



MAR5000™

People Sensing, Automatic Set Back Thermostat



Ch 1: MAR5000	2
Ch 2: Installation Instructions & Wiring Details.....	4
Ch 3: Programming	10

Marvair® Division of AIRXCEL®, Inc.

P.O. Box 400 • Cordele, GA 31010
156 Seedling Drive • Cordele, GA 31015
(229) 273-3636 • Fax: (229) 273-5154
Email: marvair@airxcel.com
Internet: www.marvair.com

General Description

The MAR5000™ thermostat is a technologically advanced intelligent thermostat designed to control Marvair's Scholar, Classic, ModPac, and XcelPac heat pumps and air conditioners. The MAR5000 thermostat uses a wireless radio network to communicate with occupancy sensors. (Optional wired sensors are also available.) Using these occupancy sensors, the system determines whether the room is occupied or vacant. When people are present, the MAR5000 thermostat automatically maintains the set point temperature and the required ventilation. When vacant, the thermostat automatically reduces the run time of the heat pump or air conditioner and adjusts the ventilation to save energy. In addition, the MAR5000 thermostat is constantly performing patented scientific calculations to ensure that the set point temperature is achieved within a specific time when the occupants return.

Additionally, the MAR5000 thermostat can learn the day-to-day occupancy patterns of the room and recover in advance of the expected occupancy and set back more deeply after a typical departure. This provides optimum savings without sacrificing the comfort level of the students and teachers.

In addition to controlling the temperature and humidity levels in the classroom, the MAR5000 thermostat records detailed occupancy and HVAC usage data for management reports. These reports can be used to determine room occupancy patterns, HVAC system duty cycle, runtime hours saved and much more. Data can be downloaded into a PC using the built-in interface and is stored in a non-volatile memory to preserve data in the event of a power loss.

The MAR5000 thermostat is UL listed and FCC certified and Energy Star qualified.

Features

Intelligent Occupancy Anticipation. For classrooms where occupancy patterns fall into a semi-regular pattern, the system supports occupancy anticipation. The MAR5000 thermostat logs the occupancy history of the classroom in a non-volatile memory and uses this log to enter deep setback immediately subsequent to a regular departure. By knowing when the space is going to be typically occupied and using the patented recovery time algorithms, the MAR5000 thermostat returns the classroom to the set point temperature “just in time” to anticipate the arrival of students and the teacher.

Real-Time Clock. The MAR5000 thermostat includes a precise (within 1 minute per year), temperature compensated time clock. Time is kept during extended power outages (up to 3½ weeks) without the need for batteries. The clock can be programmed at the time of installation of the MAR5000 thermostat to automatically adjust for day light savings time and leap years.

Dynamic Recovery Time Based Set Back. The time required to bring the room to the set point temperature after a set back period will change due to a variety of factors including seasonal changes in outdoor ambient temperatures. The MAR5000 thermostat continually monitors the time required to bring the room to the set point temperature after a set back period and adjusts the set back temperature accordingly.

Ventilation. A dedicated relay for control of the ventilation damper. Operation of the damper can be by governed by occupancy, light level or an external input.

Active Dehumidification. Solid state, fast response, high accuracy humidity/dew point sensor signals HVAC units to enter dehumidification cycle to limit humidity in the classroom. Optional timed refresh cycle for additional humidity control. The HVAC system will cycle on for 15 minutes (programmable) every six hours (programmable) to reduce humidity and “freshen” stale air.

Support of peak load demand shedding.

Relays. Seven relays for interfacing with the Marvair HVAC unit or external devices.

Dry Contacts. One dry contact set of inputs enables data feed from any dry contact output device, e.g., a door switch.

Quick and Easy Installation, Programming and Operation:

- 24 volt.
- User friendly buttons and internationally recognized icons.
- Safety thermal limits of 50°F to 90°F.
- Settings and temperatures can be locked to allow for occupant control only within a specified range.
- Cover and buttons can be locked to ensure simple operation and security.

Other Features

- Supports automatic control of lighting based upon occupancy.
- Any continuous fan setting will be disengaged when the room is unoccupied and reengage when occupied.
- ADA compliant with optional interface includes colored indicators, Braille highlighted controls and automatic changeover operation with an optional fan.

Specifications

Parameter	Limits	Comments
Operational Voltages	10-35 VAC	Can use 8 to 40 VDC
Input current	0.022 Amps	No loads energized
Switched current	1 Amp	Seven places
Relays	7	Heat, Cool, Fan, Dehumidify, Vent, + 2 ¹
Setting Range	40-99 °F	Adjustable limits
Operational Range	35-99 °F	
Temperature accuracy	+/-1°F	Can be calibrated in field
Temperature resolution ²	1/64 °F	
Humidity Accuracy	+/-2% RH	10-90% RH, +/- 4% RH < 10% > 90%
Humidity Resolution ³	0.03% RH	
Humidity response time ⁴	4 seconds	1/e (63%)
Auto Dead Band	+/-3°F	Adjustable
Output voltage	5 volts	
Data output	RS232	
Data input	RS232	
Dry contacts	2	Input and output
Dimensions of thermostat	4.9" x 5.4" x .5"	
Clock accuracy	2 minutes	Maximum drift per year

¹ Supports multiple fan speeds, cooling and heating stages. Lighting control is also available. Supports RF or hard wired sensors.

² Temperature resolution is the detectable change in temperature.

³ Humidity resolution is the detectable change in humidity.

⁴ Can detect 63% of a change in humidity within 4 seconds.

