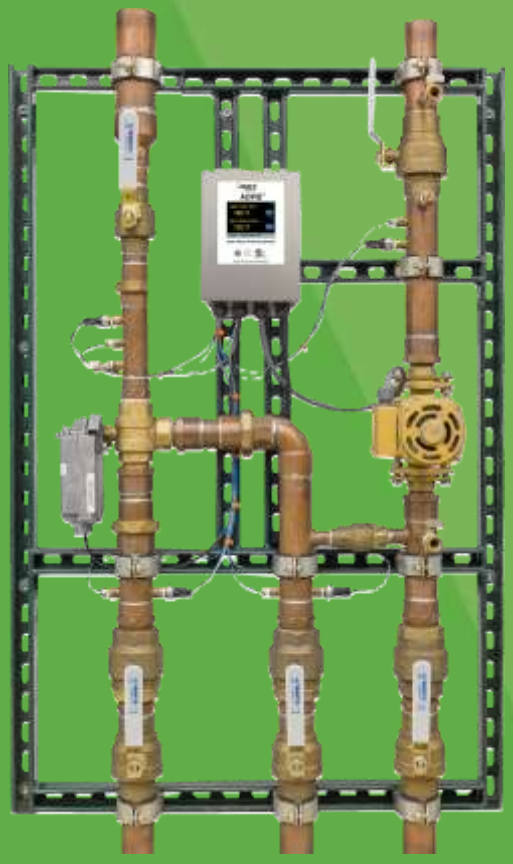
# User Guide & Instruction Manual

# ADMS

## Smart Water Tempering System



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## SAFETY INFORMATION

- **Read the Manual and all product labels and follow all safety and other information.**
- **Replacement Manuals available at aerco.com**

Understanding Safety Information

This safety-alert symbol is shown alone or used with a signal word (DANGER, WARNING, or CAUTION), a pictorial and/ or a safety message to identify hazards and alert you to the potential for death or serious personal injury.

**DANGER** Identifies hazards which, if not avoided, will result in death or serious injury.

**WARNING** Identifies hazards which, if not avoided, could result in death or serious injury.

**CAUTION** Identifies hazards which, if not avoided, could result in minor or moderate injury.

***NOTICE*** Identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.

This pictorial alerts you to the need to read the manual.

This pictorial alerts you to scalding, burn and hot water hazards.

This pictorial alerts you to burn and hot surfaces hazards.

This pictorial alerts you to electricity, electrocution, and shock hazards.

This pictorial alerts you to the need to perform appropriate Lock Out/ Tag Out procedures.

## ADMS Description and Specifications

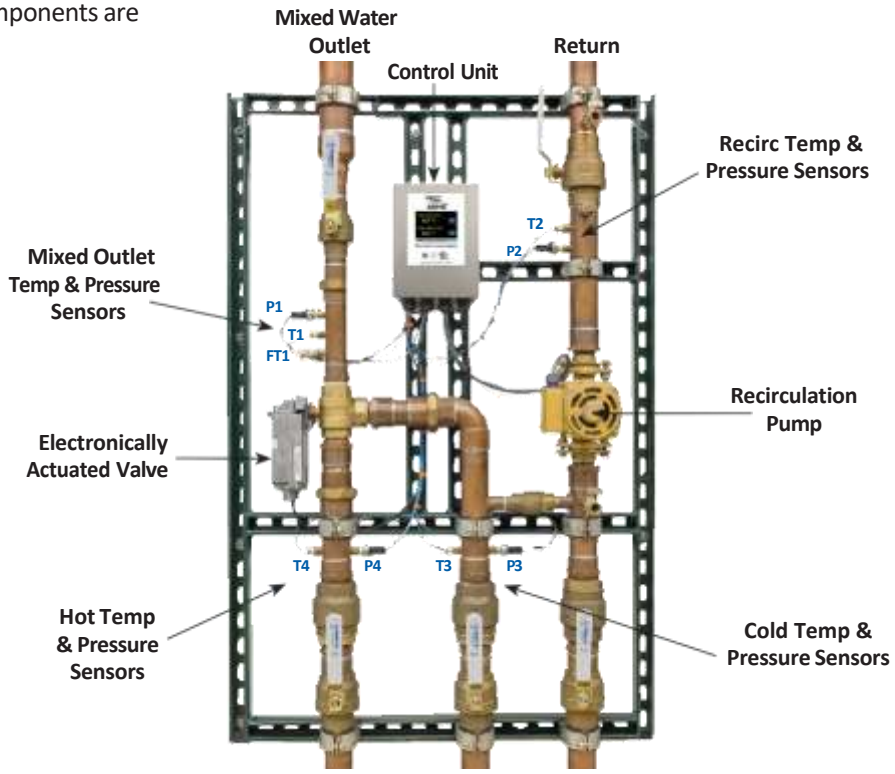
The ADMS is electronic water mixing system providing user-directed control and monitoring of water distribution systems. ADMS includes an electronic Control Module featuring a color touchscreen digital display to select desired outlet water temperature, an electronically actuated valve that mixes hot water with cold water, temperature sensors (plus a quick response temperature sensor), pressure sensors, check valves, and a recirculation pump to maintain the recirculation loop temperature (reducing wait time for tempered water to reach point-of-use fixtures, saving water and energy). The ADMS monitors hot supply inlet temperature, hot supply pressure, mixed outlet temperature, mixed outlet pressure, mixed outlet flow rate (optional), return temperature, and return pressure, to help maintain the desired outlet water temperature. ADMS also features a user programmable high temperature Sanitization mode to help limit water-borne bacteria as part of a user-directed and controlled thermal eradication protocol.

The ADMS Control Module supports building automation systems (BAS) communication with BACnet® IP, BACnet® MSTP, and Modbus® protocols, allowing remote programming and data viewing.

Installation and adjustment of the ADMS are the responsibility of the owner and installer and must be done by qualified personnel in accordance with the manufacturer's instructions, and complying with all governmental requirements, building and construction codes and standards. It is recommended to install ADMS as part of an ASSE compliant water distribution system, including mixing valves and/or temperature limiting devices at all point-of-use fixtures (faucets, sinks, tubs, showers, etc.) that are approved to ASSE 1016, 1069, 1070 and 1071. The owner and user of the ADMS is responsible for selecting and installing the product in an appropriate water distribution system, proper sizing, maintaining proper water quality/condition, and deciding what temperature is safe and appropriate for the water distribution users and facility.

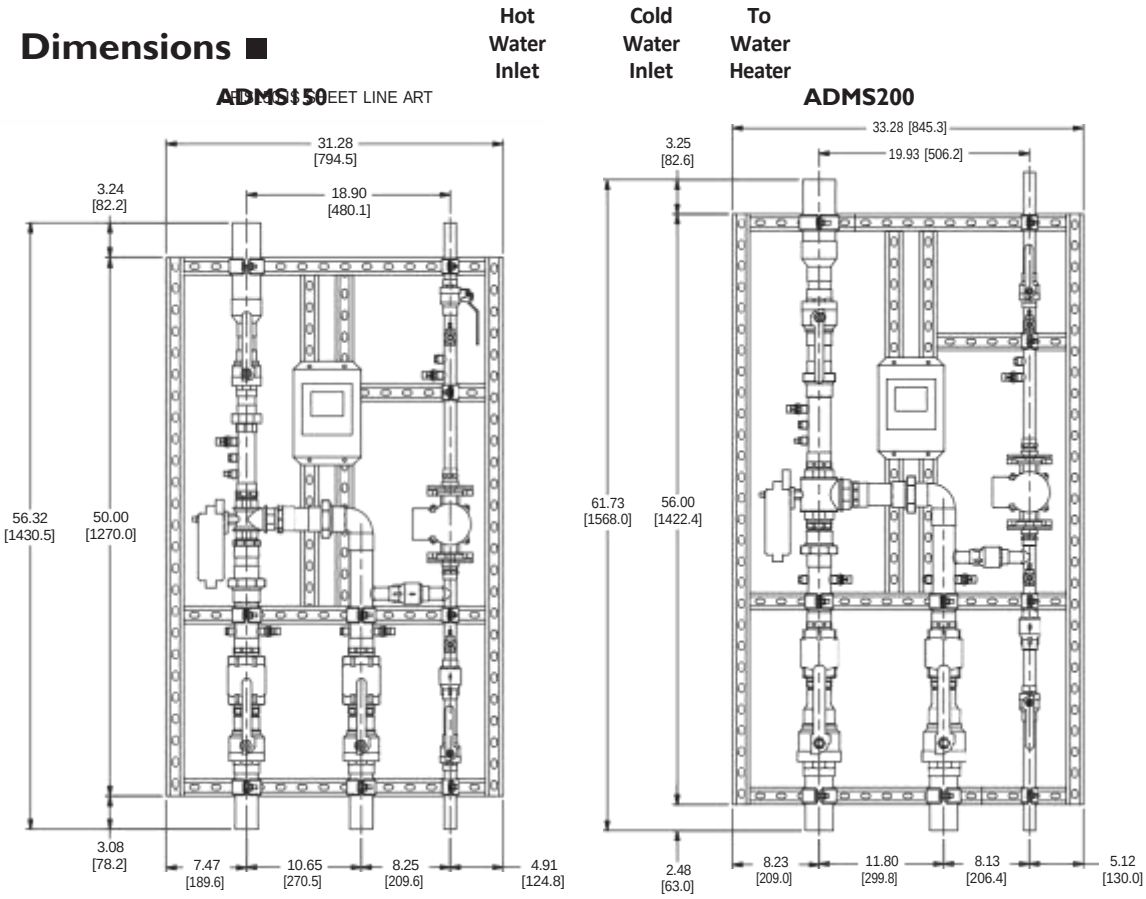
# ADMS Description and Specifications

The ADMS components are shown below:




**ADMS150**

## Dimensions ■




*Dimensions are shown ±1/2''*
*Dimensions in parentheses are in mm*

# ADMS Description and Specifications

## Specifications ■

Maximum Operating Pressure .....200psi (1379 kPa)
Maximum Hot Water Temperature..... 200°F (93°C)
Minimum Hot Water Supply Temp.**..... 2°F (1°C) Above Set Point
Hot Water Inlet Temperature Range .....120 – 180°F (49-82°C)
Cold Water Inlet Temperature Range ..... 39 – 80°F (4-27°C)
Minimum Flow*** .....0.5 gpm (1.89 lpm)
Outlet Water Temperature Adjustment Range****.....80 – 180°F (27-82°C)
Listing/Compliance.....ASSE1017®, cUPC®, NSF®, CSA 24/UL873

** The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.*

*** With Equal Pressure*
**** Minimum flow when ADMS is installed at or near hot water source recirculating tempered water with a properly sized continuously operating recirculating pump.*
***** Low limit cannot be less than the cold water temperature. For best operation, hot water should be at least 5°F (3°C) above desired set point.*

^ Listed without re-circulation line & pump

**User is responsible for determining safe and appropriate temperatures and pressures for system users, guests and facility.**

## Technical Specifications ■

Input Power.....115 V ±10%, 60 Hz, 30 VA, 1180 VA fully loaded
Pump relay.....115/230 V: 10/8 FLA, 50/48 LRA Motor Load
Alert relay:.....30 V (ac/dc) max. 2 A, resistive, Class 2
5 V capacity:..... 10 mA maximum each, resistive, Class 2
20 V capacity:..... 20 mA maximum each, resistive, Class 2
Actuator load:.....20 VA
Meets Class B:.....CES and FCC Part 15

## Capacity ■

| Flow Capacity | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Pressure Drop Across Valve | | | | | | |
| Model | Min. System Draw* | $C_V$ | 5psi (34 kPa) | 10psi (69 kPa) | 20psi (138 kPa) | 30psi (207 kPa) | 45psi (310 kPa) | 50psi (345 kPa) |
| ADMS150 | 0.50 | 26.88 | 60 gpm 227 lpm | 85 gpm 322 lpm | 120 gpm 454 lpm | 147 gpm 556 lpm | 180gpm 681 lpm | 190 gpm 719 lpm |
| ADMS200 | 0.50 | 42.70 | 96 gpm 363 lpm | 135 gpm 511 lpm | 191 gpm 723 lpm | 234 gpm 886 lpm | 286 gpm 1083 lpm | 302 gpm 1143 lpm |
| ADMS150D | 0.50 | 53.57 | 120 gpm 454 lpm | 170 gpm 644 lpm | 240 gpm 908 lpm | 294 gpm 1113 lpm | 360 gpm 1363 lpm | 380 gpm 1439 lpm |
| ADMS200D | 0.50 | 85.27 | 192 gpm 727 lpm | 270 gpm 1022 lpm | 382 gpm 1446 lpm | 468 gpm 1772 lpm | 572 gpm 2165 lpm | 604 gpm 2286 lpm |
| ADMS200T | 0.50 | 127.90 | 288 gpm 1090 lmp | 405 gpm 1533 lpm | 573 gpm 2169 lpm | 702 gpm 2657 lpm | 858 gpm 3248 lpm | 906 gpm 3430 lpm |

**With a properly sized pump*

# Installation

**⚠ WARNING**

**Failure to follow all installation requirements risks possible death, personal injury, property damage, and failure of the ADMS to perform as intended.**

- Installation of ADMS MUST be performed by qualified technicians, including licensed electricians and plumbers, following all manufacturer's instructions, complying with all local, state, federal and other governmental requirements, and with all building and construction codes and standards.
- Use ONLY with a potable water distribution system free of debris, foreign materials, corrosive chemicals or substances, and other adverse conditions.
- ADMS is recommended for use as part of an ASSE compliant water distribution system, including mixing valves and/or temperature limiting devices at all point-of-use fixtures (faucets, sinks, tubs, showers, etc.).
- ADMS MUST be installed in a dry area not susceptible to freezing.
- Keep work area clean, well-lighted, free of clutter and distractions, and accessible only by authorized personnel and workers.
- ADMS Control Module and touchscreen display must be located in accessible and well-lighted area for use, servicing, repair or replacement by authorized personnel.
- ADMS Control Module is electrically powered. ALWAYS take proper precautions to recognize, evaluate, and control electricity hazards during installation, programming, use and service/ maintenance.

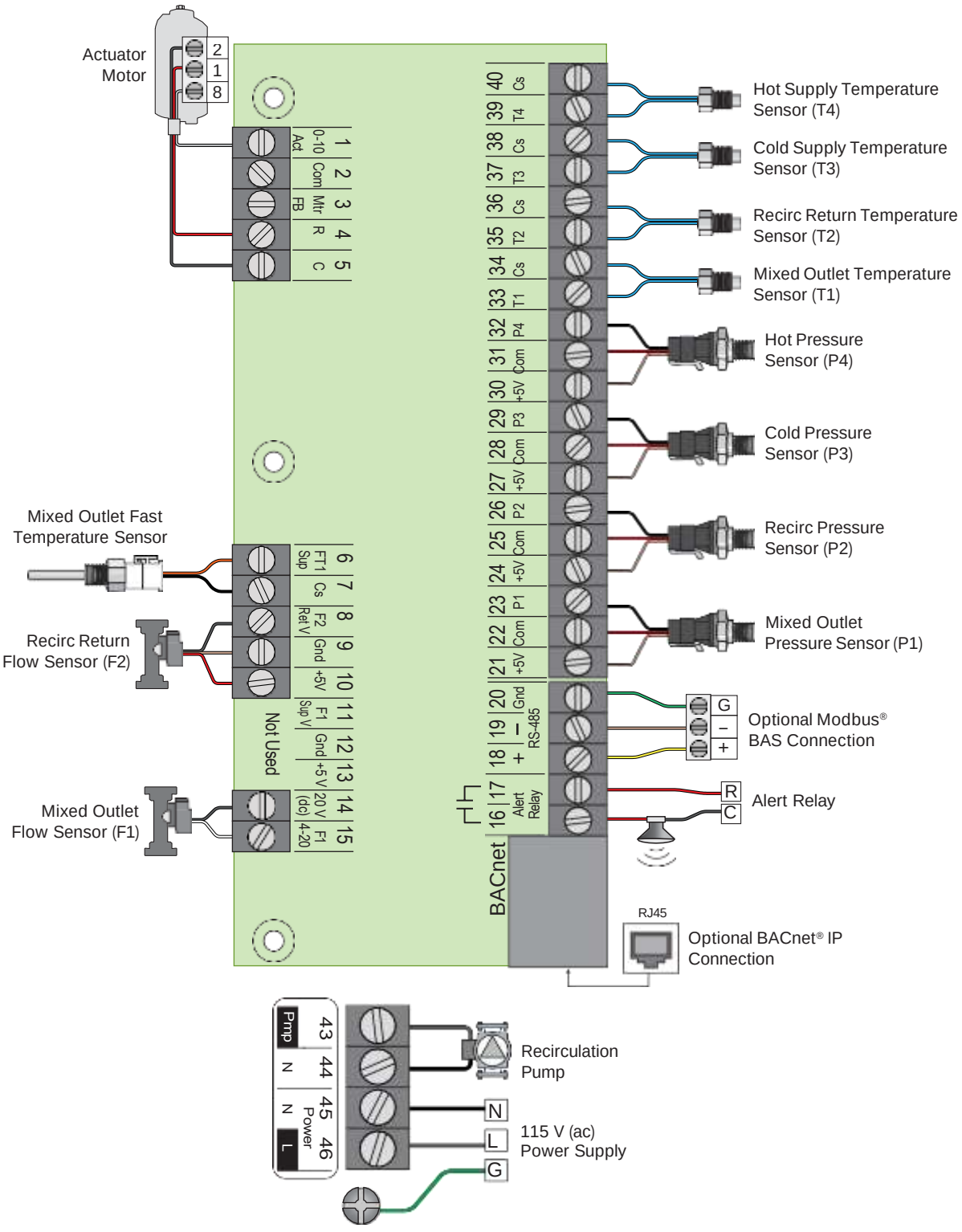
***NOTICE***

Installation of ADMS is performed by the owner using qualified and licensed trades such as plumbers and electricians, following all local, state, federal and other governmental requirements, and all building and construction codes and standards. Step-by-step installation instructions depend upon the application and the configuration of the building's water distribution system.

