MANUAL – INSTALLATION + SERVICE

Pressure Independence Module
PIM™ Series

acutherm
by price

PRESSURE INDEPENDENCE MODULE

TABLE OF CONTENTS

SUPPORT ▼

Having difficulty installing this product? Acutherm is here to help.

Application Support

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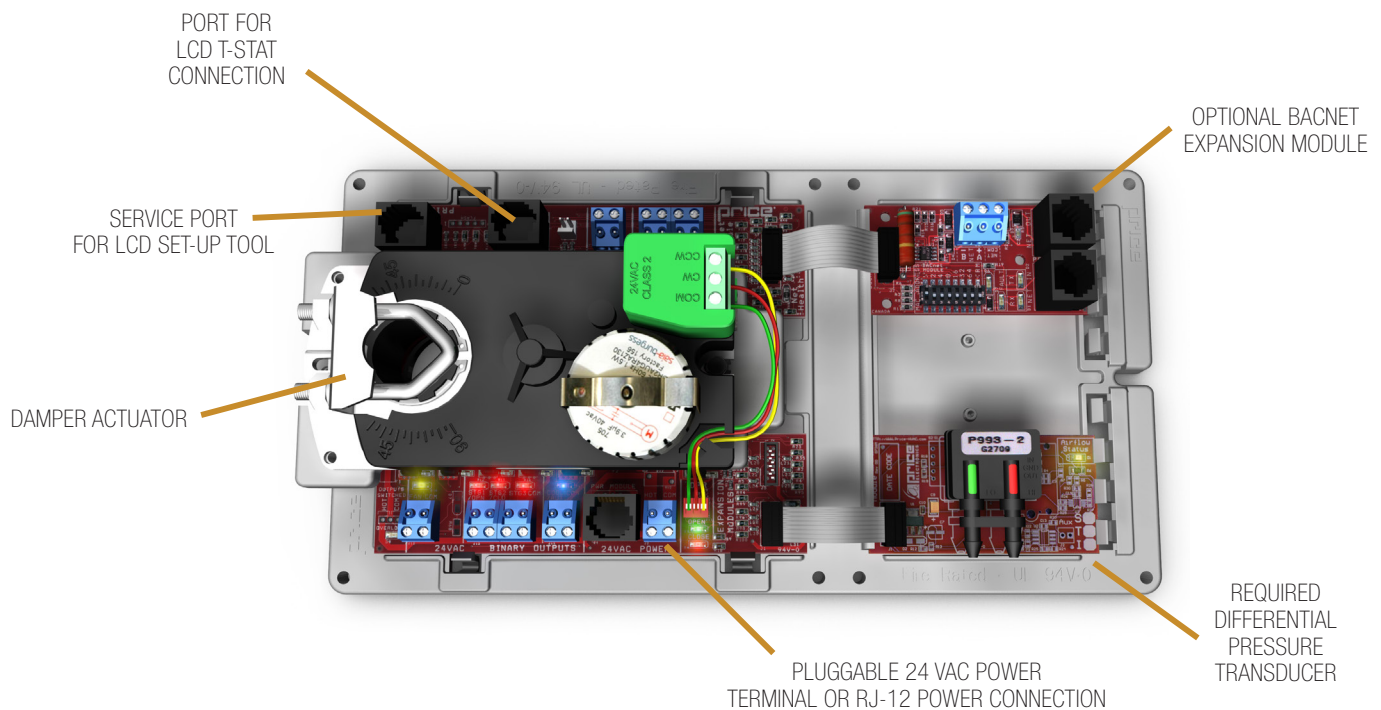# PRESSURE INDEPENDENCE MODULE

PRODUCT OVERVIEW

General

PIM - Pressure Independence Module

The Pressure Independence Module (PIM) is a device that controls pressure within a ducted system. The PIM can be setup for bypass control or for zone control.

- Bypass control maintains a constant pressure setpoint and bypasses the air from the supply to the return side. The return duct can either be ducted back to the main air handling unit or have an open return.

- Zone control would have the PIM unit in-line with the supply duct and modulates the damper to maintain a constant downstream pressure setpoint.

PIM CONTROLLER FEATURES ▼

PORT FOR LCD T-STAT CONNECTION

SERVICE PORT FOR LCD SET-UP TOOL

DAMPER ACTUATOR

OPTIONAL BACNET EXPANSION MODULE

REQUIRED DIFFERENTIAL PRESSURE TRANSDUCER

PLUGGABLE 24 VAC POWER TERMINAL OR RJ-12 POWER CONNECTION

PRESSURE INDEPENDENCE MODULE

PRODUCT OVERVIEW

Installing the PIM Unit

1. The PIM is a controller and actuator (with optional damper) that is programmed for pressure control. For bypass applications, the PIM is installed between the supply and return duct (return may be ducted or open directly to the ceiling plenum). For zone applications, the PIM is installed directly in the supply duct, before the first Therma-Fuser(TM) diffuser.

2. For PIMs supplied without a damper:

   i. Mount the controller onto the duct with the damper shaft going through the PIC's actuator, and tighten the screws on the actuator.

   ii. Secure the back end of the controller using the supplied anti-rotational bracket. Do not mount the anti-rotation bracket tightly to the PIC casing, the intent is to allow the PIC to move slightly to allow for variations on the damper shaft.

   iii. Connect any of the controller's outputs as required.
   NOTE: When the output loads require a switched HOT or COMMON 24VAC signal. Use the jumper near the FAN output to select HOT or COMMON outputs.

   iv. Power the PIC using 24VAC, the secondary 24VAC common of the transformer must be earth grounded.

3. Static Pressure Probe – the PIM unit will come with a static pressure probe. This probe needs to be installed 2/3 to 3/4 of the way down the main supply duct run. The probe then needs to be connected to the HI side port of the transducer on the PIM board with ¼" pneumatic tubing. This tubing needs to be provided by the onsite contractor. Also, leave the LO side port of the transducer open to the atmosphere.

4. Power up the PIM controller with 24VAC 6VA supply, or if an optional transformer is supplied, then apply the appropriate line voltage to the transformer. If a Acutherm Power Module (APM) is being used, plug in the provided RJ12 cable into the power jack on the PIM controller. The secondary of either transformer must be earth grounded!

LCD Set-up Tool

The balancer will require an LCD set-up tool to set the static pressure setting on the PIM controller, and to change any parameters if needed. To connect the LCD set-up tool, the balancer must connect to the PIM controller on the bypass terminal in the ceiling, using the Service Port. (Note** the PIM does not come with an LCD t-stat, so the set-up tool is required). If an LCD set-up tool was not ordered for the job, an existing LCD t-stat onsite can be used as well; you just require a CAT-5E (NETC35) cable to connect the t-stat to the controller.

