CBT Range

BACnet® CBT Controllers CBT12 / CBT12iVAV

The CBT12iVAV is a BTL Listed BACnet Advanced Application Controller with an integrated airflow sensor and actuator, and point support for single duct and fan-assisted VAV applications.

The CBT12 is also a BTL Listed BACnet Advanced Application Controller, with 4 inputs and 8 outputs, and is ideally suited to control single items of equipment.

BENEFITS

The BACnet Controller of Choice

These BACnet controllers are a truly open solution for the most demanding of applications. Cylon Auto-Matrix 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 BACnet MS/TP network.

Highly Flexible

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

Smart Energy Control

The enhanced flexibility of Cylon Auto-Matrix controllers delivers more energy efficient solutions for buildings. With smart energy optimization built-in, your building manager can successfully drive down energy costs.

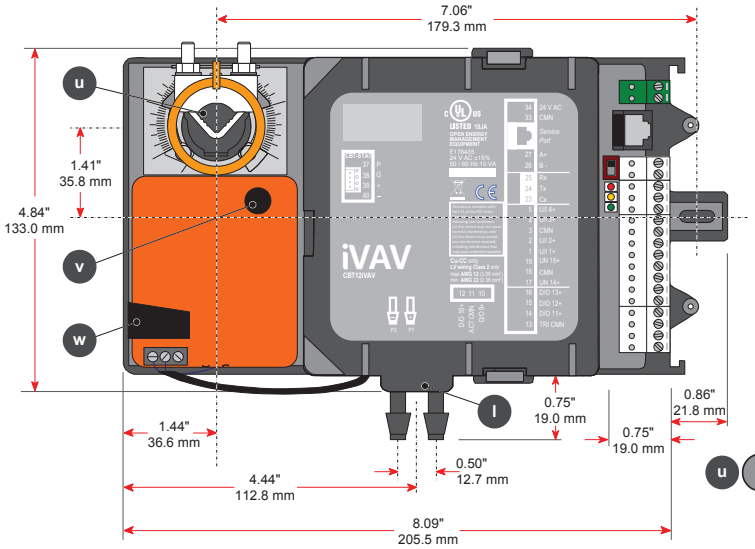
With the CBT12iVAV you can add a demand ventilation application, occupancy sensors, or lighting control to further enhance your energy savings. With the CBT12, you can add user setpoint adjustments, room occupancy sensors, or window contacts.

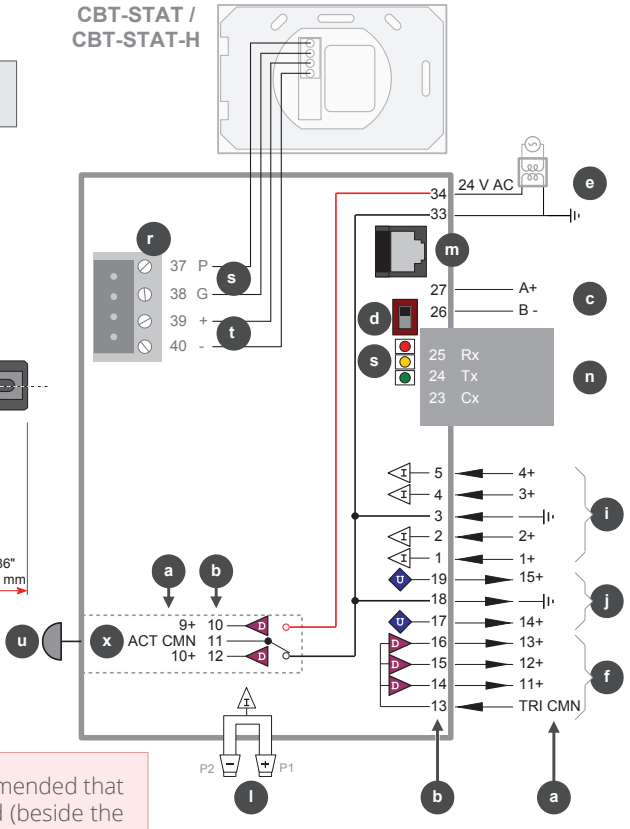
Cylon Auto-Matrix BACnet BAS

The Cylon Auto-Matrix 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.

