Control Air M and M+
For Commercial Water to Air DDC Applications

Installation & Operation Manual
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Data subject to change
1 Key to Symbols and Safety Instructions

1.1 Key to Symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- **NOTICE** is used to address practices not related to personal injury.

Important information

This symbol indicates important information where there is no risk to people or property.

1.2 Safety Warnings

**WARNING: ELECTRICAL HAZARD**
- Installation and servicing of this equipment can be hazardous due to the electrical components. Only trained and qualified personnel should install, repair, or service the equipment.

**WARNING: ELECTRICAL HAZARD**
- Before performing service or maintenance operations on the system, turn off main power to the unit. Electrical shock could cause personal injury or death.

**WARNING: PERSONAL INJURY**
- When working on equipment, always observe precautions described in the literature, tags, and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing, and place a fire extinguisher close to the work area.

**WARNING: FIRE HAZARD**
- To Reduce the risk of Fire or Electric Shock, Do not interconnect the outputs of different class 2 circuits.

**WARNING:**
- This product can expose you to chemicals including Lead and Lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).
2 Introduction

2.1 The Control Air M/M+ Interfaces

The Control Air M and M+ (M=Manager) is a Human-Machine Interface (HMI) that enables the user to view and change property values, and/or control parameters, to match a corresponding application whether it is a Water to Air or Water to Water Heat Pump. It also provides a means of accessing and modifying the controller’s schedule and real time clock in applications where a system server or Building Automation System (BAS) is not available. The Control Air M is designed for applications where there is one (1) WSHP. The Control Air M+ is designed for applications where there is up to fifty (50) WSHP’s (existing networks only).

The software is normally configured at the factory to match the unit configuration, however, there are cases where additional on-site changes need to be made. These devices will allow the qualified technician or commissioning agent to incorporate such changes (without having to download a different software application) via the commissioning tool.

2.2 Interfaces

The interfaces can be purchased by the following part numbers:

- Control Air M (8733951042)
- Control Air M+ (8733951043)
- Connecting Cable (Virtual Control Air M only) (8733908163)

2.3 Virtual Control Air M (Equipment Touch (OEM) APP)

Virtual Control Air M (see Figure 3) provides the end-user an interface to a controller by way of an Android Tablet and a purchased USB-L cable (8733-927-403). The adapter; USB to micro USB (not provided by BOSCH) may be needed if USB port is not available on Android device. This adapter needs to be a female USB to male micro USB. Once the cables are purchased, the corresponding driver will need to be downloaded and installed before using the application. The USB or micro USB end of the cable is connected to the Android device, and the serial end is connected to the DDC controller or ZS Sensor. The USB-L cable driver is available for free download at https://www.bosch-climate.us/support-center/download-center/downloads-for-fhp-products/controls-fhp-products.html.

---

**Table 1**

<table>
<thead>
<tr>
<th>Bosch Product</th>
<th>Legacy</th>
<th>Launched April 2018</th>
<th>Launched Summer 2018</th>
<th>Virtual Control Air M (Equipment Touch App)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water to Air Zone</td>
<td>WAZ.1.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water to Air FLEX</td>
<td>WAF.1.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water to Water Zone</td>
<td>WWZ.1.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 3 Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power</strong></td>
<td>24 Vac (+/-15%), 5 VA, 50-60 Hz, Class 2</td>
</tr>
<tr>
<td><strong>Backlit LCD display</strong></td>
<td>4.3&quot; resistive touchscreen color LCD display with backlighting WQVGA 480x272 px</td>
</tr>
<tr>
<td><strong>Cable</strong></td>
<td>6 ft. (1.8 m) cable to connect to controller's Local Access port.</td>
</tr>
</tbody>
</table>
| **Communication**    | Control Air M: Rnet, 2-wire EIA-485 port for connection to the Rnet sensor network (115 kbps)  
Control Air M+: EIA-485 based serial port for BACnet MS/TP communication |
| **Memory**           | — 16 MB Flash memory to store screen file.                           |
|                      | — 1.5 MB RAM to store variable data and LCD data.                    |
|                      | — 4 KB Serial EEPROM to store non-volatile configuration data.        |
| **Operating Range**  | -4° to 140°F (-20°C to 60°C), 10%-90% RH noncondensing               |
| **Overall dimensions** | Width: 5-7/16 in. (138mm)                             |
|                      | Height: 4-1/16 in. (116mm)                                         |
|                      | Depth: 1-3/8 in. (30mm)                                            |
| **Weight**           | 0.54 lbs (0.24 kg)                                                 |
| **Listed by**        | UL-916 (PAZX), CE, FCC Part 15-Subpart B-Class A                   |
| **Temperature Sensor** | Range @ 95% RH: -4°F to 140°F (-20°C to 60°C)                     |
|                      | Range @ 20% RH: -4°F to 194°F (-20°C to 90°C)                       |
|                      | Accuracy @ 25°C: ±0.4°C                                             |
|                      | Accuracy over 20°C to 30°C: ±0.5°C                                  |
|                      | Accuracy over 10°C to 45°C: ±1.0°C                                 |
|                      | Accuracy over full range: ±2.5°C                                   |
|                      | Resolution: 0.01°C                                                 |
| **Humidity Sensor**  | Range: 0 to 100% RH                                                |
|                      | Accuracy over 20 to 80% RH: ±3.0% RH                               |
|                      | Accuracy over full range: ±5.0% RH                                  |
|                      | Resolution: 0.05 RH                                                |

Table 2 Specifications
4 Physical Dimensions

Control Air M/M+ Module Termination Details
5 Wiring

The Control Air M is communicates through a Rnet connection. The Control Air M is intended for 1 HMI to 1 WSHP. It can be wired using the instructions in section 6. The Control Air M+ communicates through a BACnet MS/TP connection. The Control Air M+ is intended for 1 HMI to up to 50 WSHP’s on an existing network.

5.1 Recommended Wiring Scheme

<table>
<thead>
<tr>
<th>Connect this wire:</th>
<th>To this terminal on the Control Air M /M+:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>24 VAC (R)</td>
</tr>
<tr>
<td>Green</td>
<td>24 VAC (C)</td>
</tr>
<tr>
<td>White</td>
<td>Rnet+/MSTP+</td>
</tr>
<tr>
<td>Black</td>
<td>Rnet-/MSTP-</td>
</tr>
</tbody>
</table>

Table 3

5.2 Power Wiring Specifications

2-conductor wire 18 AWG for distances up to 100 feet. All transformer secondaries must be grounded. Wiring connections must be in accordance with NEC and local codes. All wiring and mounting screws must be field supplied.

5.3 Rnet Wiring Specifications (Control Air M)

**NOTICE:**

- Use the specified type of wire and cable for maximum signal integrity.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>4 conductor, unshielded, or unshielded CMP, plenum rated cable</td>
</tr>
<tr>
<td>Conductor</td>
<td>22 AWG (7x0096) bare copper</td>
</tr>
<tr>
<td>Maximum Length</td>
<td>500 feet (152 meters)</td>
</tr>
<tr>
<td>Recommended Coloring</td>
<td>Jacket: White</td>
</tr>
<tr>
<td>UL temperature rating</td>
<td>SmokeGard 167°F (75°C)</td>
</tr>
<tr>
<td>Voltage Limited Listing</td>
<td>300 VAC, power UL: NEC CL2P, or better</td>
</tr>
<tr>
<td>Insulation</td>
<td>Foamed FEP 0.015 in. (0.381 mm) wall 0.060 in. (1.524 mm) O.D.</td>
</tr>
<tr>
<td>Color Code</td>
<td>Black/white</td>
</tr>
<tr>
<td>Shielding</td>
<td>Aluminum/Mylar shield with 24 AWG (7x32) TC drain wire</td>
</tr>
</tbody>
</table>

Table 4

5.4 MS/TP Wiring Specifications (Control Air M+)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>Single twisted pair, low capacitance (12pF), CL2P, 22 AWG (7x30), TC foam FEP, plenum rated cable</td>
</tr>
<tr>
<td>Conductor</td>
<td>22 AWG (7x30) stranded copper (tin plated)</td>
</tr>
<tr>
<td>Maximum Length</td>
<td>1000 Feet (300 meters)</td>
</tr>
<tr>
<td>Jacket</td>
<td>SmokeGard (SmokeGard PVC) 0.021 in. (0.5334 mm) wall 0.175 in. (4.445 mm) O.D. Halar (E-CTFE) 0.010 in. (0.254 mm) wall 0.144 in. (3.6576 mm) O.D.</td>
</tr>
<tr>
<td>UL temperature rating</td>
<td>SmokeGard 167°F (75°C)</td>
</tr>
<tr>
<td>Voltage Limited Listing</td>
<td>300 VAC, power UL: NEC CL2P, or better</td>
</tr>
<tr>
<td>Insulation</td>
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</tr>
<tr>
<td>Shielding</td>
<td>Aluminum/Mylar shield with 24 AWG (7x32) TC drain wire</td>
</tr>
</tbody>
</table>

Table 5
6 Connection

6.1 Communicate Using a Tablet Through Virtual Control Air M

In lieu of using the module to interface with the controller, a connection may be established at the local access port of the controller (or at the access port of a ZS Combo Sensor connected to the controller), to perform test and balance operations or to make changes to any device on the network.