Below example shows how to connect the LCD set-up tool:

LCD SET-UP TOOL CONNECTION EXAMPLE ▼

LCD SET-UP TOOL

RJ12 GREY CABLE COMES WITH LCD SET-UP TOOL

PIM CONTROLLER

1/4" TUBING BY OTHERS

INSTALL 2/3 to 3/4 OF THE WAY DOWN MAIN DUCT

24VAC 6VA SUPPLY POWER (BY OTHERS) TRANSFORMER AVAILABLE

STATIC PRESSURE PROBE IN THE SUPPLY DUCT
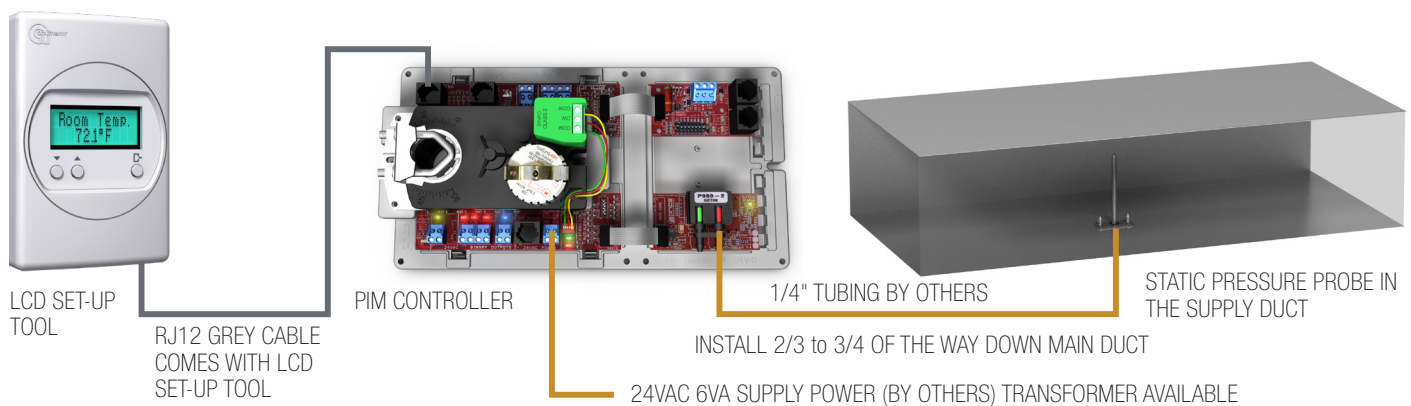
PRESSURE INDEPENDENCE MODULE

PRODUCT OVERVIEW

Balancing Procedure

The objective when balancing a system with ThermaFuser diffusers is to ensure that design airflow is achieved at the diffuser with the highest pressure drop (typically the last diffuser downstream of the PIM), ensure that the static pressure at the inlet to the diffuser with the lowest pressure drop (typically the diffuser closest to the PIM) does not exceed 0.25"wg / 62Pa and to do so at the lowest possible static pressure to minimize the fan energy used. Satisfying the first two conditions will allow the Therma-Fuser diffusers to modulate and control each space in a quiet and energy efficient manner.

Proportional Balancing Procedure

1. Adjust the fan speed to 100%

2. Adjust each PIM zone independently. Each PIM (and the diffusers downstream) is balanced as an independent zone and the PIM static pressure set point adjusted to maintain the design airflow at the Therma-Fuser diffuser with the highest pressure drop.

   a. Adjust the PIM set point to 0.15"wg / 37Pa.

   b. Open all Therma-Fuser diffusers in the PIM zone (see individual model of diffuser for opening instructions).

   c. Ensure all manual volume (balancing) dampers are 100% open.

   d. Allow a little time (5-10 minutes) for the PIM to control to the set point.

   e. Measure the airflow at each diffuser.

   f. Compare the measured airflow with the design airflow for each space and:

      i. Determine which diffuser is the lowest with respect to the design airflow. This is the diffuser with the highest pressure drop.

      ii. Determine which diffuser is the highest with respect to the design airflow. This is the diffuser with the lowest pressure drop.

   g. Do not close the manual damper on the diffuser with the highest pressure drop. Keep this damper 100% open.

   h. Adjust the manual volume damper on each of the other diffuser to match the percentage from the design airflow as that of the diffuser with the highest pressure drop.

   i. Adjust the PIM set point until design airflow (+10% / -5%) is achieved at the diffuser with the highest pressure drop. Allow a little time (5-10 minutes) for the PIM to control to the set point.

   j. Check the static pressure at the takeoff to the diffuser with the lowest pressure drop (static pressure should be less than or equal to 0.25"wg / 62Pa).

   k. Check the remaining diffusers on the PIM zone to ensure all are supplying greater than or equal to design airflow.

   l. Note the PIM set point.

   m. Return all Therma-Fuser diffusers in the zone to operation (see individual model for instructions).

3. Repeat for each PIM zone on the system.

4. Adjust the fan speed.
   Once each PIM zone has been balanced and the PIM set points adjusted, identify the PIM zone with the highest pressure drop (typically the zone furthest from the fan or the PIM with the damper open the furthest).

   a. Open all Therma-Fuser diffusers in the PIM zone (see individual model of diffuser for opening instructions).

   b. Establish the static pressure set point for the fan speed control by turning it down to the slowest speed that will maintain the design airflow at the highest pressure drop diffuser in the highest pressure drop PIM zone (PIM damper should be open to almost 100%).

   c. Return all Therma-Fuser diffusers in the zone to operation (see individual model for instructions).

NOTE: Diffuser noise is caused by higher velocity air through the diffuser which is caused by a high static pressure. Acutherm recommends a static pressure no higher than 0.25"wg / 62Pa at the inlet to the diffuser. Some system designers may accept higher noise levels and opt for a higher static pressure. Care should be taken not to exceed the design maximum static pressure at the takeoff to the first diffuser after the PIM.

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Quick Start Guide

The PIM uses a sophisticated PIC controller that has intelligence for many different applications. The full menu structure is described on the following pages. Below is a quick menu to the settings that are applicable to the PIM.

Service Menu

(LCD and LCD Setup Only)

Hold down 'Enter/Menu' button for 5 seconds. Display will show 'Passcode:'. Use Up and Down keys to enter the password in this sequence: **Down, Up, Up, Down**.

Service Menu Application		
▼		
Service Menu Setpoint		
▼		
Service Menu DischgAirTmp		
▼		
Service Menu Input		
▼		
Service Menu Ouput		
▼		
Service Menu BACnet	▶ If the PIM has the BACnet option, please see the BACnet section for more details.	
▼		
Service Menu Stat Setup		
▼		
Service Menu P/C Setup	▶ **Vent Pressure x.xxx in H$_2$O**	
▼	▼	
Service Menu Diagnostic	**Press Setpoint 0.150 in H$_2$O**	▶ **Press Setpoint 0.150** To adjust the static pressure set point.
▼	▼	
Press Menu to Exit	**Control Type Downstream**	▶ **Press. App. Downstream**
	▼	▼
	Press Deadbnd 0.030 in H$_2$O	**Press. App. Bypass** To adjust control between Zone (Downstream) and Bypass.
	▼	
	Dpr. Runtime 95 sec.	
	▼	
	Max Step 5%	
	▼	
	AF Fail NSB Enabled	
	▼	
	Unocc DprPros	
	▼	
	Press Menu to Exit	

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Info Menu

(LCD & LCD Setup)

Once the PCV has 24VAC power applied to it and the LCD Setup Tool is plugged into the Service Port, the thermostat screen will go through the initial start-up screen. The display should indicate that this is a Pressure Controller, and not something different.

To view basic information on the PCV controller, press the 'Menu' button ⌐ once and scroll through with the 'Down' arrow button.

APPLICATION PRESSURE CTRL	Air terminal, pressure controller, dual duct or fan powered terminal unit
▼	
VENT PRESSURE 0.150 IN H20	Current pressure reading
▼	
SUPPLYAIRTEMP 85.0F	If supply probe is not present, LCD will display no probe. If supply probe is present, LCD will display temperature.
▼	
DAMPER POSITION 50%	This indicates the current position of the damper as percent (%) Range is 0-100% (100% = full open or maximum air)
▼	
AIR HANDLER IS ACTIVE	If Night Setback is enabled, occupied and unoccupied modes triggered by airflow
▼	
MAC ADDRESS 1	Shows the BACnet MAC address – range is 1-99 MAC Address can be set via DIP switch If no BACnet module attached, LCD will display MAC address None
▼	
DEVICE INSTANCE 101	(Instance must be "globally" unique on your site) Displays controller's BACnet Device Instance (if BACnet is attached) Device Instance can range from 0-4, 194, 303
▼	
PRESS MENU TO EXIT	**NOTE:** Service menu will automatically time out after 20 seconds

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Service Menu

(LCD and LCD Setup Only)

Hold down 'Enter/Menu' button for 5 seconds. Display will show 'Passcode:'. Use Up and Down keys to enter the password in this sequence: **Down, Up, Up, Down**.

