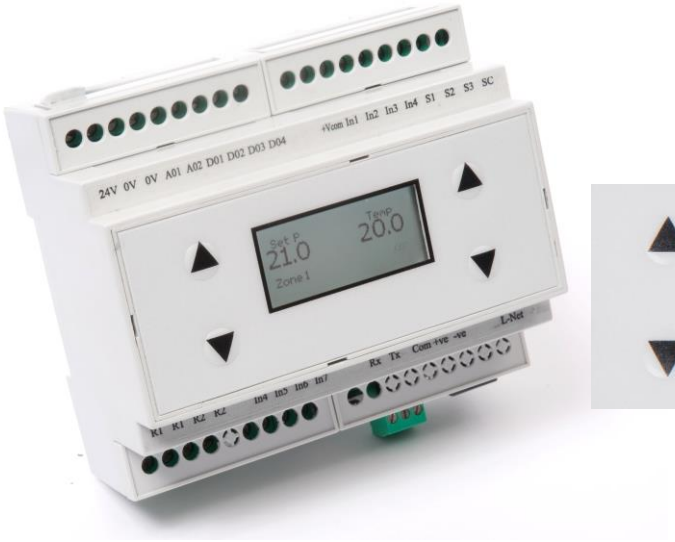
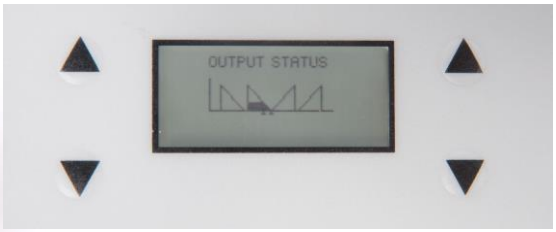
TITAN Products Ltd.

# CCM-204 MULTI-PURPOSE TEMPERATURE CONTROLLER




**BACnet Enabled**

C-037 08/12

**DESCRIPTION**

**The BACnet enabled CCM-204 Multi-Purpose Temperature Controller is designed to offer complete control flexibility for ventilation and air conditioning systems.**

With a vast array of inputs and outputs the BACnet advanced application specific controller can offer control strategies ranging from single stage heating or cooling to 3 stage heating, venting and cooling. The controller also offers other features such as fan control and CO2 priority on ventilation.

The CCM-204 Multi-Purpose controllers can be used standalone, as part of a master-slave group or part of a Building Management System via the inbuilt Native BACnet MS-TP communications.

The controllers are available with an inbuilt display with a graphical illustration of the control. Alternatively a Room Room Display Unit (RDU-4) is available to allow occupants to set individual comfort conditions.

All BACnet controllers from Titan Products are compatible with Titan Products 10K3A1 temperature sensors .

**FEATURES**

- 24V AC supply
- Native BACnet RS485 communications
- 2 or 4 x 0-10V outputs
- 4 or 2 x 24V AC Triac outputs dependent on configuration
- 7 x 0-10V Analogue inputs or use as Digital Inputs
- 4 x temperature sensor inputs 10K3 or Custom Profile
- 2 x VF relays
- Multiple HVAC control options
- Real Time Clock option
- Din Rail mounting

**SPECIFICATION**

| | |
|---|---|
| Supply | 24VAC/DC |
| Power consumption | 5 VA max |
| Triac outputs | 350mA max |
| 0-10V outputs | 5mA max |
| Temperature Sensors | 10K3A1 or Custom Profile |
| Analogue Inputs | 0-10V |
| Digital Inputs | Voltfree |
| Relay output | 240V 5 amp max. |
| Communications | Native BACnet |
| Network | BACnet MS/TP -RS485 |
| Indication | Tx/Rx comm.'s |
| Enclosure | Din mounting (IP20) |
| Enclosure Rating | L94-VO |
| Size | 106 mm wide<br>92 mm high<br>62 mm deep |

The CCM-204-MPC is a standalone multi-purpose HVAC controller that incorporates open systems communications to integrate to a BMS using Native BACnet MSTP protocol. The details listed describe a range of the standard settings, options and operational features that are available from the embedded applications library. All settings can be accessed and modified with optional front display or the FPT-601 Field Programming Tool or from the BMS using the BACnet communications interface.