6.2 To Wire and Mount the Control Air M/M+

1. Remove the backplate from the Control Air M/M+
   a. Hold the Control Air M/M+ as shown in the picture below.
   b. While firmly pressing the 2 tabs on top of the Control Air M/M+, pull on the backplate with your index finger until the backplate releases from the Control Air M/M+.

2. Pull the communication cable, power cable, and external thermistor wiring (if applicable) through the large hole in the center of the backplate. See Figure 7.

3. Partially cut, then bend and pull off the outer jacket of the Rnet cable(s). Do not nick the individual wire insulation.

4. If wiring 1 cable to the Control Air M/M+, cut the shield wire off at the outer jacket, then wrap the cable with tape at the outer jacket to cover the end of the shield wire. If wiring 2 cables in a daisy-chain configuration, twist together the shield wires, then wrap the shield wires with tape.

5. Strip about 0.25 inch (0.6 cm) insulation from the end of each wire.

6. Connect wiring to the Control Air M/M+ as shown in Figure 7.

   For Control Air M+ the black and white cables must be wired to the respective MS/TP+/- terminals

   NOTICE:
   - Allow no more than 0.06 inch (1.5 mm) bare communication wire to protrude. If bare communication wire contacts the cable’s foil shield, shield wire, or a metal surface other than the terminal block, the device may not communicate correctly.

7. Attach the backplate to the wall or panel. If mounting in or on a panel:
   a. Drill two 3/16 inch (4.8 mm) pilot holes in the panel.
   b. Attach backplate using pan head 6-32 x 3/8" to 1/2" long machine screws. Do not overtighten screws to prevent damage to plastic housing.

8. Attach the Control Air M/M+ to the backplate:
   a. Place the bottom of the Control Air M/M+ onto the backplate by aligning the 2 slots on the Control Air M/M+ with the tabs on the backplate.
   b. Push the Control Air M/M+ onto the backplate until the tabs at the top of the Control Air M/M+ snap onto the backplate.

9. Turn off the controller’s power.

10. Connect the other end of the Rnet wiring to the controller’s Rnet port or to a zone sensor.

   It is recommended to use Loctite 220 on screw threads if the Control Air M/M+ will be subject to vibration.

11. Connect power wiring to a 24 Vac power supply.

12. Turn on the controller’s power.
6.3 Additional Information on Connecting Control Air M to a Controller

Connect the Control Air M module (or Android tablet if using Virtual Control Air M) to the serial port on the DDC controller as indicated below, or to a ZS wall-mounted sensor connected to the controller (Virtual Control Air M only).

**NOTICE: EQUIPMENT DAMAGE**
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

**Mounting**

The Control Air M/M+ must be mounted within the building interior. You can mount the Control Air M/M+:
- In a panel with the controller or on the panel door
- On a wall up to 500 feet from the controller

**Wiring**

The Control Air M/M+ requires a 24 Vac power supply. It is not powered by the Rnet.

<table>
<thead>
<tr>
<th>CAUTION: ELECTRICAL HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Control Air M/M+ can share a power supply with the DDC controller as long as you:</td>
</tr>
<tr>
<td>1. Maintain the same polarity.</td>
</tr>
<tr>
<td>2. Use the power supply only for DDC controllers.</td>
</tr>
</tbody>
</table>

You can also wire an external 10 kOhm, Type II thermistor to the Control Air M/M+. See External sensor resistance requirements (Table 8, page 15).

![Figure 9](image_url1)

![Figure 10](image_url2)
6.4 Communication Setup (For Control Air M+ only)

The following setup process must be completed for a Control Air M+ before being able to view controller screens.

**Set Up Communications**

Default admin password for Control Air M+ is "admin".

1. On the System View (home) screen, touch Setup > Communications.
2. In the left column, select the baud rate of the MS/TP network that the Control Air M+ is on.

3. Use the following information to set the 3 fields on the right.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Device Instance</td>
<td>The Control Air M+’s BACnet Device Instance. This number must be unique on the MS/TP network. Leave this at the default (160099) unless there is another Control Air M+ or other device on the network with this number.</td>
</tr>
<tr>
<td>My Address</td>
<td>The Control Air M+’s address. This number must be unique on the MS/TP network. Leave this at the default (127) unless there is another System Touch or other device on the network with this address.</td>
</tr>
<tr>
<td>Destination Network</td>
<td>The network number of the BACnet ARCNET or BACnet MS/TP network that the Control Air M+ will discover controllers on. To discover controllers on the Control Air M+’s own MS/TP network, this field must be set to 0.</td>
</tr>
</tbody>
</table>

**NOTICE:**

- The Control Air M+ Device Instance number is added to each controller’s alarm recipients list when you create the system database. If you change My Device Instance after you create the database, you must rediscover the controllers to have the Control Air M+ receive alarms from controllers.

4. Touch Save.

**Discover controllers**

In the previous step, you defined the network that the Control Air M+ will discover devices on. To discover controllers:

1. On the Setup screen, touch Discovery > Set Range.
2. Control Air M+ can scan the network for all MAC addresses (0 to 255), or you can define a smaller range of addresses to search for. Touch each field on the Set Range screen, and then enter an address.

3. Touch Save.
4. On the Discovery screen, touch Discover. When discovery is complete, the screen lists every BACnet controller that was found on the network.

The Control Air M+ cannot discover controllers on a BACnet IP network, so a BACnet router that is on an IP network and the ARCNET or MS/TP network will not be discovered.
Create the System Database

The discovery process finds every BACnet controller on the network, but you may not want to include them all in the system you are creating. The manufacturer recommends that you have no more than 32 devices in your system.

1. Touch each controller that you want to include in the system and change its name to something that will be meaningful to a user (maximum 21 characters). For example, if the first controller on the screen controls the lobby, change the name to "Lobby".

![Figure 14](image)

2. Select the controllers that you want to include in the system by touching individual boxes on the left side of the screen or by touching Select All.
3. Touch Create DB (database). The System View screen shows your new system.
4. Click on any controller to enter the specific screens for that controller. Once a controller is selected, the Control Air M+ provides the exact same screens as a Control Air M would provide.

![Figure 15](image)

---

Establishing Communication for Virtual Control Air M

Plug the USB-L cable to the USB (Bosch part number 8733-927-403) to USB micro adapter (field supplied) and then to the Android tablet and controller before launching Virtual Control Air M (Equipment Touch (OEM) app). The DDC controller must be connected to a 24 VAC source and powered on.

![Figure 16](image)

---

Clear DB deletes the system (controllers, alarms, and schedule groups) and returns the Control Air M+ to its initial state.
7 How to Navigate Screens in Control Air M/M+

7.1 Login
The following displays if the screen you selected requires a password. Enter your password, then touch Done.

![Keyboard Image]

Each screen is programmed with one of the following password levels:

<table>
<thead>
<tr>
<th>A screen requiring this password level...</th>
<th>Can be accessed by...</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>A user logged in with the User, Admin, or Factory password</td>
</tr>
<tr>
<td>Admin</td>
<td>A user logged in with the Admin or Factory password</td>
</tr>
<tr>
<td>Factory</td>
<td>A user logged in with the Factory password</td>
</tr>
<tr>
<td>No password</td>
<td>Anyone</td>
</tr>
</tbody>
</table>

Table 7

No password is required on initial use of Control Air M. To setup or change passwords on the Control Air M by going to:

Touchscreen Setup > Passwords screen.
You log out on the Setup screen.

