price® ELECTRONICS

UMCB
UNDERFLOOR MODULATING CONTROLLER FOR TERMINALS

SERVICE & INSTALLATION MANUAL

Important Safeguards

When using electrical appliances, basic safety precautions should always be followed including the following:

1. Read all instructions.
2. Do not touch hot surfaces.
3. To protect against electrical shock do not immerse cord, plugs, or Control Box in water or other liquids.
4. Unplug the unit when not in use and before cleaning.
5. Do not operate any appliance with a damaged cord or plug or after the appliance malfunctions or has been damaged in any manner. Return appliance to the nearest authorized service facility for examination, repair or adjustment.
6. The use of accessory attachments not recommended by the appliance manufacturer may cause injuries.
7. Do not use outdoors.
8. Do not let cord hang over edge of a table or counter, or touch hot surfaces.
9. Do not place on or near a hot gas or electric burner, or in a heated oven.
10. Always attach plug to appliance first, then plug into the power source. To disconnect, turn any control to “off”, then remove plug from power source.
11. Do not use appliance for other than intended use.
12. Save these instructions.

Date: 04/09
Reference #: G-61

Contents

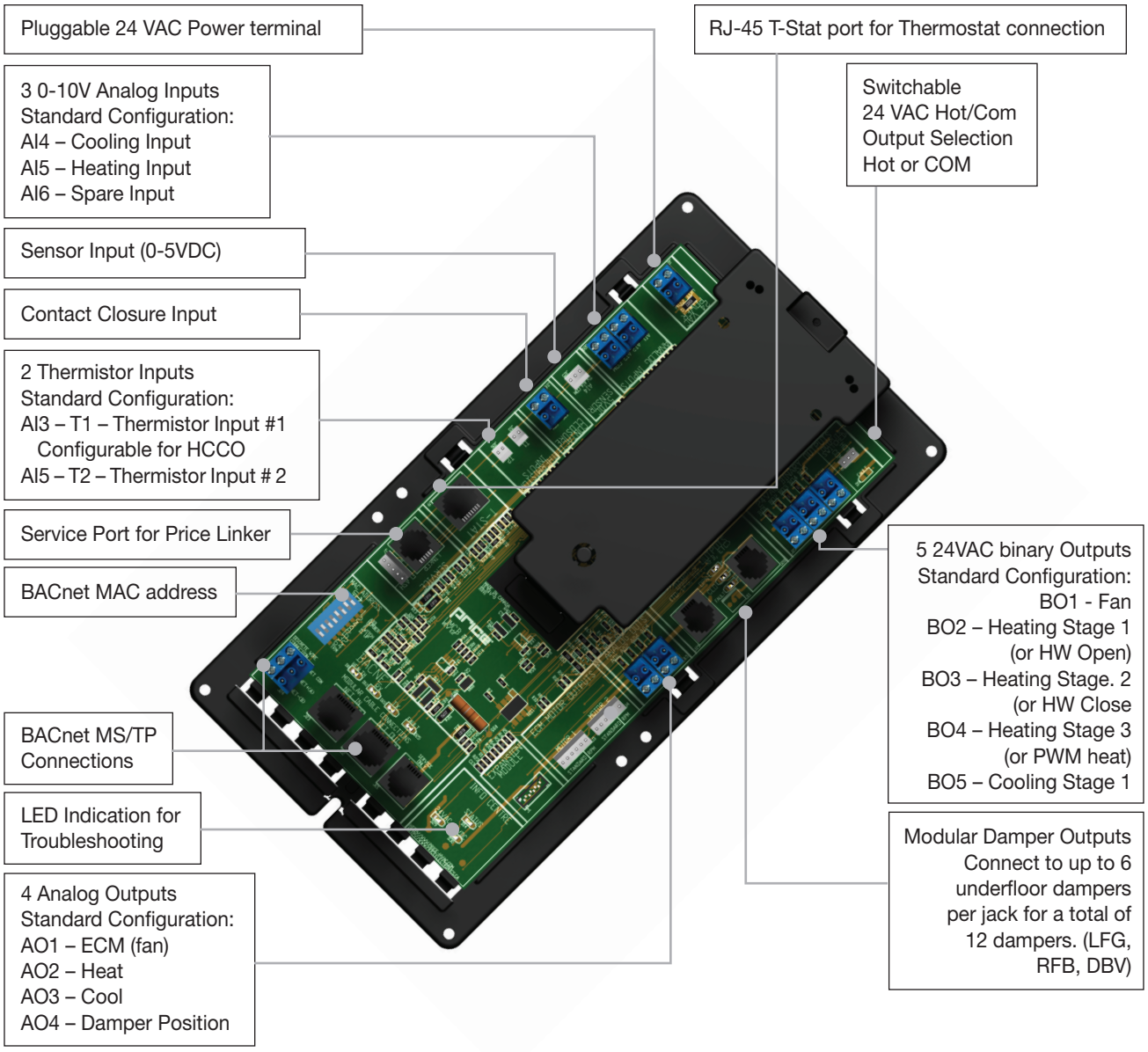
General Description

UMCB – Underfloor Modulating Controller for Fan Terminals

The Price Underfloor Modulating Controller (UMCB) is a direct digital controller for underfloor fan terminals in a pressurized underfloor plenum. The UMCB combines the accuracy of direct digital control with the flexibility of an individual room control system, providing maximum control and efficiency. An advanced and configurable proportional integral controller allows for exceptional user comfort and energy efficiency. Installation of the controller and thermostat is simple and error proof with RJ-45 (network type) connections to the thermostat and BACnet network.

The UMCB is typically controlled by one of the four Price thermostats, however it can also be controlled by a third party T-Stat (using dual 0-10V inputs) or BMS system.

The UMCB typically comes factory mounted to Price FDBU underfloor terminals, but may also be ordered stand-alone for retrofit jobs.



Operation of the UMCB

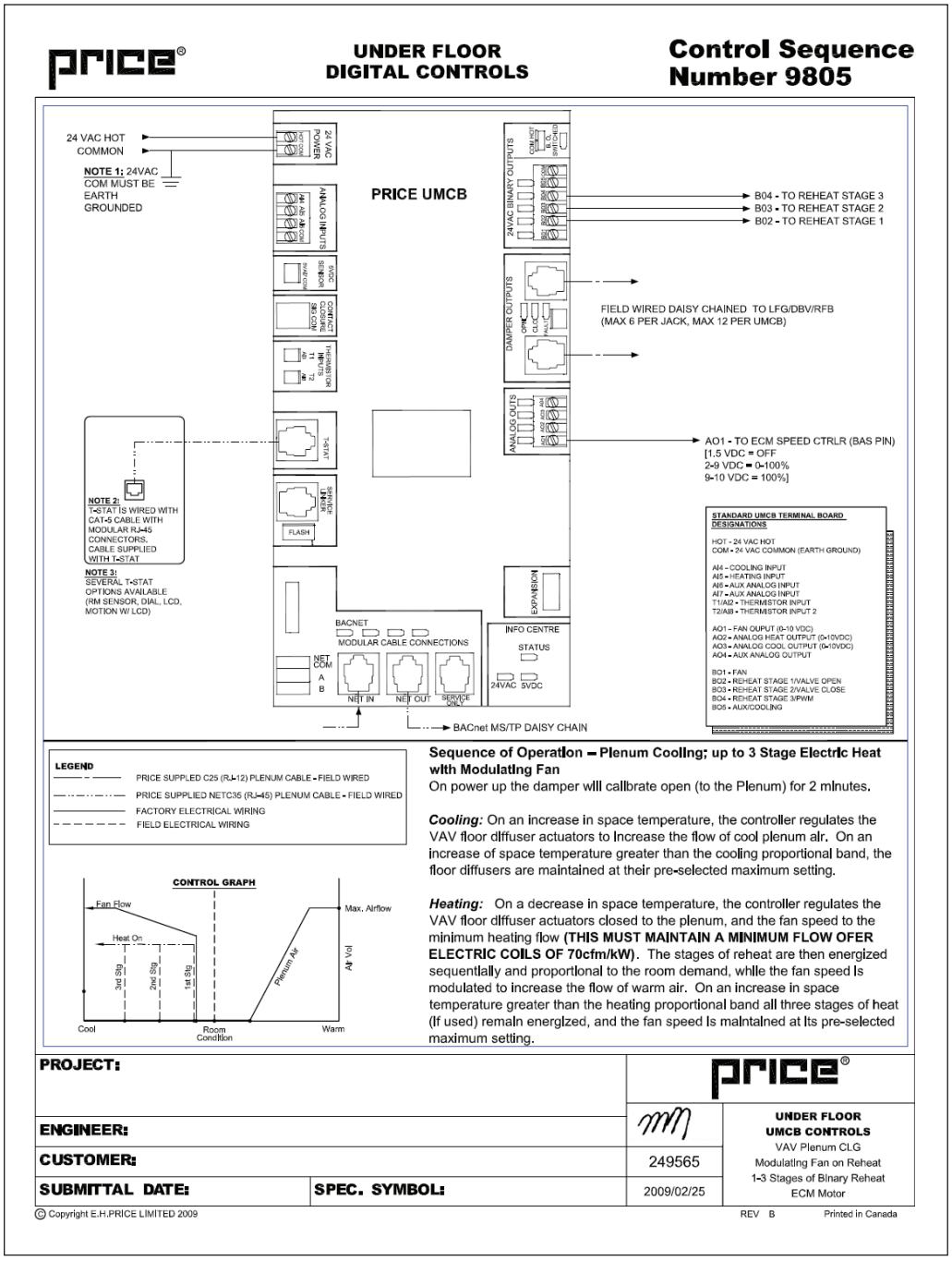
The UMCB is an advanced and fully configurable underfloor modulating controller. It is typically interfaced with one of 4 Price Thermostats to determine room load and allow for setup functions. With a variety of output configurations, the UMCB can control fan terminals with modulating or binary (on/off) fan functions, electric or Hydronic reheat, and up to 12 plug & play modulating dampers.

The UMCB is typically factory calibrated with one of the Price standard underfloor sequence of operations. (9800 series)

The UMCB can be used as a stand alone unit, or can be interfaced into a BAS with the MS/TP BACnet network.

The UMCB offers 4 thermostat options that provide a range of control from room temperature sensing, all the way to motion sensing. With the use of the LCD Thermostat, balancing and system setup can be achieved. Further, with the use of the LCD Thermostat with Motion, the UMCB can be used as a motion-occupied zone and lighting controller. The LCD Thermostat with Motion offers different levels of sensitivity and still performs all the functions of the regular LCD thermostat.

The UMCB can also be configured to accept 0-10v input signals from a BAS system or 3rd party T-Stat for room load calculations, instead of data from the Price thermostat.