Chapter 2

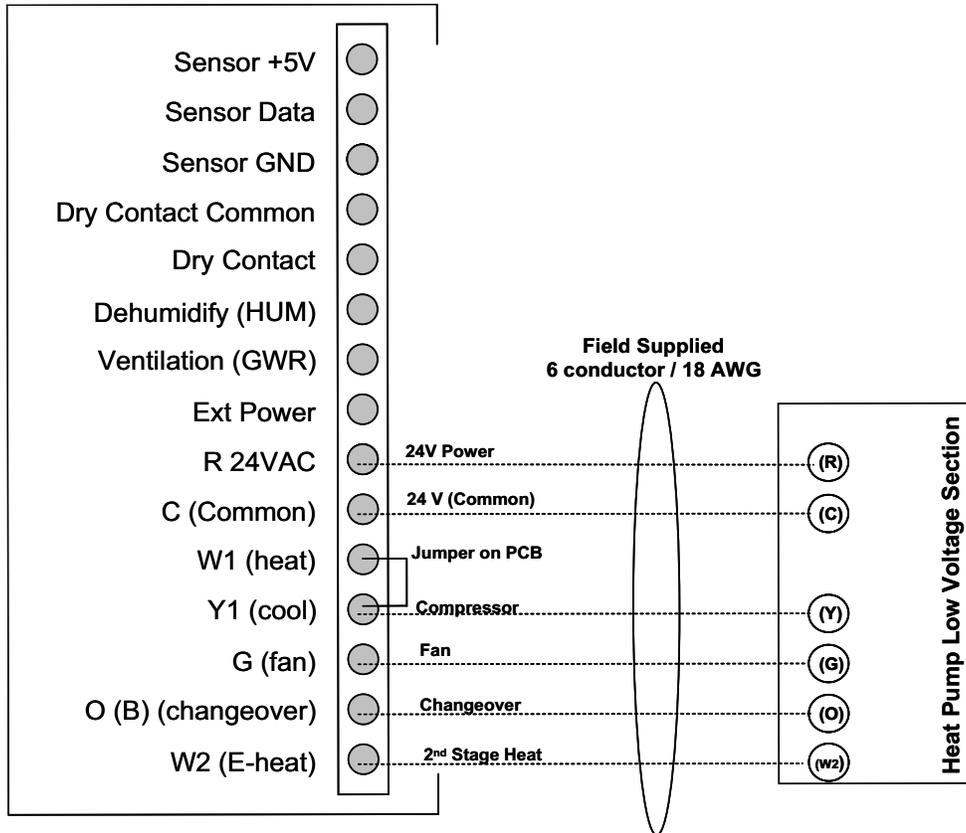
Installation Instructions & Wiring Detail

Pin Locations and Back plate

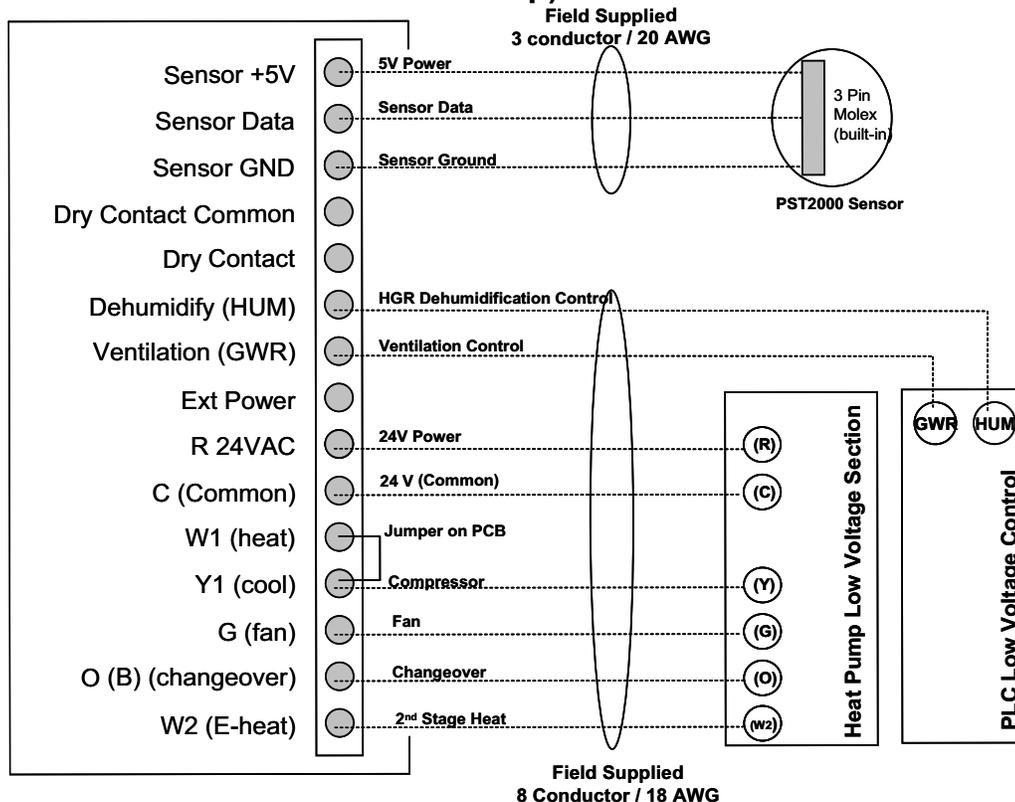
Pin	Direction	Use
1	Out	Occupancy sensor +5V
2	In	Occupancy sensor Data
3	In	Occupancy sensor ground
4	In	Dry Contact in (door switch/load shed)
5	Out	Dry Contact out (door switch/load shed)
6	Out	Dehumidify (HUM)
7	Out	Ventilation (GWR)
8	In	External power relay
9	In	(R) 24 V Hot (Stat power)
10	In	(C) 24 V Hot (Stat power)
11	Out	(W1) Heat
12	Out	(Y1) Cool
13	Out	(G) Fan
14	Out	(O) (B) Changeover, (Y2), (G2)
15	Out	(W2) Emergency heat



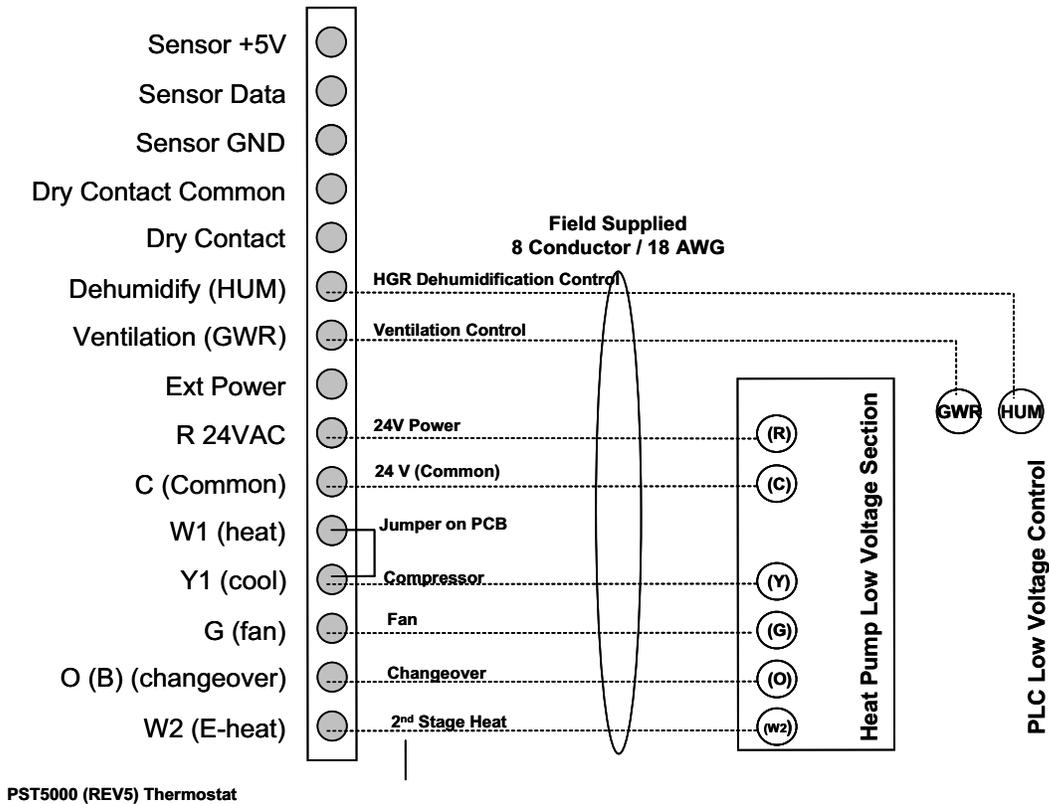
MAR5000 Wiring Detail (Wireless Sensors to Heat Pump)



