DAIKIN

OPERATION MANUAL

OM 1382-2

DECEMBER 2025

MICROTECH® UNIT CONTROLLER

FOR REBEL® COMMERCIAL PACKAGED ROOFTOP SYSTEMS

- MODEL DPS
- R-32 REFRIGERANT
- APP VERSION: 2506036302

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Table of Contents

Introduction

This manual provides operating information and controller operation sequences, maintenance, and start-up procedures for packaged rooftop systems.

Hazardous Information Messages

⚠ DANGER

Danger indicates a hazardous situation, which will result in death or serious injury if not avoided.

⚠ WARNING

Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided.

⚠ CAUTION

Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided.

NOTICE

Notice indicates practices not related to physical injury.

NOTE: Indicates important details or clarifying statements for information presented.

MicroTech Fundamentals

⚠ WARNING

Only qualified personnel should install, operate and service the equipment and that improper adjustment of settings and operation by an unqualified person could result in property damage, injury, or death.

NOTICE

This document applies to controllers equipped with the software version displayed on the front cover. Controllers with older or newer software versions may have features that do not correspond with the features defined in this document.

Getting Started

This manual contains information designed to assist the field technician with unit setup. The technician will need to be familiar with the following topics, at a minimum, to successfully set up unit operation:

- Keypad navigation/editing/passwords
- Control Mode
- Occ Mode (Occupancy)
- DSP Setpoint (Duct Static Pressure)
- BSP Setpoint (Building Static Pressure)
- Heat/Cool Changeover
- DAT Clg Setpoint (Discharge Air Temperature)
- DAT Htg Setpoint (Discharge Air Temperature)
- Clg Enable (OAT/EWT lockout)
- Htg Enable (OAT lockout)
- Econo Enable (Changeover temp/Enthalpy switch)
- Ventilation Limit/OA damper

The keypad/display consists of a 5-line by 22 character display, three keys and a “push and roll” navigation wheel. There is an **Alarm Button**, **Menu (Home) Button**, and a **Back Button**. The wheel is used to navigate between lines on a screen (page) and to increase and decrease changeable values when editing. Pushing the wheel acts as an **Enter Button**.

The first line on each page includes the page title and the line number to which the cursor is currently “pointing.” The line numbers are X/Y to indicate line number X of a total of Y lines for that page. The left most position of the title line includes an “up” arrow to indicate there are pages “above” the currently displayed items, a “down” arrow to indicate there are pages “below” the currently displayed items, or an “up/down” arrow to indicate there are pages “above and below” the currently displayed page.

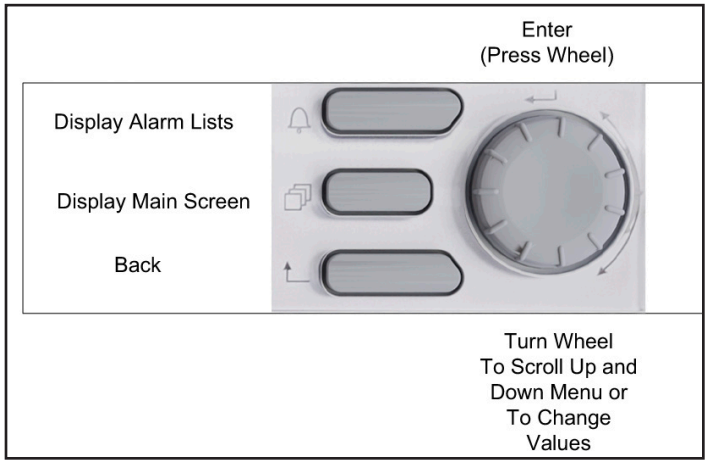
Each line on a page can contain status only information or include changeable data fields. When a line contains status only information and the cursor is on that line, all but the value field of that line is highlighted - meaning the text is white with a black box around it. When the line contains a changeable value and the cursor is at that line, the entire line is highlighted. Each line on a page may also be defined as a “jump” line, meaning pushing the navigation wheel will cause a “jump” to a new page. An arrow is displayed to the far right of the line to indicate it is a “jump” line and the entire line is highlighted when the cursor is on that line.

The keypad/display Information is organized into Menu groups: **Main Menu**, **Quick Menu, View Status Menu, Commission Unit Menu, Manual Control Menu, Service Menu, Unit Configuration Menu, and Alarm list Menus**.

NOTE: Only menus and items that are applicable to the specific unit configuration are displayed.

The **Main Menu** allows the user to enter a password, access the Quick Menu pages, view the current unit state, access the Alarm List Menu, as well as access to information about the unit. The **Quick Menu** provides access to status information indicating the current operating condition of the unit. The **View Status Menus** include basic menus and items required to setup the unit for general operation. These include such things as control mode, occupancy mode and heating and cooling setpoints. The **Commission Unit Menus** include more advanced items for "tuning" unit operation such as PI loop parameters and time delays. The **Manual Control Menu** allows service personnel to test unit specific operation manually. The **Unit Configuration Menu** allows the user to access to the unit specific configuration information. These generally do not needing changing or accessing unless there is a fundamental change to or a problem with the unit operation. The **Alarm Lists Menu** includes active alarm and alarm log information.

Figure 1: Keypad Controls



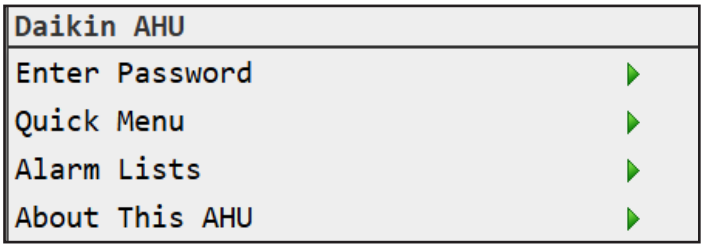
Passwords

Various menu functions are accessible or inaccessible depending on the access level of the user and the password they enter, if any. There are four access levels, including: No Password, Level 2, Level 4, and Level 6, with Level 2 having the highest level of access. Without entering a password, the user has access only to basic status menu items. Entering the Level 6 password (5321) allows access to the Alarm Lists Menu, Quick Menu, and the View Status Menus group. Entering the Level 4 password (2526) allows similar access as Level 6 with the addition of the Commission Unit Menu, Manual Control, and Service Menu groups. Entering the Level 2 password (6363) allows similar access as Level 4 with the addition of the Unit Configuration Menu.

NOTE: Alarms can be acknowledged without entering a password.

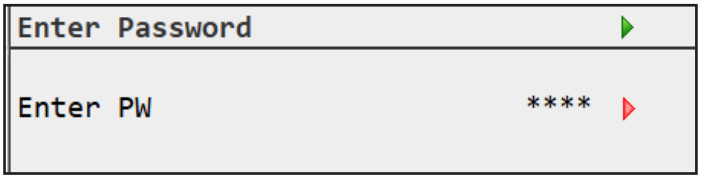
The main password page is displayed when the keypad/display is first accessed, the Home Key is pressed, the Back Key is pressed multiple times, or if the keypad/display has been idle longer than the Password Timeout (default 10 minutes). The main password page provides access to enter a password, access the Quick Menu, view the current Unit State, access the alarm lists, or view information about the unit.

Figure 2: Password Main Page



The password field initially has a value **** where each * represents an adjustable field. These values can be changed by entering the Edit Mode described below.

Figure 3: Password Entry Page



Entering an invalid password has the same effect as continuing without entering a password. Once a valid password has been entered, the controller allows further changes and access without requiring the user to enter a password until either the password timer expires or a different password is entered. The default value for this password timer is 10 minutes. It is changeable from 3 to 720 minutes via the Advanced Timer Settings menu.

Navigation Mode

In the Navigation Mode, when a line on a page contains no editable fields, all but the value field of that line is highlighted - meaning the text is white with a black box around it. When the line contains an editable value field, the entire line is inverted when the cursor is pointing to that line.

When the navigation wheel is turned clockwise, the cursor moves to the next line (down) on the page. When the wheel is turned counter-clockwise, the cursor moves to the previous line (up) on the page. The faster the wheel is turned the faster the cursor moves.

When the Back Button is pressed the display reverts back to the previously displayed page. If the Back button is repeated pressed the display continues to revert one page back along the current navigation path until the “Main Menu” is reached.

When the Menu (Home) Button is pressed the display reverts to the “main page.”

When the Alarm Button is depressed, the Alarm Lists Menu is displayed.

Edit Mode

The Editing Mode is entered by pressing the navigation wheel while the cursor is pointing to a line containing an editable field. Once in the edit mode, pressing the wheel again causes the editable field to be highlighted. Turning the wheel clockwise while the editable field is highlighted causes the value to be increased. Turning the wheel counter-clockwise while the editable field is highlighted causes the value to be decreased. The faster the wheel is turned the faster the value is increased or decreased. Pressing the wheel again causes the new value to be saved and the keypad/display to leave the Edit Mode and return to the Navigation Mode.

Service Timers

A user may override timers for a period of up to 60 minutes by setting the Service Timer to a non-zero number. When the Service Timer is not zero, the times listed below are set to the Service Time (Default = 20 seconds) instead of the normal values. This allows the unit to be run through its operating states without having to wait for the normal time delays to expire. These times revert to the standard values when the Service Timer counts down to zero or is set to zero by the user.

The affected times are:

- Cooling Stage Time
- Heating Stage Time
- Start Initial Time
- Recirculation
- ZeroOATime

Rapid Start

The user may elect to initiate a rapid startup sequence at unit power up by setting the Rapid Start flag to Yes. When this flag is set to Yes, the Service Timer is set to 10 minutes whenever the power is reset to the controller.

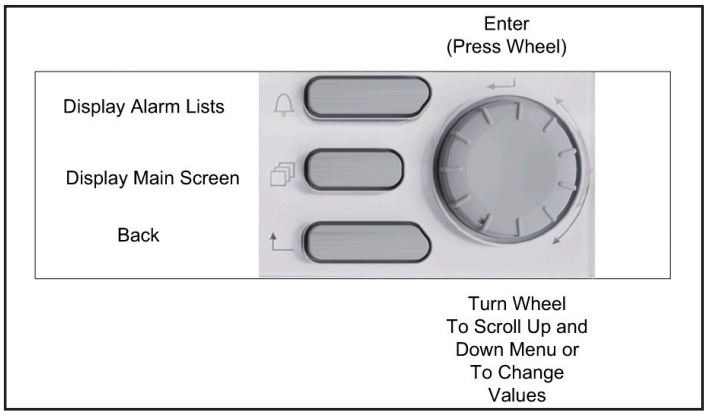
Menu Navigation

Keypad Menu Structure

The following is a description of the MicroTech menu structure. These menus and items can all be displayed with the keypad/display.

NOTE: Menu items displayed will change based on the selected unit configuration.

Table 1: Keypad Dial



Main Menu Navigation

Table 2: Main Menu

Selection	Location
Enter Password	Table 3 on page 7
Quick Menu	Table 4 on page 7
View Status	Table 13 on page 9
Unit State=	N/A
Unit Status =	N/A
MWU Status=	N/A
System Mode=	N/A
CmpIntrLock=	N/A
Dehum Status=	N/A
Ctrl Mode=	N/A
Occ Mode=	N/A
HP Mode=	N/A
CmpCtrlMode=	N/A
Commission Unit	Table 23 on page 11
Manual Control	Table 5 on page 8
Cmp Circ Man Ctrl	Table 6 on page 8
Service Menus	Table 7 on page 8
Advanced Menus	Table 8 on page 8
Trending Set-Up	Table 9 on page 8
Unit Maintenance	Table 38 on page 14
BMS Communications	Table 10 on page 8
Alarm Lists	Table 11 on page 9
About This AHU	Table 12 on page 9

Table 3: Main Menu > Enter Password

Enter Password
Enter Password****

Table 4: Main Menu > Quick Menu

Quick Menu (page 34)		
Unit State=		Min DAT Limit=
Unit Status=		Unocc Clg Spt=
MWU Status=		Unocc Htg Spt=
Dehum Status=		SAF Capacity=
System Mode=		SAF DuctPress=
CmpIntrLock=		SAF DSP Spt=
Ctrl Mode=		RFEF Capacity=
Occ Mode=		Bldg Press=
HP Mode=		BldgSP Spt=
CmpCtrlMode=		RAF DuctPress=
Clg Capacity=		RAF DSP Spt=
OAD Positon=		CO2 PPM=

(continued)		
Quick Menu (page 34)		
Htg Capacity=		OA Flow=
2nd Htg Cap=		OA Flow Spt=
Preheat Cap=		OA Flow=
Rht Capacity=		OA Flow Spt=
Control Temp=		SAF Flow=
Occ Clg Spt=		SAF Flow Spt=
Occ Htg Spt=		OA Temp=
Disch Air=		Rel Hum 1=
DAT Clg Spt=		Rel Hum 2=
DAT Htg Spt=		

Table 5: Main Menu > Manual Control

Manual Control (page 21)		
Manual Ctrl=		ModPrhtDmpr=
Supply Fan=		PreheatVlv=
SAF Cap Cmd=		Htg Stg 1=
Exh Dampers=		Htg Stg 2=
Ret/Exh Fan=		Htg Stg 3=
RFEF Cap Cmd=		Htg Stg 4=
OADamper Pos=		ER Wheel=
DXBP Dmpr Cmd=		ER Whl CapCmd=
CW Valve=		ERBP Dmpr Cl=
Heat Enable		ERBP Dmpr Op=
Htg Valve=		SCR Preheat=
SCR Capacity=		Alm Output=
F&BP Damper=		EconStatusOut=
ModPrhtVlv=		RelDmprCls=

Table 6: Main Menu > Cmp Circ Man Ctrl

Cmp Circ Man Ctrl (page 22)		
Manual Ctrl=		CondSol1 Circ1=
Circ1 OAF1=		C1 EVI1 Cap=
Circ1 OAF2=		C1 EVO Cap=
C1OAF1 Cap=		4WV1=
C1OAF2 Cap=		DFAuxHtgOut=
VCmp1 =		MHG1Rht Valve=
VCmp1 Cmd=		RH1 Bleed Valve=
C1FCmp3=		

Table 7: Main Menu > Service Menus

Service Menus (page 116)		
Timer Settings		Alarm/Event Config
Operating Hours		I/O Module Status
Save/Restore Settings		Unvrsl/AI I/O Status
Active Alarms		Digital Input Status
Alarm Log		Digital Output Status
Event Log		Network Input Status
Data Snapshots		Modbus Status

Table 8: Main Menu > Advanced Menus

Advanced Menus (page 142)		
Unit Set-Up		HP Defrost1 Set-Up
Advanced Timers		Dehum Set-Up
SAF Set-Up		Reheat Set-Up
RFEF Set-Up		Energy Rec Set-Up
HtgClg ChgOvr Set-Up		Relief Damper Set-Up
Cooling Set-Up		IAQ Sensor Set-Up
Econo Set-Up		A2L Sensors
OA Damper Set-Up		Power Monitor
Heating Set-Up		Sensor Offsets
OAF Circ1 Set-Up		IP Set-Up
EV Circ1 Set-Up		HMI Set-Up
VCmp Circuit1 Set-Up		Unit Configuration

NOTE: To access “Advanced Menus”, enable by selecting “Ena Adv Menus” (in Service Menus) and set to “Yes”.

