

## TECHNICAL DATA SHEET

DS0124 rev 38

# 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 eXpansion) 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<sup>HD</sup> 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 96 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

# PRODUCT SELECTION CHART

		CBXi-8R8	CBXi-8R8-H	FLX-4R4	FLX-4R4-H	FLX-8R8	FLX-8R8-H	FLX-16DI
<b>Service</b>		Main Controller	Main Controller	Expansion Module	Expansion Module	Expansion Module	Expansion Module	Expansion Module
<b>I/O Point Qty</b>	UniPuts with Relay <sup>(1)</sup>	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
<b>Input Options</b>	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	✓	✓	✓	✓	✓	✓	✓
<b>Output Options</b>	Analog 0 ... 10 V	✓	✓	✓	✓	✓	✓	
	Digital 0 ... 10 V	✓	✓	✓	✓	✓	✓	
	Relay Contacts 24 V AC	✓	✓	✓	✓	✓	✓	
<b>HOA Switch &amp; Pot.</b>			✓		✓		✓	
<b>18 V Aux Power</b>		✓	✓	✓	✓	✓	✓	✓
<b>BACnet MS/TP-to-IP Routing</b>		✓	✓					
<b>Modbus TCP<sup>(2)</sup></b>		✓	✓					
<b>RS-485 Port<sup>(3)</sup></b>		BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU					
<b>CBT-STAT Bus (UCU Room Display)</b>		✓	✓					

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

Note (2) : CBXi supports a maximum of 320 Modbus points.

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 320 points that can be a combination of Modbus RTU or TCP may be connected.

Note: CBXi acts only as a Modbus Client for Modbus TCP communications, and only as a Modbus Master for Modbus RTU communications.

# 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 <sup>2</sup> ) Min: AWG 22 (0.355 mm <sup>2</sup> )

## 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 CBXi	30 VA (no FLX modules)
Rating	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 320 points may be connected, which can be a combination of Modbus RTU or TCP
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

