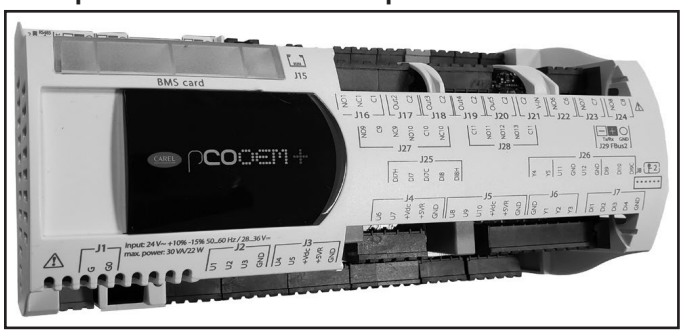
October, 2025

INSTALLATION INSTRUCTIONS
Indirect gas-fired heating and make-up air units mode series “D”, “H”, “I”, and “O”

Modine Controls System featuring
Carel pCooEM+ Medium Microprocessor Conroller



⚠ WARNING

1. Improper installation, adjustment, alteration,service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.
2. Disconnect power supply before making wiring connections or working on this equipment. Follow all applicable safety procedures to prevent accidental power up. Failure to do so can result in injury or death from electrical shock or moving parts and may cause equipment damage.
3. Leak Detection system installed. Unit must be powered except for service.
4. This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.
5. Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

IMPORTANT

1. The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these kits must be performed by a qualified installation and service agency.
2. These instructions must also be used in conjunction with the Installation and Service Manual originally shipped with the unit, in addition to any other accompanying component supplier literature.

THIS MANUAL IS THE PROPERTY OF THE OWNER.
PLEASE LEAVE IT WITH THE OWNER WHEN YOU LEAVE THE JOB.

MODINE CONTROLS SYSTEM MANUAL

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General Information

Controls are one of the most important components of specialized HVAC equipment. The Modine Control System is designed and engineered around the design of the Indirect Gas-Fired Heating and Make-Up Air Units, model series “D”, “H”, “I”, and “O”, to ensure the unit operates safely, reliably, with optimized performance, and maintaining maximum energy efficiency.

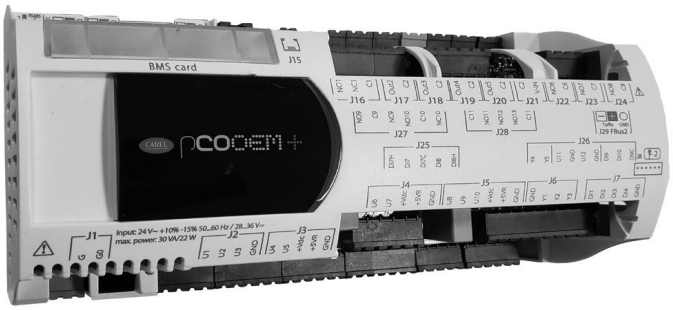
Special Design Requests

Modine Manufacturing Company will sometimes build units with special features as requested by the customer. This manual only covers standard features and does not include any changes made for special feature requests by the customer

MODINE CONTROLS SYSTEM MANUAL

Controller Overview

The Modine Controls System utilizes a Carel pCOOEM+ Medium programmable microprocessor controller. Highly advanced with a powerful 32-bit microprocessor for fast processing speed, the controller features a number of I/O's for complex HVAC/R applications.

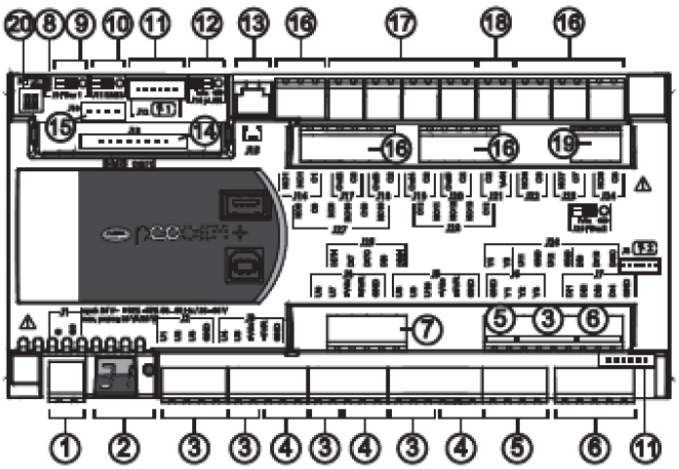


The main controller board is housed in a plastic case that ensures a high index of protection and reduces the risk of electrostatic discharges due to incorrect handling. The controller offers greater safety due to the optical isolation of the serial pLAN, protection of the analog inputs in the event of incorrect connections, and an extended range of operating temperatures. Given the increasing demand for integration, pCOOEM+ can interface with BMS systems via many of the most commonly-used serial communication standards, using optional boards.

pCOOEM+ Main Features:

- 12 Universal Inputs
  - Uses 10K NTC temperature sensors
  - 4-20ma Humidity and CO2 sensors for reliability
- 5 Analog Outputs
  - 0-10vdc for easy fault finding
- 10 Digital inputs
  - Used to monitor all aspects of the unit
- 13 Digital Outputs
  - True relayed outputs for reliability
- Real Time Clock
  - With battery backup and day light savings adjustment
- pLAN Communication
  - To allow connectivity to space sensors and other controllers
- Alarm Logging
  - With a snapshot of the unit sensors
- Run Hours logging
  - With maintenance setpoints
- Password Protection
  - Three levels of password protection
- Manual Control
  - For easy startup and service
- Simple Interface
  - Easy to understand menus and settings
- Built in Scheduler
  - Up to 7 periods per day – Either On/Off control or Occupied/Unoccupied
  - Holiday Scheduler with up to 16 holiday periods
- Remote Display option
  - Can be 100ft from unit using standard RJ12 cable
- All reset points fully adjustable

pCOOEM+ Medium Controller Layout



1. Power Connector [G(+), G0(-)]
2. Button for setting pLAN address and secondary display, LEDs
3. Universal inputs/outputs
4. +Vdc: Power to active probes
   +5 VR: Power to ratiometric probes
5. Analog outputs
6. DI: Voltage free contact digital inputs
7. DI: Digital inputs at voltage A (24 Vac or 28-36 Vdc)
   DIH: Digital inputs at voltage B (230 Vac - 50/60 Hz)
8. +Vout: Power to additional terminal
9. Fieldbus1 connector
10. BMS2 connector
11. Unipolar Valves connectors
12. pLAN plug-in connector
13. pLAN telephone connector for terminal/downloading application program
14. BMS1 optional card connector
15. PLD terminal conector
16. Relay digital outputs
17. Powered-on relay digital outputs
18. Power supply for “powered-on relay digital outputs”
19. Fieldbus2 connector
20. Microswitch to select RS485/tLAN level on Fieldbus1

Temperature (T) and Temperature-Relative Humidity (T-RH) Sensor Chart ①

Unit Type	Air Config	Digits 20-21	Actuator	Damper Control	① Mixed Air	Return Air	Outdoor (Inlet) Air: Indoor Units ②	Outdoor (Inlet) Air: Outdoor Units ②	Supply Air	pAD Space ③
Heating Only Unit (Digit 2=B or D)	100% RA	AA, BA, CA	None	None	T	-	-	-	T	T
	100% OA	BA	None	None	-	-	T	T	T	T
		DA	Two Position	Two Position	-	-	T	T	T	T
	OA/RA	EA	Two Position	Two Position (0% or 100%)	-	T	T	T	T	T
		GA	Modulating	Two Position (0% or Min %)	T	T	T	T	T	T
				Three Position (0% or Min % or 100%)	T	T	T	T	T	T
				Space CO2 DCV	T	T	T	T	T	T
				Building Pressurization	T	T	T	T	T	T
				BMS Control	T	T	T	T	T	T
				Dry Bulb Economizer	T	T	T	T	T	T
				Dry Bulb Economizer with CO2 Override	T	T	T	T	T	T
				Enthalpy Economizer	T	T-RH	T-RH	T-RH	T	T
				Enthalpy Economizer with CO2 Override	T	T-RH	T-RH	T-RH	T	T
Heating/Cooling Unit (Digit 2=C or P or Digit 2=B or D with External Cooling Coil by others)	100% RA	AA, BA, CA	None	None	T	-	-	-	T	T-RH
	100% OA	BA	None	None	-	-	T-RH	T-RH	T	T-RH
		DA	Two Position	Two Position	-	-	T-RH	T-RH	T	T-RH
	OA/RA	EA	Two Position	Two Position (0% or 100%)	-	T-RH	T-RH	T-RH	T	T-RH
		GA	Modulating	Two Position (0% or Min %)	T	T-RH	T-RH	T-RH	T	T-RH
				Three Position (0% or Min % or 100%)	T	T-RH	T-RH	T-RH	T	T-RH
				Space CO2 DCV	T	T-RH	T-RH	T-RH	T	T-RH
				Building Pressurization	T	T-RH	T-RH	T-RH	T	T-RH
				BMS Control	T	T-RH	T-RH	T-RH	T	T-RH
				Dry Bulb Economizer	T	T-RH	T-RH	T-RH	T	T-RH
				Dry Bulb Economizer with CO2 Override	T	T-RH	T-RH	T-RH	T	T-RH
				Enthalpy Economizer	T	T-RH	T-RH	T-RH	T	T-RH
				Enthalpy Economizer with CO2 Override	T	T-RH	T-RH	T-RH	T	T-RH

① All sensors are field installed except the Mixed Air Sensor which is factory installed.
② Indoor units use a duct mounted sensor while outdoor units use a true outdoor sensor.
③ The Space pAD is optional to provide for space reset of the supply air temperature setpoint and is required for unoccupied space temp control.
Refer to the Sequence of Operation section for additional information.

pCOOEM+ Medium Controller Input/Output (I/O) List

I/O Type	I/O #	Type/Voltage	Description	Standard or Optional
Univeral I/O	U1 (U1-GND)	VFC Only	Evap Cooler Float Switch OR DX Condensing Unit Alarm	O
	U2 (U2-GND)	VFC Only	Damper End Switch	O
	U3 (U3-GND)	VFC Only	Damper Position 1 OR Blower Fan Speed 1	O
	U4 (U4-GND)	PT1000	Outdoor Air Temperature	O
	U5 (U5-GND)	4-20mA	Outdoor Air Humidity	O
	U6 (U6-GND)	PT1000	Return Air Temperature	O
	U7 (U7-GND)	4-20mA	Return Air Humidity	O
	U8 (U8-GND)	4-20mA or VFC Only	Duct Pressure OR Damper Position 2 OR Blower Fan Speed 2	O
	U9 (U9-GND)	4-20mA	Building Pressure	O
	U10 (U10-GND)	PT1000	Mixed Air Temperature	O
	U11 (U11-GND)	PT1000	Supply Air Temperature	S
	U12 (U12-GND)	4-20mA	CO2 Content	O
Digital Inputs	DI1 (DI1-GND)	VFC	Unit Enable OR Occupied	O
	DI2 (DI2-GND)	VFC	Airflow Switch	S
	DI3 (DI3-GND)	VFC	Blower Door Switch	O
	DI4 (DI4-GND)	VFC	Filter Switch	O
	DI7 (DI7-DI7C)	24vAC	Furnace 1 Safety Chain	S
	DI8 (DI8-DI7C)	24vAC	Furnace 2 Safety Chain	O
	DI9 (ID9-IDC9)	24vAC	Furnace 3 Safety Chain or A2L Sensor(s)	O
	DI10 (ID10-IDC9)	24vAC	Supply Air/Return Air/Smoke Detector	O
Analog Outputs	AO1 (Y1-GND)	0 - 10vDC	Cooling Signal	O
	AO2 (Y2-GND)	0 - 10vDC	Furnace 1 Signal	S
	AO3 (Y3-GND)	0 - 10vDC	Damper Position	O
	AO4 (Y4-GND)	0 - 10vDC	Blower Speed	O
	AO5 (Y5-GND)	0 - 10vDC	Exhaust Fan Speed	O
Digital Outputs	DO1 (NO1-C1)	NO	Damper On/Off	O
	DO2 (OUT2-C2)	NO	Furnace 1 Ignition Initiation	S
	DO3 (OUT3-C2)	NO	Furnace 2 Stage 1	O
	DO4 (OUT4-C2)	NO	Not Used	N/A
	DO5 (OUT5-C2)	NO	Furnace 3	O
	DO6 (NO6-C6)	NO	Blower On/Off (Motor Starter/ VFD Enable)	S
	DO7 (NO7-C7)	NO	Exhaust Fan Enable	O
	DO8 (NO8-C8)	NO	Not Used	N/A
	DO9 (NO9-C9)	NO	Furnace 2 Stage 2	O
	DO10 (NO10-C10)	NO	Furnace 3 Stage 2	O
	DO11 (NO11-C11)	NO	Evap Cooler Fill Valve	O
	DO12 (NO12-C11)	NO	Evap Cooler Drain Valve OR DX Stage 2 OR CW Stage 2	O
	DO13 (NO13-C11)	NO	Evap Cooler Pump OR DX Enable OR DX Stage 1 OR CW Enable OR CW Stage 1	O

Sequence of Operation

The Indirect Gas-Fired Indoor and Outdoor Heating and Make-Up Air Units, model series “D”, “H”, “I”, and “O” that are equipped with the Modine Control System (MCS) are designed to provide accurate and reliable control of the heating, ventilating, and cooling (if equipped) functions during year-round outdoor ambient conditions.
The unit is intelligently managed by the factory installed Modine Control System featuring the Carel pCOOEM+ series microprocessor based controller with control operating sequences detailed below.

1. Unit On/Off

In order for the unit to run, power must be applied, and the controller’s display used to enable the unit via the “ON/OFF UNIT” sub menu.

- If the unit is “ON”, control will be determined by the current occupancy mode of the unit and control configuration/setpoints.
- If the unit is “OFF”, no setpoint control will take place and the unit will remain in stand-by with all control devices disabled except A2L mitigation.

In addition, the following control sources are also available as secondary means to turn the unit on and off.

a) On/Off by Digital Input: Available when an On/Off switch device is wired to controller input DI1.
b) On/Off by BMS: Available when a BMS Interface Card is installed in controller.
c) On/Off by pAD Thermostat: Available when a Space pAD Thermostat is wired to controller.
d) On/Off by Clock Schedule: Always available – internal RTC supplied within the controller.

2. Unit Occupancy Mode

When the unit is “ON”, there are two modes of occupancy – occupied and unoccupied. To utilize occupancy control a space pAD device must be installed. If there is no space pAD installed, there will be no option to use occupied and unoccupied control setpoints, meaning that the unit will work to condition the space to the occupied requirements whenever the unit is enabled. Occupancy can be determined by any of the following:

a) Occupancy by Digital Input: Set via the controller digital input DI1 through a unit enable relay where:
   - 0V to Relay Coil = Unoccupied
   - 24V to Relay Coil = Occupied

b) BMS Call: Available when BMS Interface Card installed in unit controller
c) Clock Schedule: Configured via the “CLOCK/SCHEDULER” menu.
d) Space Occupancy Override: Set via the override button found on the pAD thermostat.

3. Damper/Air Control Sequences

The unit is available with a number of air control configurations to handle 100% recirculation applications, 100% outside air applications, or a mixture of outside and recirculating air applications. The unit can be configured with or without dampers.

The summaries below include references to Model Digits 20-21. These are meant as a general reference and identify the dampers included and type of actuator, however the unit order documentation or controller setup must be reviewed to confirm the application, as some digits may be the same but have different control strategies. For example, Digits 20-21=GA indicate outside and return air dampers with a modulating actuator, but the control of that actuator can be performed many different ways.

The following summarizes the configurations available and their control strategies:

Sequence of Operation (continued)

100% Outside Air Configuration

This configuration is specific to ventilation/make-up air applications where recirculation is not required. The configurations available are as follows:

A. 100% OA – Outside Air Opening without Dampers, No Return Air (Model Digits 20-21=BA)
No dampers or actuator are installed, therefore no damper control sequence applied.

B. 100% OA – OA Dampers, No Return Air (Model Digits 20-21=DA)
Utilizes outside air dampers only with a 2-position on/off actuator, no return air opening. The dampers open to 100% OA whenever the unit is in occupied mode and closed when unoccupied.
Note: The option exists to have the unit OA dampers open on a call for space heating or cooling, but this is not recommended as it is very energy intensive to introduce 100% OA for space conditioning during unoccupied periods. It is recommended to have dedicated recirculating space conditioning equipment to handle unoccupied space heating/cooling demand.

Recirculating (Return Air) Only Configuration

This configuration is specific to space conditioning applications with no ventilation air required. No dampers or actuators are installed, therefore no damper control sequence is applied. (Model Digits 20-21=AA, BA or CA).

Recirculating and Outside Air Configuration

This configuration provides a combination of space conditioning and ventilation/make-up air when occupied and 100% recirculating capability for space conditioning when unoccupied. All configurations utilize outside and return dampers that are driven in opposite directions (as one opens, the other closes). Damper actuators can be either:

- Two position actuator that is either 100% open outside air with 0% return air when occupied or 100% closed outside air with 100% return air when unoccupied. (Model Digits 20-21=EA)
- Modulating actuator controlled by a 2-10V modulated analog signal from the controller. The outside air damper and return air damper positions always total 100%. For example, if the outside air damper is at 70%, the return air damper will be at 30%. Minimum position can be changed in Service Settings. (Model Digits 20-21=GA)

The modulating actuator (Digits 20-21=GA) can be controlled a number of ways as described below for the occupied mode of operation. In all cases, outside air dampers are closed and return air dampers open in the unoccupied mode. In unoccupied mode the unit would run in full re-circulation mode if there was a space call for heating/cooling.

A. **Two Position (0% or Minimum OA %) via Occupancy Control**
Dampers open to a customer defined minimum position between 20% and 100% outside air.

B. T**wo Position (0% or Minimum OA %) via Digital Input (Multi-Position) Control**
The unit controller sends the damper actuator to one of two positions determined by the combinational logic at digital input U3 on the controller, as shown in the following table.

Damper Position	Digital Input U3
0% OA	Open
Minimum OA %	Closed

C. Three Position (0%, Minimum OA %, Maximum OA %) via Digital Input (Multi-Position) Control
The unit controller sends the damper actuator to one of three positions determined by the combinational logic at digital inputs U3 and U8 on the controller, as shown in the following table. Min and Max OA can be adjusted independently in Service Settings.