Table 9: Main Menu > Trending Set-Up

Trending Set-Up (page 105)		
Apply Chgs=		Enable Trend5=
Sample Time=		Ena FreeTrend=
TrendOnOff=		AutoExpTime=
Enable Trend1=		Export Data=
Enable Trend2=		Clear Trend=
Enable Trend3=		TrendFull=
Enable Trend4=		

Table 10: Main Menu > BMS Communications

BMS Communications (page 110)		
AHU Loc/Net=		BACnet IP Set-Up
LON Set-Up		Modbus Set-Up
BACnet MSTP Set-Up		Network Unit Set-Up

Table 11: Main Menu > Alarm Lists

Alarm Lists (page 119)		
Active Alarms		Alarm Log

Table 12: Main Menu > About This AHU

About This AHU		
SO_Item=		LON BSP=
Unit SN=		LON App Ver=
App Version=		Modbus BSP=
Options Code=		BACnet BSP=
Cf1-16=		HMI GIUD=
Cf17-31=		OBH GIUD=
Main BSP=		

View Status Navigation

Table 13: Main Menu > View Status

View Status	Location
Unit Status/Settings	Table 14 on page 9
Occupancy	Table 15 on page 9
Temperatures	Table 16 on page 9
SAF Control	Table 17 on page 10
Compressor Status	Table 18 on page 10
Economizer	Table 19 on page 10
Heating	Table 20 on page 10
Dehumidification	Table 21 on page 10
Date/Time/Schedules	Table 22 on page 10

Table 14: View Status > Unit Status/Settings

Unit Status/Settings (page 40)		
Unit State=		Clg Status=
Unit Status=		Htg Status=
MWU Status=		2nd Htg Status=
System Mode=		Econo Status=
CmpIntrLock=		Clg Capacity=
CmpCapIn=		Htg Capacity=
HtgCapIn=		2nd Htg Cap=
HeatCoolIn=		Preheat Cap=
OADCapIn=		Rht Capacity=
RhtCapIn=		SAF Capacity=
AlmResetIn=		RFEF Capacity=
SAFCapIn=		OAD Positon=
RFEFCapIn=		Rel Hum 1=
SAF Status=		Rel Hum 2=
Dehum Status=		Net Emrg Ovrd=
Ctrl Mode=		Net App Mode=

Table 15: View Status > Occupancy

Occupancy (page 29)		
Occupancy=		UnoccSrc=
Occ Mode=		Tnt Ovrde Tm=
OccSrc=		TOSensorSrc=
NetOccManCmd=		

Table 16: View Status > Temperatures

Temperatures (page 118)		
Control Temp=		C1DRT1=
Disch Air=		SRT1=
Return Air=		DFT1=
EffSpaceT=		C1DRT3=

(continued)		
Temperatures (page 118)		
Space Temp 1=		ER EWT=
Space Temp 2=		SRT1=
Space Temp 3=		VCmp1 Temp=
OA Temp=		C1FCmp3 Temp=
EF/LC Temp=		LRT1=
ER LWT=		

Table 17: View Status > SAF Control

SAF Control (page 47)		
SAF Capacity=		OA Flow=
SAF Cap Cmd=		SAF Flow=
SAF DuctPress=		Bldg Press=
CO2 PPM=		

Table 18: View Status > Compressor Status

Compressor Status (page 60)		
Clg Capacity=		SSH1=
Clg Status=		DSH1=
Htg Capacity=		Subcooling1=
Htg Status=		Te1=
VCmp1=		Tc1=
VCmp1 Cap=		C1DRT1=
C1FCmp3=		C1DRT3=
PTS1=		SRT1=
PTD1=		

Table 19: View Status > Economizer

Economizer (page 91)		
OAD Positon=		Econo Status=
Min OA Pos=		FreeClgStatus=

Table 20: View Status > Heating

Heating (page 76)		
Htg Capacity=		Htg Stg 2=
2nd Htg Cap=		Htg Stg 3=
Htg Status=		Htg Stg 4=
2nd Htg Status=		Preheat Cap=
Htg Stg 1=		

Table 21: View Status > Dehumidification

Dehumidification (page 67)		
Dehum Status=		Dewpoint 2 =
Rel Hum 1=		Reheat Spt=
Rel Hum 2=		Rht Capacity=
Dewpoint 1 =		

Table 22: View Status > Date/Time/Schedules

Date/Time/Schedules (page 31)		
Time=		Hol 8=
Date=		Hol 9=
UTC Diff=		Hol 10=
Mon=		Beg=
Tue=		End=
Wed=		Enable=
Thu=		Htg Rate=
Fri=		Htg OAT=
Sat=		Des Htg OAT=
Sun=		Clg Rate=
Hol=		Clg OAT=
Hol 1=		Des Clg OAT=
Hol 2=		DLS Strt Month=
Hol 3=		DLS Strt Week=
Hol 4=		DLS End Month=
Hol 5=		DLS End Week=
Hol 6=		DLS Enable=
Hol 7=		Max Purge=

Commission Unit Navigation

Table 23: Main Menu > Commission Unit

Commission Unit	Location
Unit Set-Up	Table 24 on page 11
Timer Settings	Table 25 on page 11
SAF Set-Up	Table 26 on page 11
HtgClg ChgOvr Set-Up	Table 27 on page 11
Cooling Set-Up	Table 28 on page 11
Econo Set-Up	Table 29 on page 11
OA Damper Set-Up	Table 30 on page 12
Heating Set-Up	Table 31 on page 12
Dehum Set-Up	Table 32 on page 12
Humidity Sensor Set-Up	Table 33 on page 12
Energy Rec Set-Up	Table 34 on page 12
Remote Sensor Set-Up	Table 35 on page 13
Configurable I/O	Table 36 on page 13
Alarm/Event Config	Table 37 on page 13

Table 24: Commission Unit > Unit Set-Up

Unit Set-Up (page 25)		
Eng Units=		Loc SpaceT Cfg=
UnitName=		Emerg Stop=

Table 25: Commission Unit > Timer Settings

Timer Settings (page 97)		
Start Up=		Tnt Ovrd Incr=
Recirculate=		Post Heat=
Clg Stg Time=		Low DAT=
Htg Stg Time=		Service Time=
Zero OA Time=		

Table 26: Commission Unit > SAF Set-Up

SAF Set-Up (page 47)		
SAF Ctrl=		OA Flow Spt=
Rem SAF Cap=		OA Flow DB=
SAF DuctPress=		SAF Flow=
SAF DSP Spt=		SAF Flow Spt=
SAF DSP DB=		SAF Flow DB=
Control Temp=		Bldg Press=
Occ Clg Spt=		BldgSP Spt=
Occ Htg Spt=		BSP DB=
Occ Clg DB=		SAF SETUP
Occ Htg DB=		Max SAF Hz=
CO2 PPM=		Max SAF RPM=
CO2SensorSrc=		Min Clg Cap=

(continued)		
SAF Set-Up (page 47)		
Min SAF PPM=		Max Clg Cap=
Max SAF PPM=		Min Htg Cap=
Min PPM Cap=		Max Htg Cap=
Max PPM Cap=		VAVBox Out=
OA Flow=		SAF1 Status=

Table 27: Commission Unit > HtgClg ChgOvr Set-Up

HtgClg ChgOvr Set-Up (page 45)		
Ctrl Temp Src=		Occ Htg DB=
Rem Spt Src=		RmtSptLoLmt=
Control Temp=		RmtSptHiLmt=
Occ Clg Spt=		CalRemSpt@50°F=
Occ Htg Spt=		CalRemSpt@86°F=
Occ Clg DB=		DemandShed=

Table 28: Commission Unit > Cooling Set-Up

Cooling Set-Up (page 61)		
Circ1 CmpState=		Min LCT Spt=
Circ1Status=		Max LCT Spt=
VCmp1 Cap=		EffSpaceT=
VCmp1 Cmd=		Unocc Clg Spt=
VCmp1 Rps=		Unocc Diff=
C1FCmp3=		Clg Stg Time=
Control Temp=		OA Temp=
Occ Clg Spt=		Clg Lo OAT Lk=
Occ Clg DB=		OAT Diff=
Disch Air=		Clg Reset=
DAT Clg Spt=		Min Clg Spt=
DAT Clg DB=		Min Clg Spt@=
EF/LC Temp=		Max Clg Spt=
LCT Setpoint=		Max Clg Spt@=

Table 29: Commission Unit > Econo Set-Up

Econo Set-Up (page 91)		
Control Temp=		Max Econ Spt@=
Occ Clg Spt=		Max OAT Lmt=
Occ Clg DB=		Min OAT Lmt=
Disch Air=		Calibrate OAD=
UseDATClgSpt=		Pos Sw Open=
DAT Econ Spt=		Max Sw Diff=
DAT Econ DB=		Pos Sw Close=
Clg Stg Time=		Min Sw Diff=
Econ Chgovr=		OAD Sw Status=

(continued)		
Econo Set-Up (page 91)		
OA Temp=		OAEOffset=
Chgover Temp=		OADewpoint=
Econo Diff=		OARelHum=
Econo FDD=		OAEnthalpy=
Econ Reset=		RADewpoint=
Min Econ Spt=		RARelHum=
Min Econ Spt@=		RAEnthalpy=
Max Econ Spt=		DATSptEnth=

Table 30: Commission Unit > OA Damper Set-Up

OA Damper Set-Up (page 85)		
Vent Limit=		PPM @ DCV Lmt=
LoFlo VntLmt=		PPM @ Vnt Lmt=
DCV Limit=		CO2 PPM=
OAD Positon=		CO2SensorSrc=
Min OA Pos=		OA Flow Reset=
Min OA Src=		OA Flow=
Network Reset=		OA Flow Spt=
Net Min OA=		OA Flow DB=
Ext AI Reset=		BSP OA Ovrd=
OA @ MinV/mA=		Bldg Press=
OA @ MaxV/mA=		BldgSP Spt=
Ext Singal=		BSP DB=
CO2 Reset=		

Table 31: Commission Unit > Heating Set-Up

Heating Set-Up (page 76)		
Control Temp=		Max Htg Spt @=
Occ Htg Spt=		Min DAT Ctrl=
Occ Htg DB=		Min DAT Limit=
Disch Air=		MWU Sensor=
DAT Htg Spt=		StgG1PriState=
DAT Htg Spt=		StgG2PriState=
DAT Htg DB=		StgG3PriState=
EffSpaceT=		StgGSpltState=
Unocc Htg Spt=		StgG1DiagCode=
Unocc Diff=		StgG2DiagCode=
Htg Stg Time=		StgG3DiagCode=
OA Temp=		ModGState=
Htg Hi OAT Lk=		ModGDiagCode=
CmpHtgLoOATLk=		ModGErrCode=
OAT Diff=		ModGPhase=
Htg Reset=		ModGErrCode=

(continued)		
Heating Set-Up (page 76)		
Min Htg Spt=		ModGDiagCode=
Min Htg Spt @=		EF/LC Temp=
Max Htg Spt=		

Table 32: Commission Unit > Dehum Set-Up

Dehum Set-Up (page 67)		
Dehum Method=		LCT Spt Reset=
Rel Hum 1=		Min LCT Spt=
Rel Hum 2=		Min LCT Spt@=
Hum 1 Spt=		Max LCT Spt=
Hum 2 Spt=		LCTRstRHSpt=
Dewpoint 1 =		LCTRstDptSpt=
Dewpoint 2 =		Max LCT Spt@=
Dewpnt 1 Spt=		Min Reheat Spt=
Dewpnt 2 Spt=		Max Reheat Spt =
Rel Hum DB=		Reheat Spt=
Dewpoint DB=		DAT Htg DB=
LCT Setpoint=		Unocc Dehum=
LCT Deadband=		

Table 33: Commission Unit > Humidity Sensor Set-Up

Humidity Sensor Set-Up (page 98)		
Hum Sensor 1=		SpaceDwpnt1=
Hum Sensor 2=		SpaceRel Hum 2=
SpaceRH1Src=		SpaceDwpnt2=
SpaceRH2Src=		RARelHum=
SpcHumSensTyp=		RADewpoint=
SpcHum MinSig=		OARelHum=
SpcHum MaxSig=		OADewpoint=
SpaceRel Hum 1=		

Table 34: Commission Unit > Energy Rec Set-Up

Energy Rec Set-Up (page 96)		
Energy Rec=		ER Whl CapCmd=
ER Wheel=		ER LWT=
ER Whl Cap=		RARelHum=

Table 35: Commission Unit > Remote Sensor Set-Up

Remote Sensor Set-Up (page 99)		
Snsr1 ID=		Config Done=
Snsr2 ID=		Sensor2 Name=
Snsr3 ID=		Rem Space T=
Commission Sts=		Rem Space RH=
CommissionMode=		Rem Space CO2=
AllSnsrsReady=		Rem Space Spt=
Sensor1Sts=		Rem Occupancy=
Sensor2Sts=		Snsr2 ID=
Sensor3Sts=		Sensor2 Addr=
Sensor1 State=		Snsr2 Alm Sts=
Sensor2 State=		Sensor2 Cmd=
Sensor3 State=		Sensor2 State=
Sensor1 Name=		Snsr2Rdy Sts=
Rem Space T=		ID Assign Done=
Rem Space CO2=		Config Done=
Rem Space RH=		Sensor3 Name=
Rem Space Spt=		Rem Space T=
Rem Occupancy=		Rem Space RH=
Snsr1 ID=		Rem Space CO2=
Sensor1 Addr=		Rem Space Spt=
Snsr1 Alm Sts=		Rem Occupancy=
Sensor1 Cmd=		Snsr3 ID=
Sensor1 State=		Sensor3 Addr=
Snsr1 Rdy Sts=		Snsr3 Alm Sts=
ID Assign Done=		Sensor3 Cmd=
Config Done=		Sensor3 State=
Sensor1 Cmd=		Snsr3 Rdy Sts=
Sensor1 State=		ID Assign Done=
Snsr1 Rdy Sts=		Config Done=
ID Assign Done=		

Table 36: Commission Unit > Configurable I/O

Configurable I/O (page 103)		
ApplyIOChgs=		Input X6=
X1 Cfg=		Input X5=
Input X1=		Output X6=
Output X1=		X7 Cfg=
X2 Cfg=		Input X7=
Input X2=		Output X7=
Output X2=		X8 Cfg=
X3 Cfg=		Input X8=
Input X3=		Output X8=
Output X3=		Output DO1=
X4 Cfg=		Output DO2=
Input X4=		Output DO3=
Output X4=		Output DO4=
X5 Cfg=		Output DO5=
Output X5=		Output DO6=
X6 Cfg=		

Table 37: Commission Unit > Alarm Event Config

Alarm Event Config (page 129)		
Hi DAT Limit=		AlmLogToSD=
Lo DAT Limit=		Show Events=
Hi RAT Limit=		EventLogToSD=
Faults=		Show Events=
Problems=		EventLogToSD=
Warnings=		SnapshotsToSD=

Unit Maintenance Navigation

Table 38: Main Menu > Unit Maintenance

Unit Maintenance	Location
Operating Hours	Table 39 on page 14
Air Filters	Table 40 on page 14

Table 39: Unit Maintenance > Operating Hours

Operating Hours (page 117)		
Supply Fan=		VCmp1=
Ret/Exh Fan=		C1FCmp3=
Cooling=		Dehumid=
Heating=		Reheat=
2nd Heating=		ER Wheel=
Preheat=		ER Preheat=
Economizer=		UV Lights=
Tnt Override=		

Table 40: Main Menu > Air Filters

Air Filters (page 117)		
MainFltrSpt1=		MainFltrSw=
MainFltrPres1=		FinalFltrSpt=
MainFltrSpt2=		FinalFltrPres=
MainFltrPres2=		FinalFltrSw=

Field Wired Inputs

Rebel units are available with several control schemes which may require low voltage field wiring. Use the Unit Specific Electrical Schematics to determine which control connections will be required for installation. Check unit specific electrical documentation in the door of the unit's control panel.