All installations require thorough flushing of all piping BEFORE installation, and testing for and eliminating all leaks before and after installation.

Check valves are recommended to prevent cross-flow.

# Control Unit Connections (interior)



# Description of Controls and Functions

The following sections generally outline and describe the controls and functions of the ADMS Control Module you will experience when using the digital display. See “Set Up and Programming” section of this Manual for use instructions.

**⚠ WARNING**

**Always read the Manual and all product labels and follow all safety and other information. If you are ever uncertain about a particular task or the proper method of operating this equipment, ask your supervisor, consult this Manual, or visit aerco.com**

## Control Module and Digital Display ■

The intelligence running the ADMS is contained within a Control Module. The color and touch screen digital display allows the user to view temperatures, pressures, flow rates throughout the system, and to configure the controls. The following sections describe and explain the user interface to assist in navigating and configuring the control.

After power up, the “Attention!” screen (shown below) will appear. You have 60 seconds to begin system navigation.

**Start Up Screen**

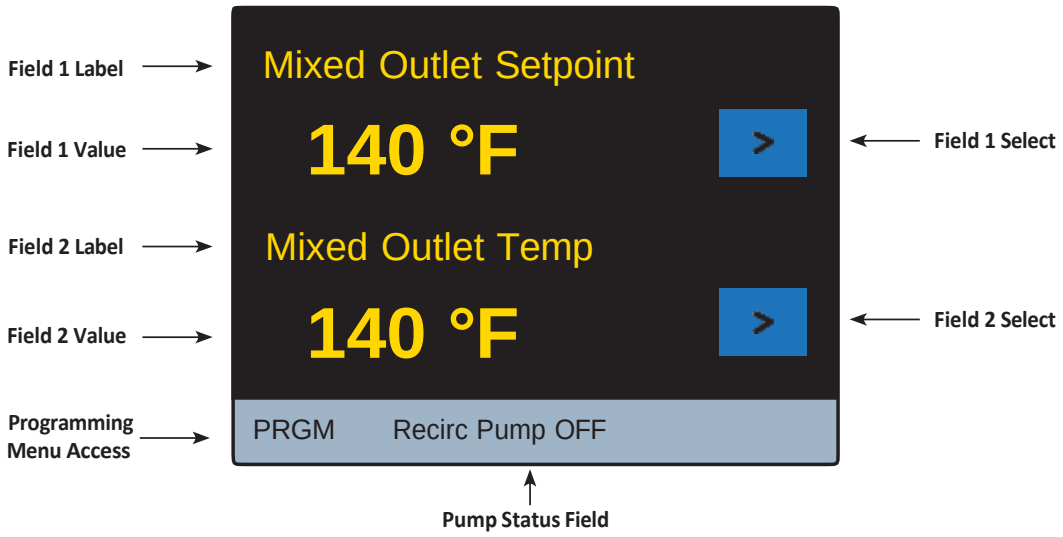

***NOTICE***

The Control will begin mixing operation after 60 seconds. The "Attention" message will appear again after 10 seconds of inactivity until the 60 seconds time has elapsed.

# Description of Controls and Functions

By touching the screen the user can access the "Home" screen, shown below.

**Home Screen**




As shown in the screen shot above, there are two fields viewable within the “Home” screen. For instance, the. Label (item) and Value for Field 1 and Field 2 shown in the Home screen view above are:

Field 1 - “Mixed Outlet Set point” and value of “140°F.”
Field 2 - “Mixed Outlet Temp” and value of “140°F.”

The Label (item) displayed in the fields can be changed by touching the “Field Select” > icon to the right of each field value. The Labels (items) available for viewing on the Home screen by touching the “Field Select” > icon are shown in the table below:

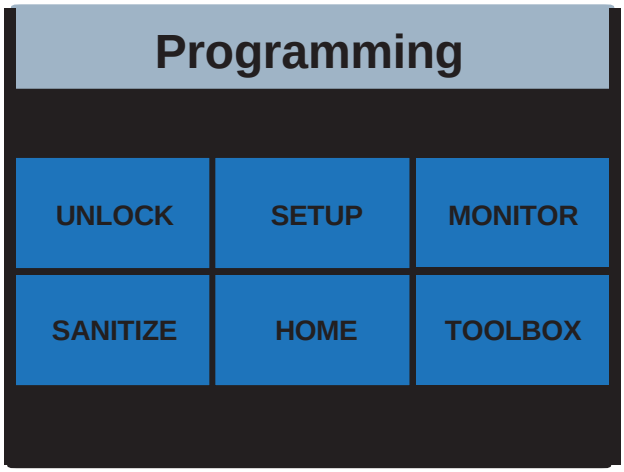
| Item | Description | Units |
|---|---|---|
| Mixed Outlet Setpoint | Temperature setpoint | °F or °C |
| Mixed Outlet Temp | Temperature measured at the mixing valve outlet | °F or °C |
| Hot Supply Temp | Temperature measured at the hot inlet | °F or °C |
| Cold Supply Temp | Temperature measured at the cold inlet | °F or °C |
| Recirc Return Temp | Temperature measured at the recirculation pump inlet | °F or °C |
| Mixed Outlet Pressure | Pressure measured at the mixing valve outlet | psi or KPa |
| Hot Pressure | Pressure measured at the mixing valve hot inlet | psi or KPa |
| Cold Pressure | Pressure measured at the mixing valve hot inlet | psi or KPa |
| Recirc Pressure | Pressure measured at the recirculation pump inlet | psi or KPa |
| Load Flow* | Difference between the mixed and recirc flow rates (F1 and F2) | gpm or $m^3$/h or lpm |
| Mixed Outlet Flow* | Flow rate measured at the mixed outlet (F1) | gpm or m3/h or lpm |
| Recirc Flow* | Flow rate measured on the recirculation return piping (F2) | gpm or m3/h or lpm |
| Valve Position | Control Voltage supplied to the mixing valve | V |
| Mix Percent | Mixed percent hot to total flow, i.e. (Tmixed-Tcold)/(Thot-Tcold) | % |

*Available on models with optional flow monitoring package

# Description of Controls and Functions

Also shown on the Home screen is the Pump Status Field (showing if pump is ON or OFF), and the PRGM icon to access the Programming menu.
Touching the PRGM icon takes the user to the "Programming" Menu containing six function icons – "Unlock," "Setup," "Monitor," "Sanitize," "Home" and "Toolbox" - as shown below:

**Programming Menu**

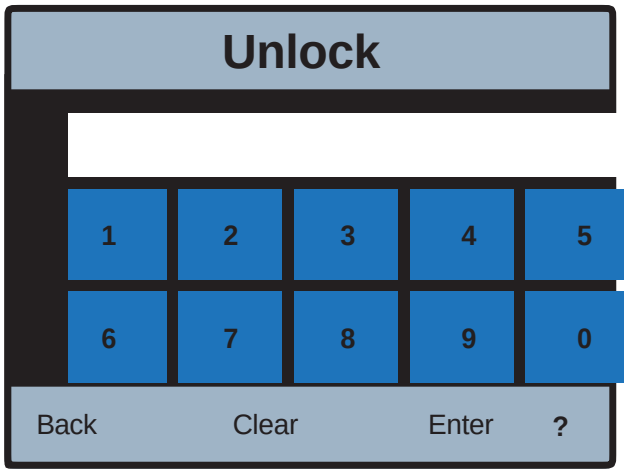



On the "Programming" Menu the UNLOCK and HOME icons are the only active icons until the control is unlocked. See "Unlock the System" in the "Set up and Programming" section of this Manual.

Touching the HOME icon takes the user back to the Home Screen.

Touching the UNLOCK icon takes the user to the "Unlock" function screen shown below:

**Unlock Function**



# Description of Controls and Functions

To set and enter a passcode and unlock the system, follow instructions in the “Set Up and Programming” section of this Manual.

**NOTICE**

The Enter icon on the Unlock function screen is deactivated until the user enters the correct passcode.

The Back icon will take you back to the Programming Menu.

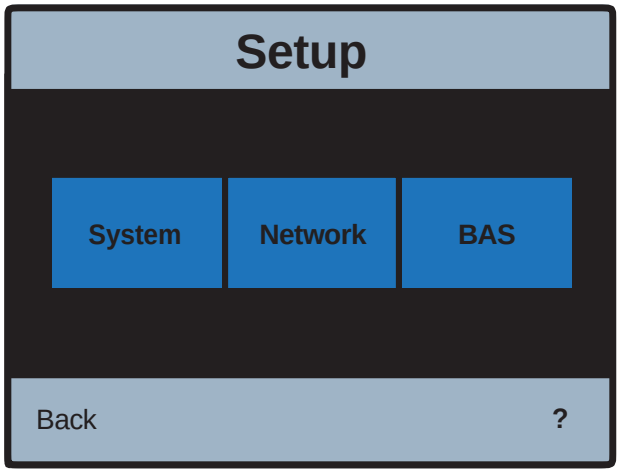
The ? icon will show additional information if available.

After entering the correct passcode, the “Setup“, “Monitor”, “Sanitize” and “Toolbox” functions can be accessed from the “Programming” Menu screen.

The following Sections generally outline and describe these functions.

Touching the SETUP icon on the “Programming” Menu will allow access to the Setup function:

**Setup Function**

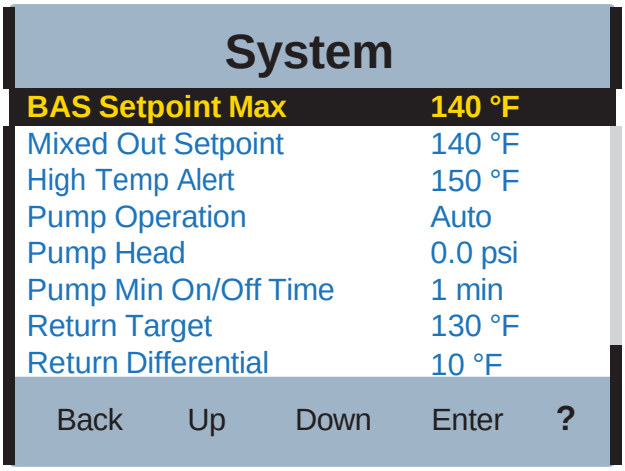



The Set up Function allows the user to access three menus:

- “System”
- “Network”
- “BAS”

# Description of Controls and Functions

**System Menu**

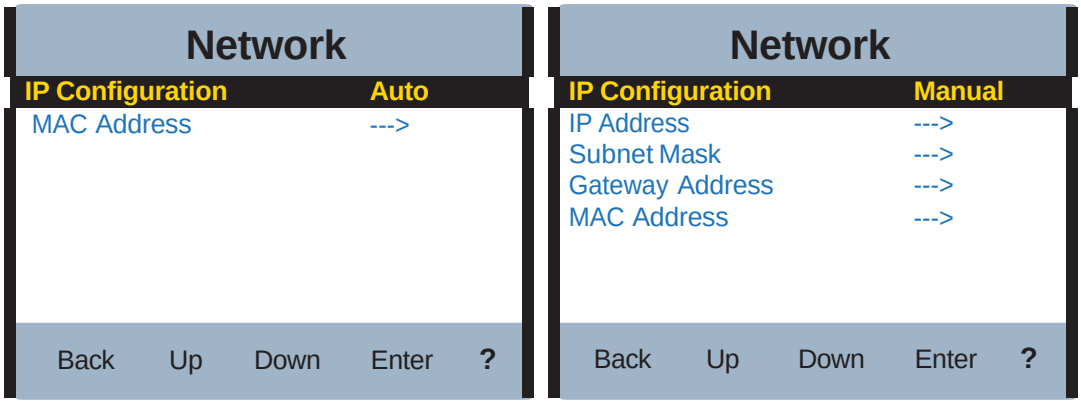



**The System Menu selections are generally described in the table below:**

| Item Field | Range | Default | Additional Info |
|---|---|---|---|
| BAS Setpoint Max | 80 to Mixed Out Maximum - 10F (max value = 180°F) | 140°F | Limit to the remote temperature adjustment (BAS) for added security and safety. If BAS is set to 'None' this field will not display. |
| Mixed Out Setpoint | 80 to Mixed Out Maximum - 10F (max value = 180°F) | 140°F | Mixed Outlet setpoint. |
| High Temp Alert | Mixed Out Setpoint +10F to 190°F | 150°F | A mixed outlet temperature over this amount will create an error condition and issue a reset for the control. |
| Pump Operation | OFF <> ON <> AUTO | AUTO | DHW Recirculation pump control mode. AUTO-temperature differential and dead head protection. ON-Pump is always on. OFF-Pump is always off. |
| Pump Head | 0.0 to 50.0 psi | 8.5 psi | If the head measured across the pump is greater than this value, the pump will turn/remain off since it can not generate any flow at these operating conditions (Dead Head Protection) |
| Pump Min On/Off Time | 0 to 60 min | 1 min | The minimum time the pump runs or remains off. |
| Return Target | 80°F to 180°F | 130°F | The target temperature about which the pump relay will operate. |
| Return Differential | 1°F to 20°F | 10°F | The differential used to determine the pump on and pump off temperatures. |

# Description of Controls and Functions

## Network Menu




## The Network Menu selections are generally described in the table below:

| Item Field | Range | Default | When Displayed | Description | Additional Info |
|---|---|---|---|---|---|
| IP Configuration | Manual<> Auto | Auto | Always | | IP Address: 0.0.0.0<br>Netmask: 0.0.0.0<br>Gateway: 0.0.0.0 |
| IP Address | 0.0.0.1 to 255.255.255.255 | 192.168.0.1 | IP Configuration=Manual | Use keypad entry 0 thru 9<br>key in IP Address<br>Buttons on screen are OK, DEL, TAB, <–, -->, ? | |
| Subnet Mask | 0.0.0.1 to 255.255.255.255 | 255.255.255.0 | IP Configuration=Manual | Use keypad entry 0 thru 9<br>key in Subnet IP Address<br>Buttons on screen are OK, DEL, TAB, <–, -->, ? | |
| Gateway Address | 0.0.0.1 to 255.255.255.255 | 192.168.0.1 | IP Configuration=Manual | Use keypad entry 0 thru 9<br>key in Gateway IP Address<br>Buttons on screen are OK, DEL, TAB, <–, -->, ? | |
| MAC Address | aa:bb:ee:ff:11:22 | Unique to each device | Always | | MAC Address: 00:04:a3:62:59:8e |

## BAS Menu

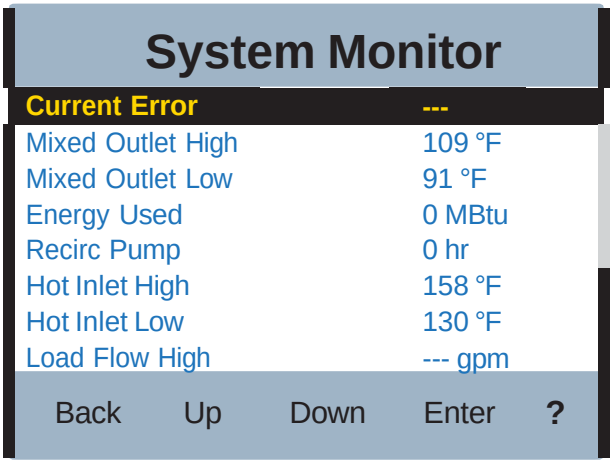
### The BAS Menu selections are generally described in the table below:

| Item Field | Range | Default | When Displayed | Description | Additional Info |
|---|---|---|---|---|---|
| BAS Type | NONE <> BAC-IP <> BAC-MSTP <> MODBUS | NONE | Always | Building Automation Type: | None = control runs in stand alone.<br>BAC-IP = control is connected to a BACnet/IP system.<br>BAC-MSTP = control is connected to a BACnet/MS-TP system.<br>MODBUS = control is connected to a Modbus system. |
| BACnet DEVICE ID | 0 to 4194303 | 1 | BAS Type = BAC-IP or BAC-MSTP | Buttons on screen are OK, DEL, <–, --> ? | BACnet device ID |
| BACnet Port | 1 to 65535 | 47808 | BAS Type = BAC-IP | Use keypad entry 0 thru 9<br>key in BACnet PORT<br>Buttons on screen are OK, DEL, <–, -->, ? | BACnet Port |
| Register Foreign Dev | OFF<>ON | OFF | BAS Type = BAC-IP | | Is a BACnet Device that has an IP subnet address different from those comprising the BACnet/IP network. |
| BBMD TIME | OFF, 30 to 65535 | OFF | BAS Type = BACnet<br>Register Foreign Dev ≠ OFF | Time-to-live (Seconds)<br>Use keypad entry 0 thru 9<br>key in BBMD TIME<br>Buttons on screen are OK, DEL, <–, -->, ? | BACnet Broadcast Management. A specified time, extending that time by periodic (automatic) renewal requests. |
| BBMD IP | 0.0.0.1 to 255.255.255.255 | 127.127.127.127 | BAS Type = BACnet<br>Register Foreign Dev ≠ OFF | Use keypad entry 0 thru 9<br>key in IP Address<br>Buttons on screen are OK, DEL, <–, --> ? | BACnet Foreign device internet Protocol address. A numerical label assigned to the foreign device. |
| BBMD PORT | 0 to 65535 | 47808 | BAS Type = BACnet<br>Register Foreign Dev ≠ OFF | Use keypad entry 0 thru 9<br>key in BBMD PORT<br>Buttons on screen are OK, DEL, <–, --> ? | BACnet Broadcat Management Port. |
| BAC-MSTP Address | 0 to 127 | 1 | BAS Type = BAC-MSTP | Buttons on screen are OK, DEL, <–, --> ? | Set the MSTP address. Each MSTP device must have a unique address. |
| BACnet Baud Rate | 9600, 19K2, 38K4, 57K6, 76K8, 115K2 | 9600 | BAS Type = BAC-MSTP | Slider, OK,<–, --> ? | BACnet MS/TP baud rate |
| Modbus Address | 1 to 247 | 1 | BAS Type = MODBUS | Radio buttons, OK, ? | Modbus Address:<br>1 to 247 |
| Modbus Data Type | RTU <> ASCII | RTU | BAS Type = MODBUS | Slider, OK,<–, --> ? | Modbus Data Type<br>RTU or ASCII |
| Modbus baud Rate | 1200, 4800, 9600, 14K4, 19K2, 28K8, 38K4, 57K6, 76K, 115K2 | 9600 | BAS Type = MODBUS | Slider, OK,<–, --> ? | Modbus baud rate |
| Modbus Parity | None <> Odd <> Even | Even | | Slider, OK,<–, --> ? | Modbus Parity type. |