Damper Position	Digital Input U3	Digital Input U8
0% OA	Open	Open
Minimum OA %	Closed	Open
Maximum OA 0%	Open	Closed

(continued next page)

Sequence of Operation (continued)

D. Demand Controlled Ventilation (CO_2) Control:

The unit controller sends the damper to a customer defined minimum OA position. A space mounted CO_2 sensor monitors the space CO_2 level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that CO_2 reading against the CO_2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and the dampers are controlled as follows:

1. If the CO_2 level is below the setpoint, the dampers will modulate to the minimum outside air position.
2. If the CO_2 level is above the setpoint, the dampers will modulate to increase the volume of outside air to dilute the CO_2 levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

E. Building Pressurization Control:

The unit controller sends the damper to a customer defined minimum OA position. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100” W.C., adjustable between limits of 0.000” and 5.000” W.C.) and control as follows:

1. If the building pressure is below the setpoint, the dampers will modulate to increase the volume of outside air, increasing building pressure. The dampers will modulate to the maximum OA setpoint, up to 100%.
2. If the building pressure is above the setpoint, the dampers will modulate to reduce the volume of outside air, decreasing the building pressure. The dampers will modulate to the minimum outside air setpoint.

F. Dry Bulb Difference Economizer Control

The unit controller sends the damper to a customer defined minimum OA position. Outdoor Air (OA), Return Air (RA), and Mixed Air (MA) temperature sensors are monitored by the controller and will control as follows:

1. If there is a demand for supply air cooling and the OA temp is lower than the RA temp, economizer cooling is enabled to use OA to cool down the Supply Air (SA) to the SA setpoint.
2. If there is a demand for supply air cooling and the OA temp is higher than the RA temp, the control of the dampers will shift to control MA temperature to the SA setpoint and enable DX cooling (if equipped) to control to the SA setpoint. This allows partial free cooling while achieving the desired SA temperature setpoint.
3. In all other cases, the dampers are at minimum OA position.

G. Dry Bulb Difference Economizer Control with CO_2 Override

This control strategy is the same as Dry Bulb Difference Economizer Control but includes additional monitoring of a space CO_2 sensor. The sensor monitors the space CO_2 level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that CO_2 reading against the CO_2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and the dampers are controlled as follows:

1. If the CO_2 level is below the setpoint, the dampers will modulate based on the Dry Bulb Difference Economizer control.
2. If the CO_2 level is above the setpoint, the controller will override the Dry Bulb Difference Economizer control and the dampers will modulate to increase the volume of outside air to dilute the CO_2 levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

H. Enthalpy Difference Economizer Control

The unit controller sends the damper to a customer defined minimum OA position. Outdoor Air (OA) and Return Air (RA) temperature/humidity (enthalpy) sensors, and a Mixed Air (MA) temperature sensor are monitored by the controller and will control as follows:

1. If there is a demand for supply air cooling and the OA enthalpy is lower than the RA enthalpy, economizer cooling is enabled to use OA to cool down the Supply Air (SA) to the SA setpoint.
2. If there is a demand for supply air cooling and the OA enthalpy is higher than the RA enthalpy, the control of the dampers will shift to control MA temperature to the SA setpoint and enable DX cooling (if equipped) to control to the SA setpoint. This allows partial free cooling while achieving the desired SA temperature setpoint.
3. In all other cases, the dampers are at minimum OA position.

I. Enthalpy Difference Economizer Control with CO_2 Override

This control strategy is the same as Enthalpy Difference Economizer Control but includes additional monitoring of a space CO_2 sensor. The sensor monitors the space CO_2 level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that CO_2 reading against the CO_2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and the dampers are controlled as follows:

1. If the CO_2 level is below the setpoint, the dampers will modulate based on the Enthalpy Difference Economizer control.
2. If the CO_2 level is above the setpoint, the controller will override the Enthalpy Difference Economizer control and the dampers will modulate to increase the volume of outside air to dilute the CO_2 levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

(continued next page)

Sequence of Operation (continued)

J. BMS Damper Control

The unit controller sends a damper control signal to open or close based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation

4. Supply Fan Sequences

The unit features a supply fan motor controlled by either an on/off single speed motor starter or a variable frequency drive. Supply fan controls are coordinated with damper controls to avoid control conflicts. For example, you cannot have building pressure control on both dampers and supply fan.

The available supply fan controls are described below for the occupied mode of operation. In all cases, the fan is either off during unoccupied or intermittent on a call for space heating, cooling, or dehumidification if equipped with a space pAD and configured for unoccupied setback operation. The fan speed will be based on the occupied control point.

For variable air volume applications described below, there are operating range limitations to protect the equipment. Minimum speed is based on a number of factors with the minimum calculated and entered in the controller by the factory for the exact configuration selected. For additional information, refer to the Installation & Service Manual shipped with the unit.

The available supply fan control options are as follows:

A. On/Off Motor Starter: The supply fan operates when the unit controller sends the supply fan motor starter an enable signal. The speed of the fan is not managed by the unit controller.

B. Constant Speed: The supply fan VFD operates at a constant speed that does not dynamically change. The default setpoint is 100% but can be adjusted within the allowable range.

C. Digital Input (Multi-Speed) Control: The unit controller sends the supply fan VFD to one of up to four speed setpoints determined by the combinational logic at two of the digital inputs (U3 and U8) on the controller, as shown in the following table. Each of the four setpoint values can be modified within the allowable range.

VFD Speed	Digital Input U3	Digital Input U8
Fan Off	Open	Open
Low Fan Speed	Closed	Open
Medium Fan Speed	Open	Closed
High Fan Speed	Closed	Closed

D. Building Pressure Control: The supply fan VFD will ramp up to the minimum speed setpoint. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100” W.C., adjustable between limits of 0.000” and 5.000” W.C.) and control as follows:

1. If the building pressure is below the setpoint, the VFD will modulate to increase the volume of outside air, increasing the building pressure. The VFD will modulate up within the allowable range.
2. If the building pressure is above the setpoint, the VFD will modulate to reduce the volume of outside air, decreasing the building pressure. The VFD will modulate down with the allowable range.

E. Duct Pressure Control: The supply fan VFD will ramp up to the minimum speed setpoint. A duct pressure sensor installed downstream in the supply duct monitors the pressure in the duct and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the duct pressure setpoint (default value is 1.500” W.C., adjustable between limits of 0.000” and 5.000” W.C.) and control as follows:

1. If the duct pressure is below the setpoint, the VFD will modulate to increase the volume of supply air, increas ing the duct pressure. The VFD will modulate up within the allowable range.
2. If the duct pressure is above the setpoint, the VFD will modulate to reduce the volume of supply air, decreasing the duct pressure. The VFD will modulate down with the allowable range. In order to prevent over pressuriz ation of the duct work, if the duct pressure sensor detects a pressure above 5.000” W.C. then the unit is imme diately shutdown via the high static pressure alarm. The unit will remain shut down in alarm until the alarm condition is cleared via the handheld display or BMS reset call.

(continued next page)

Sequence of Operation (continued)

F. Demand Controlled Ventilation (CO2) Control: The supply fan VFD will ramp up to the minimum speed setpoint. A CO2 sensor installed in the space monitors the CO2 level and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that CO2 reading against the CO2 setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:

1. If the CO2 level is below the setpoint, the VFD will modulate to reduce the volume of outside air. The VFD will modulate down with the allowable range.
2. If the CO2 level is above the setpoint, the VFD will modulate to increase the volume of outside air to dilute the CO2 levels below the setpoint. The VFD will modulate up with the allowable range.

G. Building Management System (BMS) Control: The supply fan VFD will modulate within the allowable range based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation. 5.

5. Exhaust Fan Sequences

While Modine does not offer exhaust fans with these units, the controller has the capability of controlling an external exhaust fan by others. The controller includes sequences for either a motor starter or a variable frequency drive. Exhaust fan controls are coordinated with supply fan controls to avoid control conflicts. For example, you cannot have building pressure control on both supply and exhaust fans.

The available exhaust fan controls are described below for the occupied mode of operation. In all cases, the fan is off during the unoccupied mode. For variable air volume applications described below, the fan can be controlled within a maximum range to 20% to 100% of configured design speed.

The available exhaust fan control options (if selected) are as follows:

A. On/Off Motor Starter: The exhaust fan is enabled by a relay output on the unit controller. The enable signal is sent to the exhaust fan when the unit is in occupied mode and supply fan is active. The speed of the fan is not managed by the unit controller.

B. Constant Speed: The exhaust fan is enabled by a relay output on the unit controller and is also given a speed control signal by an analog output on the unit controller. The exhaust fan runs at a constant speed, this speed is a configurable setpoint expressed as a “%” value. The default value is 50.0% and this speed setpoint can be adjusted between limits of 20.0% and 100.0%.

C. Supply Fan Offset: The exhaust fan is enabled by a relay output on the unit controller and is also given a speed control signal by an analog output on the unit controller. The exhaust fan runs at a constant speed determined by the supply fan speed and a configurable offset value. By default the supply fan offset is -10%. For example, if the supply fan is running at 50% then the exhaust fan would run at 40% (50% - 10% = 40%). This offset value can be configured between -20% and +20%.

D. Building Pressure Control: The exhaust fan is enabled by a relay output on the unit controller and is also given a speed control signal by an analog output on the unit controller. The exhaust fan VFD will ramp up to the minimum speed setpoint. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100” W.C., adjustable between limits of 0.000” and 5.000” W.C.) and control as follows:

1. If the building pressure is below the setpoint, the VFD will modulate to decrease the volume of exhaust air, increasing the building pressure. The VFD will modulate down within the allowable range.
2. If the building pressure is above the setpoint, the VFD will modulate to increase the volume of exhaust air, increasing the building pressure. The VFD will modulate up with the allowable range.

E. Building Management System (BMS) Control: The exhaust fan is enabled by a relay output on the unit controller and is also given a speed control signal by an analog output on the unit controller. The exhaust fan VFD will modulate within the range described above based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

(continued next page)

Sequence of Operation (continued)

6. Temperature Control Sequences

The temperature control sequences maintain the required supply air temperature via indirect fired gas furnace heating, economizer free cooling and DX,CW or Evaporative cooling. The supply air temperature is monitored by a factory supplied, field installed supply air sensor that is mounted downstream of the unit discharge in the supply duct. Temperature is maintained by modulation of cooling and heating systems to meet the supply air temperature setpoint.

The active supply air temperature control will be one of three possible setpoints:

A. Cooling: The setpoint will be 55.0°F (adjustable from 45°F to 90°F). Cooling operation requires a supply air reset be used to create a call for cooling, as discussed in the "Supply Air Reset Controls" section.

Note: Econ will be displayed when the Enthalpy Economizer damper control (if equipped) is active without any DX cooling active. For more information on the Enthalpy Economizer damper control, refer to the "Damper Sequences" section.

B. Heating: The setpoint will be 100.0°F (adjustable from 60°F to 150°F). Heating operation requires a supply air reset be used to create a call for heating, as discussed in the "Supply Air Reset Controls" section.

C. Neutral Air: The setpoint will be 70°F (adjustable from 50°F to 90°F). The neutral air setpoint is active if there is no call for heating or cooling from a supply air reset. Note: If a pAD thermostat is located in the conditioned space but the unit is configured to control temperature to neutral air, the pAD can still be used as a means of adjusting the neutral air temperature setpoint, allowing the building owner to increase and decrease the setpoint without having to open the roof top unit control panel.

Dehumidification is not covered in this section. It will be detailed in a separate section called "Dehumidification Control Sequences".

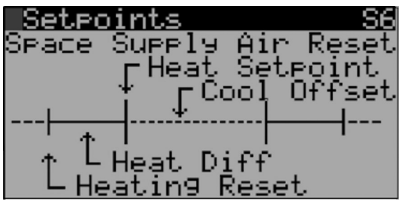
Supply Air Temperature Resets

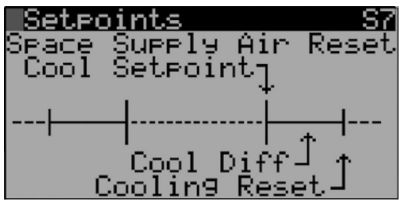
While the basic control for supply air temperature control is neutral air, reset of the supply air temperature for heating or cooling can be configured using either a space temperature sensor (pAD), the outdoor or mixed air temperature sensor, or a combination of both. Each is described as follows:

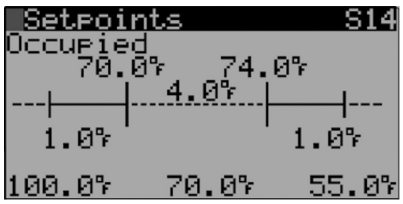
A. Space Temperature Reset: The space reset call comes from the pAD mounted in the conditioned space. This call is generated based on the space temperature and space cooling and heating setpoints. The default space temperature setpoint values are as follows:

1. Occupied Mode
   - Cooling: 74.0°F (adjustable from 50.0°F to 90.0°F)
   - Heating: 70.0°F (determined by the Heat Offset, see next item)
   - Heating Offset: 4.0°F (adjustable from 2.0°F to 20.0°F)
   - Heating Differential: 1.0°F (adjustable from 1.0°F to 10°F)
   - Cooling Differential: 1.0°F (adjustable from 1.0°F to 10°F)

The Heating Offset determines how far below the cooling setpoint the temperature must fall before the unit enters the heating mode. The Heating and Cooling differentials prevent short cycling. Graphically, the occupied mode setpoints above are as follows:







Note the bottom row displays the Heating, Neutral Air, and Cooling supply air reset temperature setpoints. For space temperatures between the Heating and Cooling setpoints, the unit is in Stand-By mode.

For example, with a heating setpoint of 70.0°F the space must fall below 69.0°F (70.0°F - 1.0°F) before a heating reset call is sent to the unit. The space must rise above 70°F before the heating reset condition is cleared. On a call for space heating, the supply air temperature setpoint will be reset to or heating is satisfied, the unit will return to the neutral air active setpoint which is 70°F.

(continued next page)

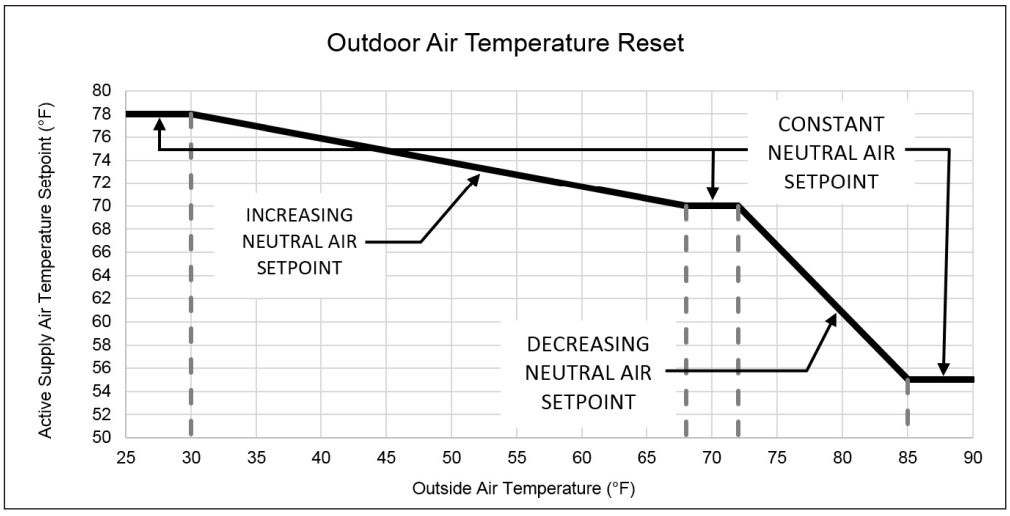
Sequence of Operation (continued)

B. **Outdoor Air Temperature Reset:** The outdoor reset calls comes from the outdoor air temperature sensor. This call is generated based on the outdoor temperature and outdoor cooling and heating setpoints. The resulting supply air temperature setpoint is proportionally increased in the heating reset mode or decreased in the cooling reset mode. This is only active in the occupied mode. This method of temperature control is best suited to preventing the space temperature rising too high during high ambient conditions or falling too low during low ambient conditions. The default temperature setpoint values are as follows:

1. **Heating Neutral Air Reset** (values below on Setpoints S1 screen)
   - OA (top left value): 30.0°F (adjustable from 0.0°F to 50.0°F)
   - HTG (top right value): 78.0°F (adjustable from 60.0°F to 100.0°F)
   - OA (bottom left value): 68.0°F (adjustable from 50.0°F to 75.0°F)
   - NA (bottom right value): 70.0°F (adjustable from 60.0°F to 80.0°F)
2. **Cooling Neutral Air Reset** (values shown below on Setpoints S2 screen)
   - OA (top left value): 72.0°F (adjustable from 65.0°F to 75.0°F)
   - NA (top right value): 70.0°F (adjustable from 60.0°F to 80.0°F)
   - OA (bottom left value): 85.0°F (adjustable from 75.0°F - 100.0°F)
   - CLG (bottom right value): 55.0°F (adjustable from 50.0°F - 80.0°F)

The Outdoor Air Temperature Reset sequence is much easier to understand if viewed graphically. Reviewing the setpoints and the graphic below, the following is the sequence:

- **Outside Air between 68°F and 72°F:** The neutral air setpoint will be 70.0°F.
- **Outside Air below 68°F:** The neutral air setpoint is adjusted as follows:
  - **From 68°F down to 30°F:** The setpoint will be proportionally increased from 70.1°F to 77.9°F.
  - **Below 30°F:** The setpoint will be 78.0°F.
- **Outside Air above 72°F:** The neutral air setpoint is adjusted as follows:
  - **From 72°F up to 85°F:** The setpoint will be proportionally decreased from 69.9°F to 54.9°F.
  - **Above 85°F:** The setpoint will be 55.0°F.