7.2 Alarms
The Alarm screen allows the user to view up to 100 events starting with the most recent. It also allows user to see which points have gone into alarm and returned to normal as well as the ones that have been manually cleared.

The user can also change the alarm settings under Alarm Settings.

![Alarm Screen Image]

7.3 Trends
This screen allows the end user to view trends for points that have trending enabled.

![Trend Screen Image]
7.4 Browser
Touch a button to see that type of BACnet objects found in the controller. Each screen shows a list of network-visible BACnet objects with BACnet Object Name, Current Value, and BACnet Object Instance number.

Figure 21

Screen Name
Description: Below is an example of AV BACnet objects in a controller

Figure 22
Touch an object in the above screen to see the details shown below.

Figure 23

8 To Update the Control Air M/M+’s Firmware
The Control Air M/M+ has a USB port at the bottom that allows you to update the device’s firmware from a USB flash drive.

8.1 Prerequisite
The USB flash drive must be formatted as FAT, FAT16, or FAT32. To verify, right-click the flash drive in Windows Explorer, then select Properties. File system should show FATxx. If File system shows NTFS or anything else, you must reformat the drive. Right-click the flash drive, then select Format. In the File system field, select FAT (Default), then click Start.

NOTICE:
- Follow the steps below in order. If you select Reload Firmware (step 3) on the display before you insert the USB drive (step 2), the touchscreen will become inoperable.

8.2 To Update the Firmware
1. Create a folder on the flash drive called Touch, then put the ETxxxxxx.hex file in the folder.
2. Plug the flash drive into the Control Air M/M+’s USB port.
3. From the System screen, touch Setup > Touchscreen Setup > Reload Firmware.
4. A warning message appears. Touch Yes to continue.
5. The following series of messages appear:
   - Verifying Firmware Image
   - Reading Firmware Image from USB
   - Installing Application
   - Verifying Firmware Image.
6. When the Home screen displays, remove the flash drive.

8.3 Resetting the Control Air M/M+
You can create a reset.dat file and put it on a USB flash drive to reset some of the Control Air M/M+’s functionality.

Prerequisite
The USB flash drive must be formatted as FAT, FAT16, or FAT32. To verify, right-click the flash drive in Windows Explorer, then select Properties. File system should show FATxx. If File system shows NTFS or anything else, you must reformat the drive. Right-click the flash drive, then select Format. In the File system field, select FAT (Default), then click Start.

1. Insert the USB flash drive into your computer.
2. Create a folder on the flash drive named Touch.
3. In a text editor such as Notepad, start a new file.
4. In the file, type a function number from the table below.
5. Save the file to the flash drive’s Touch folder with the name reset.dat.
6. For function 01 or 02, copy any updated firmware.hex file or .stv file in the Touch folder.
7. Insert the flash drive into the USB port at the bottom of the Control Air M/M+.

8. Cycle power to the Control Air M/M+.

<table>
<thead>
<tr>
<th>If...</th>
<th>Then you should...</th>
<th>Function number</th>
</tr>
</thead>
<tbody>
<tr>
<td>You cannot get to the Touchscreen</td>
<td>Reload the firmware</td>
<td>01</td>
</tr>
<tr>
<td>You need to quickly update the firmware on several Control Air M/M+ devices</td>
<td>Reload the firmware - Put the new firmware in the Touch folder with the reset.dat file</td>
<td>01</td>
</tr>
<tr>
<td>Your Control Air M/M+ has a unrecoverable error from site to site</td>
<td>Reset factory defaults</td>
<td>04</td>
</tr>
<tr>
<td>The Control Air M/M+ does not respond correctly to the location where you touched the screen</td>
<td>Calibrate the touchscreen</td>
<td>08</td>
</tr>
</tbody>
</table>

Table 8

8.4 Compliance

FCC Compliance
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.

NOTICE: EQUIPMENT DAMAGE

- Changes or modifications not expressly approved by the responsible party for compliance could void the user’s authority to operate the equipment.

CE Compliance

WARNING:

- This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

External sensor resistance requirements

<table>
<thead>
<tr>
<th>Temp (°C)</th>
<th>Temp (°F)</th>
<th>Resistance (Ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40</td>
<td>-40</td>
<td>335,651</td>
</tr>
<tr>
<td>-35</td>
<td>-31</td>
<td>242,195</td>
</tr>
<tr>
<td>-30</td>
<td>-22</td>
<td>176,683</td>
</tr>
<tr>
<td>-25</td>
<td>-13</td>
<td>130,243</td>
</tr>
<tr>
<td>-20</td>
<td>-4</td>
<td>96,974</td>
</tr>
<tr>
<td>-15</td>
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<tr>
<td>-10</td>
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<td>55,298</td>
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<td>-5</td>
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<td>42,315</td>
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<td>0</td>
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<td>32,651</td>
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<td>5</td>
<td>41</td>
<td>25,395</td>
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<td>10</td>
<td>50</td>
<td>19,903</td>
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<tr>
<td>15</td>
<td>59</td>
<td>15,714</td>
</tr>
<tr>
<td>20</td>
<td>68</td>
<td>12,494</td>
</tr>
<tr>
<td>25</td>
<td>77</td>
<td>10,000</td>
</tr>
<tr>
<td>30</td>
<td>86</td>
<td>8,056</td>
</tr>
<tr>
<td>35</td>
<td>95</td>
<td>6,530</td>
</tr>
<tr>
<td>40</td>
<td>104</td>
<td>5,325</td>
</tr>
<tr>
<td>45</td>
<td>113</td>
<td>4,367</td>
</tr>
<tr>
<td>50</td>
<td>122</td>
<td>3,601</td>
</tr>
<tr>
<td>55</td>
<td>131</td>
<td>2,985</td>
</tr>
<tr>
<td>60</td>
<td>140</td>
<td>2,487</td>
</tr>
<tr>
<td>65</td>
<td>149</td>
<td>2,082</td>
</tr>
<tr>
<td>70</td>
<td>158</td>
<td>1,752</td>
</tr>
</tbody>
</table>

Table 9
9 The Control Air M and M+ Screens

9.1 Units Status Screen
The Unit Status screen is the home page for the Control M and M+ (please make sure to complete steps in section 6.4 for Control Air M+), and shows the main menus/categories of the software the user can interface with on the devices.

Figure 18 shows the Unit Status screen and other sub-menus under the home page: Settings, Service, and Thermostat.

- Settings – For an installer, these settings allow for changes to the device, as well as unit configuration at start-up.
- Service – For a service technician, this menu allows a user to diagnose or troubleshoot the WSHP.
- Thermostat – For the end-user, this page provides the look and feel of a thermostat when the device is installed in a zone.

9.2 Settings Screen
The Settings page allows the user to access one of the following unit or device settings pages:

- Unit Settings
- Device Settings
- Alarm Settings
- Unit Options
- Zone Control
- DAT Control
- Schedule
- BAS Values
- Setpoints

9.2.1 Unit Settings Screen
This screen can be accessed from the home page through the Settings menu. This menu (and subsequent screens in it) allows the commissioning agent to setup or modify operational parameters of the unit. There are two (2) sub-sections on this screen:

- Options & I/O Configuration
- Control Air 5830 Options

Once all operational parameters and I/Os are configured, these settings may be saved and archived to flash memory by selecting the Save Settings check-box.

Figure 26

Occupancy Command
Under the Unit Settings screen, this parameter is used to define the entity that will be providing the occupancy command to the unit. The options for this variable are the following:

- Digital Input
- Local Schedule
- BAS Command
- Manual Override

Throughout the setup process, by selecting different boxes, this is how you advance to the next setup screen if available, while the back arrow is used to backtrack to previous screens.

Digital Input: The Digital Input option may be selected if the unit occupancy is required to be controlled remotely via a switch (dry contact) or other binary input. The connection (typically from a room occupancy sensor) may be made in IN-1 or IN-2 of the controller, and should be selected under Options & I/O Configuration. Choosing this setting allows the unit to be placed in occupied mode once the input is shorted to ground, and in unoccupied mode once the input is opened.