# 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<sup>HD</sup>

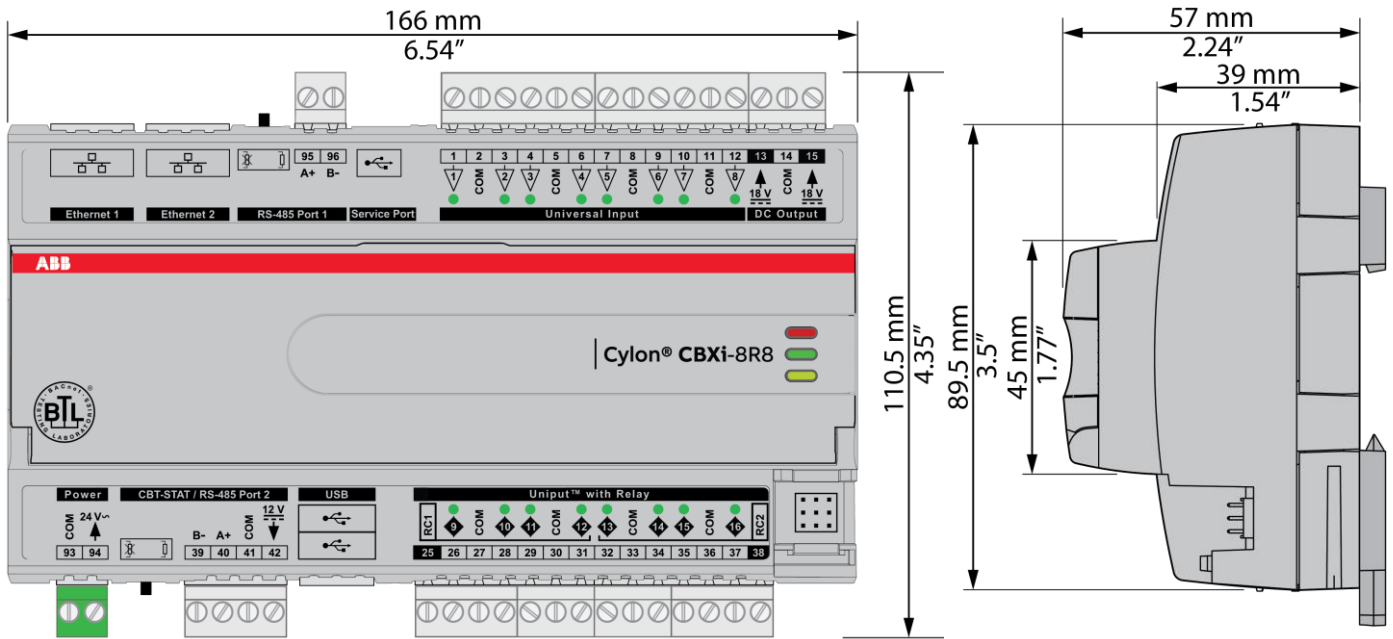


Touchscreen

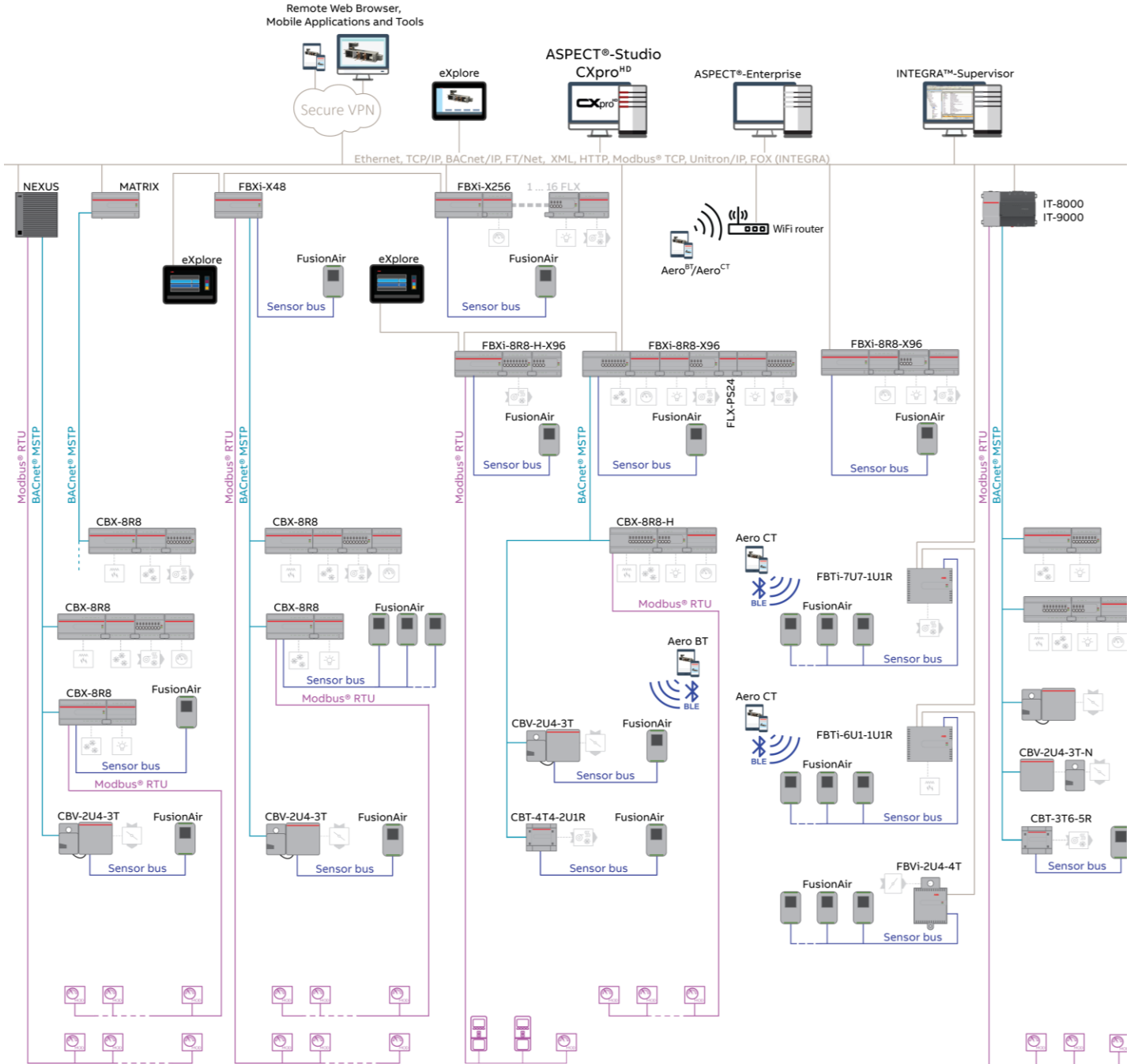
eXplore



# DIMENSIONS



# SYSTEM ARCHITECTURE



FBXi / CBXi-8R8 / CBX-8R8	FLX-8R8 -H	FBVi-2U4-4T	INTEGRA Series	FusionAir Smart Sensor
CBXi-8R8-H / CBX-8R8-H	FLX-4R4-H	NEXUS Series	eXplore	CBT-STAT
CBV-2U4-3T	FLX-PS24	MATRIX-2 Series		UCU Room Display
FLX-8R8 / FLX-4R4 / FLX-16DI	CBT-4T4-2U1R			