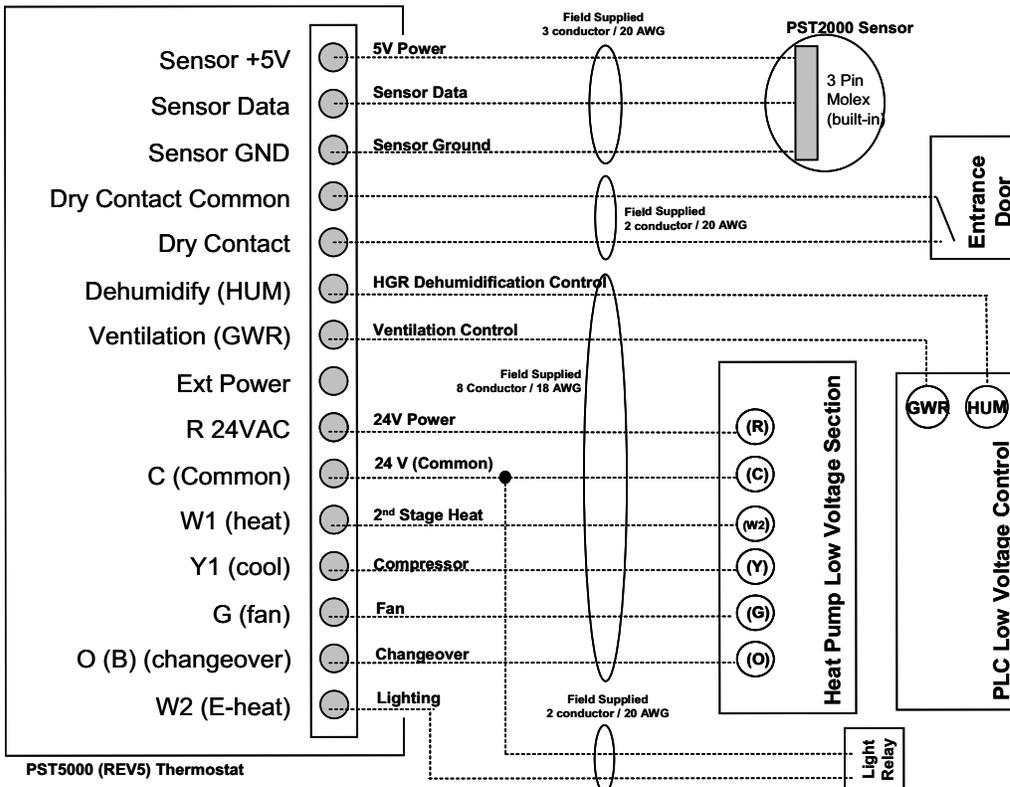
MAR5000 Wiring Detail (Hard-wire Sensors, Humidity Control Ventilation Control to Heat Pump)



MAR5000 Wiring Detail (Wireless Sensors, Humidity Control Ventilation Control to Heat Pump)



MAR5000 Wiring Detail (Hard-wired Sensors, Humidity Control, Ventilation Control, Door Monitoring, Lighting Control to Heat Pump)



The MAR5000 thermostat controller consists of a display with an attached back plate and a remote sensor.

A. Location of the Display and Back Plate.

Install the MAR5000 thermostat controller approximately 5 ft. (1.5 M) above the floor in an area with good air circulation at an average classroom temperature. Do not install the MAR5000 where it can be affected by

- Drafts or dead spots behind doors or in corners,
- Hot or cold air from ducts,
- Radiant heat from the sun or appliances,
- Concealed pipes and chimneys, and
- Non-conditioned areas such as an exterior wall.

WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow safety warnings exactly could result in serious injury, death, and/or property damage.

Turn off electrical power at fuse box or service panel BEFORE making any electrical connections and ensure a proper ground connection is made before connecting line voltage.

B. Mounting the Back plate

The back plate should be mounted directly on a wall. Use 18 gauge color coded thermostat cable for proper wiring.

1. Disconnect all power to the Marvair Heat pump or air conditioner before installing the back plate to prevent electrical shock or damage to the equipment.
2. Hold the back plate in position and mark holes for anchors (not supplied with the MAR5000). Take care that the wires from the Marvair heat pump or air conditioner and the remote sensor do not fall back into the wall.
3. Drill two 3/16" (4.8mm) holes and gently tap the anchors into the wall.
4. Pull wires through the opening in the back plate.
5. Secure the back plate to the wall with screws.
6. Connect the wires to the back plate according to the applicable wiring diagram. See pages 5 and 6 for various schematics. Firmly tighten each terminal screw.
7. Fit wires as close as possible to the back plate. Push excess wire back into the hole.
8. Plug hole with insulation to prevent drafts from affecting the thermostat.

C. Mounting the Display

Disconnect all power to the Marvair Heat pump or air conditioner before installing the display to prevent electrical shock or damage to the equipment.

1. Loosen the set screw on upper left side of display.
2. Snap display into position on top of the back plate. Make sure the pins in the display are aligned with the holes in the back plate.
3. Tighten set screw.