Local Schedule: Schedule runs the unit on a local, modifiable schedule, which cannot be accessed over a network. The occupancy schedule for heating or cooling can be set according to the morning, daytime, and night time settings for each day of the week. The option will allow the unit to run on an 8:00 AM to 5:00 PM default schedule everyday if the unit is to be started up during the construction phase of the project. See the Schedule Screen for more information.
**BAS Command:** The unit factory default for the Occupancy Command parameter is set to BAS Command. A qualified technical agent may change the parameter to be BAS Command, if different from the default setting. This option will enable the unit to be commanded from the BAS Server. The unit is ready for BAS integration once this parameter is set up, and it can then be commanded to occupied or unoccupied via the BAS by writing to the Occupancy Status integration point (refer to Integration Points List document).

**Manual Override:** If the unit is intended to run all the time it can be set to Manual Override, which will override the schedule and set the unit into occupied mode indefinitely, until the Manual Override option is deselected. This setting is suitable for applications involving Discharge Air Control.

**Compressor Control**

Under the Unit Settings screen, this parameter will provide the user the ability to determine where the temperature values are acquired to achieve compressor control.

**Discharge Air Control (DAC):** This is selected when the application requires the temperature to be read from the supply duct (discharge air) to control compressor operation. This option should be used when the unit is designed for a Discharge Air Control application.

**Zone Control-ZS:** This option is selected when the application requires the temperature to be read from a space/zone using a ZS sensor mounted in that space as the primary source of temperature readings. This is the default setting from factory.

**Zone Control-BAS:** This option allows the user to acquire temperature values from an existing Building Automation System (BAS).

**Zone Control-Rem:** This option allows the user to choose a remote zone sensor, (that is not ZS), for zone temperature readings. An example may be a duct mounted temperature sensor used for reading return air temperature. The temperature sensor must be connected in IN-2 of the controller, and selected under Options & I/O Configuration.

**Wall Mount Sensor**

This parameter provides the user an opportunity to enable or disable the use of ZS wall mounted sensor(s) in the space (include ZS Manager), either as the primary source of temperature readings for a Zone Control application, or for the Zone Temperature Reset option during Discharge Air Control applications.

**ZS Combo:** Choosing this setting allows the user to enable a ZS Wall Mount Sensor in the zone for zone temperature readings, as well as CO2 and/or relative humidity readings. Up to five (5) ZS sensors may be daisy chained to each controller, as long as they’re properly addressed. This is the default setting from factory. Choosing "None" for this parameter disables the ZS sensor function in the controller programming, and the controller no longer recognizes a ZS sensor at the Rnet port (even if one is connected).

**ZS Manager/Control Air M/M+:** Choosing this setting allows the user to enable a ZS Manager Wall Mount Sensor or Control M/M+ in the zone for zone temperature readings, as well as CO2 and/or relative humidity readings (for Manager). Using a ZS Manager or Control M/M+ provides the end-user the ability to utilize the Fan Mode (Fan On, Fan Auto) and System Mode (Heat/Cool/Auto/Off) features of the controller.

**Options & I/O Configuration**

This section of the Unit Settings screen allows the user to select options for the heat pump unit, by choosing the appropriate control from the outputs (binary or analog) and corresponding sensing/switching devices from the inputs. Changes made on this page are critical in determining how the software will function based on how the inputs are being used, and for which options the outputs are used.

![Figure 27](image)

The main parameters that may be configured in this section include:

- BO-4 Options
- BO-5 Options
- Input 1
- Input 2
- Input 5
- IE Module
- Rnet Input

**BO-4**

This parameter allows the user to select an option to be controlled by the on/off, relay action (24VAC) of Binary Output #4 of the Control Air 5600/5830.

- This selection is ONLY available when "1 compressor 1 stage" is selected for Compressor Stages (single stage operation applications).

The options available for this parameter include:

- Economizer
- Boilerless
- Fresh Air Damper

**Economizer:** This option is selected when the unit application involves a water-side economizer. The signal from BO-4 is used to activate the economizer valve when the appropriate conditions in the software are satisfied. An Entering Water Temperature (EWT) sensor is connected in IN-2 to control economizer operation.

**Boilerless:** This option is selected when the unit application includes boilerless electric heat control. The signal from BO-4 is used to activate electric heat when the appropriate conditions in the software are satisfied. An Entering Water Temperature (EWT) sensor is connected in IN-2 to control boilerless operation.
**Fresh Air Damper:** This option is selected when the unit application requires the control of an outside air damper for indoor air quality control and also for the Air Economizer in Zone Control option. The signal from BO-4 is used to activate a solenoid to open or close the damper.

**BO-5**
This parameter allows the user to select an option to be controlled by the on/off, relay action (24VAC) of Binary Output #5 of the Control Air 5600/5830. The options available for this parameter include:

- Hot Gas Reheat
- Aux Electric Heat
- Fresh Air Damper
- Condenser Water Valve
- Economizer
- Boilerless

**Hot Gas Reheat:** This option is selected when the unit is equipped with a reheat coil for humidity control with hot gas reheat. The signal from BO-5 is used to turn the reheat valve on or off. If a non-ZS wall-mount sensor with RH capabilities is used, the sensor must be selected in IN-1 or IN-2.

**Aux Electric Heat:** This option is selected when the unit application includes the option for a single stage of auxiliary electric heat. The signal from BO-5 is used to turn the electric heater relay/contactor on or off.

**Fresh Air Damper:** This option is selected when the unit application requires the control of an outside air damper for indoor air quality control and also for the Air Economizer in Zone Control option. The signal from BO-5 is used to activate a solenoid to open or close the damper.

**Condenser Water Valve:** This option is selected when the unit application requires the verification of flow in the condenser coil prior to engaging the compressor(s). The signal from BO-5 is used to activate the leaving water valve based on a call for cooling or heating. A Valve End Switch (VES) connected in IN-5 (or Input Expansion Module) is used to verify the valve action in order to engage the compressor(s).

**Economizer:** This option is selected when the unit application involves a water-side economizer. The signal from BO-5 is used to activate the economizer valve when the appropriate conditions in the software are satisfied. An Entering Water Temperature (EWT) sensor is connected in IN-2 to control economizer operation.

**Boilerless:** This option is selected when the unit application includes boilerless electric heat control. The signal from BO-5 is used to activate electric heat when the appropriate conditions in the software are satisfied. An Entering Water Temperature (EWT) sensor is connected in IN-2 to control boilerless operation.

---

**Figure 28**

**UI 1**
This parameter allows the user to select what input device will be connected in IN-1 of the controller where applicable. For proper operation of the unit, the appropriate input should be selected, and the input should match the corresponding options and application of the unit. The following inputs are available for IN-1:

- Static Pressure Sensor (0-5V) - Required for VFD
- RH probe (0-5V) - Required for HGRH without ZS
- CO2 Sensor (0-5V) - Used on some Damper options
- Digital Input for Occupancy Enable (Dry)

The IN-1 jumper on the controller may need to be set accordingly for Dry/Therm or 0-5V. The factory default for the controller is 0-5V.

**UI 2**
This parameter allows the user to select what input device will be connected in IN-2 of the controller where applicable. For proper operation of the unit, the appropriate input should be selected, and the input should match the corresponding options and application of the unit. The following inputs are available for IN-2:

- Non-ZS Remote Zone Sensor (Therm)
- Outdoor Air Temp Sensor (Therm)
- Entering Water Temp Sensor (Therm)
- Mixed Air Temp Sensor (Therm)
- Return Air Temp Sensor (Therm)
- RH probe (0-5V)
- Digital Input for Occupancy Enable (Dry)

The IN-2 jumper on the controller may need to be set accordingly for Dry/Therm or 0-5V. The factory default for the controller is Dry/Therm.
UI 5
This parameter allows the user to select what input device will be connected in IN-5 of the controller where applicable. Input #5 may be used as a single source for Dry/Therm inputs, or an Input Expansion Module (IEM) may be connected in this input for a specific trio of Dry inputs (see Table # 3 for further details). For proper operation of the unit, the appropriate input should be selected, and the input should match the corresponding options and application of the unit. The following inputs are available for IN-5:

- Dirty Filter Switch
- Entering Water Temp Sensor
- Differential Pressure Switch
- Secondary Drain Pan Switch
- Fan Status Switch
- Valve End Switch
- Damper End Switch
- Smoke Detector Switch
- Pump Status Switch
- Mixed Air Temp Sensor
- Input Expansion Module (IEM)

IE Module
If the IE Module is selected in IN-5 the user has the option of configuring the module to one of seven available options:

<table>
<thead>
<tr>
<th>Terminal AA</th>
<th>Terminal BB</th>
<th>Terminal CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Valve End Switch</td>
</tr>
<tr>
<td>Smoke Detector Switch</td>
<td>Fan Status Switch</td>
<td>Valve End Switch</td>
</tr>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Differential Pressure Switch</td>
</tr>
<tr>
<td>Smoke Detector Switch</td>
<td>Fan Status Switch</td>
<td>Dirty Filter Switch</td>
</tr>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Damper End Switch</td>
</tr>
<tr>
<td>Smoke Detector Switch</td>
<td>Fan Status Switch</td>
<td>Secondary Drain Pan</td>
</tr>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Pump Status Switch</td>
</tr>
</tbody>
</table>

Table 10

Rnet Input
This parameter allows the user to select the sensing combination to be used by the corresponding ZS wall sensor(s) connected at the Rnet port. The options available for this parameter include:

- ZS (Temp Only)
- ZS (RH Only)
- ZS (CO2 Only)
- ZS (Temp + RH)
- ZS (Temp + CO2)
- ZS (RH + CO2)
- ZS (Temp + RH + CO2) – Default setting

The sensing combination selected will be limited by the actual capabilities of the connected ZS sensor(s), but does not have to exactly match those capabilities. E.g. the combination Temp + RH may be selected for a sensor that reads all 3 variables, if CO2 is not required.

Figure 29
Control Air 5830 Options

This section of the Unit Settings screen allows the user to select options for the heat pump unit, when it is paired with a Control Air 5830 controller. The options are used to configure the analog outputs only available on this controller.

The main parameters that may be configured in this section include:

- AO-1 Options
- AO-2 Options
- AO-3 Options

AO 1
This parameter allows the user to select an option to be controlled by the 0-10VDC modulating signal from Analog Output #1 of the DDC Control Air 5830 controller. The options available for this parameter include:

- VFD Control
- Electric Heat with SCR

**VFD Control:** This option is selected when the unit application involves using a Variable Frequency Drive (VFD) to control the fan. The signal from AO-1 is used to vary the fan speed up or down based on readings from a static pressure sensor connected in IN-1 of the controller.

**Electric Heat with SCR:** This option is selected for applications requiring modulated auxiliary electric heat. The signal from AO-1 is used as the input for a Silicon-Controlled Rectifier (SCR) to provide an auxiliary source of heat.

AO 2
This parameter allows the user to select an option to be controlled by the 0-10VDC modulating signal from Analog Output #2 of the DDC Control Air 5830 controller. The options available for this parameter include:

- Modulating Hot Gas Reheat Control

**Modulating Hot Gas Reheat Control:** This option is selected when the unit application requires modulating hot gas reheat for discharge air control applications, or for humidity control in zone control applications. The signal from AO-2 is used to adjust the modulating reheat valve to maintain a specified discharge air temperature.

AO 3
This parameter allows the user to select an option to be controlled by the 0-10VDC modulating signal from Analog Output #3 of the DDC Control Air 5830 controller. The options available for this parameter include:

- Modulating Fresh Air Damper Control

**Modulating Fresh Air Damper Control:** This option is selected when the unit application requires a modulating damper to control indoor air quality. The signal from AO-3 is used to adjust the signal to the damper solenoid based on CO2 readings.

If a ZS sensor is used for RH or CO2 readings, the software automatically recognizes these inputs as long as Temp + RH + CO2 is selected for Rnet Input (selected by default).

9.2.1.1 Advanced Screen

This screen can be accessed from the home page through the Settings menu, under Unit Settings. The menu is intended for qualified technicians to adjust sensitive parameters that determine the overall functionality of the heat pump.

If it becomes necessary to adjust the PID values (gains) for Discharge Air Cooling action, Modulating ReHeat valve action, or Silicon Controlled Rectifier (SCR) controlled Electric Heat, these values can be accessed through this screen.

Adjusting the loop gains can drastically affect how the systems responds to variables and should only be carried out by a qualified technician.
9.2.1.2 Unit Configuration Screen

This screen can be accessed from the home page through the Settings menu, under Unit Settings. The menu is intended for qualified technicians to adjust factory configured parameters relating to the heat pump.

Most of the parameters on this page are setup at the factory based on the type of unit ordered; however, in some cases (e.g. setting up a Field Installed DDC controller) these settings may need to be modified.

There are four main parameters on this page:

- Compressor Stages
- Unit Operation Mode
- Evap Coil Configuration
- Fan Operation

Only qualified technical agents should attempt making modifications on these menus.

Compressor Stages

This parameter allows the user to choose the number of compressors and stages for the application. This parameter is typically set up from factory to match the unit configuration and should only be changed by a qualified technician.

Ensure the compressor configuration is set accurately as this selection will determine the code structure for reporting compressor safety alarms from the Unit Protection Module (UPM) to the controller. The fault codes for a 1 compressor 1 stage unit are different from that for a 2 compressor 2 stage unit.

2 Compressor 2 Stages: This value is selected when unit has 2 compressors and each compressor will operate as an independent stage.

1 Compressor 2 Stages: This value is selected when a unit has 1 compressor that has two independent stages. This is the default setting from factory.

1 Compressor 1 Stage: This value is selected when a unit has 1 compressor with only 1 stage of operation.

Unit Operation Mode

This variable is used to set the heat/cool configuration of the heat pump unit.

- Heat Pump: This value is selected when the unit is equipped with a reversing valve, and intended for heating and cooling operations. This is the default setting from factory.
- Straight Cool: This value is selected when the unit is not equipped with a reversing valve, and is intended for cooling only operations.

Binary output #2 (BO-2) on the controller is disabled when the Straight Cool option is selected for Unit Operation Mode.

Evap Coil Configuration

This parameter allows the user to choose the evaporator coil configuration setup of the unit.

- Series: This option is selected if the evaporator coils on the heat pump unit are not adjacent to each other, but rather arranged one behind the other.

Selecting Series for Evap Coil Configuration disables second stage compressor operation during heating, ONLY for DAC applications. This option should be selected for applications where cooling only is required for second stage.

Parallel: This option is selected if the evaporator coils on the heat pump unit are arranged adjacent to each other; either side-by-side, or one on top of the other. This is the default setting from factory.

Fan Operation

This parameter allows the user to choose the fan configuration setup of the unit.

- Start/Stop: This option is selected if the fan will be controlled by a single binary output for on/off operation.
- S/S + VFD: This option is selected if a VFD will be used to vary the fan speed to maintain static pressure.
9.2.2 Device Settings Screen

The Device Settings menu allows the user to adjust or reset any settings on the actual Control Air M/M+ module.

On this screen the BACnet® ID will be displayed. This value can be changed, however, it is not recommend to change this parameter arbitrarily as it may cause network problems.

Always consult with Network Administrator (Front End company) before changing the controllers BACnet® ID as it may interfere with other devices in the network.

Two main sub menus are available on this screen:

- Controller
- Touchscreen

9.2.2.1 Controller Screen

This screen provides access to the device Module Setup menu, that provides the end-user the ability to set the time/date, update device communication information, and access to the Time Master page.

9.2.2.1.1 Set Time and Date

Touch the time or date field to edit it.
9.2.2.1.2 Communication
This screen lets you edit the information below for the controller.

![Communication Screen]

Touch a field to tap in new information.
- **BACnet Device Instance** – number
- **Auto Generate Device ID** – Enter No or Yes

You can edit the following fields that pertain to the controller’s MS/TP network:
- **Max Masters** - Set this to the highest MAC address (up to 127) on the MS/TP network. If you later add a device with a higher address, you must change this field to that new address.
- **Max Info Frames** - Specifies the maximum number of information messages a controller may transmit before it must pass the token to the next controller. CAUTION Increasing this number allows the controller to transmit more messages while it has the token, but it also increases the overall time it takes for the token to pass through the network.

- For a router, set this value to a high number such as 200
- In non-router controllers, use the following formula to calculate this value: \[
\text{Max Info Frames} = \frac{2 - (\text{devices} \times (0.002 + (80/\text{baud})))}{(600/\text{baud}) \times \text{devices}}
\]
For example, if the network has 15 devices at 19200 baud, Max Info Frames would be 4.

You may need to increase the result of the formula for controllers that need to communicate many values to other devices.

9.2.2.1.3 Router
Lets you view or edit the router’s ARC156, MS/TP, or Ethernet network number.

![Router Screen]

Touch a field to tap in the new number on the keypad.