Installing the PIC

1. Mount the controller to the fan terminal in a protective controls enclosure free of dust and other contaminants.
2. Connect any of the controller's outputs as required. Note: when the output loads require a switched HOT or COMMON 24 VAC signal. Use the jumper near the BO5 output to select HOT or COMMON outputs.
3. Power the UMCB using 24 VAC, the secondary 24 VAC common of the transformer must be earth grounded.

Features of the UMCB

- 24 VAC Binary Outputs (7) – A variety of binary outputs for heating, cooling or fan operation which are rated for maximum 0.5 amps each. Max: 1.85 amps total. Field switchable from HOT to COM.
- Modular connections to dampers – Use RJ-12 cables included with dampers to connect underfloor dampers to UMCB.
- Outputs protected by self-resetting thermal fuses – prevents damage to circuit board in the event of a shorted output or damaged damper cable. Fault LEDs light up when shorted/overloaded output is attempting to engage, or when dampers are trying to drive on an output with a damaged cable.
- Analog Outputs (4) – Fully configurable (2-10vdc, 0-10vdc, 10-2vdc etc.) outputs for heating, cooling, fan operation, and auxiliary, rated at maximum 10 mA each.
- Analog input 0-10VDC (4) – Used for sensor voltage monitoring, or can be configured to control the UMCB using dual 0-10VDC cooling/heating inputs instead of a Price T-Stat.
- Sensor Input (5VDC) – Available for monitoring and control with custom control sequences.
- Therm Sensor Input (2) 10K type J thermistor – Used for temperature monitoring, the 2 thermistor values can be viewed over the BACnet network. Heat/cool changeover is also possible with custom control sequences.
- Contact Closure Input (1) – night setback or damper override.
- Native BACnet MS/TP communication – providing a native BACnet MS/TP interface. Connect using included RJ-45 cable, or use discrete twisted-pair wire to terminal block. Available speeds: 9600, 19200, 38400, 76800 (default).
- T-stat port - for RJ-45 connection to thermostat from the PIC controller.
- Service Port – RJ-12 port used to connect Price Linker for system balancing and setup, or to connect an LCD Thermostat for system balancing and setup. The LINKER is a USB 2.0 interface to Price controls and is used in conjunction with FREE setup and balancing software available from Price.
- LED Indication – for ease of troubleshooting.
- Pluggable terminal blocks – for ease of installation and wiring.

Input/Output Description

24VAC Binary Outputs	Binary Output for On/Off control of a fan. Multiple configurations. For example:
BO1 - Fan	• Intermittent Heating – Fan runs when there's a call for heating to move air across reheat coils and into the occupied space • Intermittent Heating and cooling – Fan run when there's a call for heating or cooling to deliver conditioned air into the occupied space. • More configurations available with custom sequences.
BO2 – Heat Stg. 1	• Binary (electric, or binary hot water) • Tristate (floating) open signal of hot water valve
BO3 – Heat Stg. 2	• Binary (electric, or binary hot water) • Tristate (floating) open signal of hot water valve
BO4 – Heat Stg. 3	• Binary (electric, or binary hot water) • 24VAC PWM to SSR (10 second period – requires solid-state relay)
BO5 – Cool Stg. 1	Binary Output for one stage of cooling if required. Can be used as an auxiliary binary output with custom sequence if required

Analog Outputs	
AO1 – Fan	Analog Output for any type of modulating fan (0-10vdc, 2-10vdc, 10-2vdc etc.)
AO2 – Heat	Analog Output for modulating heating valve (0-10vdc, 2-10vdc, 10-2vdc etc.)
AO3 – Cool	Analog Output for modulating cooling valve (0-10vdc, 2-10vdc, 10-2vdc etc.)
AO4 – Damper	Analog output for 0-10V damper. Damper position: (0-10vdc = 0-100%)

Analog 0-10VDC inputs	
AI4 – Cooling Input	• Can be configured (along with AI5) to control the UMCB from a 3rd party T-Stat. In this configuration, AI4 is the 0-10VDC cooling load input. • Can also be used for simple voltage monitoring when analog inputs not configured as control source.
AI5 – Heating Input	• Can be configured (along with AI4) to control the UMCB from a 3rd party T-Stat. In this configuration, AI5 is the 0-10VDC heating load input. • Can also be used for simple voltage monitoring when analog inputs not configured as control source.
AI6 – Auxiliary	Typically used for voltage monitoring over BACnet network.

Additional Inputs	
AI7 – 5VDC sensor	Typically used for voltage monitoring over BACnet network.
Contact Closure	Configurable Binary Input can be used for night setback, damper force open/close etc.
AI3 – T1 Thermistor	Analog Input for temperature probe hookup with 10k Type J Thermistor. • Typically used for temperature monitoring over BACnet network • Can also be configured for heat/cool changeover if required.
AI8 – T2 Thermistor	Typically used for temperature monitoring over BACnet network.

Switched HOT/COM Jumper: UMCB offers a jumper selectable HOT/COM switch that allows the binary outputs to be switched HOT or switched COMMON.

COM Terminals: All COM terminals on the UMCB controller are internally connected, which allows for a common reference point throughout the board.

T-Stat RJ-45 Port: The UMCB comes equipped with an RJ-45 port to provide ease of plugging in a thermostat cable from the the controller to any of the selected thermostats. The thermostat cable is supplied by Price.

Service Port: The UMCB comes equipped with an RJ-12 port to provide ease of plugging in an RJ-12 cable to the Price Linker for system balancing and setup, or to connect an LCD Thermostat for system balancing and setup. The LINKER is a USB 2.0 interface to Price controls, and is used in conjunction with FREE setup and balancing software available from Price.

Price - Flow Response Chart

HCCO box		Cooling Min	Cooling Flows	Heating Min	Heating Flows	Neutral Supply Air Flow
PI = Cooling	Duct air = Cold		X			
PI = Heating	Duct air = Cold			X		
PI = Neutral	Duct air = Cold	X				
PI = Cooling	Duct air = Hot	X				
PI = Heating	Duct air = Hot				X	
PI = Neutral	Duct air = Hot	X				
PI = Cooling	Duct air = Neutral					X
PI = Heating	Duct air = Neutral			X		
PI = Neutral	Duct air = Neutral					X

***Note1**: By default the UMC3 is shipped configured for COLD SUPPLY AIR ONLY. This can be changed to enable HCCO with T1 thermistor probe (however this will almost NEVER be the case)

***Note2** : PI = Proportional Integral = room load (either cooling/neutral/heating)

Above is a Flow Response chart for the PIC controller, showing the demand, Duct Air condition, and the controller's output.

E.g.: PI = Cooling, Duct Air = Cold, Output = Cooling Flows. This indicates that the Room Demand is in Cooling, the Duct Air is Cold, and the controller would modulate between the Cool Min and Cool Max values.

TECH TIP: Use the above table to determine what airflows are being chased in certain modes.

Example: If UMCB is trying to heat the room (PI = heating) and cool air is being supplied (Duct air = Cold) it will chase its heating min flow.

NOTE: In all cases, the damper position is always set in reference to the Plenum air.

Therefore, when using LFG-HC dampers (ducted from terminal on one side, open the plenum on the other), 100% would mean open to plenum, and closed to fan terminal. 0% would mean closed to plenum, and fully open to the fan terminal

UMCB – Underfloor Modulating Controller – Thermostat Options x 4

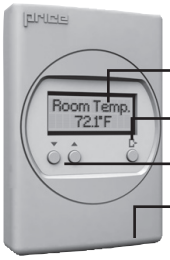
All thermostats are connected with a CAT-5 cable (RJ-45) connection from the UMCB to the back of the selected thermostat. Each thermostat has an RJ-12 Service Port on the bottom, providing a computer interface using the USB LINKER service tool for setup and balancing, and without having to access the plenum

Room Sensor Thermostat: PIC-TS-SENS

- Set point adjust from hidden dial on the back
- Setpoint Adjust – from hidden dial on the back
- Service Port - Linker Connection

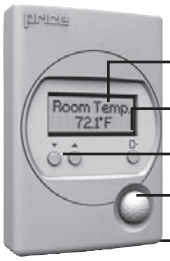
Dial Thermostat: PIC-TS-DIAL

- Dial Adjustment for Temperature
- LED – 1 blink cooling mode, 2 – heating, 3 - neutral
- Occupancy Override Button
- Service Port - Linker Connection



LCD Thermostat: PIC-TS-LCD

- LCD screen for menu display
- Menu Button
- Increase and decrease push buttons for day temperature setpoint adjustment
- Service Port - Linker Connection



LCD Thermostat w/ Motion Sensor: PIC-TS-MOTION

- LCD screen for menu display
- Menu Button
- Increase and decrease push buttons for day temperature setpoint adjustment
- Motion sensor allows for automatic detection of occupancy
- Service Port – Linker connection

Thermostat Installation

General Description

The UMCB thermostats are all physically the same size and mounting instructions will be typical.

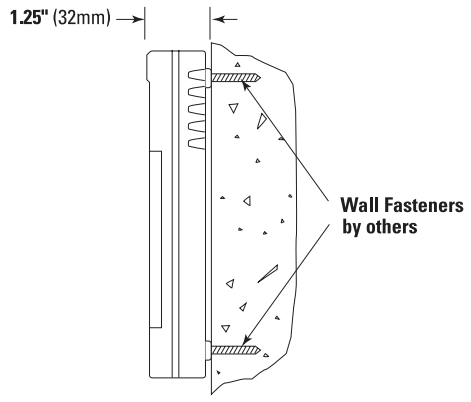
Location

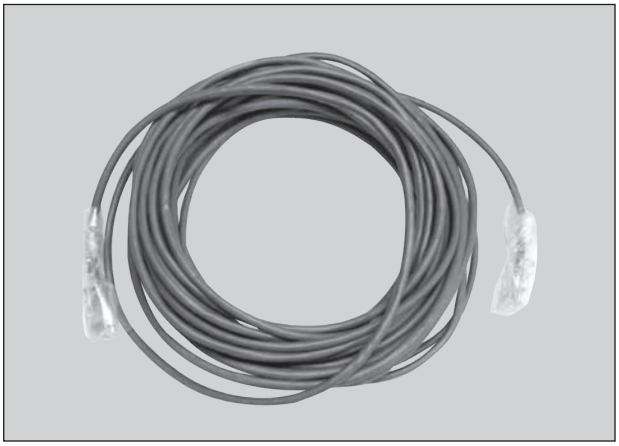
1. Thermostats must be mounted to a wall and wired to the controller via the supplied plenum rated 35ft CAT-5 cable. This cable plugs into the thermostat and the UMCB with the ease of RJ-45 connections. Note: the cable run can be extended to 70 ft using a Price cable coupler and additional 35ft cable.
2. Mount the required thermostat in a place that is convenient for the end user, but the following should be taken into consideration:
   - Do not mount a thermostat in direct sunlight i.e. across from a window where heat can alter the temperature reading.
   - Should not be installed on an outside wall.
   - Keep away from hot equipment like computers, monitors and heaters etc.
   - Ensure nothing will restrict vertical air circulation to the thermostat. (Do Not Cover)
   - Ensure wall is NOT pressurized! Hot/cold air from a pressurized wall will direct blow onto the thermostat's temperature sensor causing 'bad' readings.

