) : CBXi supports a maximum of 120 Modbus points across a maximum of 12 devices.

Note (3) : RS-485 Port 1 supports one communication protocol at a time.
When configured for BACnet MS/TP-to-IP routing, up to a maximum of 24 connected BACnet MS/TP devices are recommended.
When configured for Modbus RTU, a maximum of 120 points across a maximum of 12 devices that can be a combination of Modbus RTU or TCP may be connected.

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SPECIFICATIONS

MECHANICAL

Size (excluding terminal plugs)	166 x 89.5 x 57 mm [6.5 x 3.55 x 2.25"]
Enclosure	Flame-Retardant ABS DIN 43880 type-2 compatible Enclosure IP 20
Mounting	DIN rail

CONNECTION

Note: Use Copper or Copper Clad Aluminum 70 °C (158 °F) conductors only.

Terminals	PCB mounted plug terminal connections
Conductor Area	Max: AWG 12 (3.31 mm^2) Min: AWG 22 (0.355 mm^2)

ENVIRONMENT

Note: This equipment is intended for field installation within an enclosure.

Ambient Temperature	-25 °C … 50 °C (-13 °F … 122 °F)
Ambient Humidity	0% … 90% RH non-condensing
Storage Temperature	-30 °C … +70 °C (-22 °F … 158 °F)
EMC Immunity	EN 61326-1: 2013
EMC Emission	EN 61326-1: 2013 EN 61000-3-2: 2014 EN 61000-3-3: 2013
Approvals	UL Listed (CDN & US) UL916 Energy Management Equipment – File No. E176435
Safety	CE Approved

ELECTRICAL

Supply Requirements		24 V AC/DC ±20 % 50/60 Hz
Supply Rating	CBXi	30 VA (no FLX modules)
	CBXi + 1 x FLX	42 VA
	CBXi + 2 x FLX	54 VA
	CBXi + 3 x FLX	66 VA
FLX Power Connection		Proprietary FLX bus connector carries power and communications from CBXi unit to power to up to 3 FLX modules. Using the FLX-PS24 allows up to a total of 5 FLX modules.
Auxiliary Power		18 V DC / 60 mA output

PROCESSOR

Type	TI Sitara AM335X Dual-core ARM Cortex A8
Clock Speed	600 MHz
System Memory	4 GB eMMC Flash + 512 MB DDR3 DRAM
Real-Time Clock	Yes, backed for 7 days typical

COMMUNICATIONS

Ethernet ports	Dual Switched 10/100BASE-TX (RJ45) Addressing: IPv4, IPv6 or Hostname / DHCP Client or Static IP Connection Topology: Daisy-chain BACnet/IP, BTL-BBC
Local serial port	USB Micro-B socket
USB ports	2 x Type-A USB connectors USB 2.0 5 V DC 2.5W
RS485 Port 1	Software selectable BACnet MS/TP or Modbus RTU RS485 @ 9K6,19K2, 38K4(default), 57K6, 76K8 or 115k2 Baud. Max cable length 1.2 km @ default ¼ unit load device. When configured as Modbus RTU a maximum of 120 points across a maximum of 12 devices that can be a combination of Modbus RTU or TCP may be connected. When configured as BACnet MS/TP a maximum of 24 devices is recommended.
Local STAT Port	RS485 with a maximum cable length 500 m Supports CBT-STAT and UCU Room Display
FLX bus	115.2K Baud Max bus length (including extension cables): 30 m / 100 ft. using 18 AWG conductors 15 m / 50 ft. using 22 AWG conductors
FLX bus Connection	FLX bus connector carries inter-module communications and module power

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INPUTS / OUTPUTS

Note: Shielded cable is recommended for all input connections.

UniPuts™ with Relay

When configured as Input:

Analog Input
- Range: 0 ... 10 V @ 40 kΩ
- Accuracy: ±0.5% full scale [50mV]

Resistance measurement
- Range: 0 ... 450 kΩ
- Accuracy: ±0.5% of measured resistance

Temperature measurement
- Range: -40 °C ... +110 °C (-40 °F ... +230 °F)
- Accuracy: 10k NTC sensors (e.g. 10k Type 2 (10K3A1) or 10k Type 3 (10K4A1)) ±0.3 °C, -40 to 90 °C (-40°F to 194°F); ±0.4 °C > 90 °C (194°F)

Current input
- Range: 0 ... 20 mA @ 390 Ω

Note: Current Input requires user-supplied external 390 Ω resistance.