9.2.2.1.4 IP
Lets you view or edit network addresses and the UDP Port.

![IP Screen]

Touch a field to tap in the new number on the keypad.
**9.2.2.1.5 Time Master**

If the controller can be a BACnet Time Master, this screen lets you configure how it sends time synchronization broadcasts.

**Figure 38**

- **Time Sync Mode** - Tap in the number below that represents your selection:
  - 0 = No Broadcast - The controller will not act as Time Master.
  - 1 = Local Broadcast - If it doesn't already exist, a BACnet address with network number and MAC address length both set to zero is added to the controller’s Time Synchronization Recipients list found on the driver’s Device page in WebCTRL®. The controller will then send time broadcasts only to controllers on its ARCnet or MS/TP network.
  - 2 = Global Broadcast - If it doesn't already exist, a global address with network number set to 65535 and MAC address length set to zero is added to the controller’s Time Synchronization Recipients list found on the driver’s Device page in WebCTRL®. The controller will then send time broadcasts to all its connected networks.

- **Time Sync Interval** - Enter how often local or global time broadcast should be sent (1-9999 minutes). If Time Sync Interval is set to zero, no time sync messages are sent.

**Figure 39**

This screen provides the end-user the ability to edit and modify the touchscreen settings. Touch a button to go to one of these screens:

<table>
<thead>
<tr>
<th>Screen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>About</td>
<td>Displays information about the touchscreen firmware</td>
</tr>
<tr>
<td>Inactivity Timeout</td>
<td>Lets you define how long the Control Air M can have no activity before returning to the Standby screen and logging out the user. Set to 0 to deactivate this feature</td>
</tr>
<tr>
<td>Sensor Setup</td>
<td>Lets you set up the Control Air M temperature and humidity sensors. See Using Control Air M’s temperature and humidity sensors to control equipment</td>
</tr>
<tr>
<td>Clean Screen</td>
<td>Displays a one-minute count-down timer so that you can clean fingerprints from the display window without touching something that would affect equipment operation.</td>
</tr>
<tr>
<td>Key Click Off/On</td>
<td>Touch Key Click Off to turn off the sound when you touch a field or button. Touch Key Click On to turn on the sound</td>
</tr>
<tr>
<td>Alarm Sound Off/On</td>
<td>Touch Alarm Sound Off to turn off the alarm notification sound or touch Alarm Sound On to turn on the sound. An alarm will generate a sound only if it is set up by Bosch</td>
</tr>
<tr>
<td>Reload Firmware</td>
<td>Erases the current firmware so that you can load new firmware through the USB port. See To update the Control Air M/M+’s firmware</td>
</tr>
<tr>
<td>Passwords</td>
<td>Let you change the User or Admin password, if allowed.</td>
</tr>
<tr>
<td>Calibrate Touch Panel</td>
<td>Lets you recalibrate the Control Air M/M+ by touching targets. The device is calibrated in the factory, but time, temperature, or handling could affect the calibration. Recalibrate the screen if you touch it in one location and it responds as if you touched it in another.</td>
</tr>
</tbody>
</table>

If the controller looks through its Time Synchronization Recipient List and finds an entry with MAC address length set to zero and network number set to 65535, the controller’s BACnet Time Master mode is set for Global Broadcast. If there is no global broadcast entry in the recipient list, the controller then looks for a local broadcast address (MAC address length set to zero and network number set to zero or to the same network number as the module’s). If such an entry is found, the BACnet Time Master mode is set for Local Broadcast. Otherwise, the mode defaults to Disabled/None.
9.2.3 Alarms Settings Screen

The Alarm Settings menu can be accessed from the home page through the Settings menu. This screen allows the user to adjust or reset any heat pump unit alarm settings, including:

1. Enable or disable all the alarm trip limits for heating and cooling.
2. Enable or disable all the alarm trip limits for zone humidity.
3. Set values for alarm trip limits on entering and leaving water temperature.
4. Enable/disable smoke alarm.
5. Enable/disable fan runtime to trip filter alarm.

9.2.4 Unit Options Screen

The Unit Options menu can be accessed from the home page through the Settings menu. This screen allows the user to configure any factory-installed options to be controlled by DDC. Options available for configuration on this page include:

- Hot Gas ReHeat (On/Off)
- Water-side Economizer
- Boilerless
- Variable Frequency Drive (VFD)
- Input Expansion Module (IEM)

Hot Gas Reheat: These parameters should be configured if a RH sensor is selected for Rnet Input, Input 1, Input 2 or BAS Input (RH) AND Hot Gas Reheat is installed and selected for BO-5 Options on the Unit Settings screen. Parameters that maybe adjusted include:

- Zone Dehumidification Setpoint:
  used to set the RH set-point to be maintained with Hot Gas Reheat.

- Zone Dehumidification Setpoint Differential:
  used to establish the RH hysteresis value for initiating humidity control via HGRH in the space.
Water-side Economizer: These parameters should be configured if Economizer is installed and selected for BO-5 or BO-4 Options on the Unit Settings screen (EWT Sensor input required). Parameters that may be adjusted include:

— **Econ Valve Water Setpoint:**
  used to set the EWT trip value (in °F) below which the economizer valve is energized to provide free cooling without compressors.

— **Econ Entering Setpoint Differential:**
  used to set the EWT value (in °F) above which the economizer valve is de-energized and free cooling operation is ceased. This differential value is added to the trip value to determine the high limit at which to disengage the economizer valve.

Boilerless: These parameters should be configured if Boilerless is installed and selected for BO-5 or BO-4 Options on the Unit Settings screen (EWT Sensor input required). Parameters that may be adjusted include:

— **Boilerless Entering Water Setpoint:**
  used to set the EWT trip value (in °F) below which compressor operation is ceased to protect the coils, and the single stage of auxiliary electric heat is enabled.

— **Boilerless Entering Setpoint Differential:**
  used to set the EWT value (in °F) above which boilerless operation is disabled. This differential value is added to the trip value to determine the high limit at which to terminate the boilerless electric heat operation.

Variable Frequency Drive (VFD): These parameters may be configured if VFD Control is installed and selected for AO-1 Options on the Unit Settings screen (Static pressure input required). Parameters that may be adjusted include:

— **VFD Minimum Fan Speed:**
  used to select the minimum speed (in %) for the fan while maintaining static pressure levels.

— **Static Pressure Setpoint:**
  used to configure the duct static pressure set-point to be maintained by the VFD.

Input Expansion Module (IEM): These parameters may be configured if the Input Expansion Module (IEM) is installed and selected for Input 5 on the Unit Settings screen. Parameters that may be adjusted include:

— **IEM Configuration:**
  used to select one of the seven (7) trio of options in table #3 when an IEM is connected in IN-5 of the controller.
— **Enable Smoke Detector on IEM:** used to enable or disable the SDS functionality when the IEM is used.

— **Enable Fan Status on IEM:** used to enable or disable the FSS functionality when the IEM is used.

— **Enable Valve End on IEM:** used to enable or disable the VES functionality when the IEM is used.

<table>
<thead>
<tr>
<th>Terminal AA</th>
<th>Terminal BB</th>
<th>Terminal CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Valve End Switch</td>
</tr>
<tr>
<td>Smoke Detector Switch</td>
<td>Fan Status Switch</td>
<td>Valve End Switch</td>
</tr>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Differential Pressure Switch</td>
</tr>
<tr>
<td>Smoke Detector Switch</td>
<td>Fan Status Switch</td>
<td>Dirty Filter Switch</td>
</tr>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Damper End Switch</td>
</tr>
<tr>
<td>Smoke Detector Switch</td>
<td>Fan Status Switch</td>
<td>Secondary Drain Pan</td>
</tr>
<tr>
<td>Dirty Filter Switch</td>
<td>Fan Status Switch</td>
<td>Pump Status Switch</td>
</tr>
</tbody>
</table>

Table 12

**Figure 51**

In addition to viewing CO2 levels, the user can set the zone CO2 trip value in order to receive notification when CO2 levels are above a certain value. If the application involves CO2 monitoring as well as an outside air damper control, the CO2 level at which the damper is open (On/Off or Modulating) can also be adjusted through this screen. In addition if the Air Economizer option is enabled during setup, the governing parameters for the outside air temperature and humidity limits may be setup on this page.

