

Microset™ II

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Contents

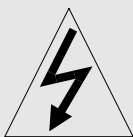


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Important Safety Information and Installation Precautions

Read All Instructions

Failure to follow all instructions may result in equipment damage or a hazardous condition. Read all instructions carefully before installing equipment.



Local Codes and Practices

Always install equipment in accordance with the National Electric Code and in a manner acceptable to the local authority having jurisdiction.

High Voltage Safety Test

Experienced electricians, at first contact, always assume that hazardous voltages may exist in any wiring system. A safety check using a known, reliable voltage measurement or detection device should be made immediately before starting work and when work resumes.

Lightning and High-voltage Danger

Most electrical injuries involving low-voltage wiring result from sudden, unexpected high voltages on normally low-voltage wiring. Low-voltage wiring can carry hazardous high voltages under unsafe conditions. Never install or connect wiring or equipment during electrical storms. Improperly protected wiring can carry a fatal lightning surge for many miles. All outdoor wiring must be equipped with properly grounded and listed signal circuit protectors, which must be installed in compliance with local, applicable codes. Never install wiring or equipment while standing in water.



Wiring and Equipment Separations

All wiring and controllers must be installed to minimize the possibility of accidental contact with other, potentially hazardous and disruptive power and lighting wiring. Never place 24VAC or communications wiring near other bare power wires, lightning rods, antennas, transformers, or steam or hot water pipes. Never place wire in any conduit, box, channel, duct or other enclosure containing power or lighting circuits of any type. Always provide adequate separation of communications wiring and other electrical wiring according to code. Keep wiring and controllers at least six feet from large inductive loads (power distribution panels, lighting ballasts, motors, etc.). Failure to follow these guidelines can introduce electrical interference and cause the system to operate erratically.

Warning

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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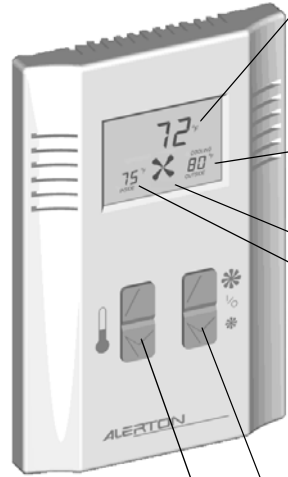
Quick Reference

Mode IDs

- M1—Office, no fan, occupied
- M2—Office, no fan, unoccupied
- M3—Office, no fan, ON/OFF
- M4—Office, fan, occupied
- M5—Office, fan, unoccupied
- M6—Hotel, no fan, rented
- M7—Hotel, no fan, vacant
- M8—Hotel, fan, rented
- M9—Hotel, fan, vacant

Field Service Codes

Code	Data point	Meaning
UC.	AV-95	Unoccupied cooling setpoint
UH.	AV-96	Unoccupied heating setpoint
CO.	AV-93	Cooling offset
HO.	AV-94	Heating offset
HS.	AV-100	Occupied heating setpoint
CS.	AV-99	Occupied cooling setpoint
AL.	AV-97	Override limit
HI.	AV-91	Setpoint high limit
LO.	AV-92	Setpoint low limit
SP.	AV-90	Occupant-selected space temperature setpoint
SC.	n/a	Size, cooling—size of VAV cooling duct diameter in inches or cm
SH.	n/a	Size, heating—size of VAV heating duct diameter in inches or cm
CF.	n/a	Cold flow—the current airflow in the VAV box cold duct in cfm or lps
HF.	n/a	Hot flow—the current airflow in the VAV box hot duct, in cfm or lps



ID	Display/control function	Description	Software remarks
1	<ul style="list-style-type: none"> Setpoint (°F or °C as appropriate) Override time remaining ON/OFF status Time of day (optional alternate) Value associated with data code (field service mode) 	Displays unit setpoint, after-hours/housekeeping timer, ON/OFF status, or value of field service code, depending on mode of operation. Optionally, in modes M1-M6, the time of day can display alternately on a three-second cycle with any of the above.	<ul style="list-style-type: none"> Setpoint = AV-90. Housekeeping timer or after-hours timer = AV-98. ON/OFF mode = BV-65. Time of day is read directly from the VLC when BV-82 is ON. The VLC must be time-synced. BV-83 controls format (12- or 24-hour).
2	<ul style="list-style-type: none"> Outside air temperature (OAT) Outside humidity (optional alternate) 	Displays OAT. Optionally, an outside humidity reading in %RH can display alternately on a three-second cycle with the OAT.	OAT = AV-103, which is written to in DDC. %RH = AV-107. If AV-107 is non-zero display will cycle.
3	<ul style="list-style-type: none"> Fan status 	Displays occupant-selected fan status and speed in modes M4, M5, M8, and M9. In these modes, the occupant can use the right UP/DOWN buttons to increase and decrease the fan speed. In other modes, occupant adjustment is disallowed, but DDC can control the fan status and speed display nonetheless.	Only one of the following BVs may be ON; otherwise, the Microset II indicates a high fan speed: <ul style="list-style-type: none"> BLANK = BVs 72-74 OFF. Low = BV-72 ON. Med = BV-73 ON. High = BV-74 ON.
4	<ul style="list-style-type: none"> Space temperature Space humidity (optional alternate for MS-2000H) Field service code (field service mode) 	Displays space (room) temperature. With the Microset II with humidity sensor (MS-2000H), the room %RH can display alternately on a three-second cycle with the room temperature.	<ul style="list-style-type: none"> Space temperature = AV-101. AI-0 is room temperature as read by the Microset II thermistor. VLC DDC must transfer AI-0 to AV-101 for space temperature display. Display will cycle between space temperature and humidity if BV-84 is ON. Space humidity = AV-102. No DDC required. AV-102 cannot store other values.
5	<ul style="list-style-type: none"> Right UP/DOWN buttons <ul style="list-style-type: none"> Fan speed control (M4, M5, M8) After-hours increment/decrement (M2, M5) ON/OFF control (M3, M6) Housekeeping timer ON/OFF (M7, M9) Adjust value (field service mode) 	Button press causes only affected value on LCD to appear; all others disappear. Display remains in this state for three seconds after button release.	Button press affects BV-67 according to mode (see Table 4 on p. 13). In fan modes, button press also affects BVs 72–74 (Table 7 on p. 26).
	<ul style="list-style-type: none"> Left UP/DOWN buttons <ul style="list-style-type: none"> Adjust setpoint Display unoccupied heating/cooling setpoints (M2, M5) Scroll through codes (field service mode) 	Button press causes only affected value on LCD to appear; all others disappear. Display remains in this state for three seconds after button release.	

Introduction

The Microset™ II is a wall-mounted sensor for BACtalk® VLCs¹. Depending on the VLC version, the Microset II may be interchangeable with previous version BACtalk Microsets. See “Compatibility with Earlier Version VLCs” on p. 8 for details. The Microset II has a backlit liquid crystal display (LCD) and intuitive button operation. It connects to a VLC using three low voltage wires. The Microset II exchanges data and receives commands from a VLC using a range of AV and BV data points in the VLC that are reserved for Microset operation. These data points are available from the VLC as BACnet objects.

1. The Microset II is not compatible with the Alerton TUX product line.

Features:

- ◆ Outside temperature displayed at all times
- ◆ Space (room) temperature displayed at all times
- ◆ Optional outside and room humidity display
- ◆ Fan speed display/adjustment (up to three speeds and OFF)
- ◆ Setpoint display/adjustment
- ◆ After-hours/housekeeping overrides
- ◆ Optional time of day display
- ◆ Heating or cooling mode display
- ◆ English or metric units

Specifications

Table 1 BACtalk Microset II specifications.

Thermistor	The thermistor is integrated with the device. The unit is a microprocessor-based sensor with a built-in analog to digital converter for temperature and humidity, which is designed to communicate directly to VLCs.
Type	Uni-curve Type II.
Resistance	10KΩ at 77°F (22°C).
Interchangeability	0.36°F (0.2°C).
Time Constant ^a	10 seconds (to 66% of new temperature).
Stability ^a	0.036°F (0.02°C) drift per year.
Accuracy ^a	±0.36°F (0.2°C) over range of 32–158°F (0–70°C).
Power	24 VAC/VDC @ 25mA for backlit display. Orange lead terminates to 24 VAC or 24 VDC terminal on VLC. Sensor draws 5 VDC @ 10 mA from VLC.
VLC Connection	18 AWG, shielded, 3-conductor, 250 ft. max. Black wire to VLC IN, white to VLC input COM, orange is optional 24 VAC for backlit display. Low capacitance wire recommended.
Dimensions	4.6" (117 mm) H X 3.0" (76 mm) L X 0.7" (18 mm) D.
Optional Humidity Sensor	
Total Accuracy	±2% RH, 0–100% RH @ 25°C, with saturated salt calibration.
Operating Temp.	-40–185°F (-40–85°C).
Repeatability	±0.5% RH.
Interchangeability	±5% RH up to 60%RH, ±8% RH at 90% RH (typical humidity).
Ratings	Listed Underwriters Laboratory as an accessory for VAVs and VLCs. EMC Directive 89/336/EEC (European CE Mark). <i>Pending</i> . FCC Part 15, Subpart J, Class A. <i>Pending</i> .

a. Based on normal operating conditions.