# Description of Controls and Functions

## Monitor Function ■

Touching the MONITOR icon on the "Programming" Menu will allow access to the Monitor Function:




## The Monitor Function allows access to the following fields:

| Item Field | Range | When is it Displayed | Description | Additional Info |
|---|---|---|---|---|
| Current Error | | Always | | The highest priority error code. |
| Mixed Outlet High | -22 to 266°F | Always | | The highest measured mixed outlet temperature since last cleared. |
| Mixed Outlet Low | -22 to 266°F | Always | | The lowest measured mixed outlet temperature since last cleared. |
| Recirc Pump | 0-65535 hrs | Always | | Accumulated run time hours of pump since last cleared. |
| Hot Inlet High | -22 to 266°F | Always | | The highest measured hot inlet temperature since last cleared. |
| Hot Inlet Low | -22 to 266°F | Always | | The lowest measured hot inlet temperature since last cleared. |
| Pressure High | 0-65535 psi | Always | psi or kPa<br>Resolution in tenths | The highest measured DHW outlet pressure since last cleared. |
| Pressure Low | 0-65535 psi | Always | psi or kPa<br>Resolution in tenths | The lowest measured DHW outlet pressure since last cleared. |
| Energy | 0-65535 Therms or GJ | Optional F1 and F2 Flow Sensors present<br>System Supply Sensor present<br>System Return Sensor present | | The accumulated energy usage since last cleared. |
| Flow High | 0-65535 gpm | Optional F1 and F2 Flow Sensors present | gpm or $m^3/h$<br>Resolution in tenths | The largest load flow measured since last cleared. |
| Reset All | ON<>OFF | Always | | Clear all monitored values to zero. |

## Sanitize Function ■

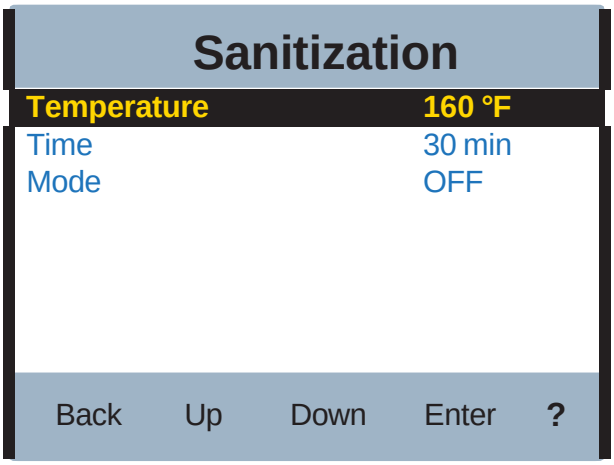
**⚠ DANGER**

**The Sanitization function produces high temperature water at all point-of-use fixtures (faucets, sinks, tubs, showers, etc.). Only qualified and authorized personnel who fully understand the function's operation, output and risks, should use the Sanitization function, and only as part of and in compliance with, a thermal eradication protocol safely and properly designed by the owner or manager of the water distribution system. The owner or manager of the water distribution system has sole responsibility to protect end-users, facility employees or contractors, personnel performing the Sanitization, and bystanders from scalding, burning, thermal shock, or other hazards from possible exposure to water or any parts of the water distribution system during Sanitization and cool down period, until system water returns to a safe and proper outlet water temperature set point.**
**Always read and follow the User Guide & Instruction Manual.**

**See "Sanitization" section of this Manual for use instructions.**

# Description of Controls and Functions

Touching the SANITIZE icon on the "Programming" Menu will allow access to the sanitization Function:



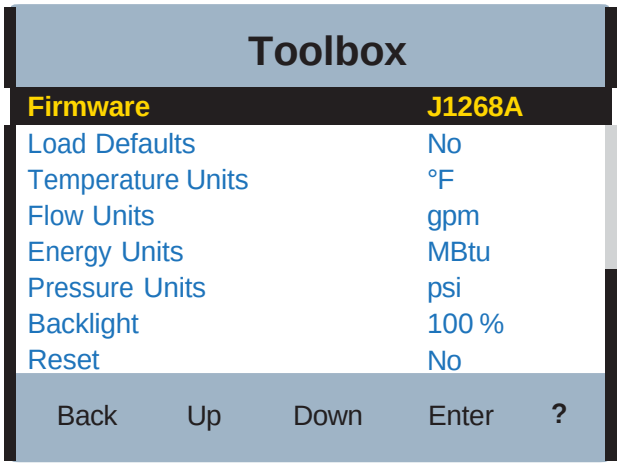

## The Sanitization Function allows access to the following fields:

| Item Field | Range | Default | When Displayed | Description | Additional Info |
|---|---|---|---|---|---|
| Temperature | 120 to 180 ºF | 140 ºF | After PIN correctly entered | | The sanitization target temperature. |
| Time | 0 to 600 mins | 60 mins | After PIN correctly entered | Countdown starts once DHW is up to the Sanitization Temperature | Sanitization Timer. |
| Mode | ON <> OFF | OFF | After PIN correctly entered | | Turn sanitization on or off. |

# Description of Controls and Functions

## Toolbox Function ■

Touching the TOOLBOX icon on the "Programming" Menu will allow access to the Toolbox Function:




## The Toolbox Function allows access to the following fields:

| Item Field | Range | Default | When is it Displayed | Additional Info |
|---|---|---|---|---|
| Firmware | J1268A | J1268A | Always | J1268A |
| | | | | SVN XXX |
| Load Defaults | No <> Yes | No | Always | Reset the programmable settings to factory defaults. |
| Temperature Units | °F <> °C | °F | Always | Units used for temperature display. |
| Flow Units | gpm <> $m^3/h$ <> lpm | gpm | Optional F1 or F2 Flow Sensors present | Units used for Flow Rate display. |
| Energy Units | TH <> GJ <> MBtu <> kWh | MBtu | Optional F1 and F2 Flow Sensors present | Units used for calculated Energy Usage display. |
| Pressure Units | psi <> kPa | psi | Always | Units used for Pressure display. |
| Backlight | 10 to 100 % | 100% | Always | Adjust the brightness of the LCD backlight. |
| Reset | No <> Yes | No | Always | Reset the device. |

# Set up and Programming

## Turn on Power ■

**NOTICE**

Before beginning, make sure all ball valves are in the fully open position. Double valve (DV) and Triple valve (TV) system must be set up as individual system described in this section.

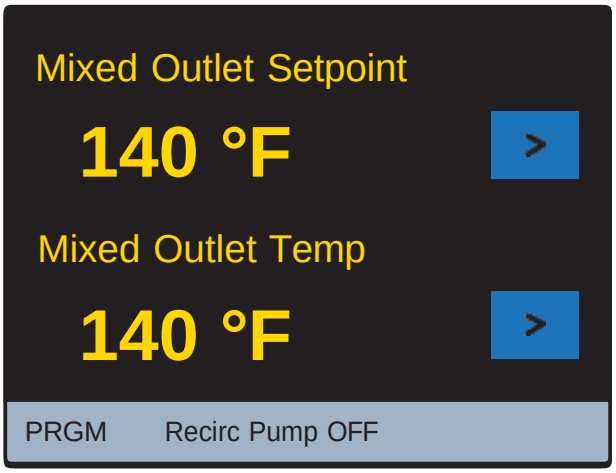
1. Turn ADMS power “ON” by turning on the main switch.
2. When powered up, the display will show a 60 second countdown timer and read:


**NOTICE**

The control will begin mixing operations automatically after 60 seconds. During the 60 seconds the user may adjust setting and configure the control by touching anywhere on the screen to access the PRGM menu. If the user does nothing, the control will automatically route to the home screen after 60 seconds and begin normal operation.

3. The Home Screen will appear:

**Home Screen**



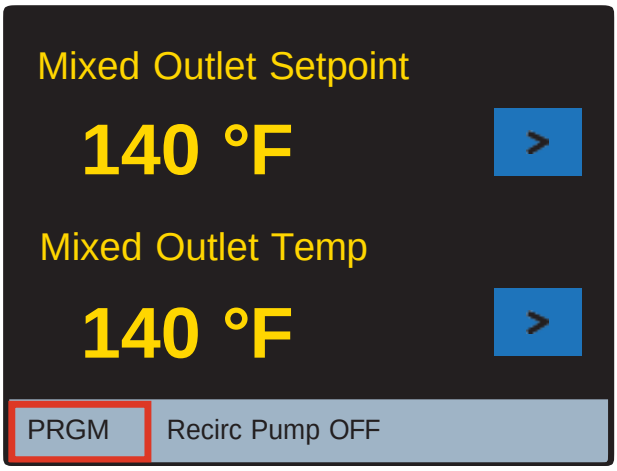
## Create a passcode ■

**NOTICE**

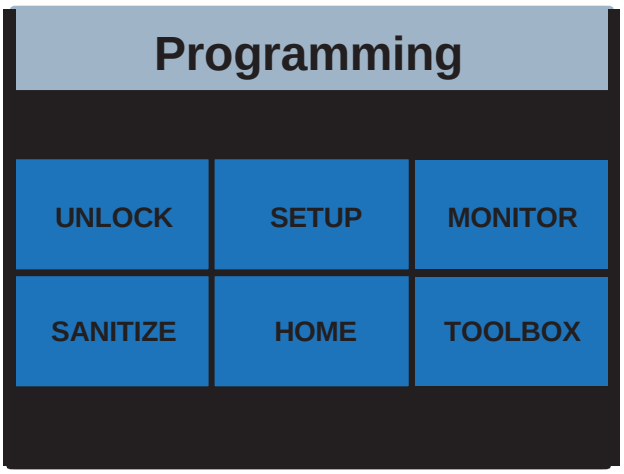
The ADMS comes programmed with a factory default passcode (1017). For added security, and to help prevent unauthorized access, it is recommended that you create a unique 4 digit passcode as outlined below.

1. To select and set your own passcode, on the Home Screen, touch the PRGM icon in the lower left corner as shown below:

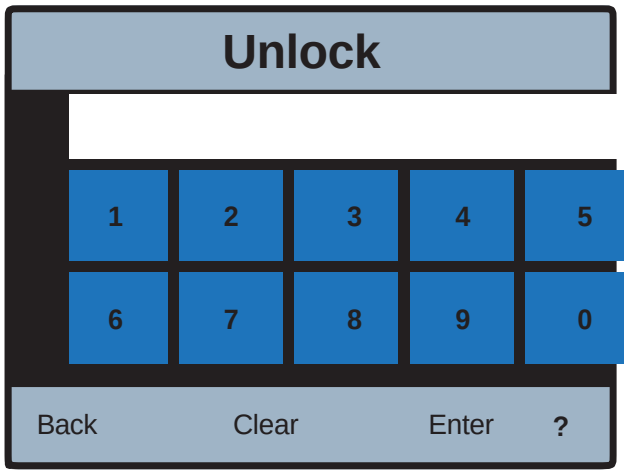
**Home Screen**




2. You will be directed to the Programming Menu, which appears as shown below:




3. On the Programming Menu, touch the UNLOCK icon. The Unlock function screen will appear and you will be prompted to enter the passcode:




4. Creating your own passcode:
   - To create your own passcode, enter the factory default passcode 1017 and press the ? icon in the lower right corner of the Unlock screen.
   - Enter a new 4-digit passcode and touch the Enter icon (make sure to keep your new code in a secure place).
   - Re-enter the new passcode and touch the Enter icon again to finalize the passcode change.

**NOTICE**

If you make a mistake when re-entering your new passcode and it does not match your first entry, the Enter icon will be deactivated. If this happens, press Clear and try entering the new passcode again.

**NOTICE**

To reset the passcode to the factory setting, on the "Programming" menu, press and hold the SETUP icon for 10 seconds. When the passcode is reset, you will be automatically directed to the "Unlock" page.

## Unlock the system ■

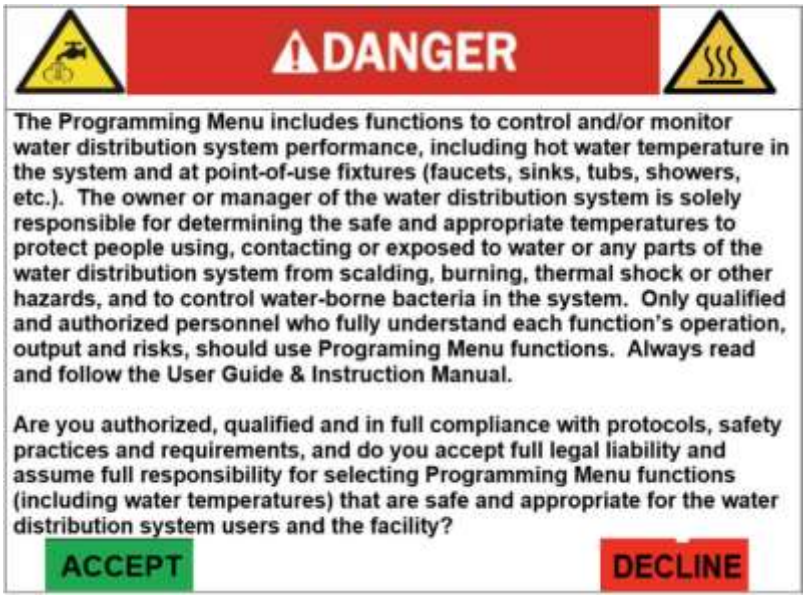
1. To unlock the system, on the Unlock screen, enter your new passcode, and touch the Enter icon.

**NOTICE**

If you need to clear your entry and start again, touch the Clear icon. If you want to go back to Programming Menu, touch the Back icon.

If you did not set up your own passcode, you can enter the factory default passcode 1017.

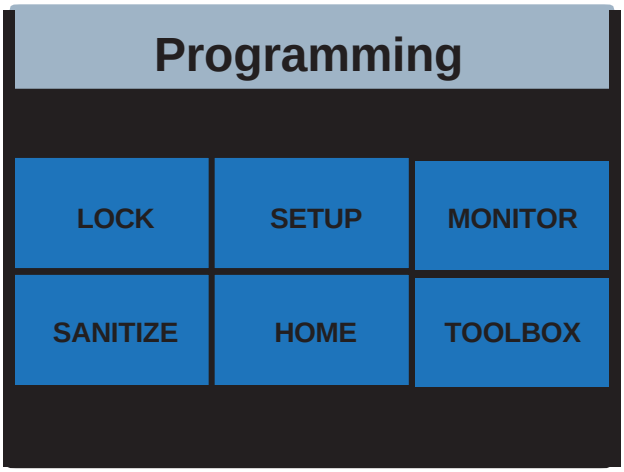
2. When the passcode is entered, you will be directed to the liability and responsibility acceptance screen:




3. You must touch the ACCEPT icon to proceed to the Programming Menu and to use system functions.

Touching the DECLINE icon means you will not be able to change system settings and you accept all default settings (including the outlet water temperature set point of 120° F/ 49° C) as safe and appropriate for the water distribution system users and the facility. You will be returned to the "Programming" screen.

