Cylon BACnet Unitary Controller (CBT) Range

CBT12	CBT12iVAV

The **Cylon BACnet Unitary Controller (CBT) Range** is a range of BTL Listed BACnet Advanced Application Controllers with 4 inputs and 8 outputs, ideally suited to controlling single items of equipment.

The **CBT12iVAV** variant has an integrated airflow sensor and actuator, and point support for single duct and fan assisted VAV applications.

- **BACnet MS/TP Fieldbus**

- **Supports the following configurable BACnet objects:**
  AI/BI/AO/BO/AV/BV, Alarms, Trend Logs, and Schedules

- **Integrated Pressure Sensor (CBT12iVAV only)**
  Can measure differential pressure directly without need for a separate sensor. The measured value is converted to airflow rate by the controller's strategy.

- **4 Universal Inputs**
  Can be configured as analog or digital inputs

- **4 UniPuts™ with Triac Outputs (CBT12 only)**
  Can be configured as analog / digital outputs or voltage inputs

- **2 UniPuts™ (CBT12iVAV only)**
  Can be configured as analog / digital outputs or voltage inputs. Configured as analog outputs in preloaded strategy.

- **Up to 8 Triac Outputs**
  Can switch up to 24 V AC

- **Integrated Actuator (CBT12iVAV only)**
  Points 9 and 10 are dedicated to controlling the integrated actuator.

- **Up to 500 Strategy Blocks**

- **Up to 6 Trendlogs**

- **1024 entries per Trendlog**

- **Data Security**
  Strategy and setpoints backed up in Flash

- **No Hardware I/O Jumpers**
  Hardware points are automatically configured by the downloaded strategy

The BACnet Controller of Choice

These BACnet controllers are a truly open solution for the most demanding of applications. **Cylon BACnet** controllers offer unparalleled flexibility and performance on an open platform.

The system can easily be extended by adding best of breed 3rd party devices on the same MS/TP network.

Highly Flexible

The **CBT12** and **CBT12iVAV** are fully programmable to meet the most demanding control applications. Unlike others, it can be re-engineered for specific applications over BACnet.