Table 41: Potential Field Connections and Locations on TB2 (Standard and Refrigeration Only Controls)

Terminal Block Number	Description	Signal
STANDARD CONTROLS		
200	Power	24V AC
201	Signal for Tenant Override	Contact Closure
203	Return SD Into E-Stop	Contact Closure
204	Return SD Into E-Stop	Contact Closure
205	Field Provisions For E-Stop	Contact Closure
206	Field Provisions For E-Stop	Contact Closure
209	Power	24V AC Common
210	Space Temperature Sensor 1	Thermistor
212	Setpoint Adjustment, Wallstat	
214	CO2 / Ext OA Reset	0-10VDC
215	Alarm Output	24VAC Relay
216	Alarm Return	24VAC Relay
217	Fan Operation	24VAC Relay
236	Controller Common	
240	Local / Remote Status	Relay Output
240C	Local / Remote Status	Relay Output
297	Passive Ventilation Input	Contact Closure
2104C	A2L Alarm Status	Relay Output
2104	A2L Alarm Status	Relay Output
2105C	A2L Fault Status	Relay Output
2105	A2L Fault Status	Relay Output
REFRIGERATION ONLY CONTROL		
202	Condensate Overflow Switch	Contact Output
203	Condensate Overflow Switch	Contact Output
206	Field Provisions for E-Stop	
220	Freezestat Sensor Terminal 1	Contact Closure
221	Freezestat Sensor Terminal 2	Contact Closure

(continued)		
Terminal Block Number	**Description**	**Signal**
223	Heat Capacity Input	0-10VDC
231	Alarm Reset	Contact Closure
242	Cooling System Interlock (From Field)	Contact Closure
244	HP Heating / Cooling Mode Input	Contact Closure
245C	Defrost Status Output	Relay Output
245	Defrost Status Output	Relay Output
246	Reheat Capacity Input	0-10VDC
247	Cooling Capacity Input	0-10VDC
250	Cooling Actual Capacity Output	0-10VDC
267	Supply Fan Capacity Input	0-10VDC
275	Exhaust/Return Fan Capacity Input	0-10VDC
277	Outside/Return Air Damper Input	2-10VDC
232A	Main Filter Transducer/ Switch	4-20mA / Contact Output
232B	Main Filter Transducer/ Switch	4-20mA / Contact Output
232C	ERW Filter Transducer/ Switch	4-20mA / Contact Output
232D	ERW Filter Transducer/ Switch	4-20mA / Contact Output
2104C	A2L Alarm Status	Relay Output
2104	A2L Alarm Status	Relay Output
2105C	A2L Fault Status	Relay Output
2105	A2L Fault Status	Relay Output

Table 42: Potential Field Connections and Locations on TB2A (Auxiliary Set)

Terminal Block Number	Description	Signal
208E	Zone Humidity Sensor #1	4-20mA
208G	Zone Humidity Sensor #2	4-20mA
210E	Space Temperature Sensor 2	Thermistor
210G	Space Temperature Sensor 3	Thermistor
296A	Return Air SD Aux Contact	Relay Output
296B	Return Air SD Aux Contact	Relay Output
2100	Smoke Purge - Purge	Contact Closure
2101	Smoke Purge - Pressurize	Contact Closure
2102	Smoke Purge - Vent	Contact Closure
2103	Smoke Purge - Shutdown	Contact Closure

Table 43: Potential Field Connections and Locations on TB2S (Auxiliary Sensor Output Blocks)

Terminal Block Number	Description	Signal
229A	Airflow Signal	4-20ma / 0-10VDC
229B	Airflow Signal Common	4-20ma / 0-10VDC
281C	Thermistor Common	Thermistor
281	Discharge Air Temperature Signal	Thermistor
282	Return Air Temperature Signal	Thermistor
283	Leaving Coil Temperature Signal	Thermistor
284	Leaving Wheel Temperature Signal	Thermistor
285	Entering Wheel Temperature Signal	Thermistor
297	Outdoor Air Temp Signal	Thermistor
2120	Supply Fan Airflow Signal	4-20mA
2121	Supply Fan Airflow Common	4-20mA
2122	Return/Exhaust Fan Airflow Signal	4-20mA
2123	Return/Exhaust Fan Airflow Common	4-20mA
2124	Duct Static Pressure Signal	4-20mA
2125	Duct Static Pressure Common	4-20mA
2126	Building Static Pressure Signal	4-20mA
2127	Building Static Pressure Common	4-20mA
GND	Shield Ground	N/A

Figure 4: TB2 Diagram (Standard Controls)

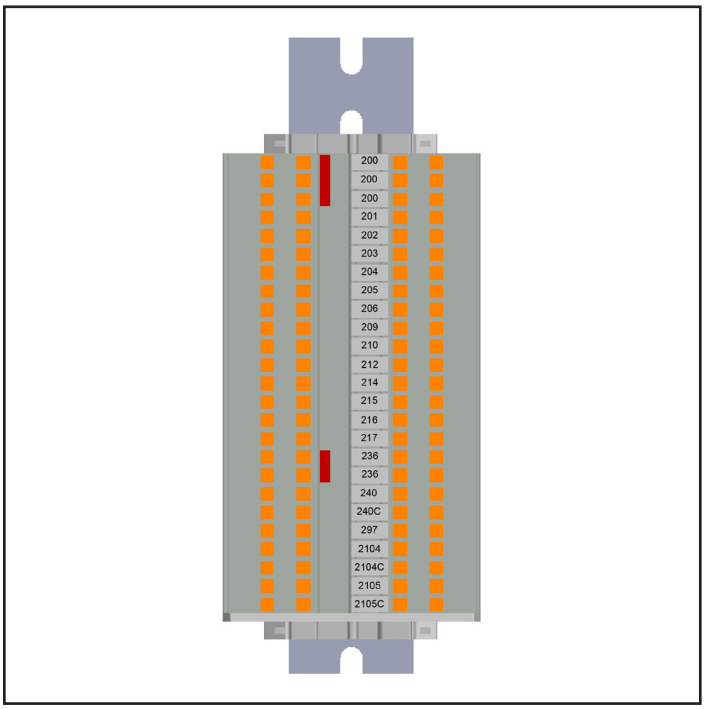


Figure 5: TB2 Diagram (Refrigeration Only Control)

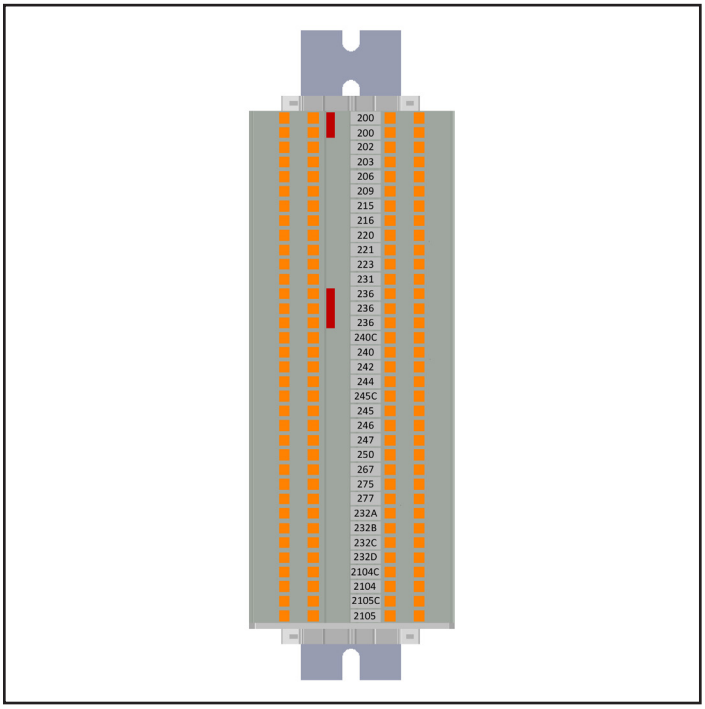


Figure 6: TB2A Diagram

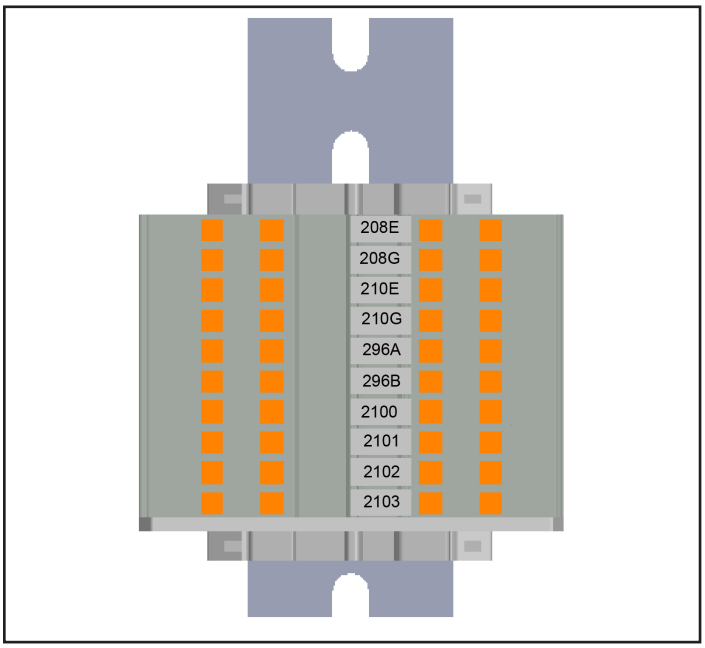
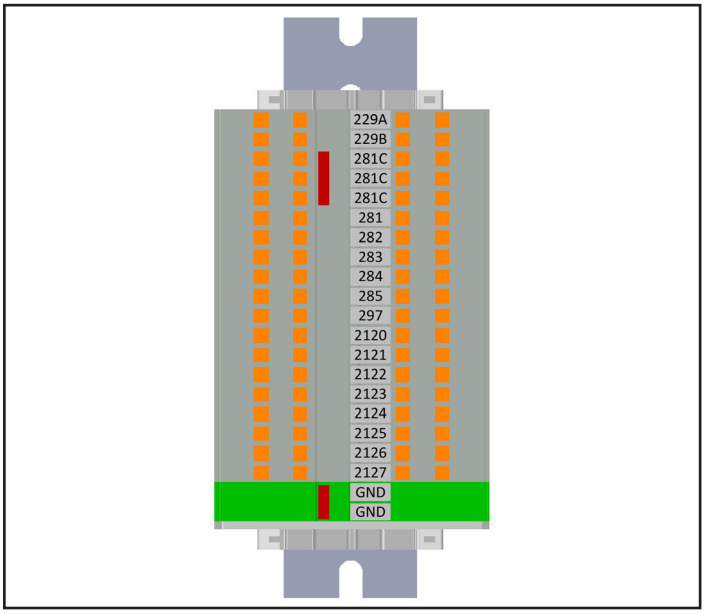


Figure 7: TB2S Diagram



MicroTech Field Wiring

The MicroTech unit controller can be connected to a variety of field installed sensors.

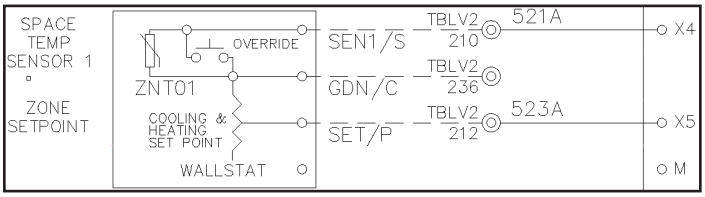
Table 44: Field Installed Sensors

Sensor	Daikin Applied Part Number
Space Sensor with Tenant Override	113117701
DDC Space Sensor with Setpoint Adjust and Tenant Override	910143408
Combo DDC Temp and Humidity Sensor with Setpoint Adjustment and Tenant Override	910191961
Communicating Network Space Sensors	910279216 910278050
Space Humidity Sensor	910202119
Wall Mounted CO_2 Sensor	107287012
Duct Mounted CO_2 Sensor	910111672

Space Temperature Sensors

The MicroTech unit controller works with 10kohm Type 2 thermistors and can support up to 3 space sensors. These sensors can drive cooling and heating based on the highest, lowest, or average space sensor reading.

Figure 8: Space Temperature Sensors Wiring Diagram



Communicating Network Space Sensors

The MicroTech unit controller can be connected to a network of the 3 network space sensors as either a temperature sensor only or a temperature, Humidity and CO2 combo sensor. Each Sensor comes with a backlit LCD screen to show current space conditions, allow setpoint adjustment and commands.

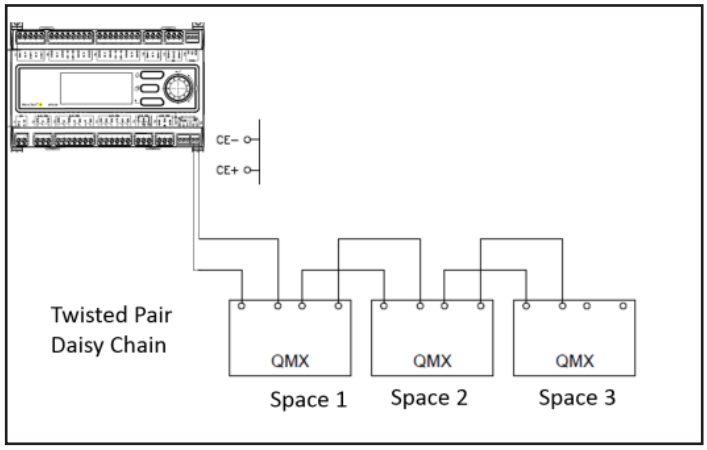
Table 45: Network Space Sensors

Sensor	Daikin Applied Part Number
Network Temperature Sensor	910279216
Network Combo Temperature Sensor	910278050

Figure 9: Network Temperature Sensor

The MicroTech can support up to 3 Network (QMX) sensors wired to the Process Bus terminals with a daisy chain twisted pair cable.

Figure 10: Wired Network Sensor Example

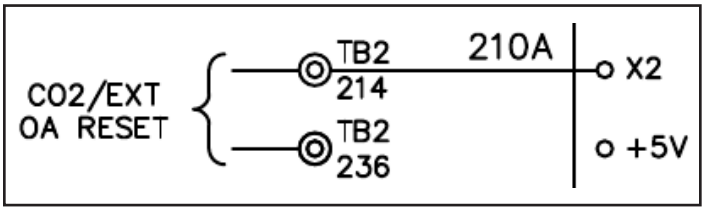


NOTE: The sensor is available in English units only and does not show SI units.

IAQ/OA Flow

All units equipped with 100%, 0-30% OA or 0-100% OA Economizer dampers can be supplied with outdoor airflow measuring stations. Additionally, these variations can also be provided with a field mounted CO2 sensor for Demand Control Ventilation. CO2 sensors are wired to the TB2 in the low voltage panel at terminal 214. Demand Control Ventilation can also be performed using the communicating network space sensors. See Table 144 on page 161.

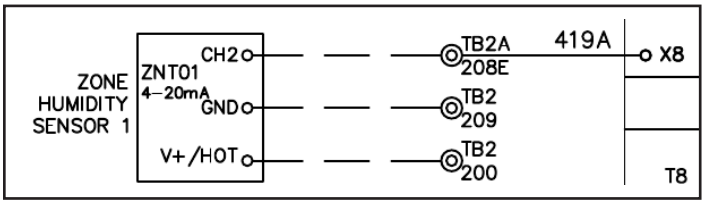
Figure 11: CO2/OA Wiring Diagram



Humidity Sensors

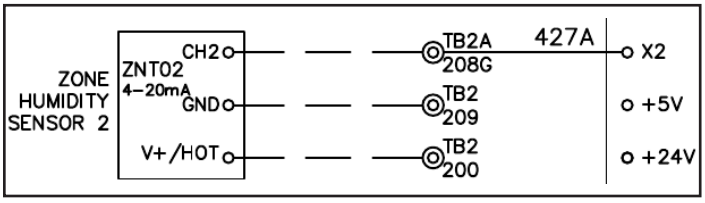
The MicroTech will support up to 2 remote, field wired mounted humidity sensors and two factory installed Outdoor and Return Air Humidity Sensors. Humidity sensors are used for economizer control, dehumidification control, and for monitoring via a Building Automation System. See Table 79 on page 98 and refer to Table 68 on page 67.

Figure 12: Humidity Sensor 1 Wiring Diagram



NOTE: Refer to Table 112 on page 132.