Mounting

The Microset II is designed to be wall-mounted indoors, with dimensions ideal for mounting to a single-gang electrical box. See Fig. 3 on p. 6.

Mount in a clean, dry location away from windows, air ducts, and other places where environmental factors may affect temperature and humidity readings.

Note If you mount the Microset II on the interior of an outside wall, thoroughly insulate so outside air behind the sensor doesn't affect the sensor reading.

To meet requirements of the Americans with Disabilities Act, mount no higher than 48" from the floor and with a minimum clear floor space of 30" X 48" (760 X 1220 mm). See Fig. 1.

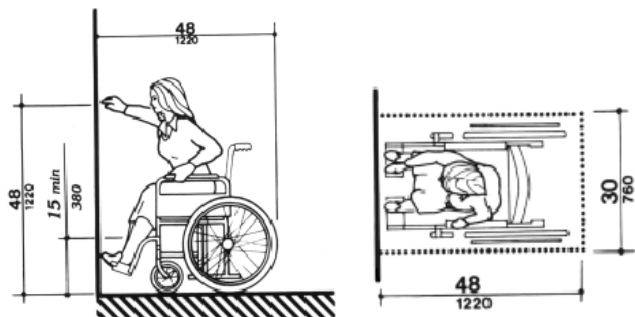


Fig. 1 Mounting guidelines for compliance with Americans with Disabilities Act (ADA).

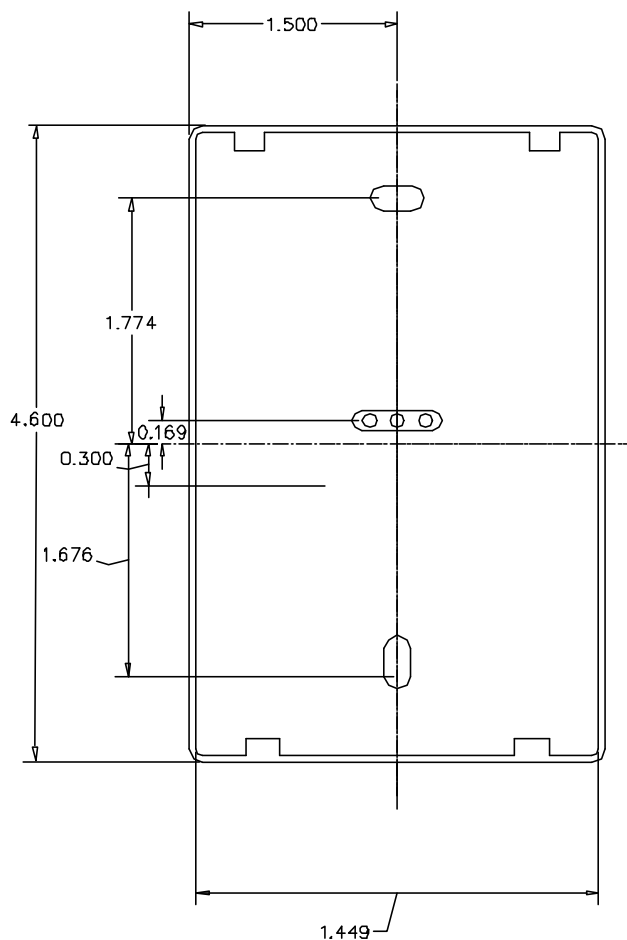


Fig. 2 Backplate mounting dimensions.

The Microset II ships with the backplate on backwards. This makes the backplate easier to remove during installation. Two screws attach the backplate to an electrical box, mud ring, or other mounting surface.

k To secure the Microset II to a mounting surface:

- 1 Remove the backplate from the Microset II and the wiring pigtail.
- 2 Flip the backplate so the smooth side faces the mounting surface.
- 3 Rethread the wires through the center knockout on the backplate.
- 4 Use wire nuts or other connectors to splice the Microset II wires to the wire run from the VLC (see "Wiring" on p. 8 for details).

- 5 Secure the backplate to the mounting surface with the enclosed screws or your own.

- 6 Hold the Microset II at an angle above the backplate and then slide it down.

The two tabs on the inside top edge of the Microset II should fit into the tab slots on the backplate (see Fig. 3).

- 7 Push the bottom of the Microset II onto the backplate legs until they snap securely on the tab-stops (see Fig. 3).

Caution Do not crimp or kink the pigtail wires.