Smart Energy Control

The enhanced flexibility of Cylon controllers delivers more energy efficient solutions for buildings. With smart energy optimization built-in, your building manager can successfully drive down energy costs.
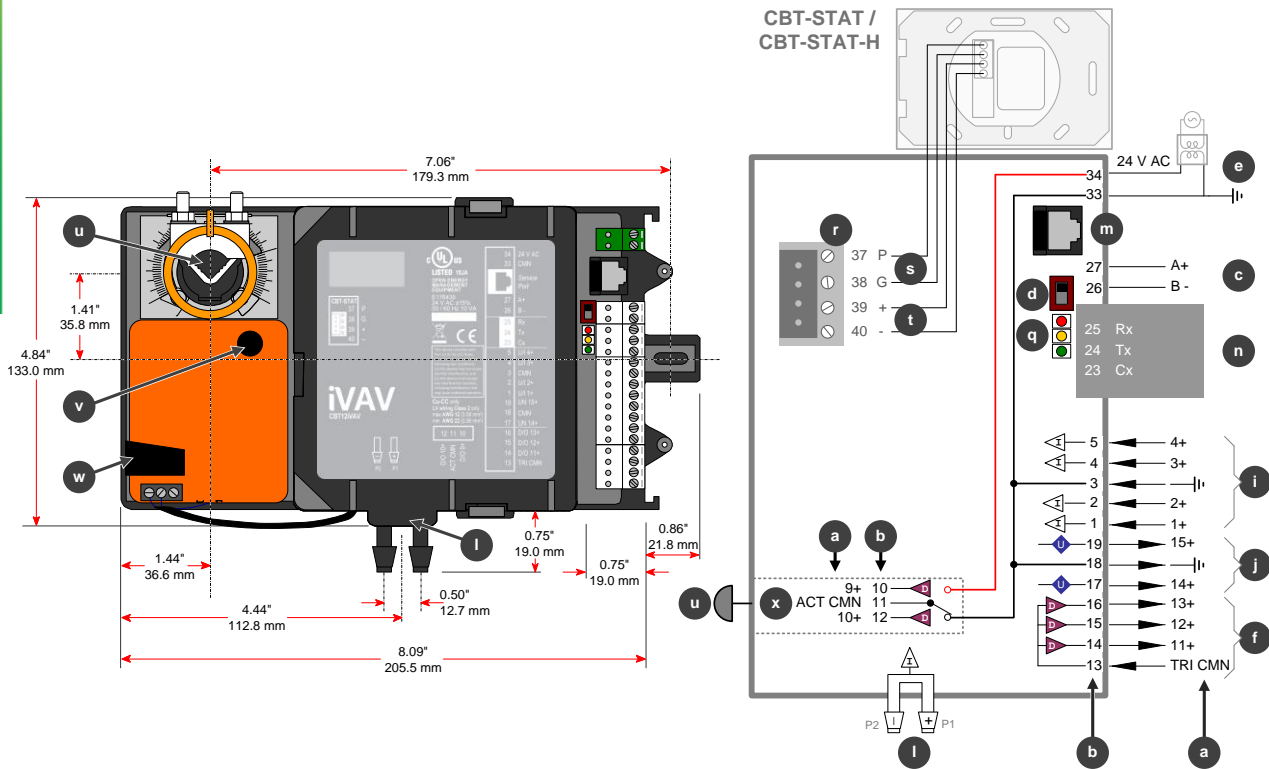
With the **CBT12iVAV** you can add a demand ventilation application, occupancy sensors or lighting control to further enhance your energy savings. With the **CBT12** you can add user setpoint adjustments, room occupancy sensors or window contacts
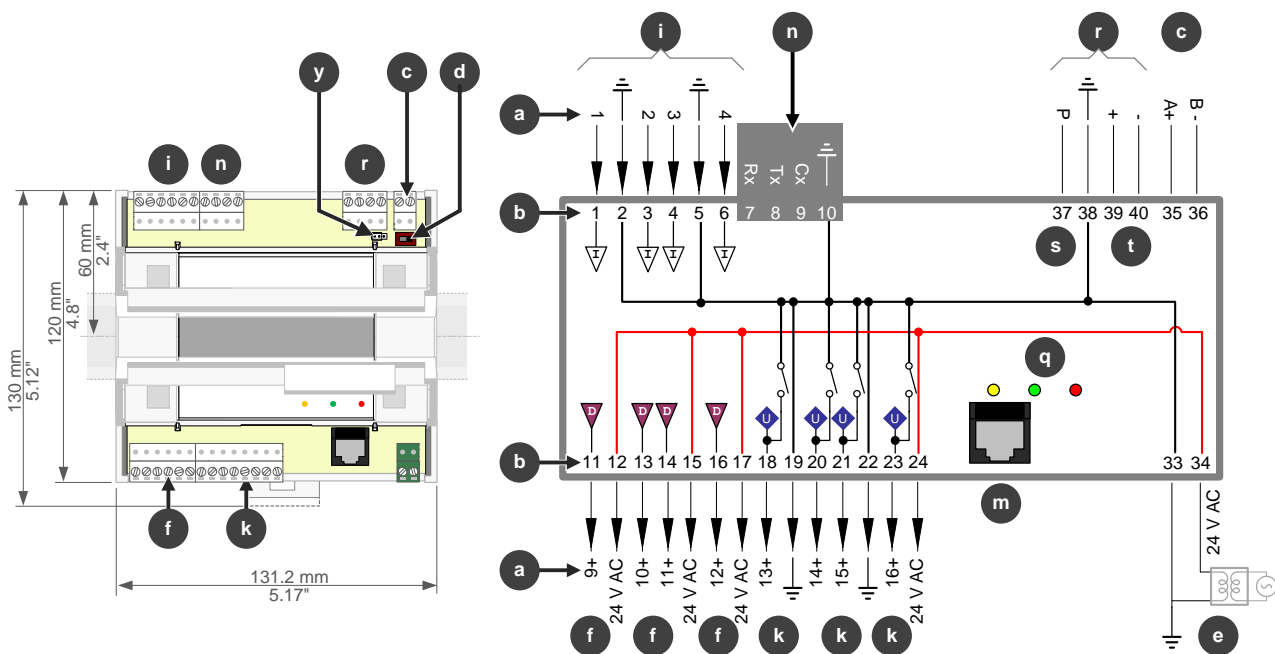
Cylon BACnet BEMS