**Figure 52**

The following parameters may be configured:

**Ventilation Options:** Used to select how the damper is activated. The damper may be indexed on by one of the following three (3) options:

— **Damper Open on Fan**
  The damper opens a few seconds after the fan output is energized and closes when the output is de-energized.

— **Damper Open on Occupied**
  The damper opens a few seconds after the unit enters Occupied mode, and closes when unit leaves occupied mode (Unoccupied).

— **Air Economizer**
  Upon a call for cooling, if the outside air temperature and humidity is within a user configured range, compressor operation is ceased, the damper is indexed open, and the fan is used to condition the space.

**9.2.4.1 IAQ Screen**

The Indoor Air Quality (IAQ) screen can be accessed from the Unit Options screen. The screen provides the zone CO2 as well as configuration information on dampers (on/off or modulating) and ventilation options (Air Economizer).
9.2.5 Zone Control Screen

The Zone Control menu can be accessed from the home page through the Settings menu. This screen allows the user to view zone conditions (temperature, humidity, CO2), as well as modify and configure any parameters related to Zone Control. These values should only be adjusted if Zone Control-ZS is selected for Compressor Control under the Unit Settings Screen.

**Modulating Damper in**

These parameters may be adjusted when Modulating Fresh Air Damper is selected for AO-3 Options on the Unit Settings screen.

- **Mod Damper Min Position**
  Used to select the minimum position (in %open) for the damper while maintaining CO2 levels in the space.

- **Mod Damper Activation**
  Used to determine how damper modulation is triggered. The process can be initiated by one of the following:
  a. Occupied
  b. Unoccupied
  c. Any Occupancy

**Air Economizer Setup**

The following parameters may be modified for Zone Control Applications when the Air Economizer option is enabled by selecting Fresh Air Damper for BO-4 Options or BO-5 Options on the Unit Settings screen AND selecting Air Economizer for Damper Options on the IAQ screen.

- **Air Econ Cooling OAT Lo Limit**
  used to set the low temperature limit for the OAT range required for free cooling.

- **Air Econ Cooling OAT Hi Limit**
  used to set the high temperature limit for the OAT range required for free cooling.

- **Air Econ Cooling OARH Lo Limit**
  used to set the low relative humidity limit for the OARH range required for free cooling.

- **Air Econ Cooling OARH Hi Limit**
  is used to set the high relative humidity limit for the OARH range required for free cooling. For this option the Outside Air Temperature and Humidity may be set to BAS values.

Finally the CO2 level (in ppm) at which the damper is opened may also be configured on this screen.

**Allow setpoint adjustment**

used to establish the ZSP/ZSM’s setpoint adjustment feature in the space. Select Yes to allow the space occupant to change temperature setpoint from the ZSP/ZSM (by the allowable amount), or No to prevent setpoint manipulation in the space.

- **Adjust Limit**
  used to set the allowable amount by which the zone temperature setpoint may be adjusted in the space via a ZS sensor. The default value is +/- 3°F, and may be configured to a max/min of +/- 9°F.
— **Allow local override**

used to establish the ZSP/ZSM’s occupancy override feature in the space. Select Yes to allow the space occupant to override the occupancy schedule from the ZSP/ZSM (place unit in occupied mode), or No to prevent local occupancy override in the space.

![Figure 58](image1)

Using the touchscreen and navigating for the individual variables (Temperature, Relative humidity and CO2), the HMI provides information on the state and configuration of all active sensors on the network.

From the Settings menu, the user will have the opportunity to reconfigure any ZS sensor options that were not previously configured during SETUP. These include: Sensor combination setup, enable/disable setpoint adjustment from the space, setpoint adjustment limits if adjustments are allowed, enable/disable local override from sensor for ZSP and ZSM sensors.

When two or more ZS sensors (up to five sensors daisy-chained to one controller) are used per control program, the following parameters on this page may be configured:

— **Multiple ZS Temp combination:**

used to establish how the effective zone temperature readings from the connected ZS sensors is calculated and transmitted to the control program. The temperature readings may be calculated based on the Average, Maximum, or Minimum temperature of the different sensors.

![Figure 59](image2)

**9.2.6 DAT Control Screen**

The Discharge Air Temperature (DAT) Control menu can be accessed from the home page through the Settings menu. This screen allows the user to view, modify and configure any parameters related to Discharge Air Control. These values should only be adjusted if Disch Air Control is selected for Compressor Control under the Unit Settings Screen. The effective DAT set point and the modulating valve status can be viewed on this page.

![Figure 60](image3)

![Figure 61](image4)

![Figure 62](image5)
If the DAT Setpoint Reset by Zone temperature (ZTR) feature is enabled the governing parameters are also available on this screen.

Parameters that may be adjusted include:

- **Discharge Air Temp Setpoint**: used to set the leaving air temperature setpoint the unit will modulate to achieve.

- **Temperature Reset Mode**: used to select between a Single reset or Multiple resets. Selecting Multiple resets (default) allows the unit compressor to be staged for heating, free cooling, part-load cooling, and full-load cooling, based on Outside or Mixed air.

- **Reset DAT Setpoint based on Zone Temp**: enables or disables the Zone Temperature Reset (ZTR) option, which provides a means to adjust the DAT setpoint (userconfigurable) as the zone temperature increases above the cooling setpoint.

- **OAT Single Reset Temp**: used to set the OAT trip value for compressor reset operation when Single reset is selected for “Temperature Reset Mode” on the previous page.

- **Outside Air Heating Trip**: used to set the heating trip value for compressor heating operation when Multiple reset is selected for “Temperature Reset Mode” on the previous page.

- **Outside Air Part Cool Trip**: used to set the first stage trip value for compressor cooling operation when Multiple reset is selected for “Temperature Reset Mode” on the previous page. Note that the temperature range between the Part Cool and Heat trip values determines the free-cooling temperature range, during which only the fan is used to condition the space.

- **Outside Air Full Cool Trip**: used to set the second stage trip value for compressor cooling operation when Multiple reset is selected for “Temperature Reset Mode” on the previous page. When the “Reset DAT Setpoint based on Zone Temp” feature is enabled, the following parameters may be configured in addition:
  - **As Zone Temp Changes from**: used to set the lower limit of the zone temperature above which the DAT setpoint will be reset using a linear algorithm.
  - **To**: is used to set the high limit of the zone temperature below which the DAT setpoint will be reset using a linear algorithm.
  - **DAT Setpoint Resets from**: used to set the initial DAT setpoint for which the zone reset will be applied. This value should match the actual DAT setpoint value set for “Discharge Air Temp Setpoint” on the DISCHARGE AIR CONTROL SETUP screen.
  - **To**: used to set the final value of the DAT setpoint for which the zone reset will be applied.

### 9.2.7 Schedule Screen

The Schedule menu can be accessed from the home page through the Settings menu. This screen allows the user to view, add, edit, or delete BACnet schedules in the controller.

**Viewing Schedules**

- **Month View (default)**

On the system view (home) screen, touch schedules and then touch the schedule group that you want to see. Next, touch schedule. The above example shows which days in the current month have schedules (indicated by green boxes).
Week View

![Image of Week View](image1.png)

Figure 66

Which days of the week shown have schedules (indicated by green bars).

If you see Schedule editing disabled at the bottom of the screen instead of Add Schedule, scheduling is being done through another application and is disabled for the Control Air M+.

Touch a day to see the schedule(s) for that day. In the screen below, touch a schedule’s name or green bar (not the Effective Schedule bar) to edit or delete the schedule.

![Image of Schedule](image2.png)

Figure 67

The Effective Schedule is the combined result of the day’s schedule(s).

You cannot edit a schedule’s Type (Dated, Weekly, Continuous), its Priority (Normal or Override), or whether the schedule is an ON Schedule or Off Schedule. If you need to change any of these settings, delete the schedule, and then make a new one.

Scheduling for a group of equipment

![Image of Schedule Group](image3.png)

Figure 68

You can create up to 4 schedule groups with up to 8 schedule objects in each group. On the System View (home) screen, touch Schedules. Touch Create to see all controllers in the system whose control program(s) have a BACnet schedule object.

If the Control Air M+ does not find any schedule objects, scheduling is being done through another application and is disabled for the Control Air M+.

Touch the Group Name field, and then enter a name for the group. Touch the boxes on the left side of the screen for the controllers that you want to include in the schedule group.