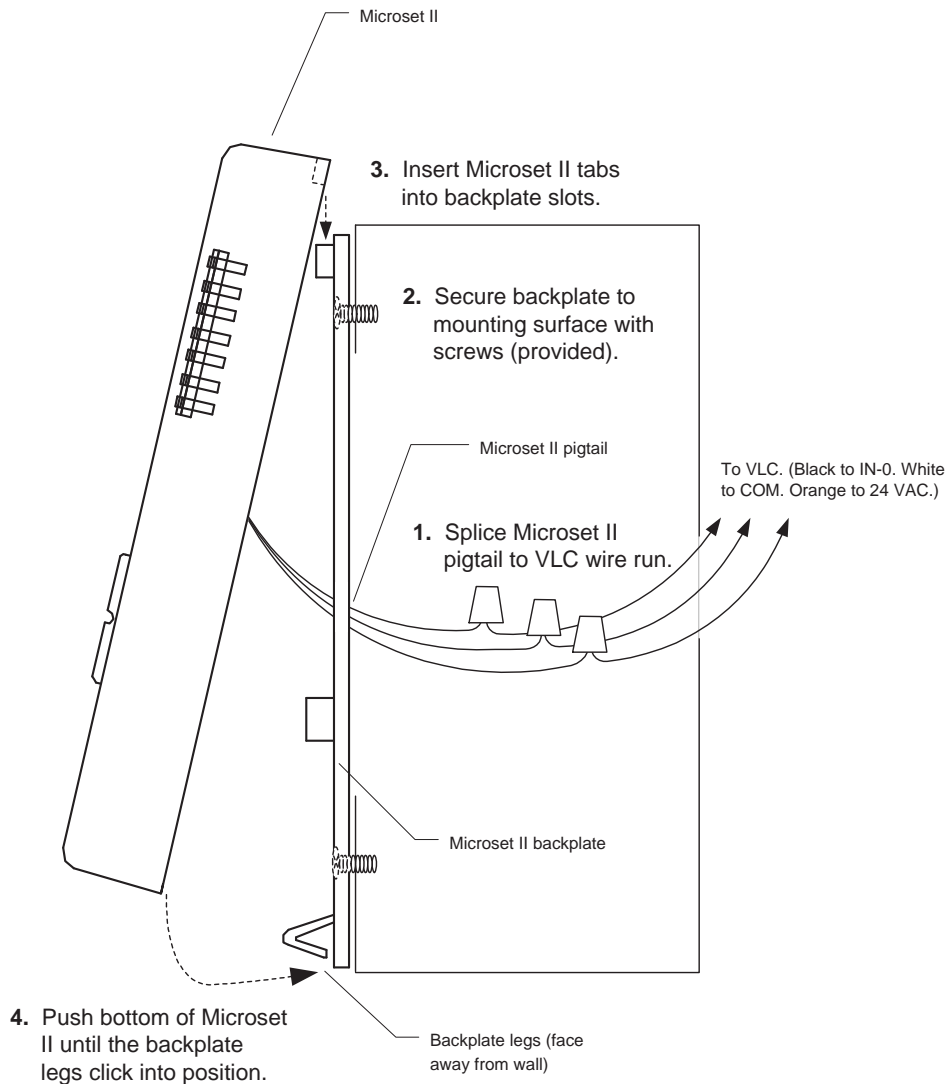


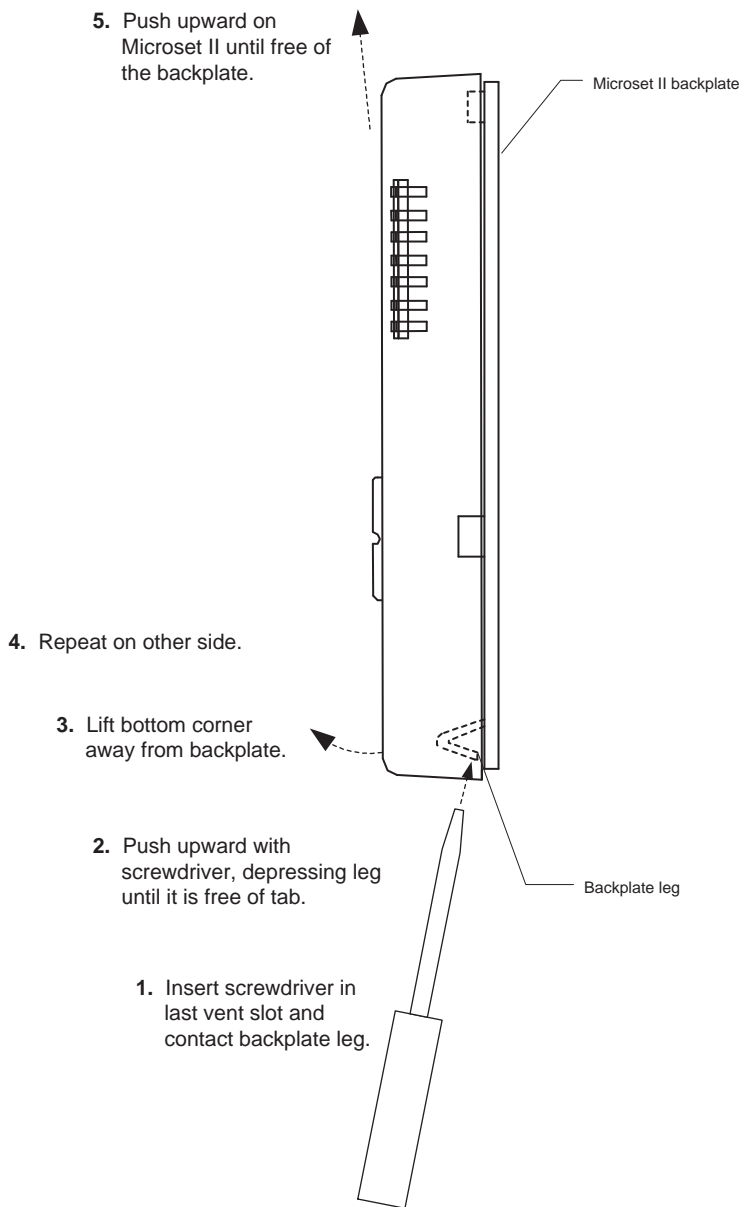
Fig. 3 Microset II mounting.

k To remove the Microset II from the backplate:

- 1 Insert a thin, flat-tipped screwdriver into the last vent slot on the bottom of the Microset. Position the screwdriver so that you can apply pressure to the backplate leg (see Fig. 4, bottom view).
- 2 Firmly depress the backplate leg until it is clear of the tab-stop on the Microset II.

- 3 Gently pull the freed corner of the Microset II away from the wall.
- 4 Repeat steps 1–4 on the other side.
- 5 Push upward on the bottom of the Microset II until it is completely free of the backplate.

Side view



Bottom view

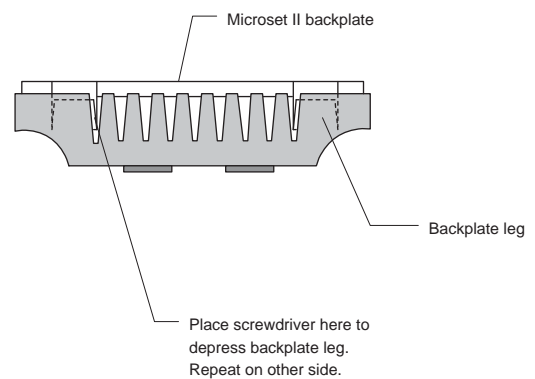


Fig. 4 Removal of Microset II from backplate.

Wiring

The Microset II has a three-conductor connection to the VLC.

Table 2 VLC wire terminations.

Wire color	VLC terminal
Orange	24 VAC or 24VDC ^a
Black	IN 0/MSET
White	COM

a. The orange lead powers the backlit display. It is optional: if left unterminated, the backlight is not available. Connecting to a VLC terminal is preferred, but the orange lead may connect to any point on the VLC source. Do not connect to a 24 VAC source that does not have common ground with the VLC.

See Fig. 5 for wiring connections and terminations. Also see the Gen 4 VLC *Installation and Wiring Guide (LTBT-TM-GEN4VLC)* for detailed input wiring instructions for VLCs and the *Network Installation and Design Guide (LTBT-TM-NETWRK)* for instructions on installing twisted-pair wiring.

Wire Specifications

- ◆ Type: 18 AWG, shielded
- ◆ Length: ≤250 ft.
- ◆ Resistance: <12Ω

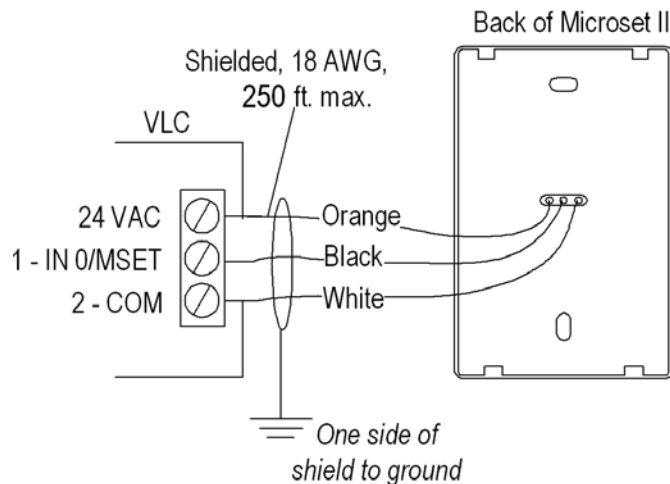


Fig. 5 Basic Microset II wiring.

Note Do not run Microset II wire in the same conduit or alongside building power cables. This can cause interference. If power cables must be crossed, cross at 90°.

Compatibility with Earlier Version VLCs

VLC firmware versions prior to 1.09 do not fully support the Microset II. Use the following information to determine if retrofitting older version VLCs with a Microset II will provide a satisfactory feature set for the application.

VLC Versions Prior to 1.06c

VLC versions earlier than 1.06c do not have BV-72 and higher (see Table 7 on p. 26). They do not support fan-control or hotel modes. None of these options is available: space humidity display, outside humidity display, fan speed display, and time of day display. The LCD backlight is always ON.

VLC Versions 1.06c through 1.08

VLC versions 1.06c–1.08 do not have BV-80 and higher (see Table 7 on p. 26). The Microset II may be used in fan-control applications by cutting a circuit board trace on the Microset II (contact your Alerton Representative or Alerton Technical Support). If the trace is cut, BV-65 selects office mode or hotel mode (ON = office). None of these options is available: inside humidity display, outside humidity display, and time of day display.

Operational Overview

The Microset II operates in one of nine modes. In each mode, the Microset II displays data and has operational features unique to that mode. Operating modes are listed in Table 3 on p. 12 and Table 4 on p. 13.

Review the different Microset II modes and determine which one is best for your application. Then use DDC in the VLC to set BVs 64, 65, 80, and 81 according to Table 4 on p. 13.

All Microset II operating logic executes in VLC DDC. BACtalk data displays can directly reference data points in the VLC reserved for Microset II operation. This offers the system operator flexibility and ease of use—with a mouse click, the system operator can control Microset II operations.

Hotel vs. Office Modes

BV-81 controls hotel and office mode (BV-81 ON = hotel). The primary difference between hotel and office mode is the function of the after-hours timer as compared to the function of the housekeeping timer. See “After-hours Override Operation” and “Housekeeping Override Operation” herein. Other operational details vary as well. See “Operating Mode Specifics” on p. 12.

Fan-control vs. No-fan-control Modes

BV-80 determines fan control mode (BV-80 ON = fan-control mode).

In fan-control modes, the occupant can select fan speed at the Microset II. Fan-control modes are typically used in fan-coil, air conditioning, or unit ventilator applications.

In no-fan-control modes, the occupant is unable to select fan speed. However, if desired, VLC DDC can cause fan symbology to display at the Microset II. No-fan-control modes are typically used in VAV or heat pump applications.

Cooling and Heating Setpoint Calculation

The Microset II calculates current heating and cooling setpoints (AV-99 and AV-100) using different logic in occupied and unoccupied modes (as read from BV-67). Using the current setpoints (AV-99 and AV-100) in your control DDC is most efficient because the VLC automatically calculates these setpoints according to the operating status of the Microset II.