Figure 13: Humidity Sensor 2 Wiring Diagram

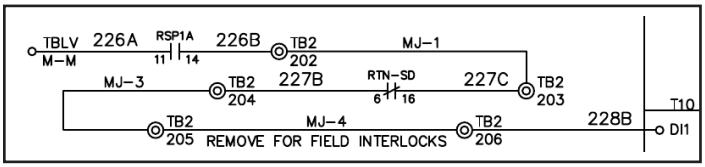


NOTE: Refer to Table 115 on page 136.

Emergency Off Circuit

The Emergency Off Circuit will shut down the unit when the Digital Input is open. This circuit contains the smoke detector and field wired emergency off terminals.

Figure 14: Emergency Off Circuit Wiring Diagram



Smoke Detectors

The Supply and Return Air Smoke Detectors have Auxiliary outputs from Pin 8 and 18 on the detector that are available on the TB2A Terminals.

- TB2A terminals 296A and 296B for return air smoke detector
- TB2A terminals 296C and 296D for supply air smoke detector

Figure 15: Return Air Smoke Detector Wiring Diagram

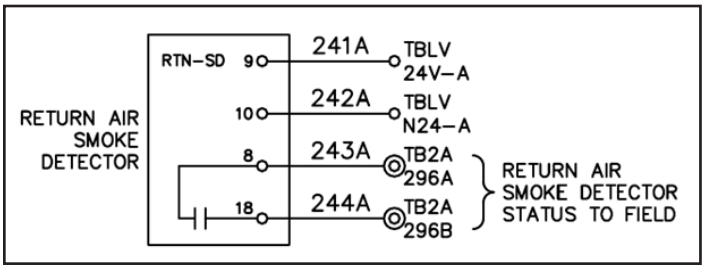
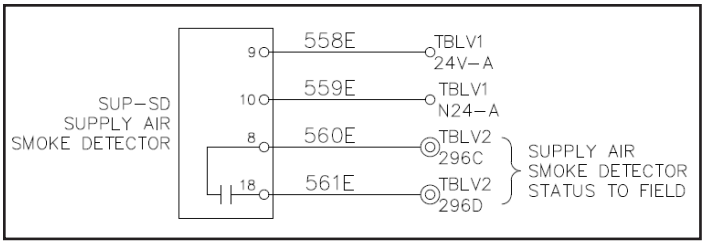
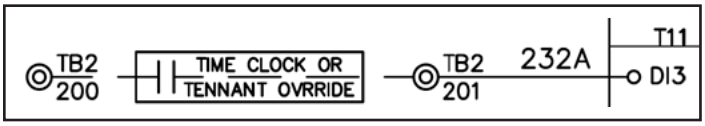


Figure 16: Supply Air Smoke Detector Wiring Diagram



Tenant Override

Figure 17: Tenant Override Wiring Diagram



Ventilation Override and Smoke Purge

The optional Ventilation Override Smoke Purge sequence provides four (4) field wire terminal block inputs that allow override of unit operation during an emergency control scenario. This control occurs with hard wired relays outside of the MicroTech controller's logic. The inputs provide an override function to Ventilate, Pressurize, or Purge.

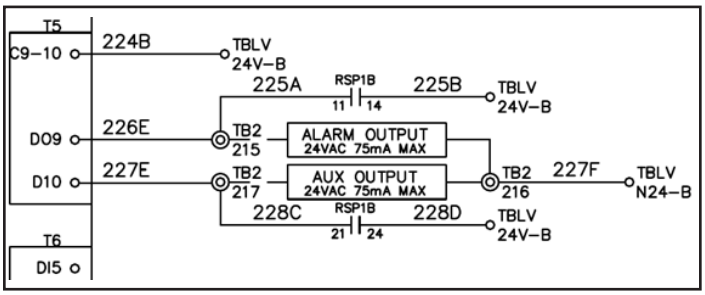
Table 46: TB2A Terminal Sequence

Function	TB2A Terminal	Sequence
Unit Shut Down	2103	The unit must be shut down to initiate the emergency override functions.
Ventilate	2102	When the ventilate contact is active, the Outdoor Air Damper is driven open to 100%.
Pressurize	2101	When the Pressurize contact is active, the Outdoor Air damper is driven open to 100% and the supply fan ramps to the SAF Vent Speed. This is adjustable in the Commission Unit \ SAF Set-up menu.
Purge	2100	When the Pressurize contact is active, the Return Air damper is driven open to 100% and the Relief fan (exhaust) ramps to the EF Vent Speed. This is adjustable in the Commission Unit \ EF Set-up menu.

Alarm Output and Auxiliary Output

MicroTech has an Alarm Output contact, DO9, that is available on TB2 Terminals 215 and 217 that provides a digital output anytime an alarm is active on the controller. MicroTech also has an Auxiliary Output contact, DO10, that is available on TB2 Terminals 216 and 217 that can be configured to provide a digital output anytime the fan is operational or to be used as a VAV active signal to drive boxes open during morning warm-up. To configure DO10, review Table 124 on page 147. Both outputs are Triac outputs.

Figure 18: Alarm and Auxiliary Outputs Wiring Diagram



Temporary Operations

Manual Unit Operation

⚠ WARNING

Only qualified personnel should install, operate and service the equipment and that improper adjustment of settings and operation by an unqualified person could result in property damage, injury, or death.

Manual Control can be initiated during start up to control individual features of the air handling system independent of the control sequence. Place the unit into Manual Control mode through the MicroTech Keypad menu - Main Menu\Manual Control\Manual Ctrl = Manual. Once in manual control, you can activate fans and compressors manually, check damper operation, etc.

NOTE: Manual operation is not intended for extended operation beyond troubleshooting or initial start-up.

Table 47: Manual Control

Menu Display Name	Default	Range	Description
Manual Ctrl=	Normal	Normal ManCtrl	Manual Ctrl is an adjustable item that allows the unit to enter manual control mode. Manual Ctrl will be automatically set back to 'Normal' if any fault alarm is active, A2L mitigation sequence is active, or 240 minutes have expired after Manual Ctrl was set to 'ManCtrl'.
Supply Fan=	Off	Off On	Supply Fan is an adjustable item that manually turns the fan on.
SAF Cap Cmd=	0%	0-100%	SAF Cap Cmd is an adjustable item that manually drive the supply fan to a capacity.
Exh Dampers=	0%	0-100%	Exh Dampers is an adjustable item that sets the exhaust damper position if the unit is equipped with a modulating exhaust damper.
Ret/Exh Fan=	Off	Off On	Ret/Exh Fan is an adjustable item that manually turns on the Return or Exhaust Fan.
RFEF Cap Cmd=	0%	0-100%	RFEF Cap Cmd is an adjustable item that manually sets the Return or Exhaust Fan capacity.
OADamper Pos=	0%	0-100%	OADamper Pos is an adjustable item that manually sets the outdoor air damper position capacity.
CW Valve=	0%	0-100%	CW Valve is an adjustable item that manually sets the capacity of the chilled water control valve.
Heat Enable	Off	Off On	Heat Enable is an adjustable item that manually turns on the primary heater. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
Htg Valve=	0%	0-100%	Htg Valve is an adjustable item that manually sets the capacity of the hot water or steam control valve. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
SCR Capacity=	0%	0-100%	SCR Capacity is an adjustable item that manually sets the capacity of the SCR electric heater. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
F&BP Damper=	0%	0-100%	F&BP Damper is an adjustable item that manually sets the capacity of the Face and Bypass Damper.
ModPrhtVlv=	0%	0-100%	An adjustable item that manually controls the capacity of preheat hot water or steam valve.
ModPrhtDmpr=	0%	0-100%	An adjustable item that manually controls the capacity of preheat damper.
Htg Stg 1=	Off	Off On	Htg Stg 1 is an adjustable item that manually turns on stage 1 of heat in a staged heater. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
Htg Stg 2=	Off	Off On	Htg Stg 2 is an adjustable item that manually turns on stage 2 of heat in a staged heater. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Htg Stg 3=	Off	Off On	Htg Stg 3 is an adjustable item that manually turns on stage 3 of heat in a staged heater. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
Htg Stg 4=	Off	Off On	Htg Stg 4 is an adjustable item that manually turns on stage 4 of heat in a staged heater. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
ER Wheel=	Off	Off On	ER Wheel is an adjustable item that manually turns on the energy recovery wheel.
ER Whl CapCmd=	0%	0-100%	ER Whl CapCmd is an adjustable item that manually sets the capacity the energy recovery wheel speed.
ERBP Dmpr Cl=	Off	Off On	ERBP Dmpr Cl is an adjustable item that manually closes the Energy recovery wheel bypass damper.
ERBP Dmpr Op=	Off	Off On	ERBP Dmpr Op is an adjustable item that manually opens the Energy recovery wheel bypass damper.
SCR Preheat=	0%	0-100%	SCR Preheat is an adjustable item that manually sets the capacity of the SCR Preheat defrost coil. The SAF Capacity must be greater than the Effective Min SAF Capacity to adjust this parameter.
Alm Output=	Off	Off On	Alm Output is an adjustable item that manually turns on the alarm output.
Aux Output=	Off	Off On	Aux Output is an adjustable item that manually turns on the Auxiliary output DO10.
EconStatusOut=	Off	Off On	An adjustable item that manually turn on/off economizer status output.
RelDmprCls=	Off	Off On	RelDampCls is an adjustable item that manually turns on the Relief Damper Close output.

Table 48: Cmp Circ Man Ctrl

Menu Display Name	Default	Range	Description
Manual Ctrl=	Normal	Normal ManCtrl	Manual Ctrl is an adjustable item that allows the unit to enter manual control mode.
Evac/ ChrgMode=	Off	Off Circ1 AllCirc	Evac/ChrgMode is an adjustable item that manually turns on crankcase heaters and opens expansion valves for evac/charging purposes.
Circ1 OAF1=	Off	Off On	Circ1 OAF1 is an adjustable item that manually turns the outdoor fan 1 on for circuit 1. This parameter is changeable only when the Circuit State is set to 'Off'.
C1OAF1Cap=	0%	0-100%	C1OAF1Cap is an adjustable item that manually controls capacity of circuit 1 outdoor air fan. This parameter is changeable only when the Circuit State is set to 'Off'.
Circ1 OAF2=	Off	Off On	Circ1 OAF2 is an adjustable item that manually turns the outdoor fan 2 on for circuit 1. This parameter is changeable only when the Circuit State is set to 'Off'.
C1OAF2Cap=	0%	0-100%	C1OAF2Cap is an adjustable item that manually controls capacity of circuit 1 outdoor air fan. This parameter is changeable only when the Circuit State is set to 'Off'.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
VCmp1 =	Off	Off On	VCmp1 is an adjustable item that manually turns on the Variable Compressor 1. This parameter is only adjustable when the following are true: - The fixed compressor on the circuit is set to 'Off'. - The circuit is not disabled. - The SAF Capacity is greater than Effective Min SAF Capacity. - The Circuit State is not set to 'Standby'.
VCmp1 Cmd=	0%	0-100%	VCmp1 Cmd is an adjustable item that manually sets the capacity of the variable compressor 1. This parameter is changeable only when the Circuit State is set to 'Normal'.
C1FCmp3=	Off	Off On	C1FCmp3 is an adjustable item that manually turns on the fixed speed compressor. This parameter is only adjustable when the following are true: - The circuit is not disabled. - The SAF Capacity is greater than Effective Min SAF Capacity. - The Circuit State is not set to 'Standby'.
CondSol1 Circ1=	Off	Off On	An Adjustable item that manually turns circuit 1 condenser splitter valve 1 on/off. This parameter is changeable only when the Circuit State is set to 'Off'.
C1 EVI1 Cap=	0%	0-100%	An adjustable item that manually adjusts the capacity of circuit 1 indoor expansion valve. This parameter is changeable only when the Circuit State is set to 'Off'.
C1 EVO1 Cap=	0%	0-100%	An adjustable item that manually adjusts the capacity of circuit 1 outdoor expansion valve. This parameter is changeable only when the Circuit State is set to 'Off'.
4WV1=	Off	Off On	An adjustable item that manually opens/closes circuit 1 4-way valve.
DFAuxHtgOut=	Off	Off On	DFAuxHtgOut is an adjustable item that manually opens/closes defrost digital output, i.e. the roof panel heater (3-17 tons only).
MHG1Rht Valve=	0%	0-100%	MHG1Rht Valve is an adjustable item that manually sets the capacity of the modulating hot gas reheat valve.
RH1 Bleed Valve=	Off	Off On	RH1 Bleed Valve is an adjustable item that manually opens/closes the bleeder valve of the hot gas reheat coil.

Temporary Operation for Heating and Cooling

For **Temporary Heating and Cooling** operation during the construction or prior to building occupancy follow these steps.

NOTE: This temporary control works on all units with a Return Air Opening (and not 100% OA configured equipment) and controls to maintain the return air temperature at the setpoint before space sensors or additional controls are available. It is not intended to directly control humidity or building pressure.

1. Be prepared to record the original settings on paper for each of the following sets. You will need to revert the settings to the defaults prior to final commissioning.
2. Configure for Zone Control:
   For Temporary Heating and Cooling operation you will need to configure the MicroTech for Zone Control operation using the keypad menu.
   a. Enter Password 6363.
   b. Navigate: Main Menu\Advanced Menus\Unit Configuration (you will need to enable the Advanced Menus in the service menu).
   c. Set Control Type = Zone Temperature Control (ZTC).
   d. Scroll to the top save settings. The controller will cycle power.
3. Configure for RAT:
   Set temporary cooling or heating setpoint.

NOTE: This parameter is only adjustable when the following are true:

- The fixed compressor on the circuit is set to 'Off'.
- The circuit is not disabled.
- The SAF Capacity is greater than Effective Min SAF Capacity.
- The Circuit State is not set to 'Standby'.

   a. Enter Password 6363.
   b. Navigate: Main Menu\Commission Unit\Htg/Clg ChgOvr Set-Up.
   c. Set Ctrl Temp Src = RAT.
   d. Set OccClg Spt = desired setpoint for temporary cooling.
   e. Set Occ Htg Spt= desired setpoint for temporary heating.
   f. Return to Main Menu.

4. Set-Up OA Damper
   a. Navigate: Main Menu\Commission Unit\OA Damper Set-Up.
   b. Set Vent Limit = 0%.
   c. Return to Main Menu.
5. Configure for Cooling or Heating
   a. Navigate: Main Menu\ Quick Menu.
   b. Set Ctrl Mode = CoolOnly for Cooling Operation OR Heat for Heating operation.
   c. Set Occ Mode = Occ.
6. Revert to original control settings once temporary operation is complete.

Unit Set-Up

Unit Type Setup

The units of measure can be set to English or SI units. General unit set-up configurations are used to adjust the MicroTech controller's units of measure: Unit Name, Space Temperature Configuration, and Emergency Stop control.

Unit Name

A customized Unit Name can be entered. This helps identify each unit when more than one unit is connected to a single remote HMI. Example: RTU-1

Local Space Temperature Configuration

More than one LocSpaceT Cfg can be connected to the MicroTech. This configuration sets which sensor will drive the unit operation; either Sensor 1, Sensor 2, sensor 3 or Minimum value, Maximum value, or Average value.

Emergency Stop

The Emerg Stop configuration determines how the MicroTech will resume operation after an emergency off signal. "ManClr" requires a cycling of the power at the disconnect. When set to "AutoClr" the unit will resume operation once the emergency off signal disappears.