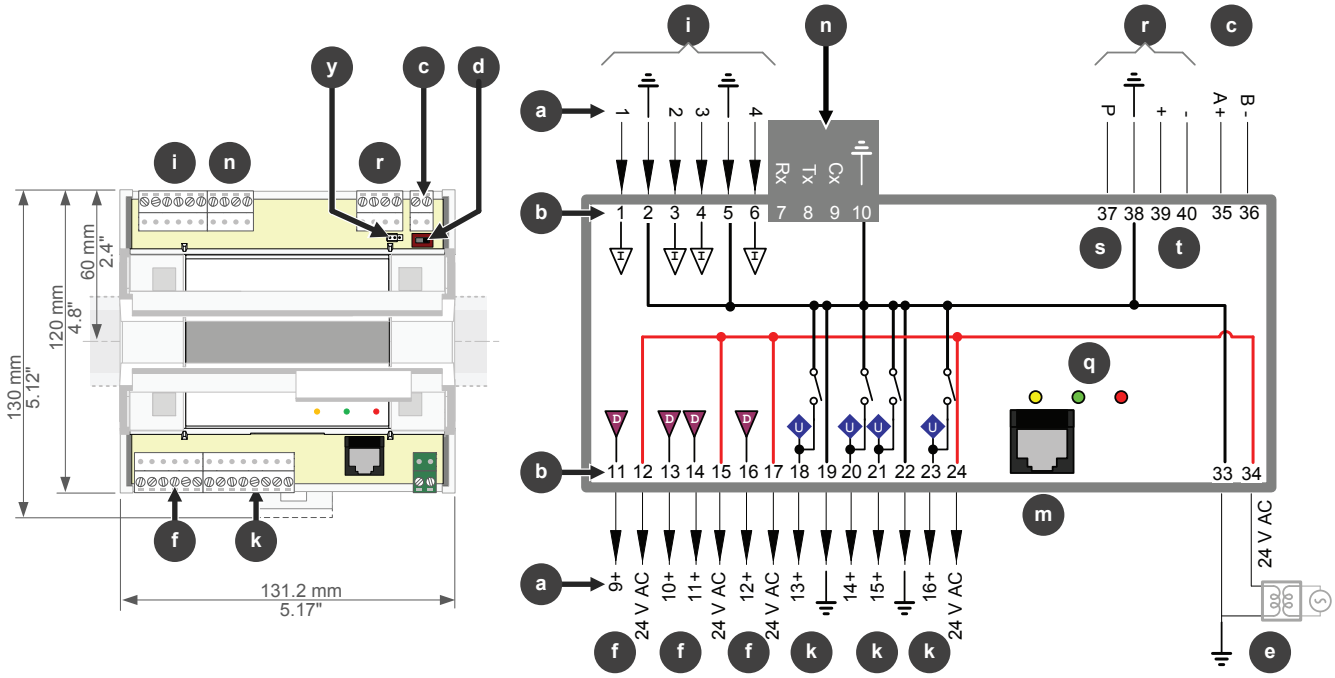
BACnet MS/TP Fieldbus
Supports the following Configurable BACnet Objects: AI/BI/AO/ BO/AV/BV, Alarms, Trend Logs and Schedules
Integrated Pressure Sensor (CBT12iVAV only) Can measure differential pressure directly without need for separate sensor. The measured value is converted to airflow rate by the controller's strategy
4 Universal Inputs Can be configured as analog or digital
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
Triac Outputs 3 on the CBT12iVAV / Up to 8 on the CBT12
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

NOTE:
In CBT12iVAV Terminals 3, 18 and 33 are connected internally





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

1S9K660	**CBT-STAT**
⏚	**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. AAM recommends that this is done at the 24 V AC transformer.
d	**BACnet MS/TP Terminator**
CBT12 CBT12iVAV	**OFF** (BACnet MS/TP bus not terminated at this controller)
CBT12 CBT12iVAV	**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. AAM recommends that this is done at the 24 V AC transformer.
D f	**Digital Outputs**
I i	**Universal Input**
l	**Airflow Sensor**
U j	**UniPut®**
U k	**UniPuts® + Triac**
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.
r	**Keypad Port**
s	**Room Display / CBT-STAT Power Supply**
t	**Room Display / CBT-STAT EIA-485**
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)

q	**Indicator LEDs**
CBT12iVAV CBT12	**Red LED** Continuous : Optional battery is healthy Flash once/second : No battery/battery low *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.
CBT12iVAV CBT12	**Green LED** Continuous : Strategy servicing and no comms Flash rapidly (every 100ms) : Strategy not servicing Flash once/second : MS/TP comms & strategy servicing *When service port is in use, the green LED blinks off as service port communication is received*
CBT12iVAV CBT12	**Yellow LED** Off : Normal operation On : Priority Array set above 16, for one or more hardware points, by external BACnet client or by the UEC
CBT12iVAV CBT12	**Cycle top to bottom (CBT12iVAV)** **Cycle left to right (CBT12)** Controller is in terminal mode
CBT12iVAV CBT12	**Cycle bottom to top (CBT12iVAV)** **Cycle right to left (CBT12)** Upgrade in progress while controller is in terminal mode *Strategy not serviced while in terminal mode*
CBT12iVAV CBT12	**Cycle green to yellow** Global comms/setup problem
CBT12iVAV CBT12	**Green and yellow flash simultaneously** Global comms/setup problem and hardware point priority array set above 16 by external BACnet client, or the Cylon Engineering Center.