The **Cylon BACnet** range offers reduced costs in terms of training, implementation, rollout and maintenance. Modular, extendible packages along with low installation costs mean a low entry point for building control.

CBT-STAT / CBT-STAT-H

iVAV
CBT12iVAV

7.06" / 179.3 mm
1.41" / 35.8 mm
4.84" / 133.0 mm
1.44" / 36.6 mm
4.44" / 112.8 mm
8.09" / 205.5 mm
0.50" / 12.7 mm
0.75" / 19.0 mm
0.75" / 19.0 mm
0.86" / 21.8 mm

24 V AC

37 P
38 G
39 +
40 -

34
33
27 A+
26 B -
25 Rx
24 Tx
23 Cx

5 4+
4 3+
3
2 2+
1 1+
19 15+
18 14+
17
16 13+
15 12+
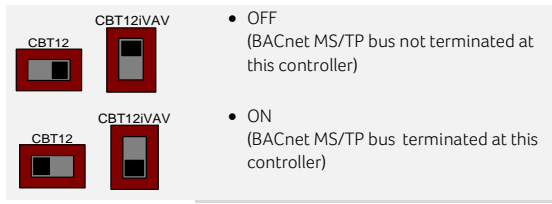14 11+
13 TRI CMN

9+ 10
ACT CMN 11
10+ 12

P2 P1

Note: In the CBT12iVAV, terminals 3, 18 and 33 are connected internally.

Note: Use caution when disconnecting the CBT-STAT connector. It is recommended that you press downwards with your finger at the end of the circuit board, beside the connector, while pulling the connector upwards.

Note: For European form-factor CBT-STAT, contact Cylon Sales Support.

60 mm / 2.4"
120 mm / 4.8"
130 mm / 5.12"
131.2 mm / 5.17"

1 2 3 4 5 6
Rx Tx Cx
7 8 9 10

37 38 39 40 35 36
P + - A+ B -

11 12 13 14 15 16 17 18 19 20 21 22 23 24

9+ 24 V AC 10+ 11+ 24 V AC 12+ 24 V AC 13+ 14+ 15+ 16+ 24 V AC

33 34
24 V AC

Note: In the CBT12, terminals 12, 15, 17, 24, and 34 are connected internally. When a controller is powered, 24 V AC is available for low current devices at terminals 12, 15, 17, and 24. The total combined current must be less than 0.9 A.

	Common
a	Point Numbers
b	Terminal Numbers
c	BACnet MS/TP Port

Important: In order for the BACnet MS/TP bus to operate reliably, the common power connection (terminal 33 ⏚) must be connected to Earth. Cylon recommend that this is done at the 24 V AC transformer.

d	BACnet MS/TP Terminator

- OFF
  (BACnet MS/TP bus not terminated at this controller)

- ON
  (BACnet MS/TP bus terminated at this controller)

e	Power 24 V AC

Important: The common power connection (terminal 33 ⏚) must be connected to Earth. Cylon recommend that this is done at the 24 V AC transformer.

f	Digital Outputs
i	Universal Input
j	UniPut™
k	UniPuts™ + Triac
l	Airflow Sensor
m	Service Port (RJ-45)

Note: Service Port must not be connected until after the device is powered on.

n	Service Port (screw terminal)

Note: Service Port must not be connected until after the device is powered on.

q	Indicator LEDs

Red LED

Continuous: Optional battery is healthy.
Flash once a second: Indicates no battery/battery is low.
Note: Battery is present only on custom versions.