D. Selecting the HVAC Profile

The Mar5000 comes factory programmed with Marvair profile that controls the operation of the Marvair HVAC unit including dehumidification and ventilation. However, this profile may be modified in the field as described in Chapter 3, *Programming*. To select the Marvair profile:

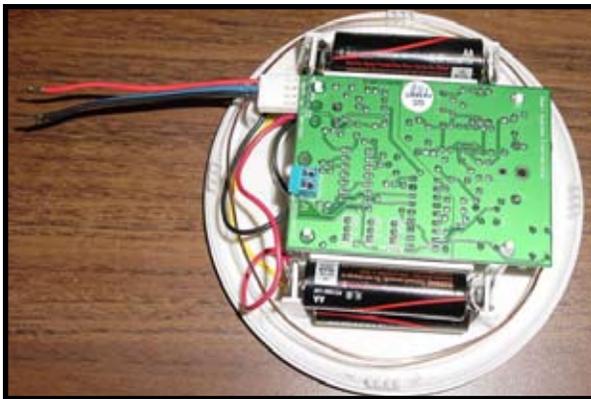
1. Turn on the Marvair HVAC unit. d0 will be briefly displayed.
2. Quickly press the up arrow until d2 is displayed. This selects the Marvair profile.

Note: if you are not fast enough and the temperature is shown instead of d0, then press the up button until 17 is displayed. Then press % and d0 will be displayed. Press the up button until d2 is shown on the display.

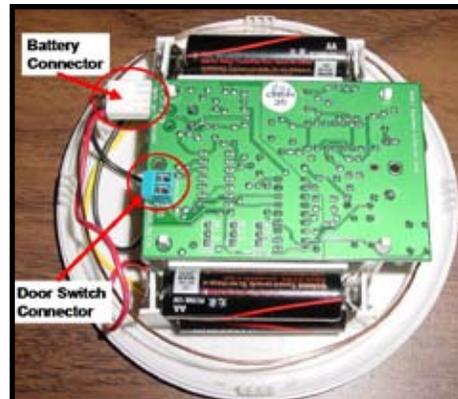
E. Location and Mounting of the Sensor

The sensor is comprised of a base plate and the sensor body. The sensor can be located on the ceiling or on a wall. It should be installed at sufficient height to minimize the possibility of vandalism. Since the sensor detects motion and body heat, make sure the sensor can “see” the entire room. The sensor communicates to the thermostat through a wireless interface. The power to the sensor can either be through batteries or hard wired. To install the sensor:

1. Release the sensor body from the base plate.
2. Hold the base plate in position and mark holes for anchors (not supplied with the MAR5000).
3. Drill two 3/16” (4.8mm) holes and gently tap the anchors into the wall.
4. Pull 24 volt power wires if the sensor is hard wired through the opening in the back plate.
5. Secure the base plate to the wall or ceiling with screws.
6. Insert batteries if the sensor is not hard wired.
7. Select option jumpers depending upon whether the sensor is hard wired or battery powered.
8. Attach the sensor body to the base plate by aligning the slots with the tabs.
9. Rotate the sensor body clockwise until it snaps into place.
10. After the sensor is installed it must be linked to the thermostat.



Hard Wired Sensor



Sensor with Battery Power

F. Linking the Sensor to the Thermostat

Note: anytime a new sensor or thermostat is installed, they must establish a communications link. Power must be provided to the thermostat and the sensor for the communications link.

1. Unlock the thermostat cover by removing the screw with an allen wrench. The screw is located at the bottom of the cover.
2. Under the thermostat cover are buttons used to link the thermostat to the sensor.

3. Press & hold the “FAN” button until it turns on, then OFF and then ON again.
4. Quickly press the HEAT/COOL/AUTO/OFF button once.
5. All the symbols should briefly appear. Then the screen should show 00 for a few seconds. Finally the screen will revert to the normal display which shows the temperature setting.

Note: when pressing the buttons, it is important to do so quickly; do not pause. If you do pause, the screen will show normal temperature setting display and you must start over. Marvair recommends that the following procedures should be read several times before starting.

a. Erasing a previous sensor from memory (not required for new installations).

1. Press the % button three times; the screen should show 00.
2. Press the Up arrow until 03 is displayed.
3. Press the % button once.

Any previous sensor has been erased from memory.

b. Putting the Thermostat into the Learn Mode.

1. Press the % button three times; the screen should show 00.
2. Press the Up arrow until 02 is displayed.
3. Press the % button once.

The screen should now show -0. This means that the sensor is in the Learn Mode and ready to link with the sensor.

c. Establish the Communications Link.

1. Insert a straightened paper clip into the small hole on the face of the sensor.
2. Push lightly – you should feel a small switch inside the sensor when you press it. Hold switch in for 2 seconds.
3. Look at the thermostat. It should now display a symbol, “S” and a number, typically 6 or 7. S7 is the maximum signal strength, but a signal strength between 2 & 7 is acceptable.
4. Press the % button once and wait for the screen to return to the normal temperature setting display.

This completes the linking of the sensor with the thermostat.

MAR5000 Advanced Set-Up Features

Accessing front panel commands is accomplished by pressing the % button 3 times. The first time the button is pressed, the display will show the current savings percent. After the second press, the display will show the average number of runtime hours saved per day (“place” a decimal point between the two digits displayed to see the runtime hours saved in tenths, i.e., 3.4 hours of otherwise wasted runtime now saved per day). After the third press, the display will show “00”. By using the UP and DOWN buttons, the display will scroll from “00” through “99” offering the user the ability to turn on or off the many different options. To return to normal operation quickly, it is necessary to press the savings button again. Otherwise, the system will revert to normal operation after thirty seconds. The program options are defined below.