SERVICE MENU: APPLICATION	Change the Application the unit is operating as
▼	
SERVICE MENU: SETPOINT	Setup of Setpoint limits (day minimum/maximum) °F/°C selection
▼	
SERVICE MENU: DISCHARGEAIR TEMP	Setup of DAT HEAT and COOL setpoints Shows discharge air temperature reading
▼	
SERVICE MENU: INPUT	Allows setup of contact closure
▼	
SERVICE MENU: OUTPUT	Allows setup of FAN, HEAT, COOL outputs Allows setup of room light output (motion stat only) Enable analog DAT control
▼	
SERVICE MENU: BACNET	Allows setup of BACnet addresses MAC address, Device Instance and Baud Rate Included only if BACnet module is attached
▼	
SERVICE MENU: STAT SETUP	Allows setup of LCD back lighting, sounds, motion sensor Adjustment of HVAC and room lighting time-outs
▼	
SERVICE MENU: P/C SETUP	Allows pressure setpoint and pressure deadband adjustment Allows adjustment of damper
▼	
SERVICE MENU: DIAGNOSTIC	Load defaults and resets controller (recommended not to change)
▼	
PRESS MENU TO EXIT	**NOTE:** Service menu will automatically time out after 20 seconds

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Application Menu

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.

APPLICATION	**CONTROL APPLICAITON PRESSURE CONTROLLER**	**AIR TERMINAL**	For typical single duct and fan powered units
	PRESS MENU TO EXIT	**FANCOIL 4 PIPE**	Fan coil terminals 4-pipe with hot and cold water
		FANCOIL 2 PIPE	Fan coil terminals 2-pipe with hot and cold changeover
		DUAL DUCT	Dual duct terminal units with hot and cold inlets
		EXHAUST BOX	Exhaust terminal unit typically with constant flow
		FLOW FOLLOWER	Volumetric offset application, typically for Venturi valves, but also for single ducts
		MIXING BOX DAT	Allows PIC to maintain discharged air temperature
		CO2 TRACKING	Tracks airflow to the current CO_2 in the occupied space
		PRESSURE CONTROLLER	Allows PIC to maintain constant pressure
		PRESS MENU TO EXIT	

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Setpoint Menu

(Setpoint Limits and Temperature Units)

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.

SETPOINT	**SET LOW LIMIT** **65.0F**	This is the lowest setpoint allowed Range: 10.0°F - 100.0°F, Default: 65.0°F
	SET HIGH LIMIT **80.0F**	This is the highest setpoint allowed Range: 10.0°F - 100.0°F, Default: 80.0°F
	TEMPERATURE UNITS **FAHRENHEIT**	Fahrenheit or Celsius Default: °F
	NIGHT HEAT SET **62.0F**	PIC will maintain this heating setpoint when unoccupied Range: 10.0°F - 100.0°F, Default: 62.0°F
	NIGHT COOL SET **83.0F**	PIC will maintain this cooling setpoint when unoccupied Range: 10.0°F - 100.0°F, Default: 83.0°F
	PROPORTIONAL BAND **2.0F**	Default: 2°F, 1°C Proportional Band is the raneg of control or the throttling range of the device
	DAY DIFFERENTIAL **1.0F**	1°F, 0.5°C Day Differential is the deadband on either side of the setpoint
	PRESS MENU **TO EXIT**	

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Discharge Air Temperature Menu

NOTE: Thermostat must remain connected in this application

(Application Specific Options)

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.