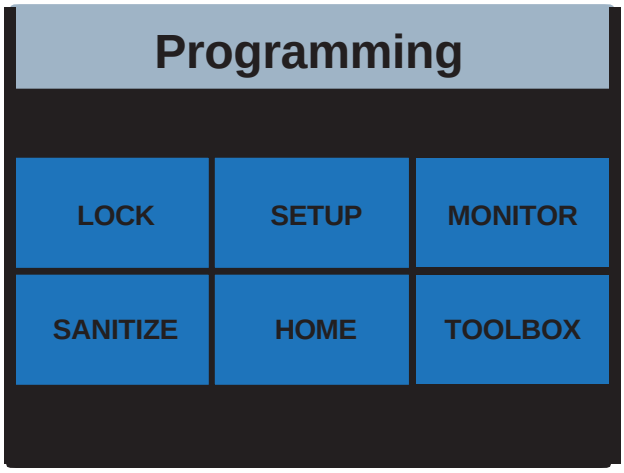
4. When you touch the ACCEPT icon, you will access the Programming Menu, which will appear as:



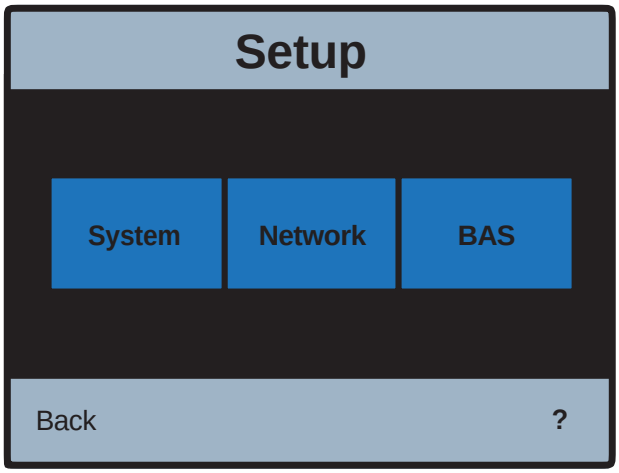

## Selecting and adjusting the mixed outlet water temperature ■

**DANGER**

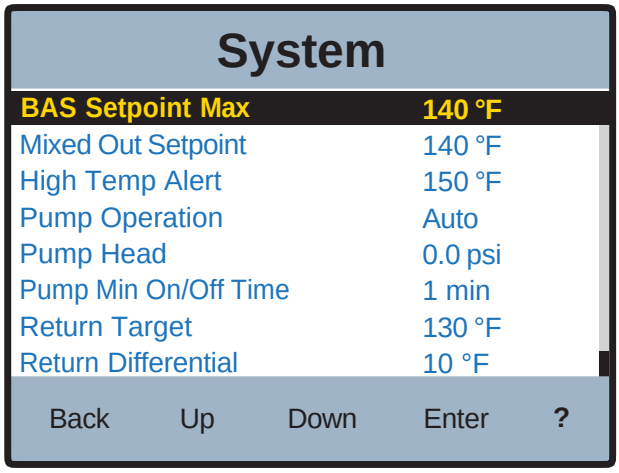
**The next steps involve selecting or adjusting the mixed outlet water temperature – the hot water temperature in the water distribution system and delivered to point-of-use fixtures (faucets, sinks, tubs, showers, etc.). The owner or manager of the water distribution system is solely responsible for determining the safe and appropriate temperatures to protect people using, contacting or exposed to water or any parts of the water distribution system from scalding, burning, thermal shock or other hazards, and to control waterborne bacteria in the system. Only qualified and authorized personnel who fully understand each function's operation, output and risks, should use Programming Menu functions. Always read and follow the User Guide & Instruction Manual.**




Touch the SETUP icon which will direct you to the Setup Menu which will appear as:



Touch the System icon which will direct you to the System Menu which will appear as:

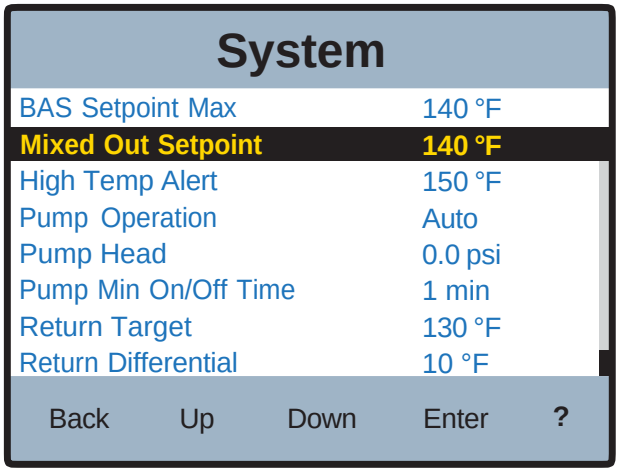



2. Selecting and Setting Outlet Water Temperature Set-point:

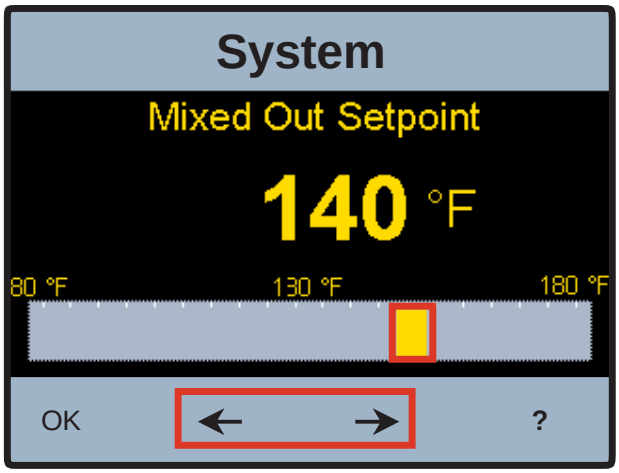
**WARNING**

**BEFORE setting mixed outlet water temperature or electing default temperature, point-of-use mixing valves and/or temperature limiting devices MUST be installed at all fixtures (faucets, sinks, tubs, showers, etc.)**

Using the Up or Down icons, scroll through the System Menu and select:
Mixed Out Setpoint 140 °F




3. After selecting (highlighting) Mixed Out Setpoint 140 °F, touch Enter and you will be directed to the Mixed Out Setpoint selection page:




4. Select and set the safe, appropriate and desired outlet water temperature for your users, application and facility by using the slider icon or by touching the right or left arrows until the selected temperature is displayed.

**The owner or manager of the water distribution system is solely responsible for determining the safe and appropriate temperatures to protect people using, contacting or exposed to water or any parts of the water distribution system from scalding, burning, thermal shock or other hazards, and to control water-borne bacteria in the system.**

5. Once the desired temperature is selected, press the OK icon to apply the setting.

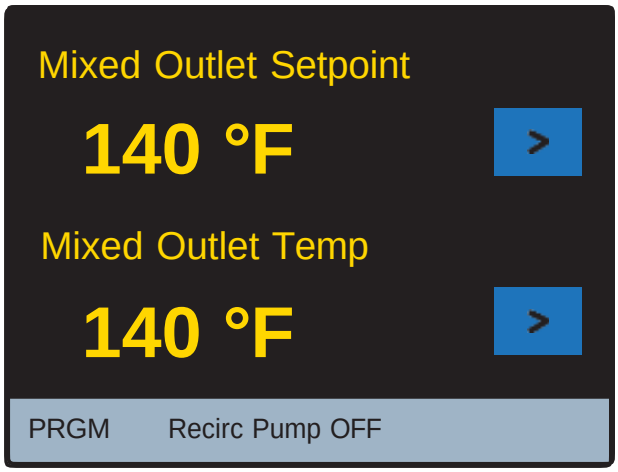
   You will be returned to the System Menu screen.

## Commissioning ■

**You must confirm and test your outlet water temperature setting**

1. **Confirming proper setting and operation:** With your desired Outlet Water Temperature Set Point selected and set, make sure the Mixed Outlet Temperature is within desired operating range.

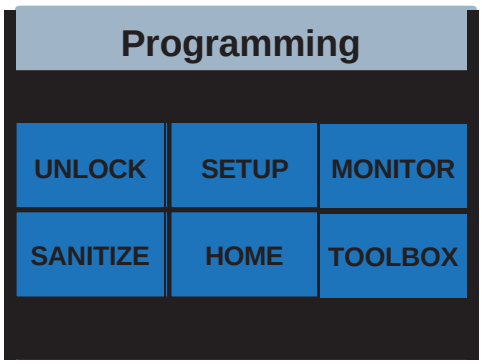
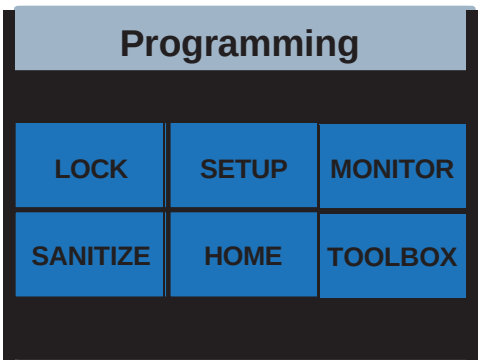
**Home Screen**



**If you are finished at this time, the system will return to a locked state if not touched for 60 seconds.**

Or, touch the PRGM icon twice to return to the "Programming" menu, then press LOCK

1. When the system is locked, the "Programming" menu will now display the UNLOCK icon, as shown below on left:

| System Locked | System UnLocked |
|---|---|
|  |  |





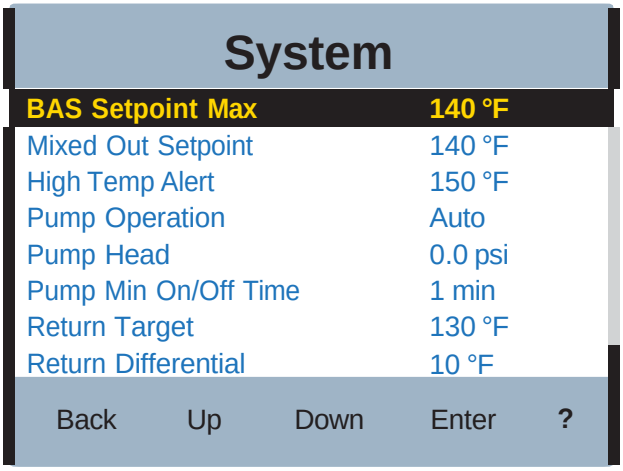
2. If you want to access other settings on the System Setup Menu, touch the SETUP icon on the "Programming" Menu and follow the instructions under **Accessing other settings on the System Setup Menu**, below.

3. If you are done with programming and settings at this time, touch the HOME icon on the "Programming" Menu and you will be returned to the Home Screen.

# Set up and Programming

## Accessing other settings on the System Setup Menu ■

1. From the "Programming" Menu, touch the SETUP icon to go to the System Setup Menu:




## The System Set up menu options are as follows:

| Menu Options | Description |
|---|---|
| **System Setup** | |
| BAS Setpoint Max | Maximum mixed outlet temperature the BAS system can set |
| Mixed Outlet Setpoint | Mixed outlet temperature setting |
| High Temp Alert | Temperature at which the control will issue a reset (min. 10F above setpoint). |
| Pump Operation | Pump setting. AUTO is temperature and pressure based pump control. ON, pump is always ON. OFF, pump is always OFF. |
| Pump Head | If pressure across the pump is greater than input value, pump will remain OFF |
| Pump Min On/Off Time | The minimum time the pump remains on or off |
| Return Target | Designated temperature of return line water from facility |
| Return Differential | Designated temperature delta to turn "on" recirculation pump should return line temperature fall below this value |

# Sanitization

The Sanitization function produces high water temperatures and is intended **ONLY** for use as part of a user-directed, controlled and supervised thermal eradication protocol that has been safely and properly designed to help limit water-borne bacteria within the tempered water distribution system. The instructions contained in this Manual for the Sanitization function are not intended to be a thermal eradication protocol.

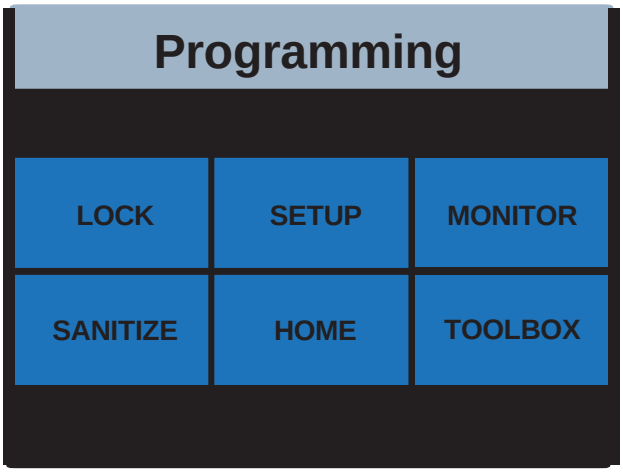
Selecting, directing, and controlling a safe and properly designed thermal eradication protocol is the sole responsibility of the people who own, manage or control the water distribution system. It is their responsibility to protect water distribution end-users, facility employees or contractors, and bystanders from scalding, burning, thermal shock, or other hazards from possible exposure to water or any parts of the water distribution system during Sanitization and cool down period, until system water returns to a safe and proper outlet water temperature set point.

**⚠ DANGER**

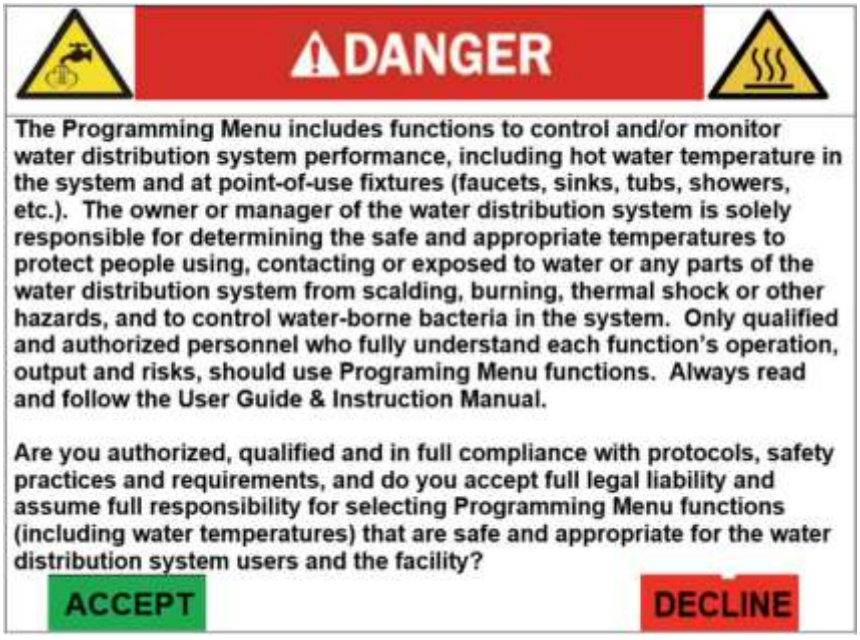
**The Sanitization function produces high temperature water at all point-of-use fixtures (faucets, sinks, tubs, showers, etc.). Only qualified and authorized personnel who fully understand the function's operation, output and risks, should use the Sanitization function, and only as part of and in compliance with, a thermal eradication protocol safely and properly designed by the owner or manager of the water distribution system. The owner or manager of the water distribution system has sole responsibility to protect end-users, facility employees or contractors, personnel performing the Sanitization, and bystanders from scalding, burning, thermal shock, or other hazards from possible exposure to water or any parts of the water distribution system during Sanitization and cool down period, until system water returns to a safe and proper outlet water temperature set point. Always read and follow the User Guide & Instruction Manual.**

# Sanitization

1. On the Programming Menu




Touch the SANITIZE icon, which will direct you to the responsibility and liability acceptance page:



2. You must touch the ACCEPT icon to proceed with the Sanitization function.

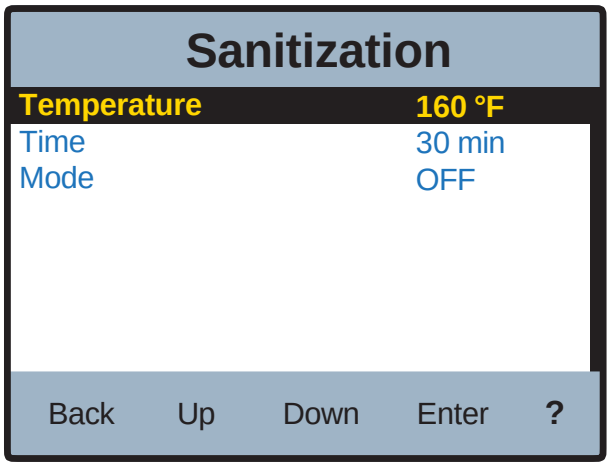
   - Touching the DECLINE icon means you will be unable to utilize the Sanitization function and you will be returned to the “Programming” Menu page.

   - When you touch the ACCEPT icon, you will be directed to the Sanitization menu screen.

3. Select the Sanitization temperature first by highlighting the TEMPERATURE function on the Sanitization menu and then touching

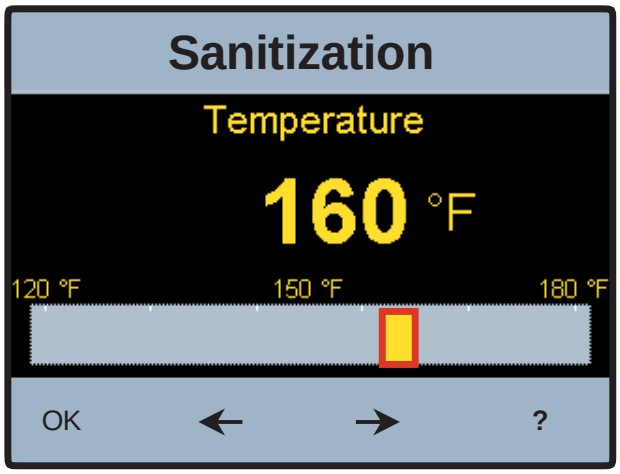
**NOTICE**

During first 60 seconds upon power up, mode setting does not appear.

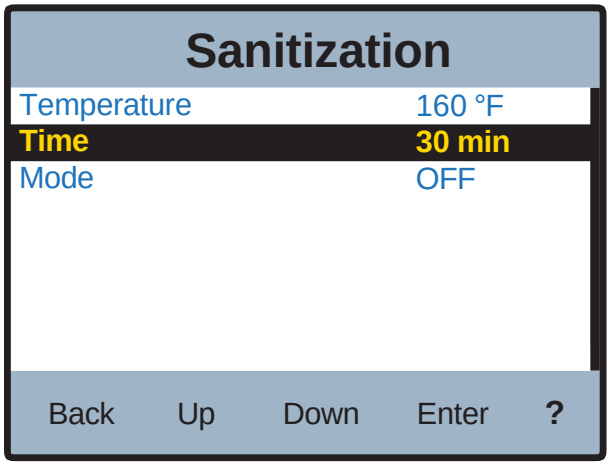



Enter

4. Using the slide bar or directional arrows select the desired outlet water temperature.



5. Next, select the run time in minutes by first highlighting the TIME function on the Sanitization menu and touching Enter.