#	Option
00	Reset the Service Icon – Resetting the Service Icon will cause the flashing wrench, which indicates a loss of communication between the sensor and the base, to cease for 24 hours.
01	Display Radio strength – This command displays 2 values on the screen for RF testing. The left digit is a counter which increments for 0 – 9 and then A – F as every packet is received by the base station. The right digit displays the strength (0-7) of the received packet. This command can be used during installation or during a service call to evaluate the RF performance of any sensor or sensor location.
02	Learn ID – This command places the base station into “learn mode” so that it can identify the ID of its sensors. In order for this to occur the sensor must also be placed into “learn mode.”
03	Erase all IDs – Erasing all IDs will delete all of the IDs of the sensors that have been associated with the base. This should be done when a sensor is removed from use. Remaining sensors will have to be re-associated.
04	Display number of IDs – This displays the number of sensors that are currently associated with the base station.
05	Start Remote update test – This function reports which sensors are not reporting to the base station. The cycle starts with FF and waits until the sensors send packets. If all sensors are reporting to the base station 00 will eventually be shown on the display. The display shows numbers in Hexadecimal, which can be converted to Binary to determine which sensors are not reporting. Once in this mode you must press the % key to get out. MAR5000s with command 68 enabled will default into this mode if one of the sensors becomes disabled.
06	Transmit continuously off – This function turns the Transmit ID continuously function off.
07	Transmit ID continuously – This command instructs the 5000 to broadcast its ID.
08	All Icons on – This command will cause all icons on the crystal to be displayed briefly.
09	Calibrate Temperature – This command allows one to adjust the actual temperature up or down for calibration purposes. Once this command is entered, the operator dials the temperature up or down until the number displayed matches the correct temperature.
10	Max Operational and setpoint temperature (84) – The Max Operational and Setpoint Temperature is the highest temperature that the SmartSystem will allow the temperature in the room to reach. This applies to both how far the system will let the temperature drift and how high a person can set the temperature for (in auto). This command allows one to adjust this temperature up or down in degrees.
11	Min operational and setpoint temperature (64) - The Min Operational and Setpoint Temperature is the lowest temperature that the SmartSystem will allow the temperature in the room to reach. This applies to both how far the system will let the temperature drift and how low a person can set the temperature (in auto). This command allows one to adjust this temperature up or down in degrees.

- 12 Edit Hysteresis – Hysteresis is defined as the distance, in temperature, that the temperature is allowed to drift away from the setpoint before the heater/air conditioning turns on. It is the same distance away from the setback point that the temperature can drift before the heater/air conditioning turns on. The default is (48/64) degrees Fahrenheit and this function allows you to increase or decrease the numerator of the equation (48 is the default.)
- 13 Enable Fahrenheit (default) – The temperature displayed on the thermostat is Fahrenheit by default. If it is changed to Celsius, selecting this command will change it back to Fahrenheit.
- 14 Enable Celsius – This command changes the displayed temperature format from Fahrenheit to Celsius.
- 15 Set comfort zone – The comfort zone is the temperature, which is chosen on either side of the setpoint, to which the thermostat is programmed to recover. This command allows one to adjust the number of degrees above/below the setpoint. The default is 3 degrees Fahrenheit.
- 16 Set Auto H<>C Over drift – This is the number of degrees that the system will allow the temperature to drift, after a duty cycle, before it turns the opposite heating/cooling component on. This works only in auto setting. Proper setting of this function will help protect against whipsawing after an overshoot. This function allows one to set the number of degrees. The default is 3 degrees.
- 17 Select Default Parameters – This allows one to set the default parameters D0 – D2. Once this is set, changes to other features will be saved in the event of a power outage. Selecting a profile causes all features (00-118) to be reset to the profile’s defaults. D2 is the Marvair profile.
- 20 Set changeover cool on – This function instructs the changeover relay to engage when cooling is engaged. This is a necessary feature for heat-pump systems.
- 21 Set changeover heat on – This function refers to the position of the changeover in a heat-pump HVAC unit. If the changeover needs to be engaged when heating, select this option.
- 22 Enable smart fan control (default) – This function enables the use of pre fan (cooling) and post fan operations (heating and cooling). Pre-fan and post-fan operations engage just the fan in order to move the temperature in the desired direction before and after the heating/cooling elements are engaged. The pre and post fans operate for either a maximum amount of time or until the system ascertains that running only the fan isn’t moving the temperature in the proper direction.
- 23 Disable pre and post fan control – This command disables the pre and post fan operations for heating and cooling.
- 24 Enable pre fan for occupied heat – Allows the fan to be turned on before the heater when the room is in occupied mode. If the room is getting warmer it will keep the fan on and not turn on the heater. Once the room begins to cool, the temperature ceases to increase, or the maximum pre fan time is reached, the heating element will be engaged.
- 25 Disable pre fan for occ heat (default) – The pre fan will turn the fan on in an attempt to warm the room with warm air from the ducts. This occurs before the heater goes on when the thermostat is in occupied mode. This feature is not on by default, but can be disabled if someone enables it.
- 26 Enable Indoor Air Quality – This forces the fan to run constantly whenever the room is occupied.
- 27 Disable Indoor Air Quality (default) – This turns off the command to run the fan whenever the room is occupied.
- 28 Enable Autospeed Fan (Chg Ovr= Hi) – This command is used with fan coil HVAC systems. It allows the High speed fan to turn on, because it is linked to the changeover relay, whenever the temperature is above or below two Hysteresis values from the setpoint (occupied) or setback (unoccupied). This creates a multistage fan.
- 29 Disable Autospeed Fan (default) – This disables the ability to do calculations for a multistage fan. The changeover relay will respond normally as set forth in commands 20 and 21.

- 30 Max On time occupied – This command allows one to change the amount of time that the thermostat will allow the heat/cool to run during one duty-cycle while in an occupied state. If the HVAC drives for the maximum amount of time when occupied, the system must also wait the maximum “off time” (command 31) before it can drive again, even if the temperature goes past the hysteresis. If it does not drive the maximum amount of time, the corresponding temperature drift will only go to the hysteresis and then again begin to drive. This command is useful for HVAC sharing rooms where there are 2 thermostats but just 1 HVAC system (typical in some time shares) or in a standard environment to lessen the likelihood of freezing a compressor.
- 31 Max On time off (occupied) – This command allows one to change the amount of time that the thermostat will allow the heat/cool to remain off in-between duty-cycles while in an occupied state. If the HVAC drives for the maximum amount of time the system must also wait the maximum “off time” before it can drive again, even if the temperature goes past the hysteresis. If it does not drive the maximum amount of time, the corresponding temperature drift will only go to the hysteresis and then begin to drive.
- 32 Max On Unoccupied time – This command allows one to change the amount of time that the thermostat will allow the heat/cool to run during one duty-cycle while in an unoccupied state. If the HVAC drives for the maximum amount of time the system must also wait the maximum “off time” before it can drive again, even if the temperature goes past the hysteresis. If it does not drive the maximum amount of time the corresponding temperature drift will only go to the hysteresis and then begin to drive. This command is useful for rooms where there are 2 thermostats but just 1 HVAC system or in a standard environment to lessen the likelihood of freezing a compressor..
- 33 Max On Unoccupied time off – This command allows one to change the amount of time that the thermostat will allow the heat/cool to remain off in-between duty-cycles while in an unoccupied state. If the HVAC drives for the maximum amount of time the system must also wait the maximum off time before it can drive again, even if the temperature goes past the hysteresis. If it does not drive the maximum amount of time the corresponding temperature drift will only go to the hysteresis and then begin to drive.
- 34 Edit Minimum Pre fan time – The pre fan time is the minimum amount of time that the fan will run, if it is enabled, before the cooling/heating elements turn on. This function allows one to edit the number of minutes that the fan alone will run.
- 35 Edit Maximum Post fan time (heat) – The post fan time is the amount of time that the fan will run after the heater has turned off. This is to clear the ducts of any warm air that is in them. This function allows one to edit the maximum number of minutes that the fan alone will run. The actual time will be determined from the slope of the temperature (if making progress) or the max timer. This is measured after the temperature attains setpoint and is measured in minutes.
- 36 Edit Minimum Heat time – This is the minimum amount of time that the heat will run in an occupied or unoccupied room. The default is 1 minute and it is entered in 6 second increments (1min = 10.)
- 37 Edit Minimum Cool time – This is the minimum amount of time that the air conditioner will run in an occupied or unoccupied room. The default is 1 minute and it is entered in 6 second increments (1min = 10.)
- 38 Enable Soft Landing – This function turns off the heating or cooling function before the setpoint is reached, after measuring how far the fan alone can drive the temperature. This premature disengaging of the heating/cooling elements with running of just the fan attempts to prevent the overshooting of the setpoint with the fan.
- 39 Disable Soft landing (default) – This function will cause the heater or air conditioner to drive the temperature to the setpoint before disengaging the heating/cooling elements and engaging the post fan (if selected).
- 40 Enable Auto-sleep mode – When this option is engaged and the ambient light level is low (the opto value exceeds the opto trip point) in an occupied state, sleep mode will automatically be entered. This also allows a separate sleep temperature to be set as the setpoint.