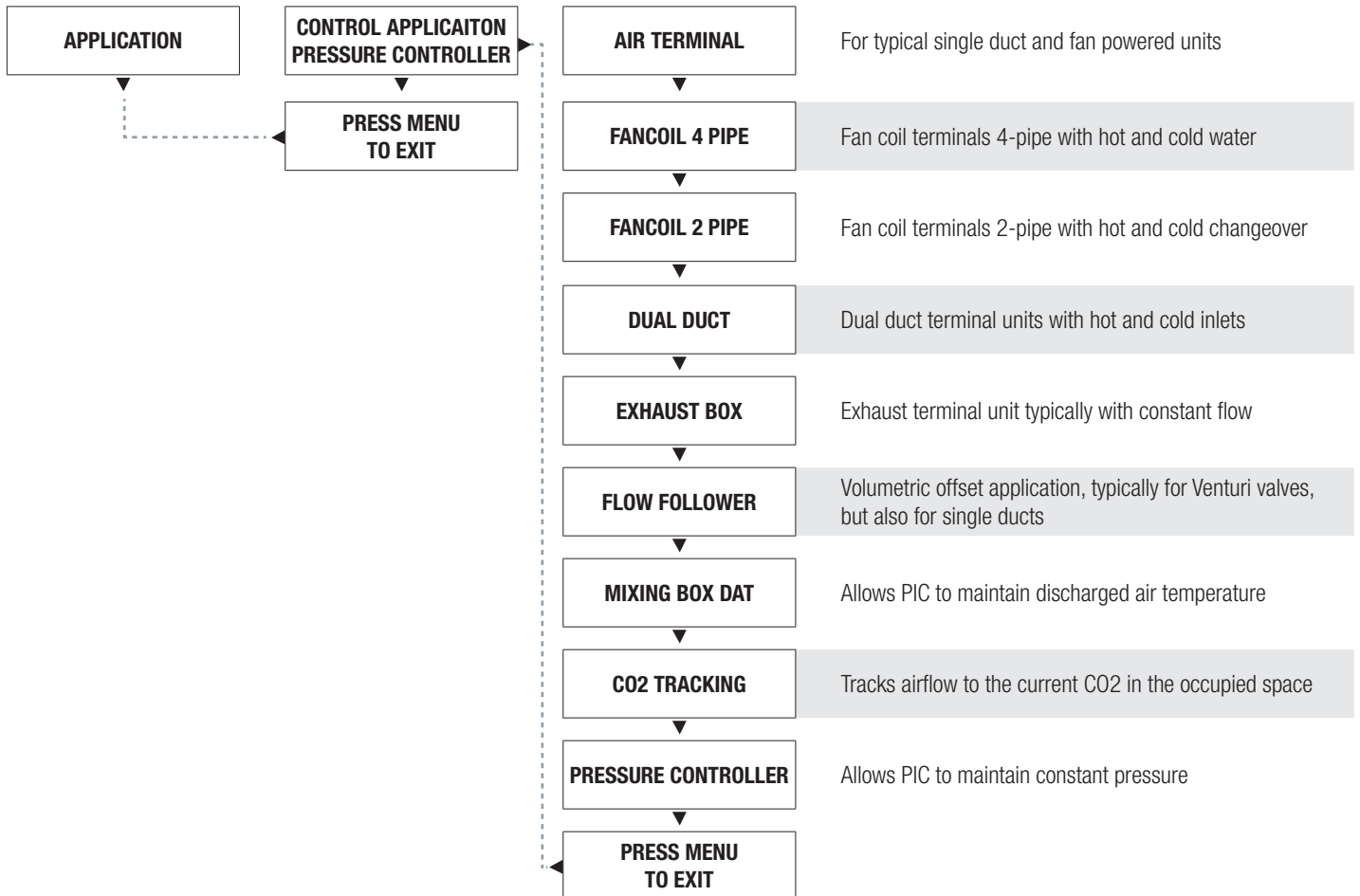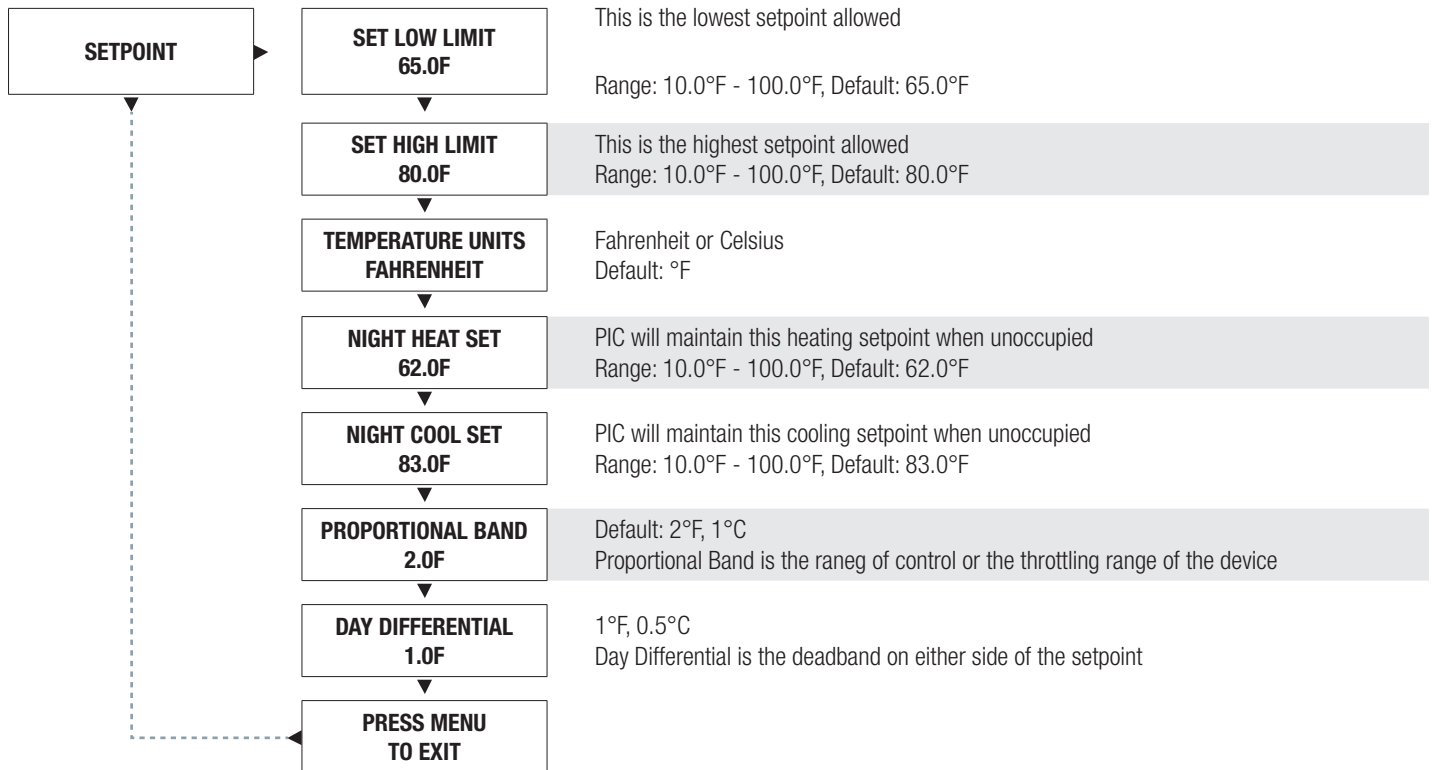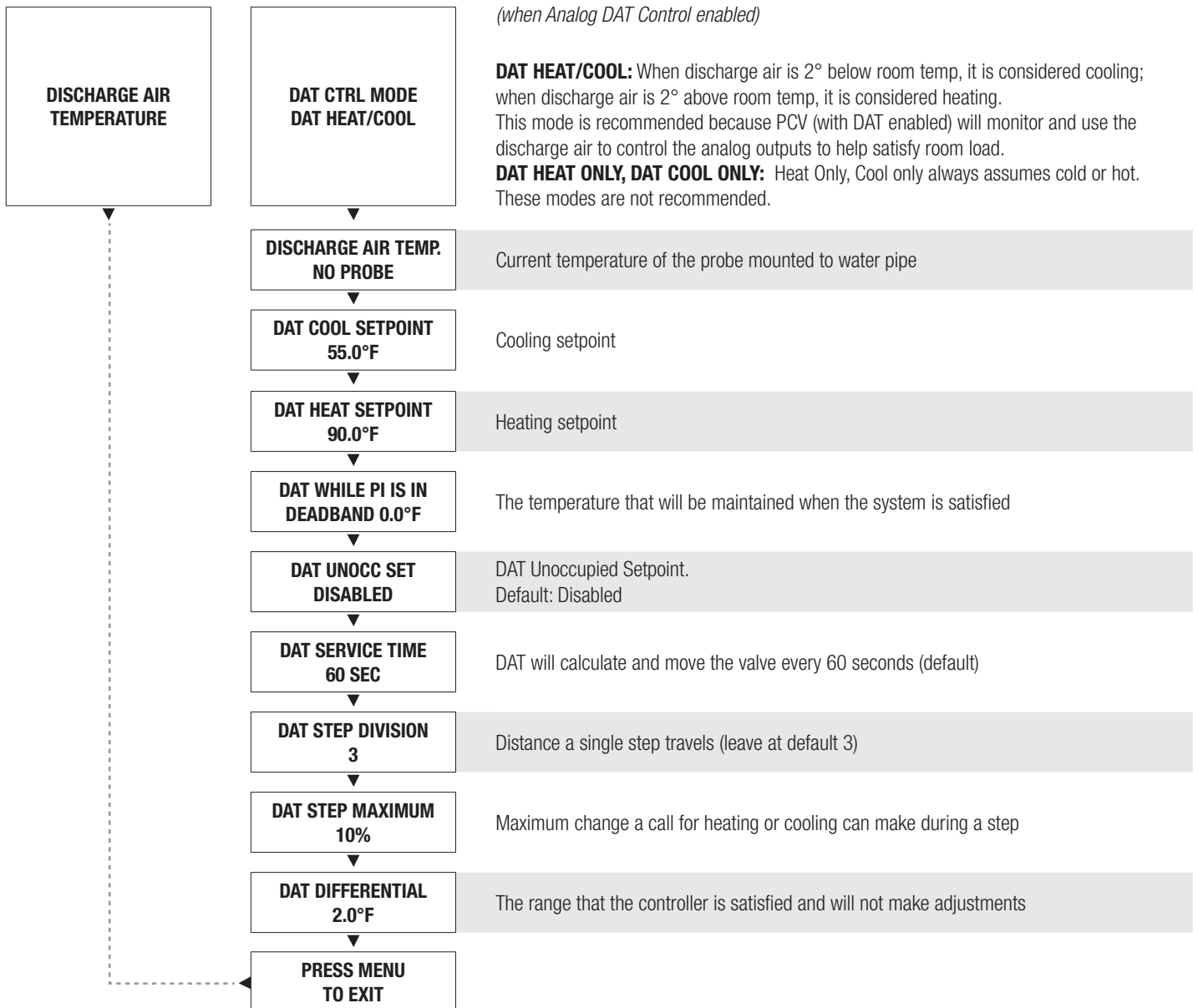|		
DISCHARGE AIR TEMPERATURE	**DAT CTRL MODE DAT HEAT/COOL**	*(when Analog DAT Control enabled)* **DAT HEAT/COOL:** When discharge air is 2° below room temp, it is considered cooling; when discharge air is 2° above room temp, it is considered heating. This mode is recommended because PCV (with DAT enabled) will monitor and use the discharge air to control the analog outputs to help satisfy room load. **DAT HEAT ONLY, DAT COOL ONLY:** Heat Only, Cool only always assumes cold or hot. These modes are not recommended.
	DISCHARGE AIR TEMP. NO PROBE	Current temperature of the probe mounted to water pipe
	DAT COOL SETPOINT 55.0°F	Cooling setpoint
	DAT HEAT SETPOINT 90.0°F	Heating setpoint
	DAT WHILE PI IS IN DEADBAND 0.0°F	The temperature that will be maintained when the system is satisfied
	DAT UNOCC SET DISABLED	DAT Unoccupied Setpoint. Default: Disabled
	DAT SERVICE TIME 60 SEC	DAT will calculate and move the valve every 60 seconds (default)
	DAT STEP DIVISION 3	Distance a single step travels (leave at default 3)
	DAT STEP MAXIMUM 10%	Maximum change a call for heating or cooling can make during a step
	DAT DIFFERENTIAL 2.0°F	The range that the controller is satisfied and will not make adjustments
	PRESS MENU TO EXIT	