**Controller Settings & Options**

Network Native BACnet MSTP or Standalone

Unit address Sets the controller unit MAC address on MS/TP bus. **Range 1 to 127 for a master**

Dev Object ID Allows the setting of the device object ID. **Range 0 to 4194302**

Baud Rate Sets communication baud rate. **Range Options: - 9,600 19,200 38,400 or 76,800**

Group Control: Allows individual controllers to be set-up as a **Group Master** or **Group Slave**. This sets groups of controllers to take control information and instructions such as temperature, fan speed, occupancy ON/Off etc from a common Master (125 Slaves max). Any number of Groups can be set within the limit of 126 controllers on the MS/TP network

Temp Units this can be set to: **deg C or deg F**

## Control Options

All the control strategies can be viewed and selected through the optional controller display.
The control strategy options are: -
1 stage heat and cool from one 0-10V output with SP at 5V
1 stage heating or cooling with summer/winter option
2 stage heating/ventilation
2 stage heating/cooling
2 or 3 stage heating with single stage cooling
2 or 3 stage cooling with single stage heating
2, 3 or 4 stage heating only
2, 3 or 4 stage cooling only
3 stage heating/vent/cooling.
1 or 2 step On/Off Control (using the Triac switching outputs or the on-board relays)

In addition to the temperature controls strategies the controller incorporates relative humidity control and an option for CO2 air quality measurement and control .

## User Display & Settings

The in-built display allows the setup and configuration of the control options as well as showing details on the status and mode of operation.

The Titan Field Programming Tool FPT-601 can also be used for the controller setup as well as for up copying and loading new control configurations if required.

**Control Outputs**
The 0-10V outputs AO1 to AO4 control strategies are configured at the controller setup and provide PI control. The 0-10V outputs can be assigned for heat, cool, vent or fan control and all the analogue control outputs have a min and max control range settings. The 2 x 24Vac Triac outputs are also available for control and can be used for TPC floating control of Heat or Vent or Cool or PWM used for heat or Fan Control. In addition the 2 x Triac can be set for 2 stage DX cooling (on/off control) with a differential setting between each switched output and a Hysteresis setting.

The 2 x voltfree relay outputs can be used for starting associated plant such as Heat enable, Fan Control Enable or On/Off control.

**Inputs**
There are 4 temperature sensor inputs which can be used for control (with averaging), low/high limit control functions and summer compensated scheduling also these inputs if not used for temperature control can be configured to provide a temperature reset function from a 1k to 11K potentiometer.

The 7 inputs can be used for 0-10V or volt free DI's and these can be allocated for any of the standard options that are available from the setup menu.

**Fault Indication**
If any of the control temperature sensors (SEN1 to 4) goes faulty then the controller display will indicate the fault. In addition the controller allows viewing of the status of any of the DI inputs that are used for controller interlocks such as Fan Prove Fail, HTCO Fail, Condense Stat Active, etc.

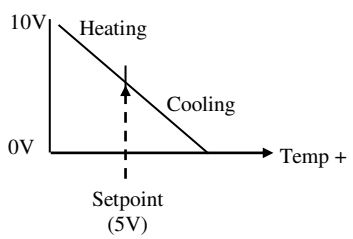
**Setting the Control Parameters**
All the settings and configuration options are accessible via the controller display or FPT601 Field Programming Tool and these consist of the following:

**Control strategy type**
**Input and output configuration**
**Controller setpoint**
**Minimum setpoint value**
**Maximum setpoint value**
**Integral time**
**Proportional band Pb**
**Dead band Db**.
**Inter-stage dead band**
**Time scheduling**

## Control Strategies

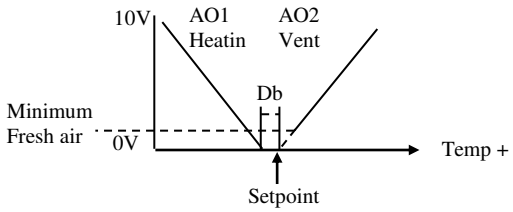
### Single stage Heat/Cooling for one 0-10V output

The selection provides a single output temperature control on a selected AO with a setpoint balanced at 5V. This control strategy is designed for mid-position valve or damper control such as hot & cold duct systems.