Unit Set-Up Menu

Table 49: Main Menu \ Commission Unit \ Unit Set-Up

Menu Display Name	Default	Range	Description
Eng Units	English	English SI	Eng Units is an adjustable item to indicate if the unit is to display English or Metric units of measure.
Unit Name	-	-	Unit Name is an adjustable item that allows each controller to be given a unique name. This may be useful when multiple units are connected to a single remote HMI.
Loc SpaceT Cfg	Sens1	Min Max Avg Sens1 Sens2 Sens3	Loc SpaceT Cfg is an adjustable item that allows the user to select which space temperature sensor will be used as the effective space temperature sensor. MicroTech can be equipped with up to 3 space sensors, where the Min (lowest reading), Max (Highest Reading), Average (average reading) or a specific sensor can be used as the effective space sensor.
Emerg Stop	ManClr	ManClr AutoClr	Emerg Stop is an adjustable item that sets if the unit requires a manual reset after an emergency stop or if it will automatically restart once the emergency signal does not exist.

Enable the Unit

Control Mode

The unit heating and cooling can be set up for automatic heat/cool, heating only, cooling only, fan only, or accept network commands based on a network signal by setting the Control Mode parameter. Also the entire unit may be disabled by the Control Mode.

Off

When Control Mode is set to “OFF,” the Unit Status is “OffMan” and the unit is completely disabled, including unoccupied heating (night set back) and unoccupied or unoccupied cooling (night set up) operation.

Heat Only

When Control Mode is set to “HeatOnly,” heating operation is allowed to operate as required to maintain the heating setpoints. Cooling operation is disabled (Cooling Status is “OffMan”).

Cool Only

When Control Mode is set to “CoolOnly,” cooling operation is allowed to operate as required to maintain the cooling setpoints. Heating operation is disabled (Heating Status is “OffMan”).

Fan Only

When Control Mode is set to “FanOnly,” the fans are allowed to operate but cooling and heating operation is disabled (Cooling Status and Heating Status are “OffMan”).

Heat Cool

When Control Mode is set to “**Heat/Cool**”, both cooling and heating operation are allowed to operate as required to maintain the cooling and heating setpoints.

Auto

When Control Mode is set to “**Auto**”, unit operation will be allowed but Control Mode will have no other effect on unit operation. Cooling and heating operation will depend on Net App Mode.

Net App Mode

The unit heating and cooling can be set up for automatic heat/cool, heating only, cool only, or fan only operation based on a network signal by setting the Control Mode parameter to “Auto/Net”. With the Control Mode parameters set to “Auto/Net,” the heat/cool, cool only, heat only, fan only decision is determined by the Net App Mode. The Net App Mode is set by a signal. The following sections describe the five available Net App Mode selections.

NOTE: The Net App Mode has no effect on the unit operation unless the Control Mode parameter is set to “Auto/Net.”

Net App Mode - Off

When the Net App Mode is set to “OFF,” the Unit Status is “OffNet” and the unit is completely disabled, including unoccupied heating (night set back) and unoccupied or unoccupied cooling (night set up) operation.

Net App Mode - Heat Only

When the Net App Mode is set to “HeatOnly,” heating operation is allowed to operate as required to maintain the heating setpoints. Cooling operation is disabled (Cooling Status is “OffNet”).

Net App Mode - Cool Only

When the Net App Mode is set to “CoolOnly,” cooling operation is allowed to operate as required to maintain the cooling setpoints. Heating operation is disabled (Heating Status is “OffNet”).

Net App Mode - Fan Only

When the Net App Mode is set to “FanOnly,” the fans are allowed to operate but cooling and heating operation is disabled (Cooling Status and Heating Status are “OffNet”).

Net App Mode - Auto

When the Net App Mode is set to “Auto,” heating and cooling operation are allowed to operate as required to maintain the heating and cooling setpoints.

NOTE: Control Mode can be viewed and changed in the Main Menu, Quick Menu, and Unit Status/Setting Menu

Occupancy

Occupancy Mode is a configurable item that determines the current unit mode. Settings can be, Occ (Occupied), Unocc (Unoccupied), TntOvrd (Tenant Override), or Auto/Net (Auto change based on network or schedule).

Occupied Operation

During **Occupied Operation**, the unit starts and runs continuously, cooling, dehumidifying and heating as required to maintain the occupied setpoints.

Unoccupied Operation

During **Unoccupied Operation** the unit operates normally except that the Minimum OA position is always set to zero so that the damper is closed to the outdoor air.

NOTE: For 100% OA units, the damper will be 100% open when the unit is in Unoccupied Operation.

- **Unoccupied Cooling:** Unoccupied operation is initiated if the space sensor is reliable, the space temperature is greater than the Unoccupied Cooling Setpoint, and the Unoccupied Cooling Setpoint is set lower than its maximum setting. In this case, the unoccupied source indicates “UnoccClg”.
- **Unoccupied Heating:** Unoccupied operation is initiated if the space sensor is reliable, the space temperature is less than the Unoccupied Heating Setpoint, and the Unoccupied Heating Setpoint is set higher than its minimum setting. In this case, the Unoccupied Source indicates “UnoccHtg”.
- **Unoccupied Dehumidification:** Dehumidification may be initiated in the unoccupied mode only if Dehumidification Method is not set to Always or None and Unoccupied Dehumidification is set to Yes on the keypad. When this is the case and the humidity goes high the unit transitions in the normal manner through Start up and Recirc to Fan Only and then into the Dehumidification Mode. In this case, the UnoccSrc= parameter indicates “Unocc Dehum”.

Determining Occupancy Source

Occupancy can be driven by a number of sources: Network Schedule, Internal Schedule, a preprogrammed event, Manual Control of Occupancy, a remote wired switch, a Building Automation System or a Temperature Sensor Override.

- **Schedule:** Occupancy can be driven off of a schedule either through the network or using the internal schedule function on MicroTech.
  - **Network:** When occupancy is set to NetSchd, this means that occupancy is being driven to occupancy due to a network schedule.
  - **Internal:** When occupancy is set to IntSchd, this means that occupancy is being driven to occupancy due to the internal schedule in the unit controller.
  - **One Event:** When occupancy is set to OneEvnt, this means that occupancy is being driven to occupancy due to a preprogrammed, scheduled event in the unit controller.
- **Manual Occupancy:** Occupancy can be driven manually to occupied, at the MicroTech controller interface, via a contact closure of a switch or via a Building Automation network.
  - **Occupancy Mode:** Occ Mode is when the occupancy has manually been set to Occ at the unit controller.
  - **Remote Switch:** When the unit is in occupancy due to a field supplied external time clock or a tenant override switch in the form of a set of dry contacts is closed across terminals 200 and 201 on the unit field terminal block TB2.
  - **Network:** When an OccManCmd is shown for occupancy status, the network is sending a manual occupied signal.
- **Tenant Override:** Tenant override is when the unit occupancy status is overridden from unoccupied to occupied operation for a override timer, and adjustable timer from 0-300 min.
  - **TStat Tenant Override:** The TStat Tenant Override (TstatTO), status is occupancy override due to the tenant override button on the any zone thermostat being pushed and held for at least 1 second.
  - **ManTenant Override:** Manual Tenant Override (ManTO) status is occupancy override due to the unit is manually set to occupied at the unit controller and the override timer is set to a non-zero value.
  - Tenant Override can be set to not be activated by any space sensors by setting the TOTime = 0min and by setting the TOSensorSrc = None
  - The TOTime entry on the keypad can also be manually set to a non-zero value. In this case the value begins timing down from the edited value.
  - Tenant Override operation may be terminated by manually setting the Tenant Override parameter on the keypad to zero or by disabling the unit.

Determining Unoccupied Source

Unoccupied operation is allowed when a valid space temperature sensor(s) is present.

- **Unoccupied Dehumidification:** Unoccupied operation is enabled with the Unocc Dehum in the Dehumidification set-up menu is set to Yes and Dehum Method is not set to Always or None. In order for unoccupied operation to be performed a valid space humidity sensor must be connected to the unit and configured in the Humidity Sensor set up menu. During unoccupied dehumidification, the unit will activate the unit with the outside air damper closed and will start cooling plus dehumidification operation to control the space sensor relative humidity, or dew point setpoint. Refer to the Dehumidification section for details on configuring the dehumidification method, and sensor setpoints. In this case, the Unoccupied Source indicates “UnoccDehum”.
- **UnoccClg:** Unoccupied operation is initiated if the space sensor is reliable, the space temperature is greater than the Unoccupied Cooling Setpoint, and the Unoccupied Cooling Setpoint is set lower than its maximum setting In this case, the unoccupied source indicates “UnoccClg”.
- **Unocc Htg:** Unoccupied operation is initiated if the space sensor is reliable, the space temperature is less than the Unoccupied Heating Setpoint, and the Unoccupied Heating Setpoint is set higher than its minimum setting. In this case, the Unoccupied Source indicates “UnoccHtg”.
- **Internal Optimal Start:** Unoccupied operation is enabled due to an internal optimal start schedule being activated. In this case, the Unoccupied Source indicates “IntOptStrt”.
- **Network Optimal Start:** Unoccupied operation is enabled due to a network optimal start schedule being activated. In this case, the Unoccupied Source indicates “NetOpStrt”.

Occupancy Menu

Table 50: Main Menu \ View Status \ Occupancy

Menu Display Name	Default	Range	Description
Occupancy	-	Occ Unocc TntOvrd	Occupancy is a status only item that displays the current occupancy status.
Occ Mode	Auto/Net	Occ Unocc TntOvrd Auto/Net	Occ Mode is an adjustable item that sets the occupancy mode for manual occupied and unoccupied operation, or for automatic operation based on a time schedule input, or manual tenant override operation.
OccSrc	-	None NetSchd IntSchd OneEvnt RemoteSW NetManCmd OccMode TstatTO ManTO UnitDsbld	OccSrc is a status only item which indicates the input source or function that is responsible for setting the Occupancy parameter to “Occ” or “TntOvrd”.
NetOccManCmd	-	Occ Unocc TntOvrd Standby Auto	A status only item that displays the current Network Occupied Manual Command.
UnoccSrc	-	UnoccDehum Unocc Clg UnoccHtg IntOptStrt NetOptStrt IntPurge NetPurge A2LSnsrPrb A2LLeakPrb None	UnoccSrc is a status only item which indicates the input source or function that is responsible for running the unit while the Occupancy parameter to “Unocc”.
Tnt Ovrde Tm	0	0-300min	Tnt Ovrd Time is an adjustable item which indicates the amount of time remaining for unit operation since tenant override operation was activated.
TOSensorSrc	Any	None Sensor1 Sensor2 Sensor3 Any	TOSensorSrc is an adjustable item which indicates which space sensor can drive tenant override. MicroTech can support up to 3 space sensors with tenant override.

Scheduling

The unit can be scheduled for operation by using the following three methods:

- Unit internal time scheduling functions
- External time clock function
- Network time scheduling function

Provided the unit is not locally or remotely disabled, the unit operates when any of these scheduling functions is calling for occupied operation. Conversely, the unit enters the unoccupied mode when all of these scheduling functions are calling for unoccupied state. Therefore, any unused scheduling functions should be set for continuous unoccupied state.

Date and Time

The controller uses the **Date and Time** to execute its internal scheduling functions. The current Time and Date will not be lost if the unit is turned off for up to seventy-two hours. The Time and Date are adjustable from the keypad. The Time of day can be set by entering the hour (00-23), minute (00-59), and second (00-59) into three fields of the Current Time. Note that MicroTech uses “military” time. The current Date can be set by entering the day (00-31), month (01- 12) and year (1999-2155) into the three fields of the Current Date.

Internal Daily Scheduling

An **Internal Daily Schedule** provides one start time and one stop time for each of the seven days of the week and for holidays. When the Occ Mode= parameter is set to “Auto/Net”, and the unit is not disabled for other reasons, it starts and stops according to the controller internal schedule.

Holiday Scheduling

The operator may select the days when start and stop times for holidays are used by selecting a start date and an end date for up to ten periods during the year using the Holiday Scheduling feature. Whenever a holiday period occurs, the controller uses the Holiday Schedule start and stop time for the period. For example, assume that Christmas Eve occurs on a Thursday. The building is shut down on both Christmas Eve and Christmas Day, but operates normally on the weekend. This holiday period would be scheduled by setting the Holiday Schedule to the default “no schedule” values “HH:MM- HH:MM” and setting the Holiday Period to “12/24/19 - 12/25/19”

One Event Scheduling

One-Event Scheduling is provided so that one operating period can be scheduled without affecting the regular internal schedule. A start date/time and an end date/time can be set. The unit can be scheduled to operate during a specified period by using this feature. During the specified period defined by the One Event Beginning Date/Time and One Event Ending Date/Time parameters, the unit starts up and runs continuously regardless of any other time scheduling functions. For example, assume that a space served by the unit is occupied for a special event on March 12, 2019 from 5:00 p.m. to 10:00 p.m. when the normal time scheduling has the unit shut off after 4:00 p.m. on that date. This event can be accounted for by setting the One Event Beginning Date/Time to “3/12/19 @ 17:00:00” and the One Event Ending Date/Time to “3/12/19 @ 22:00:00.”

External Time Scheduling

An **External Time Scheduling** clock can be used to schedule unit operation. This is accomplished by a field supplied external time clock signal in the form of a set of dry contacts wired across terminals 200 and 201 on the unit field terminal block TB2. In this case, all internal daily schedules should be set to “HH:MM-HH:MM” (default setting).

Date/Time/Schedules Menu

Table 51: Main Menu \ View Status \ Date/Time/Schedule

Menu Display Name	Default	Range	Description
Time	-	00:00:00-23:59:59	Time: is an adjustable item that sets the current time (Hr:Mn:Sec).
Date	-	1/1/1970-12/31/9999	Date is an adjustable item that sets the current date. (M/D/Y).
UTC Diff	.-60min	-780-780	UTC Diff is an adjustable parameter that can be set to indicate how the local time where the unit is situated differs from the Coordinated Universal Time.
DAILY SCHEDULE			
Mon	HH:MM-HH:MM	00:00-23-59	The Daily Schedule sets the start and stop times for each of the days of the week. One start and one stop time can be set for each day.
Tue			
Wed			
Thur			
Fri			
Sat			
Sun			
Hol			
HOLIDAY DATES			
Hol 1	MM/DD/99-MM/DD/99	00/00/00-12/31/99	The Holiday Schedule is used to set the start and stop times for up to 10 different holidays.
Hol 2			
Hol 3			
Hol 4			
Hol 5			
Hol 6			
Hol 7			
Hol 8			
Hol 9			
Hol 10			
ONE EVENT SCHEDULE			
Beg	MM/DD/99 @ HH:MM	00/00/00 -12/31/99 @ 00:00 - 23:59	The One Event Schedule is used to set the start and stop times for one event.
End	MM/DD/99 @ HH:MM	00/00/00 -12/31/99 @ 00:00 - 23:59	
DAYLIGHT SAVINGS			
DLS Strt Month	Mar	NA Jan-Dec	DLS Strt Mon is an adjustable item that sets the month for daylight savings time to begin.
DLS Strt Week	2ndWeek	1stWeek 2ndWeek 3rdWeek 4thWeek 5thWeek	DLS Strt Week is an adjustable item that sets the week of the month for daylight savings time to begin.
DLS End Month	Nov	NA Jan-Dec	DLS End Mon is an adjustable item that sets the month for daylight savings time to end.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
DLS End Week	1stWeek	1stWeek 2ndWeek 3rdWeek 4thWeek 5thWeek	DLS End Week is an adjustable item that sets the week of the month for daylight savings time to end.
DLSEnable	Auto	Off Auto	DLS Enable is an adjustable item that sets whether or not daylight savings time is enabled.

Optimal Start

The **Optimal Start** sequence is used so the unit starts at the most efficient time before building occupancy. Optimal Start can be initiated based on an internal schedule or from a signal from a connected network. When Optimal Start is based on an internal schedule, the controller uses start history, outdoor air temperature and space temperature to determine when the unit should start. The unit may start up to four hours before the schedule occupancy time. When Optimal Start is based on network control, the network may write a time to occupancy to the unit to initiate the start time.

No Optimal Start

If the space temperature is between the Occupied or Unoccupied Heating and Cooling setpoints, the unit will start at the occupancy time.