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Sequence of Operation (continued)

Supply Air Temperature Resets

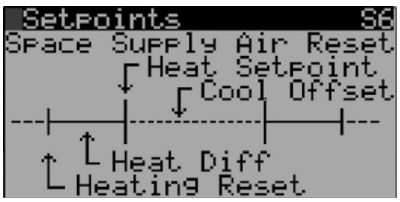
While the basic control for supply air temperature control is neutral air, reset of the supply air temperature for heating or cooling can be configured using either a space temperature sensor (pAD), the outdoor or mixed air temperature sensor, or a combination of both. Each is described as follows:

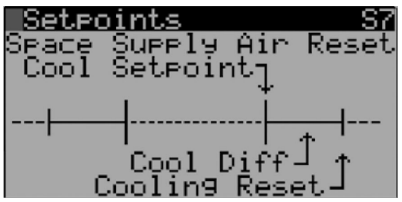
A. **Space Temperature Reset:** The space reset call comes from the pAD mounted in the conditioned space. This call is generated based on the space temperature and space cooling and heating setpoints. The default space temperature setpoint values are as follows:

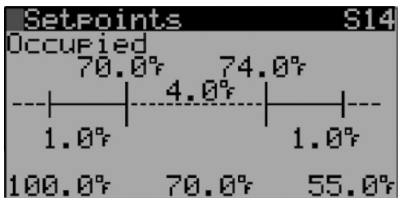
1. Occupied Mode

   - Cooling: 74.0°F (adjustable from 50.0°F to 90.0°F)
   - Heating: 70.0°F (determined by the Heat Offset, see next item)
   - Heating Offset: 4.0°F (adjustable from 2.0°F to 20.0°F)
   - Heating Differential: 1.0°F (adjustable from 1.0°F to 10°F)
   - Cooling Differential: 1.0°F (adjustable from 1.0°F to 10°F)

The Heating Offset determines how far below the cooling setpoint the temperature must fall before the unit enters the heating mode. The Heating and Cooling differentials prevent short cycling. Graphically, the occupied mode setpoints above are as follows:







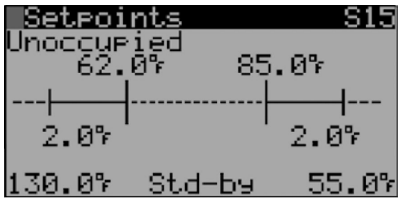
Note the bottom row displays the Heating, Neutral Air, and Cooling supply air reset temperature setpoints.

For example, with a heating setpoint of 70.0°F the space must fall below 69.0°F (70.0°F - 1.0°F) before a heating reset call is sent to the unit. The space must rise above 70°F before the heating reset condition is cleared. On a call for space heating, the supply air temperature setpoint will be reset to 100°F. Once the call for heating is satisfied, the unit will return to the neutral air active setpoint which is 70°F.

2. Unoccupied Mode

   - Cooling: 85.0°F (adjustable from 70.0°F to 90.0°F)
   - Heating: 62.0°F (adjustable from 50.0°F to 70.0°F)
   - Heating Differential: 2.0°F (adjustable from 1.0°F to 10°F)
   - Cooling Differential: 2.0°F (adjustable from 1.0°F to 10°F)

Graphically, the unoccupied mode setpoints above are as follows:



Note the bottom row displays the Heating and Cooling supply air reset temperature setpoints. For space temperatures between the Heating and Cooling setpoints, the unit is in Stand-By mode.

For example, with a heating setpoint of 62.0°F the space must fall below 60.0°F (62.0°F - 2.0°F) before a heating reset call is sent to the unit. The space must rise above 62°F before the heating reset condition is cleared. On a call for space heating, the supply air temperature setpoint will be reset to 130°F. Once the call for heating is satisfied, the unit will return to the Stand-By mode of operation.

(continued next page)

Sequence of Operation (continued)

Mechanical Heating/Cooling System Response to Heating/Cooling Resets

With supply air heating and cooling resets detailed above, the following describes the control of heating and cooling (if equipped) to maintain the active supply air setpoint.

A. **Heating:** On receiving a call for heating the unit controller compares the supply air temperature from the duct sensor with the active supply air temperature in order to generate a heating demand, ranging from 0-100%, using a proprietary PID control loop. All furnace control sequences use a minimum furnace run time and a minimum furnace stage time delay. The unit is available with 1, 2, or 3 furnaces in series. The sequence of each is as follows:

1. **Single Furnace Units (75-400MBH):** Single furnace units are built with a modulating furnace with turndown down to 40% of full rating. The unit controller sends a 0-10VDC modulating signal to the modulating valve to maintain the required active supply air temperature setpoint.

2. **Two Furnace Units (500-800MBH):** Two furnace units are built with a modulating furnace with turndown down to 40% of full rating in series with a 2 stage furnace. This provides a system modulation range of 20% to 100% of full rating The unit controller sends a 0-10VDC modulating signal to the modulating valve to maintain the required active supply air temperature setpoint. Stages on Furnace 2 are enabled automatically based on demand.

3. **Three Furnace Units (1050-1200MBH [model sizes 840-960]):** Three furnace units are built with a modulating furnace with turndown down to 40% of full rating in series with two 2 stage furnaces. This provides a system modulation range of 13% to 100% of full rating The unit controller sends a 0-10VDC modulating signal to the modulating valve to maintain the required active supply air temperature setpoint. Stages on Furnace 2 and 3 are enabled automatically based on demand. Three furnace units also include furnace rotation on failure and run hours in order achieve high system up time and balance individual heat exchanger run hours.

B. **Cooling:** The unit offers cooling control options as follows:

1. **DX or Chilled Water Cooling:** On receiving a call for cooling the unit controller compares the supply air temperature with the active supply air temperature setpoint in order to generate a cooling demand using a proprietary PI control loop. Cooling can be configured as single stage, two stage, or modulating.

   a) **Staged Cooling:** Each stage will have an ON demand % and an OFF demand % with respect to the units cooling demand range and sent to the external cooling system via relay enable output(s) on the unit controller.

   b) **Modulating Cooling:** The cooling demand % will be scaled as a 0-10vDC control signal and sent to the external cooling system via an analog output and relay enable output on the unit controller.

   b) For DX systems, the controller also has the ability to accept a single fault signal back from a DX cooling system. If at any time a fault signal is detected while there is a DX demand signal being sent from the unit controller, the DX demand will be inhibited, and an alarm generated.

2. **Evaporative Cooling:** The controller manages the Evaporative Cooler Fill Valve, Drain Valve, and Pump via controller relay outputs. The controller also monitors an optional float switch (if equipped) via controller digital inputs. Evaporative cooling can be based on either Space Temperature or Outdoor Air Temperature. The evaporative cooler is controlled as follows:

   a) Evaporative cooling is available if the outdoor air is above the default OA Enable Setpoint of 74.0°F (adjustable).

   b) The drain valve closes, the fill valve opens, and the tank is filled.

   c) The optional float switch can be used to ensure that there is an adequate level of water in the tank before the pump is allowed to run.

   d) The pump will run to provide cooling based on two possible configurations:

      i. **Outside Temperature Control:** The pump will run while the outdoor temperature is above the OA Enable Setpoint.

      ii. **Space Temperature Control:** This requires the unit be equipped with a space pAD and be in the occupied mode When the space temperature is above the default Cooling Setpoint of 74.0°F (adjustable) the pump is turned on until the space falls below the space Cooling Setpoint off value of 72.0°F (adjustable). The pump will remain off and water will remain in the tank until the outdoor temperature falls below the OA Disable Setpoint of 70.0°F (adjustable), at which the tank will be drained by opening the drain valve and closing the fill valve.

   e) Once the outdoor temperature falls below the OA Disable Setpoint of 70.0°F (adjustable) the pump will be disabled, and the tank will be drained by opening the drain valve and closing the fill valve.

(continued next page)

Sequence of Operation (continued)

7. Dehumidification Control Sequences

The dehumidification (dehum) control is sequenced to maintain the required space humidity in both occupied and unoccupied mode via the mechanical DX or CW cooling system (if equipped). Dehum can be initiated based on space relative humidity (RH), mixed air dew point (MADP), outdoor air dew point (OADP), or a combination of space RH / MADP or space RH / OADP. If the dehum mode is set to none, there is no dehum sequence initiated.

Temperature control is not covered in this section. It is detailed in a separate section called “Temperature Control Sequences”.

Dehum Initiation Options

A. **Space RH Control:** This option requires a space pAD with humidity sensing be installed in the space. The call for dehum comes from the pAD and is generated based on the space RH and the space RH setpoints. The default space humidity setpoints are as follows:

- Occupied Mode: 60% RH (adjustable from 0% to 100% RH)
- Unoccupied Mode: 70% RH (adjustable from 0% to 100% RH)

A 5% RH offset is applied to the space dehum setpoints to prevent short cycling of a dehum call from the space pAD. For example, with an occupied humidity setpoint of 60% RH, the space must be dehumidified to 55% RH before the dehum call is ended.

B. **Outdoor Air DP Control:** This option requires an outdoor temperature/humidity sensor be installed. The call for dehum comes from the outdoor sensor and is generated based on the calculated outdoor air dew point and comparing against the outdoor air dew point setpoint. This cannot call for dehum in unoccupied. See Combination Outdoor DP/ Space RH control option. The default dew point setpoint is

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

C. **Combination Outdoor Air DP and Space RH Control:** This option is a combination of both Outdoor Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as outdoor air DP control alone does not permit unoccupied operation. The default dew point setpoints are:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

D. **Mixed Air DP Control:** This option requires a return air temperature/humidity sensor, an outdoor air temperature/ humidity sensor, and mixed air dry bulb temperature sensor be installed. The call for dehum comes from the calculated mixed air DP value and compared against the mixed air DP setpoint. This cannot call for dehum in unoccupied. See Combination Mixed Air DP/Space RH control option. The default mixed air DP setpoints are as follows:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

E. **Combination Mixed Air DP and Space RH Control:** This option is a combination of both Mixed Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as mixed air DP control alone does not permit unoccupied operation. The default mixed air DP setpoints are as follows:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

Dehum/Cooling Control Priority

The unit is designed to prioritize temperature control over humidity control, therefore the unit must have satisfied supply air cooling demand and heating demand before dehumidification is allowed. If the supply air temperature or the space temperature drops too low as a result of the dehum process then dehum is stopped.

Once dehum demand is active, the unit controls the supply air cooling demand to the supply air dehum setpoint (default 50.0°F, adjustable). which is typically 5°F below the cooling setpoint. This lower temperature setpoint is to further reduce the temperature below the dew point to increase moisture removal.

Sequence of Operation (continued)

8. A2L Refrigerant Leak Dissipation System Sequences:

The mechanical DX cooling system uses R-32 or R-454B refrigerants which are classified as mildly flammable A2L refrigerants. This requires the unit have a leak dissipation system consisting of a A2L sensor certified to UL-60335-2-40. The dissipation system is automatic, factory installed and wired, and requires no additional field connections to function. Field connections are available to receive system status. When the system detects a leak, the following mitigation actions will be initiated until refrigerant has not been detected for at least 5 minutes:

A. The blower will be forced on if not running. Motor starter units will energize the blower. If a variable speed blower is configured, the speed will be set to the service screen maximum speed.
B. The damper, if equipped, will be forced to 100% outdoor air.
C. Heating and DX cooling will be locked out and not allowed to run. If either heating or cooling is active during that start of mitigation, it will be shut down immediately.
D. If an external exhaust fan is configured, it will be forced on. If it is of a modulating type, it will be sent a 50% demand.
E. An A2L Leak alarm will be generated and logged in the recallable dissipation alarm history on Modine Control System Carel controller. If equipped with BACnet, the BMS system is notified of a dissipation event via readable alarm point.
F. The unit will be in “OFF BY ALARM” mode until the A2L leak alarm is manually reset via PGD1 or BMS. If a leak is reintroduced while in this mode, the unit will still mitigate as needed.
G. The dissipation system shall be “Fail Safe” per UL requirements. If a refrigerant sensor has a fault or is disconnected, the unit will initiate the mitigation actions.

NOTE: By default, if the unit is configured with a smoke sensor, and it is receiving a smoke/fire signal this will bypass the mitigation sequence, and shut the unit down.

Display/Keypad Functions

The Modine Control System option includes a unit mounted pLDpro user interface with LCD display and keypad. Additionally, all functions of the interface can be replicated using the remote user interface module, pGD1 or pGDE.

Carel pLDpro User Interface Display and Keypad

Remote User Interface Module □

□ Refer to Literature #15-543 for installation instructions. Refer to the Board Settings section for instructions on programming the remote display keypad to the controller.

Standard Keypad Button Functions

pLDpro Built-In Keypad	pGD1 Remote User Interface Module	Function	Button Function
		ALARM	Illuminated when there is an active alarm, pressing once will allow viewing of active alarms, pressing twice will reset active manual-reset alarms.
	Prg	PRG	Selects the main navigation menu screen.
	Esc	ESC	Returns to the main unit status display screen.
		UP	Scroll through display screens, settings, or increase the setpoint value.
		ENTER	Confirm point adjustments or move the cursor to the next available set point.
		DOWN	Scroll through display screens, settings, or decrease the setpoint value.

Extra Function Keypad Button Sequences

pLDpro Built-In Keypad	pGD1 Remote User Interface Module	Function	Button Function
+ +	+ +	UP + DOWN+ ENTER	Accesses controller address.
+	+	ALARM + ENTER	Accesses controller system information.

□ If using the pGDE remote user interface module, the keypad keys match the pLDpro keypad.

Sequence of Operation (continued)

7. Dehumidification Control Sequences

The dehumidification (dehum) control is sequenced to maintain the required space humidity in both occupied and unoccupied mode via the mechanical DX or CW cooling system (if equipped). Dehum can be initiated based on space relative humidity (RH), mixed air dew point (MADP), outdoor air dew point (OADP), or a combination of space RH / MADP or space RH / OADP. If the dehum mode is set to none, there is no dehum sequence initiated.

Temperature control is not covered in this section. It is detailed in a separate section called “Temperature Control Sequences”.

Dehum Initiation Options

A. **Space RH Control:** This option requires a space pAD with humidity sensing be installed in the space. The call for dehum comes from the pAD and is generated based on the space RH and the space RH setpoints. The default space humidity setpoints are as follows:

- Occupied Mode: 60% RH (adjustable from 0% to 100% RH)
- Unoccupied Mode: 70% RH (adjustable from 0% to 100% RH)

A 5% RH offset is applied to the space dehum setpoints to prevent short cycling of a dehum call from the space pAD. For example, with an occupied humidity setpoint of 60% RH, the space must be dehumidified to 55% RH before the dehum call is ended.

B. **Outdoor Air DP Control:** This option requires an outdoor temperature/humidity sensor be installed. The call for dehum comes from the outdoor sensor and is generated based on the calculated outdoor air dew point and comparing against the outdoor air dew point setpoint. This cannot call for dehum in unoccupied. See Combination Outdoor DP/ Space RH control option. The default dew point setpoint is

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

C. **Combination Outdoor Air DP and Space RH Control:** This option is a combination of both Outdoor Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as outdoor air DP control alone does not permit unoccupied operation. The default dew point setpoints are:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

D. **Mixed Air DP Control:** This option requires a return air temperature/humidity sensor, an outdoor air temperature/ humidity sensor, and mixed air dry bulb temperature sensor be installed. The call for dehum comes from the calculated mixed air DP value and compared against the mixed air DP setpoint. This cannot call for dehum in unoccupied. See Combination Mixed Air DP/Space RH control option. The default mixed air DP setpoints are as follows:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

E. **Combination Mixed Air DP and Space RH Control:** This option is a combination of both Mixed Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as mixed air DP control alone does not permit unoccupied operation. The default mixed air DP setpoints are as follows:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

Dehum/Cooling Control Priority

The unit is designed to prioritize temperature control over humidity control, therefore the unit must have satisfied supply air cooling demand and heating demand before dehumidification is allowed. If the supply air temperature or the space temperature drops too low as a result of the dehum process then dehum is stopped.

Once dehum demand is active, the unit controls the supply air cooling demand to the supply air dehum setpoint (default 50.0°F, adjustable). which is typically 5°F below the cooling setpoint. This lower temperature setpoint is to further reduce the temperature below the dew point to increase moisture removal.

Password Protection

⚠ WARNING

Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

To prevent unauthorized adjustments, a password is required to gain access to certain menus. When a password is required, the following screen will be displayed:

The password can be entered by using the UP or DOWN key to scroll through the values for each digit, then pressing ENTER to move the cursor to the next digit. Repeat this process until all four digits of the password are entered.

The password for appropriate Service sub menu selections is 1500. The password for the Manufacturer sub menu is a custom, one-time password that is only available by contacting the Service Department at Modine.

Menu Navigation

The Main Status Screen is displayed when the unit is first turned on or after one minute of keypad inactivity. From this Main Status Screen, eight sub menus can be accessed. Details on the Main Status Screen and each sub menu shown below will be detailed in the following sections of this manual.

Sub Menu Selections

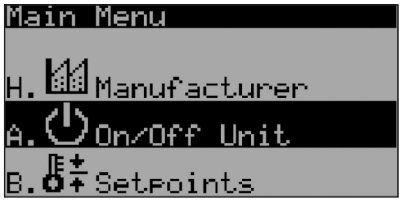
Sub Menu	Description
A. On/Off Unit	Switch unit on or off.
B. Setpoints	View the user setpoints.
C. Clock/Scheduler	View the current time and date and occupancy schedule.
D. Input/Output	View the status of the controller inputs and outputs.
E. Alarm Logger	View the alarm log.
F. Board Switch	Change the controller pLAN board address.
G. Service	View maintenance related parameters, such as hours run, sensor calibration and manual overrides.
H. Manufacturer	Manufacturer menu and adjustment of various manufacturer related parameters, such as unit configuration and timing settings.

Example Sub Menu Navigation

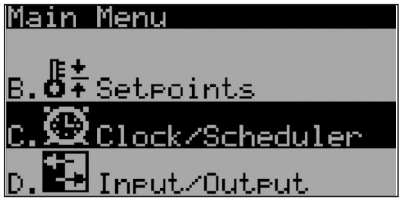
The following example shows how to navigate to and enter the Clock/Scheduler sub menu, however the process is similar for all sub menu selections.

1. Starting from the Main Status Screen:

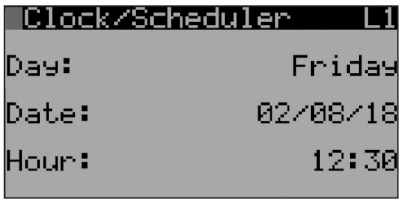
2. Press the PRG key to access the sub menu. Note that the sub menu starts with On/Off Unit highlighted.



3. Press the UP or DOWN key repeatedly until the Clock/Scheduler sub menu is selected.

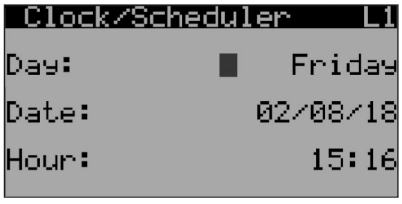


4. Press the ENTER key to enter the sub menu.



5. Once within the sub menu, if the blinking cursor is located in top line of the screen, pressing the UP or DOWN keys will scroll through available Clock/Scheduler sub menus.