Installation

1. The back plate on each thermostat is removable and can be mounted to a standard electrical box or directly to drywall using anchors supplied by others.
2. Run the CAT-5 cable through the center hole in the plate. Connect the cable to the thermostat, then secure the thermostat onto the wall plate inserting top portion of the thermostat first, then snapping the bottom half in.
3. All thermostats will come equipped with a 0.050" Allen key for the set screw at the bottom.

Surface Mount Detail





35 foot plenum rated cable included with thermostat (PIC-CABLE)

TECH TIP: Careful thermostat installation will reduce field issues! Do not twist or kink the blue CAT5 thermostat cable. Damaged cables are difficult to troubleshoot!

Thermostat cable product code: PIC-CABLE

How to use the Room Sensor Thermostat

- The Room Sensor Thermostat is powered from the UMCB.
- Measures room temperature.
- Set point can be adjusted from a hidden dial on the back of the T-Stat using a small flat-head screw driver.
- Setpoint limits can be adjusted through free setup software using the Price LINKER, or through a BACnet system.
- Eliminated problem of unauthorized tampering to the thermostat.
- Occupancy button can be used to override the system during unoccupied times Default setting is 4hrs.

How to use the Dial Thermostat

- The Dial Thermostat is powered from the UMCB.
- Measures room temperature & features a dial adjustment & an occupancy button.
- Temperature Setpoint limits can be adjusted through free setup software using the Price LINKER, or through a BACnet system.
- Simply use the adjustable dial for temperature adjustment.
- Occupancy button can be used to override the system during unoccupied times Default setting is 4hrs.

How to use the LCD Thermostat

- The LCD Thermostat is powered from the UMCB controller and has a variety of features.
- Measures room temperature and features an LCD screen with push button day setpoint adjustment.
- Temperature set point limits are set through free setup software using the Price LINKER, or through a BACnet system.
- LCD Thermostat can also be used as a balancing tool for the Price Intelligent Controller system by simply connecting the RJ-45 cable to the back of the thermostat.

How to use the LCD Thermostat with Motion Sensor

- The LCD Thermostat with Motion Sensor is powered from the UMCB controller and has a variety of features as well.
- This model measures room temperature, features an LCD screen with day Setpoint adjustment, and motion sensor with lighting control.
- Temperature set point limits are set through free setup software using the Price LINKER, or through a BACnet system.
- The LCD Thermostat with Motion Sensor can be used as a balancing tool for the Price Intelligent Controller system by simply connecting the RJ-45 cable to the back of the thermostat.
- This thermostat can also be used as a motion sensor for occupied and unoccupied times in a space. It also has the capability to act as a lighting controller for occupied/ unoccupied schedules.

Initial Startup – LCD & Motion thermostat only

When the LCD thermostat is powered from the UMCB, it will display the following information:

Price Electronics	Start up screen
LCD Thermostat Standard Model	Standard/Motion Model
LCD Thermostat Version X.XX	Displays firmware version of thermostat
Loading Initializing..	Loading parameters
UMCB Version X.XX	Controller type and controller firmware version.
Sequence xxxx	Displays sequence programmed into stat Note: a sequence number of 0 means the stat has NOT been calibrated
MAC Address XXX	Displays current MAC Address
Device Inst. XXXXXXX	Displays current Device Instance
Room Temp. 75.0°F	(For Example)

Changing the setpoint – LCD & Motion thermostat only

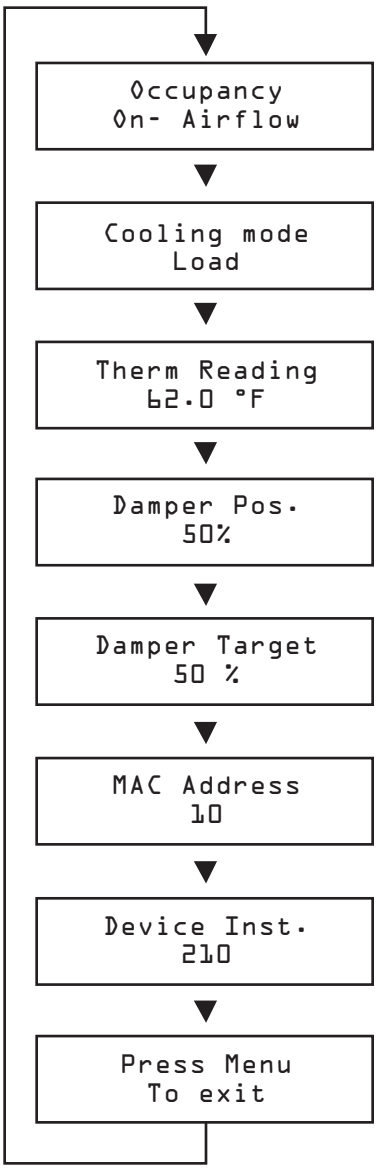
Day Setpoint Adjustment
Increase and decrease push buttons for Day set point adjustment

Day Setpoint 75.0° F
Day Setpoint Saving.....

Info Menu – LCD & Motion stat only

The info menu shows information about the controller status regarding room load, damper position and BACnet address info. No values can be changed from this menu and it is not locked or protected in any way.

- The User Menu is accessed by hitting the Menu button
- Scroll through with the UP and DOWN buttons



Occupancy
The Occupancy can be determined by airflow, contact closure, motion or by a user pressing a button.

Room Load
- Cooling Mode is shown as a load from -1 to -100%. (-100% = max)
- Heating Mode is shown as a load from 0 to 100%. (+100% = max)
- Dead band Mode will be shown as 0%, where the room is satisfied.

Thermistor #1 Input Reading
- If no probe is present, LCD will display No Probe.
- If probe present, LCD will display temperature.

Damper Position
- This indicates the current position of the damper in percent. (%)
- Range is 0-100% (100% = full open or maximum air)

Damper Target:
- This indicates the current target of the damper in percent (%).
- This target is where the damper is currently driving towards

MAC Address (MAC address must be unique on the network segment)
- Shows the BACnet MAC address. Range 1-99
- MAC Address can be set via dip switch.
- If no BACnet module attached, LCD will display MAC address None

Device Instance (Instance must be 'globally' unique on your site)
- Displays controller's BACnet Device Instance (if BACnet is attached)
- Device Instance can range from 0 – 4,194,303.

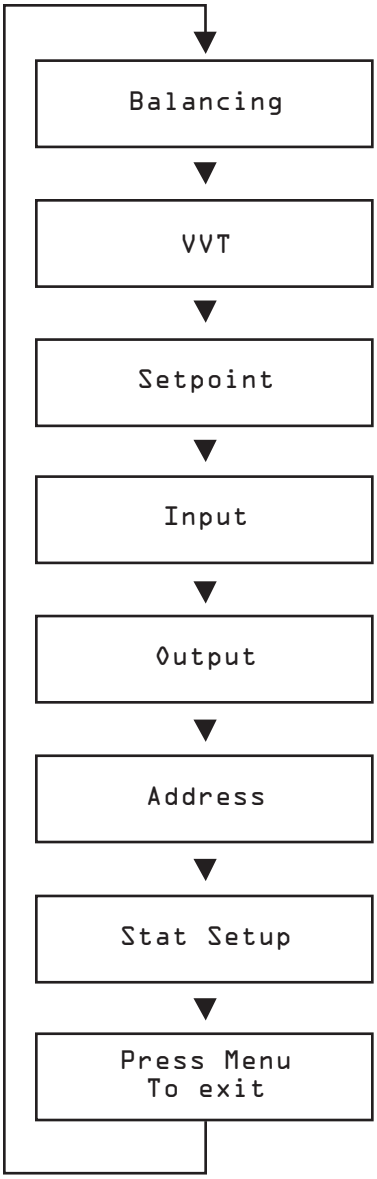
Exit
- This will exit the info menu if you press the Menu button
- Note: Info menu will automatically time out after 60 seconds

Service Menu – LCD Stat Only

The service menu allows the balancer/installer to access to the controller setup to change settings. For example setting flows, heating outputs, etc.

- Hold down the Menu button for 5 seconds
- Display shows `Passcode:`
- Use the up and down buttons to enter the password in this sequence:

DOWN UP UP DOWN



Balancing
- Allows you to force damper open/close/min/max
- See page 15

VVT
- Allows you to set limits (%) in VVT mode
- See page 16

Setpoint
- Setup of Setpoint limits (day minimum/maximum)
- °F / °C selection
- See page 17

Input
- Shows thermistor reading
- Allows setting of HCCO if desired
- See page 18

Output
- Allows setup of auxiliary Binary and Analog inputs
- Allows setup of room light output (motion stat only)
- See page 19-20

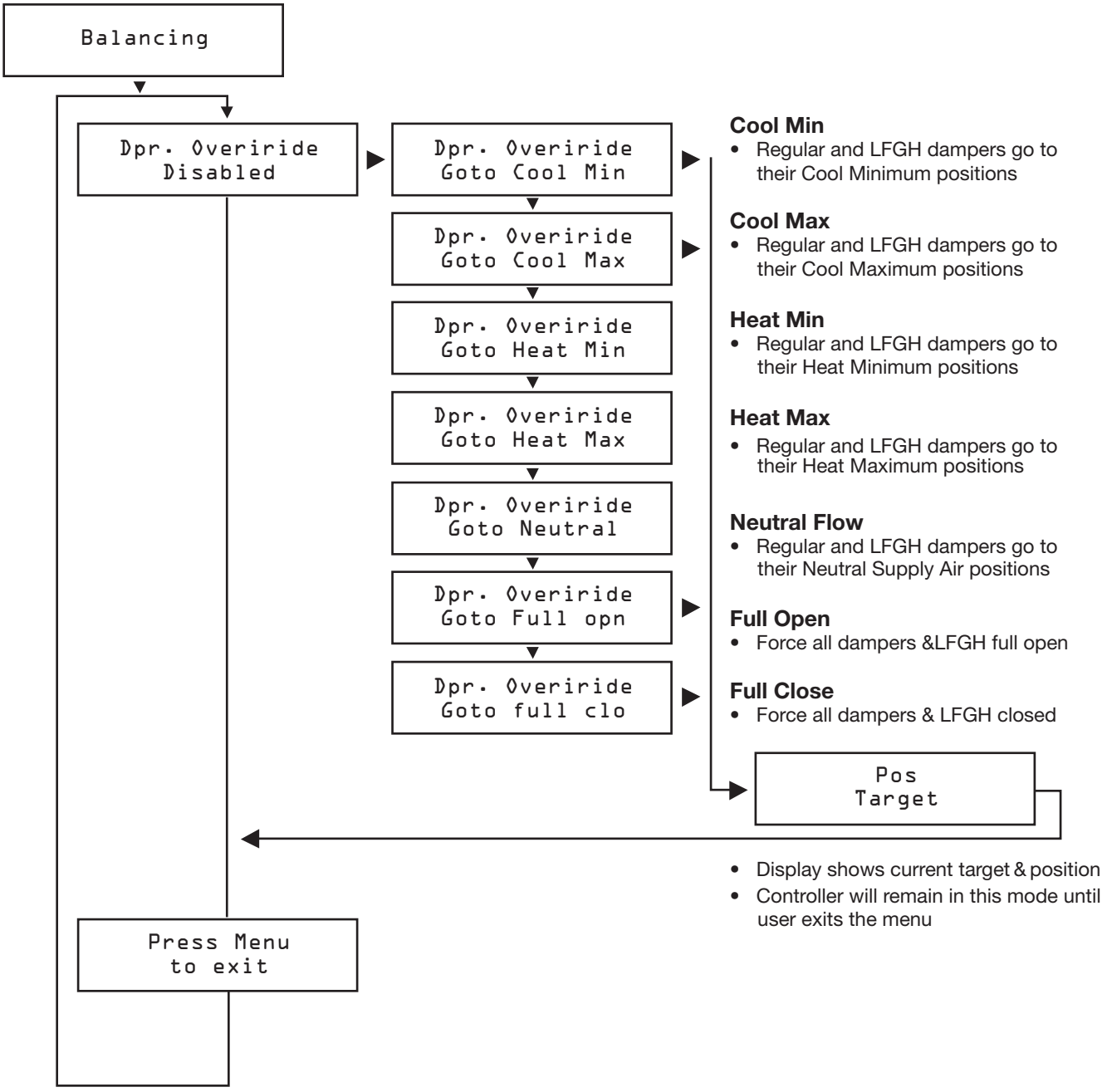
Address
- Allows setup of BACnet addresses
- MAC address, Device Instance Baud Rate
- See page 21