Optimal Start Menu

Table 52: Main Menu \ View Status \ Date/Time/Schedules

Menu Display Name	Default	Range	Description
Enable	No	Yes No	Enable is an adjustable item that turns on the optimal start feature. Setting the value to yes will activate this function.
Htg Rate	0.4°F/min	0.0-1.0°F/min	Htg Rate is an adjustable item used by the controller in determining the amount time before occupancy to start when the Optimal Start parameter is set to “ON”.
Htg OAT	35°F	-40-60°F	Htg OAT is an adjustable item used by the controller in determining the amount time before occupancy to start when the Optimal Start parameter is set to “ON”.
Des Htg OAT	0°F	-40-60°F	Design Htg OAT is an adjustable item that sets the outdoor air temperature at which the heating system could just hold the load. The rate of temperature rise would equal zero.
Clg Rate	0.4°F/min	0.0-1.0°F/min	Clg Rate is an adjustable item that sets the rate of temperature drop in degrees per minute when the unit last started optimally in cooling.
Clg OAT	85°F	-40-140°F	Clg OAT is an adjustable item that sets the outdoor air temperature when the unit was last started optimally in cooling.
Des Clg OAT	95°F	-40-140°F	Design Clg OAT is an adjustable item that sets the outdoor air temperature at which the cooling system could just hold the load. Rate of temperature rise would equal zero.

Purge Menu

Table 53: Main Menu \ View Status \ Date/Time/Schedules

Menu Display Name	Default	Range	Description
Max Purge	0min	0-300min	Max Purge is an adjustable item that sets the value of the maximum purge hold timer.

Purge Operation

Purge Operation will provide pre-cooling to the space when the space OccStatus is Unocc by initiating unoccupied operation similarly to unoccupied cooling except that only economizer cooling will be used to cool the space. In this mode, mechanical cooling will be disabled (off Ambient). Purge Operation will be enabled prior to any scheduled start by the amount of time defined by the max purge time. Purge Operation is only valid if conditions are suitable for economizer operation and there is a space temperature sensor connected to the unit.

Quick Menu

Items in the Quick Menu contain basic unit operating status and control setpoint parameters. The items shown in the Quick Menu are Read Only if a valid password has not been entered. The following are brief descriptions of the Quick Menu items. No password is required to view the Quick Menu.

Table 54: Main Menu \ Quick Menu

Menu Display Name	Default	Range	Description
Unit State	-	Off Start Recirc FanOnly MinDAT Htg Econo Clg	Unit State is a status only item which indicates the state of unit operation in which the unit is currently operating. The unit can be in any of the operating states shown.
Unit Status	-	Enable OffMan OffManCtrl OffNet OffAlmt OffRetry OffPassVnt	Unit Status is a status only item which indicates the status of operation in which the unit is currently operating. The unit status can be any of the status values shown.
MWU Status	-	Inactive Active	MWU Status is a status only item that indicates whether or not the unit is in the heating state due to MWU function.
Dehum Status	-	Inactive Active	Dehum Status is a status only item which indicates the status of operation of the dehumidification operation.
Ctrl Mode	Off	Off HeatOnly CoolOnly FanOnly HeatCool Auto/Net	Ctrl Mode is an adjustable item which sets the occupancy mode of the unit. The unit can be HeatOnly, CoolOnly, FanOnly, HeatCool, or Auto/Net.
Occ Mode	Auto/Net	Occ Unocc TntOvrd Auto/Net	Occ Mode is an adjustable item which sets the occupancy mode of the unit.
HP Mode	-	CoolOnly HeatCool	An adjustable item used to select the mode the refrigeration system can operate.
CmpCtrlMode	-	Off Cooling Dehum Heating MinDAT	A status only item indicating the current Compressor Control Mode.
Clg Capacity	-	0-100%	Clg Capacity is a status only item which indicates the percentage of the unit cooling capacity currently operating.
OAD Position	-	0-100%	OAD Position is a status only item which indicates the percentage that the outdoor air damper is currently open.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Htg Capacity	-	0-100%	Htg Capacity is a status only item which indicates the percentage of the unit heating capacity currently operating.
2nd Htg Cap	-	0-100%	Secondary Heating Capacity is a status only item which indicates the percentage heating capacity currently operating.
Preheat Cap	-	0-100%	Pre-Heating Capacity is a status only item which indicates the percentage heating capacity currently operating.
Rht Cap	-	0-100%	Rht Cap is a status only item which indicates the percentage of the unit maximum reheat capacity the unit is currently operating at.
Control Temp	-	-461.2-525.2.0°F	Control Temp is a status only item which displays the current value of the “Control Temperature.” The “Control Temperature” is defined as the temperature input selected by the Control Temperature Source parameter. For example, if the Control Temperature Source parameter is set to “Return,” then the control temperature parameter reads the same value as the Return Air Temperature parameter.
Occ Clg Spt	72.0°F	0.0-100.0°F	Occ Clg Spt is a status only item which indicates the temperature in which the unit will go into the occupied cooling mode of operation. Once a valid password has been entered this item becomes an adjustable item.
Occ Htg Spt	68.0°F	0.0-100.0°F	Occ Htg Spt is a status only item which indicates the temperature in which the unit will go into the occupied heating mode of operation. Once a valid password has been entered this item becomes an adjustable item.
Disch Air	-	-50.0-250.0°F	Disch Air is a status only item which displays the current temperature reading from the unit’s discharge air temperature sensor (DAT). This sensor is standard on all units.
DAT Clg Spt	55.0°F	40.0-100.0°F	DAT Clg Spt is a status only item which indicates the temperature that the DAT should be maintained at when it is in the cooling mode of operation. Once a valid password has been entered this item becomes an adjustable item. **NOTE:** This is true only for DTC and 1ZnVAV units. The item is not adjustable for ControlType = Zone units.
DAT Htg Spt	85.0°F	40.0-140.0°F	DAT Htg Spt is a status only item which indicates the temperature that the DAT should be maintained at when in the heating mode of operation. Once a valid password has been entered this item becomes an adjustable item. **NOTE:** This is true only for DTC and 1ZnVAV units. The item is not adjustable for ControlType = Zone units.
Min DAT Limit	55.0°F	0.0-70.0°F	Min DAT Limit is a status only item which indicates the discharge air low limit temperature on CAV zone control units. Heating will be activated to maintain this setting when the discharge temperature falls below it during the Fan Only operating state. Once a valid password has been entered this item becomes an adjustable item. On VAV or CAV discharge control units, the minimum discharge temperature limit is the DAT Clg Spt.
Unocc Clg Spt	85.0°F	40.0-100.0°F	Unocc Clg Spt is a status only item which indicates the temperature in which the unit will go into the cooling mode of operation in the unoccupied occupancy state. Once a valid password has been entered this item becomes an adjustable item.
Unocc Htg Spt	55.0°F	40.0-140.0°F	Unocc Htg Spt is a status only item which indicates the temperature in which the unit will go into the heating mode of operation in the unoccupied occupancy state. Once a valid password has been entered this item becomes an adjustable item.
SAF Capacity	-	0-100%	SAF Capacity is a status only item which indicates the current capacity of the supply air fan.
SAF DuctPress	-	0.0-5.0in	SAF DuctPress is a status only item which displays the current supply duct static pressure reading.
SAF DSP Spt	1.0in	0.2-4.0in	SAF DSP Spt is a status only item which displays the current supply fan duct static pressure setpoint. Once a valid password has been entered this item becomes an adjustable item.
EF Cap	-	0-100%	EF Cap is a status only item indicated the current capacity of the exhaust fans.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Bldg Press	-	-0.250-0.250in	Bldg Press is a status only item indicated the current building static pressure reading.
BldgSP Spt	0.050in	-0.250-0.250in	BldgSP Spt is a status only item which displays the current building static pressure setpoint. Once a valid password has been entered this item becomes an adjustable item.
CO2 PPM	-	0-5000ppm	CO2 PPM is a status only item which displays the current CO2 PPM reading.
OA Flow	-	0-60000 CFM	OA Flow is a status only item which displays the current OA Flow reading.
OA Flow Spt	2000CFM	0-60000 CFM	OA Flow Spt is a status only item which displays the current minimum outdoor air flow setpoint. Once a valid password has been entered this item becomes an adjustable item.
SAF Flow	-	0-60000 CFM	SAF Flow is a status only item which displays the current supply air fan airflow reading.
SAF Flow Spt	2000CFM	0-60000 CFM	SAF Flow Spt is a status only item which displays the current supply air flow setpoint. Once a valid password has been entered this item becomes an adjustable item.
OA Temp	-	-50.0-200.0°F	OA Temp is a status only item which displays the current temperature reading from the unit mounted outdoor air temperature sensor. This sensor is standard on all units.
Rel Hum1	-	0-100%	Rel Hum1 is a status only item that displays the current relative humidity reading from the optional relative humidity sensor at user defined location 1.
Rel Hum2	-	0-100%	Rel Hum2 is a status only item that displays the current relative humidity reading from the optional relative humidity sensor at user defined location 2.

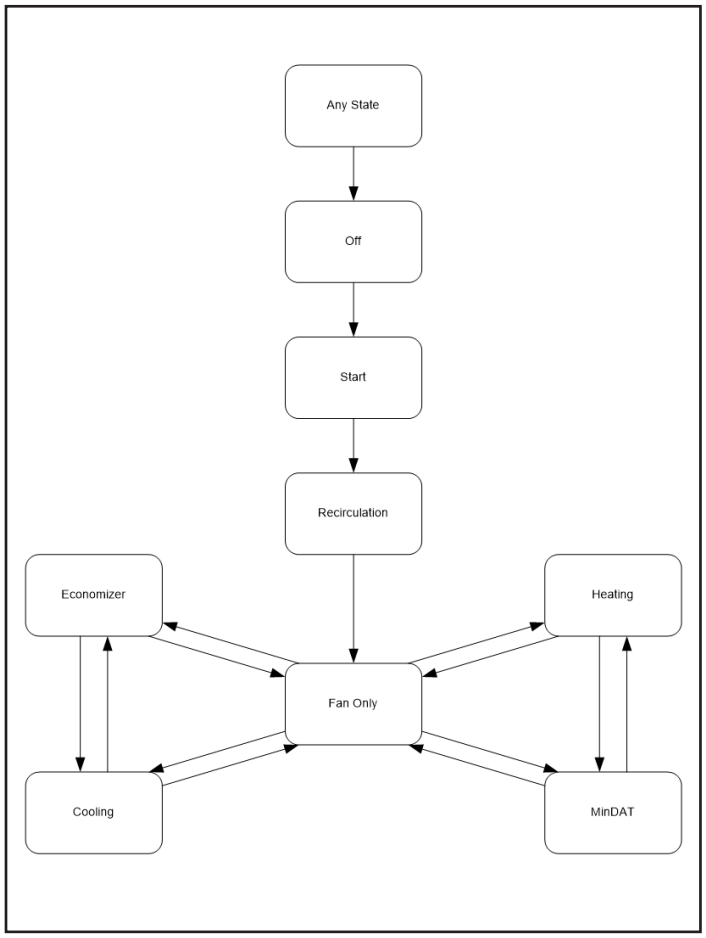
Unit State

The Unit State can operate in one of eight operational states. From an OFF state, the unit will always go into the “Start-Up” sequence. It will firstly enter the Start-Up state for 3 minutes (see Table 97 on page 117) before transitioning to the “Recirculation” state of operation for another 3 minutes (for the exception of Damper Type = 100OA(2) - no recirculation state). Once recirculation is complete, the unit will enter the Fan Only state of operation. Then, based on the control temperature source, (Ctrl Temp Src), selected in the HtgClg ChngOVr (see Table 57 on page 45) set up menu, a sensor will drive the unit into the correct state of the 4 remaining states - heating, cooling, economizer, or min DAT.

The current state will be displayed by the Unit State parameter in the Main Menu \ Quick Menu, or the Main Menu \ ViewStatus \ Unit Status/Settings Menu

Neither heating or cooling is provided when the unit is in the Fan Only state, with the exception of when dehumidification is active. The outdoor air dampers are open to the minimum position in the fan only when the fan ON time exceeds the Zero OA time (with the exception of 100% OA units).

Figure 19: Unit State Diagram



Off

In the OFF operating state the fans are off, the outside air dampers are closed and cooling and heating are disabled. The unit is in the OFF state when it is not enabled, or when it is in unoccupied mode with no call for unoccupied operation. See “Occupancy Menu” on page 29 for how occupancy is determined.

Start

When a unit is commanded to Start, it will always enter the START operating state for an adjustable time period (default is 180s, see Table 97 on page 117) before entering the Recirculation or Fan Only operating state. During start up operation, the fans remain OFF, the outdoor air dampers remain closed, and cooling and heating are disabled (except for 100% outdoor air heating start sequences). The Fan Operation output is turned ON (DO10, TB2 216 and 217) to allow shut off dampers and VAV boxes to be opened before the fan is turned ON.

Fan Only

The unit enters the Fan Only operating state after the recirculation timer expires. Units configured for 100% outside air operation will transition directly from the Start up operating state to the Fan Only operating state. Neither heating or cooling is provided when the unit is in the Fan Only state, with the exception of when dehumidification is active. The outdoor air dampers are open to the minimum position in this state when the fan ON time exceeds the Zero OA time (with the exception of 100% OA units). Once entering the Fan Only state, the unit will then, based on the control temperature source (Ctrl Temp Src), selected in the HtgClg ChngOVr set up menu, a sensor will drive the unit into the correct state of the 4 remaining states - heating, cooling, economizer, or min DAT (see Table 57 on page 45).

Cooling

The unit enters the Cooling operating state when cooling is required and the economizer is disabled, not present, or already fully open. Cooling operation can be mechanical DX compressors or chilled water coils. To determine what unit configuration you have, review “Control Type” on page 43.

- **Zone Temperature Control (ZTC):** If the unit is configured for Zone Temperature Control (ZTC), the transition to cooling will occur when the following are true:
  - The control temperature rises above the occupied or unoccupied cooling setpoint by more than ½ the occupied or unoccupied cooling deadband.
  - The discharge air temperature is greater than the Min DAT limit by more than ½ the DAT heating deadband. This will prevent more cold air from being brought in when the DAT is already cold.
  - The economizer operation is disabled or not present, or the economizer was fully open for the duration of cooling stage timer.
- **Discharge Air Temperature (DAC) or Single Zone VAV (1ZnVAV):** If the unit is configured for Discharge Air Temperature Control the transition to Cooling will occur

when the following are true:

- The control temperature rises above the occupied or unoccupied cooling setpoint by more than ½ the occupied or unoccupied cooling deadband. Note: for control temperature source none, the control temperature is the discharge air temperature.
- The discharge air temperature is greater than the DAT cooling setpoint by more than ½ the DAT cooling deadband.
- Post heat operation is complete.
- The economizer operation is disabled or not present, or the economizer was fully open for the duration of cooling stage timer.

Economizer

If the unit is equipped with a 0-100% modulating Economizer and the conditions are suitable for free cooling, the unit attempts to satisfy the cooling load by using outdoor air before using mechanical cooling. Suitability for Economizer operation is determined by drybulb, comparative drybulb, or comparative energy/enthalpy. See "Economizer Control" on page 87 for details.

- **Zone Temperature Control (ZTC)**: If the unit is configured for Zone Temperature Control, the transition to Economizer will occur when the following are true:
  - The control temperature rises above the occupied or unoccupied cooling setpoint by more than ½ the occupied or unoccupied cooling deadband.
  - The discharge air temperature is greater than the Min DAT limit by more than ½ the DAT heating deadband. This will prevent more cold air from being brought in when the DAT is already cold.
  - The economizer operation is not disabled.
- **Discharge Air Temperature (DAC) or Single Zone VAV (1ZnVAV)**: If the unit is configured for Discharge Air Temperature Control, the transition to Economizer will occur when the following are true:
  - The control temperature rises above the occupied or unoccupied cooling setpoint by more than ½ the occupied or unoccupied cooling deadband. Note: for control temperature source none, the control temperature is the discharge air temperature.
  - The discharge air temperature is greater than the DAT cooling setpoint by more than ½ the DAT cooling deadband.
  - Post heat operation is complete.
  - The economizer operation is not disabled.
- **Dehumidification:** When a unit is operating in dehumidification in Fan Only or Cooling operating states, dehumidification must finish operation and transition to cooling before the unit will enter economizer.