6. Using the  or ← → select the desired Run Time.

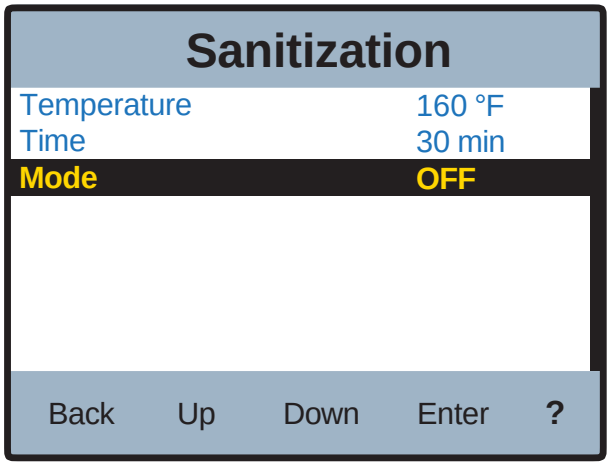

**⚠ WARNING**

**BEFORE starting the Sanitization function, make sure you are in full compliance with a safely and properly designed thermal eradication protocol, protecting end-users, facility employees or contractors, personnel performing the Sanitization, and bystanders from scalding, burning, thermal shock, or other hazards.**

7. To engage/start the Sanitization function, select MODE on the Sanitization menu and touch Enter .

**NOTICE**

During first 60 seconds upon power up, mode setting does not appear.

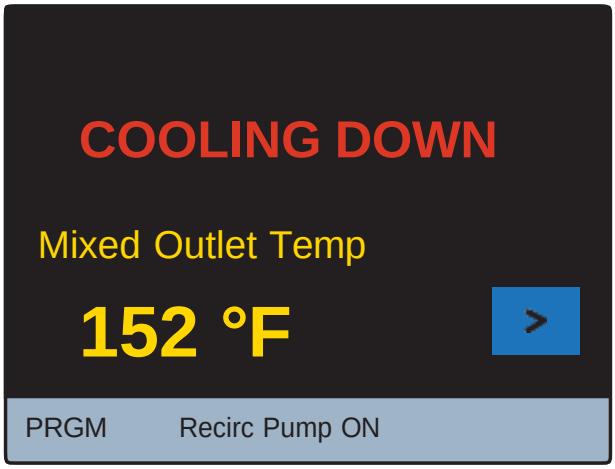



8. Once in the MODE menu, toggle to the ON radio button and then select OK.

# Sanitization

The Sanitization Mode is now fully functional. Note: The HOME screen will indicate you are Sanitizing the water delivery system and indicate Mixed Outlet Temperature.


9. After Sanitization Mode has completed (user selected run time has elapsed), the ADMS will go into a Cool Down Mode to return to the Mixed Outlet temperature prior to sanitizing.



## Configuring the Control for BAS communication ■

1. Configure the control to communicate using the “User Interface-BAS Menu” information within this manual and/or the “BAS Integration Manual.”

## Introduction ■

The ADMS is equipped with a 1069 Control Module designed and programed by tekmar Control Systems Ltd. This control can communicate with a Building Automation System (BAS) using BACnet® IP, BACnet® MSTP, or Modbus®. This manual provides information about the measurements, control parameters, and error messaging which can be accessed by building automation and/or management systems that use BACnet® IP, BACnet® MSTP, or Modbus® communication. The 1069 Control Module can be configured to provide remote monitoring and remote temperature set-point control from the connected BAS. See ADMS User Guide & Instruction Manual for additional information.

## BAS Connection Procedure ■

**⚠ DANGER**

**BEFORE attempting to connect BAS, a certified and qualified electrician MUST fully de-energize and disconnect all electrical power from ADMS.**

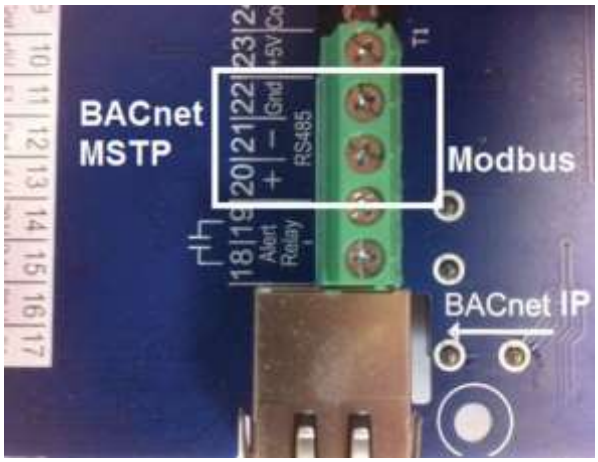
**Perform required LOCK OUT/TAG OUT procedures.**

**BAS connection MUST be performed by certified and qualified electrician.**

1. After completely de-energizing and disconnecting all power from ADMS and performing required LOCK OUT/TAG OUT, carefully open the ADMS control module by releasing latches to reveal BACnet® and Modbus® hook up terminals.

**As an additional safety check, once the box is open, confirm that the unit is de-energized by measuring the AC voltage across the "L" and "N" terminals (46 and 45 respectively) using the voltmeter. Alternatively, use a voltage detector to confirm that the unit is NOT energized.**

2. With the control module open, the BACnet®, Modbus®, and Alert Relay connections are visible on the bottom side of the main control board as shown below:




3. The control module has a plug installed in an unused hole through the enclosure to allow for easy installation of the BAS wires. Remove this plug and run the BAS wires through this hole to the control.

**NOTICE**

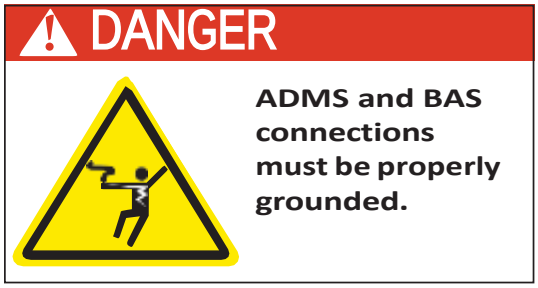
A grommet or wire protector (similar to those used on the other enclosure holes) should be used to protect the wire from being damaged by the enclosure hole opening.

4. If connecting the control to a BACnet® IP supported BAS system simply run a CAT-5E or CAT-6 cable from the BACnet® Network Switch and connect to the RJ45 Ethernet style jack on the board.

**NOTICE**

Cable length not to exceed 150 ft (45.7m) for CAT-5E, or 300 ft. (91.4 m) for CAT-6. Check continuity across each wire.

5. If connecting to a BACnet® MSTP system run the A(-), B(+), Gnd terminals from the nearest BAS system component and connect to terminals 21, 20, and 22 (+, -, Gnd) of the IntelliStation Control Module 1069.




**DO NOT ground to the enclosure. Ground ("Gnd") terminal must be connected to terminal 22 marked "Gnd."**

6. If connecting to a Modbus® BAS system run the A-B-G terminals from the nearest the BAS system component and connect to terminals 20, 21, and 22.

**DO NOT ground to the enclosure. Ground ("G") terminal must be connected to terminal 22 marked "Gnd."**

If connecting the "Alert Relay" simply wire positive and negative wires to terminals 18, and 19.

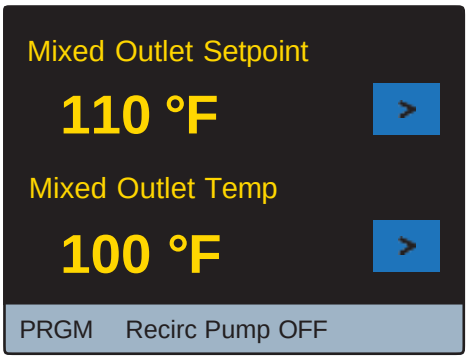
**If using the alert relay make sure not to exceed relay rating. The alert relay is rated for 5A @ 250 VAC, 5A @ 30 VDC and not polarity sensitive.**

7. Once connected to the control close the enclosure and reconnect the power.

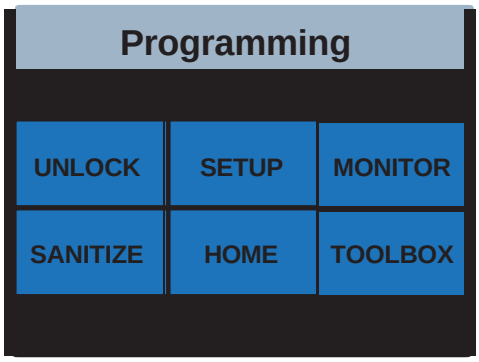
## BACnet® and Modbus® Settings in the ADMS Control Module Menu ■

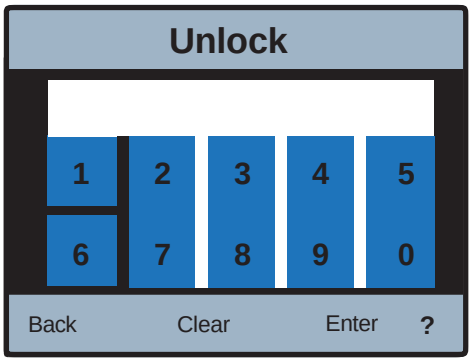
When the unit powers up it displays the warning message shown below until 60 seconds has elapsed. After 60 seconds the control will automatically redirect to the "Home" screen. The settings menu can be accessed prior to the time elapsing by touching anywhere on the screen.


From the home screen depress the PRGM icon to access the "Programming" menu.



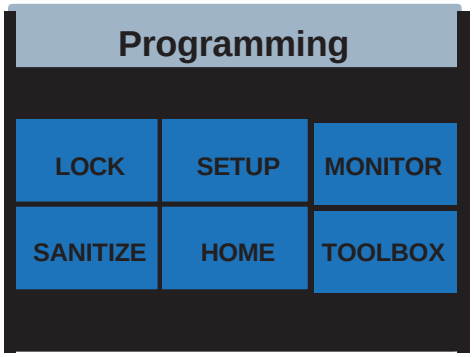

From within the "Programming" menu (shown below) only the HOME and UNLOCK icons are active until the control is in the unlocked state. Note: After 60 seconds of inactivity the control automatically locks and returns to the home screen.



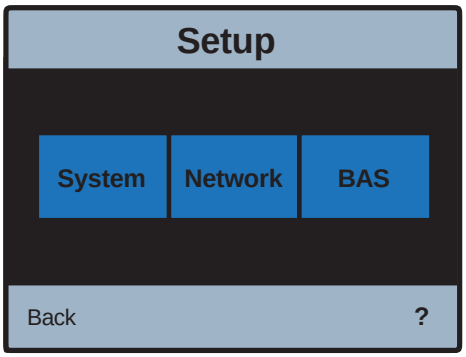




To unlock the control select the UNLOCK icon from within the "Programming" menu.

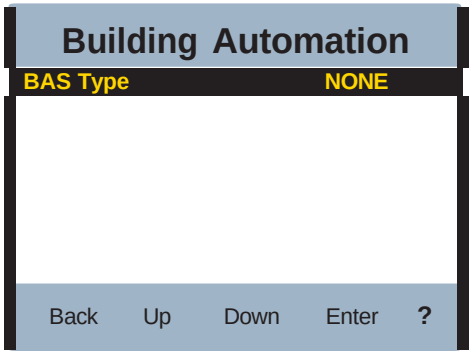
Unlock the control by entering “1017” and selecting the Enter icon. If the wrong code was entered select Clear to try again. Note: the Enter icon will only work if the correct code is entered. Once unlocked, the control automatically redirects to the “Programming” menu but this time the UNLOCK icon will appear as LOCK icon, indicating that the control is unlocked, and the other icons (SETUP, MONITOR, SANITIZE, TOOLBOX) will now be active.



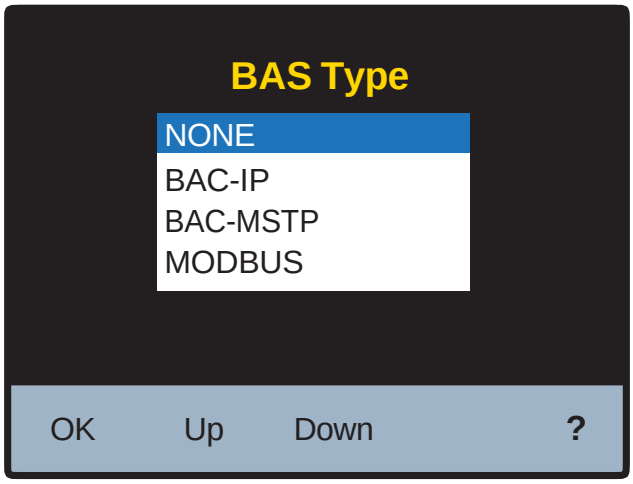

Select the SETUP icon from within the “Programming” menu to access the “Setup” menu shown below.




Select the BAS icon from within the “Setup” menu to access the “Building Automation” menu shown below.




The default “BAS Type” is “NONE” as shown above. To change this setting press the Enter icon and the “BAS Type” adjustment screen will appear (as shown below).

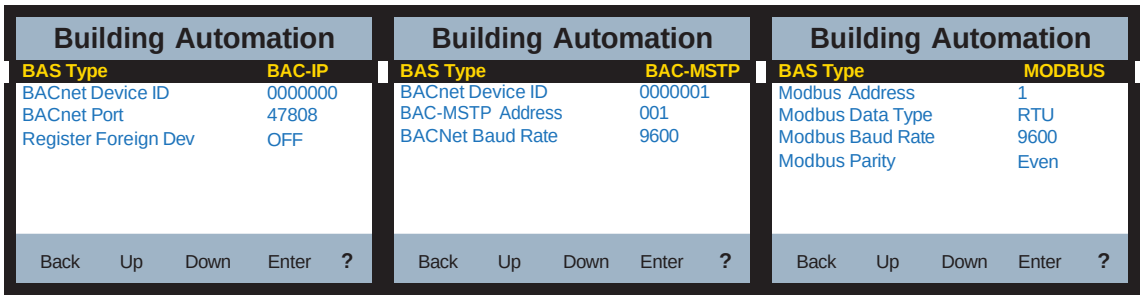



Depress the Up and Down icons to scroll through the BAS types and depress the OK icon to configure the control to the highlighted type and return to the “Building Automation” menu. Note: depending on the "BAS Type" selected, various user configurable items will now appear within the “Building Automation” menu. A table of the user definable items is shown on the next page.

The Building Automation “BAS Menu” shows default settings for each of the communication protocols supported by this control (BACnet® IP, BACnet® MSTP, or Modbus®).

## BAS Menu

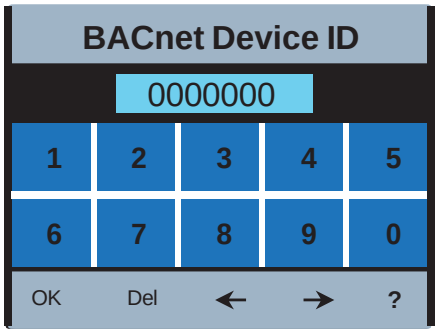
| Item Field | Range | Default | When Displayed | Description | Additional Info |
|---|---|---|---|---|---|
| BAS Type | NONE <> BAC-IP <> BAC-MSTP <> MODBUS | NONE | Always | Building Automation Type: | None = control runs in stand alone.<br>BAC-IP = control is connected to a BACnet/IP system.<br>BAC-MSTP = control is connected to a BACnet/MS-TP system.<br>MODBUS = control is connected to a Modbus system. |
| BACnet DEVICE ID | 0 to 4194303 | 1 | BAS Type = BAC-IP or BAC-MSTP | Buttons on screen are OK, DEL, <–, --> ? | BACnet device ID |
| BACnet Port | 1 to 65535 | 47808 | BAS Type = BAC-IP | Use keypad entry 0 thru 9<br>key in BACnet PORT<br>Buttons on screen are OK, DEL, <–, -->, ? | BACnet Port |
| Register Foreign Dev | OFF<>ON | OFF | BAS Type = BAC-IP | | Is a BACnet Device that has an IP subnet address different from those comprising the BACnet/IP network. |
| BBMD TIME | OFF, 30 to 65535 | OFF | BAS Type = BACnet<br>Register Foreign Dev ≠ OFF<br><br> | Time-to-live (Seconds)<br>Use keypad entry 0 thru 9<br>key in BBMD TIME<br>Buttons on screen are OK, DEL, <–, -->, ? | BACnet Broadcast Management. A specified time, extending that time by periodic (automatic) renewal requests. |
| BBMD IP | 0.0.0.1 to 255.255.255.255 | 127.127.127.127 | BAS Type = BACnet<br>Register Foreign Dev ≠ OFF<br> | Use keypad entry 0 thru 9<br>key in IP Address<br>Buttons on screen are OK, DEL, <–, --> ? | BACnet Foreign device internet Protocol address. A numerical label assigned to the foreign device. |
| BBMD PORT | 0 to 65535 | 47808 | BAS Type = BACnet<br>Register Foreign Dev ≠ OFF<br> | Use keypad entry 0 thru 9<br>key in BBMD PORT<br>Buttons on screen are OK, DEL, <–, --> ? | BACnet Broadcat Management Port. |
| BAC-MSTP Address | 0 to 127 | 1 | BAS Type = BAC-MSTP | Buttons on screen are OK, DEL, <–, --> ? | Set the MSTP address. Each MSTP device must have a unique address. |
| BACnet Baud Rate | 9600, 19K2, 38K4, 57K6, 76K8, 115K2 | 9600 | BAS Type = BAC-MSTP | Slider, OK,<–, --> ? | BACnet MS/TP baud rate |
| Modbus Address | 1 to 247 | 1 | BAS Type = MODBUS | Radio buttons, OK, ? | Modbus Address:<br>1 to 247 |
| Modbus Data Type | RTU <> ASCII | RTU | BAS Type = MODBUS | Slider, OK,<–, --> ? | Modbus Data Type<br>RTU or ASCII |
| Modbus baud Rate | 1200, 4800, 9600, 14K4, 19K2, 28K8, 38K4, 57K6, 76K, 115K2 | 9600 | BAS Type = MODBUS | Slider, OK,<–, --> ? | Modbus baud rate |
| Modbus Parity | None <> Odd <> Even | Even | | Slider, OK,<–, --> ? | Modbus Parity type. |



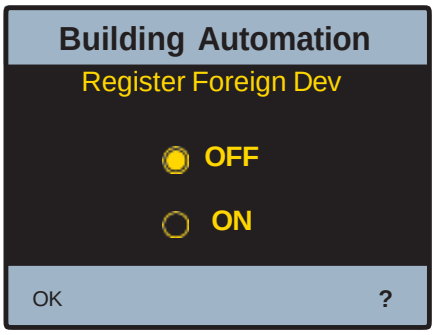

Each of the settings can be adjusted by depressing the Up and Down icons to highlight the setting of interest and depressing the Enter icon to adjust the setting.