6. If the user wants to change a parameter on the displayed sub menu, pressing the ENTER key will move the cursor to the parameter settings and successive presses of ENTER will move the cursor to the next item. To change any item, the UP or DOWN arrow keys can be used to make the changes. Note that some selections are read only and cannot be changed.



7. To revert back to the previous sub menu level, press the ESC key.

Menu Tree

Regardless of the current screen displayed, pressing the PRG key main sub menu listing, indicated on page 8 and as shown below. The sub menu screens shown are condensed on this page and are detailed further in this manual. Depending on the configuration of the unit, not all sub menu screens are available.

MAIN SCREEN	MAIN MENU	SUB MENU SCREENS ①	SCREEN #
Unit Status	A. On/Off Unit	On/Off Unit	-
	B. Setpoints	Neutral Air	S1
		Space Temperature Resets	S2-9
		Outdoor Temperature Resets	S10-13
		Occupied	S14
		Unoccupied	S15
		Dehum Dewpt Setpoints	S16-17
		Dehum rH Setpoints	S18-19
		Dehum Supply Air Temperature Setpoint	S20
	C. Clock/ Scheduler	Clock	L1-2
		Scheduler	L3-6
		Holidays	L7-11
	D. Input/Output	Universal In/Out	R1-16
		Digital Inputs	T1-8
		Relay Outputs	V1-15
		Analog Outputs	W1-5
	E. Alarm Logger	Alarm Log	-
	F. Board Switch		-
	G. Service	a. Information	A1-5
		b. Run Hours	X1-11
		c. Service Settings / a. Maint. Hours Set	M1-10
		c. Service Settings / b. Probe Adjustment	P1-9
		c. Service Settings / c. Control Settings	CS1-36
		c. Service Settings / d. P/PI/PID Loops	D1-16
		c. Service Settings / e. Alarm Management	AM1-11
		d. pAD Config.	PC1-4
		e. BMS Config.	U1-8
		f. Fieldbus Config.	FB1
		g. Manual Management / a. Manual Control	MN1-2
		g. Manual Management / b. Universal In/Out	C1-9
		g. Manual Management / c. Digital Inputs	D1-8
		g. Manual Management / d. Relay Outputs	G1-G15
		g. Manual Management / e. Analog Outputs	H1-5
	H. Manufacturer	Manufacturer sub menu is for factory setup and not accessible without contacting the factory for guidance.	

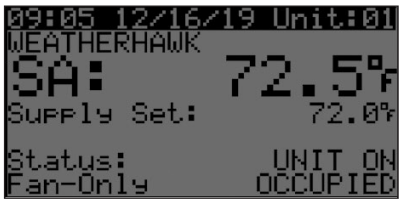
Shaded Area Requires Password for Access

① Menu tree listing is condensed and may show selections that are not available on all units.

① Menu tree listing is condensed and may show selections that are not available on all units.

Main Status Screen

The Main Status Screen is displayed when the unit is first turned on or after one minute of keypad inactivity. The following information is displayed on the Main Status Screen:



- Time/date
- Unit number
- Supply Air Temperature
- Current Supply Air Setpoint
- Unit Status
- Unit Mode

Once this screen is displayed, the user can navigate up and down through the list of Main Status Screen Parameters by using the UP or DOWN buttons. These screens are described in further detail in the next section.

Note that the main unit controller will always show as Unit: 01.

Main Status Screen Parameters

The following table describes the menu parameters:

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Main Screen		**Time/Date:**	Actual Value	Hr:Min MM/DD/YY	
		SA:	Actual Value		°F
		Supply Set:	Actual Value		°F
		Status: (Off/On)	Actual Value	WAITING UNIT ON OFF by ALARM OFF by pLAN OFF by BMS OFF by CLOCK OFF by DIG-IN OFF-KEYPAD OFF-OPEN DOOR WAIT SUP FAN WAIT-DAMPER	
		(Mode)	Actual Value	Fan-Only Econ Heating Cooling Dehumid	
		(Occupancy)	Actual Value	UNOCCUPIED OCCUPIED-BMS OCCUPIED-CLK OCCUPIED-DIG OCCUPIED-PAD OCCUPIED	
pAD Thermostat *(Screen visible only if pAD is enabled)*	**M1**	**pAD Thermostat:** (Address)	Actual Value		
		Temperature:	Actual Value		°F
		pAD Humidity: (If Available on pAD)	Actual Value		%rH
		Dew Point:	Actual Value		°F
		Enthalpy:	Actual Value		BTU/Lb.

(continued next page)

Main Status Screen Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Furnace 2 Stage 1	M11	**Able To Turn On:**	Actual Value	No Yes	
		Able To Turn Off:	Actual Value	No Yes	
		Minimum On Time Remaining:	Actual Value		s
Furnace 2 Stage 2	M12	**Able To Turn On:**	Actual Value	No Yes	
		Able To Turn Off:	Actual Value	No Yes	
		Minimum On Time Remaining:	Actual Value		s
Furnace 3	M13	**Stage 1 Call:**	Actual Value	Disabled Enabled	
		Stage 2 Call:	Actual Value	Disabled Enabled	
		Safety Chain:	Actual Value	Open Closed	
Furnace 3 Stage 1	M14	**Able To Turn On:**	Actual Value	No Yes	
		Able To Turn Off:	Actual Value	No Yes	
		Minimum On Time Remaining:	Actual Value		s
Furnace 3 Stage 2	M15	**Able To Turn On:**	Actual Value	No Yes	
		Able To Turn Off:	Actual Value	No Yes	
		Minimum On Time Remaining:	Actual Value		s
Dry Bulb Economizer	M16	**Allowed:**	Actual Value	No Yes	
		Active:	Actual Value	No Yes	
		Damper Demand:	Actual Value	0 - 100	%
Enthalpy Economizer	M16	**Allowed:**	Actual Value	No Yes	
		Active:	Actual Value	No Yes	
		Damper Demand:	Actual Value	0 - 100	%
CW Cooling	M17	**Demand:**	Actual Value	0 - 100	%
		Output:	Actual Value	0 - 10	vDC
DX Cooling	M17	**Demand:**	Actual Value	0 - 100	%
		Output:	Actual Value	0 - 10	vDC
Evaporative Cooling	M17	**Fill Valve:**	Actual Value	Open Closed	
		Drain Valve:	Actual Value	Open Closed	
		Float Switch:	Actual Value	Open Closed	
		Pump:	Actual Value	Off On	
Evaporative Cooling Auto Flush	M18	**Fill Valve Time Counter:**	Actual Value		hrs

(continued next page)

Main Status Screen Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Dehumidification	**M19**	**Call:**	Actual Value	No Yes	
		Inhibitted:	Actual Value	No Yes	
		Active:	Actual Value	No Yes	
		SAT SP:	Actual Value		°F
		SAT:	Actual Value		°F
Damper Status	**M20**	**Outdoor Air Pos:**	Actual Value	Closed Open 0 - 100	
		Return Air Pos: (If Enabled)	Actual Value	0 - 100	%
Air Flow Status	**M21**	**Blower:** (On/Off)	Actual Value	Off On	
		Blower: (Modulating)	Actual Value	0 - 100	%
		Exhaust Fan:	Actual Value	0 - 100	%
Duct Pressure *(screen visible only with duct pressure sensor)*	**M22**	**Pressure:**	Actual Value		iwc
		Setpoint	Actual Value		iwc
Building Pressure *(screen visible only with building pressure sensor)*	**M23**	**Pressure:**	Actual Value		iwc
		Setpoint:	Actual Value		iwc
Space CO2 *(Screen Visible only with CO2 Sensor)*	**M24**	**CO2 Content:**	Actual Value		ppm
		CO2 setpoint:	Actual Value		ppm
Unit On/Off Scheduler	**M25**	**Clock Override:**	Actual Value	Off On	
		Override Time:	Actual Value	1 - 3	(hr)hours
Unit Occupancy Scheduler	**M26**	**Clock Override:**	Actual Value	Off On	
		Override Time:	Actual Value	1 - 3	(hr)hours
Manual I/O Status	**M27**	**Unit Operating Mode:**	Actual Value	Auto Manual	
		Reset Unit To Auto Mode:	No	No Yes	

MODINE CONTROLS SYSTEM MANUAL
Main Status Screen Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Control Temp/Hum *(Screen Visible only if Serial Probes are enabled)*	**M2**	**Temperature:**	Actual Value		°F
		Humidity:	Actual Value		%rH
		Dew Point:	Actual Value		°F
		Enthalpy:	Actual Value		BTU/Lb.
Return Air *(Screen visible only if unit has RAT)*	**M3**	**Temperature:**	Actual Value		°F
		Humidity:	Actual Value		%rH
		Dew Point:	Actual Value		°F
		Enthalpy:	Actual Value		BTU/Lb.
Mixed Air *(Screen visible only if unit has MAT)*	**M4**	**Temperature:**	Actual Value		°F
		Humidity:	Actual Value		%rH
		Dew Point:	Actual Value		°F
		Enthalpy:	Actual Value		BTU/Lb.
Outdoor Air *(Screen visible only if unit has OAT)*	**M5**	**Temperature:**	Actual Value		°F
		Humidity:	Actual Value		%rH
		Dew Point:	Actual Value		°F
		Enthalpy:	Actual Value		BTU/Lb.
Lockouts	**M6**	**Heating Lockout:**	Actual Value	No Yes	
		CW Cooling Lockout:	Actual Value	No Yes	
		DX Cooling Lockout:	Actual Value	No Yes	
		Evap Cool Lockout:	Actual Value	No Yes	
		Lockouts:	Actual Value	None Cooling Heating Cool & Heat	
Demand Status	**M7**	**Heating Demand:**	Actual Value	0 - 100	%
		Cooling Demand: (if enabled)	Actual Value	0 - 100	%
		Dehum. Demand: (if enabled)	Actual Value	0 - 100	%
		Unit tD: (if enabled)	Actual Value		°F
Furnace 1	**M8**	**Call:**	Actual Value	Disabled Enabled	
		Safety Chain:	Actual Value	Open Closed	
		Demand:	Actual Value	0 - 100	%
		Signal:	Actual Value	0 - 10	vDC
Furnace 1	**M9**	**Able To Turn On:**	Actual Value	No Yes	
		Able To Turn Off:	Actual Value	No Yes	
		Minimum On Time Remaining:	Actual Value		s
Furnace 2	**M10**	**Stage 1 Call:**	Actual Value	Disabled Enabled	
		Stage 2 Call:	Actual Value	Disabled Enabled	
		Safety Chain:	Actual Value	Open Closed	

(continued next page)

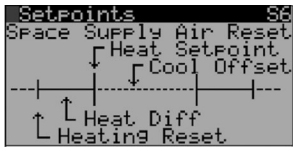
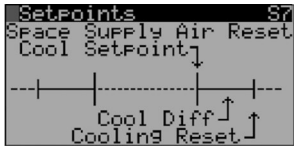
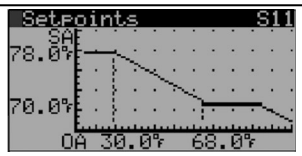
A. On/Off Unit Sub Menu Parameters

The On/Off Unit menu allows the user to view the detailed On/Off status of the controller.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
On/Off Unit		**Unit Address:**	Actual Value	1 - 32	
		Power by Display:	OFF	OFF ON	
		Status:	OFF by KEYPAD	WAITING UNIT ON OFF by ALARM OFF by pLAN OFF by BMS OFF by CLOCK OFF by DIG-IN OFF-KEYPAD OFF-OPEN DOOR WAIT SUP FAN WAIT- DAMPER	
On/Off Unit *(Screen visible only with pAD enabled)*		**pAD n°**	1	1 - 32	
		On/Off	ALWAYS ON	ALWAYS ON pLAN ON/OFF	

B. Setpoints Sub Menu Parameters

The Setpoint menu allows the user to view and adjust temperature related parameters.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Neutral Air Setpoint *(Reset type NONE)*	**S1**	**Neutral Air Setpoint:**	70.0	45.0 - 150.0	°F
pAD Thermostat Occupied Setpoints *(Screen Visible with pAD)*	**S2**	**Space pAD** *(Address)*	Actual Value	1 - 32	
		Heat Setpoint:	74.0	50.0 - 90.0	°F
		Cool Offset:	4.0	2 - 40	°F
		Cool Setpoint:	Actual Value	Actual Value	°F
Differentials Occupied	**S3**	**Heat Diff:**	1.0	1.0 - 10.0	°F
		Cool Diff:	1.0	1.0 - 10.0	°F
pAD Thermostat Unoccupied Setpoints *(Screen Visible with pAD)*	**S4**	**Space pAD** *(Address)*	Actual Value	1 - 32	
		Heat Setpoint:	85.0	50.0 - 90.0	°F
		Cool Setpoint:	62.0	50.0 - 90.0	°F
Differentials Unoccupied	**S5**	**Heat Diff:**	2.0	1.0 - 10.0	°F
		Cool Diff:	2.0	1.0 - 10.0	°F
Space Supply Air Reset Heating *(Graphical Display of Space Reset Setpoints, if configured)*	**S6**		Reference Only (These correlate to the settings in S2 and S3 with actual values seen in screen S14)		
Space Supply Air Reset Cooling *(Graphical Display of Space Reset Setpoints, if configured)*	**S7**		Reference Only (These correlate to the settings in S4 and S5 with actual values seen in screens S15)		
Supply Air Reset Occupied	**S8**	**Heating Reset:**	100.0	50.0 - 130.0	°F
		Neutral Air: *(Space Reset Only)*	70.0	50.0 - 90.0	°F
		Cooling Reset:	55.0	45.0 - 90.0	°F
Supply Air Reset Unoccupied	**S9**	**Heating Reset:**	55.0	50.0 - 130.0	°F
		Cooling Reset:	80.0	45.0 - 90.0	°F
Outdoor Air Heating Reset	**S10**	**OA** *(Top Left Value)*	30.0	0.0 - 50.0	°F
		NA High *(Top Right Value)*	78.0	60.0 - 100.0	°F
		OA *(Bottom Left Value)*	68.0	50.0 - 75.0	°F
		NA Low *(Bottom Right Value)* *(Same as Cooling NA High)*	70.0	60.0 - 80.0	°F
		NA Granularity: *(Rate at which change occurs)*	0.5	0.5 or 1.0	°F
Outdoor Air Heating Reset Setpoints *(Graphical Display of S10 Outdoor Air Reset Setpoints, if configured)*	**S11**		Actual Value		°F

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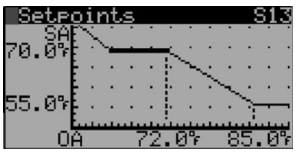
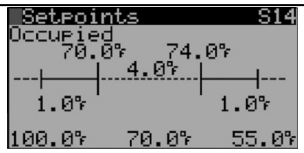
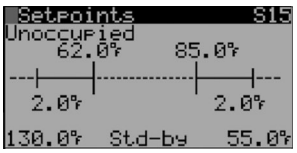
B. Setpoints Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Outdoor Air Cooling Reset	**S12**	**OA** *(Top Left Value)*	72.0	65.0 - 75.0	°F
		NA High *(Top Right Value)*	70.0	60.0 - 80.0	°F
		OA *(Bottom Left Value)*	85.0	75.0 - 100.0	°F
		NA Low *(Bottom Right Value)* *(Same as Cooling NA High)*	55.0	50.0 - 80.0	°F
		NA Granularity: *(Rate at which change occurs)*	0.5	0.5 or 1.0	°F
Outdoor Air Reset Cooling Setpoints *(Graphical Display of S12 Outdoor Air Reset Setpoints, if configured)*	**S13**		Actual Value		°F
Occupied *(Graphical Display of S8-S11 Space Reset Setpoints, if configured)*	**S14**		Actual Value		°F
Unoccupied *(Graphical Display of S12-S14 Space Reset Setpoints, if configured)*	**S15**		Actual Value		°F
Dehum Dewpt Setpoints *(Screen Visible with Dewpoint Dehumidification and 100% OA configuration)*	**S16**	**Occupied OA Dewpoint:** *(OA & Space Selected)*	55.0 Adjusted from pAD	45.0 - 65.0	°F
		Occupied Diff Off:	5.0	0.0 - 10.0	°F
		Unoccupied Space Dewpoint: *(Visible only with pAD)*	60.0	45.0 - 65.0	°F
		Unoccupied Diff Off: *(Visible only with pAD)*	5.0	0.0 - 10.0	°F
Dehum Dewpt Setpoints *(Screen Visible with Dewpoint Dehumidification and Mixed Air configuration)*	**S17**	**Occupied MA Dewpoint:** *(MA & Space Selected)*	55.0 Adjusted from pAD	45.0 - 65.0	°F
		Occupied Diff Off:	5.0	0.0 - 10.0	°F
		Unoccupied Space Dewpoint: *(Visible only with pAD)*	60.0	45.0 - 65.0	°F
		Unoccupied Diff Off: *(Visible only with pAD)*	5.0	0.0 - 10.0	°F
Occupied Dehum rH Setpoints *(Screen Visible with space pAD including Humidity)*	**S18**	**Occupied Setpoint:**	60	0 - 90	%rH
		Occupied Diff Off:	5	0.0 - 10.0	%rH
Unoccupied Dehum rH Setpoints *(Screen Visible with space pAD including Humidity)*	**S19**	**Unoccupied Setpoint:**	70	0 - 90	%rH
		Unoccupied Diff Off:	5	0.0 - 10	%rH
Dehum Control	**S20**	**Supply Air Temp Setpoint:**	50.0	0 - 90	°F

C. Clock/Scheduler Sub Menu Parameters

The Clock/Scheduler menu allows the user to view and alter the time and date. The user can also add up to seven schedules for occupancy requirements as well as up to sixteen holidays.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Clock	L1	**Day:**	Actual Day	SUNDAY - SATURDAY	
		Date:	Actual Date	MM/DD/YY	
		Hour: (military time)	Actual Time	HH:MM	
Clock	L2	**DST: (daylight savings time)**	ENABLE	ENABLE DISABLE	
		Transition Time:	60	0-60	min
		Start: (Date placement in month)	SECOND	LAST FIRST SECOND THIRD FOURTH	
		Start: (Day)	SUNDAY	SUNDAY - SATURDAY	Day
		Start: (Month)	March	JANUARY - DECEMBER	Month
		Start: (Time)	2	0 - 23	Hour
		End: (Date placement in month)	FIRST	LAST FIRST SECOND THIRD FOURTH	
		End: (Day)	SUNDAY	SUNDAY - SATURDAY	Day
		End: (Month)	NOVEMBER	JANUARY - DECEMBER	Month
		End: (Time)	2	0 - 23	Hour
Unit On/Off By Schedule	L3	**Number of Schedules**	0	0 - 7	
Scheduler	L4	**Schedule #:**	0	1-7	
		Time On:	00:00	00:00 - 23:59	Hrs:Min
		Time Off:	00:00	00:00 - 23:59	Hrs:Min
		Days Enabled:		M T W T F S S	
Unit Occupancy By Schedule	L5	**Number of Schedules**	0	0 - 7	
Scheduler	L6	**Schedule #:**	0	1-7	
		Time On:	00:00	00:00 - 23:59	Hrs:Min
		Time Off:	00:00	00:00 - 23:59	Hrs:Min
		Days Enabled:		M T W T F S S	