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Input Menu

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.
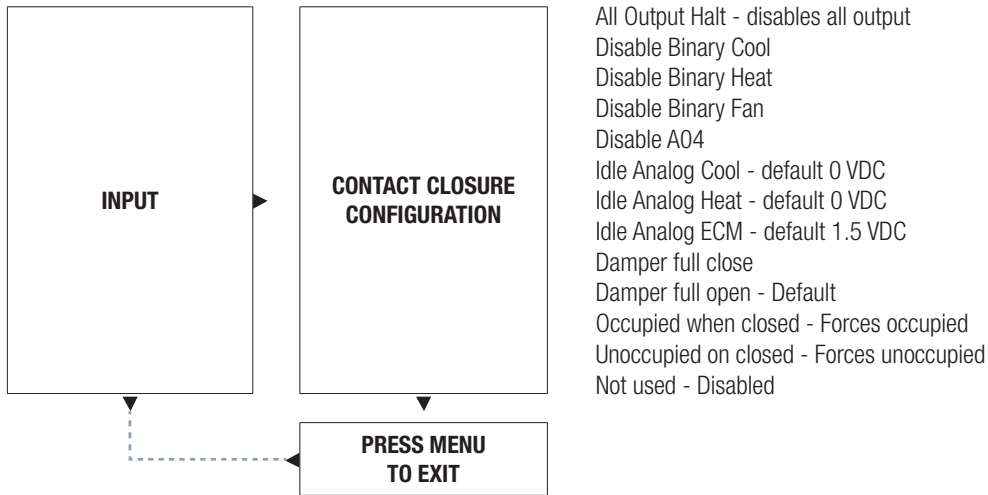
```
┌──────────────┐     ┌──────────────────┐        All Output Halt - disables all output
│              │     │                  │        Disable Binary Cool
│              │     │                  │        Disable Binary Heat
│              │     │                  │        Disable Binary Fan
│              │     │                  │        Disable A04
│              │     │                  │        Idle Analog Cool - default 0 VDC
│    INPUT     │ ──▶ │ CONTACT CLOSURE  │        Idle Analog Heat - default 0 VDC
│              │     │  CONFIGURATION   │        Idle Analog ECM - default 1.5 VDC
│              │     │                  │        Damper full close
│              │     │                  │        Damper full open - Default
│              │     │                  │        Occupied when closed - Forces occupied
│              │     │                  │        Unoccupied on closed - Forces unoccupied
└──────────────┘     └──────────────────┘        Not used - Disabled
        ▼                     ▼
        │            ┌──────────────────┐
        │            │   PRESS MENU     │
        └──────────▶ │    TO EXIT       │
                     └──────────────────┘
```

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Output Menu – Heat

(Setup of Heat Outputs)

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.
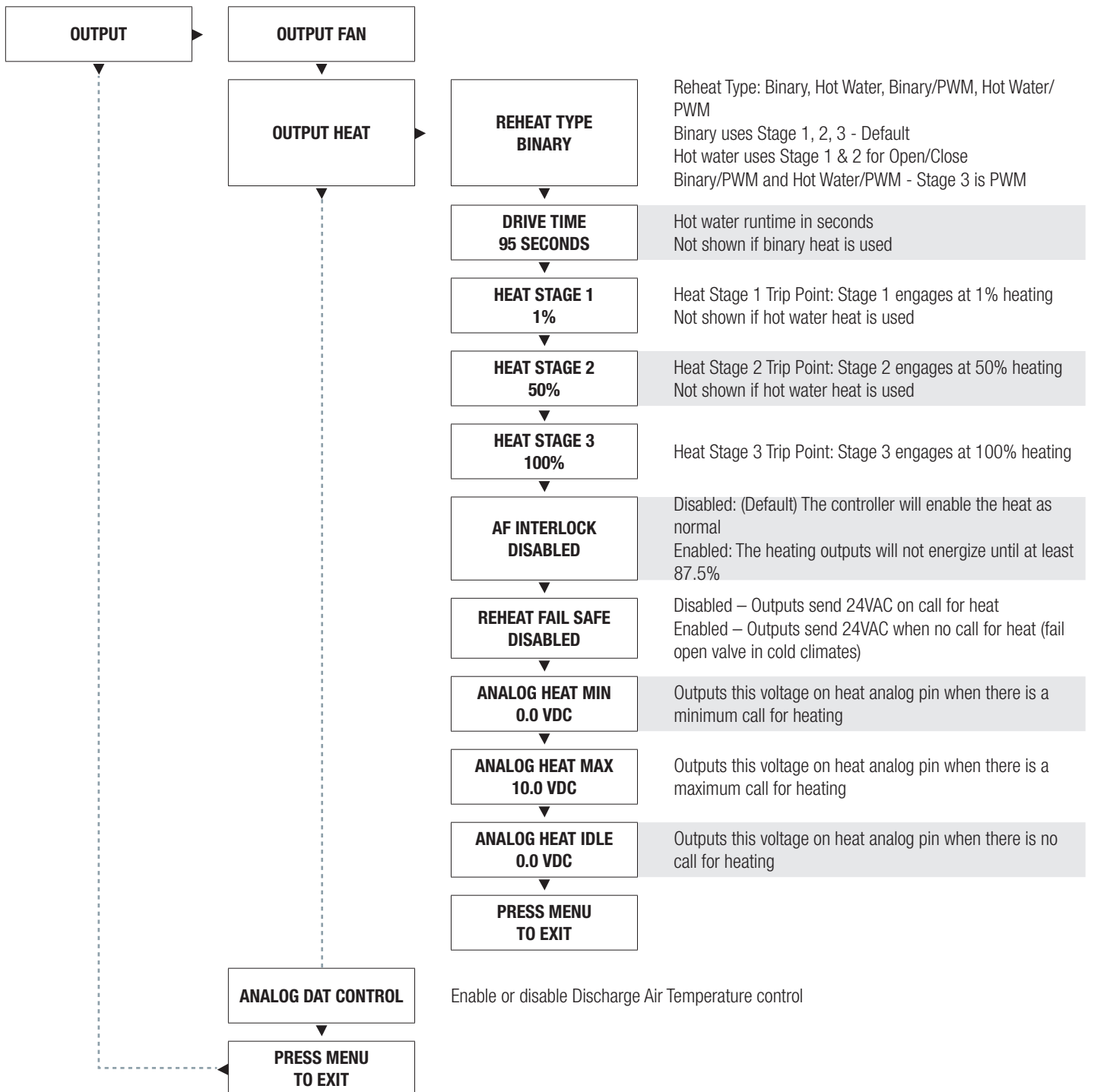
OUTPUT → **OUTPUT FAN**	
OUTPUT HEAT → **REHEAT TYPE BINARY**	Reheat Type: Binary, Hot Water, Binary/PWM, Hot Water/PWM Binary uses Stage 1, 2, 3 - Default Hot water uses Stage 1 & 2 for Open/Close Binary/PWM and Hot Water/PWM - Stage 3 is PWM
DRIVE TIME 95 SECONDS	Hot water runtime in seconds Not shown if binary heat is used
HEAT STAGE 1 1%	Heat Stage 1 Trip Point: Stage 1 engages at 1% heating Not shown if hot water heat is used
HEAT STAGE 2 50%	Heat Stage 2 Trip Point: Stage 2 engages at 50% heating Not shown if hot water heat is used
HEAT STAGE 3 100%	Heat Stage 3 Trip Point: Stage 3 engages at 100% heating
AF INTERLOCK DISABLED	Disabled: (Default) The controller will enable the heat as normal Enabled: The heating outputs will not energize until at least 87.5%
REHEAT FAIL SAFE DISABLED	Disabled – Outputs send 24VAC on call for heat Enabled – Outputs send 24VAC when no call for heat (fail open valve in cold climates)
ANALOG HEAT MIN 0.0 VDC	Outputs this voltage on heat analog pin when there is a minimum call for heating
ANALOG HEAT MAX 10.0 VDC	Outputs this voltage on heat analog pin when there is a maximum call for heating
ANALOG HEAT IDLE 0.0 VDC	Outputs this voltage on heat analog pin when there is no call for heating
PRESS MENU TO EXIT	
ANALOG DAT CONTROL	Enable or disable Discharge Air Temperature control
PRESS MENU TO EXIT	