Stat Setup
- Allows setup of LCD back lighting, sounds, motion sensor
- Adjustment of HVAC and room lighting timeouts
- See page 22

Exit
- This will exit the SERVICE menu if you press the Menu button
- Note: Service menu will automatically time out after 20 seconds

Balancing Menu

- Scroll through with the UP (▲) and DOWN (▼) buttons
- Press Enter to apply your changes (⏎)
- Saving…… will display as your changes are applied



Cool Min
- Regular and LFGH dampers go to their Cool Minimum positions

Cool Max
- Regular and LFGH dampers go to their Cool Maximum positions

Heat Min
- Regular and LFGH dampers go to their Heat Minimum positions

Heat Max
- Regular and LFGH dampers go to their Heat Maximum positions

Neutral Flow
- Regular and LFGH dampers go to their Neutral Supply Air positions

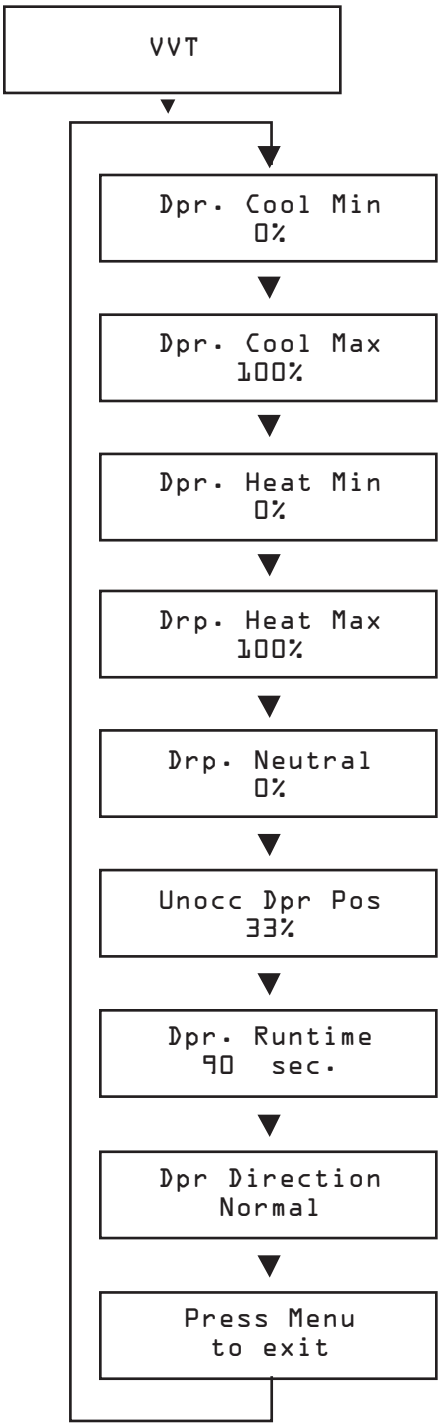
Full Open
- Force all dampers &LFGH full open

Full Close
- Force all dampers & LFGH closed

- Display shows current target & position
- Controller will remain in this mode until user exits the menu

VVT Menu - Pressure Dependent Mode

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



Damper Cool Min Position
- Cool Minimum Position in %
- Range: 0-100% Default: 0%

Damper Cool Max Position
- Cool Maximum Position in %
- Range: 0-100% Default: 100%

Damper Heat Min Position
- Heat Minimum Position in %
- Range 0-100% Default: 0%

Damper Heat Max Position
- Heat Maximum Position in %
- Range 0-100% Default: 100%

Damper Neutral Supply Air position (not normally used)
- Damper position (in %) when Neutral supply air is present
- Range 0-100% Default: 0%

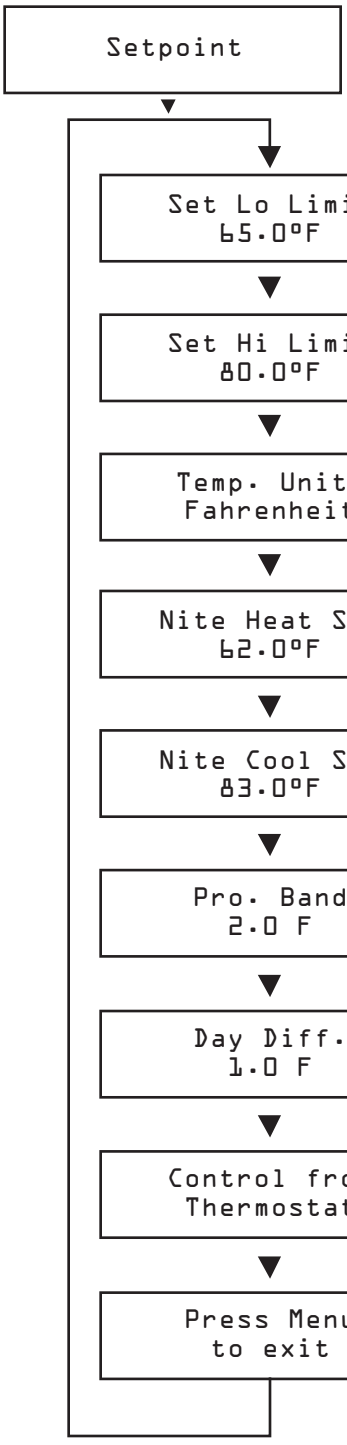
Unoccupied Damper Position
- Unoccupied (night Setback) Damper Position in %
- Range: 0-100% Default: 33%

Damper Runtime
- Damper runtime (time to drive through entire damper range)
- Range: 0-600 seconds Default: 90 seconds

Damper Direction
- Can be used to reverse the damper direction.

Setpoint Menu - Setpoint Limits and Temperature Units

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



Day Setpoint Low Limit
- This is the lowest Setpoint allowed
- Range: 10.0°F – 100.0°F Default: 65.0°F

Day Setpoint High Limit
- This is the lowest Setpoint allowed
- Range: 10.0°F – 100.0°F Default: 80.0°F

Temperature Units
- Fahrenheit or Celsius
- Default: °F

Night Heat Setpoint
- UMC3 will maintain this heating setpoint when unoccupied
- Range: 10.0°F – 100.0°F Default: 62.0°F

Night Cool Setpoint
- UMC3 will maintain this cooling setpoint when unoccupied
- Range: 10.0°F – 100.0°F Default: 83.0°F

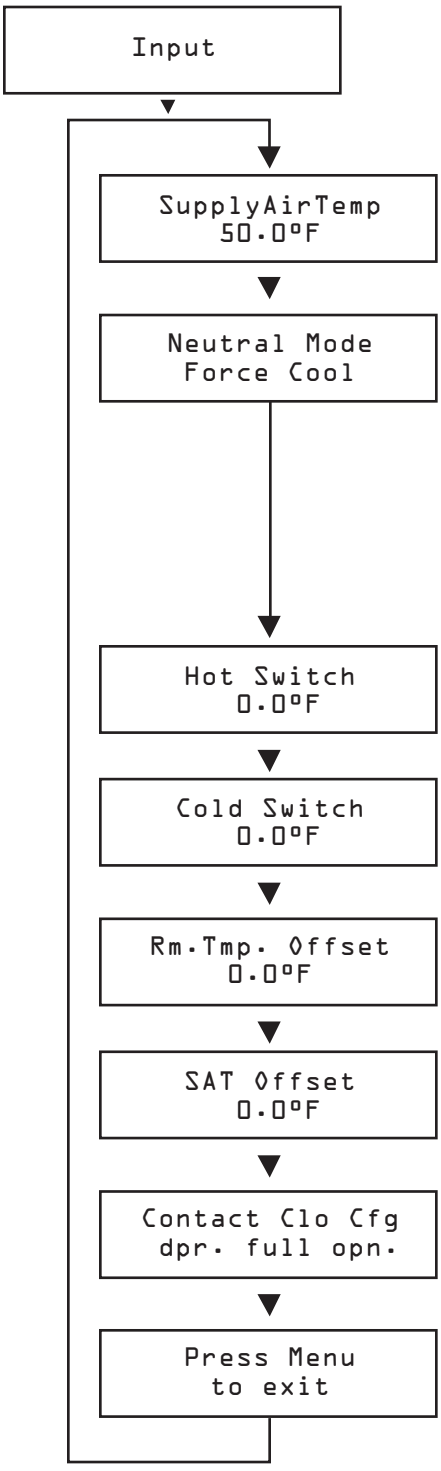
Proportional Band
- The Proportional Band is the temperature range through which the controller calculates a 0-100% load.
- Range: 0.5°F – 25.0°F Default: 2°F

Day Differential
- This is the maximum allowed “error” on either side of the room setpoint before the controller will enter its heating or cooling proportional bands
- Range: 0.5°F – 25.0°F Default: 1.0°F

Control Source
- Thermostat: Controller uses T-Stat temperature and setpoint to determine room load and control.
- Analog Input: Controller uses 0-10VDC inputs to determine room load and control

Input Menu - Supply Air Temp and Neutral Mode

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



Supply Air Temperature (S.A.T.) readout
- Shows current thermistor probe reading.
- Range: -59.0°F – 300.0°F.
- No probe, means no sensor is connected.