Occupied Setpoint Logic (BV-67 ON)

- ◆ Current cooling setpoint (AV-99) = Occupant-selected space temperature setpoint¹ (AV-90) + Cooling offset (AV-93) + Demand offset (AV-106)
- ◆ Current heating setpoint (AV-100) = Occupant-selected space temperature setpoint¹ (AV-90) – Heating offset (AV-94) – Demand offset (AV-106)

Unoccupied Setpoint Logic (BV-67 OFF)

- ◆ Current cooling setpoint (AV-99) = Unoccupied cooling setpoint (AV-95)
- ◆ Current heating setpoint (AV-100) = Unoccupied heating setpoint (AV-96)

1. The system's setpoint high limit (AV-91) and setpoint low limit (AV-92) limit this value.

After-hours Override Operation

Unoccupied office modes (M2 and M5) offer an after-hours override feature, which enables the occupant to override a scheduled unoccupied status at the Microset II.

In override, the unit calculates current setpoints (AV-99 and AV-100) using occupied setpoint logic (see “Cooling and Heating Setpoint Calculation” on p. 9). The occupant can increase or decrease the timer to the next half-hour increment. The occupant can also adjust the setpoint and fan speed (if applicable).

The after-hours timer (available in software as AV-98) automatically counts down whenever it is set to a non-zero value.

To disable this feature, set the after-hours timer limit (AV-97) to zero.

DDC can read override status from BV-66, which is ON if the after-hours timer is non-zero. When BV-64 (occupied/unoccupied command) is ON, the after-hours timer automatically resets to zero.

Housekeeping Override Operation

Vacant hotel modes (M7 and M9) offer a housekeeping override. This is similar to the after-hours override in that it causes occupied setpoint logic to be in effect. However, there are important differences: the occupant can only start and stop the timer (timer adjustment is not allowed); the override timer limit (AV-97) is read in minutes, not hours; and the occupant can't adjust setpoint or fan speed.

This feature can be disabled by setting the override timer limit (AV-97) to zero.

DDC can read override status from BV-66, which is ON if the housekeeping timer is non-zero. When BV-64 (occupied/unoccupied command) is ON, the housekeeping timer automatically resets to zero.

English and Metric Units

You can set the Microset II to display English or metric units based on the selection in the VLC DDC header file or you can toggle that status in software. The English or metric setting at the VLC is referred to as the native units mode.

BV-69 can be set ON to reverse native units mode for the Microset II display. Thus, if the VLC is set to English, and BV-69 is ON, the Microset II displays units in appropriate metric equivalents. This enables the system to display units at the Microset II according to occupant preference without a programmer having to write separate DDC sequences around each unit of measure.

See the *Programmer's Guide and Reference for BACtalk Systems (LTBT-TM-PRGRMR)* for information about setting native units in the VLC.

Outside Air Temperature (OAT) Display

For OAT read at another unit to display at the Microset, the OAT value must be written in LSi DDC to the Present Value of AV-103 in the VLC.

LCD Backlight Operation

The orange Microset II wire must provide 24 VAC/VDC for the backlight to operate. BV-79 controls backlight operation. If BV-79 is OFF, the backlight turns ON when any button is pressed and stays on for 20 seconds after there is no button activity. If BV-79 is ON, the backlight is ON continuously.

Testing the LCD

You can test the LCD to ensure that it is functional.

k **To test the LCD:**

- 1 Press and hold the left UP and right DOWN buttons simultaneously.

All LCD items should be visible.

Note Some items on the LCD are reserved for future use.

- 2 The LCD returns to normal operations when the buttons are released.

Operating Mode Specifics

Use Table 4 on p. 13 to determine DDC values to set for enabling each operating mode.

This topic provides LCD, button operation, and DDC detail for each of the operating modes. Use Table 3 to compare operating mode features.

Table 3 Operating mode feature comparison.

Mode ID	Mode Name	Features						
		Occupant Setpoint Adjustment	Occupant Fan Speed Control	Occupant ON/OFF Control	After-hours Override	Housekeeping Timer	Alternate Time of Day Disp.	View Unoccupied Setpoints
Office Modes								
No fan control								
M1	Office, no fan, occupied	◆					◆	
M2	Office, no fan, unoccupied	◆ ^a			◆		◆	◆
M3	Office, no fan, ON/OFF	◆		◆			◆	
Fan control								
M4	Office, fan, occupied	◆ ^b	◆				◆	◆
M5	Office, fan, unoccupied	◆ ^a	◆ ^a		◆		◆	
Hotel Modes								
No fan control								
M6	Hotel, no fan, rented	◆		◆			◆	
M7	Hotel, no fan, vacant					◆		
Fan control								
M8	Hotel, fan, rented	◆ ^b	◆				◆	
M9	Hotel, fan, vacant					◆		

a. Available only when after-hours override is active.

b. Available only when fan is running.

DDC for Enabling Operating Modes

Table 4 lists data point settings for the various operating modes and indicates the action of BV-67 in each mode. See Table 7 on p. 26 for further detail.

Combinations of values for BVs 64, 65, 80, and 81 in VLC DDC control operating modes. In each mode, BV-67 (a read-only point) reports occupied/unoccupied status. Use this data point in DDC as a flag to control occupied and unoccupied operating sequences.

Table 4 Data point settings for Microset II operating modes, with BV-67 status.

Mode	Description	BV-64 Occupied	BV-65 ON/OFF	BV-80 Fan-control	BV-81 Hotel	BV-67 (read only) occupied/unoccupied status
M1	Office, no fan, occupied	ON	OFF	OFF	OFF	ON
M2	Office, no fan, unoccupied	OFF	OFF	OFF	OFF	OFF unless after-hours timer (AV-98) is non-zero.
M3	Office, no fan, ON/OFF	ON	ON	OFF	OFF	Right UP/DOWN buttons control BV-67 to match occupant selected ON/OFF status. UP turns BV-67 ON, DOWN turns it OFF.
M4	Office, fan, occupied	ON	ON ^a	ON	OFF	ON unless the fan is OFF (BVs 72-74 OFF), then BV-67 is OFF.
M5	Office, fan, unoccupied	OFF	ON ^a	ON	OFF	OFF unless after-hours timer (AV-98) is non-zero.
M6	Hotel, no fan, rented	ON	ON ^a	OFF	ON	Right UP/DOWN buttons control BV-67 to match occupant selected ON/OFF status. UP turns BV-67 ON, DOWN turns it OFF.
M7	Hotel, no fan, vacant	OFF	ON ^a	OFF	ON	OFF unless housekeeping timer (AV-98) is non-zero.
M8	Hotel, FC, Rented	ON	ON ^a	ON	ON	ON unless the fan is OFF (BVs 72-74 OFF), then BV-67 is OFF.
M9	Hotel, FC, Vacant	OFF	ON ^a	ON	ON	OFF unless housekeeping timer (AV-98) is non-zero.

a. The Microset turns BV-65 ON in these modes.

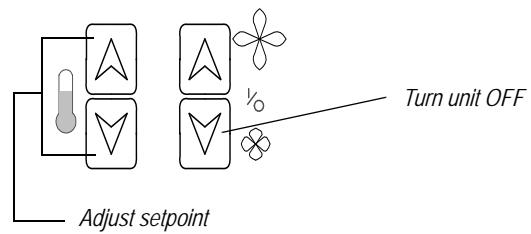
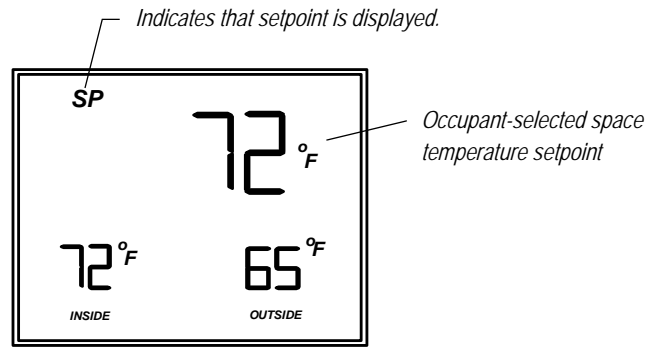
Office Modes

Office modes are typically used in commercial use environments.

M1—Office, No Fan, Occupied

Set BV-64 ON and BV-65, BV-80, and BV-81 OFF. The LCD displays the occupant-selected space temperature setpoint (AV-90). The unit controls to occupied setpoints.

This mode's counterpart is M2, which is activated by setting BV-64 OFF.



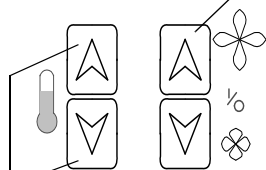
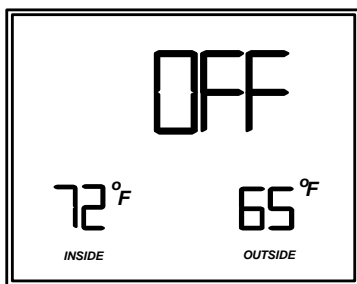
M2—Office, No Fan, Unoccupied

Set BVs 64, 65, 80, and 81 OFF. The LCD displays the word OFF. The unit controls to unoccupied setpoints.