⚠ **CAUTION** - DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISPOSE OF USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

Green LED

Continuous: Strategy servicing and no comms.
Flash rapidly (every 100 ms): Strategy not servicing.
Flash once a second: MSTP comms, and Strategy servicing.
Note: When Service Port is in use, the Green LED blinks off as Service Port comms are received.

Yellow LED

Off: Normal operation.
On: Priority Array set above 16, for one or more Hardware Points, by external BACnet Client, or by the Cylon Engineering Center.

Cycle left-to-right (CBT12) **or top to bottom** (CBT12iVAV)

Controller is in terminal mode.

Cycle right-to-left (CBT12) **or bottom to top** (CBT12iVAV)

Upgrade in progress while Controller is in terminal mode.
Note: The strategy is not serviced while in upgrade mode.

Cycle green to yellow

Globals communication/setup problem

Green and yellow flash simultaneously

Globals communication/setup problem **and** Hardware Point Priority Array is set above 16 by external BACnet Client, or by the Cylon Engineering Centre.

r	Keypad Port
s	Room Display / CBT-STAT Power supply
t	Room Display / CBT-STAT RS485
u	Rotary Actuator
v	Actuator direction selector
w	Damper Manual Override
x	Internal Actuator Outputs
y	Room Display / CBT-STAT Terminator
	OFF (Not Terminated)
	ON (Terminated)

Specifications:

MECHANICAL

Size (excluding terminal plugs)	**CBT12iVAV** : 8.3 x 5.12 x 2.36" [210 x 130 x 60 mm] **CBT12** : 5.7 x 5.12 x 1.78" [145 x 130 x 45 mm]
Enclosure	Injection moulded ABS
Mounting	DIN rail (CBT12) Direct Mount (CBT12iVAV)
Airflow Sensor Connection (CBT12iVAV only)	Use rubber hose suitable for a 0.2" [5.1 mm] O.D. nozzle.
Integrated Actuator (CBT12iVAV only)	Belimo LMB24-3-T with Belimo Brushless DC Motor Torque: 45 in-lb [5 Nm] Degrees of Rotation: 95° adjustable with mechanical stop Fits Shaft Diameter 1/4" to 5/8" [6mm to 16mm] Noise level < 35 dB (A) Running Time - 95 sec constant, independent of load

ENVIRONMENT

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

Ambient Temperature	32 °F ...122 °F [0 °C ... 50 °C] ambient.
Ambient Humidity	0 % ... 90 % RH non-condensing
EMC Immunity	EN 55024, 2010
EMC Emission	EN 55022, 2010 Class A
Approvals	UL Listed (CDN & US) UL916 Energy Management Equipment - File No. E176435 BTL Listed – BACnet Advanced Application Controller (B-AAC)

WIRING

Note: *Use Copper or Copper Clad Aluminium conductors only.*

Termination	PCB mounted screw terminal connections.
Conductor Area	Max: AWG 12 [3.09 mm^2] Min: AWG 22 [0.355 mm^2]

ELECTRICAL

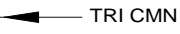|	
Supply Requirements	24 V AC +15 %* / −20 % 50/60 Hz
Transformer Rating	Up to 55 VA (up to 12 VA internal power plus up to 43 VA supplied to Triac loads)
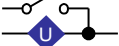
* for **CBT12** *devices manufactured before August 2016 – i.e. with serial number starting with "CT12635----" or earlier, the supply requirements are 24 V AC* **+10 %** */ −20 % 50/60 Hz*

PROCESSOR

Type	STM32F103ZET6 32bit processor
Clock Speed	8 MHz crystal, 72 MHz internal processor clock rate
System Memory (soldered to PCB not removable)	512k flash, 64k SRAM internal to processor 1024k SRAM external

Subject to change without notice
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UK Patent GB 2 400 991
Irish Patent 84413