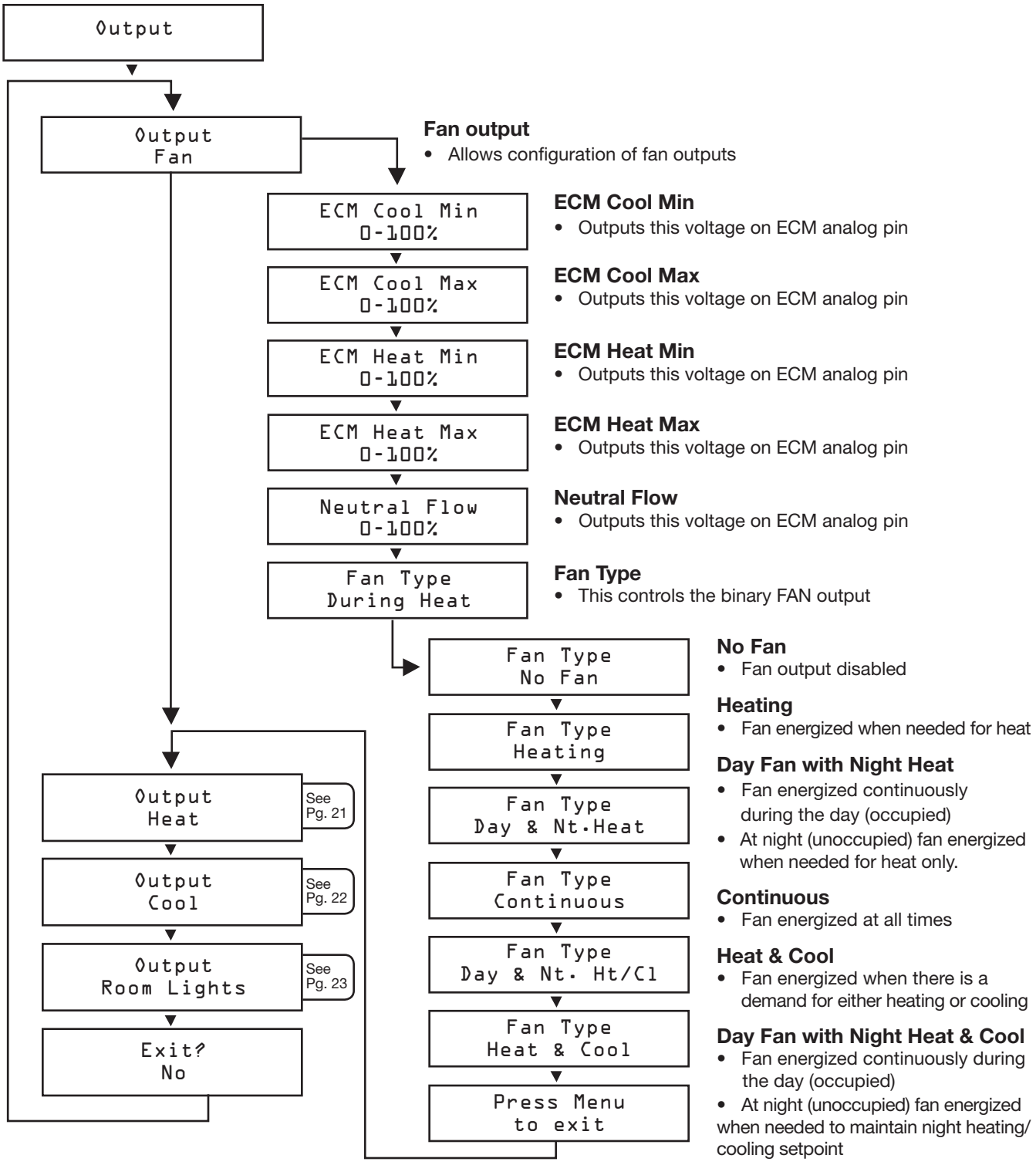
Neutral Mode
- Controls supply air calculations by the UMCB.
- Note: Default mode is “Force Cool”. This will be used 99.9% of the time.
- Neutral Mode: Dynamic
  - When Supply Air Temperature (as measured on thermistor input T1) is below room temp, it is considered cold.
  - When Supply Air Temperature (S.A.T) is above room temp, it is considered hot.
  - Note: There is a 2 degree differential on either side of the current room temperature which would equate to Neutral supply air if the SAT fell within this range.
- Neutral Mode: Conventional
  - Uses hot/cold switch points which are hard set below.
  - Not recommended.
- Neutral Mode: Force Cool
  - UMCB Default.
  - Controller assumes Cold supply air at all times (despite any reading of T1 thermistor input).
  - This is useful by allowing the T1 thermistor input to be used for monitoring only.
- Neutral Mode: Force Cool
  - Control assumes Hot supply air at all times.
  - Not recommended.

Hot Switch – Only active/visible when Neutral mode = Conventional
- UMC3 will consider the supply air warm if at the hot switch temp or above.
- Default: 0.0°F – UMC3 defaults to Cool supply air at all times.

Cold Switch – Only active/visible when Neutral mode = enabled
- UMC3 will consider the supply air cold if at the cold switch temp or below.
- Default: 0.0°F – UMC3 defaults to Cool supply air at all times.

Output Menu Fan - Setup of Fan Outputs

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



Fan output
- Allows configuration of fan outputs

ECM Cool Min
- Outputs this voltage on ECM analog pin

ECM Cool Max
- Outputs this voltage on ECM analog pin

ECM Heat Min
- Outputs this voltage on ECM analog pin

ECM Heat Max
- Outputs this voltage on ECM analog pin

Neutral Flow
- Outputs this voltage on ECM analog pin

Fan Type
- This controls the binary FAN output

No Fan
- Fan output disabled

Heating
- Fan energized when needed for heat

Day Fan with Night Heat
- Fan energized continuously during the day (occupied)
- At night (unoccupied) fan energized when needed for heat only.

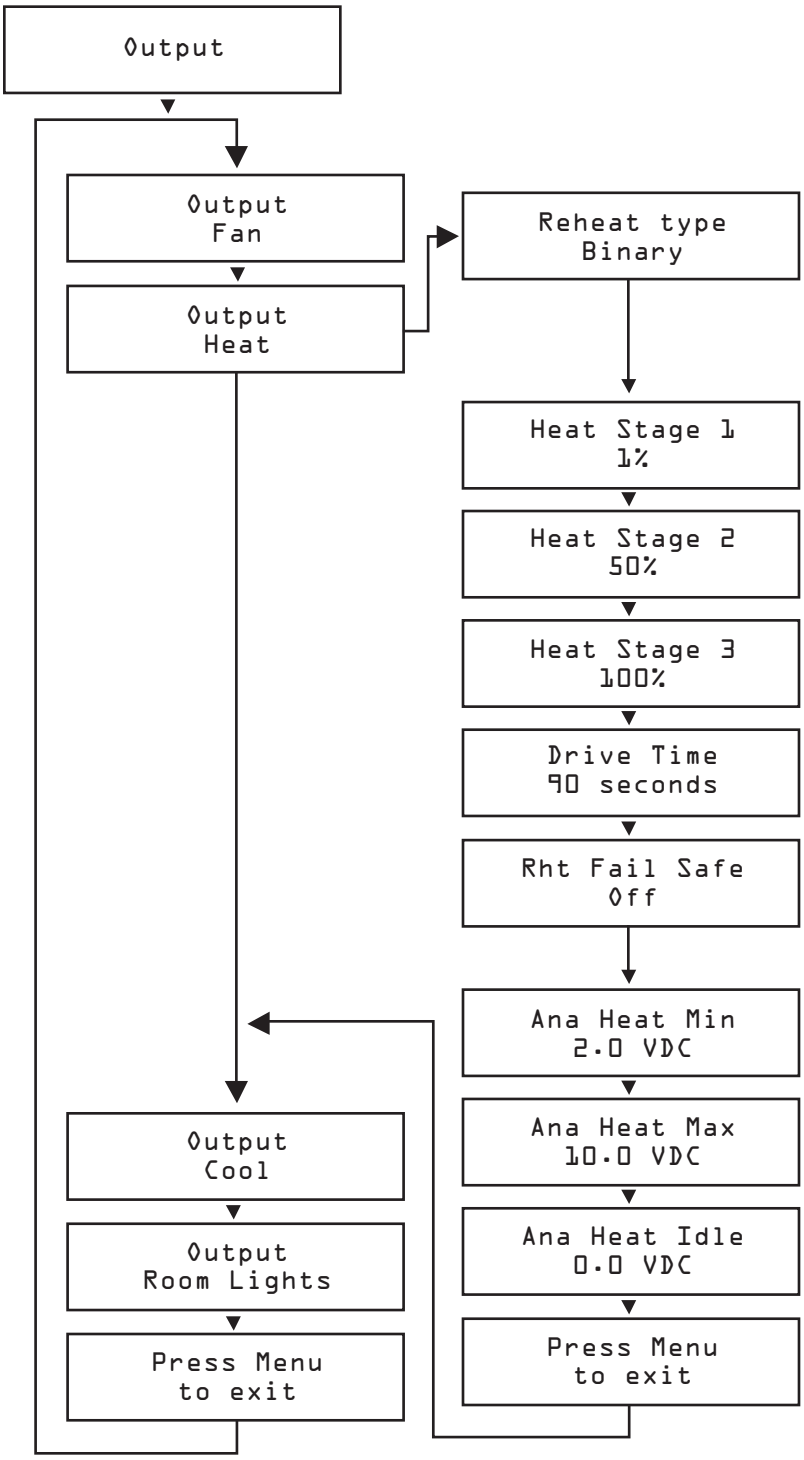
Continuous
- Fan energized at all times

Heat & Cool
- Fan energized when there is a demand for either heating or cooling

Day Fan with Night Heat & Cool
- Fan energized continuously during the day (occupied)
- At night (unoccupied) fan energized when needed to maintain night heating/ cooling setpoint

Output Menu Heat - Setup of Heat Outputs

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



Reheat Type: Binary, Hot Water Binary/PWM, Hot Water/PWM
- Binary uses stage1, 2, 3 - DEFAULT
- Hot water uses stage 1&2 for OPN/CLO
- Binary/PWM – stage 3 is PWM
- Hot Water/PWM – stage 3 is PWM

Heat Stage 1 trip point
- Stage 1 (BO2) engages at 1% heating demand
- Not shown if HOT WATER heat is used

Heat Stage 2 trip point
- Stage 2 (BO3) engages at 50% heating demand
- Not shown if HOT WATER heat is used

Heat Stage 3 trip point
- Stage 3 (BO4) engages at 100% heating

Drive Time (hot water only)
- Hot water runtime in seconds
- Not shown if BINARY heat is used

Reheat Fail Safe
- Disabled – outputs send 24 VAC on call for heat
- Enabled – outputs send 24 VAC when no call for heat(fail open valve in cold climates – ie: Winnipeg)