The occupant can press the right UP button to initiate after-hours override. The occupant can press and hold the left UP button to view the unoccupied heating setpoint or press and hold the left DOWN button to view the unoccupied cooling setpoint.

If desired, after-hours operation can be disabled by writing a 0 value to the after-hours timer limit (AV-97).

This mode's counterpart is M1, which is activated by setting BV-64 ON.



Press and hold to initiate after-hours override and increment timer in 0.5 hour increments

Press and hold to view unoccupied cooling setpoint

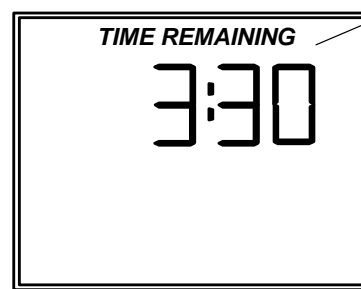
Press and hold to view unoccupied heating setpoint

After-hours Override Operation

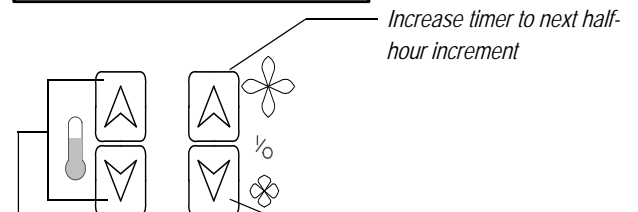
When after-hours override is in effect, the after-hours timer (AV-98) automatically decrements, and the LCD displays the current timer value. The unit controls to occupied setpoints while the after-hours timer is non-zero.

At any time, the occupant can use the right UP/DOWN buttons to increase or decrease the timer to the next half-hour increment up to the timer limit (AV-97).

The after-hours timer automatically resets to zero if the zone is set to occupied (BV-64 ON).



After-hours override time remaining in hh:mm



Increase timer to next half-hour increment

Decrease timer to next half-hour increment

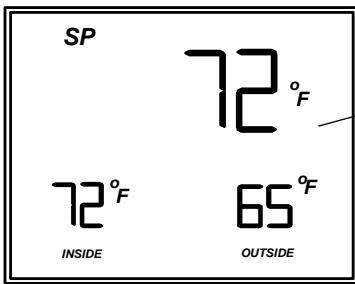
Adjust setpoint (setpoint displays until either right button is pressed)

M3—Office, No Fan, Occupied, ON/OFF

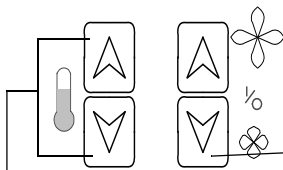
Set BV-64 and BV-65 ON and BV-80 and BV-81 OFF. The occupant can use the right UP/DOWN buttons to set ON and OFF operation.

Operation when ON

The LCD displays the occupant-selected space temperature setpoint (AV-90). The unit controls to occupied setpoints. The occupant can adjust the temperature setpoint with the left UP/DOWN buttons. The occupant can turn the unit OFF with the right DOWN button.



Occupant-selected space temperature setpoint



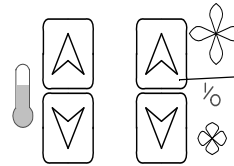
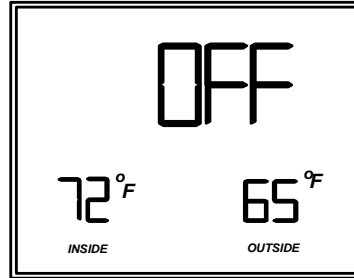
Adjust setpoint

Turn unit OFF

Operation when OFF

The LCD displays the word OFF. The unit controls to unoccupied setpoints.

The occupant can press the right UP button to turn the unit ON. The left buttons have no effect.



Turn unit ON

M4—Office, Fan, Occupied

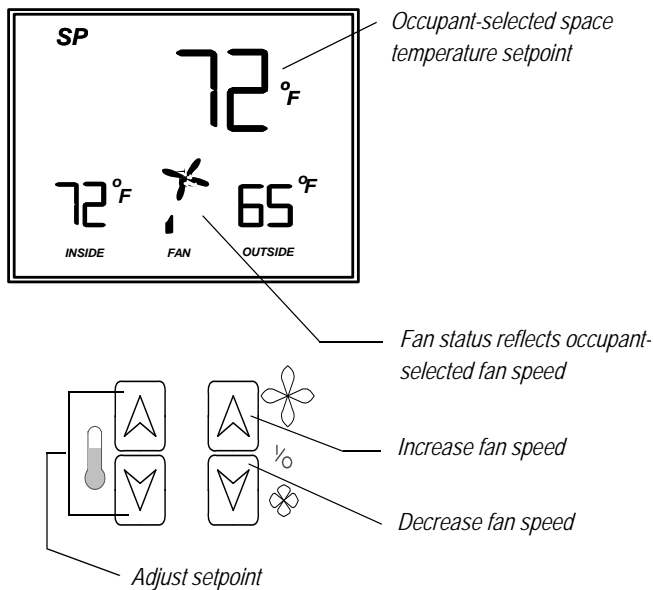
Set BVs 64 and 80 ON and BV-81 OFF. Operation depends on whether the fan is running or stopped.

This mode’s counterpart is M5, which is activated by setting BV-64 OFF.

Operation with Fan ON

The LCD displays the occupant-selected space temperature setpoint (AV-90) and the fan speed. The unit controls to occupied setpoints.

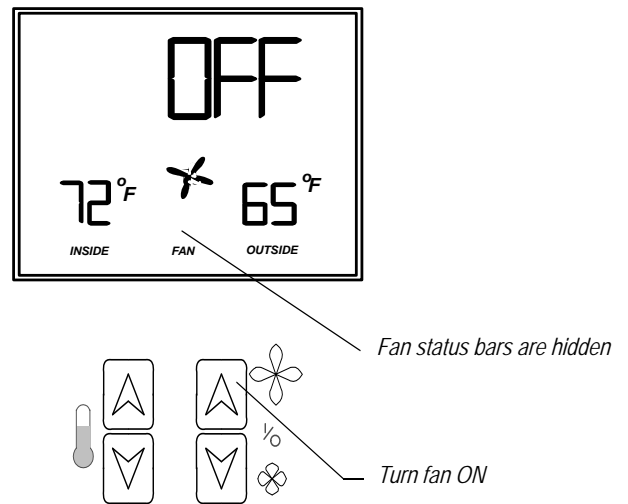
The occupant can adjust the setpoint with the left UP/DOWN buttons. The occupant can also use the right UP/DOWN buttons to change the fan speed or turn the fan OFF.



Operation with Fan OFF

If the occupant presses the right DOWN button until the fan turns OFF, the fan symbol stops turning, the fan speed bars are not visible, and the word OFF appears on the LCD. The unit controls to unoccupied setpoints.

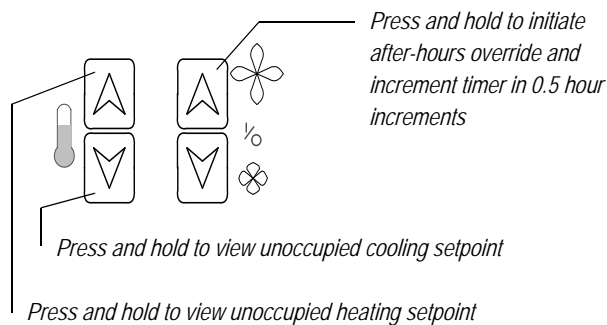
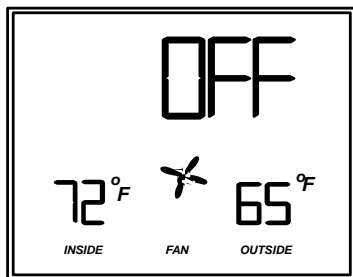
The occupant can press the right UP button to turn the unit ON.



M5—Office, Fan, Unoccupied

Set BV-64 and BV-81 OFF and BV-80 ON. The LCD displays the word OFF. The unit controls to unoccupied setpoints.