(continued next page)

C. Clock/Scheduler Sub Menu Parameters

The Clock/Scheduler menu allows the user to view and alter the time and date. The user can also add up to seven schedules for occupancy requirements as well as up to sixteen holidays.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Holidays	**L7**	**Number of Holidays:**	0	0 4 8 12 16	
Holidays (Screen will show only if 4 or more holidays are selected)	**L8**	**Holiday 1 Start - Stop**	00/00-00/00	1/1-12/31	
		Holiday 2 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 3 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 4 Start - Stop	00/00-00/00	1/1-12/31	
Holidays (Screen will show only if 8 or more holidays are selected)	**L9**	**Holiday 5 Start - Stop**	00/00-00/00	1/1-12/31	
		Holiday 6 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 7 Start - Stop	00/00-00/01	1/1-12/31	
		Holiday 7 Start - Stop	00/00-00/00	1/1-12/31	Days
		Holiday 8 Start - Stop	00/00-00/00	1/1-12/31	
Holidays (Screen will show only if 12 or more holidays are selected)	**L10**	**Holiday 9 Start - Stop**	00/00-00/00	1/1-12/31	
		Holiday 10 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 11 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 12 Start - Stop	00/00-00/00	1/1-12/31	
Holidays (Screen will show only if 16 holidays are selected)	**L11**	**Holiday 13 Start - Stop**	00/00-00/00	1/1-12/31	
		Holiday 14 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 15 Start - Stop	00/00-00/00	1/1-12/31	
		Holiday 16 Start - Stop	00/00-00/00	1/1-12/31	

D. Input/Output Sub Menu Parameters

The Input/Output menu allows the user to quickly view the status of the controller inputs and outputs.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	CHANNEL	RANGE	UNITS
a. Universal In/Out *(Screens are visible based on unit configuration)*	**R1**	**Evap Cooler Float Switch**	U01	Closed Open	
	R2	**DX Condensing Unit Alarm**	U01	Closed Open	
	R3	**Damper End Switch**	U02	Closed Open	
	R4	**Damper Position 1**	U03	Closed Open	
	R5	**Blower Speed 1**	U03	Closed Open	
	R6	**Outdoor Air Temperature**	U04		iwc
	R7	**Outdoor Air Humidity**	U05		%rH
	R8	**Return Air Temperature**	U06		°F
	R9	**Return Air Humidity**	U07		%rH
	R10	**Duct Pressure**	U08		iwc
	R11	**Damper Position 2**	U08	Closed Open	
	R12	**Blower Speed 2**	U08	Closed Open	
	R13	**Building Pressure**	U09		iwc
	R14	**Mixed Air Temperature**	U10		°F
	R15	**Supply Air Temperature**	U11		°F
	R16	**CO2 Content**	U12		ppm
b. Digital Inputs *(Screens are visible based on unit configuration)*	**T1**	**Unit Enable / Unit Occupied**	DI1	Closed Open	
	T2	**Airflow Switch**	DI2	Closed Open	
	T3	**Blower Door Safety Switch**	DI3	Closed Open	
	T4	**Filter Switch**	DI4	Closed Open	
	T5	**Furnace 1 Safety Chain**	DI7	Closed Open	
	T6	**Furnace 2 Safety Chain**	DI8	Closed Open	
	T7	**Furnace 3 Safety Chain**	DI9	Closed Open	
	T8	**A2L Sensor(s)**	DI9	Closed Open	
	T9	**SA/RA Fire Stat / Smoke Detect**	DI10	Closed Open	

(continued next page)

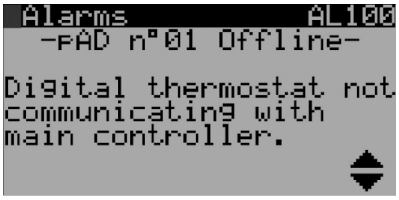
D. Input/Output Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	CHANNEL	RANGE	UNITS
c. Relay Outputs *(Screens are visible based on unit configuration)*	**V1**	**Damper On/Off**	1	OFF ON	
	V2	**Furnace 1 Ignition Initiation**	2	OFF ON	
	V3	**Furnace 2 Stage 1**	3	OFF ON	
	V4	**(Not Used)**	4	OFF ON	
	V5	**Furnace 3 Stage 1**	5	OFF ON	
	V6	**Blower On/Off**	6	OFF ON	
	V7	**Exhaust Fan Enable**	7	OFF ON	
	V8	**(Not Used)**	8	OFF ON	
	V9	**Furnace 2 Stage 2**	9	OFF ON	
	V10	**Furnace 3 Stage 2**	10	OFF ON	
	V11	**Evap Cooler Fill Valve**	11	OFF ON	
	V12	**Evap Cooler Drain Valve**	12	OFF ON	
	V13	**DX Stage 2 / CW Stage 2**	12	OFF ON	
	V14	**Evap Cooler Pump**	13	OFF ON	
	V15	**DX Stage 1 / CW Stage 2**	13	OFF ON	
d. Analog Outputs *(Screens are visible based on unit configuration)*	**W1**	**Cooling Signal**	Y1	0.0 - 10.0	vDC
	W2	**Furnace 1 Signal**	Y2	0.0 - 10.0	vDC
	W3	**Damper Position**	Y3	0.0 - 10.0	vDC
	W4	**Blower Speed**	Y4	0.0 - 10.0	vDC
	W5	**Exhaust Fan Speed**	Y5	0.0 - 10.0	vDC

E. Alarm Logger Sub Menu Parameters

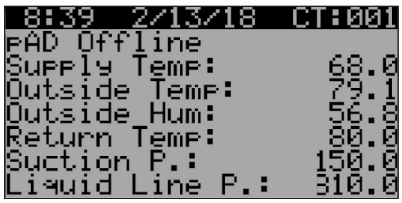
The Alarm Logger menu allows the user to view up to 100 past alarms.

To access the contents of the Alarm Logger, start by pressing the ALARM button, followed by the DOWN button. Displayed will be the most recent alarm, as shown in the following example:



To get to the log, press the DOWN arrow key until the following screen is shown, then press the ENTER key:

The most recent alarms will be displayed, as shown in the following example:



SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Alarm Log		**Time** **Date** **CT:** *(Alarm Count)*	Actual Value	HH:MM MM/DD/YY 0 - 100	
		(Alarm Description) (If no alarm is stored in the log "NO ALARMS" will be displayed)	Actual Value	See Below	
		Supply Temp:	Actual Value		
		Outdoor Temp:	Actual Value		
		Outdoor Hum:	Actual Value		
		Return Temp:	Actual Value		
		Return Hum.:	Actual Value		
		Heating Demand:	Actual Value		

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E. Alarm Logger Sub Menu - Alarm Listing

Alarm Code	Alarm Description	①	②	③	Cause	Action
A001	Clock Board Fault			•	Internal error with the controllers on board RTC.	Daily OTP and clock schedules will not function correctly.
A002	Extended Memory Fault		•		Internal error with the controllers P type memory.	The controller will likely be rendered unusable.
A003	Outdoor Air Temperature Probe Fault	•			Outdoor Air Temperature probe is either faulty or disconnected.	Alarm is generated - no action is taken.
A004	Outdoor Air Humidity Probe Fault	•			Outdoor Air Humidity probe is either faulty or disconnected.	Alarm is generated - no action is taken.
A005	Return Air Temperature Probe Fault	•			Return Air Temperature probe is either faulty or disconnected.	Alarm is generated - no action is taken.
A006	Return Air Humidity Probe Fault	•			Return Air Humidity probe is either faulty or disconnected.	Alarm is generated - no action is taken.
A007	Duct Pressure Probe Fault	•			Duct Pressure probe is either faulty or disconnected (the function of this alarm is configurable and is defaulted to shutdown the unit).	Alarm is generated - supply fan is limited to minimum speed.
	Duct Pressure Probe Fault - Unit SD		•			Alarm is generated - unit is shutdown.
A008	Building Pressure Probe Fault	•		•	Building Pressure probe is either faulty or disconnected.	Alarm is generated - supply or exhaust fan is limited to minimum speed if either are configured to building pressure control.
A009	Mixed Air Temperature Probe Fault	•			Mixed Air Temperature probe is either faulty or disconnected.	Alarm is generated - no action is taken.
A010	Supply Air Temperature Probe Fault	•		•	Supply Air Temperature probe is either faulty or disconnected (the function of this alarm is configurable and is defaulted to shutdown the unit).	Alarm is generated - cooling and heating functions are disabled.
	Supply Air Temperature Probe Fault - Unit SD		•			Alarm is generated - unit is shutdown.
A011	CO2 Content Probe Fault	•		•	CO2 Content probe probe is either faulty or disconnected.	Alarm is generated - damper or supply fan is limited to minimum position or speed if either are configured to CO2 control.
A012	Furnace 1 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A013	Furnace 2 Stage 1 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A014	Furnace 2 Stage 2 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A015	Furnace 3 Stage 1 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A016	Furnace 3 Stage 2 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A017	Supply Blower Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A018	Exhaust Fan Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A019	Evap. Cooler Pump Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A020	DX Stage 1 / CW Stage 1 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.

① AR = Auto Reset, ② UD = Unit Disabled, ③ CD = Component Disabled

(continued next page)

E. Alarm Logger Sub Menu - Alarm Listing (continued)

Alarm Code	Alarm Description	①	②	③	Cause	Action
A021	DX Stage 2 / CW Stage 2 Run Hours Exceed				Device run hours have exceeded reset run hours check limit.	Alarm is generated - no action is taken.
A022	Supply Low Limit Temperature		•		The supply air temperature is above the maximum allowed limit configured.	Alarm is generated - supply fan post purge will run and then unit is shutdown.
A023	Supply High Limit Temperature		•		The supply air temperature is below the minimum allowed limit configured.	Alarm is generated - supply fan pot purge will run and then unit is shutdown
A024	Smoke Detector - Auto Reset	•	•		Smoke detector / Fire Stat input has been triggered.	Alarm is generated - unit is shutdown.
A025	Smoke Detector - Manual Reset		•		Smoke detector / Fire Stat input has been triggered.	Alarm is generated - unit is shutdown.
A026	Blower Door Safety Switch - Auto Reset	•	•		Blower door saefty switch input has been triggered.	Alarm is generated - unit is shutdown.
A027	Blower Door Safety Switch - Manual Reset		•		Blower door saefty switch input has been triggered.	Alarm is generated - unit is shutdown.
A028	High Duct Pressure Limit		•		The supply duct pressure is above the maximum allowed limit configured.	Alarm is generated - unit is shutdown.
A029	Cooling Differential	•			There is a call for cooling but the unit is cooling the supply air	Alarm is generated - no action is taken.
A030	Heating Differential	•			There is a call for heating but the unit is heating the supply air	Alarm is generated - no action is taken.
A031	Filter Dirty	•			There is a high pressure drop across the air filters	Alarm is generated - no action is taken.
A032	BMS Offline	•			the heartbeat signal from the BMS is no longer present	Alarm is generated - no action is taken.
A033	pAD Offline	•		•	pAD is either faulty or not connected	Alarm is generated - all pAD functions will be disabled.
A034	pAD Temperature Probe Fault	•		•	pAD Temperature probe is either faulty or disconnected.	Alarm is generated - space dehumidification functions will be disabled.
A035	pAD Humidity Probe Fault	•		•	pAD Humidity probe is either faulty or disconnected.	Alarm is generated - space heating and cooling functions will be disabled and unit will control the supply air to the neutral air set point.
A036	Damper End Switch Not Made	•		•	2 position damper has not made the end switch.	Alarm is generated - no heating or cooling functions are available until the end switch is made.
A038	Furnace 1 Safety Chain Alarm	•			The safety chain input has not made within the safety chain delay time.	Alarm is generated - the next furnace stage will be enabled and then this stage will be re-tried when demand calls for further heating.
A039	Furnace 2 Safety Chain Alarm	•			The safety chain input has not made within the safety chain delay time.	Alarm is generated - the next furnace stage will be enabled and then this stage will be re-tried when demand calls for further heating.
A040	Furnace 3 Safety Chain Alarm	•			The safety chain input has not made within the safety chain delay time.	Alarm is generated - the next furnace stage will be enabled and then this stage will be re-tried when demand calls for further heating.

① AR = Auto Reset, ② UD = Unit Disabled, ③ CD = Component Disabled

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E. Alarm Logger Sub Menu - Alarm Listing (continued)

Alarm Code	Alarm Description	①	②	③	Cause	Action
A041	Furnace 1 Safety Chain Closed With No Call	•			The safety chain input is receiving a 24v signal even though the controller is not calling for the furnace.	Alarm is generated - no action is taken.
A042	Furnace 2 Safety Chain Closed With No Call	•			The safety chain input is receiving a 24v signal even though the controller is not calling for the furnace.	Alarm is generated - no action is taken.
A043	Furnace 3 Safety Chain Closed With No Call	•			The safety chain input is receiving a 24v signal even though the controller is not calling for the furnace.	Alarm is generated - no action is taken.
A044	Safety Chain Alarm (Single Furnace Units)	•			The safety chain input has not made within the safety chain delay time.	Alarm is generated - no action is taken.
A045	Blower Airflow Fail		•		The air flow switch has failed to make after the allowable delay time.	Alarm is generated - unit is shutdown.
A046	DX Condensing Unit Alarm			•	The external condensing unit trip/ fault signal has been detected by the controller.	Alarm is generated - all DX cooling functions are locked out.
A047	Evaporative Cooler Freeze	•		•	The outdoor air temperature is below the minimum allowed limit configured for freeze protection.	Alarm is generated - the tank is drained to avoid freezing.
A048	A2L Alarm		•		A2L Sensor has detected a leak, or sensor is faulted	A2L mitigation sequence is activated

① AR = Auto Reset, ② UD = Unit Disabled, ③ CD = Component Disabled

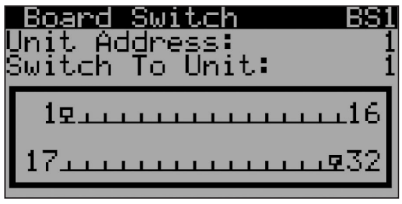
F. Board Switch Sub Menu Parameters

The Board Switch menu allows the user to jump between different controllers with a remote display. This requires a remote display, along with additional controllers, setup in a pLAN network. A pLAN can consist of up to 32 devices, in different combinations, but a maximum of 31 controllers.

The menu displays the following selections:

- Unit Address: The pLAN address of the controller the display is currently accessing.
- Switch to unit: The pLAN address of the controller the display would like to access.

The Board Switch screen will indicate the current devices connected to the pLAN network (Keypad, pAD Wall Stat, and/or ERM unit). In the screen below, the main controller is on address 1.



The pCOOEM+ main unit controller is factory defaulted to the following addresses for modules communicated with on the pLAN:

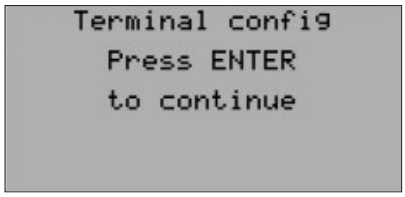
SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	ADDRESS
Board Switch	**BS1**	**Unit Address:**	Actual Value	pCOOEM+ Controller	1
				Remote Wall Stat (pAD)	4
				Local Display	5
				Remote Display (pGD1)	32
		Switch to Unit:	Actual Value	See Above	See Above

Programming the Remote Display Keypad to the Carel Controller

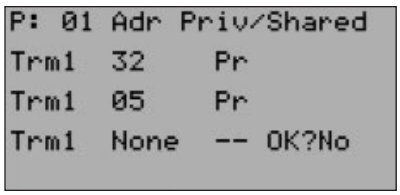
Once the pGD1 is connected to the Carel pCOOEM+ controller, the address must be set as follows:

1. Press and hold down the UP+DOWN+ENTER buttons simultaneously until “Display Address” screen is shown. The address settings should be:
   - Display: 32
   - I/O Board: 1

2. If the settings are not as shown, press the ENTER button to go to the “Terminal Config” screen as follows:



3. Press the ENTER button again. The display will show the following terminal configuration screen:



4. Press the ENTER button until the cursor is underneath the Trm1 setting. Press the UP or DOWN buttons to change the value to 32. The value 05 should already be present and should remain. That is the address of the pLDPRO interface mounted on the unit.
5. Press the ENTER button until the cursor is underneath Pr or Sh. Press the UP or DOWN buttons to change the value to Pr.
6. Press the ENTER button until the cursor is underneath No. Press the UP or DOWN buttons to change the value to Yes and press the ENTER button to complete the programming.

G. Service Sub Menu Parameters

⚠ WARNING

Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

The Service menu allows the user to access several sub-menus regarding controller information, controller overrides, operating hours, BMS configuration, I/O manual management and BMS protocol settings (BACnet® or LonWorks®).