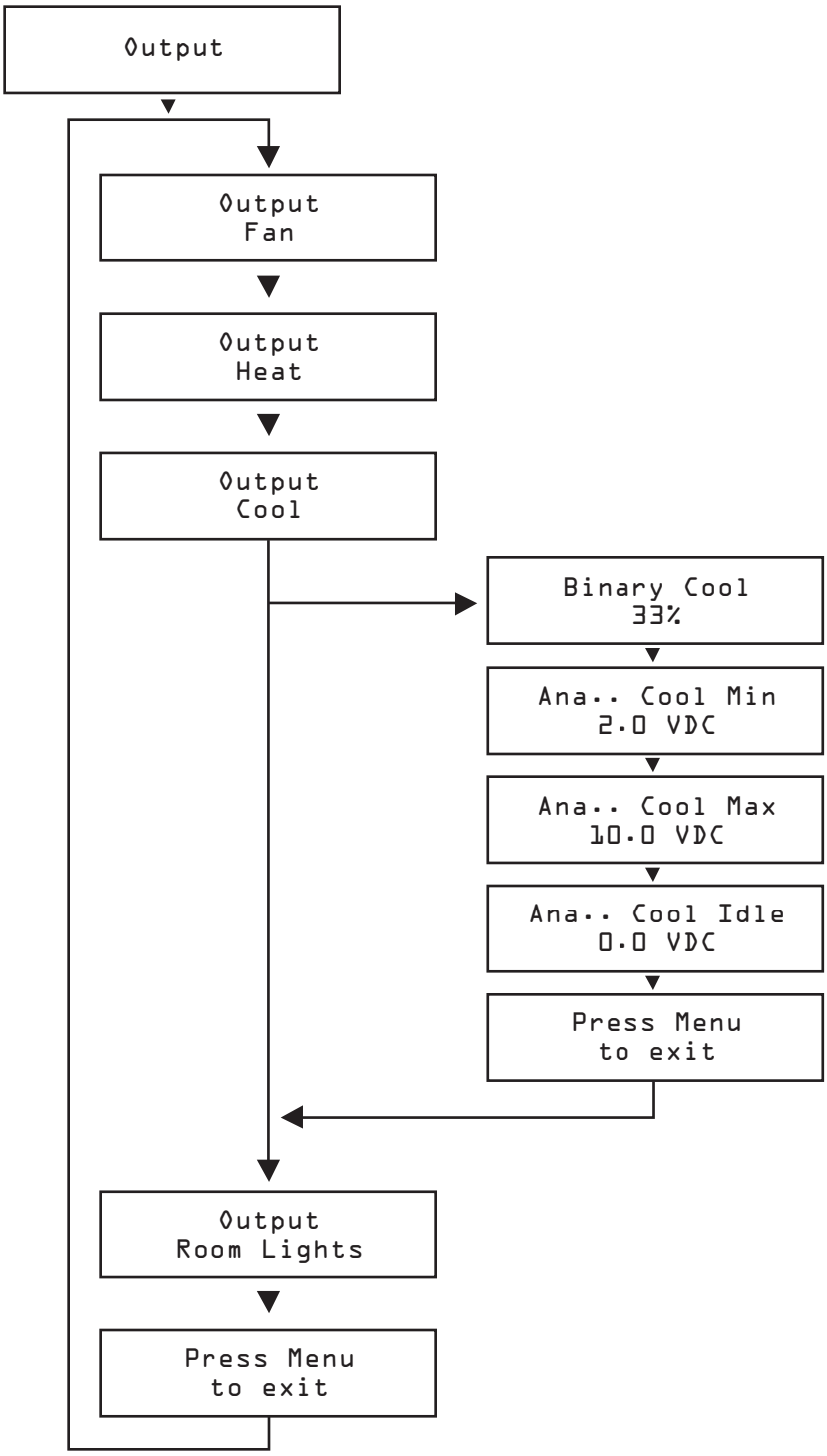
Analog Heat Min
- Outputs this voltage on heat analog pin when there is a minimum call for heating

Analog Heat Max
- Outputs this voltage on heat analog pin when there is a maximum call for heating

Analog Heat Idle
- Outputs this voltage on heat analog pin when there is no call for heating

Output Menu Cool - Setup of Cooling Outputs

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



Binary Cool trip point
- Cool engages at 33% cooling load

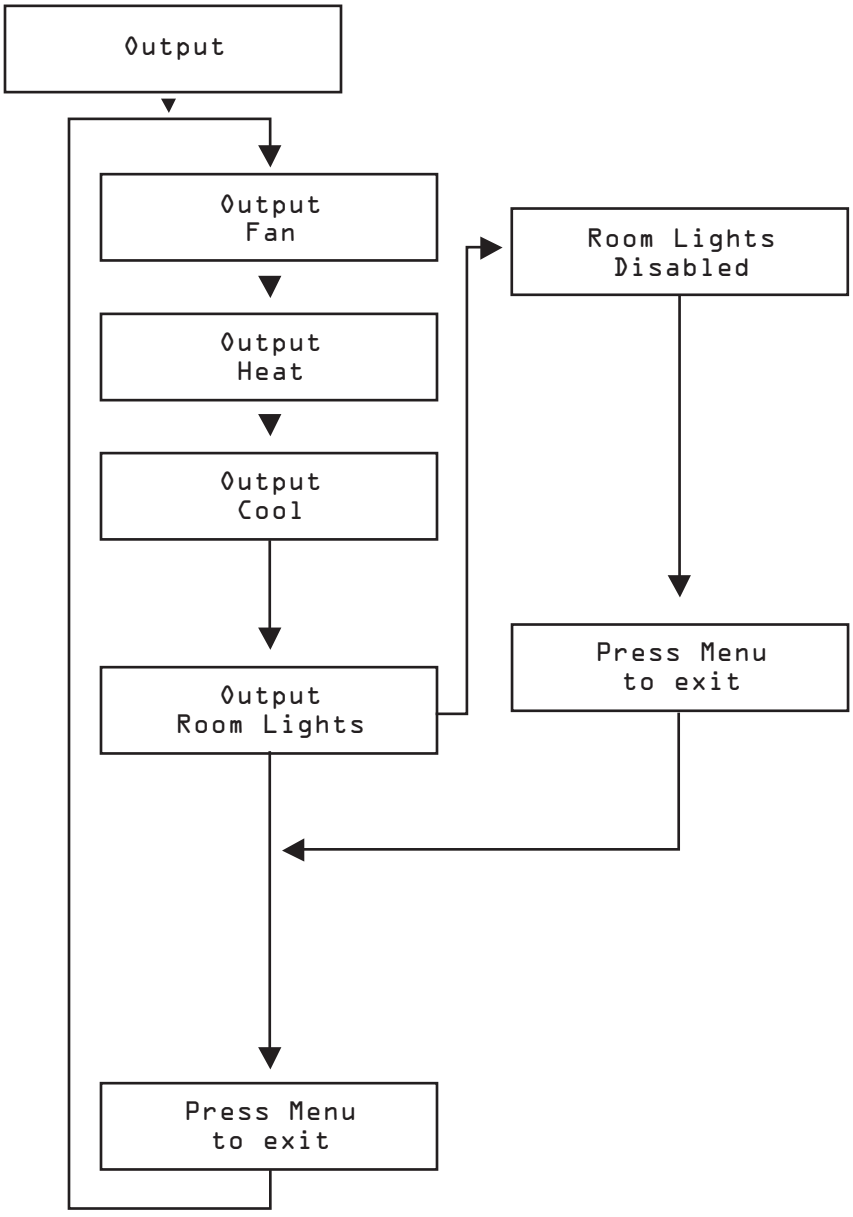
Analog Cool Min
- Outputs this voltage on cool analog pin when there is a minimum call for cooling

Analog Cool Max
- Outputs this voltage on cool analog pin when there is a maximum call for cooling

Analog Cool Idle
- Outputs this voltage on cool analog pin when there is no call for cooling

Output Menu Room Lights - Setup of Lighting Output (Motion Thermostat Option only)

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes
- Saving…… will display as your changes are applied



Room Lights Output Config

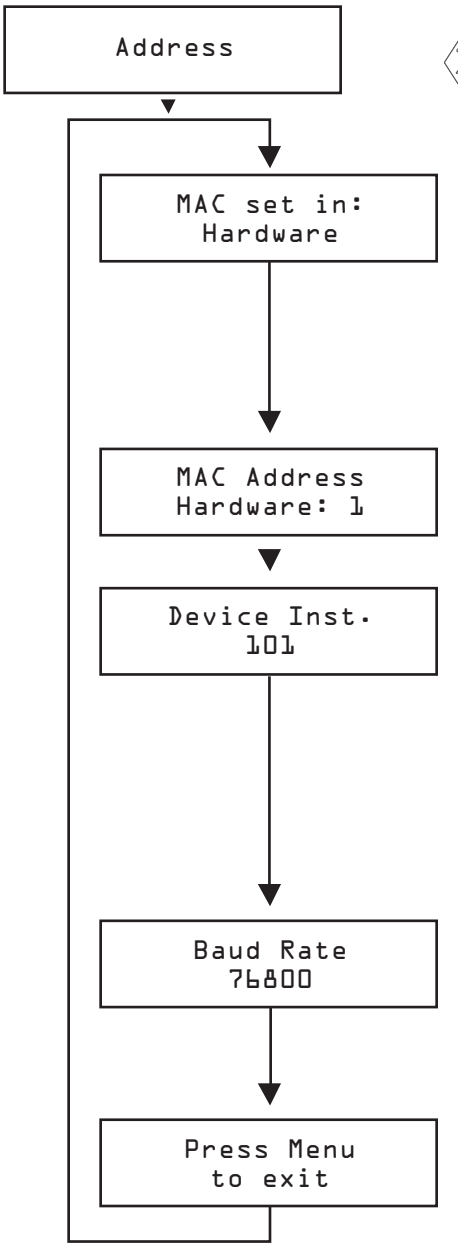
- Disabled – no outputs used-DEFAULT
- Fan (BO1) – will trigger room lights
- Heat Stage 3 (BO4) – will trigger room lights
- Binary Cool (BO5) – will trigger room lights
- B09 – output will trigger room lights (future expansion board)

Note: the room lights option will override the selected output to control a 24 VAC relay which is intended to control lighting. Use a spare output so there is no conflict with your current sequence of operations.

Motion Stat
(PIC-TS-)MOTION

Address Menu - BACnet Addressing Setup

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



NATIVE BACnet MS/TP

MAC address

- Hardware – uses DIP switch on BACnet module for MAC address – default - recommended
- Software – uses STAT to set MAC address – this OVERRIDES the hardware switches and could be confusing if you're not careful
- Note: the MAC address (range 1-99) is added to the device instance
- Example: MAC address = 1, Device instance = 100 – total address for this UMCB would be 101.