- 41 Disable Auto-sleep mode (default) – This turns off the automatic sleep mode. If sleep mode is desired it must be entered into from the face of the thermostat.
- 42 Edit sleep timer value – This function set the minimum amount of sleep time when sleep mode is enabled. This command allows you to set the minimum amount of time in hours (default is 8 hours).
- 43 Edit day unoccupied delay (10 minute default) – The day unoccupied delay is the amount of time that the thermostat waits after it has received “room unoccupied” messages from all sensors during the daytime. Once this delay timer has expired, the 5000 will begin unoccupied mode processing and allow the temperature to setback. This command allows one to alter the amount of time in minutes that the thermostat will wait. “Daytime” is determined from the CDS cell which measures the ambient light.
- 44 Edit Night 1 unoccupied delay (45 minute default) – The night 1 unoccupied delay is the amount of time that the thermostat waits after it has received “room unoccupied” messages from all sensors, before beginning unoccupied mode processing when the room is dark. This command allows one to alter the amount of time in minutes that the thermostat will wait. The value is entered in minutes with a 5x multiplier.
- 45 Edit Night 2 unoccupied delay (90) – The night 2 unoccupied delay works in much the same way that the night 1 delays operates. It is triggered if, at any time during the night when in unoccupied mode, the thermostat receives an occupied status report from one of the sensors. The next, and any subsequent, time the thermostat goes into unoccupied mode that night it will use the night 2 delay. This command allows one to alter the amount of time in minutes that the thermostat will wait. This value is entered in minutes with a 5x multiplier.
- 46 Refresh cycle wait time (4 hours) – This command is used for the refresh cycle and details the amount of unoccupied time that must elapse before a refresh cycle is called. The HVAC unit must not come on at all for the set amount of time before the system will call for a refresh cycle. This time is measured in hours.
- 47 Refresh cycle ON time (10 minutes) – This command is used in conjunction with the refresh cycle wait time and details how long the HVAC unit will run after the refresh cycle wait time has elapsed. This setting ignores the setpoint and engages the HVAC heating/cooling + fan elements for the specified amount of time. The command allows one to change the time in minutes.
- 48 Disable Wrench and Sleep modes – This function disables sleep mode and prevent the flashing wrench from showing if there is a communication error between the sensor and the base station.
- 49 Allow Wrench and Sleep modes – (default) – This restores the ability to have a sleep mode and will allow the flashing wrench to show if there is a communication error between the sensor and the base station.
- 50 Display Setpoint only – The actual temperature of the room is displayed by default at all times except when a setpoint is being selected. This command will cause the thermostat to only display the setpoint temperature.
- 51 Temp/Set normal display (default) – The actual temperature of the room is displayed by default at all times except when a setpoint is being selected. If this mode has been changed to only show the setpoint temperature (command 50), this command will bring it back into the default settings.
- 52 Enable warning ICON (default) – This command will allow the “flashing wrench” to be seen if communication is lost between the sensor and the base station.
- 53 Disable warning ICON – This command will not allow the “flashing wrench” to be seen if communication is lost between the sensor and the base station.
- 54 Enable 2 Stage cooling (chg Ovr=Hi) – This function allows for multistage cooling by allowing the hi cooling to be attached through the changeover relay. The hi stage cooling will engage when the temperature is more than 2 hysteresis from the setpoint or setback (unoccupied).
- 55 Disable 2 Stage Cooling (default) – This disables the ability to have multistage cooling and restores the changeover .