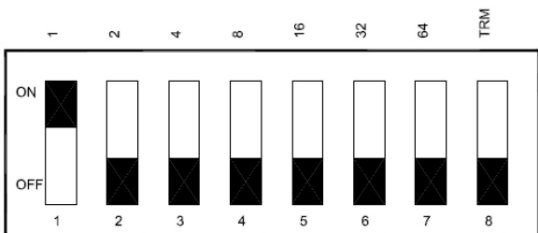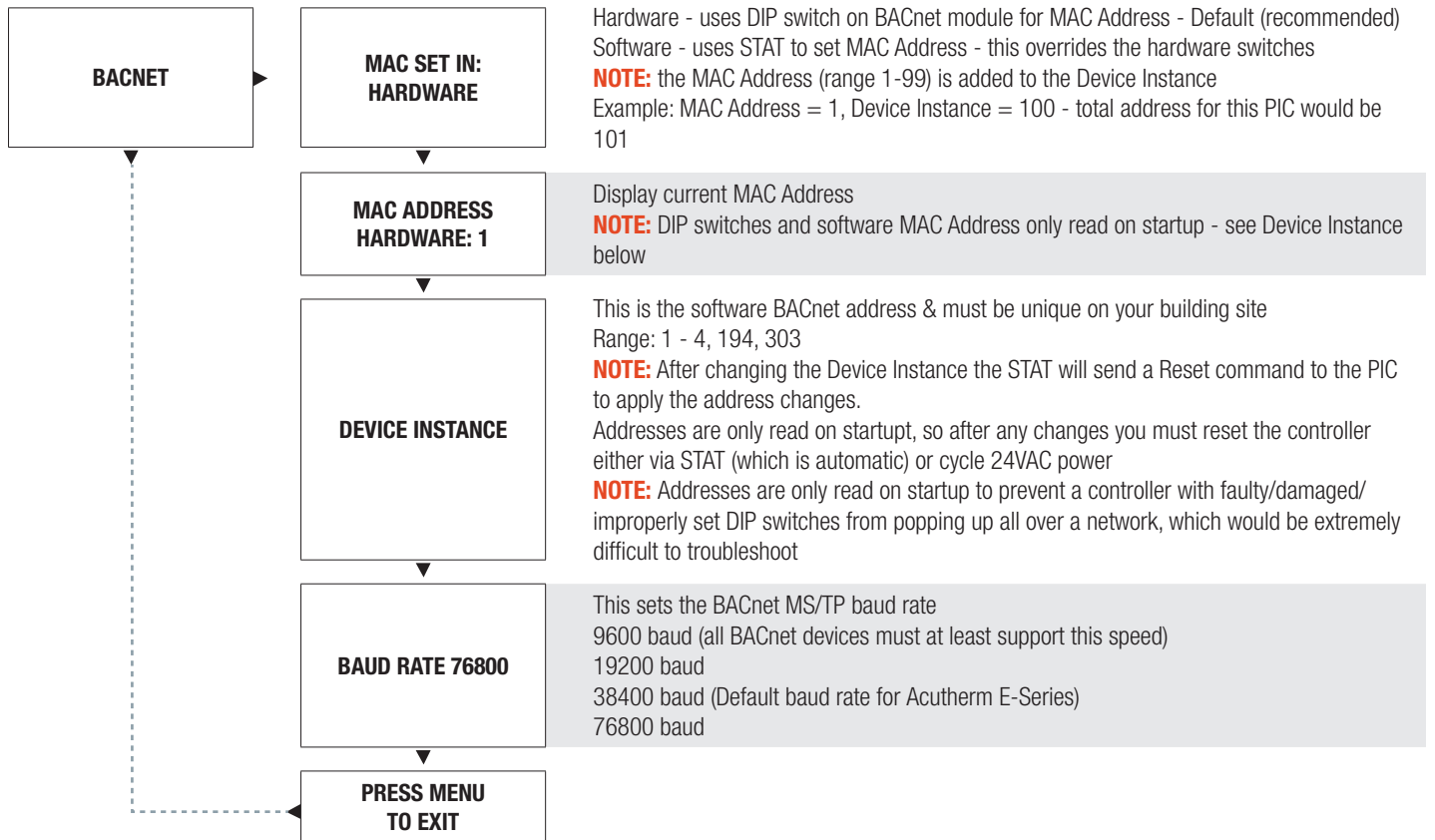# PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Address Menu

(BACnet Addressing Setup)

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.

BACNET	**MAC SET IN: HARDWARE**	Hardware - uses DIP switch on BACnet module for MAC Address - Default (recommended) Software - uses STAT to set MAC Address - this overrides the hardware switches **NOTE:** the MAC Address (range 1-99) is added to the Device Instance Example: MAC Address = 1, Device Instance = 100 - total address for this PIC would be 101
	MAC ADDRESS HARDWARE: 1	Display current MAC Address **NOTE:** DIP switches and software MAC Address only read on startup - see Device Instance below
	DEVICE INSTANCE	This is the software BACnet address & must be unique on your building site Range: 1 - 4, 194, 303 **NOTE:** After changing the Device Instance the STAT will send a Reset command to the PIC to apply the address changes. Addresses are only read on startup, so after any changes you must reset the controller either via STAT (which is automatic) or cycle 24VAC power **NOTE:** Addresses are only read on startup to prevent a controller with faulty/damaged/improperly set DIP switches from popping up all over a network, which would be extremely difficult to troubleshoot
	BAUD RATE 76800	This sets the BACnet MS/TP baud rate 9600 baud (all BACnet devices must at least support this speed) 19200 baud 38400 baud (Default baud rate for Acutherm E-Series) 76800 baud
	PRESS MENU TO EXIT	

Setting the MAC address using the DIP Switches:

The MAC address is set in binary.