Certain screens within the Service Sub Menus require a password for access. Refer to the section titled “Password Protection” for additional guidance.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
a. Information					
Information	A1	Project Name	Actual Value		
		Ver. (Software Version)	Actual Value		#.##
		Date (Software Release Date)	Actual Value		MM/DD/YY
		BIOS Version & Date	Actual Value		MM/DD/YY
		BOOT Version & Date	Actual Value		MM/DD/YY
SPO Information (if unit has special program)	A2	SPO Number	Actual Value	Actual Value	
		Date:	Actual Value		MM/DD/YY
		Software Changes			
Information	A3	pCO Type			
		Total flash	Actual Value		Kb
		RAM	Actual Value		Kb
		Built-In Type (Display)	Actual Value		
		T Memory Writes	Actual Value		
		Main Cycle:	Actual Value		Cycles/sec
		Cycle Time	Actual Value		ms
Information	A4	T-Memory Writes:	Actual Value		
Control Power Status	A5	Last Off Time:	Actual Value		MM/DD/YY HH/MM/SS
		Last On Time:	Actual Value		MM/DD/YY HH/MM/SS
Restore Dates	A6	Factory Save:	Actual Value		MM/DD/YY HH/MM/SS
		Last Customer Save:	Actual Value		MM/DD/YY HH/MM/SS

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G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
b. Run Hours					
Furnace 1 Ignit Init	**X1**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Furnace 2 Stage 1	**X2**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Furnace 3 Stage 1	**X3**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Blower Enable	**X4**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Exhaust Fan Enable	**X5**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Furnace 2 Stage 2	**X6**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Furnace 3 Stage 2	**X7**	**Run Hours:**	Actual Value	0 - 350,000	hrs
CW / DX Stage 2	**X8**	**Run Hours:**	Actual Value	0 - 350,000	hrs
Evap Cool Pump	**X9**	**Run Hours:**	Actual Value	0 - 350,000	hrs
CW / DX Stage 1	**X10**	**Run Hours:**	Actual Value	0 - 350,000	hrs
c. Service Settings / a. Maint. Hours Set					
Furnace 1 Ignit Init		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Furnace 2 Stage 1		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Furnace 3 Stage 1		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Blowe Enable		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Exhaust Fan Enable		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Furnace 2 Stage 2		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Furnace 3 Stage 2		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
CW / DX Stage 2		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
Evap Cool Pump		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	
CW / DX Stage 1		**Alarm Threshold:**	0	0 - 350,000	hrs
		Reset Run Hours:	No	No Yes	

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G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
c. Service Settings / b. Probe Adjustment					
Outdoor Air Temperature (As the universal inputs inputs have been listed under "Inputs/Outputs" section, only the Outdoor Air Temperature sensor has been detailed.)	**P1 to P9**	**Input:**	U04		
		Offset: Calibration Offset	0	-99.9 - 99.9	°F
		Value: (including Offset)	Actual Value		°F
c. Service Settings / c. Control Settings					
Control Settings	**CS1**	**Disable Buzzer:**	Yes	No Yes	
		Backlight Delay:	5	5 - 100	(m)inutes
Control Settings	**CS2**	**Temperature Units:**	°F	°F	
		Barometric Pressure:	29.92	28.00 - 30.99	inHg
Control Settings	**CS3**	**Input DI01 Option:**	Not Used	Not Used Unit On/ Off Unit Occupancy	
Enable Unit On/ Off By	**CS4**	**By Digital Input:**	Off	Off On	
		By Supervisor:	Off	Off On	
		By pLAN network:	Off	Off On	
		By Schedule:	Off	Off On	
Enable Unit Occupancy By	**CS5**	**By Digital Input:**	Off	Off On	
		By Supervisor:	Off	Off On	
		By pLAN network:	Off	Off On	
		By Schedule:	Off	Off On	
Control Settings	**CS6**	**pAD Thermostat:**	OFF	OFF ON	
		Reset Type:	NONE	NONE SPACE OUTSIDE AIR SPACE & OA	
		Dehum Mode:	NONE	NONE OA DEWPOINT OA & SPACE SPACE MA & SPACE MA DEWPOINT	
Control Settings	**CS7**	**Allow pAD Setpoint to be Neutral Air Setpoint: (Screen shown if pAD is ON and Reset Type is set to NONE)**	NO	NO YES	
Control Settings	**CS8**	**Supply Air Reset Filtering Time:**	10	0 - 999	(s)econds

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G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Fan-Only Mode Diff.	**CS9**	**Above Setpoint:**	5.0	0.0 - 99.9	°F
		Current Setpoint:	Actual Value		°F
		Below Setpoint:	-5.0	-10.0 - 0.0	°F
		Temp/Time Delay:	30	10 - 180	(s)econds
		Heat/Cool Change over Delay:	5.0	5 - 60	(m)inutes
Blower Control (Parameters depend on Blower configuration)	**CS10**	**Constant Speed:**	100.0	Min - Max Output	%
		Speed 1: Press Setpt: (Building or Duct Static Pressure) CO2 Setpoint BMS Modulation:	50.0	0 - 100.0	%
			0.100	0.000 - 0.500	iwc
			1.500	0.000 - 5.000	iwc
			800	0 - 2000	ppm
			(Min Output)	Min - Max Output	%
		Speed 2:	70.0	0 - 100.0	%
		Speed 3: Minimum Output:	85.0	0 - 100.0	%
			50	Design Min Limits	%
		Speed 4: Maximum Output:	100.0	0 - 100.0	%
			100	Design Max Limits	%
Blower Control (Parameters depend on Blower configuration)	**CS11**	**Constant Speed**			
		Speed 1:	100.0	Min-Max Output	%
		Press Setpt:	50.0	0 - 100.0	%
		(Building or Duct Static	0.100	0.000 - 0.500	iwc
		Pressure)	1.500	0.000 - 5.000	iwc
		CO2 Setpoint	800	0 - 2000	ppm
		BMS Modulation	(Min Output)	Min - Max Output	%
		Speed 2:	70.0	0 - 100.0	%
		Speed 3: Min. Output Cool: Min. Output Heat:	85.0	0 - 100.0	%
			50	Design Min Limits	%
		Speed 4: Maximum Output:	100.0	0 - 100.0	%
			100	Design Max Limits	%
Blower Control (Parameters depend on Blower configuration)	**CS12**	**Occupied Blower Mode:**	On	On Auto	
Blower Control	**CS13**	**Post Purge Time:**	120	15 - 900	s
		Enable Low Supply Air Limit:	Yes	No Yes	
Exhaust Fan Control (Parameters depend on Exhaust Fan configuration type)	**CS14**	**Constant Speed:**	50.0	20.0 - 100.0	%
		Speed 1:	20.0	0 - 100	%
		Press Setpt: (Building Pressure)	0.100	0.000 - 0.500	iwc
		Sup Fan Offset:	-10.0	-20.0 - 20.0	%
		BMS Modulation:	(Min Output)	Min - Max Output	%
		Speed 2:	40.0	0 - 100	%
		Speed 3:	70.0	0 - 100	%
		Minimum Output:	20.0	40 - 100	%
		Speed 4: Maximum Output:	100.0	0 - 100	%
			100.0	40 - 100	%

(continued next page)

G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Exhaust Fan Control (Parameters depend on Exhaust Fan configuration type)	**CS15**	**Min. On/Off Time:**	60	0 - 900	s
Damper Control (Parameters depend on Damper configuration type. Screen not shown on 100% OA units)	**CS16**	**2 Pos. OA Damper Open Wait Time:**	15	0 - 180	s
Damper Control (Parameters depend on Damper configuration type. Screen not shown on 100% OA units)	**CS16**	**Supply Fan Wait Time:**	0	0 - 180	s
Damper Control (Parameters depend on Damper configuration type. Screen not shown on 100% OA units)	**CS17**	**OA Position:**	50	Min - Max Output	%
		OA Damp Pos 1:	50	0 - 100	%
		CO2 Setpoint:	800	0 - 2000	ppm
		Building Pressure Setpoint:	0.100	0.000 - 0.500	iwc
		BMS OA Damper Pos:	(Min Open)	0 - 100	%
		OA Damp Pos 2:	50	0 - 100	%
		OA Damp Pos 3:	50	0 - 100	%
		OA Damp Min Opent:	0	Design Min Limits	%
		OA Damp Pos 4:	50	0 - 100	%
		OA Damp Max Open:	100	Design Max Limits	%
Dry Bulb Economizer	**CS18**	**Outdoor & Return Comparison For Econ.**			
		On Diff:	5.0	0.0 - 99.0	°F
		Off Diff:	0.0	0.0 - 99.0	°F
Enthalpy Economizer	**CS19**	**Outdoor & Return Comparison For Econ.**			
		On Diff:	5.0	0.0 - 99.0	BTU/Lb.
		Off Diff:	0.0	0.0 - 99.0	BTU/Lb.
Furnace Control	**CS20**	**Temp. Lockout:**	No	No Yes	
		Reference:	Outdoor Air	Outdoor Air Return Air	°F
		Lockout Above:	65.0	0.0 - 99.9	°F
Furnace Control	**CS21**	**Stage Load Up Time:**	90	90 - 600	s
		Stage Load Down Time:	0	0 - 120	s
Furnace Control	**CS22**	**Any Stage Off To Next Stage On Delat Time:**	135	0 - 300	s
Evap. Cooling Control	**CS23**	**Evaporative Cooling Based On:**	Space Temperature	Space Temperature Outdoor Temperature	
Evap. Cooling Control	**CS24**	**Outdoor Air Fill Setpoint:**	70.0	0.0 - 100.0	°F
		Disable Diff:	5.0	0.0 - 99.9	°F

(continued next page)

G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Evap. Cooling Control	CS25	Enable Auto Flush:	Yes	No Yes	
		Fill Valve Open:	24	0 - 72	hrs
		Flush For:	5	0 - 180	mins
Evap. Cooling Control	CS26	Enable Freeze Protection:	Yes	No Yes	
		Outdoor Air Temp. Setpoint:	45.0	0.0 - 150.0	°F
DX Cooling Control	CS27	Temp. Lockout:	No	No Yes	
		Reference:	Outdoor Air	Outdoor Air Return Air	°F
		Lockout Above:	45.0	0.0 - 99.9	°F
DX Cooling Control	CS28	Enable DX CU Alarm:	No	No Yes	
		Stage Min On Time:	60	0 - 99	s
		Stage Min Off Time:	60	0 - 99	s
		Stage Delay:	30	0 - 99	s
DX Cooling Control	CS29	Stage 1 On At:	50.0	0.0 - 100.0	%
		Stage 1 Off At:	0.0	0.0 - 100.0	%
		Stage 2 On At:	100.0	0.0 - 100.0	%
		Stage 2 Off At:	50.0	0.0 - 100.0	%
CW Cooling Control	CS30	Temp. Lockout:	No	No Yes	
		Reference:	Outdoor Air	Outdoor Air Return Air	°F
		Lockout Above:	45.0	0.0 - 99.9	°F
CW Cooling Control	CS31	Stage Min On Time:	60	0 - 99	s
		Stage Min Off Time:	60	0 - 99	s
		Stage Delay:	30	0 - 99	s
CW Cooling Control	CS32	Stage 1 On At:	50.0	0.0 - 100.0	%
		Stage 1 Off At:	0.0	0.0 - 100.0	%
		Stage 2 On At:	100.0	0.0 - 100.0	%
		Stage 2 Off At:	50.0	0.0 - 100.0	%
Dehum Control	CS33	Minimum On Time:	5	0 - 30	m
		Minimum Off Time:	10	0 - 99	m
Dehum Control	CS34	Stop Dehum. Space Below Cool Setpoint By:	3.0	0.0 - 20.0	°F
Customer Save/ Restore	CS35	Save:	No	No Yes	
		Restore:	No	No Yes	

(continued next page)

G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
c. Service Settings / d. P/PI/PID Loops					
Economizer Control	D1	Proportional Gain:	1.0	0 - 99.9	
		Integration Time:	100	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
Economizer Control	D2	Dead Band:	5.0	0 - 99.9	°F
		En. Anti-Bump:	Yes	No Yes	
Cooling Control	D3	Proportional Gain:	3.0	0 - 99.9	
		Integration Time:	100	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
Cooling Control	D4	Dead Band:	0.0	0 - 99.9	°F
		En. Anti-Bump:	Yes	No Yes	
SA. Dehum Control	D5	Proportional Gain:	3.0	0 - 99.9	
		Integration Time:	100	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
SA. Dehum Control	D6	Dead Band:	0.0	0 - 99.9	°F
		En. Anti-Bump:	Yes	No Yes	
Heating Control	D7	Proportional Gain:	2.0	0 - 99.9	
		Integration Time:	160	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
Heating Control	D8	Dead Band:	0.0	0 - 99.9	°F
		En. Anti-Bump:	Yes	No Yes	
CO2 Damper Control	D9	Proportional Gain:	10.0	0 - 99.9	
		Integration Time:	100	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
CO2 Damper Control	D10	Dead Band:	0.0	0 - 99.9	ppm
		En. Anti-Bump:	Yes	No Yes	
Blower Duct Pressure Control	D11	Proportional Gain:	6.7	0 - 99.9	
		Integration Time:	120	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
Blower Duct Pressure Control	D12	Dead Band:	0.010	0 - 99.9	iwc
		En. Anti-Bump:	Yes	No Yes	

(continued next page)

G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
Blower Building Pressure Control	**D13**	**Proportional Gain:**	20.0	0 - 99.9	
		Integration Time:	120	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
Blower Building Pressure Control	**D14**	**Dead Band:**	0.010	0 - 99.9	iwc
		En. Anti-Bump:	Yes	No Yes	
Exhaust Fan Building Pressure Control	**D15**	**Proportional Gain:**	40.0	0 - 99.9	
		Integration Time:	100	0 - 999.9	s
		Derivative Time:	0	0 - 999	s
Exhaust Fan Building Pressure Control	**D16**	**Dead Band:**	0.010	0 - 99.9	iwc
		En. Anti-Bump:	Yes	No Yes	
c. Service Settings / e. Alarm Management					
Temperature Differential Alarms	**AM1**	**Differential Alarm Enable:**	No	No Yes	
		Cooling Differential:	1.0	0 - 10.0	°F
		Cooling Alarm Delay:	10	0 - 30	m
		Heating Differential:	5.0	0 - 10.0	°F
		Heating Alarm Delay	3	0 - 30	m
Blower Airflow Fail Alarm	**AM2**	**Startup Delay:**	15	0 - 999	s
		Shut Down Delay:	180	0 - 999	s
Blower Door Switch	**AM3**	**Reset Type:**	Manual	Auto Manual	
Smoke Detector Alarm	**AM4**	**Reset Type:**	Manual	Auto Manual	
Damper End Switch Alarm	**AM5**	**Start Delay:**	90	0 - 360	s
		Run Delay:	5	0 - 360	s
Duct Static Pressure (Screen Visible with Static Pressure Sensor)	**AM6**	**Sensor Failure Action:**	Fan Min Speed	Fan Min Speed Unit Shutdown	
Duct Static Pressure (Screen Visible with Static Pressure Sensor)	**AM7**	**High Static Alarm Shutdown Pressure:**	5.000	0 - 9.999	iwc
Retry Status	**AM8**	**Blower Airflow Fail Status:**	Actual Value	0 - 99	
Retry Status	**AM9**	**Furnace Safety Chain Status:**	Actual Value	0 - 99	
Retry Status	**AM10**	**Condensing Unit Trip Status:**	Actual Value	0 - 99	
Retry Status	**AM11**	**Supply Air Temp. Sensor Status:**	Actual Value	0 - 99	

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G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
d. pAD Config.					
pAD Configuration	**PC1**	**pAD n°01**	Actual Value		
		Plan Address	4	1 - 32	
		Firmware Version	Actual Value		
		HW Options	Actual Value	None (Temp Only) Humid (Humidity probe installed)	
pAD Configuration	**PC2**	**pAD n°01**	Actual Value		
		Large Display: (Change what appears on the thermostat)	Temp	NA T.Set Temp H.Set Hum	
		Small Display: (Change what appears on the thermostat)	Hum	Time T.Set Temp H.Set Hum	
		Disable Up/Down:	No	No Yes	
pAD Configuration Set Point Limits	**PC3**	**Temperature Min:**	60.0°F	45 - 100°F	°F
		Temperature Max:	90.0°F	60 - 100°F	°F
		Humidity Min:	0%	0 - 100%	%
		Humidity Max:	100%	0 - 100%	%
pAD Configuration Key Functions	**PC4**	**Key 1:**	1 = ON/OFF	0 = DISABLE 1 = ON/OFF 2 = MODE 3 = HUM 4 = NIGHT/SLEEP 5=CLOCK 6 = TEMP 7 = PROG 8 = FAN 9 = ALARM	
		Key 2:	9 = ALARM		
		Key 3:	3 = HUM		
		Key 4:	4 = NIGHT/SLEEP		
		Key 5:	0 = DISABLE		
		Key 6:	6 = TEMP		
e. BMS Config.					
BMS Configuration (Modine Control System Supports the Following Protocols: Lon BACnet IP/Eth BACnet MSTP)	**U1**	**BMS-1 Protocol:**	BACnet MSTP	N/A CAREL MODEM MODBUS PCOLOAD BACnet MSTP BAC-net IP/Eth LON	
		BACnet PlugIn?	NO	NO YES	
		BMS-2 Protocol:	PCOLOAD	N/A PCOLOAD CAREL MODBUS	

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G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
BMS Configuration	**U2**	**Address**	1	0 - 999	
		Baud rate	2400	1200 2400 4800 9600 19200	
BMS Configuration	**U3**	**Enable Heartbeat:**	No	No Yes	
		Thresholds:	5	0 - 999	
		Timeout:	300s	0 - 9999	s
		Period:	Actual Value	0.0 -999.9	s
BMS Configuration	**U4**	**If BMS Offline Turn Unit:**	Off	Off On	
MSTP SETUP (Screen only Visible When BACnet MSTP is Selected and BACnet PlugIn is Enabled.)	**U5**	**Instance**	0	0 - 4194999	
		Baud rate	N/A	N/A 9600 19200 38400 76800	bps
		MAC Address:	0	0 - 127	
		MaxMasters:	0	0 - 127	
		MaxInfoFrames:	0	0 - 99	
TCP/IP Setup (Screen Only Visible when BACnet IP/ Eth is Selected and BACnet Plugin is Enabled.)	**U6**	**Instance:**	Actual Value	0 to 99,000	
		IP:	Actual Value	0.0.0.0 to 255.255.255.255	
		SubNet:	Actual Value	0.0.0.0 to 255.255.255.255	
		Gateway:	Actual Value	0.0.0.0 to 255.255.255.255	
TCP/IP Setup (Page 2) (Screen Only Visible when BACnet IP/ Eth is Selected and BACnet Plugin is Enabled.)	**U7**	**DNS 1**	Actual Value	0.0.0.0 to 255.255.255.255	
		DNS 2	Actual Value	0.0.0.0 to 255.255.255.255	
		Type	Actual Value	IP Etherent	
BACnet Read/Write (Screen Only Visible when BACnet IP/Eth or BACnet MSTP is Selected and BACnet Plugin is Enabled.)	**U8**	**Function:**	Read	Read Write	
		Update?	NO	NO YES	