- 56 Edit Maximum Post fan time (cool) – This function allows one to select the maximum amount of time that the post fan will run when the HVAC has finished cooling a room. Otherwise the maximum post fan time is determined by whether progress is made when using the fan. This command is detailed in minutes.
- 57 Manual E-Heat setback shutoff (Max 7) – This command will cause the emergency heat strip to disengage when it is up to 7 degrees Fahrenheit from the first hysteresis. The amount of difference can be changed in degrees with this function.
- 58 Manual E-Heat setback engage (Max 15) – This command will cause the emergency heat strip to engage when it is up to 15 degrees from 2 hysteresis values away from the users setpoint. In order for it to engage, the temperature must be further from the setpoint than the band that this creates. The amount of difference can be changed in degrees with this function. The emergency heat can also engage if the temperature remains within the setback shutoff to setback engage band (or oscillates around this border) for a cumulative time exceeding 5* (Manual E-Heat setback engage) minutes. Once this timer is exceeded, the strip is engaged to protect the heat pump and the temperature is driven for a minimum of 1 minute to the setback shutoff temperature.
- 60 Hardware reset – This function will force the thermostat to interrupt its power supply, thereby restarting it.
- 61 Select Default Parameters – This allows one to set the default parameters D0 – D2. Once this is set changes to other features will be saved in the event of a power outage.
- 62 Reset Default Identification – This function erases the ID of the thermostat returning it to 000000. When power is subsequently cycled, all the settings on the thermostat are restored to the D0 defaults and allows one to reconfigure the settings from a starting point. The runtime data is kept during this procedure.
- 63 Enable radio relay updates
- 64 Disable radio relay updates (default)
- 66 Edit min Eheat time (0=default,1,2,3 minutes) – With this function emergency strip heat is always called for whenever heating is needed. It will run for at least this minimum amount of time or until it reaches setpoint. This function is calculated in minutes and is counterproductive if you have enabled # 57 and #58.
- 67 Zero statistical block – This command will erase all runtime data that has been accumulated since installation.
- 68 Shutdown when communication lost (AF mode) – This command, when enabled, will cause the thermostat to refuse to call for heat or cooling if communication is lost between the sensor and the base station and mode 05 is then entered to indicate the failed sensor(s).
- 69 Revert to occupied if communication lost (default) – If the communication is lost between the sensor and the base station the thermostat will default into the occupied state, never allowing the temperature to drift more than the hysteresis.
- 70 Disable Auto& Night, enable limits – This function disables the auto heat or cooling feature and disables the ability to engage sleep mode. It also allows one to use the user setpoint limits set in #72 and #73.
- 71 Enable Auto& Night, disable limits – This feature allows one to use the auto heat or cooling feature and to engage a sleep mode. It keeps the setpoint limits as specified in #10 and #11.
- 72 Heat Max limits (76) – The heat max limits are used as setpoint limits that can be set at temperatures within the operational max limits (#10.) These are set in degrees and cannot be higher/lower than the maximum/minimum operational limits.
- 73 Cool Min limits (70) – The cool min limits are used as setpoint limits that can be set at temperatures within the operational min limits (#11.) These are set in degrees and cannot be higher/lower than the maximum/minimum operational limits.

- 74 E-Heat only mode (enable) – By selecting this command, only emergency heat will be called for by the thermostat when there is any heating call. The heat pump will never be called for and “EH” will occasionally flash on the screen when in heating mode.
- 75 E-Heat only mode (disable) – Default – This will allow for normal heating operation to occur (the heat pump can be called for).
- 76 E-Heat assist mode (enable). When this mode is enabled, the E-Heat will always engage along with the heat pump to assist the heat pump.
- 77 E- Heat assist mode (disable). This returns the system to normal heating operation. The E-heat will engage only as needed.

THE FOLLOWING ARE TEMPORARY COMMANDS USED FOR TESTING PURPOSES.

- 80 HEAT on – This command force engages the heat ON for 6 seconds and then the thermostat will revert to normal operation.
- 81 HEAT off – This command force disengages the heat OFF for 6 seconds and then the thermostat will revert to normal operation.
- 82 COOL on – This command force engages the cool ON for 6 seconds and then the thermostat will revert to normal operation.
- 83 COOL off – This command force disengages the cool OFF for 6 seconds and then the thermostat will revert to normal operation.
- 84 FAN on – This command force engages the fan ON for 6 seconds and then the thermostat will revert to normal operation.
- 85 FAN off – This command force disengages the fan OFF for 6 seconds and then the thermostat will revert to normal operation.
- 86 CHANGEOVER on – This command force engages the changeover ON for 6 seconds and then the thermostat will revert to normal operation.
- 87 CHANGEOVER off – This command force disengages the changeover OFF for 6 seconds and then the thermostat will revert to normal operation.
- 88 EMERGENCY HEAT on – This command force engages the emergency heat ON for 6 seconds and then the thermostat will revert to normal operation.
- 89 EMERGENCY HEAT off – This command disengages the emergency heat OFF 6 seconds and then the thermostat will revert to normal operation.

THIS ENDS THE TEMPORARY COMMAND SECTION.

- 90 Set fan normally open (default) - This function tells the thermostat that the fan relay requires 24 volts to turn it on.
- 91 Set fan normally closed - This function tells the thermostat that the fan relay requires 24 volts to turn it off.
- 92 Set cool normally open (default) - This function tells the thermostat that the cooling relay requires 24 volts to turn it on.
- 93 Set cool normally closed - This function tells the thermostat that the cooling relay requires 24 volts to turn it off.
- 94 Set E heat normally open (default) - This function tells the thermostat that the emergency heat relay requires 24 volts to turn it on.
- 95 Set E heat normally closed- This function tells the thermostat that the emergency heat relay requires 24 volts to turn it off.
- 96 Set heat normally open (default) - This function tells the thermostat that the heat relay requires 24 volts to turn it on.

- 97 Set heat normally closed- This function tells the thermostat that the heat relay requires 24 volts to turn it off.
- 98 Set chgover normally open(default) - This function tells the thermostat that the changeover valve requires 24 volts to turn it on.
- 99 Set chgover normally closed- This function tells the thermostat that the changeover valve requires 24 volts to turn it off.
- 100(A0) Set dehumidification relay normally open(default) - This function tells the thermostat that the dehumidification relay requires 24 volts to turn it on.
- 101(A1) Set dehumidification relay normally closed- This function tells the thermostat that the dehumidification relay requires 24 volts to turn it off.
- 102(A2) Set ventilation relay normally open(default) - This function tells the thermostat that the ventilation relay requires 24 volts to turn it on.
- 103(A3) Set ventilation relay normally closed- This function tells the thermostat that the ventilation relay requires 24 volts to turn it off.
- 104(A4) Ventilation ON – This command temporarily force engages the ventilation relay on. If ventilation is not normally being called, this may disengage after 6 seconds.
- 105(A5) Ventilation OFF – This command temporarily force disengages the ventilation relay off. If ventilation is being called on, this relay may re-engage after 6 seconds.
- 106(A6) Dehumidification ON – This command temporarily force engages the humidity relay on. If the humidity relay is not normally being called, this may disengage after 6 seconds.
- 107(A7) Dehumidification OFF – This command temporarily force disengages the humidity relay off. If dehumidification is being called on, this relay may re-engage after 6 seconds.
- 108(A8) Set RH target. This command sets the relative humidity % to target if active dehumidification is enabled
- 109(A9) Enable humidity control (RH target). This command enables active dehumidification. Whenever the relative humidity is above the target set in (108) for more than 5 minutes, the system will engage the humidity relay. Dehumidification sessions must last a minimum of 5 minutes. Dehumidification will cease if temperature in the space drops more than 2 degrees below setpoint (set in command 114) and can only occur in the cooling mode.
- 110(B0) Disable humidity control (default). This command turns off humidity targeting.
- 111(B1) Enable compressor as dehumidifier. This command will instruct the system to treat the compressor as an active dehumidifier. The compressor will be called on if the relative humidity is above the target. It will remain on until the relative humidity falls within range, or the temperature in the space drops more than 2 degrees F below setpoint (as set in command 114).
- 112(B2) Disable compressor as dehumidifier (default). This command instructs the system to no longer treat the compressor as a dehumidifier. Dehumidification sessions will still be able to last until 2 degrees F below setpoint (as set in command 114), just not explicitly using the compressor.
- 113(B3) Compressor restart delay (3 minutes default). Whenever the compressor disengages, it must remain off for the time specified by this command. It is adjusted in 6 second increments. The default value is 30 = 3 minutes (30 * 6 = 180 seconds).
- 114(B4) Max temperature overshoot when dehumidifying in degrees (2 degree default). This value is the maximum amount the temperature in the room is allowed to fall below the user's setpoint during activate dehumidification. When temperature falls more than this amount below setpoint , any active dehumidification session will end.
- 115(B5) Enable occupancy anticipation. When enabled, the system will track the occupancy patterns over 28 days in order to predict for every day of the week the likely arrival time. If there is sufficient regularity in the patterns, then the system will target a recovery to setpoint at the typical arrival time.