- Accuracy: depends on user supplied external resistor

Digital Volt-Free contact, 2 mA contact-wetting current

Digital 24 V AC detect

Pulse counting up to 20 Hz, 25 ms - 25 ms

When configured as Output:

Analog Output 0 ... 10 V @ 20 mA max load, 12-bit resolution

Digital Output 0 ... 10 V @ 20 mA max load

Relay Contacts with ability to switch up to 24 V AC
Maximum Load: 24 V AC, 2 (1) A resistive (inductive) for all relay contacts

Universal Inputs

Analog Input
- Range: 0 ... 10 V @ 130 kΩ
- Accuracy: ±0.5% full scale [50mV]

Resistance measurement
- Range: 0 ... 450 kΩ
- Accuracy: ±0.5% of measured resistance

Temperature measurement
- Range: -40 °C ... +110 °C (-40 °F ... +230 °F)
- Accuracy: 10k NTC sensors (e.g. 10k Type 2 (10K3A1) or 10k Type 3 (10K4A1)) ±0.3°C, -40 to 90°C (-40°F to 194°F); ±0.4°C > 90°C (194°F)

Current input
- Range: 0 ... 20 mA @ 390 Ω
- Accuracy: ±0.5% full scale [100µA]

Digital Volt-Free contact, 2 mA contact-wetting current

Pulse counting up to 20 Hz, 25 ms – 25 ms

Notes:
1) All inputs and outputs are protected against short circuit, as well as over-voltage up to 24 V AC.
2) Inputs use on-board 16-bit analog to digital convertor.
3) 18 V DC supply, max 60 mA per CBXi unit, is available for powering sensors.

SOFTWARE FEATURES

Maximum number of Strategy Modules	2000
Maximum number of Trendlog Modules	144
Entries per Trendlog	1024
Maximum BACnet Schedules	16
Exceptions per Schedule	5
Maximum number of Exposable BACnet Points	960
Data Security	Strategy and Set points backed up in Flash