Control Air M+ does not support writing schedules to third-party devices.

Touch Save and on the Schedule Groups screen, touch the group that you want to schedule. Then, touch Schedule and touch the plus sign to the right of Add Schedule. Touch the Schedule Name field, and enter a unique name. Select one of the following:

- **ON** Schedule for an occupied period
- **OFF** Schedule for an unoccupied period that is to override an ON schedule. For example, a holiday schedule that is to override a weekly schedule.

Touch the Type field, then select one of the following:

<table>
<thead>
<tr>
<th>Select...</th>
<th>To use the schedule...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dated</td>
<td>For a specified period of time between a start and end date. For example, 7:00 am to 7:00 pm every day between July 1st and July 22.</td>
</tr>
<tr>
<td>Weekly</td>
<td>Every week on the specified days. For example, every Monday through Friday, 8:00 am to 5:00 pm.</td>
</tr>
<tr>
<td>Continuous</td>
<td>Continuously between 2 specified dates/times. For example, a non-stop schedule that starts June 1st at 12:00 am and ends August 31st at 11:50 pm.</td>
</tr>
</tbody>
</table>

Table 13
ON Schedule only—Select one of the following:

- Normal for a typical occupied period
- Override for a occupied period that is to override an OFF schedule.

Touch Next to define the criteria for the type of schedule you selected earlier in the scheduling process.

Touch Save when finished.

Adding multiple periods to a weekly schedule

A weekly schedule can have multiple periods. For example, the first period could be every Monday through Friday, 8:00 am to 5:00 pm. The second period could be every Monday through Wednesday, 6:00 pm to 8:00 pm.

You can create up to 4 periods for a day, and up to 28 periods in a week.

Following the instructions above, create a weekly schedule for the first period. In the screen below, touch the green bar for the schedule that you want to add a period to.

You can create up to 4 periods for a day, and up to 28 periods in a week.

Figure 69

In the screen below, touch the schedule’s name or green bar (not the Effective Schedule bar).

Figure 70

Touch Next and then touch +Period. Set the times and days for the new period. For example, Monday through Wednesday, 6:00 pm to 8:00 pm. Then, touch Save. The screen in Figure 66 now shows both periods.

9.2.8 BAS Values Screen

The BAS Values menu can be accessed from the home page through the Settings menu. This screen allows the user to manage and modify values that may be read from a Building Automation System (BAS). Parameters that may be configured as BAS and managed on this screen include:

- Zone Temperature
- Zone Humidity
- Zone CO2
- Outside Air Temperature
- Smoke Alarm Trigger
- BAS Loop Enable (compressor will not work when disabled)

9.2.9 Setpoints Screen

The Setpoints menu can be accessed from the home page through the Settings menu. This screen allows the user to manage zone, IAQ, and outdoor parameter setpoints for temperature, humidity, and CO2. In addition to managing parameters from other settings screens, the following may also be adjusted:

- Occupied Heating: used to set the zone occupied heating temperature setpoint. This parameter becomes unavailable for Straight Cool units.
- Occupied Cooling: used to set the zone occupied cooling temperature setpoint.
- Unoccupied Heating: used to set the zone unoccupied heating temperature setpoint. This parameter becomes unavailable for Straight Cool units.
- Unoccupied Cooling: used to set the zone unoccupied cooling temperature setpoint.
9.3 Service Screen

The Service menu allows the qualified technician to adjust or reset any settings on the WSHP, and efficiently troubleshoot and correct issues on the unit. Under this menu, one can scroll up/down to view and adjust the following:

- Analog Inputs/Outputs
- Binary Inputs/Outputs
- Zone Control
- DAT Control

Also, on the bottom of the screen the user can choose to view and adjust parameters from the following sub-screens:

- Unit Fan
- Heat/Cool
- UPM Status
- Help

From the Setup screen, the user will have the opportunity to reconfigure any I/Os that were not previously configured during setup.
9.3.1 Unit Fan Screen

The Unit Fan menu can be accessed by selecting its link through the Service button on home menu screen.

The fan screen allows the user to view fan runtime hours, in addition to accessing the Fan Set-points screen which allows the user to set the fan to run continuously or to run only when the compressors are operational.

The user also has the option to configure the fan to run or stop during a compressor lockout condition imposed by the software. From the Fan screen the user can access the service screen on which the fan runtime hours are displayed. This parameter is normally utilized as a reminder for filter change. On the Set-point screen, the user can reset the timer to start a new count after replacing the filter, run or stop the fan during a fire alarm event (where applicable), and enable a fan status switch (where applicable). Finally the user may configure the fan to run or stop (fan reference speed used for VFDs) during a fire alarm scenario.

9.3.1.1 VFD Speed Screen

When the Heat Pump application involves a Variable Frequency Drive (VFD) for fan control, and the option is selected at settings, the unit options menu becomes visible.

### Figure 82

Figure 76 shows the same screen without this menu, when the VFD option is NOT selected. Once selected, this screen provides a duct static pressure reading, as well as the option to modify the Static Pressure set-point, and the minimum fan speed percentage. Other parameters to be configured include:

- **Smoke Event Fan response**: used to configure fan behavior during an emergency event. The fan may be configured to STOP when a smoke/fire alarm event is triggered, or RUN when the smoke/fire alarm is triggered.

- **Smoke Event Fan speed (VFD)**: used instead for units with VFD to configure the fan behavior during an emergency event. Fan speed may be set anywhere from 0% (off) to 100% (maximum on) in response to the smoke/fire alarm being triggered.

9.3.2 Heat/Cool Screen

The Heating/Cooling screen can be accessed from the Home screen through the Service menu. As explained in the previous sections the touchscreen allows the user to access other frames/screens by hitting the back arrow, touching the home icon button, or touching one of the other text boxes. To navigate and or change properties on this screen the user may follow the same steps as illustrated in the changing a value section of this manual. From the Heating/ Cooling screen the user can see the actual state of the different points that are involved and needed for the cooling and heating operation respectively.

### Figure 83

The user may configure the fan to run or stop (fan reference speed used for VFDs) during a fire alarm scenario.
The runtime hours and counters for the compressors are displayed and can be reset by navigating selecting and changing the particular value. For Zone Control applications, the compressors may be set to be locked out below a user-defined setpoint to prevent condensation issues from this screen.

9.3.3 UPM Status Screen

The UPM Status screen can be accessed from the home Screen via the Service Menu. Once an alarm is received via pulse feedback from the UPM board, it is displayed in the screen as shown below. From this screen the user may reset the UPM board after it has enter the lockout mode by navigating to “Reset UPM now?” selecting yes.

The Help screen can be accessed from the home Screen via the Service Menu. From this screen the user is able to access the software version of the controller to which they are connected.

Other information on this screen include the controller part number and unit serial number. This information will be useful whenever technical support is contacted, or may be required to download the correct manuals or integration point list files from our website. The technical support phone numbers can also be found in this screen.

In addition, troubleshooting tips as well as configuration help tips may also be accessed from this screen.
9.4 Thermostat Screen

The unit mode is OFF by default and needs to be turned to Auto/Heat or Cool.

The Thermostat screen can be accessed from the Home screen. This screen turns the Control Air M into a potential Thermostat. The main features of this screen are:

- **Zone temperature**: The 75°F from figure 93 is the effective zone temperature that the system is using to condition the space.

- **Heat and cool setpoints**: The 65 and 69 refer to the current heating and cooling setpoints for the system.

- **Power button**: This button indicates if the system is in occupied or unoccupied mode. It can also be used as an local override button. If pressed when unit is unoccupied the unit will go into occupied mode for 30 minutes. There is also a "time until" value that indicates when the unit will go back to unoccupied mode.

- **Fan mode**: The drop down on the lower left of the screen allows the user to configure the supply fan to either On or Auto mode. On mode keeps the fan running continuously while occupied. Auto mode cycles the fan with the compressor.

- **Setpoint adjustment**: This can be used to change the default heating and cooling setpoints. If changed, the unit will use the new setpoints during occupied mode.

- **Unit mode**: This can be used to put the unit in one of the following 4 modes:
  - **OFF**: Unit will not try to meet any setpoints
  - **Auto**: Unit will try to maintain space between heating and cooling setpoints
  - **Cool**: Unit will try to maintain space below cooling setpoint
  - **Heat**: Unit will try to maintain space above heating setpoint.