Mac address

- Display current MAC address
- Note: DIP switches and software MAC address are only read on startup! See Device Instance below.

Device Instance

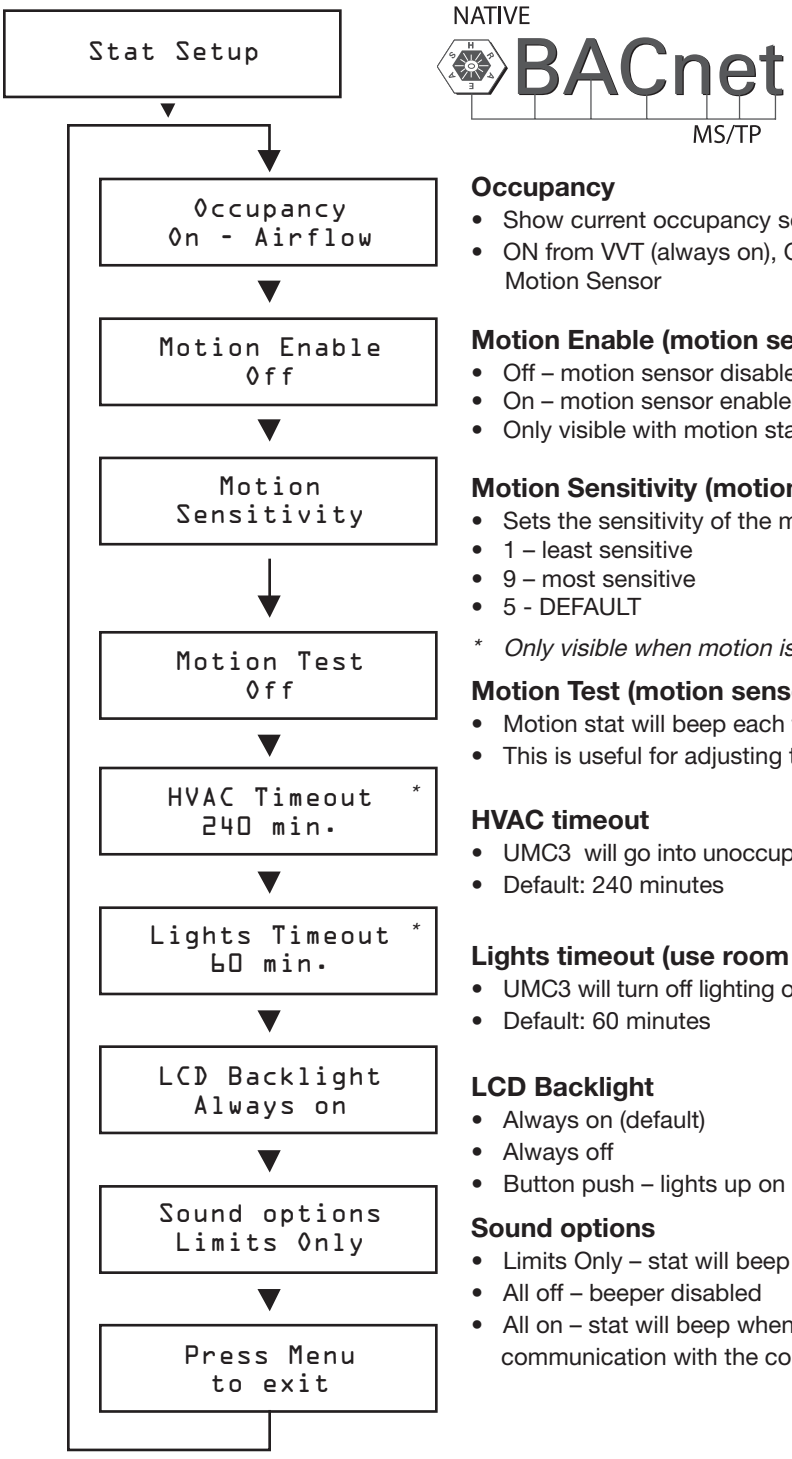
- This is the 'software' BACnet address & MUST be unique on your building site.
- Range: 1 – 4,194,303
- Note: After changing device instance the STAT will send a RESET command to the UMC3 to apply the ADDRESS changes. Addresses are only READ on startup, so after any changes you must reset the controller either via STAT (which is automatic) or cycle 24 VAC power.
- Note: Addresses are only read on startup to prevent a controller with faulty damaged/improperly set DIP switches from popping up all over a network, which would be extremely difficult to troubleshoot

Baud Rate

- This sets the BACnet MS/TP baud rate
- 9600 baud (all BACnet devices must at least support at least this speed) - slowest
- 19200 baud
- 38400 baud
- 76800 baud (default baud rate for PRICE products) - fastest

Start Setup Menu - Start Options

- Scroll through with the UP ▲ and DOWN ▼ buttons
- Press Enter to apply your changes ⏎
- Saving…… will display as your changes are applied



NATIVE BACnet MS/TP

Occupancy
- Show current occupancy source
- ON from VVT (always on), ON from Airflow, ON from Contact, ON from Motion Sensor

Motion Enable (motion sensor STAT only)
- Off – motion sensor disabled – default for regular LCD T-Stat
- On – motion sensor enabled (only enabled if you have a motion stat)
- Only visible with motion stat

Motion Sensitivity (motion sensor STAT only)
- Sets the sensitivity of the motion sensor
- 1 – least sensitive
- 9 – most sensitive
- 5 - DEFAULT

* *Only visible when motion is enabled*

Motion Test (motion sensor STAT only)
- Motion stat will beep each time motion is sensed
- This is useful for adjusting the sensitivity value & testing

HVAC timeout
- UMC3 will go into unoccupied after no motion is detected and this timer expires
- Default: 240 minutes

Lights timeout (use room light output to select lighting signal)
- UMC3 will turn off lighting output after no motion is detected and this timer expires
- Default: 60 minutes

LCD Backlight
- Always on (default)
- Always off
- Button push – lights up on button press

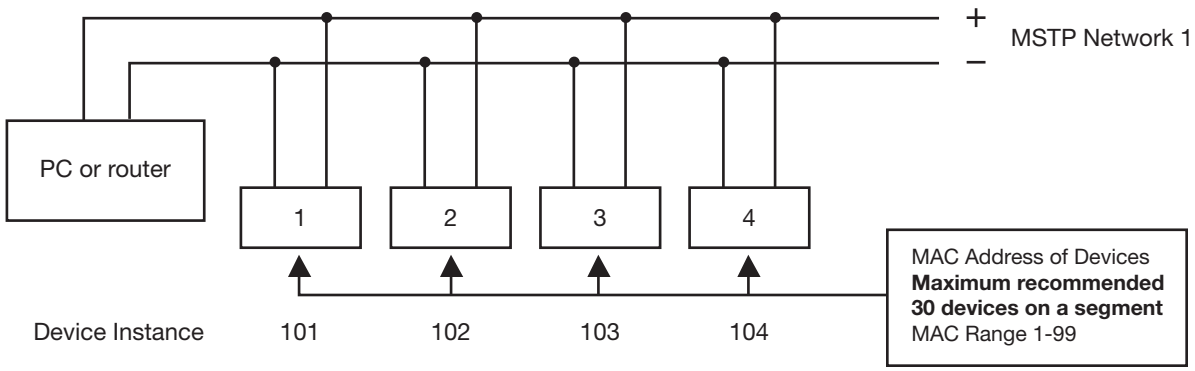
Sound options
- Limits Only – stat will beep when user tries to exceed a limit - default
- All off – beeper disabled
- All on – stat will beep when user tries to exceed a limit or stat loses communication with the controller (for testing use only) – not recommended

BACnet Networking and Setup

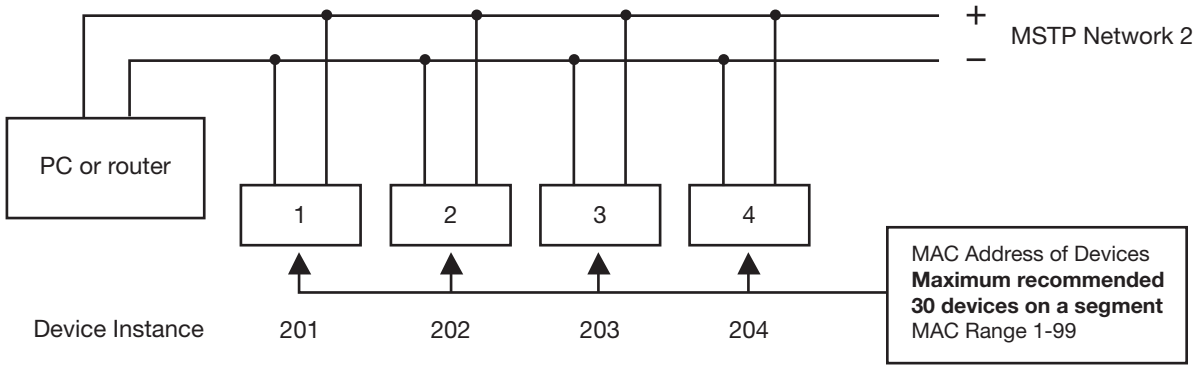
Setting the MAC Address:

- MAC Address:
  MAC (media access control) must be UNIQUE on an MS/TP network segment within building. An installer setting up an MS/TP segment with 30 devices must ensure each device has a UNIQUE MAC address (Range 1-99). The MAC address is set with dip switches on the BACnet Module. This is the hardware setup for the MAC address. The MAC address can also be set in software, through the LCD thermostat. This option of setting the address through software is available when the controller is not accessible to the user (finished drywall ceiling for example).

Network Segment #1



Network Segment #2



TECH TIP: Each device needs a unique MAC and device instance. All devices must be at the same baud rate. 24 VAC hot and common polarities are critical and must not be reversed on ANY devices! Reverse polarity will stop communication on that MS/TP segment.

Setting the Device Instance

- Device Instance:
  A device instance number identifies a device within an entire building, therefore giving it a unique number or address, much like a telephone ext. number. A building can have one telephone number, but all the extensions have a unique number to identify them. A device instance number would work the same way and must be unique throughout the building. The Device Instance number is user set through the LCD thermostat or the USB LINKER tool.

  Below is a table defining how a device instance number is obtained.
  *Note: Each device on a network segment must be set to run at the same speed or baud rate.

Description	Default Value (Factory)	Notes
MAC Address	Set by DIP switch	Value: limited to 1-99
Tier1 (x100)	58	Value: limited to 0-99
Tier2 (x10,000)	1	Value: limited to 0-99
Tier3 (x1,000,000)	0	Value: limited to 0-4

Example Device instance setup with default settings:

- MAC Address = 4 (4 x 1 = 4) – Set by DIP Switches on BACnet module, or through software.