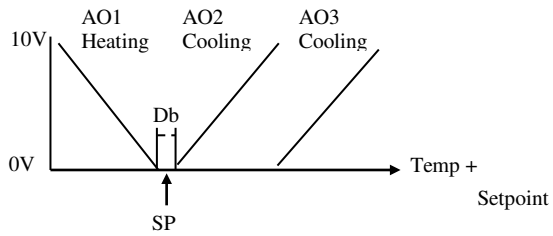
**1 Stage Heating and 1 Stage Ventilation**

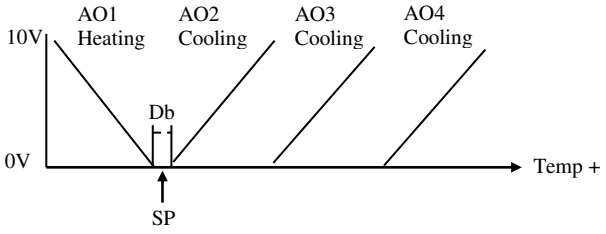
The selection provides temperature control for heating with the second AO used for ventilation. The selection provides optional settings for minimum fresh air and Dead band (Db) between the heat/vent cycles (see minimum ventilation selection).

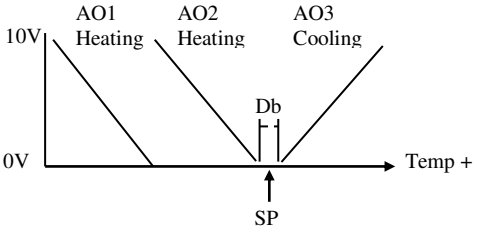


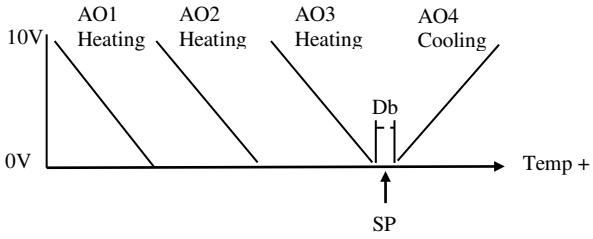

**Heating & Cooling Control Strategy Options (with Dead band Db)**

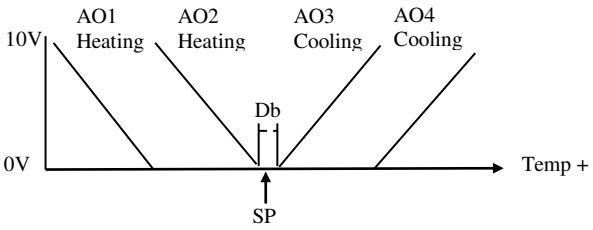
The selections provide PI temperature control with the set point between heat and cool cycles and a Dead band (Db) setting.



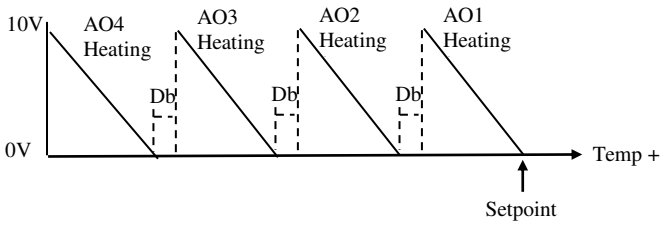



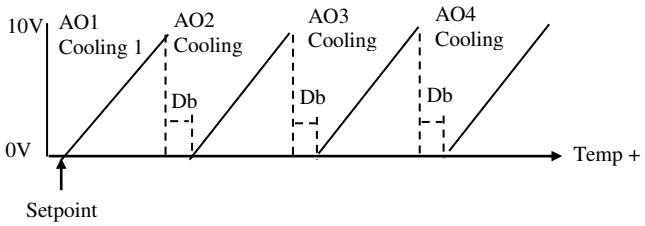

**2 to 4 Stage Sequence Control of Heating (with Dead Band Db)**

The selection provides PI temperature control for up to 4 stages of heating with an inter-stage Dead Band (Db) setting.



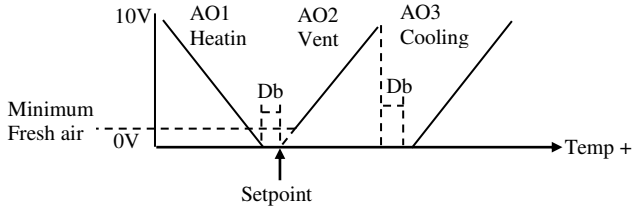
**2 to 4 Stages Sequence Control of Cooling (with Dead Band Db)**

The selection provides PI temperature control for up to 4 stages of cooling with an inter-stage Dead Band (Db) setting.