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G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
f. Fieldbus Config.					
Fieldbus 1 Config.	**FB1**	**Fieldbus 1 Config. Protpcol:**	WinLoad		
		Fieldbus 2 Config. Protpcol:	MODBUS	MODBUS WinLoad	
Modbus Status	**FB2**	**Modbus CMD Result:**		Modbus General Error Invalid Com Config Com Config Done No Error	
Configuration of Modbus Settings 1st Master	**FB3**	**Baudrate:**	19200	1200 2400 4800 9600 19200	Bits/s
		Stop Bit:	1	1,2	
		Parity Mode:	None	None Even Odd	
		Timeout	180ms	100 - 5000	ms
		Error Status:	None	“Nothing” Generic Error Bios Error	

⚠ WARNING

Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
g. Manual Management / a. Manual Control					
Manual Override	**MN1**	**Time:**	30	0 - 480	ms
Demand Control	**MN2**	**Enable Demand Control:**	Off	Off On	
		Select Mode: (Unit Specific)	Fan-Only	FAN-ONLY ECON HEATING COOLING DEHUM	
		Fan:	0	0 - 100	%
		Heat:	0	0 - 100	%
		Cool:	0	0 - 100	%
		Dehum:	0	0 - 100	%
		Econ:	0	0 - 100	%

(continued next page)

G. Service Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
g. Manual Management / b. Universal In/Out					
Outdoor Air Temperature (As the universal inputs have been listed under "Inputs/ Outputs" section, only the outdoor air temperature sensor has been detailed.)	**C1 to C9**	**Manual Control U "XX": Puts the input into manual mode**	OFF	OFF ON	
		Manual Position: Sets the Manual Value for this input (only has an affect when the input is in manual control, item above is ON).	0		°F
		U "XX" Value: If Manual Control is OFF it is the actual value of the Sensor. If Manual Control is ON it is the value of the Manual Position.	Actual Value		°F
g. Manual Management / c. Digital Inputs					
Airflow Switch (As the digital inputs have been listed under "Inputs/ Outputs" section, only the Airflow Switch has been detailed.)	**D1 to D8**	**Manual Control DI "XX": Puts the input into manual mode**	OFF	OFF ON	
		Manual Position: Sets the Manual Value for this input (only has an affect when the input is in manual control, item above is ON).	Actual Value	CLOSED OPEN	
		DI "XX" Status: If Manual Control is OFF it is the actual status of the input. If Manual Control is ON it is the status of the Manual Position.	Actual Value	CLOSED OPEN	
g. Manual Management / d. Relay Outputs					
Furnace 1 Ignit Init1 (As the digital outputs have been listed under "Inputs/ Outputs" section, Only Furnace 1 Ignit Init has been detailed.)	**G1 to G15**	**Manual Relay "XX": Puts the output into manual mode**	OFF	OFF ON	
		Manual Position: Sets the Manual Value for this output (only has an affect when the output is in manual control, item above is ON).	Actual Value	OFF ON	
		Relay "XX" Status: If Manual Control is OFF it is the actual status of the output. If Manual Control is ON it is the status of the Manual Position.	Actual Value	OFF ON	
g. Manual Management / e. Analog Outputs					
Furnace 1 Signal (As the analog outputs have been listed under "Inputs/ Outputs" section, Only the Furnace 1 Signal value has been detailed.)	**H1 to H5**	**Manual Y "X": Puts the output into manual mode**	AUTO	AUTO HAND	
		Manual Value Sets the Manual Value for this output (only has an affect when the output is in manual control, item above is HAND).	Actual Value	0.00 - 10.00	vDC
		Y "X" Output: If Manual Control is AUTO it is the actual value of the output. If Manual Control is HAND it is the value of Manual Value.	Actual Value	0.00 - 10.00	vDC

Typical BMS System Variables

Read/ Write	Data Type	Variable Description	BACnet Variable Name	BAC-net Address	Lon Name	SNVT #
R	A	Supply Air Temp	SA_Temp_BMS	AV1	SA_Temp	105
R	A	Space Temp	pAD_Temp_BMS	AV2	pAD_Temp	105
R	A	Space Dew Point	pAD_DewP_BMS	AV3		
R	A	Space Enthalpy	pAD_Enth_BMS	AV4		
R	A	Outdoor Air Temp	OA_Temp_BMS	AV5	OA_Temp	105
R	A	Outdoor Air Dew Point	OA_DewP_BMS	AV6		
R	A	Outdoor Air Enthalpy	OA_Enth_BMS	AV7		
R	A	Return Air Temp	RA_Temp_BMS	AV8	RA_Temp	105
R	A	Return Air Dew Point	RA_DewP_BMS	AV9		
R	A	Return Air Enthalpy	RA_Enth_BMS	AV10		
R	A	Mixed Air Temp	MA_Temp_BMS	AV11	MA_Temp	105
R	A	Mixed Air Dew Point	MA_DewP_BMS	AV12		
R	A	Mixed Air Enthalpy	MA_Enth_BMS	AV13		
R	A	Actual Supply Air Temp Setpoint	SA_SP_BMS	AV14	SA_SP	105
R/W	A	Occupied - Space Heating Setpoint	Space_Heat_SP_Occ_BMS	AV15	Spc_Ht_SP_Oc	105
R/W	A	Occupied - Space Cooling Setpoint Offset	Space_Cool_Offset_Occ_BMS	AV16	Spc_Cl_Ofs_Oc	105
R	A	Occupied - Space Cooling Setpoint	Space_Cool_SP_Occ_BMS	AV17		
R/W	A	Occupied - Space Heating Differential	Space_Heat_Diff_Occ_BMS	AV18		
R/W	A	Occupied - Space Cooling Differential	Space_Cool_Diff_Occ_BMS	AV19		
R/W	A	Occupied - Supply Air Heating Setpoint	SA_Heat_Res_SP_Occ_BMS	AV20	SA_Ht_R_SP_Oc	105
R/W	A	Neutral Air Temp Setpoint	SA_NA_SP_BMS	AV21	SA_NA_SP	105
R/W	A	Occupied - Supply Air Cooling Setpoint	SA_Cool_Res_SP_Occ_BMS	AV22	SA_Cl_R_SP_Oc	105
R/W	A	Unoccupied - Space Heating Setpoint	Space_Heat_SP_Unocc_BMS	AV23	Spc_Ht_SP_Uo	105
R/W	A	Unoccupied - Space Cooling Setpoint	Space_Cool_SP_Unocc_BMS	AV24	Spc_Cl_SP_Uo	105
R/W	A	Unoccupied - Space Heating Differential	Space_Heat_Diff_Unocc_BMS	AV25		
R/W	A	Unoccupied - Space Cooling Differential	Space_Cool_Diff_Unocc_BMS	AV26		
R/W	A	Unoccupied - Supply Air Heating Setpoint	SA_Heat_Res_SP_Unocc_BMS	AV27	SA_Ht_R_SP_Uo	105
R/W	A	Unoccupied - Supply Air Cooling Setpoint	SA_Cool_Res_SP_Unocc_BMS	AV28	SA_Cl_R_SP_Uo	105
R/W	A	Dehum Mode Supply Air Temp Setpoint	Dehum_SAT_Setpoint_BMS	AV29	Dh_SAT_SP	105
R/W	A	55F (0-100)	SA_Reset_Heat_High_BMS	AV30		
R/W	A	70F (50-100)	SA_Reset_Heat_Low_Cool_High_BMS	AV31		
R/W	A	78F (50-100)	SA_Reset_Cool_Low_BMS	AV32		
R/W	A	70F (50-100)	OA_Reset_Heat_Low_BMS	AV33		
R/W	A	85F (50-100)	OA_Reset_Heat_High_BMS	AV34		
R/W	A	30F (0-100)	OA_Reset_Cool_Low_BMS	AV35		
R/W	A	60F (50-100)	OA_Reset_Cool_High_BMS	AV36		
R/W	A	Outdoor Air Dew Point Setpoint	OA_DewP_SP_BMS	AV37	OA_DewP_SP	105
R/W	A	Mixed Air Dew Point Setpoint	MA_DewP_SP_BMS	AV38	MA_DewP_SP	105
R/W	A	Unoccupied - Dew Point Setpoint	Unocc_Dehum_DewP_SP_BMS	AV39	Uo_Dh_DP_SP	105
R/W	A	pAD Wall Stat Minimum Allowed Temp Setpoint	pAD_SetMin_Temp_BMS	AV40		
R/W	A	pAD Wall Stat Maximum Allowed Temp Setpoint	pAD_SetMax_Temp_BMS	AV41		
R/W	A	SA Exit Fan Only Enter Heating Offset	SA_Vent_Mode_Heating_Offset_BMS	AV42		
R/W	A	SA Exit Fan Only Enter Cooling Offset	SA_Vent_Mode_Cooling_Offset_BMS	AV43		
R	A	SA Heating Changeover Temp	SA_Vent_Mode_Heating_CO_Temp_BMS	AV44		
R	A	SA Cooling Changeover Temp	SA_Vent_Mode_Cooling_CO_Temp_BMS	AV45		

Data Type A=Analog, I=Integer, D=Digital

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Typical BMS System Variables (continued)

Read/ Write	Data Type	Variable Description	BACnet Variable Name	BACnet Address	Lon Name	SNVT #
R/W	A	Supply Fan Speed Setpoint	SF_Speed_SP_BMS	AV46		
R/W	A	Exhaust Fan Speed Setpoint	EF_Speed_SP_BMS	AV47		
R/W	A	DX Cooling Outdoor Air Temp Lockout Setpoint	DX_Cooling_Lockout_Temp_BMS	AV48		
R/W	A	CW Cooling Outdoor Air Temp Lockout Setpoint	CW_Cooling_Lockout_Temp_BMS	AV49		
R/W	A	Outdoor Air Fill Setpoint For Evaporative Cooling	Evap_Cool_OA_Enable_Setp_BMS	AV50		
R/W	A	Outdoor Air Freeze Protection Setpoint To Drain Evaporative Cooler	Evap_Cool_Freeze_OA_Setp_BMS	AV51		
R	I	Description of values in Controls Manual	Unit_Status	AV1001	Unit_Status	8
R	I	Description of values in Controls Manual	Occupancy_Status	AV1002	Unit_Status	8
R	I	Description of values in Controls Manual	Unit_Mode	AV1003	Unit_Status	8
R	I	Description of values in Controls Manual	Mechanical_Temp_Lockouts	AV1004	Unit_Status	8
R	I	Space Humidity	pAD_Hum	AV1005		
R	I	Outdoor Air Humidity	Outdoor_Air_Humidity	AV1006		
R	I	Return Air Humidity	Return_Air_Humidity	AV1007		
R	I	Mixed Air Humidity	Mixed_Air_Humidity	AV1008		
R	I	Duct Pressure	Duct_Pressure	AV1009		
R	I	Building Pressure	Building_Pressure	AV1010		
R	I	Space CO2 Content	Space_CO2_Content	AV1011		
R	I	Modulating Cooling Demand	Aout_Cooling_Signal_Disp	AV1012		
R	I	Modulating Furnace Demand	Aout_Furnace_1_Signal_Disp	AV1013		
R	I	Outdoor Air Damper Position	OA_Damper	AV1014	OA_Damper	8
R	I	Return Air Damper Position	RA_Damper	AV1015		
R	I	Blower Speed Demand	Aout_Blower_Speed_Disp	AV1016	AO_Blow_Spd	8
R	I	Exhaust Fan Speed Demand	Aout_Exhaust_Fan_Speed_Disp	AV1017	AO_Exh_Fan_Spd	8
R	I	Heating Demand	Heating_Demand_Disp	AV1018	Heating_Dem	8
R	I	Cooling Demand	Cooling_Demand_Disp	AV1019	Cooling_Dem	8
R	I	Supply Air Dehum Demand	Dehum_Demand_Disp	AV1020		
R/W	I	pAD Wall Stat Minimum Allowed rH Setpoint	pAD_SetMin_Hum_BMS	AV1021		
R/W	I	pAD Wall Stat Maximum Allowed rH Setpoint	pAD_SetMax_Hum_BMS	AV1022		
R/W	I	Occupied - Space rH Setpoint	Occ_Dehum_Space_rH_SP_BMS	AV1023	Oc_Deh_rH_SP	81
R/W	I	Unoccupied - Space rH Setpoint	Unocc_Dehum_Space_rH_SP_BMS	AV1024	Uo_Deh_rH_SP	81
R/W	I	Space CO2 Setpoint	Space_CO2_Setp	AV1025		
R/W	I	Outdoor Air Minimum Open Position	OA_Damper_Min_Pos_BMS	AV1026		
R/W	I	Outdoor Air Maximum Open Position	OA_Damper_Max_Pos_BMS	AV1027		
R/W	I	Outdoor Air Damper Open Position	OA_Damp_Pos_BMS	AV1028	OA_Dmp_Pos	8
R/W	I	Delay Between Unit Heating and Unit Cooling	Heat_Cool_CO_Delay_BMS	AV1029		
R	I	Alarm Code Number Variable 1	Alarm_Code_1	AV1030	Alarm_Code_1	8
R	I	Alarm Code Number Variable 2	Alarm_Code_2	AV1031	Alarm_Code_2	8
R	I	Alarm Code Number Variable 3	Alarm_Code_3	AV1032	Alarm_Code_3	8
R	I	Alarm Code Number Variable 4	Alarm_Code_4	AV1033		
R	I	Alarm Code Number Variable 5	Alarm_Code_5	AV1034		
R	I	Alarm Code Number Variable 6 (Maintenance)	Alarm_Code_6	AV1035	Alarm_Code_6	8
R	I	Software Version High	BMS_Sw_Ver_H	AV1036		
R	I	Software Version Low	BMS_Sw_Ver_L	AV1037		
R	I	SPO Controls Program Number	SPO_Number	AV1038		

Data Type A=Analog, I=Integer, D=Digital

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Typical BMS System Variables (continued)

Read/ Write	Data Type	Variable Description	BACnet Variable Name	BACnet Address	Lon Name	SNVT #
R	I	Current Day	CURRENT_DAY	AV1080		
R	I	Current Month	CURRENT_MONTH	AV1081		
R	I	Current Year	CURRENT_YEAR	AV1082		
R	I	Current Hour	CURRENT_HOUR	AV1083		
R	I	Current Minute	CURRENT_MINUTE	AV1084		
R	D	General Alarm	Alarm_On	BV1	Alarm_On	95
R	D	Alarm Active - Will Automatically Reset	Auto_Reset_Alarm	BV2		
R	D	Alarm Active - Requires Manual Reset	Manual_Reset_Alarm	BV3		
R	D	Component Maintenance Hours Exceeded - Requires Manual Reset	Maintenance_Alarm	BV4		
R	D	Unit Off By Alarm - Requires Manual Reset	Unit_Shutdown_Alarm	BV5		
R/W	D	BMS On Off Command	BMS_OnOff	BV6	BMS_OnOff	95
R/W	D	BMS Occupied Command	BMS_Occupied	BV7	BMS_Occ	95
R/W	D	BMS Alarm Reset Command	BMS_Alarm_Reset	BV8	BMS_AL_Res	95
R/W	D	Heartbeat Signal From BMS	BMS_Heartbeat_In	BV9		
R	D	Unit In Occupied Mode	Occupied	BV10	Occupied	95
R	D	Unit In Unoccupied Mode	UnOccupied	BV11		
R	D	Fan Is Enabled and Airflow Is Proven	Unit_On_Airflow_Okay	BV12		
R	D	Unit In Manual Control Mode	Manual_Control_Mode_Active	BV13	Man_Cntrl_On	95
R	D	Input - Evap Cooler Float Switch	Din_Evap_Cooler_Float_Switch	BV14		
R	D	Input - Condensing Unit Alarm	Din_Condensing_Unit	BV15		
R	D	Input - Damper End Switch	Damper_End_Switch	BV16		
R	D	Input - Damper Position 1	Damper_Position_1	BV17		
R	D	Input - Blower Speed 1	Blower_Speed_1	BV18		
R	D	Input - Damper Position 2	Damper_Position_2	BV19		
R	D	Input - Blower Speed 2	Blower_Speed_2	BV20		
R	D	Input - Unit Enable Or Occupied	Din_Unit_Enable_Or_Occupied	BV21		
R	D	Input - Airflow Switch	Din_Airflow_Switch	BV22		
R	D	Input - Blower Door Switch	Din_Blow_Dr_Safe_Sw	BV23		
R	D	Input - Filter Switch	Din_Filter_Switch	BV24		
R	D	Input - Furnace 1 Chain	Din_Furnace_1_Safe_Chain	BV25		
R	D	Input - Furnace 2 Chain	Din_Furnace_2_Safe_Chain	BV26		
R	D	Input - Furnace 3 Chain	Din_Furnace_3_Safe_Chain	BV27		
R	D	Input - SA RA Fire Stat Smoke Detector	Din_Sup_Ret_Air_Smoke_Detect	BV28		
R	D	Output - Damper On Off	Dout_Damper_On_Off	BV29		
R	D	Output - Furnace 1 Ignition Initiation	Dout_Furnace_1_Ignit_Init	BV30		
R	D	Output - Furnace 2 Stage 1	Dout_Furnace_2_Stage_1	BV31		
R	D	Output - Furnace 3 Stage 1	Dout_Furnace_3_Stage_1	BV32		
R	D	Output - Blower On Off	Dout_Blower_On_Off	BV33		
R	D	Output - Exhaust Fan Enable	Dout_Exhaust_Fan_Enable	BV34		
R	D	Output - Furnace 2 stage 2	Dout_Furnace_2_Stage_2	BV35		
R	D	Output - Furnace 3 stage 2	Dout_Furnace_3_Stage_2	BV36		
R	D	Output - Evap Cooler Fill Valve	Dout_Evap_Cool_Fill_Vlv	BV37		
R	D	Output - Evap Cooler Drain Valve	Dout_Evap_Cool_Drain_Vlv	BV38		
R	D	Output - Evap Cooler Pump	Dout_DX_CW_Stage_2	BV39		
R	D	A2L leak or sensor failure	AL_A2L_Alarm	BV80		
R	D	A2L sequence is active	A2L_mitigation_req	BV81		

Data Type A=Analog, I=Integer, D=Digital

(continued next page)

MODINE CONTROLS SYSTEM MANUAL

Typical BMS System Variables (continued)