  +

  TIER 1 = 58 (58 x 100 = 5800) – Set through software

  +

  TIER 2 = 1 (1 x 10,000 = 10,000) – Set through software

  +

  TIER 3 = 0 (0 x 1,000,000 = 1,000,000) – Set through software

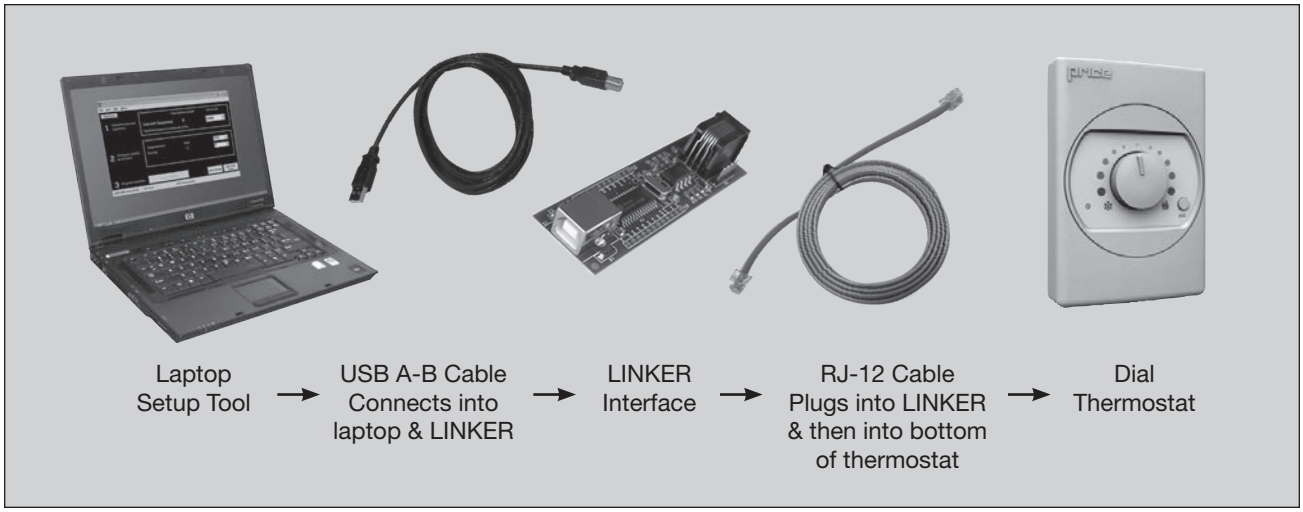
  =

  Final Device instance = 0,015,804

  Final Device instance =

0	01	58	04
Tier3 Multiplier	Tier2 Multiplier	Tier1 Multiplier	MAC Address

Linker - USB Service Tool



The Price USB LINKER is the interface that can be used with any of the Price thermostats for the UMCB. The LINKER connects to a laptop (not supplied) via a Type A USB A to B cable supplied by Price, and then connects to the service jack of the thermostat via an RJ-12 Cable supplied by Price. The laptop is required as a setup tool to setup up your parameters for your VAV application. If a laptop is not available, an LCD Thermostat can be purchased as an upgrade and used as a setup/balancing tool. The LCD Thermostat provides full functionality for setting up system parameters.

LCD Thermostat

Upgrade if laptop is not available

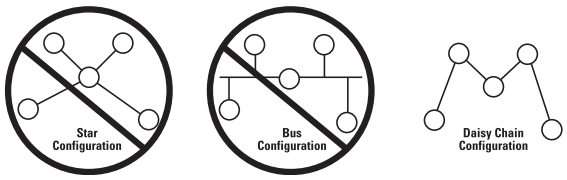
TECH TIP: When using a UMCB with a DIAL thermostat, the USB LINKER is one option for setting up the UMCB. Or you can purchase a single LCD thermostat (PIC-TS-LCD) and use that for setup. Remember all settings are stored in the UMCB, not the STAT!

Troubleshooting

The following information is provided in the event that the Price Intelligent controller (PIC) does not appear to function properly after installation.

Fault	Solution
Controller appears to be not responding or have no power. Green light on the controller is not blinking. Thermostat green indication light not on, or LCD screen is blank.	Check thermostat first for either green indication light, or LCD display. If either of these does not appear, then check the UMC3 controller for power (in "Info Centre you should see: Solid yellow indicating 24VAC, Solid Blue indicating 5VDC, and blinking Green indicating status). If no power is present, check 24 vac power with a multimeter. Cycle power to the controller. If this doesn't restore power, check the power that is feeding that controller for your problem.
Dampers don't move, and red FAULT light is illuminated.	Red fault light means there is a short in the cable from CW/CCW to COM. Find shorted cable(s) in that string of dampers and replace.
Damper acts erratically	If the CW/CCW lines in the cable are shorted together (and not shorted to the common), it could cause the dampers in a string to act erratically and drive in random directions. Find bad cable(s) in the string, and replace.
24 VAC Binary Outputs not functioning	Ensure that the PIC has 24 VAC power. Ensure that there is a call for heating or for cooling, if so, check to see that the indication light is on for the output. The next step would be to check the device that is triggering the output like a relay. Ensure that the relay has engaged (pulled in) for either heating or cooling application. The next item to check for would be the Hot/COM jumper on the PIC. Make sure that if your switching the Hot side, that the jumper is on the Hot, likewise for switching a common, ensure the jumper is on the COM

Troubleshooting - Continued

Fault	Solution
Analog Outputs not functioning	Ensure that the PIC has 24 VAC power. Check the analog output for voltage with a multimeter. You should see a voltage in the range of 0-10vdc. Direct Acting Output – 0 vdc indicates that the field device is closed or at a minimum position. 10 vdc indicates that the field device is open or at a full open position. Direct acting is typical with cooling applications. Reverse Acting Output – 0 vdc indicates that the field device is full open or maximum position, and 10 vdc indicates fully closed or minimum position. Reverse acting is typical with heating applications.
SAT Sensor Analog input not functioning	Ensure that there is a sensor wired to the input on the PIC controller. Check the type of sensor, should be a 10k Ohm type thermistor.
BACnet Communication Errors NATIVE BACnet MS/TP	BACnet MS/TP is based on a RS-485 network. It must be wired in a daily chain configuration. A daisy chain means that there is only one main cable, and every network device is connected directly along its path.  DO NOT use Star, Bus, “T”, or any other type of network configuration. Any of these other network configurations will result in an unreliable network, and make troubleshooting almost impossible. Correct polarity is imperative on MSTP wiring. Always ensure that the positive terminal on a device has the same color wire connected to it throughout the network, same for the negative terminal.Eg. 2 wire conductor with black and white wires – black to the positive terminal, and white to the negative terminal. Keep this consistency throughout the network.

Troubleshooting - Continued

Fault	Solution
BACnet Communication Errors NATIVE BACnet MS/TP	Price does not use EOL or termination on their devices Terminating a device is almost never required at the low baud rate of MS/TP devices. In fact terminating can create more problems than it solves. The network speed or baud rate must be the same throughout the network. **Note:** the default speed for Price BACnet MS/TP controls is 76800. BACnet MS/TP currently supports 4 standard speeds which are: 9600, 19200, 38400 and 76800.
BACnet Communication Errors NATIVE BACnet MS/TP	Binary address must be unique for each device on the network. No two devices can have the same address. This includes if you are incorporating a Price product into an existing network. Determine the existing addressing scheme for the existing network. The address is set on the addressable dip switches on the BACnet module which is expanded off of the PIC controller.
BACnet Communication Errors 	**Grounding and 24 VAC polarity:** Proper grounding is absolutely essential when wiring the MS/TP BACnet Network. Proper grounding will prevent many potential problems that can occur in a network of devices. Common symptoms of a poorly grounded network can include inconsistent BACnet MS/TP communications and damage from voltage spikes. The most practical method of grounding is to ground every 24 VAC transformer common/neutral used to power the controls. Connect the "common/neutral" wire of the SECONDARY side of the transformer to earth ground – such as the ground screw on in the electrical box.
BACnet Communication Errors 	**Note:** Flipping 24 VAC HOT and COMMON will cause the BACnet MS/TP network to stop communicating!!! Ensure HOT and COMMON are not reversed on ANY controllers. (**Warning:** Controllers will still power up and run even if HOT and COMMON are reversed. However output signals to other devices such as heaters, relays, etc will not work as intended!)

Hardware Specifications

Power Requirements	24 VAC, 47-63 Hz 6 VA (not including output loading) NEC Class II.
Ambient Ratings	32° to 131° F (0° to 55° C) 10 to 90% RH (non-condensing)
Outputs	24 VAC Binary (x7). Max 0.5Amps each, MAX 1.85A total Switched HOT or Switched COMMON Stages of heat or heat open/close (x3) • Fan • Cooling • Damper CW • Damper CCW Analog 0-10 VDC (x4). Max: 10mA each. • Fan (ecm) • Heat • Cool • Aux
Inputs	Changeover sensor (10k Type J thermistor) Contact closure (night setback) Airflow sensor (optional) Thermostat inputs • Room setpoint dial • Temperature sensor (10K Type J thermistor) • Accuracy of +/- 0.5°F from 55°F to 85°F (+/ 0.25°C from 13°C to 25°C)
Communication ports	BACnet MS/TP Connection (optional) • Communication speeds: 9,600, 19,200, 38,400, 76,800 (default), • Maximum recommended devices per MS/TP segment: 30 LINKER port • For local setup using Price USB LINKER service tool
Actuator Specifications	40 in-lbs (nominal torque). 90 seconds running time 90° maximum angle of rotation. External slide knob for manual override. Less than 35 db (A) noise level
Actuator Specifications	Mems technology Optional 0-1 SLM flow sensor. (0-1" W.C. equivalent) Not position sensitive.

Hardware Specifications - Continued

Tubing Specifications	Flow Sensor tubing must be 1/4 inch outside diameter
Size	11” x 5.75” x 2.75”
Weight	1.8lb. (816g)

Notes:

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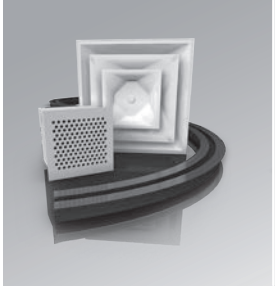	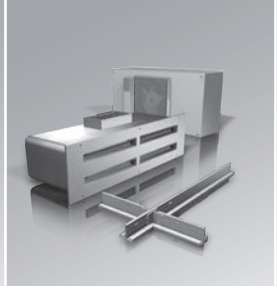		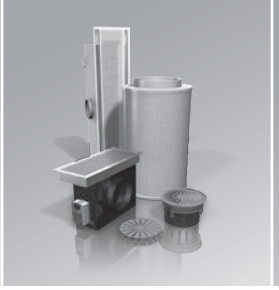	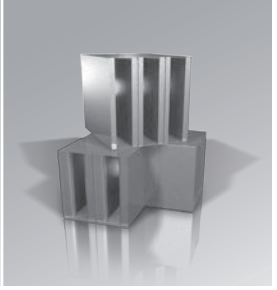

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