**3 Stage Heat/Ventilation/Cooling (with Dead Band Db)**

The selection provides PI temperature control for heating, ventilation and cooling in sequence. In this selection the ventilation output AO2 can be reduced to the minimum fresh air value when the cooling on output AO3 is activated by the controller. This action ensures "Economy of Cooling" and is an option selection when required.




Note:- Any of the AO (0-10V) outputs can be allocated to perform Fan control (see fan control settings)

**Control Settings and ranges**

**Minimum Ventilation %** (0 range 0-100%)
This setting for minimum fresh air is only allowed on control strategy selections that include ventilation. This setting is the minimum output value of the vent AO under normal control conditions. When the controller is switched OFF the output goes to 0V. See also Boost Termination setting which can affect the position of the ventilation with this control action.

**Boost Required** (Off or On)
This setting is only allowed on Control Strategy selections that include ventilation. The setting is designed to keep the ventilation output at zero (fully closed) during the heat up cycle after an Off period. See Boost Termination when Boost On is selected.

**Boost Termination** (Default 'C range 1 to 30'C)
If Boost is selected to ON. When the controller is switched On for normal operation the ventilation output is kept at 0V (fully closed) until the temperature measured on the control sensor and set in Boost Termination is achieved. Once the Boost Termination value is reached then the ventilation output will take up normal control and/or the minimum fresh air value if selected.

**Vent Reset to Min% in Cooling (Yes/No)**
**Vent min % value during cooling.**
**Vent Reset Control (fixed or Ext Temp)**
The purpose of these setting is for economy to reset the vent to a min% open position when the temperature control calls for cooling. This influence could be on a fixed action when the cooing output becomes active or by the use of an external temperature sensor at a fixed set value. If ventilation reset is on the external temperature then the vent is set to the min% when cooling is called if the external temperature is equal to or above the control temperature setpoint.

**Low Limit Temperature Sensor**
An optional low limit temperature sensor can be fitted in the discharge air duct to prevent cold air entering the occupied space and this will reset (reduce) the cooling or vent or increase the heating input. By automatically reseting the setpoint level.

**Low Limit Setpoint** (range 0-50'C)

**Low Limit PB** (1-5)'C)

**High Limit Temperature Sensor**
This is an optional control selection using the same discharge temperature senor to reduce the temperature input if the supply air exceeds the high limit set value.

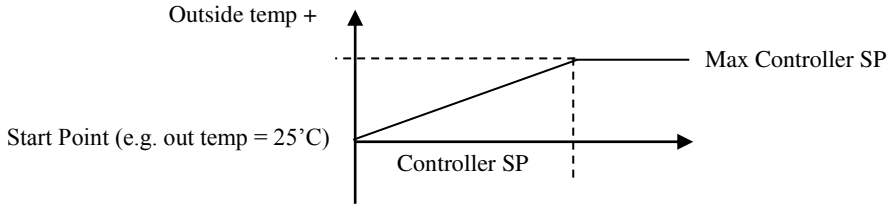
**High Limit Setpoint** (range 20 to 80'C)
**Low Limit PB** (1-5)'C)

**Remote Reset of Controller Setpoint**
A setpoint reset can be a resistive pot (1 to 11K) into any of the unused temperature sensor inputs or a 0-10V connected to any of the analogue inputs.

**Remote Reset Value** (range up to +/- 10'C)
If a remote reset action is selected then the reset value is shown indicating the maximum reset influence of the RSA and the value is + or - from the controller setpoint.

**Summer Compensation**
If selected this action raises the controller setpoint as the outside temperature increases above the required inside temperature. The reason for this is to economise on cooling in the summer months when the external temperature is high and the internal comfort setpoint can be increased.

Summer compensation needs:-
A start point 'C of external temp which will be above the normal controller setpoint. (Range 15 to 35'C)
A ratio for the increase of SP for each 'C rise in external temp above the start value (range 0.5 to 2'C)
A controller Setpoint high limit when the reset by summer compensation is inhibited. (range 15 to 30'C)

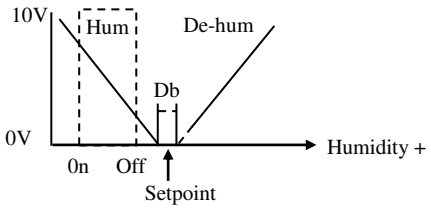



**C02 Sensor input**
If configured in the setup this sensor will be used to increased the ventilation rate subject to the rising C02 levels. The influence will take priority over the normal temperature position of the ventilation and the following settings are available.
C02 SP level
C02 Pb
Max Vent C02 position
When C02 priority vent control is in operation the normal temperature control of the heating or cooling cycles continues. If fan speed control is used then after the vents have reached fully open and if there is still a requirement to decrease the C02 level then the fan speed will increase, until such time that the internal C02 levels start to drop.