Read/ Write	Data Type	Variable Description	BACnet Variable Name	BACnet Address	Lon Name	SNVT #
R	D	Output - DX or CW Stage 2	Dout_Evap_Cool_Pump	BV40	-	-
R	D	Output - DX or CW Stage 1	Dout_DX_CW_Stage_1	BV41	-	-
R	D	Clock Alarm Or Not Installed Correctly	AI_Clock	BV42	-	-
R	D	P Type Memory Expansion Fault	AI_Extd_Memory	BV43	-	-
R	D	Probe Fault - Outdoor Air Temp	Inlet_Air_Temperature_Fail	BV44	-	-
R	D	Probe Fault - Outdoor Air Humidity	Inlet_Air_Humidity_Fail	BV45	-	-
R	D	Probe Fault - Return Air Temp	Return_Air_Temperature_Fail	BV46	-	-
R	D	Probe Fault - Return Air Humidity	Return_Air_Humidity_Fail	BV47	-	-
R	D	Probe Fault - Duct Pressure	Duct_Pressure_Fail	BV48	-	-
R	D	Probe Fault - Building Pressure	Building_Pressure_Fail	BV49	-	-
R	D	Probe Fault - Mixed Air Temp	Mixed_Air_Temperature_Fail	BV50	-	-
R	D	Probe Fault - CO2 Content	CO2_Content_Fail	BV51	-	-
R	D	pAD Thermostat Not Communicating With Controller	pAD1_Offline	BV52	-	-
R	D	Probe Fault - pAD Space Temp	pAD1_Temperature_Fail	BV53	-	-
R	D	Probe Fault - pAD Space Humidity	pAD1_Humidity_Fail	BV54	-	-
R	D	Unit Is Not Providing Cooling Of Supply air	Cooling_Alarm	BV55	-	-
R	D	Unit Is Not Providing Heating Of Supply air	Heating_Alarm	BV56	-	-
R	D	Damper End Switch Not Made	AL_Damper_End_Switch	BV57	-	-
R	D	Dirty Air Filter	Main_Filter_AL	BV58	-	-
R	D	Single Furnace Unit - Chain Alarm	Single_Furnace_Safe_Chain_Alarm	BV59	-	-
R	D	Furnace 1 Chain Alarm	AL_Furnace_1_Safe_Chain	BV60	-	-
R	D	Furnace 2 Chain Alarm	AL_Furnace_2_Safe_Chain	BV61	-	-
R	D	Furnace 3 Chain Alarm	AL_Furnace_3_Safe_Chain	BV62	-	-
R	D	Furnace 1 Closed With No Call To Furnace	AL_F1_Chain_Closed_Not_Called	BV63	-	-
R	D	Furnace 2 Closed With No Call To Furnace	AL_F2_Chain_Closed_Not_Called	BV64	-	-
R	D	Furnace 3 Closed With No Call To Furnace	AL_F3_Chain_Closed_Not_Called	BV65	-	-
R	D	Supply Airflow Switch Not Making - Shutdown Unit	Supply_Fan_AF_Switch_Alarm	BV66	-	-
R	D	Blower Door Switch - Shutdown Unit, Auto Reset	Blow_Dr_Safe_Sw_Auto	BV67	-	-
R	D	Blower Door Switch - Shutdown Unit, Manual Reset	Blow_Dr_Safe_Sw_Manual	BV68	-	-
R	D	SA RA Fire Stat Smoke Detector - Shutdown Unit, Auto Reset	Sup_Ret_Air_Smoke_Auto	BV69	-	-
R	D	SA RA Fire Stat Smoke Detector - Shutdown Unit, Manual Reset	Sup_Ret_Air_Smoke_Manual	BV70	-	-
R	D	Faulty Supply Air Temp Sensor - Shutdown Unit	SAT_Sensor_Fail_Unit_Shutdown	BV71	-	-
R	D	Supply Duct Pressure Probe Fault - Shutdown Unit	Duct_Press_Fail_Unit_Shutdown	BV72	-	-
R	D	High Supply Duct Pressure - Shutdown Unit	High_Duct_Press_Unit_Shutdown	BV73	-	-
R	D	DX Condensing Unit Alarm	Condensing_Unit_Alarm	BV74	-	-
R	D	Evaporative Cooler Freeze Alarm	AL_Evap_CL_OAT_Freeze_Alarm	BV75	-	-
R	D	Sustained Low Supply Air Temp - Shutdown Unit	Low_SAT_Unit_Shutdown	BV76	-	-
R	D	Sustained High Supply Air Temp - Shutdown Unit	High_SAT_Unit_Shutdown	BV77	-	-
R	D	Cooling Locked Out	Cooling_Lockout	BV78	-	-
R	D	Furnace Heat Locked Out Due To High OAT	Furnace_Heating_Temp_Lockout	BV79	-	-

Data Type A=Analog, I=Integer, D=Digital

MODEL NOMENCLATURE FOR SYSTEM UNITS

Weatherproof Model Nomenclature

1	2	3	4 5 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 21	22	23
PT	UC	V	MBH	HE	DS	AS	ATR	GT	GV	SS	SV	TR	BB	HP	MT	SA	AC	EC	CC

1 - Product Type (PT)
H or O - Outdoor HVAC Unit

2 - Unit Configuration (UC)
B - Blower Package - Furnace & Blower
C - Cooling Package - Furnace, Blower, & Cooling Cabinet
D - Downturn Package - Furnace, Blower, & Downturn
P - Packaged Unit - Furnace, Blower, Cooling Cabinet, & Downturn

3 - Venting (V)
P - Power

4,5,6 - Furnace Input Rating (MBH) (Except for 840 & 960)
100 - 100,000 Btu/Hr Input
125 - 125,000 Btu/Hr Input
150 - 150,000 Btu/Hr Input
175 - 175,000 Btu/Hr Input
200 - 200,000 Btu/Hr Input
225 - 225,000 Btu/Hr Input
250 - 250,000 Btu/Hr Input
300 - 300,000 Btu/hr Input
350 - 350,000 Btu/hr Input
400 - 400,000 Btu/Hr Input
500 - 500,000 Btu/Hr Input
600 - 600,000 Btu/Hr Input
700 - 700,000 Btu/Hr Input
800 - 800,000 Btu/Hr Input
840 - 1,050,000 Btu/Hr Input
960 - 1,200,000 Btu/Hr Input

7 - Heat Exchanger/Burner/Drip Pan Material (HE)
T - 409 Stainless Steel Heat Exchanger/Burner/Drip Pan

8 - Development Sequence Designation (DS)
F - Single Stage
M - 2-stage or Modulating

9 - Access Side (AS)
R - Right Hand
L - Left hand

10 - Air Temperature Rise (ATR)
H - High 60°-100°F
L - Low 20°-60°F

11 - Gas Type (GT)
N - Natural with ignition controller
P - Propane with ignition controller

12 - Gas Valve (GV)
1 - Single Stage
2 - Two Stage
4 - Electronic Modulation
7 - Electronic Modulation 0-10 Vdc External Input
9 - Electronic Modulation with Modine Control System

13 - Additional Safety Switches (SS)
0 - No Switches (Standard)
3 - High and Low Gas Pressure Switch (Premium)

14 - Supply Voltage (SV)
A - 115/60/1
B - 208/60/1
C - 230/60/1
D - 208/60/3
E - 230/60/3
F - 460/60/3
G - 575/60/3

15 - Transformer (TR)
1 - 40 VA
2 - 75 VA
3 - 150 VA
4 - 250 VA
0 - None

16 - Blower Size & Bearing Type (BB)
C - 9-9 Spider Bearings
D - 9-9 Pillow Block Bearings
E - 12-12 Spider Bearings
F - 12-12 Pillow Block Brngs
G - 15-15 Spider Bearings
H - 15-15 Pillow Block Bearings
I - 18-18 Spider Bearings under 15 Hp
J - 18-18 Pillow Block Brngs under 15 Hp
K - 18-18 Pillow Block Brngs, 15 Hp & Up
L - 20-18 Pillow Block Bearings

17 - Motor Horsepower (HP)
A - 1/3 Hp
B - 1/2 Hp
C - 3/4 Hp
D - 1 Hp
E - 1-1/2 Hp
F - 2 Hp
G - 3 Hp
H - 5 Hp
I - 7-1/2 Hp
J - 10 Hp
K - 15 Hp
V - 20 Hp
L - 1/3 Hp with Motor Starter
M - 1/2 Hp with Motor Starter
N - 3/4 Hp with Motor Starter
P - 1 Hp with Motor Starter
Q - 1-1/2 Hp with Motor Starter
R - 2 Hp Hp with Motor Starter
S - 3 Hp with Motor Starter
T - 5 Hp with Motor Starter
W - 7-1/2 Hp with Motor Starter
X - 10 Hp with Motor Starter
Y - 15 Hp with Motor Starter
Z - 20 Hp with Motor Starter

18 - Motor Type (MT)
1 - ODP
2 - ODP - High Eff.
5 - TE
6 - TE - High Eff.

19 - Sheave Arrangement (SA)
A-Z - (See Sheave Tables)

20,21 - Air Control (AC)
AA - RA Opening
BA - FA Opening
CA - FA & RA Openings
DA - FA Dampers w/ 2 pos motor (No RA)
EA - FA & RA Dampers w/ 2 pos motor
GA - FA & RA Mod motor w/ 0-10 Vdc External Input
GC - FA & RA Mod motor w/ Minimum Position (Factory Mounted)
GE - FA & RA Mod motor w/ 3 pos. damper (100% RA, Variable, 100% OA)

22 - Evaporative Cooling (EC)
0 - None
D - 12" GLASdek Media, Stainless Steel Casing

23 - Cooling Coil (CC)
0 - None
1 - Factory Installed R410A Coil
2 - Factory Installed R32 Coil
3 - Factory Installed R454B Coil

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WARRANTY

This Warranty (the “Warranty”) shall apply to Products (as defined below) sold by Modine Manufacturing Company, a Wisconsin corporation (“Seller”) to you (“Buyer”).

Seller hereby warrants that during the Applicable Warranty Period (as defined below) its Products shall be free from defects in material and factory workmanship under normal use and service, subject to the EXCLUSIONS described below and according to the terms outlined in this Warranty.

If Seller receives written notice of a breach of this Warranty prior to the end of the Applicable Warranty Period (which such notice shall include the model and serial numbers of the Product, as well as the date and a reasonably detailed description of the Product’s alleged failure), Buyer shall with Seller’s prior written approval, return the applicable Product or component thereof to Seller with shipping charges prepaid; if upon examination by Seller such Product or component thereof is disclosed to have been defective, then Seller will, without charge to Buyer, at Seller’s option, either repair the Product, replace defective parts in the Product, or offer an entire replacement unit of the Product; provided that the warranty period for a Product that has been repaired or provided with replacement parts shall not extend beyond the original Applicable Warranty Period, nor shall any replacement parts provided for a Product be under any warranty beyond the original Applicable Warranty Period for the Product; similarly, if Seller provides an entire replacement unit of the Product, the warranty period for the replacement unit is limited to the remainder of the original Applicable Warranty Period. Seller shall have no responsibility for installation, service, field labor, shipping, handling, or other costs or charges, except as expressly provided in this Warranty. Buyer shall have no remedy hereunder for any defective part returned without proper written authorization from Seller, as described above.

For purposes of this Warranty and subject to the exclusions described below, the term “Products” shall mean parts or equipment manufactured by Seller, sold to Buyer pursuant to a purchase contract between Buyer and Seller (most often initiated by a purchase order issued by Buyer and accepted by Seller), and expressly described in such contract. The term “Products” shall not include third-party parts or equipment furnished by Seller, except that, to the extent assignable, Seller will assign to Buyer the benefits (together with all limitations and exclusions) of the third-party manufacturer’s warranty for such parts or equipment. This Warranty extends only to the original purchase contract between Buyer and Seller and is nontransferable, except that this Warranty may be assigned to an Authorized End User (as defined below). All replaced parts or equipment shall become Seller’s property. For purposes of this Warranty, the term “Applicable Warranty Period” shall mean the warranty period set forth in the table below for each type or class of Product described on the table; provided that, when the Product is to be used as a component part of equipment manufactured by Buyer, the Applicable Warranty Period shall be limited to one (1) year after the date of shipment from Seller, notwithstanding anything in the table below to the contrary. For purposes of this Warranty, the term “Authorized End User” shall mean any third-party that purchases the Product directly or indirectly from Buyer for the Authorized End User’s own use upon the first installation of the Product and not for resale.

BUYER HEREBY ACKNOWLEDGES THAT ITS REMEDIES FOR BREACH OF THIS WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, ARE LIMITED AS DESCRIBED ABOVE.

EXCLUSIONS AND LIMITATIONS: This Warranty is subject to the following exclusions and limitations:

The term “Products” shall not include and this Warranty shall not apply to any of the following items: refrigerant gas, belts, filters, fuses and other items consumed or worn out by normal wear and tear.

In addition, this Warranty shall not apply to:

(1) Products or components thereof that are damaged or adversely affected by conditions beyond Seller’s control, including but not limited to polluted or contaminated or foreign matter contained in the air or water utilized for heat exchanger (condenser) cooling or if the failure of the part is caused by improper air or water supply, or improper or incorrect sizing of power supply;

(2) Any Products or components thereof which have been repaired or altered outside the factory of Seller in any way, or otherwise subject to unauthorized repairs or alterations, so as, in the judgment of Seller, to affect the Product’s durability or performance;

(3) Materials or labor of any kind not furnished by Seller, or any charges for any such labor or materials, whether such labor, materials or charges thereon are due to replacement of parts, adjustments, repairs, or any other work done by any party other than Seller;

(4) Labor or other costs incurred for diagnosing, repairing, removing, installing, shipping, servicing, or handling of either defective or replacement parts;

(5) Any Products removed from their original location for reinstallation in another location;

(6) Any Products or components thereof which have been operated, maintained, or serviced contrary to Seller’s written installation, operation, and/or servicing instructions or owner’s manual;

(7) Damages resulting from operation with an inadequate or interrupted supply of air or water;

(8) Any Products or components thereof which have been subjected to misuse, negligence, faulty installation, improper servicing, accident, excessive thermal shock, excessive humidity, physical damage, impact, abrasion, improper operation, or other operating conditions in excess of or contrary to those for which such equipment was designed;

(9) With respect to gas-fired or oil-fired units, any Products or components thereof if the input to the Product exceeds the rated input (as indicated on the Product’s serial plate) by more than five percent (5%);

(10) Any Products or components thereof which, in the judgment of Seller, have been installed in a corrosive atmosphere, marine, or coastal application, subjected to corrosive fluids or gases, or damaged or adversely affected by the effects of the physical or chemical properties of water or steam or other liquids or gases used in the Products or any component thereof;

(11) Damage or failure to start resulting from improper voltage conditions, blown fuses, open circuit breakers, or other

inadequacy or interruption of electrical service or fuel supply; or (12) Any Products or components thereof from which the serial number has been altered, defaced or removed.

BUYER AGREES THAT THE WARRANTIES AND REMEDIES DESCRIBED HEREIN ARE THE ONLY WARRANTIES AND REMEDIES PROVIDED BY SELLER WITH RESPECT TO THE PRODUCTS AND TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW SHALL BE IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND REMEDIES WHATSOEVER, EITHER EXPRESS OR IMPLIED, WHETHER ARISING FROM LAW, COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE, **INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, EACH OF WHICH SELLER HEREBY EXPRESSLY DISCLAIMS.** SELLER NEITHER ASSUMES (NOR HAS AUTHORIZED ANY PERSON TO ASSUME) ANY OTHER WARRANTY OR LIABILITY IN CONNECTION WITH ANY PRODUCTS. REPRESENATATIONS AND CONDITIONS, EXPRESS OR IMPLIED BY STATUTE, TRADE USAGE, OR OTHERWISE, ARE EXCLUDED AND WILL NOT APPLY TO THE PRODUCTS UNDER THIS WARRANTY, EXCEPT FOR WARRANTIES WHICH BY LAW CANNOT BE EXCLUDED OR LIMITED. Without limiting the foregoing, Seller makes no and specifically disclaims all representations and/or warranties that the Products will detect the presence of, or eliminate, prevent, treat, or mitigate the spread, transmission, or outbreak of any pathogen, disease, virus, or other contagion, including but not limited to COVID 19.

BUYER AGREES THAT IN NO EVENT WILL SELLER BE LIABLE FOR COSTS OF PROCESSING, LOST REVENUES OR PROFITS, INJURY TO GOODWILL, OR ANY OTHER SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES OF ANY KIND RESULTING FROM THE PURCHASE OF THE PRODUCTS, OR FROM BUYER'S USE OF ANY PRODUCT, WHETHER ARISING FROM BREACH OF WARRANTY, NONCONFORMITY TO ORDERED SPECIFICATIONS, DELAY IN DELIVERY, OR ANY OTHER LOSS SUSTAINED BY THE BUYER.

OPTIONAL SUPPLEMENTAL WARRANTY

Buyer may purchase from Seller a supplemental warranty with respect to Products which shall extend the Applicable Warranty Period as set forth in the express terms and conditions described in the supplemental warranty agreement. Such supplemental warranty terms may include an additional four (4) years on certain compressors, an additional five (5) years "all parts" warranty, an additional four (4) or nine (9) years on certain heat exchangers, and/or such additional supplemental warranty terms as Seller chooses to make available to its customers from time to time.

COMPONENT	APPLICABLE MODELS		APPLICABLE WARRANTY PERIOD (WHICHEVER OCCURS FIRST)	
			Time from Date of First Beneficial Use by Buyer or Authorized End User	Time from Date of Shipment from Seller
Heat Exchangers and/or Coils	Gas Fired Unit Heaters with Tubular Style Heat Exchangers (e.g. HD, HDS, PTX, BTX, etc)	Aluminized or Stainless Steel	10 YEARS	126 MONTHS
	Gas Fired Unit Heaters with Clam-Shell Style Heat Exchangers (e.g. PDP, BDP, etc.)	Aluminized Steel (not in high-humidity applications)	10 YEARS (must be Stainless Steel in high-humidity applications)	126 MONTHS
		Aluminized Steel (in high-humidity applications)	1 YEAR	18 MONTHS
		Stainless Steel	10 YEARS	126 MONTHS
	Low Intensity Infrared Units		5 YEARS	66 MONTHS
	Indoor and Outdoor Duct Furnaces and System Units, Steam/Hot Water Units, Oil-Fired Units, Electric Units, Cassettes, Vertical Unit Ventilators, Geothermal Units		1 YEAR	18 MONTHS
Burners and Elements	Low Intensity Infrared Units		2 YEARS	30 MONTHS
	High Intensity Infrared and Electric Infrared Units		1 YEAR	18 MONTHS
Compressors	Condensing Units for Cassettes		5 YEARS	66 MONTHS
	Vertical Unit Ventilators, Geothermal Units		1 YEAR	18 MONTHS
Sheet Metal Parts	All Products		1 YEAR	18 MONTHS
Components, excluding Heat Exchangers, Coils, Condensers, Burners, Sheet Metal	All Products		2 YEARS	30 MONTHS

As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.

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