Eg. to set the Address of 3, switch 1 & 2 must be in the ON postilion.

```
Setting the Device      x  x  x  x  x  x  x
Instance number         |  |     |     |
(Max 4,194,302)         |  |     |     MAC address
                        |  |     3rd range 0-99
                        |  2nd range 0-99
                        1st range 0-4
```


Price recommends using the Orange Compliment (A/+), Orange (B/-), Brown (NET COM) and Brown Compliment (NET COM) wire pairs from a standard CAT5E cable. The pinout used follows the 568-B Standard
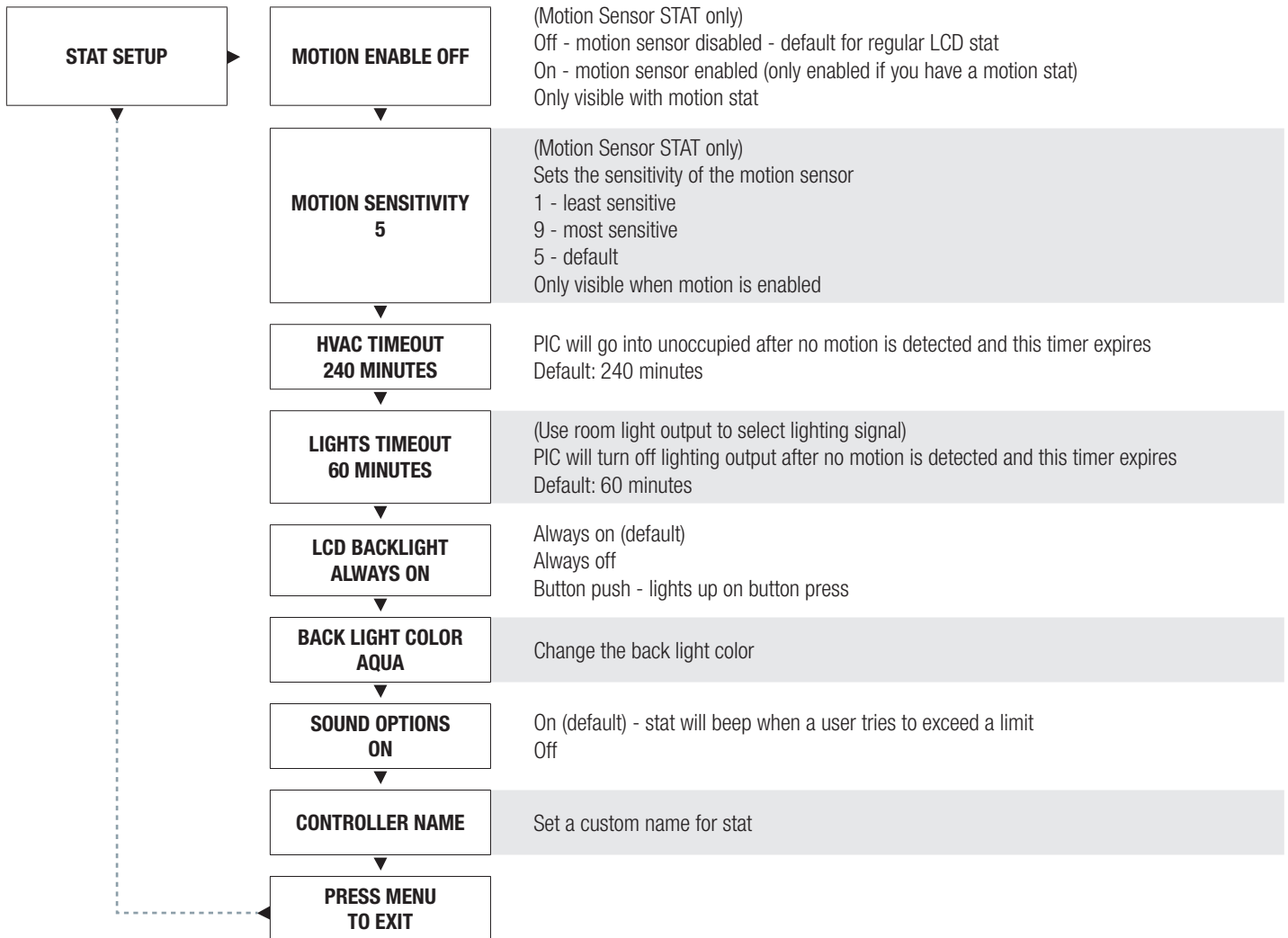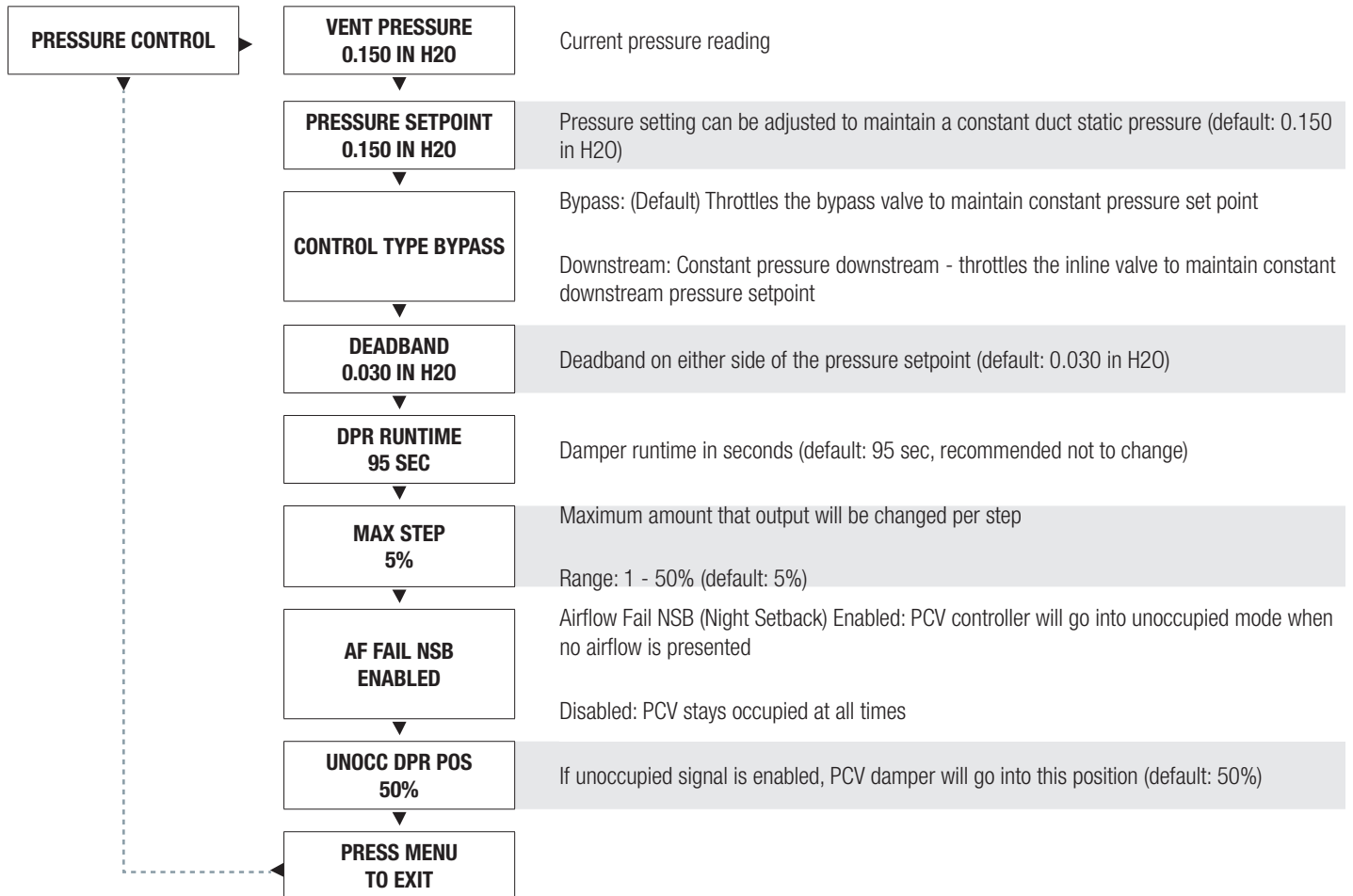
PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