**Fan Speed Control**
If the option for fan speed control is configured then the following settings are available:-
Auto Fan Control
Min and Max ouput (0-10V)
Number of speeds (1 to 10)
'C differential setting for each stage
PB setting
Ouput slew rate time to prevent hunting.

**Humidity Contol.**
This can be selected on any of the 0-10V analogue inputs with a range of 0-100%RH.

**Dehumidification** takes place by decreasing the supply air temperature which in turn removes moisture from the air then the air is re-heated back to the desired comfort level. A high humidity above the design setpoint takes priority over the cooling control output but the normal temperature control of heating remains for re-heat as and when required.
To provide flexibility of control the following settings are available:
**Humidity SP (range 0 to 100%)**
**Humidity PB (range 0 to 50%)**
**Hum Max V** out of the cooling valve under De-hum action. (range 0 to 10V)
**Hum Db (range 0 to 50%)** this creates a dead band between the start values of Hum and Dehum see diagram




Whilst the above diagram shows 0-10V for humidification the controller offers a a number of humidity control options.

a) 0-10V proportinal control (allocated to one of the AO's)
b) Triac TPC control (use triac ouputs 1 & 2 for 24V AC floating control)
c) PWM onto a heater/vaporiser (use triac output 1 or 2)
d) On/Off (use traic output 1 or 2)

NOTE:-
If deumidification is controlled from a room/space sensor it is advised to use the low limt discharge temperature control option to prevent excessive cooling taking place. Limiting the amount of cooling in the dehum cycle may result in a small delay in the return to the humidity SP but this may be preferable to suppling excessive cold air into the occupied space. In the full control cycle this low limit will effectivetly increase the activate a re-heat after the cooling dehumidifcation process.

**Night Setting** (Off, ECO or Frost)
This is to select the controller status when the controller is switched into the Off condition. Options are: -
Off = No Frost Protection, NSB or ECO operation is provided.
NSB = Night set back of the controller setpoint.
ECO = A new operating SP which is determined by increasing the controller deadband by the ECO value.
Frost = In the Off condition Frost protection is provided.
High = Protection to switch on in a cooling mode when high temp is experienced.

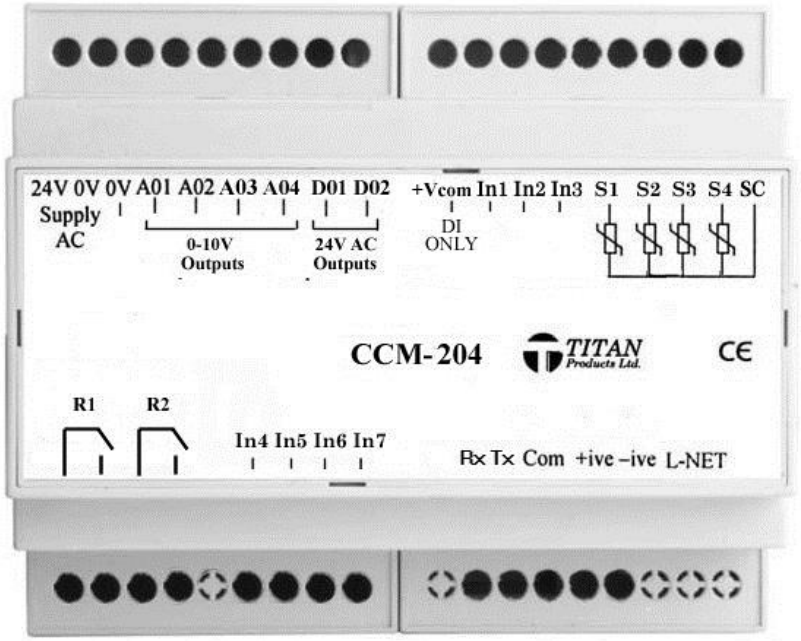
**Scheduling (Time Clock)**

The controller incorporates the real time clock option and when fitted this will allow weekly occupancy programming with annual holdiday scheduling.

**Input Expansion**

A TITAN IO/DIM4 module can be used to expand the number of inputs.

## STANDARD CONNECTIONS



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