## BACnet® Specific Settings ■

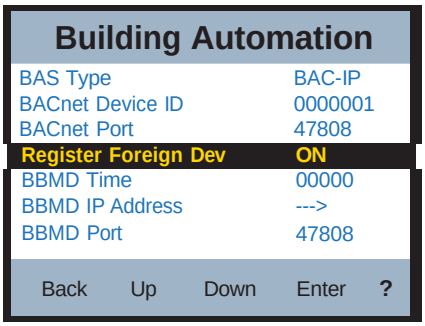
The "BACnet Device ID" setting adjustment screen is shown below.



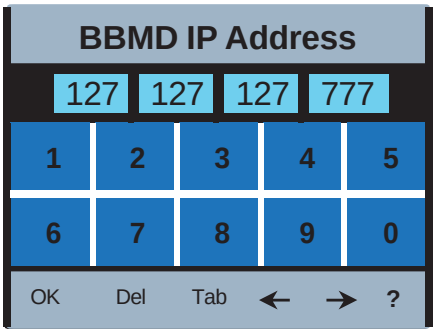

To adjust the ID depress the Del key 7 times and enter an ID appropriate for the remainder of the BAS system and press OK. Similarly, enter an appropriate "BACnet Port." To change "Register Foreign Dev" to "ON" scroll down to "Register Foreign Dev" using the Up and Down icons and select Enter. The "Register Foreign Dev" setting adjustment screen is shown in the "OFF" state below.




To toggle from "OFF" to "ON" press on the icon next to the "ON" setting to change the icon to indicating that this state is what is selected. Press OK to save this setting and return to the "Building Automation" menu shown below with "Register Foreign Dev" set to "ON". Note the additional setting available with the "Register Foreign Dev" set to "ON."




The "BBMD Time" and "BBMD Port" are adjusted similarly to the "BACnet Device ID." The "BBMD IP Address" adjustment screen is shown below.

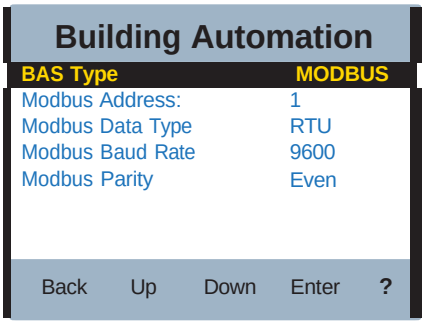



Use the Tab icon to move between the four groups of three numbers, use the ← → to move around in each group of 3 numbers, and use the Del to delete the numbers entered in the field to allow entering a new number.

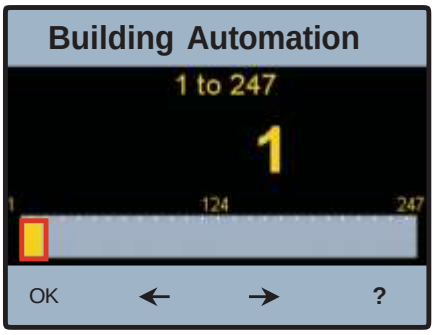
Note: for additional information on configuring the BACnet® settings see the "BACnet® Specifications" of this document.

## Modbus® Specific Settings ■

The settings available with the BAS Type are shown below. Each of the settings can be adjusted by depressing the Up and Down icons to highlight the setting of interest and depressing the Enter icon to adjust the setting.

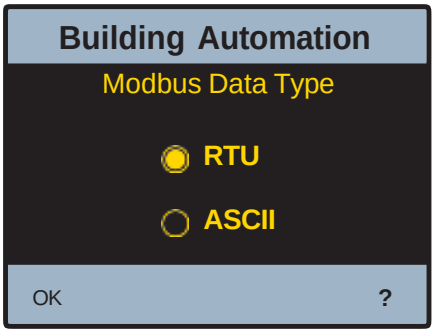


The “Modbus Address” setting adjustment screen is shown below.




To adjust the “Modbus Address” either press anywhere on the slider bar and/ or use the arrow keys and then select OK to save the setting and return to the “Building Automation” menu. The “ModBus Baud Rate” and “Modbus Parity” are adjusted in a similar fashion.

The “Modbus Data Type” settings adjustment screen is shown below.




To toggle from “RTU” to “ASCII” press on the icon next to the “ASCII” setting to change the icon to indicating that this state is what is selected. Press OK to save this setting and return to the “Building Automation” menu.

Note: for additional information on configuring the Modbus settings see the “Modbus® Specifications” of this document.

## BACnet® Protocol Implementation Statement (PICS) ■

Vendor Name: tekmar Control Systems Ltd.

Vendor ID: 983

Product Name: ADMS Smart Water Tempering System

Product Model Number: 106902

Application Software Version: J1268A  BACnet Protocol Revision: 10

Product Description:

The ADMS is a mixing control designed to deliver tempered water to plumbing fixtures. The control uses a Proportional Integral (PI) logic to accurately maintain a target temperature by mixing a high temperature water source with a low temperature water source. This control also offers advanced features including communication with a Building Automation System (BAS).

**ADMS provides user-directed control and monitoring of water distribution systems. It is the user's responsibility to select and maintain water temperatures and pressures that are safe and appropriate for the water system users, guests and facility. ADMS' Sanitization mode is intended for use as part of a user-directed, controlled and supervised protocol that has been safely and properly designed. It is recommended to install ADMS™ as part of a ASSE 1070 compliant water distribution system, including point-of-use mixing valves. Always read and follow User Guide & Instruction Manual and all product warnings and labels, and comply with all governmental and safety requirements.**

| BACnet Standardized Device Profile (ANNEX L) |
|---|
| BACnet Application Specific Controller (B-ASC) |

| Supported BIBBs (Annex K) | Name |
|---|---|
| DS-RP-B | Data Sharing-ReadProperty-B |
| DS-RPM-B | Data Sharing-ReadPropertyMultiple-B |
| DS-WP-B | Data Sharing-WriteProperty-B |
| DM-DDB-B | Device Management-Dynamic Device Binding-B |
| DM-DOB-B | Device Management-Dynamic Object Binding-B |
| DM-DCC-B | Device Management-Device Communication Control-B |

*Note: Device communication control password is "AERCO1017".*

| Segmentation Capability | Supported |
|---|---|
| Able to transmit segmented messages | No |
| Able to receive segmented messages | No |

| Standard Object Types Supported | Creatable | Deletable |
|---|---|---|
| Analog Input | No | No |
| Analog Value | No | No |
| Binary Output | No | No |

| Data Link Layer | Supported |
|---|---|
| BACnet® IP (Annex J) | Yes |
| BACnet® MSTP | Yes |

| Device Address Binding | Supported |
|---|---|
| Static Device Address Binding | No |

| Network Security Options |
|---|
| Non-Secure Device |

| Character Set | Supported |
|---|---|
| ANSI X3.4 | Yes |

## BACnet® Analog Parameters ■

Analog Input Objects= AI  Analog Value Object=AV  Read=R  Read/Write= R/W

### Analog Input Objects

| Object ID | Data Type | Name | Description | Read/ Write | Units | Range/ Value |
|---|---|---|---|---|---|---|
| 0 | AI | DHW Temp | Mixed outlet temperature | R | °F | 50 to 180 |
| 1 | AI | DHW Recirc Temp | Recirculation return temperature | R | °F | 50 to 180 |
| 2 | AI | Hot Temp | The hot inlet supply temperature | R | °F | 50 to 180 |
| 3 | AI | Cold Temp | The cold inlet supply temperature | R | °F | 50 to 180 |
| 4 | AI | DHW Pressure | The mixed outlet pressure | R | psi | 0 to 200 |
| 5 | AI | DHW Recirc Pressure | Recirculation Pump Inlet Pressure | R | psi | 0 to 200 |
| 6 | AI | Hot Pressure | Hot supply inlet pressure | R | psi | 0 to 200 |
| 7 | AI | Cold Pressure | Cold supply inlet pressure | R | psi | 0 to 200 |
| 8 | AI | DHW Flow | Mixed Outlet Flow Rate | R | gpm | 0 to 160 |
| 9 | AI | Recirc Flow | Recirculation Return Flow Rate | R | gpm | 0 to 40 |
| 10 | AI | DHW Target Max | Maximum remotely adjusted DHW target | R | °F | 50 to 180 |
| 11 | AI | Mix % | (DHW Temp-Cold Temp)/(Hot Temp-Cold Temp) | R | % | 0 to 100% |
| 12 | AI | Energy Used | Totalized Energy Consumed through the Product | R | Therms | 0 to 3.4*10^34 |
| 13 | AI | Error Code | Numerical error | R | | 0 to 30 |
| Other | AI | ERROR | ERROR | ERROR | ERROR | ERROR |

### Analog Value Objects

| Object ID | Data Type | Name | Description | Read/Write | Units | Range/Value |
|---|---|---|---|---|---|---|
| 0 | AV | DHW Target | Mixed outlet temperature target | R/W | °F | 50 to 180 |
| Other | AV | ERROR | ERROR | ERROR | ERROR | ERROR |

## BACnet® Binary Parameters ■

This control does not have any binary input parameters.

### Binary Output Parameters

| Object ID | Data Type | Name | Description | Read/Write | Units | Range/Value |
|---|---|---|---|---|---|---|
| 0 | BO | Recirc Pump Relay | Recirculation pump Status | R | N/A | 0=off, 1= on |
| other | BO | Error | Communication Error | R | N/A | 0=no, 1= yes |

## BACnet® Troubleshooting ■

If there is no or intermittent communication, check the following:

- Check the ethernet cable. Cable length must not exceed 150 ft. (45.7 m) for CAT-5E or 300 ft. (91.4 m) for CAT-6
- If the cable was manually made, check continuity across each of the wires.

## Modbus® Specifications ■

| | |
|---|---|
| Communication Protocol | Modbus over RS485 |
| Physical Layer | RS485 Two-Wire plus Signal Ground |
| Baud Rate | 2400, 9600, 19200, 57.6k, 115k) |
| | (default 19200 bps) |
| Recommended Cable | 18 AWG Shielded Twisted-Pair (STP) |
| Transmission Mode | RTU or ACSII (default RTU) |
| Maximum Cable Length | Without terminating resistors |
| | - 115,000 baud --> 177 m (580 ft) |
| | - 57,600 baud --> 353 m (1,158 ft) |
| | - 19,200 baud --> 1,000 m (3,280 ft) |
| | - 9,600 baud --> 1,000 m (3,280 ft) |
| | - 2,400 baud --> 1,000 m (3,280 ft) |
| | With 2 x 120 Ohm resistors |
| | - 115,000 baud --> 1,000 m (3,280 ft) |
| | - 57,600 baud --> 1,000 m (3,280 ft) |
| | - 19,200 baud --> 1,000 m (3,280 ft) |
| | - 9,600 baud --> 1,000 m (3,280 ft) |
| | - 2,400 baud --> 1,000 m (3,280 ft) |
| Start Bit | 1 Bit |
| Data Length | 8 Bits for RTU Mode |
| | 7 Bits for ACSII Mode |
| Parity | None (2 Stop Bits) |
| | Even (1 Stop Bit) |
| | Odd (1 Stop Bit) |
| | (default Even) |
| Addressing | 1 to 247 (default 1) |

## Modbus® Parameters■

Read=R Read/Write=R/W

### System Status Register

| Register | Parameter Name | Read/Write | Units | Type | Format | Range |
|---|---|---|---|---|---|---|
| 1 | DHW Target Max | R | °F | Input | U16 | 50 to 180°F |
| 2 | DHW Temp | R | °F | Input | U16 | 50 to 220°F |
| 3 | DHW Recirc Temp | R | °F | Input | U16 | 50 to 220°F |
| 4 | Hot Temp | R | °F | Input | U16 | 50 to 220°F |
| 5 | Cold Temp | R | °F | Input | U16 | 50 to 220°F |
| 6 | DHW Pressure | R | psi x 10 | Input | U16 | 0 to 170 psi |
| 7 | DHW Recirc Pressure | R | psi x 10 | Input | U16 | 0 to 170 psi |
| 8 | Hot Pressure | R | psi x 10 | Input | U16 | 0 to 170 psi |
| 9 | Cold Pressure | R | psi x 10 | Input | U16 | 0 to 170 psi |
| 10 | Valve Position | R | % | Input | U16 | 0 to 100% |
| 11 | Pump Status | R | on/off | Input | U16 | 0 = off, 1 = on |
| 12 | DHW Flow | R | gpm | Input | U16 | 0 to 160 |
| 13 | DHW Recirc Flow | R | gpm | Input | U16 | 0 to 40 |
| 14 | Energy Used | R | therms | Input | U16 | 0 to 65535 |
| 15 | Error Code | R | Enum | Input | U16 | See Error Code list |

### System Parameter Register

| Register | Parameter Name | Read/Write | Units | Type | Format | Range |
|---|---|---|---|---|---|---|
| 1 | DHW Target | R/W | °F | Holding | U16 | 50°F to Target Max |

### Product Information

| Register | Parameter Name | Read/Write | Units | Type | Format | Range |
|---|---|---|---|---|---|---|
| 1 | Model | R | Num | Input | U16 | Product model - “1069” |
| 2 | Firmware Revision | R | Num | Input | U16 | SVN revision |

## Modbus® Troubleshooting■

If there is no communication, check the following:

- Check that the polarity on the Modbus® + and – terminals is correct.
- Check that the Modbus® GND terminal is securely connected.
- Check that the Baud Rate on both devices are the same.

If the communication is intermittent, check the following:

- Check that the communication cable is of twisted pair type.
- Reliable communication depends on the cable length & Baud Rate used. Long cable length may require a lower Baud Rate.

## Error Codes ■

| Code | Description |
|---|---|
| 1 | NVM Error |
| 2 | Faulty Mixed Outlet (T1) sensor |
| 3 | Faulty Mixed Outlet (FT1) sensor |
| 4 | Faulty Recirc Return (T2) sensor |
| 5 | Faulty Cold Supply (T3) sensor |
| 6 | Faulty Hot Supply (T4) sensor |
| 7 | Faulty Mixed Outlet Pressure (P1) sensor |
| 8 | Faulty Recirc Return Pressure (P2) sensor |
| 9 | Faulty Cold Supply Pressure (P3) sensor |
| 10 | Faulty Hot Supply Pressure (P4) sensor |
| 11 | Faulty Mixed Outlet Flow (F1) sensor |
| 12 | Faulty Recirc Return Flow (F2) sensor |
| 13 | Max Temp Exceeded |

***Problem:*** Unstable control is observed at flow rates greater than the minimum rated flow

***Solution:*** **Balancing Routine**

1. The Balancing Routine is designed to give the software additional information regarding the normal operating balance of the system to eliminate the need for a balancing valve.
2. To conduct the Balancing Routine it is necessary to generate a load larger than the minimum rated flow rate using the following procedure.