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Cylon CONTROLS

INPUTS/OUTPUTS

Note: *Screened cable is recommended for all input connections.*

	CBT12iVAV	CBT12	
Universal Inputs ⊐I⊳	4 (points 1 to 4)	4 (Points 1 to 4)	Active voltage input 0 to 10 V @ 130 K. 12 bit resolution. Passive Input for a large range of temperature sensors. 12 bit resolution. 10K3A1 sensors are recommended. **Note**: *It is not recommended using Sensors with a heating dissipation constant (K factor) < 2 as this will lead to an offset error.* Temperature input range: 32 °F to 122 °F [0 °C to 50 °C] Active current input 0-20 mA @ 390 Ω (screened cable). Digital Volt Free Contact (Dry Contact). **Note**: *CBT Universal inputs do not support pulse counting.*
Airflow Sensor ⊐I⊳	1		0-1.3 inches of water (0 – 320 Pa) Pa airflow measurement using internal microbridge type airflow sensor. **Note**: *On the CBT12iVAV, this sensor is connected to either Point 5 or Point 8 in the controller Strategy, depending on the product code:* • Code 1M710100 : Point 5 • Code 1M710105 : Point 8 *The product code can be found on the shipping box.* *The product serial code will also indicate the point number:* *If the second character of the serial number is* • "I" : Point 5 • "S": Point 8 *The product serial code can be found on the user access area of the boa*
Integrated Actuator	1 (points 9 and 10)		CBT12iVAV points 9 and 10 are dedicated to operating the actuator and are not user accessible.
Digital Outputs ◀D	3 (points 11 to 13)	4 (points 9 to 12)	24 V AC Triac @ 500 mA maximum. CBT12iVAV: Switch live or switch neutral. CBT12: Switch neutral only
Triac Common ◀—— TRI CMN	1		Connected to 24 V AC : Digital Outputs ◀D will switch live. Connected to 0 V (⏚) : Digital Outputs ◀D will switch neutral.
UniPuts™ ◆U	2 (points 14 and 15)		(Software selectable interfaces) Active Input 0 to10 V @ 40 KΩ. 12 bit resolution. Active Output 0 to 10 V @ 10 mA max load. Digital Volt-Free contact @ 25 mA not continuous.
UniPuts™ with Triac ◆U		4	(Software selectable interfaces) Active Input 0 – 10 V @ 40 KΩ. 12 bit resolution. Digital Volt-Free contact @ 25 mA not continuous. Active Output 0 – 10 V @ 10 mA max load. 12 bit resolution. 24 V AC Triac @ 500 mA maximum. Switch neutral only.
24 V AC output terminals		4	Total current drawn from 24 V AC terminals is limited to 0.9 A.

COMMUNICATIONS

Local RS232 TTL port	@ 9600 Baud Max cable length 4m
BACnet MS/TP port	RS485 @ 9K6,19K2, 38K4 or 76K8 Baud (defaults to 38K4) Max cable length 1.2 km

INTERFACE

Engineering Software	Cylon Engineering Centre (CEC) NetLink (portable operator interface tool)

SOFTWARE FEATURES

Data Security	Strategy and Setpoints backed up in flash memory
Firmware upgrading via Service port and network	
Maximum number of Strategy Blocks	**CBT12iVAV** : 500 **CBT12** : 255
Maximum number of trend log Modules	**CBT12iVAV** : 4 **CBT12** : 6
Maximum internal trend log capacity (standard) 1024	
Maximum Controllers per BACnet MS/TP bus	99* *It is recommended for typical conditions that the number of controllers on a unitary BACnet MS/TP bus be limited to 32. MSTP devices with a fractional (¼ or smaller) unit load will be required in order to extend a single BACnet MS/TP bus trunk beyond 32 devices. Both CBM and CBT controllers are ¼ unit load devices. Please refer to MAN0106 for recommendations on configuring a specific network for optimal comms speed.*

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 Irish Patent 84413

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