- 116(B6) Disable occupancy anticipation (default). This turns off the occupancy prediction mode.
- 117(B7) Enable departure prediction. When enabled, the system will track the departure patterns over 28 days in order to predict for every day of the week the likely departure time. If there is sufficient regularity in the patterns, then the system will accelerate its setback after a typical departure
- 118(B8) Disable departure prediction. This turns off the departure prediction mode.

Press % three times to enter command mode. Press the arrows to select the feature desired, and then press % to select that feature. Sometimes a numerical selection is made after the selection. Version M

To lock a temperature press either the up or down arrow, press the % key twice, and press the up arrow to lock the temperature or the down arrow to unlock the temperature.

Advanced Set-Up Features

00	Reset the service Icon	34	Edit minimum pre fan time
01	Display radio strength	35	Edit maximum post fan time (heat)
02	Learn ID	36	Edit minimum heat time
03	Erase all IDs	37	Edit minimum cool time
04	Display number of IDs	38	Enable soft landing
05	Start Remote update test	39	Disable soft landing (default)
06	Transmit continuously off	40	Enable auto sleep mode (light based)
07	Transmit ID continuously	41	Disable auto sleep mode (default)
08	All Icons on	42	Edit sleep timer value
09	Calibrate temperature	43	Edit day delay (15 minutes)
10	Max operational and setpoint temperature (84)	44	Edit night 1 delay (9 -> 5x multiplier)
11	Min operational and setpoint temperature (64)	45	Edit night 2 delay (18->5x multiplier)
12	Edit hysteresis (1/64 of degree increments)	46	Refresh cycle wait time (4 hours)
13	Enable Fahrenheit (default)	47	Refresh cycle ON Time (10 minutes)
14	Enable Celsius	48	Disable wrench and sleep modes
15	Set comfort zone	49	Allow wrench and sleep modes (default)
16	Set "Auto" mode Heat<=>Cool over-shoot max	50	Display user setpoint only
17	Select profile mode (d0 – d2)	51	Temperature/Setpoint normal display (default)
18		52	Enable warning ICON
19		53	Disable warning ICON
20	Set changeover cool on	54	Enable 2 stage cooling (chg Ovr=Hi)
21	Set changeover heat on	55	Disable 2 stage cooling (default)
22	Enable SmartFan pre & post fan control (default)	56	Edit maximum post fan time (cool)
23	Disable SmartFan pre & post fan control	57	Manual E-Heat setback shutoff (Max 7)
24	Enable pre fan for occupied heat	58	Manual E-Heat setback engage (Max 15)
25	Disable pre fan for occupied heat (default)	59	
26	Enable indoor air quality (Fan ON when occupied)	60	Hardware reset
27	Disable indoor air quality (default)	61	Select system profile (d0 – d2)
28	Enable auto-speed fan (Chg Ovr= Hi)	62	Reset stat ID back to 000000
29	Disable auto-speed fan (default)	63	Enable radio relay updates
30	Max HVAC On time (occupied state)	64	Disable radio relay updates (default)
31	HVAC OFF time if max ON is reached (occupied)	65	
32	Max HVAC On time (unoccupied state)	66	Edit minimum E-heat time (0=default,1,2,3 mins)
33	HVAC OFF time if max ON is reached (unoccupied)	67	Zero statistical block

68	Shutdown when communication lost (AF mode)	111	Enable compressor as dehumidifier
69	Revert to occupied if communication lost (default)	112	Disable compressor as dehumidifier
70	Disable auto& night, enable limits	113	Compressor restart delay (6 sec incremen. – 3min default)
71	Enable auto& night, disable limits		
72	User setpoint heat maximum limit (76)	114	Max temperature over-shoot when dehumidifying
73	User setpoint cool min limits (70)	115	Enable occupancy anticipation
74	E-Heat only mode (enable)	116	Disable occupancy anticipation
75	E-Heat only mode (disable) - default	117	Enable departure prediction
76	E-Heat always assist (enable)	118	Disable departure prediction
77	E-Heat always assist (disable) - default		
78			
79			
80	HEAT on (temporary)		
81	HEAT off (temporary)		
82	COOL on (temporary)		
83	COOL off (temporary)		
84	FAN on (temporary)		
85	FAN off (temporary)		
86	CHANGEOVER on (temporary)		
87	CHANGEOVER off (temporary)		
88	EMERGENCY HEAT on (temporary)		
89	EMERGENCY HEAT off (temporary)		
90	Set fan normally open (default)		
91	Set fan normally closed		
92	Set cool normally open (default)		
93	Set cool normally closed		
94	Set E heat normally open (default)		
95	Set E heat normally closed		
96	Set heat normally open (default)		
97	Set heat normally closed		
98	Set chgover normally open(default)		
99	Set chgover normally closed		
100	Set dehumidify normally open (default)		
101	Set dehumidify normally closed		
102	Set ventilation normally open(default)		
103	Set ventilation normally closed		
104	VENTILATION ON (temporary)		
105	VENTILATION OFF (temporary)		
106	DEHUMIDIFY ON (temporary)		
107	DEHUMIDIFY OFF (temporary)		
108	Set RH target		
109	Enable humidity control (RH target)		
110	Disable humidity control		

Press % three times to enter command mode. Press the arrows to select the feature desired, and then press % to select that feature. Sometimes a numerical selection is made after the selection. Version M