SPECIFICATIONS

MECHANICAL

Size (excluding terminal plugs)	**CBT12iVAV** : 8.3 x 5.1 x 2.3" (210 x 130 x 60 mm) **CBT12** : 5.7 x 5.1 x 1.7" (145 x 130 x 45 mm)
Enclosure	Injection-molded ABS
Mounting	CBT12iVAV (direct) CBT12 (DIN rail)
Airflow Sensor (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 *Intended for field installation within another enclosure*

Temperature & Humidity	32˚ - 122˚ F (0˚ - 50˚ C) ambient 0 - 90 % RH non-condensing
EMC Immunity / Emission	EN 55024, 2010 / EN 55002, 2010 Class A
Approvals	UL Listed (CDN & US) UL916 Energy Management Equipment File Number E176435 BTL Listed – BACnet Advanced Application Controller (B-AAC)

COMMUNICATIONS

Local RS-232 Port	@ 9600 baud : max cable length 13.12 ft (4 m)
BACnet MS/TP Port	EIA-485 @ 9600, 19k2, 38k4, or 76k8 baud (defaults to 38k4)

WIRING *Use Copper or Copper clad Aluminum conductors only*

Termination	PCB mounted plug terminal connections
Conductor Area	Max : AWG 12 (3.09 mm²) Min : AWG 22 (0.355 mm²)

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 32-bit Processor
Clock Speed	8 Mhz Crystal, 72 MHz internal processor clock rate
System Memory (soldered to PCB)	512k flash, 64k SRAM internal to processor 1024k SRAM external

SOFTWARE FEATURES

Max strategy blocks	**CBT12iVAV** : 500	**CBT12** : 255
Max trendlogs / capacity	**CBT12iVAV** : 4 / 1024	**CBT12** : 6 / 1024
Max controllers per BACnet MS/TP	99*	

*It is recommended for typical conditions that the number of main plant controllers on a main plant fieldbus be limited to 16. MS/TP devices with a fractional (1/4 or smaller) unit load will be required in order to extend a single fieldbus trunk beyond 32 devices. Both CBM and CBT controllers are 1/4 load devices. Please refer to MAN0106 for recommendation on configuring a specific network for optimal communication speeds.

INPUTS/OUTPUTS *Screened cable is recommended for all input connections*

	CBT12	CBT12iVAV	
Universal Inputs	4	4 (points 1-4)	**Software Selectable Interfaces** • Active Input 0 to 10 V @ 130K. 12-bit resolution • Passive Input for a large range of temp sensors, 10K3A1 sensors recommended **NOTE:** it is not recommended using sensors with heating dissipation constant (K factor) < 2 as this will lead to an offset error • Active Current Input 0 to 20 mA @ 390 Ohms (screened cable) Digital Volt-Free contact @ 1 mA continuous • **NOTE:** CBT universal inputs do not support pulse counting
UniPuts + Triac	4		**Software Selectable Interfaces** • Active Input 0 to 10 V @ 40 KΩ. 12-bit resolution • Active Output 0 to 10 V @ 10 mA max load : 12-bit resolution • Digital Volt-Free contact @ 25 mA not continuous • 24 V AC triac @ 500 mA maximum : switch neutral only
Digital Outputs	4	3 (points 11-13)	• 24 V AC triac @ 500 mA maximum. **CBT12** : switch neutral only. **CBT12iVAV** : switch live or switch neutral.
Triac CMN		1	• Connected to 24 V AC : Digital Outputs will switch live. • Connected to 0 V : Digital Outputs will switch neutral.
UniPuts		2 (points 14 & 15)	**Software Selectable Interfaces** • Active Input 0 to 10 V @ 40 KΩ. 12 bit resolution. • Active Output 0 to 10 V @ 10 mA max load. • Digital Volt-Free contact @ 25 mA not continuous.
Actuator		1 (points 9 and 10)	• Integrated Actuator. Points are dedicated to actuator and are not user accessible
Airflow Sensor		1	• 0-1.3 inches of water (0-320 Pa) Pa airflow measurement using internal microbridge type airflow sensor

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