INTERFACE

Engineering Software	CXpro[HD]	
Touchscreen	eXplore	

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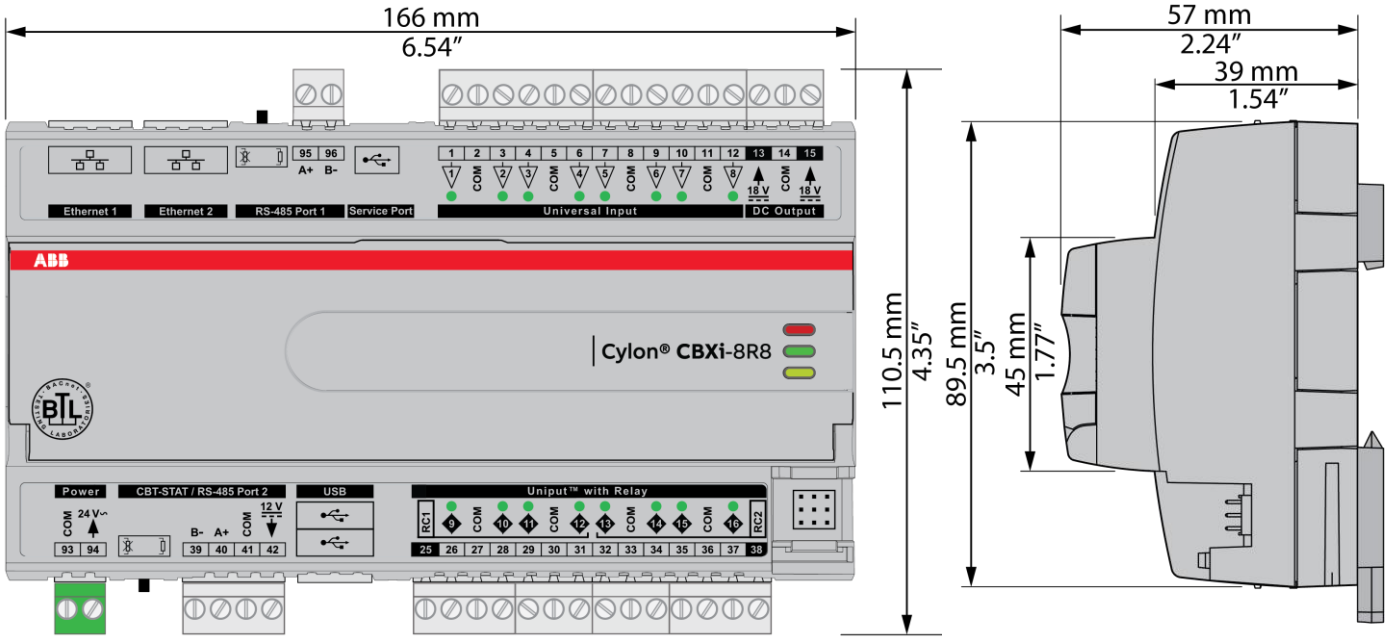
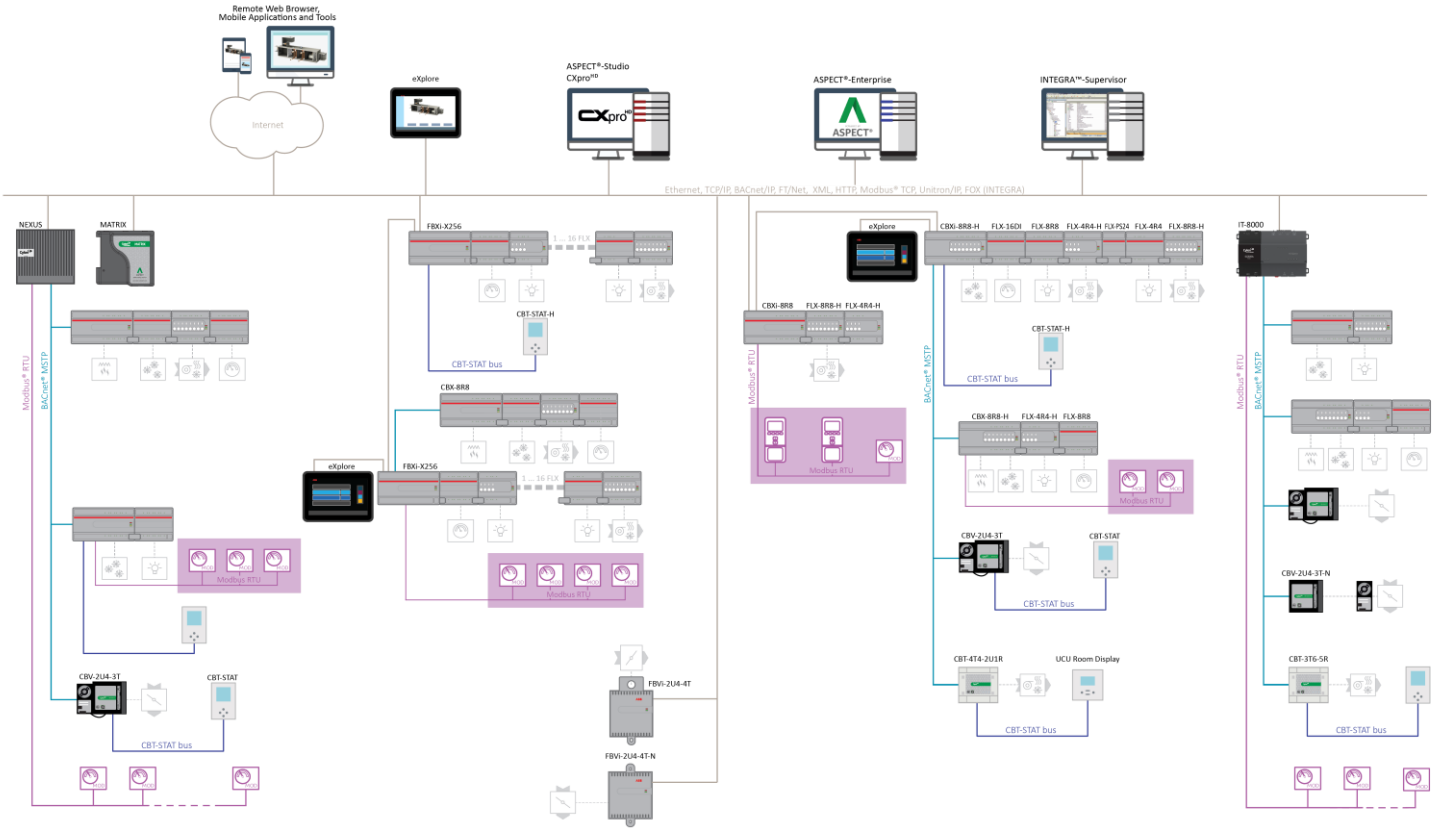
DIMENSIONS



SYSTEM ARCHITECTURE



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