**⚠ WARNING**

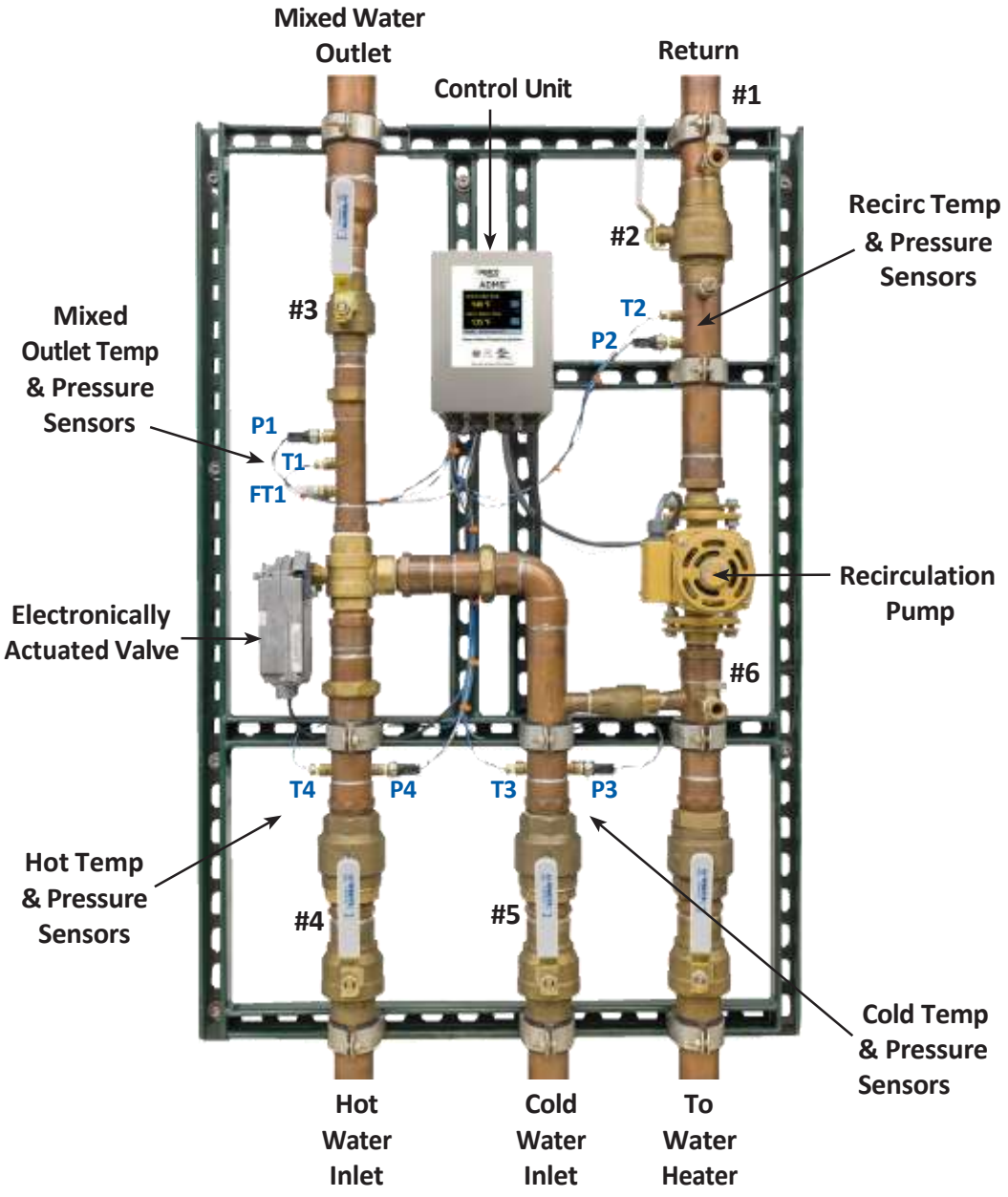
**To avoid scalding, burning, thermal shock or other hazards DO NOT use or allow anyone to use the water at any point-of-use fixture (faucets, sinks, tubs, showers, etc.) in the facility's water distribution system during Balancing Routine.**

**The Balancing Routine can cause higher temperature water in the system and delivered to point-of-use fixtures (faucets, sinks, showers, etc.). Only qualified and authorized personnel who fully understand the Balancing Routine's operation, output and risks, should perform this action.**

**Personnel performing Balancing Routine and the owner or manager of the water distribution system MUST take appropriate safeguards to protect people from using, contacting or exposure to water or any parts of the water distribution system. Always read and follow the User Guide & Instruction Manual.**

3. Attach a 1" hose to the pump inlet hose connection and ensure that the other end of the hose is securely routed to a drain.

4. Once you are sure that the hose connection has a safe path to a drain, open the pump inlet hose connect (1) and ensure that the pump inlet isolation valve (2), the mixed outlet isolation valve (3), the hot inlet isolation valve (4), the cold inlet isolation valve (5), and the hose connection valve (6) are in the fully open position.

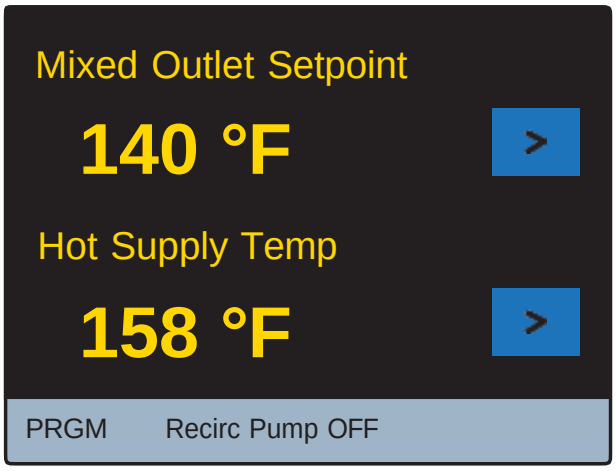


***Problem:*** Outlet temperature is below set point temperature and/or the low temperature alarm has been activated

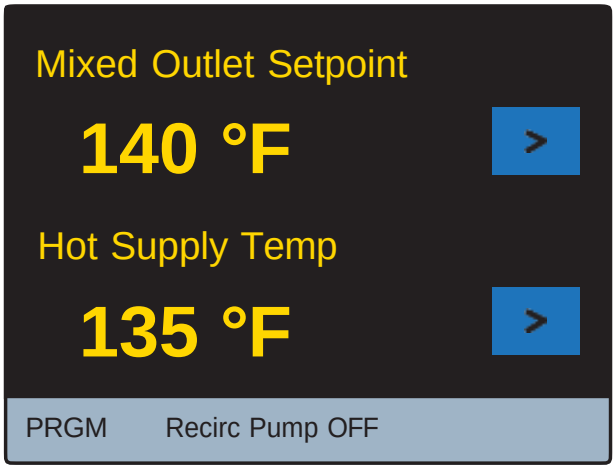
***Solution:***

1. Depending on the heating plant plumbing and location, it may take several minutes for the hot water to reach the panel. Ensure that you have allowed enough time (5 minutes) for the system to come up to temperature.

2. On the Home screen, check the "Mixed Outlet Setpoint" and the "Hot Supply Temp" using the > icon to cycle through the fields. The "Hot Supply Temp" needs to be above the set-point or the panel will not be able to reach the set-point.




3. If the "Hot Supply Temp" is BELOW the "Mixed Outlet Setpoint"
   a. Ensure flow is above the minimum rated flow by opening the hot water valve on two to four fixtures being supplied with tempered water from the panel.



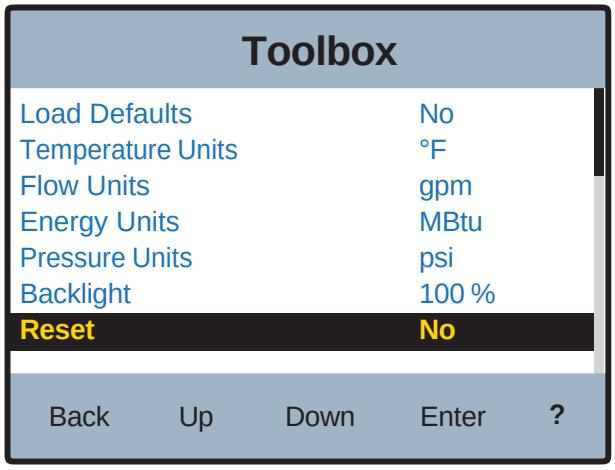
b. Ensure that the hot water inlet isolation valve is in the fully Open (ON) position as shown below

**Closed (OFF)**

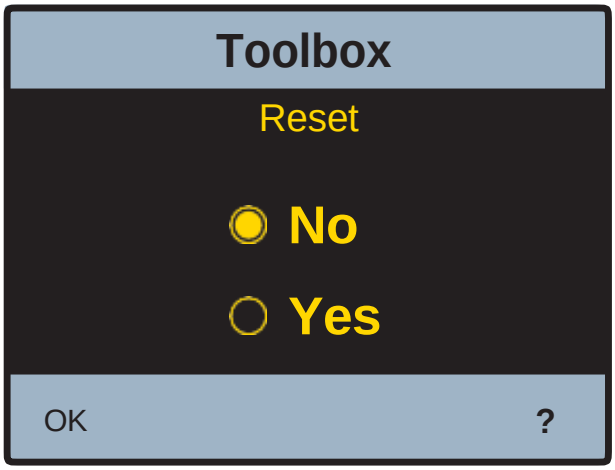
**Open (ON)**

c. Check the hot water source set-point temperature and ensure that the hot supply line has no obstructions or closed valves restricting flow to the ADMS.

4. If the "Hot Supply Temp" is ABOVE the "Mixed Outlet Setpoint", there are no obstructions preventing hot water from reaching the panel, and there is sufficient flow through the panel, reset the control by pressing the PRGM icon to access the "Programming" menu. Unlock the control (see "Unlock the System" of this manual for more detail) and then select the TOOLBOX to navigate to the "Toolbox" menu shown below.




From within the "Toolbox" menu use the Down icon to highlight "Reset" as shown above then press Enter. This will access the "Reset" menu shown below.




Press the ○ Yes and then OK and the control will reset and begin a start up sequence.

5. Reset the control by opening and closing the circuit breaker switch and wait 60 seconds to resume normal operation.

**Always use proper precautions when accessing circuit breaker box.**

***NOTICE***

If problem persists after conducting the above outlined problem solving procedures, contact AERCO Technical Support at 800-526-0288.

# Troubleshooting

***Problem:*** Outlet temperature above set point

***Solution:***

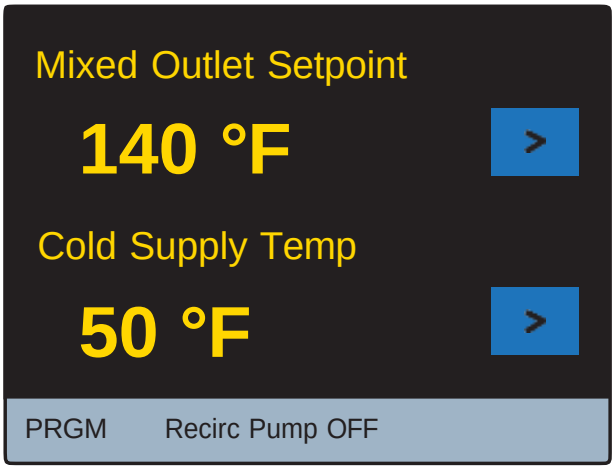
1. Ensure flow is above the minimum rated flow by opening the hot water valve on two to four fixtures being supplied with tempered water from the panel.

2. Ensure that the cold supply isolation valve is in the fully open position as shown below.

**Closed (OFF)**


**Open (ON)**

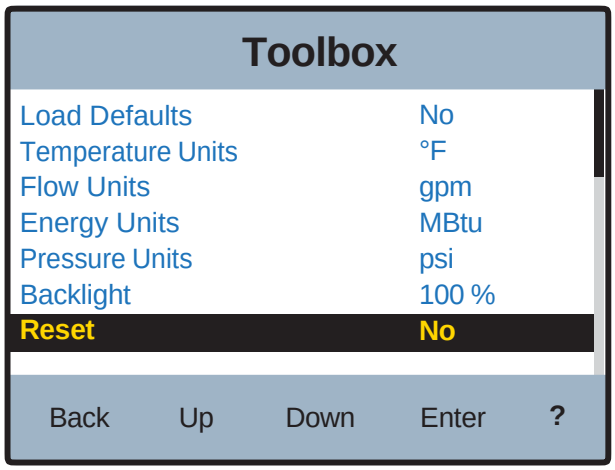

3. On the Home Screen, check the "Cold Supply Temp" using the > icon (see below) to cycle through the various fields. Ensure that it is lower than the set point temperature and that the cold supply line has no obstructions or closed valves restricting flow to the ADMS.



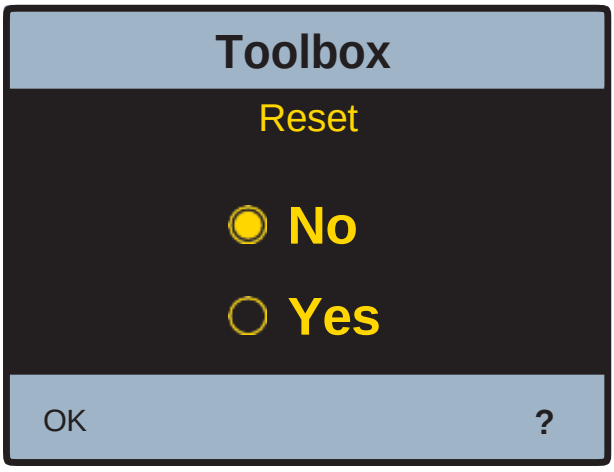

4. Reset the control by opening and closing the circuit breaker switch and wait 60 seconds to resume normal operation.

**Always use proper precautions when accessing circuit breaker box.**

5. Unlock the control (see "Unlock the System" of this Manual for more detail) and then select the TOOLBOX to navigate to the "Toolbox" menu shown below.




6. On the "Toolbox" menu use the Down icon to highlight "Reset" as shown above then press Enter. This will access the "Reset" menu shown below.




7. Press the Yes and then OK and the control will reset and begin a start up sequence.

8. Reset the control by opening and closing the circuit breaker switch and wait 60 seconds to resume normal operation.

**Always use proper precautions when accessing circuit breaker box.**

9. If problem persists after conducting the above outlined problem solving procedures contact AERCO Technical Support at 800-526-0288.

***Problem:*** If displays "---" Instead measured value.

***Solution:***

1. A sensor is not connected or functioning properly.

2. Check the connection at the sensor and the connection within the control module.

**⚠ DANGER**

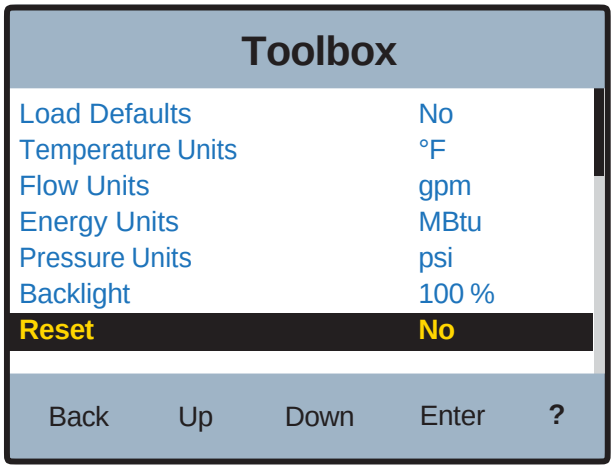
**BEFORE attempting to open Control Module, a certified and qualified electrician MUST fully de-energize and disconnect all electrical power from ADMS.**

**Perform required LOCK OUT/TAG OUT procedures.**

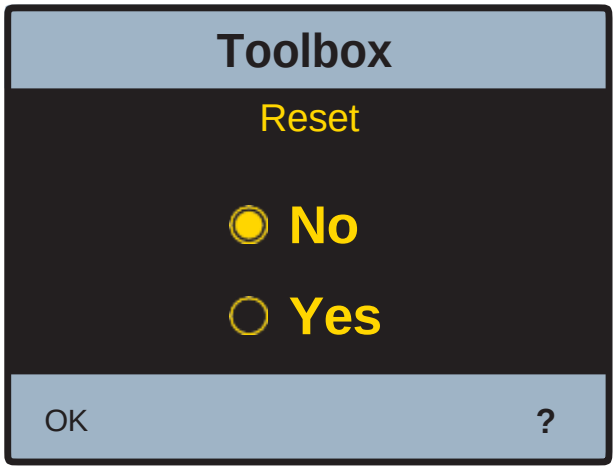
**When done, reconnection and reenergizing of ADMS MUST be performed by certified and qualified electrician.**

3. Disconnect all power and fully de-energize ADMS BEFORE opening the control module. Open the Control Module and locate the non-functioning sensor.

4. Reset the control by pressing the PRGM icon to access the "Programming" menu. Unlock the control (see Detailed User Interface this manual) and then select the TOOLBOX to navigate to the "Toolbox" menu shown below.




From within the "Toolbox" menu use the Down icon to highlight "Reset" as shown above then press Enter . This will access the "Reset" menu shown below.




Press the ○ Yes and then OK and the control will reset and begin a start up sequence.

Note: Alternatively, the control can be reset by opening and closing the circuit breaker switch and waiting 60 seconds to resume normal operation.

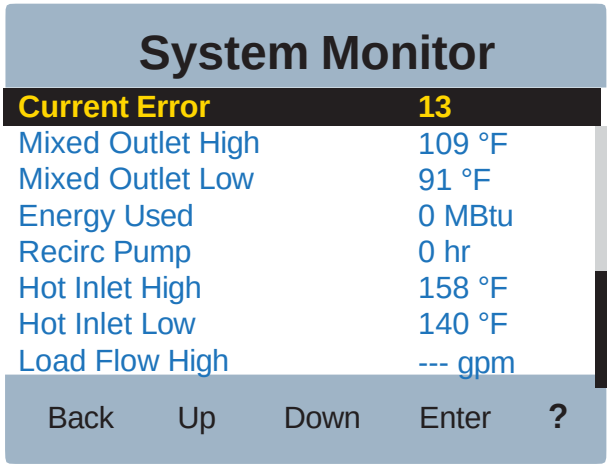
**Always use proper precautions when accessing circuit breaker box.**

5. Wait 1-5 minutes for the control to resume normal operation Also, ensure that there is a load (at least one tap on the mixed outlet system) present while the control is resuming normal operation.
   Note: See “Start-Up” and “Commissioning” procedures of this Manual for more detail.