Dehumidification

Dehumidification alone is not an operating state, but a mode of operation that can be active or inactive in the Fan Only and Cooling operating states when properly equipped. If the unit is equipped with a Liquid Sub-Cool Coil or Modulating Hot Gas Reheat Coil, dehumidification operation is allowed in the Fan Only and Cooling operating states. Dehumidification is activated based on a selectable humidity or dew point sensor input. Units can use up to two humidity or dew point inputs to determine dehumidification state. The user selects which location the humidity or dew point references for each position. Possible options are Outdoor or Space Humidity. The user can define if they want to use the maximum, minimum, or average of these two readings to drive dehumidification. Dehumidification is not allowed in Economizer, Heating, or Min DAT operating states.

Heating

The unit enters the Heating operating state when the control temperature falls below the Occupied or Unoccupied Heating Setpoint by more than ½ the occupied or unoccupied heating deadband. During the Heating operating state, the outdoor air dampers are either 100% opening if the unit is a 100% outdoor air unit, or controlled to the minimum outside air position. Cooling is disabled.

- **Zone Temperature Control (ZTC), Single Zone VAV (1ZnVAV), or Discharge Air Temperature (DAT):** If the unit is configured for Zone Temperature Control (ZTC), Single Zone VAV (1ZnVAV), Discharge Air Temperature control, the transition to Heating will occur when the following are true:
  - The control temperature falls below the occupied or unoccupied heating setpoint by more than ½ the occupied or unoccupied cooling deadband. Note: for control temperature source none, the control temperature is the discharge air temperature.
  - The Discharge Air Temperature is less than the DAT heating setpoint by more than ½ the DAT heating deadband.
  - Dehumidification is not active.
  - The Economizer operation is disabled or not present.

Special Gas Heat Start-Up for 100% OA

A **Special Gas Heat Start Up** sequence is used for 100% outdoor air units with gas heat. The special start sequence applies to Zone Control, DAT Control, and 1ZnVAV Control units. If heat is required at unit start up, the furnace enters a special burner startup sequence as the unit enters its Startup operating state. Pre-firing the burner allows the gas heat pre-purge sequences to occur and the burner to fire and warm up so that tempered air is available immediately when the fans start.

- **Initiate 100% OA Zone Control:** The 100% OA gas heat sequence is initiated at startup if the control temperature is less than the Effective Occupied or Unoccupied Heating Setpoint by ½ of the Heating deadband, or the OAT is less than the Min DAT Limit by the amount of the DAT heating deadband.
- **Initiate 100% OA DAT Control and 1ZnVAV Control:** The 100% OA gas heat sequence is initiated at start up if the Min DAT Ctrl parameter is set via the keypad and the OAT is less than the Min DAT Limit by the amount of the DAT heating deadband.
- **Special Start Up Sequence:** Initiated during the Start Up operating state, the fans remain off, and the main gas valve is energized so that the burner starts during the Warm up Time (default =40s) and operates at low fire. At the end of the warmup time, the modulating gas valve is set to a position based on the calculated application requirements. Once the gas valve is set to the calculated position, a HeatUpDelay starts (default =240s) to allow the heat exchanger to heat up. After this delay, since the unit is 100% Outside Air, the unit immediately transitions from Startup to the Fan Only state. As soon as the unit enters the Fan Only state, the unit will immediately transition to the Heating state or MinDAT.

Min DAT

If heating is enabled and there is no heating load (normally Fan Only operating state), the controller activates the units heating equipment as required to prevent the discharge air temperature from becoming too cool if the Min DAT Ctrl Flag is set to yes via the Main Menu \ Commission Unit \ Heating Set-Up. The unit enters the MinDAT operating state during occupied operation when neither cooling or heating is required based on the HtgClgChgOvr function, but based on the if the discharge air temperature falls below a minimum discharge air limit. If the discharge air temperature falls below the minimum discharge air limit by more than half the discharge heating deadband, the unit operating state changes from Fan Only to Min DAT. The unit transitions out of the Min DAT operating state once the discharge air temperature is above minimum discharge temperature limit and the heating capacity has been at its minimum position for the duration of the heating stage timer.

NOTE: On discharge air control and single zone VAV units, the DAT cooling setpoint parameter in the Cooling Setup menu acts as the minimum discharge temperature limit. On Zone Control units, the Min DAT limit parameter in the Heating Set-Up menu (Main Menu \ Commission Unit \ Heating Set-Up \ MinDAT Limit) acts as the minimum discharge temperature limit.

The unit will not be allowed to transition to MinDAT if Dehumidification is active. The unit will transition to Fan Only operation if the dehumidification becomes active while in the MinDAT state.

Unit Status/Settings

The “Unit Status/Settings” menu provides a summary of basic unit status and control items. This menu summarizes the current operating state of the unit, giving the operating state the unit is in, along with the current capacity level of that operating state.

Table 55: Main Menu \ View Status \ Unit Status\Settings

Menu Display Name	Default	Range	Description
Unit State	-	Off Start Recirc FanOnly MinDAT Htg Econo Clg	Unit State is a status only item which indicates the state of unit operation in which the unit is currently operating. The unit can be in any of the operating states shown.
Unit Status	-	Enable OffMan OffManCtrl OffNet OffAlmtry OffPassVnt OffEvac	Unit Status is a status only item which indicates the status of operation in which the unit is currently operating. The unit status can be any of the status values shown.
MWU Status	-	Inactive Active	MWU Status is a status only item that indicates whether or not the unit is in the heating state due to MWU function.
System Mode	Local	Local Remote	System Mode is a status only item which indicates the current operating status.
CmpCapIn	-	0-100%	A status only item which indicates the current state of the Compressor Capacity Input.
HtgCapIn	-	0-100%	A status only item which indicates the current state of the Compressor Heating Capacity Input.
HeatCoolIn	-	Cool Heat	A status only item which indicates the current state of Heating/ Cooling input.
OADCapIn	-	0-100%	A status only item which indicates the current state of the Outside Air Damper Capacity Input.
RhtCapIn	-	0-100%	A status only item which indicates the current state of the Reheat Capacity Input.
AlmResetIn	-	Normal Clear	A status only item which indicates the current state of the Alarm Reset Input.
SAFCapIn	-	0-100%	A status only item which indicates the current state of the Supply Fan Capacity Input.
EFCapIn	-	0-100%	A status only item which indicates the current state of the Exhaust Fan Capacity Input.
SAF Status	-	Off On	A status only item which indicates the current status of the Supply Fan on/off.
Dehum Status	-	Inactive Active	A status only item which indicates the current status of Dehumidification.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Ctrl Mode	Off	Off HeatOnly CoolOnly FanOnly HeatCool Auto/Net	Ctrl Mode is an adjustable item which sets the occupancy mode of the unit. The unit can be Heat Only, CoolOnly, Fan Only, HeatCool, or Auto/Net.
Occ Mode	Auto/ Net	Occ Unocc TntOvrd Auto/Net	Occ Mode is an adjustable item which sets the occupancy mode of the unit. The unit can be occupied, unoccupied, tenant override, or auto modes.
Clg Status	-	Enabled None OffAmb OffAlm OffNet OffMan CfgErr	Clg Status is a status only item which indicates whether or not mechanical cooling is currently allowed. If cooling is disabled, the reason is indicated.
Htg Status	-	Enabled None OffAmb OffAlm OffNet OffMan OffDehum NA	Htg Status is a status only item which indicates whether or not heating is currently allowed. If heating is disabled, the reason is indicated.
2nd Htg Status	-	Enabled None OffAmb NA OffNet OffMan NA	A status only item which indicates the current status of the 2nd Heating Status.
Econo Status	-	Enabled None OffAmb OffAlm OffNet OffMan OffDehum	Econo Status is a status only item which indicates whether or not the economizer is currently enabled. If economizer is disabled, the reason is indicated.
Clg Capacity	-	0-100%	Clg Capacity is a status only item which indicates the percentage of the unit cooling capacity currently operating.
Htg Capacity	-	0-100%	Htg Capacity is a status only item which indicates the percentage of the unit heating capacity currently operating.
2nd Htg Cap	-	0-100%	A status only item indicating the current secondary Heating source Capacity.
Preheat Cap	-	0-100%	A status only item which indicates the current state of the preheater capacity.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Rht Cap	-	0-100%	Reheat Cap is a status only item which indicates the percentage of the unit reheat capacity currently operating.
SAF Capacity	-	0-100%	SAF Capacity is a status only item which indicates the current capacity of the supply air fan.
EF Capacity	-	0-100%	EF Capacity is a status only item indicated the current capacity of the exhaust fans.
OAD Position	-	0-100%	OAD/Economizer Cap is a status only item which indicates the percentage that the outdoor air damper is currently open.
Rel Hum 1	-	0-100%	Rel Hum 1 is a status only item that displays the current relative humidity reading from the optional relative humidity sensor at user defined location 1.
Rel Hum 2	-	0-100%	Rel Hum 2 is a status only item that displays the current relative humidity reading from the optional relative humidity sensor at user defined location 2.
Net Emrg Ovrd	Normal	Normal Off	Net Emrg Ovrd is an adjustable item which indicates if the unit was shut down in an emergency situation via a network command.
Net App Mode	Auto	Off HeatOnly CoolOnly FanOnly HeatCool Auto NA	Net App Mode is a network adjustable item which indicates that the unit is set for network off, cooling only, heating only, fan only or auto heating/cooling operation via a network signal. This item has no affect on the unit operation unless the Ctrl Mode item is set to “Auto”.

Control Type

Temperature Control Configurations

Temperature Control is based on a Control Type that may be set to Zone, DAT Control, or Single Zone VAV. The setting will be based on the system and application the rooftop equipment is configured to serve.

Zone Temperature Control (ZTC)

When the Control Type is set to **Zone Temperature Control**, heating, compressors, and the economizer are controlled to maintain the temperature of the zone at a desired setpoint. This configuration is used on units equipped with constant volume supply fans. Compressors and heating stages are staged to maintain space temperature. The number of compressors is decreased when it is too cold and increased when it is too hot subject to stage timers. The number of heat stages is decreased when it is too hot and increased when it is too cold subject to stage timers.

Discharge Air Temperatrue Control (DTC)

When the Control Type is set to **DTC**, heating, compressors, and the economizer are controlled to maintain the discharge air temperature at a desired setpoint. This configuration is typically used on units equipped with variable air volume supply fans.

Single Zone VAV (1ZnVAV)

When the Control Type is set to **Single Zone VAV**, heating, compressors, and the economizer are controlled to maintain the discharge air temperature at the desired setpoint, while the variable volume supply fan is modulated to maintain the temperature of the zone at the desired heating and cooling setpoints. In heating mode, the supply fan capacity is increased as the zone temperature falls and decreased as the zone temperature rises.

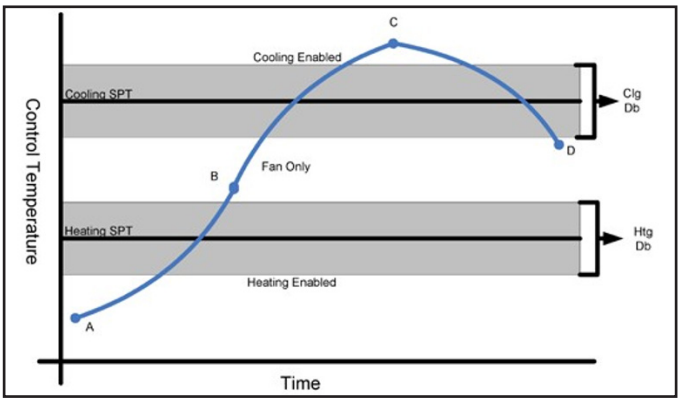
To determine which control configuration your unit is configured for, review “Unit Configuration” on page 142.

Heating/Cooling Changeover

Control Temperature Source

When the control temperature is below the occupied or unoccupied heating setpoint by more than ½ the deadband (point A), heating operation is enabled. Heating operation then remains enabled until the control temperature begins to rise and rises above the occupied or unoccupied heating setpoint by more than ½ the deadband (point B), at which point heating operation is disabled and the unit enters the fan only (or Min DAT) operating state. If the control temperature rises above the occupied or unoccupied cooling setpoint by more than ½ the deadband (point C) cooling operation is enabled. Cooling operation remains enabled until the control temperature begins to fall below the occupied or unoccupied cooling setpoint by more than ½ the deadband (point D), at which point the unit returns or fan only (or Min DAT) operating state.

Figure 20: Heating/Cooling Control Temperature



The “Control Temperature” is defined as the unit temperature input used to make the heat/cool changeover decision. This determines whether or not cooling or heating is enabled. The **Control Temperature Source** (Ctrl Temp Src) can be selected as RAT, OAT, Space, or None. The control temperature source selected will vary by application and temperature control configuration.

Table 56: Control Temp Source Quick Reference Table

	Mixed Air-Econo, 0-30			100% OA	
Source	Zone Control	DAT Control	Single Zone VAV	DAT Control	Zone Control
OAT	NA	NR	NA	R	NA
RAT	A	R	A	NR	A
Space	R	NR	R	NR	R
None	NA	A	NA	NR	NA

A = Available
R = Recommended
NA = Not Available
NR = Not Recommended

Space Temperature Control – Zone Control

A unit configured for **Space Temperature Control (Zone Control)** operates the cooling and heating capacities to either maintain the Occupied or Unoccupied Cooling Setpoint using economizer and/or Mechanical Cooling or the Occupied or Unoccupied Heating Setpoint using the heating equipment.

- Space- Space is the most common and ideal change over source temperature for Zone control units. The MicroTech controller can handle up to three space temperature sensor inputs and the min, max, average or a specific sensor can be used for control. Review “Unit Set-Up Menu” on page 25 for multiple space sensor operation and settings.
- RAT- Return is an ideal change over source temperature for zone control units that do not have a space sensor available.
- None, and OAT are not allowed for this configuration.

Discharge Air Temperature Control

In general, a unit configured for discharge air temperature control (DTC) either operates to deliver the cooling discharge air temperature setpoint using economizer and or mechanical cooling or the heating discharge air temperature setpoint using the heating equipment. Cooling and heating never operate simultaneously. The unit state in a **Discharge Air Temperature Control** can be operated to change between cooling, fan only, and heating based on RAT, OAT, Space or None. Units operating in discharge air control are typically serving multiple zones through VAV boxes or are operating as a dedicated outside air unit.

DAT Control – Multi-Zone VAV

Units serving VAV systems typically use the control temp source as Return Air Temperature or None to transition states.

- **RAT:** Return air is typically used when the zones the unit serves are not extremely diverse in unit state, when the transition to heat is relatively the same across the served zones and the rooftop is not the primary zone control heat source. Each zone may have base board, or heat in each VAV box.
- **None**: Control temp source as None is used when the VAV box distribution is diverse in state and load. In this case control temp source None, the unit no longer “changes over” between heating and cooling in the normal manner. Instead it acts as if it is always in the “cooling” mode of operation controlling to the discharge air cooling setpoint. In this case the unit operating state will vary between Cooling, Fan Only and Min DAT (heating) in order to maintain the discharge air cooling setpoint. The unit will only enter the Heating operating state and control to the discharge heating setpoint for morning warm up purposes.
- **Space and OAT** are not commonly used as the control temp in VAV systems.

DAT Control – Dedicated Outside Air Systems

Units serving as a Dedicated outside air system are typically configured for discharge air temperature control with a control temperature source as outdoor air temperature (OAT).