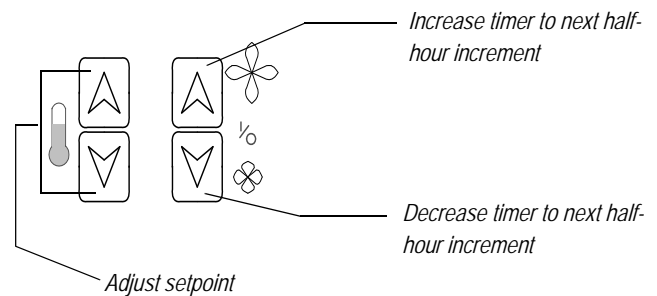
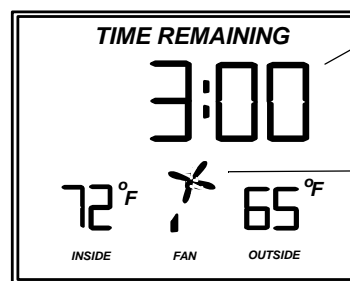
This mode's counterpart is M4, which is activated by setting BV-64 ON.



The occupant can increase or decrease the timer to the next half-hour increment up to the timer limit (AV-97) with the right UP/DOWN buttons. The right UP/DOWN buttons enable the occupant to adjust both the after-hours override time (after-hours adjustment mode) and the fan speed (fan speed mode). This function alternates after a three-second pause. Thus, after adjusting the after-hours override time, the occupant waits three-seconds to adjust fan speed.

While the after-hours override is in effect, the occupant can press the left UP/DOWN buttons to adjust the setpoint (setpoint adjustment mode) at any time.

After-hours Adjustment Mode

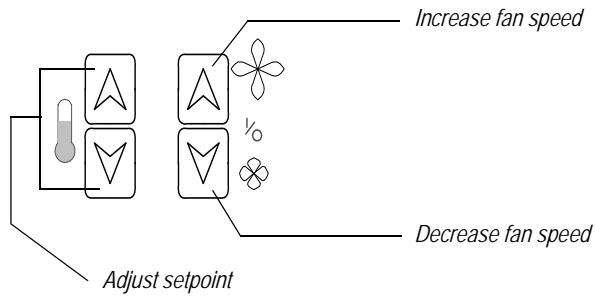
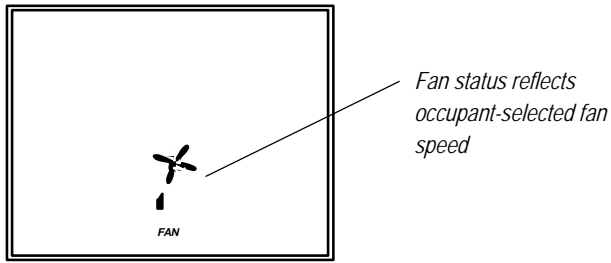


After-hours Override Operation

When after-hours override is in effect, the after-hours timer (AV-98) automatically decrements. The unit controls to occupied setpoints while the after-hours timer is non-zero.

Wait several seconds until TIME REMAINING disappears to enter fan speed mode

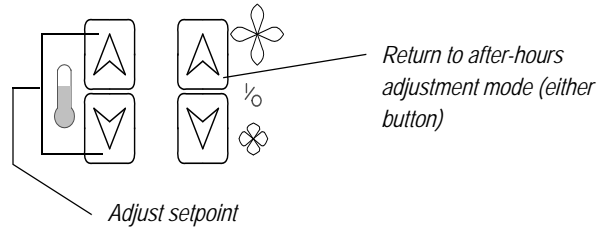
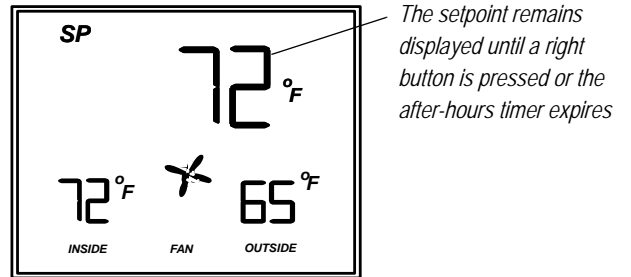
Fan Speed Mode



Wait several seconds and then press either right UP/DOWN button to enter after-hours adjustment mode

Setpoint Adjustment Mode

Pressing either left button when the unit is in after-hours override causes the setpoint to display. The occupant can use the left UP/DOWN buttons to adjust the setpoint.



Hotel Modes

Hotel modes have a feature set typically used in the hospitality industry.

M6—Hotel, No Fan, Rented

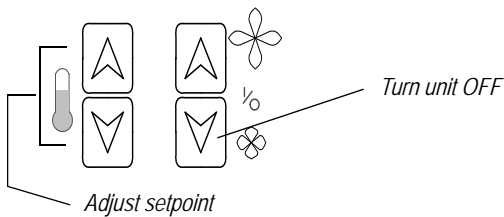
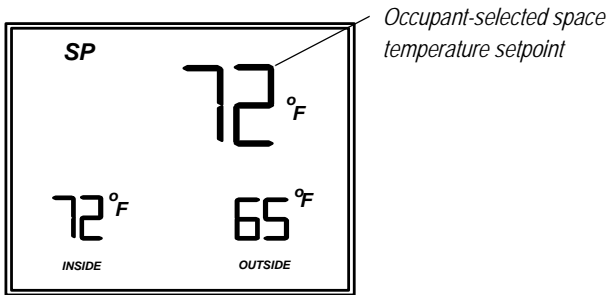
Set BV-64 and BV-81 ON and BV-80 OFF. Operation depends on whether the unit is ON or OFF.

This mode's counterpart is M7, which is activated by setting BV-64 OFF.

Operation when ON

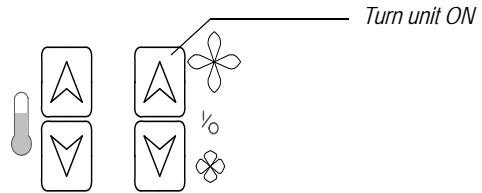
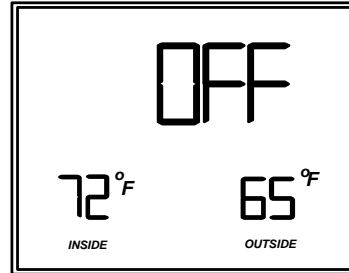
The LCD displays the occupant selected space temperature setpoint (AV-90). The unit controls to occupied heating and cooling setpoints.

The occupant can use the right DOWN button to turn the unit OFF. The occupant can also adjust the setpoint with the left UP/DOWN buttons.



Operation when OFF

The LCD displays the word OFF. The unit controls to unoccupied setpoints. The occupant can press the right UP button to turn the unit ON.

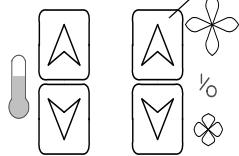
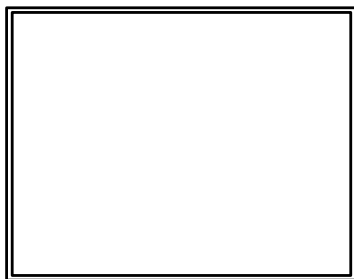


M7—Hotel, No Fan, Vacant

Set BV-81 ON and BV-64 and BV-80 OFF. The unit controls to unoccupied heating and cooling setpoints. The display is blank.

This mode's counterpart is M6, which is activated by setting BV-64 ON.

Vacant mode offers a temporary housekeeping override function. Housekeeping can press the right UP button to activate the override, which sets the timer to the override limit (AV-97).

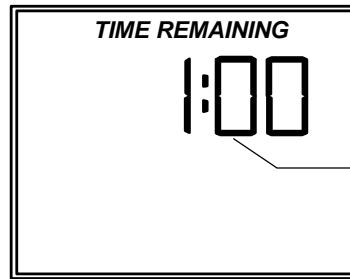


Activate housekeeping override

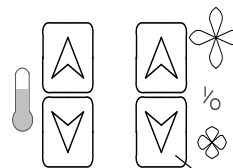
Housekeeping Override Operation

The LCD displays the override time remaining. The unit controls to occupied setpoints while the override timer (AV-98) is non-zero.

Housekeeping can press the right DOWN button to cancel the override. The timer can't restart until it has timed down or been canceled. The setpoint is not adjustable.