Stat Setup Menu

(Stat Options)

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.
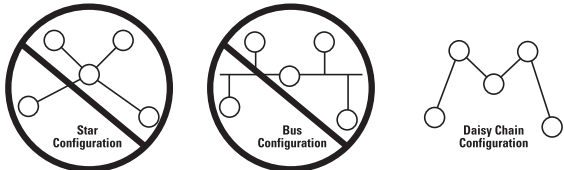
STAT SETUP	
MOTION ENABLE OFF	(Motion Sensor STAT only) Off - motion sensor disabled - default for regular LCD stat On - motion sensor enabled (only enabled if you have a motion stat) Only visible with motion stat
MOTION SENSITIVITY 5	(Motion Sensor STAT only) Sets the sensitivity of the motion sensor 1 - least sensitive 9 - most sensitive 5 - default Only visible when motion is enabled
HVAC TIMEOUT 240 MINUTES	PIC will go into unoccupied after no motion is detected and this timer expires Default: 240 minutes
LIGHTS TIMEOUT 60 MINUTES	(Use room light output to select lighting signal) PIC will turn off lighting output after no motion is detected and this timer expires Default: 60 minutes
LCD BACKLIGHT ALWAYS ON	Always on (default) Always off Button push - lights up on button press
BACK LIGHT COLOR AQUA	Change the back light color
SOUND OPTIONS ON	On (default) - stat will beep when a user tries to exceed a limit Off
CONTROLLER NAME	Set a custom name for stat
PRESS MENU TO EXIT	

PRESSURE INDEPENDENCE MODULE

DISPLAY NAVIGATION

P/C Setup

(Pressure Controller Setup)

Scroll through menu with Up and Down keys. Press 'Enter/Menu' button to apply your changes. *---Saving---* will display as your changes are applied.

PRESSURE CONTROL ▶	**VENT PRESSURE** **0.150 IN H2O**	Current pressure reading
	PRESSURE SETPOINT **0.150 IN H2O**	Pressure setting can be adjusted to maintain a constant duct static pressure (default: 0.150 in H2O)
	CONTROL TYPE BYPASS	Bypass: (Default) Throttles the bypass valve to maintain constant pressure set point Downstream: Constant pressure downstream - throttles the inline valve to maintain constant downstream pressure setpoint
	DEADBAND **0.030 IN H2O**	Deadband on either side of the pressure setpoint (default: 0.030 in H2O)
	DPR RUNTIME **95 SEC**	Damper runtime in seconds (default: 95 sec, recommended not to change)
	MAX STEP **5%**	Maximum amount that output will be changed per step Range: 1 - 50% (default: 5%)
	AF FAIL NSB **ENABLED**	Airflow Fail NSB (Night Setback) Enabled: PCV controller will go into unoccupied mode when no airflow is presented Disabled: PCV stays occupied at all times
	UNOCC DPR POS **50%**	If unoccupied signal is enabled, PCV damper will go into this position (default: 50%)
	PRESS MENU **TO EXIT**	

PRESSURE INDEPENDENCE MODULE

MAINTENANCE

Troubleshooting

The following information is provided in the event that the Pressure Independence Module does not appear to function properly after installation.

Fault	Solution
PIM controller appears to be not responding or have no power. Green light on the controller is not blinking. Thermostat green indication light not on, or LCD screen is blank.	Check thermostat first for either green indication light, or LCD display. If either of these does not appear, then check the PIM controller for power (green blinking light). If no power is present, check 24VAC power with a Multimeter. Cycle power to the controller. If this doesn't restore power, check the power that is feeding that controller for your problem.
Damper acts erratically	Check actuator mounting; ensure that the damper is fully closed when the actuator is in the fully closed position. Pivot the grey release clutch on actuator and move by hand. Ensure that the set screw on the damper shaft is torqued down tight and no slipping is occurring. Ensure the static pressure probe is connected to the HI (RED) side port of the transducer. Leave teh LO (Green) side port of the transducer open to atmosphere.
BACnet Communication Errors	BACnet MS/TP is based on a RS-485 network. It must be wired in a daisy chain configuration. A daisy chain means that there is only one main cable, and every network device is connected directly along its path. DO NOT use Star, Bus, "T", or any other type of network configuration. Any of these other network configurations will result in an unreliable network, and make troubleshooting almost impossible. Correct polarity is imperative on MS/TP wiring. Always ensure that the positive terminal on a device has the same color wire connected to it throughout the network, same for the negative terminal. Eg. 2 wire conductor with black and white wires – black to the positive terminal, and white to the negative terminal. Keep this consistency throughout the network.

PRESSURE INDEPENDENCE MODULE

MAINTENANCE

Troubleshooting - Continued

Fault	Solution
BACnet Communication Errors	BACnet MS/TP networks must be terminated to ensure proper operation. A network should be terminated twice, once at the beginning and once at the end. Termination helps reduce reflections and noise. The terminating can be done with a 100 Ω resistor across the A+ and B- lines, but PIM controllers have the option for enabling termination by flipping dip switch #8 to the ON position.The network speed or baud rate must be the same throughout the network. **NOTE:** The default speed for Acutherm BACnet MS/TP controls is 76800. BACnet MS/TP currently supports 4 standard speeds which are: 9600, 19200, 38400 and 76800.
BACnet Communication Errors	Binary Address must be unique for each device on the network. No two devices can have the same Address. This includes if you are incorporating an Acutherm product into an existing network. Determine the existing binary Addressing scheme for the existing network. The Address is set on the Addressable dip switches on the PIM.
BACnet Communication Errors	Grounding and 24VAC polarity: Proper grounding is absolutely essential when wiring the MS/TP BACnet Network. Proper grounding will prevent many potential problems that can occur in a network of devices. Common symptoms of a poorly grounded network can include inconsistent BACnet MS/TP communications and damage from voltage spikes. The most practical method of grounding is to ground every 24VAC transformer common/neutral used to power the controls. Connect the "common/neutral" wire of the SECONDARY side of the transformer to earth ground – such as the ground screw on in the electrical box.
BACnet Communication Errors	**NOTE:** Flipping 24VAC HOT and COMMON will cause the BACnet MS/TP Network to stop communicating!!! Ensure HOT and COMMON are not reversed on ANY controllers. **WARNING:** Controllers will still power up and run even if HOT and COMMON are reversed. However output signals to other devices such as heaters, relays, etc will not work as intended! 24 VAC Hot / High Voltage Primary Side / 24 VAC Common

PRESSURE INDEPENDENCE MODULE

MAINTENANCE

Hardware Specifications

Power Requirements	24VAC, 47-63 Hz 6VA (not including output loading) NEC Class II
Ambient Ratings	32º to 131º F (0º to 55º C) 10 to 90% RH (non-condensing)
Outputs	24VAC Binary Output. Max 0.5A each (x7), MAX 1.85A total Switched HOT or Switched COMMON • Damper CW • Damper CCW Analog 0-10VDC (x4). Max: 10mA each
Inputs	Thermistor Sensor (10k Type J thermistor) Analog 0-10V inputs (x2). 20k Ω input impedance • Thermostat Inputs • Temperature Sensor (10K Type J Thermistor) • Accuracy of +/- 0.5°F from 55°F to 85°F (+/ 0.25°C from 13°C to 25°C)
Communication ports	BACnet MS/TP Connection (optional) • Communication speeds: 9,600, 19,200, 38,400, 76,800 (default) • Maximum recommended devices per MS/TP segment: 30 devices • For local setup using LCD set-up service tool
Size	11" x 5.75" x 2.75"
Weight	1.8lb. (816g)

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