6. If problem persists after conducting the above outlined problem solving procedure contact AERCO for replacement sensor(s).

## Error Codes ■

If the control detects a problem, an error will display on the Home screen and from within the “System Monitor” menu. To navigate to the System Monitor” menu press PRGM icon, unlock the control (see detailed Unlock instructions in this Manual for more information), and select MONITOR from within the “Programming” menu. The “System Monitor Screen” is shown below.




The “How to Clear” information presented below is also available from within the control user interface by pressing the ? key from within the “System Monitor” while viewing the “Current Error”. For more information on navigating and using the user interface see the "control module interface".

# Troubleshooting

| Hierarchy | Description | Resolution | Control Behavior during Error Condition |
|---|---|---|---|
| 1 | NVM Error | Load defaults and/or power cycle the control | Do not operate any outputs |
| 2 | Faulty Mixed Outlet (T1) sensor | Ensure that the T1 wiring is correct | Do not operate any outputs |
| 3 | Faulty Mixed Outlet (FT1) sensor | Ensure that the FT1 wiring is correct | Do not operate any outputs, Do not calculate energy |
| 4 | Max Temp Exceeded | -Increase "Mixed Out Maximum" within the "System" settings.<br>-Turn on a tap to cool down the system. | Control Resets |
| 5 | Faulty Recirc Return (T2) sensor | Ensure that the T2 wiring is correct | Do not operate recirculation pump, Do not calculate energy |
| 6 | Faulty Cold Supply (T3) sensor | Ensure that T3 sensor wiring is correct | Continues operation |
| 7 | Faulty Hot Supply (T4) sensor | Ensure that T4 sensor wiring is correct | Continues operation |
| 8 | Faulty Mixed Outlet Pressure (P1) sensor | Ensure that P1 sensor wiring is correct | Continues operation |
| 9 | Faulty Recirc Return Pressure (P2) sensor | Ensure that P2 sensor wiring is correct | Continues operation |
| 10 | Faulty Cold Supply Pressure (P3) sensor | Ensure that P3 sensor wiring is correct | Continues operation |
| 11 | Faulty Hot Supply Pressure (P4) sensor | Ensure that P4 sensor wiring is correct | Continues operation |
| 12 | Faulty Mixed Outlet Flow (F1) sensor | Ensure that F1 sensor wiring is correct | Do not calculate energy |
| 13 | Faulty Recirc Return Flow (F2) sensor | Ensure that F2 sensor wiring is correct | Do not calculate energy |

**NOTICE**

The alert relay is configured to close while an error is occurring. Once the error is cleared the alert relay will open.

# Replacement Part Numbers

| Replacement Part # | Description |
|---|---|
| 81019285 | 1 ½ Inch 3 way valve |
| 81019286 | 2 Inch 3 way valve |
| 81019287 | Actuator |
| 81019288 | Pressure sensor with wire (P) |
| 81019289 | High speed temperature sensor with wire (FT) |
| 88006479 | Controller |
| 81019061 | Temperature sensor with wire (T) |

# Scheduled Testing, Inspection and Maintenance

## Testing/Inspection ■

**⚠ WARNING**

**Need for Periodic Inspection/Maintenance:** This product must be tested periodically in compliance with local codes, but at least once per year or more as service conditions warrant. All products must be retested once maintenance has been performed. Corrosive water conditions and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal and external components helps assure maximum life and proper product function.

## Maintenance ■

### ■ Actuator and/or Valve Removal

**NOTICE**

Valves and actuators are not field serviceable. They must be removed and replaced.

***Tools Required:***

- 10mm and 3/8" sockets, elbow and torque wrench. Not required if replacing both valve and actuator
- 3/8" wrench. Not required if replacing both valve and actuator
- 2.5mm Allen key. Not required if replacing both valve and actuator
- 1/8" (3.2mm, #2) slot screwdriver. Not required for valve only replacement
- Wire Stripper and snips. Not required for valve only replacement
- AC Voltmeter . Not required for valve only replacement
- Five to ten 4" zap straps (cable ties)
- 4" monkey wrenches (gas grips)
- 3" adjustable wrenches (shifting spanner)
- Teflon Tape. Not required for actuator only replacement

### ■ Actuator Removal Instructions

**⚠ DANGER**

**BEFORE attempting to open Control Module, a certified and qualified electrician MUST fully de-energize and disconnect all electrical power from ADMS.**

**Perform required LOCK OUT/TAG OUT procedures.**

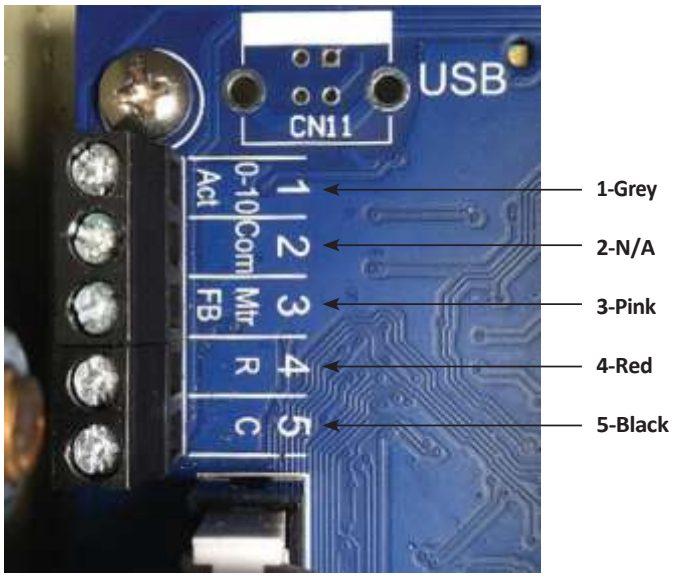
**When done, reconnection and reenergizing of ADMS MUST be performed by certified and qualified electrician.**

1. Once de-energized and disconnected, the display will become inactive and the control box can be opened.

**As an additional safety check, once the box is open, confirm that the unit is de-energized by measuring the AC voltage across the "L" and "N" terminals (46 and 45 respectively) using the voltmeter. Alternatively, use a voltage detector to confirm that the unit is NOT energized.**

2. Using the slot screwdriver loosen terminals 1 to 5 (0-10 Act, Com, Mtr FB, R, C, respectively) in the upper left side of the control module. Take note of the wire colors connected to each of the terminals. This connection should be as follows:
   1) Grey, 2) N/A, 3) Pink, 4) Red, 5) Black.

## Control Unit (interior)




3. Locate the Actuator Cable. Remove the Actuator Cable from the control box and stand supports. If needed, snip cable ties making sure not to damage any other wires when removing the cable ties.
4. Also, note the routing of the actuator cable for reinstallation.
5. Remove the actuator from the valve as follows:
   a. Using the 3/8" wrench remove the two actuator support plate bolts (see image, p.73)
   b. Using the 10mm wrench loosen the actuator armature clamping nut (see image, p.73)
   c. Using the 3/8" wrench completely remove the support plate bolts
   d. At this point the actuator should be free to slide off the valve stem away from the valve. If not, further loosen the actuator armature clamping nut
   e. Carefully remove the actuator and set it aside.

## Actuator


### Valve Replacement

**DANGER**

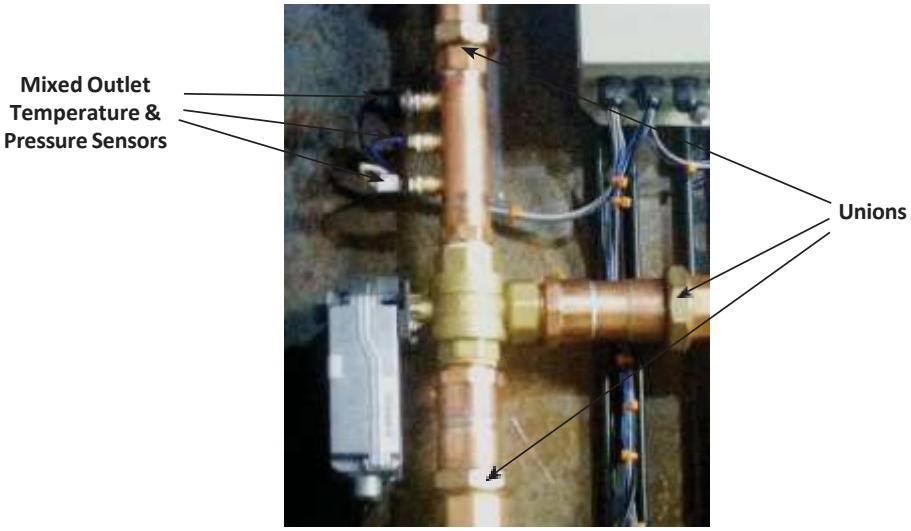
**BEFORE attempting to open Control Module, a certified and qualified electrician MUST fully de-energize and disconnect all electrical power from ADMS.**

**Perform required LOCK OUT/TAG OUT procedures.**

**When done, reconnection and reenergizing of ADMS MUST be performed by certified and qualified electrician.**

1. Once de-energized the display will become inactive.
2. If removing only the valve use Step 4 from the “Actuator Removal”
3. Disconnect the pressure sensor (P1) and outlet sensor (FT1). Using a wrench remove the redundant temperature (T1) from the pipe fitting.
4. Using either the shifting spanner or the gas grip loosen the three unions holding the valve in place (see below).

**Electronically Controlled Valve**




5. If replacing the valve remove the NPT couplers, union fittings, and actuator mounting plate from the old valve and transfer them to the replacement valve for reinstallation.
6. To reinstall the valve simply reverse the above outlined procedure.

**NOTICE**

If installing Valve and Actuator (V&A) combination, proceed to Step 8 of actuator installation procedure once the V&A have been plumbed back into the stand

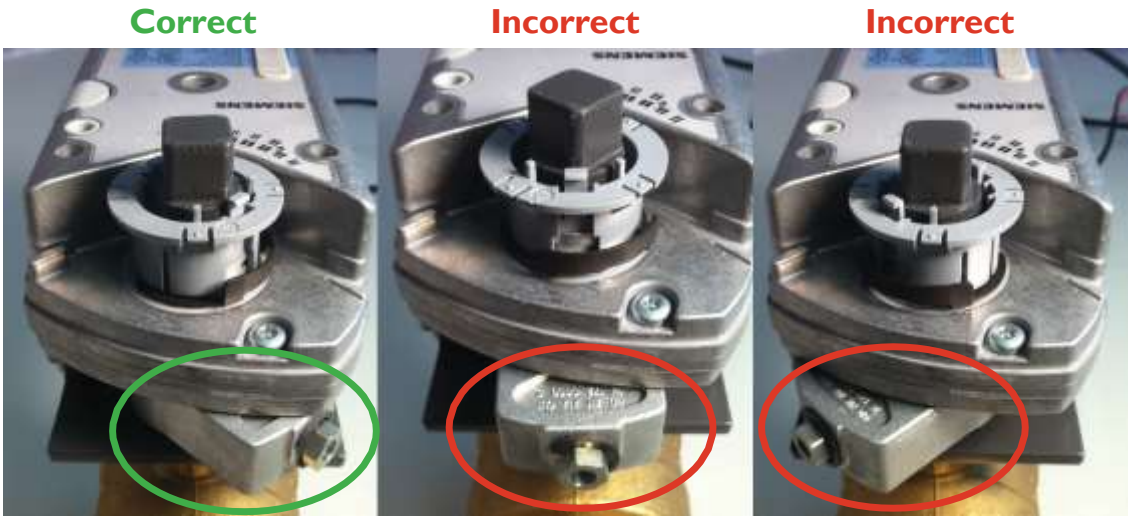
### Actuator Replacement

**NOTICE**

To install a replacement actuator, the positioning of both the actuator and valve needs to be confirmed prior to installation

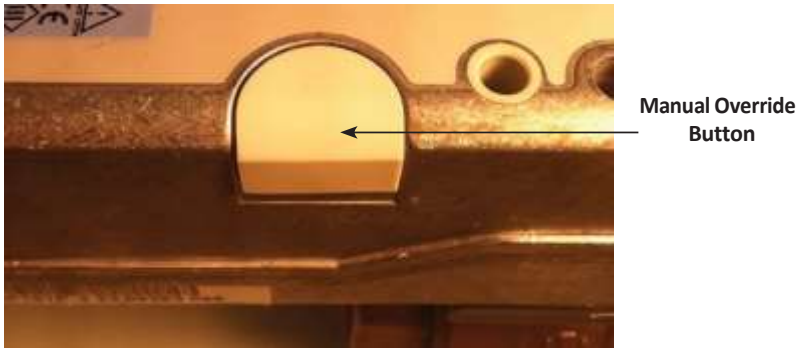
1. The actuator armature must be positioned in the un-powered rest position. Marked "Correct" in the picture below

**Actuator**




2. To adjust the armature position, depress the actuator manual override button (see below) and turn the armature to the “Correct” position shown above.

**Actuator**




3. The valve must be positioned such that it is fully opened to the branch (cold supply). The "Correct" and "Incorrect" positions are shown below. These images are looking in the outlet port of the valve (note the black plastic flow linearization insert).

***NOTICE***

When positioned correctly, the valve outlet (plastic insert) will be fully open to the cold inlet side of the valve.

## Valve Outlet

Correct Incorrect Incorrect

4. Once both the actuator and valve have been aligned “correctly” the actuator can be reinstalled onto the valve by sliding actuator over the valve stem until the actuator sits tight against the actuator support plate with the actuator positioned vertically as shown below.

**NOTICE**

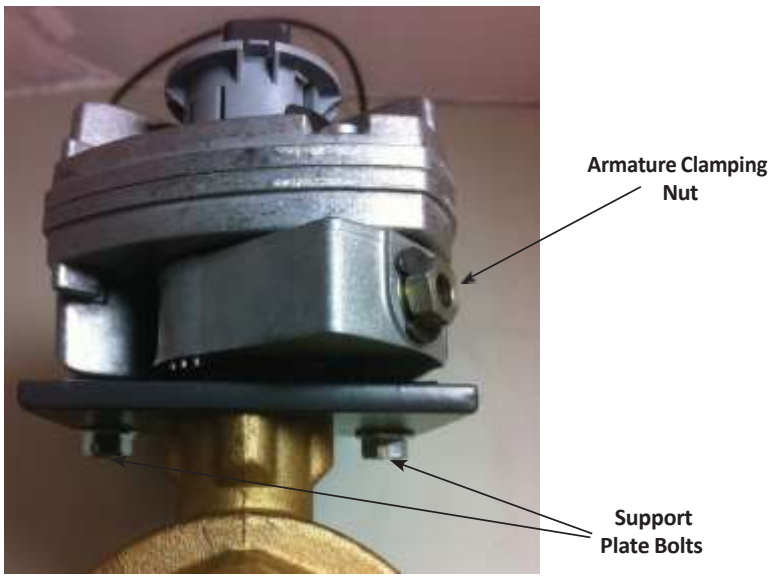
The valve outlet (with plastic insert) should be facing upwards

## Valve / Actuator

Correct

Incorrect

5. Using the 3/8" wrench, install the support plate bolts (see below) until snug. Ensure that the support plate bolts are sufficiently loose to allow for some very slight movement between the support plate and the actuator. This play will allow the actuator to find the proper position when the armature clamping nut is tightened down.




6. Tighten down the armature clamping nut using the 10mm socket and torque wrench to 50 in-lbs (5.65 N-m)
7. Using the 3/8" socket, elbow and torque wrench, torque down the support plate nut to 50 in-lbs.

**NOTICE**

Take caution not to overtighten and strip these nuts.

8. Run the control wires up to the control along the same path as when removed.
9. Cut wires to an appropriate length and strip to allow for installation into the terminal blocks.
10. Wire to terminal blocks as follows:

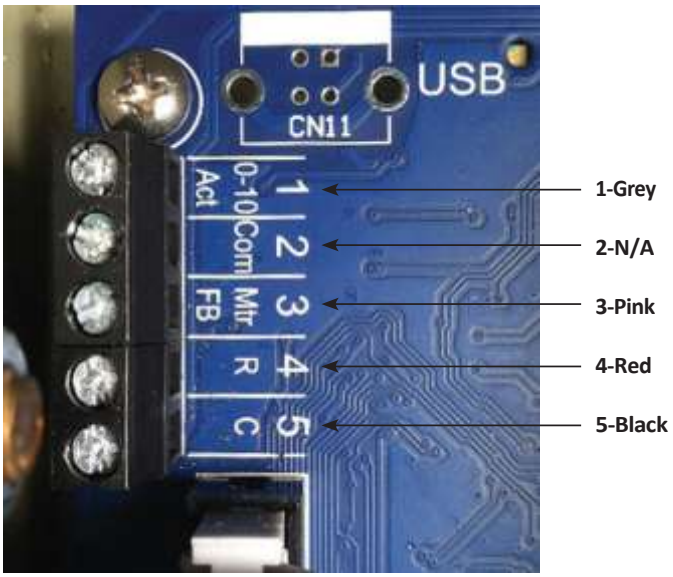
| | | |
|---|---|---|
| 1. (0-10 Act) | Grey | |
| 2. (Com) | | N/A |
| 3. (Mtr FB) | | Pink |
| 4. (R) | Red | |
| 5. ( C ) | Black | |

**NOTICE**

The "Com" terminal of the control is not wired & orange actuator wire is not used by this control

11. Utilize cable ties to secure the wires and close the control module. Once the box is closed, re-energize the unit.
12. Resume normal operation and observe that the actuator and valve are now working properly.

## Control Unit (interior)



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