Housekeeping override time remaining in mm:ss



Cancel housekeeping override

M8—Hotel, Fan, Rented

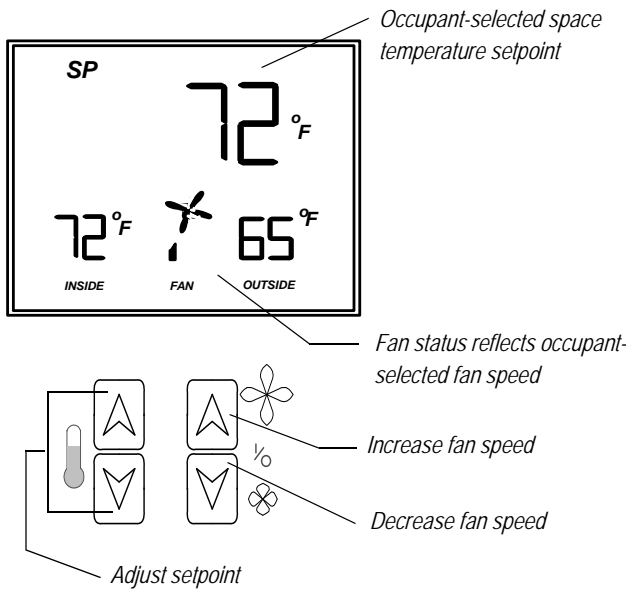
Set BVs 64, 80, and 81 ON. Operation depends on whether the fan is running or stopped.

This mode's counterpart is M9, which is activated by setting BV-64 OFF.

Operation with Fan ON

The LCD displays the occupant-selected space temperature setpoint (AV-90) and the fan speed. The unit controls to occupied setpoints.

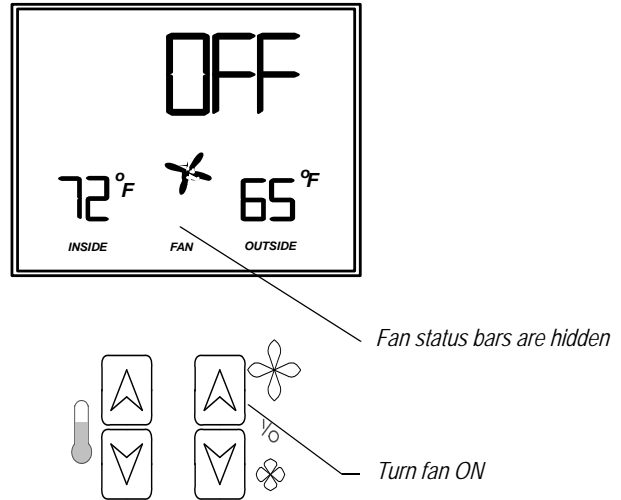
The occupant can adjust the setpoint with the left UP/DOWN buttons. The occupant can also use the right UP/DOWN buttons to change the fan speed or turn the fan OFF.



Operation with Fan OFF

If the tenant presses the right DOWN button until the fan turns OFF, the fan symbol stops turning, the fan speed bars are not visible, and the word OFF appears on the LCD. The unit controls to unoccupied setpoints.

The occupant can press the right UP button to turn the unit ON.

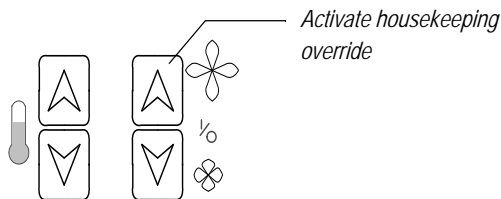
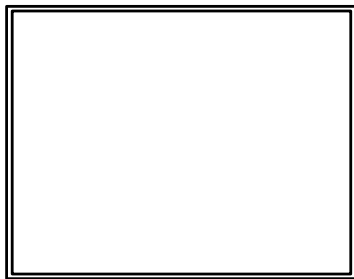


M9—Hotel, Fan, Vacant

Set BV-64 OFF and BV-80 and BV-81 ON. The display is blank. The unit controls to unoccupied heating and cooling setpoints.

This mode's counterpart is M8, which is activated by setting BV-64 ON.

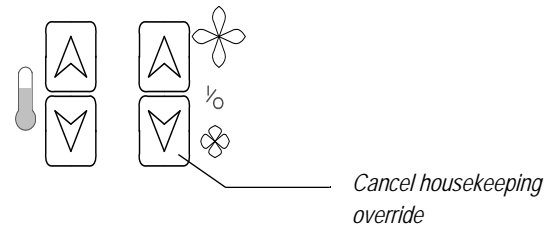
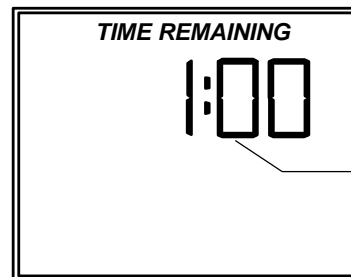
Vacant mode offers a temporary housekeeping override function. Housekeeping can press the right UP button to activate the override, which sets the timer to the override limit (AV-97).



Housekeeping Override Operation

The LCD displays the override time remaining. The unit controls to occupied setpoints while the override timer (AV-98) is non-zero.

Housekeeping can press the right DOWN button to cancel the override. The timer can't restart until it has timed down or been canceled. The setpoint is not adjustable.



Field Service Mode

Field service mode enables technicians to query and command key operating variables in the VLC while at the Microset II. A technician presses a particular button sequence at the Microset II to enter field service mode. In field service mode a technician uses the left buttons to scroll through data codes and the right buttons to change the value associated with a code.

The lower left of the LCD shows the two-digit data code and the main area displays the data value. A pre-defined list of data codes is available (see Table 5 on p. 25). You can add customized codes to this list and assign data points to them in the VLC DDC header. See the *Programmer's Guide and Reference for BACtalk Systems (LTBT-TM-PRGRMR)* for more information.

Note Fixed codes appear with a period after them, which enables a technician to distinguish them quickly from custom codes.

The data range in field service mode is -3276 to 3276. When a data value is less than -999.9, the decimal point is automatically dropped.

Set BV-68 ON (field service lockout) to deny access to field service mode.

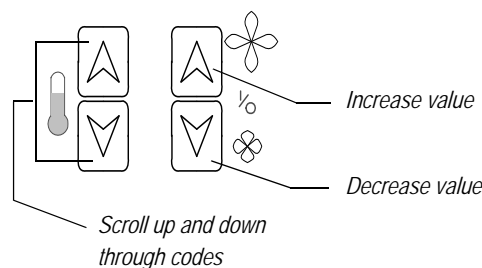
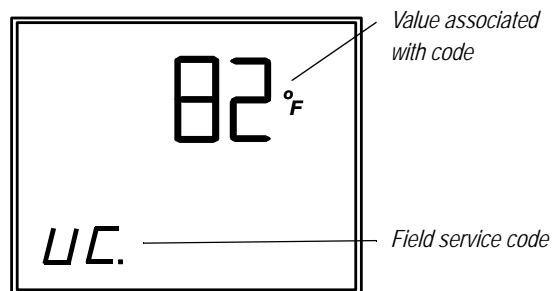
Field service mode ends automatically if there is no button activity for 40 minutes.

k To start field service mode:

- 1 Press and release the left UP button and right UP buttons simultaneously.
- 2 Repeat step 1.
- 3 Press the right UP button.

- 4 Use the left UP/DOWN buttons to set the lower right display item to the number 7.
- 5 Press the right UP button.

The Microset II displays the field service code and its associated value.



k To adjust values for codes in field service mode:

- 1 Press the left UP/DOWN button until the code you want to work with appears.
Field service codes appear in the order shown in Table 5. Pressing the left DOWN button scrolls down through this list. After fixed codes are exhausted, custom codes display in the order entered in DDC.
- 2 Press the right UP/DOWN buttons to adjust the value associated with the code.
- 3 Press the left UP/DOWN button to accept your change and scroll to a different code.

k To exit field service mode:

- ☞ Press the left and right UP buttons simultaneously or press the left and right DOWN buttons simultaneously.

Table 5 Field service mode fixed codes.

Code	Data point	Meaning
UC.	AV-95	Unoccupied cooling setpoint
UH.	AV-96	Unoccupied heating setpoint
CO.	AV-93	Cooling offset
HO.	AV-94	Heating offset
HS.	AV-100	Occupied heating setpoint
CS.	AV-99	Occupied cooling setpoint
AL.	AV-97	Override limit
HI.	AV-91	Setpoint high limit
LO.	AV-92	Setpoint low limit
SP.	AV-90	Occupant-selected space temperature setpoint
SC.	n/a	Size, cooling—size of VAV cooling duct diameter in inches or cm
SH.	n/a	Size, heating—size of VAV heating duct diameter in inches or cm
CF. ^a	n/a	Cold flow—the current airflow in the VAV box cold duct in cfm or lps
HF. ^a	n/a	Hot flow—the current airflow in the VAV box hot duct, in cfm or lps

a. Cooling and heating flows will read zero for non-VAV VLCs. These values can only be adjusted in balance mode, not in field service mode.

Balance Mode

Balance mode is similar to field service mode, except the data list is shorter, and the cold- and hot-duct VAV airflows are adjustable. Airflow balancing technicians can use this mode to calibrate the box and to set the high and low airflow limits while in the zone.

Set BV-68 ON (field service lockout) to deny access to balance mode.

Balance mode ends automatically if there is no button activity for 40 minutes.

k To start balance mode:

- 1 Press and release the left DOWN and right DOWN buttons simultaneously.

- 2 Repeat step 1.
- 3 Press the right UP button.
- 4 Use the left UP/DOWN buttons to set the lower right display item to the number 96.
- 5 Press the right UP button.

k To adjust values for codes in balance mode:

- 1 Press the left UP/DOWN button until the code you want to work with is displayed.

Field service codes appear in the order shown in Table 6. Pressing the left DOWN button scrolls down through this list. After fixed codes are exhausted, custom codes display in the order entered in VLC C3 DDC.

- 2 Press the right UP/DOWN buttons to adjust the value associated with the code.
- 3 Press the left UP/DOWN button to accept your change and scroll to a different code.

k To exit balance mode:

- ☞ Press the left and right UP buttons simultaneously or press the left and right DOWN buttons simultaneously.

Table 6 Balance mode codes.

Code	Data point	Meaning
HI.	AV-91	Setpoint high limit
LO.	AV-92	Setpoint low limit
SP.	AV-90	Occupant-selected space temperature setpoint
SC.	n/a	Size, cooling—size of VAV cooling duct diameter in inches or cm
SH.	n/a	Size, heating—size of VAV heating duct diameter in inches or cm
CF. ^a	n/a	Cold flow—the current airflow in the VAV box cold duct in cfm or lps
HF. ^a	n/a	Hot flow—the current airflow in the VAV box hot duct, in cfm or lps

a. Changing the heating or cooling flows changes the VAV flow sensor calibration factor. Typically, the technician adjusts the CF or HF to match the measured airflow when the VAV box is fully open.

VLC DDC BV and AV Assignments

Each VLC has a number of pre-assigned data points—Binary and Analog Values (BVs and AVs)—which are used to control the Microset II and read status from it. These data points are

available from the VLC as BACnet objects; BACnet-compliant devices can access the properties of these objects. For a complete reference of objects and properties available in VLCs, see the *Programmer's Guide and Reference for BACtalk Systems (LTBT-TM-PRGRMR)*.

Note Table 7 and Table 8 are concerned only with the Present Value property of the AV and BV objects. These are listed as Data Points.

Table 7 VLC DDC BV assignments for the Microset II.

Data point	Read only	Description	ON action/status	OFF action/status
BV-64		Controls occupied/unoccupied, rented/vacant status (see Table 4 on p. 13).	Sets Microset II to occupied or rented operation.	Sets Microset II to unoccupied or vacant operation.
BV-65		Enables and disables ON/OFF mode (see Table 4 on p. 13).	Enable ON/OFF mode.	Disable ON/OFF mode.
BV-66	✓	Override status. Activated in unoccupied/vacant modes when the user initiates override from the Microset II.	ON when override timer (AV-98) is non-zero.	OFF when override timer (AV-98) is zero.
BV-67	✓	Occupied status. Reflects value of BV-64 or BV-66 as appropriate. Also reflects user selection of ON/OFF mode when BV-64 is ON (see Table 4 on p. 13). Use this as a flag in DDC to control equipment occupied/unoccupied operation.	Space is occupied. Current setpoints (AV-99, AV-100) calculated using occupied logic.	Space is unoccupied. Current setpoints (AV-99, AV-100) calculated using unoccupied logic.
BV-68		Field service mode and balance mode lockout.	Lockout field service mode and balance mode.	Allow field service mode and balance mode access.
BV-69		English/metric mode swap. See "English and Metric Units" on p. 10.	Swap native units mode from English to Metric or vice versa.	Use units as determined by VLC native units mode.
BV-70	✓	Microset connection status.	Microset connection detected.	Microset not detected.
BV-71	✓	Native units mode status. Reflects native mode set in VLC DDC header.	English units.	Metric units.
BV-72 ^{a,b}		Fan low speed.	Enable fan low speed status indicator at Microset II.	
BV-73 ^{a,b}		Fa medium speed.	Enable fan medium speed indicator at Microset II.	
BV-74 ^{a,b}		Fan high speed.	Enable fan high speed indicator at Microset II.	
BV-75 ^b		Reserved for future door open icon.	n/a	n/a
BV-76 ^b		Reserved for future fan auto icon.	n/a	n/a
BV-77 ^{b,c}		Display/hide heating icon.	Display heating icon.	Hide heating icon.
BV-78 ^{b,c}		Display/hide cooling icon.	Display cooling icon.	Hide cooling icon.

Table 7 VLC DDC BV assignments for the Microset II. (Continued)

Data point	Read only	Description	ON action/status	OFF action/status
BV-79 ^b		LCD backlight command. See "LCD Backlight Operation" on p. 10.	LCD backlight ON continuously.	LCD backlight is ON only in response to button activity.
BV-80 ^d		Enable/disable fan control mode (see Table 4 on p. 13).	Fan control mode.	No-fan-control mode.
BV-81 ^d		Select office mode or hotel mode operation (see Table 4 on p. 13).	Hotel mode.	Office mode.
BV-82 ^d		Enable/disable alternate time of day.	Enable alternate time of day display.	Disable alternate time of day display.
BV-83 ^d		Select 12- or 24-hour time format.	Display time in 24-hour format.	Display time in 12-hour format.
BV-84 ^d		Display/hide room humidity. Applies only to units with optional humidity sensor.	Display room humidity.	Hide room humidity.

- a. These BVs can be written to in DDC. They are also affected by the occupant selection of fan speed. Only one of these BVs can be ON at once; otherwise, the fan displays high fan status. When fan is OFF, these BVs are OFF.
- b. Not available in VLC versions 1.06c and earlier. See "Compatibility with Earlier Version VLCs" on p. 8
- c. Do not set both BV-77 and BV-78 ON at the same time. Setting both BVs ON at the same time will cause the Microset II display to be garbled.
- d. Not available in VLC versions 1.08 and earlier. See "Compatibility with Earlier Version VLCs" on p. 8

Table 8 VLC DDC AV assignments for the Microset II.

Data point	Read only	Description
AV-90		Occupant-selected space temperature setpoint. May be written to in DDC.
AV-91		Setpoint high limit. Value of AV-90 can't exceed this value.
AV-92		Setpoint low limit. Value of AV-90 can't be below this value.
AV-93		Cooling offset in degrees. Added to the value of AV-90 in calculation of AV-99. See "Cooling and Heating Setpoint Calculation" on p. 9.
AV-94		Heating offset in degrees. Subtracted from the value of AV-90 in calculation of AV-100. See "Cooling and Heating Setpoint Calculation" on p. 9.
AV-95		Unoccupied cooling setpoint.
AV-96		Unoccupied heating setpoint.
AV-97		Override timer limit. After-hours override timer limit is in hours—3.5 = 3 hours 30 minutes. Housekeeping timer limit is in minutes—3.5 = 3 minutes 30 seconds.
AV-98		After-hours/housekeeping override timer value. Resets to 0 when BV-64 is ON.
AV-99	✓	Current cooling setpoint. Equal to AV-90 + AV-93 + AV-106 while occupied (BV-67 ON). Equal to AV-95 while unoccupied (BV-67 OFF).
AV-100	✓	Current heating setpoint. Equal to AV-90 – AV-94 – AV-106 while occupied (BV-67 ON). Equal to AV-95 while unoccupied (BV-67 OFF).
AV-101 ^a		Space temperature to display. Range is 0–127°F (-18–53°C).
AV-102 ^b	✓	Humidity, read directly from Microset II humidity sensor. Applies only to units with optional humidity sensor (MS-2000-BTH).
AV-103 ^c		Outside air temperature (OAT) to display on Microset II. Temperature range is -99–127°F (-73–53°C).
AV-104		Not used in Microset II. Microtouch lever offset.

Table 8 VLC DDC AV assignments for the Microset II. (Continued)

Data point	Read only	Description
AV-105		Not used in Microset II. Microtouch bias limit.
AV-106 ^d		Demand offset.
AV-107 ^e		Outside humidity (in %RH) to display on Microset II.

- a. The temperature read by the Microset is available as AI-0 in the VLC. Normally, VLC DDC transfers AI-0 to AV-101 for display at the Microset II.
- b. This is available only if the Microset has an optional humidity sensor.
- c. If another unit reads OAT, LSi DDC writes this value to AV-103 in the VLC. If the local VLC reads OAT, VLC DDC transfers from appropriate AI to AV-103.
- d. Typically, this is a demand offset value controlled by a BACtalk demand limiting program or by an LSi DDC demand limiting algorithm.
- e. This value displays while AV-107 is non-zero. If another unit reads outside humidity, LSi DDC writes this value to AV-107 in the VLC. Not available on VLC versions earlier than 1.09.

Notes

Notes

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