- **OAT:** Outdoor air temperature is the ideal change over source temperature for DOAS because it links unit state to load.
- **RAT, Space, None:** Control Temp Source None, Space, and RAT is not recommended for DOAS applications because unit state may transition to an improper mode of operation for the weather resulting in heating in summer and fan only in winter. These poor transitions will lead to nuisance alarms and poor control.

Single Zone VAV - 1ZnVAV

A unit configured for single zone VAV operates to deliver the cooling discharge air temperature setpoint using economizer and/or mechanical cooling or the heating discharge air temperature setpoint using the heating equipment. Cooling and heating never operate simultaneously. The unit state as a **Single Zone VAV** can be operated to change between cooling, fan only, and heating based on RAT or Space.

- **Space:** Space is the most common and ideal change over source temperature for single zone VAV units. The MicroTech controller can handle up to three space temperature sensor inputs and the min, max, average or a specific sensor can be used for control. Review “Unit Set-Up Menu” on page 25 for Space Temperature Control Configuration.
- **RAT:** Return is an ideal change over source temperature for single zone VAV units that do not have a space sensor available.
- **None and OAT** are not allowed.

Space Setpoint Adjustment

When a unit is configured for space temperature control or single zone VAV and the control temperature source is set to Space; the user has the option of using a space mounted remote sensor with setpoint adjustment functionality to control the setpoint of the space being controlled. The MicroTech controller will allow one space sensor to drive the **Space Setpoint Adjustment** feature. Rem Spt Src allows the user to select which Network sensor (up to 3 sensors) will drive the setpoint adjustment or if an analog sensor will be driving the Space Setpoint Adjustment.

Heat/Cool Changeover Menu

HtgClg ChgOvr Set-Up

The **Heating Cooling Change Over Set-Up** menu is a commissioning menu that provides adjustable parameters to configure the method and conditions with which the unit state changes.

Table 57: Main Menu \ Commission Unit \ HtgClg ChgOvr Set-Up

Menu Display Name	Default	Range	Description
Ctrl Temp Src	RAT	RAT Space OAT None	Ctrl Temp Src is an adjustable item which selects the temperature sensor input to be used for the unit heating/cooling changeover or occupied cooling and heating capacity change decisions.
Rem Spt Src*	None	None AI QMX1 QMX2 QMX3	Rem Spt Src is an adjustable item used to set whether or not to use the a remote space sensor to drive the setpoint adjustment value for the Occ Clg Spt and Occ Htg Spt. This can be designated to a single sensor.
Control Temp	-	-461.2-525.2°F	Control Temp is a status only item which displays the current value of the “Control Temperature.” The “Control Temperature” is defined as the temperature input selected by the Control Temperature Source parameter.
Occ Clg Spt	72.0°F	0.0-100.0°F	Occ Clg Spt is an adjustable item adjusts the temperature in which the unit will go into the cooling mode of operation. Once a valid password has been entered this item becomes an adjustable item.
Occ Htg Spt	68.0°F	0.0-100.0°F	Occ Htg Spt is an adjustable item which adjusts the temperature in which the unit will go into the heating mode of operation. Once a valid password has been entered this item becomes an adjustable item.
Occ Clg DB	2.0°F	0.0-10.0°F	Occ Clg DB is an adjustable item which sets a dead band around the Occ Cooling Setpoint parameter. For example, if the Occ Cooling Setpoint parameter is set to 75ºF and the Clg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 76.0ºF to 74.0ºF.
Occ Htg DB	2.0°F	0.0-10.0°F	Occ Htg DB is an adjustable item which sets a dead band around the Occ Heating Setpoint parameter. For example, if the Occ Heating Setpoint parameter is set to 70ºF and the Htg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 69.0ºF to 71.0ºF.
RmtSptLoLmt	40.0°F	40.0°F-100.0°F	RmtSptLoLmt is an adjustable item which sets the lower bound of the allowed range of setpoint adjustment from the remote space temperature sensor.
RmtSptHiLmt	100.0°F	40.0°F-100.0°F	RmtSptHiLmt is an adjustable item which sets the higher bound of the allowed range of setpoint adjustment from the remote space temperature sensor.
CalRemSpt@10°C	No	No Yes	CalRemSpt@10°C is an adjustable item used to calibrate the digital space sensor minimum setpoint input when the engineering units set to SI.
CalRemSpt@50°F	No	No Yes	CalRemSpt@50°F is an adjustable item used to calibrate the digital space sensor minimum setpoint input when the engineering units set to English.
CalRemSpt@30°C	No	No Yes	CalRemSpt@30°C is an adjustable item used to calibrate the digital space sensor maximum setpoint input when the engineering units set to SI.
CalRemSpt@86°F	No	No Yes	CalRemSpt@86°F is an adjustable item used to calibrate the digital space sensor maximum setpoint input when the engineering units set to English.
Demand Shed	Enable	Disable Enable	Demand Shed is an adjustable item used to enable or disable the ability of the a demand shed sequence to be initiated where the occClg or Occ Heat setpoints are overridden by predetermine shed increments.
*This menu is changeable to AI only if SpaceTCfg is set to AI1, AI2, or AI3 and Clg Reset and Htg Reset are not set to ExtV nor ExtmA. This menu is changeable to QMX1, QMX2 or QMX3 only if SpaceTCfg is set to QMX1, QMX2, QMX3, QMX1+, QMX2+ or QMX3+ and selected sensor is available based on the unit configuration.			

Supply Air Fan

Supply Air Fan Operation

A supply air fan will be provided with every unit. The standard supply fans will be controlled using a factory EC motor for each fan. Each motor is controlled via a Modbus interface.

The supply fans will control between an adjustable minimum and maximum fan capacity. The range is adjustable from 0-100% with separate ranges for cooling and heating operation.

The supply fan is turned ON when the unit enters the Recirculation state. The supply fan is turned OFF when the unit transitions to the OFF state, but stays on for the Off HtClDelayTime (Default=120s) if the unit is turned OFF while DX Cooling or heating is active. The OffHtClDelay time function is overridden when an Emergency Off or Duct High Limit Fault is active.

- **Speed/Network Control(Spd/Net)**: A speed/network fan control type controls the supply fan capacity to fixed speed value that is set at the unit controller or via a network input signal.
- **Single Zone VAV Control(1ZnVAV)**: Single Zone VAV control operates the unit as a single VAV box. The cooling is controlled to maintain a discharge air temperature setpoint and the supply fan is modulated to maintain a space temperature setpoint, the occupied cooling and occupied heating setpoint.
- **Duct Pressure Control(DSP)**: Duct pressure control operates the unit to maintain the supply duct conditions. The cooling is controlled to maintain a discharge air temperature setpoint and the supply fan is modulated to maintain a supply duct static pressure setpoint. The duct pressure setpoint can be adjusted at the unit controller interface or via a network input signal.
- **Carbon Dioxide Control(CO2)**: When a unit is configured for 100% outdoor air application and the control type is discharge temperature control, the unit can be configured to control the supply fan capacity based on a CO2 sensor input. The supply fan capacity will vary linearly between a minimum and maximum CO2 SAF capacity based on a minimum and maximum CO2 input (PPM) from a field mounted sensor.
- **Supply Airflow Control (Flow)**: When a unit is equipped with a supply fan airflow measuring station, the control type is discharge temperature control and the unit is configured to flow control, the supply air fan capacity is modulated to maintain an adjustable airflow(cfm) setpoint.
- **Building Static Pressure Control (BSP)**: When a unit is configured for 100% outdoor air application and the control type is discharge temperature control, the supply fan control can be configured to modulate to maintain a supply fan building static pressure setpoint.

Supply Fan Menu

The SAF Control Menu displays the fan operation and the relevant current control parameters.

Table 58: Main Menu \ View Status \ SAF Control

Menu Display Name	Default	Range	Description
SAF Capacity	-	0-100%	SAF Capacity is a status only item that indicates the current supply fan capacity.
SAF Cap Cmd	-	0-100%	SAF Cap Cmd is a status only item that indicates the current supply fan commanded capacity.
SAF DuctPress	-	0.0-5.0in	SAF Duct Press is a status only item which displays the current supply duct static pressure reading.
CO2 PPM	-	0-5000 ppm	CO2 PPM is a status only item which displays the current CO2 PPM reading.
OA Flow	-	0-60000CFM	OA Flow is a status only item which displays the current OA Flow reading.
SAF Flow	-	0-60000CFM	SAF Flow is a status only item which displays the current supply air fan airflow reading.
Bldg Press	-	-0.250-0.250in	Bldg Press is a status only item indicated the current building static pressure reading.

Supply Fan Set-Up Menu

Table 59: Main Menu \ View Status \ SAF Set-Up

Menu Display Name	Default	Range	Description
SAF Ctrl	CAV	DSP Spd/Net 1ZnVAV BSP CO2 Flow CAV	SAFCtrl is an adjustable parameter used to select how the supply fan is to be controlled. The supply fan can normally be controlled by CAV, duct pressure(DSP), space temperature (1ZnVAV), or Speed/Net Control which allows a constant speed to be set or adjusted with a building automation system. In 100% Outside air applications the supply fan can be controlled with a PI_Loop to maintain a CO2 setpoint, a constant CFM setpoint (Flow), or Build static pressure setpoint (BSP).
SPEED CONTROL			
Rem SAF Cap	33%	0-100%	Rem SAF Cap is an adjustable item for setting the supply fan speed by the keypad or by a network control signal.
DSP CONTROL			
SAF DuctPress	-	0.0-5.0in	SAF Duct Press is a status only item that indicates the current value for the duct static pressure sensor.
SAF DSP Spt	1.0in	0.2-4.0in	SAF DuctSP Spt is an adjustable item which sets the supply fan duct static pressure setpoint. The SAF is modulated with a PI_Loop to maintain this setpoint.
SAF DSP DB	0.1in	0.0-0.5in	SAF DSP DB is an adjustable item which sets a dead band around the DuctSP Spt. No Duct static pressure control action is taken when the current duct static pressure input is within this deadband.
1 ZONEVAV CONTROL			
Control Temp	-	-461.2-525.2°F	Control Temp is a status only item which displays the current value of the “Control Temperature.” The “Control Temperature” is defined as the temperature input selected by the Control Temperature Source parameter.
Occ Clg Spt	72.0°F	0.0-100.0°F	Occ Clg Spt is a status only item which indicates the temperature in which the unit will go into the cooling mode of operation. Once a valid password has been entered this item becomes an adjustable item.
Occ Htg Spt	68.0°F	0.0-100.0°F	Occ Htg Spt is a status only item which indicates the temperature in which the unit will go into the heating mode of operation. Once a valid password has been entered this item becomes an adjustable item.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Occ Clg DB	2.0°F	0.0-10.0°F	Occ Clg DB is an adjustable item which sets a dead band around the Occ Cooling Setpoint parameter. For example, if the Occ Cooling Setpoint parameter is set to 75ºF and the Clg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 76.0ºF to 74.0ºF.
Occ Htg DB	2.0°F	0.0-10.0°F	Occ Htg DB is an adjustable item which sets a dead band around the Occ Heating Setpoint parameter. For example, if the Occ Heating Setpoint parameter is set to 70ºF and the Htg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 69.0ºF to 71.0ºF.
CO2 CONTROL			
CO2 PPM	-	0-5000ppm	CO2 PPM is a status only item which indicates the current reading from the CO2 sensor.
CO2SensorSrc	QMX1	QMX1 QMX2 QMX3	CO2SensorSrc is an adjustable item that sets the source sensor type for CO2 control.
Min SAF PPM	800	0-5000ppm	Min SAF PPM is an adjustable item that sets the PPM value at which the supply fan speed is controlled to minimum when CO2 supply fan control is selected.
Max SAF PPM	1100	0-5000ppm	Max SAF PPM is an adjustable item that sets the PPM value at which the supply fan speed is controlled to maximum when CO2 supply fan control is selected.
Min PPM Cap	50	0-100%	Min PPM Cap is an adjustable item that sets the supply fan capacity when the CO2 input signal is at minimum when CO2 supply fan control is selected.
Max PPM Cap	100	0-100%	Max PPM Cap is an adjustable item that sets the supply fan capacity when the CO2 input signal is at maximum when CO2 supply fan control is selected.
FLOW CONTROL			
OA Flow	-	0-60000CFM	OA Flow is a status only item that displays the current outdoor air flow CFM.
OA Flow Spt	2000CFM	0-60000CFM	OA Flow Spt is an adjustable item that sets the Outdoor airflow cfm that the PI_loop will modulating the SAF capacity to maintain.
OAFlow DB	3%	0-100%	OAFlow DB is an adjustable item that sets a deadband around the OA Flow Setpoint.
SAF Flow	-	0-60000CFM	SAF Flow is a status only item that displays the current supply air fan airflow CFM.
SAF Flow Spt	2000CFM	0-60000CFM	SAF Flow Spt is an adjustable item that sets the SAF Flow CFM setpoint that the PI_Loop will modulate the supply air fan capacity to maintain.
SAF Flow DB	3%	0-100%	SAF Flow DB is an adjustable item that set a deadband around the SAF Flow Setpoint.
BSP CONTROL			
Bldg Press	-	-0.250-0.250in	Bldg Press is a status only item indicated the current building static pressure reading.
Bldg SP Spt	0.050in	-0.250-0.250in	BldgSP Spt is an adjustable item which sets the current building static pressure setpoint.
BSP DB	0.010in	0.000-0.100in	BSP DB is an adjustable item that sets the deadband around the Bldg SP setpoint that the PI Loop will modulating the Supply air fan capacity to maintain.
SAF SETUP			
MaxSAF Hz	60Hz	0-100Hz	MaxSAF Hz is an adjustable item that sets the maximum supply air fan speed (Hz) that will be allowed in units using the analog VFD output.
MaxSAF RPM	2600RPM	0-5000RPM	MaxSAF RPM is an adjustable item that sets the maximum supply air fan speed (RPM) that the supply air fans will be allowed to operate at in units that are us the ECM supply fans. Note this is set based on the supply fan model size and the system specifications.
Min Clg Spd	33%	0-100%	MinClgSpd is an adjustable item that sets the minimum supply fan speed used for cooling operation.
Max Clg Spd	100%	0-100%	MaxClgSpd is an adjustable item that sets the maximum supply fan speed used for cooling operation.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Min Htg Spd	33%	0-100%	MinHtgSpd is an adjustable item that sets the minimum supply fan speed used for heating operation.
Max Htg Spd	100%	0-100%	MaxHtgSpd is an adjustable item that sets the maximum supply fan speed used for heating operation.
VAVBox Out	-	Heat Cool	VAVBox Out is a status only item that indicates the current value of the VAV output. The VAV output is only available to the field via network communications.
SAF1 Status	-	Fault OK	A status only item which indicates the current status of Supply Fan 1 for analog controlled SAF.
SAF(1-6)Status	-		SAF(1-6)Status is a status only value that indicates any faults detected in the operation of supply air fans.
		OK	OK = no faults detected
		HLL	HLL = hall effect sensor error
		TFEI	TFEI = electronics interior overheated
		TFM	TFM = motor overheated
		TFE	TFE = power mod overheated
		BLK	BLK = locked motor
		SKF	SKF = communication error
		PHA	PHA = power phase error
		UzLow	UzLow = DC link undervoltage
		UzHigh	UzHigh = DC link overvoltage
		UeLow	UeHigh = mains power overvoltage
		UeHigh	UeLow = mains power undervoltage
		NoComm	NoComm = loss of communication
		OC	OC = DC bus overcurrent protection
		OT	OT = over temperature protection
		RRP	RRP = fan reverse run error
		EEPROM	EEPROM = EEPROM read/write failure
		P_OC	P_OC = DC bus peak overcurrent
		AC_OV	AC_OV = AC bus overvoltage
		AC_UV	AC_UV = AC bus undervoltage

Exhaust Fan

Rooftop units may be equipped with zero, one, or more **Exhaust Fans**. Normally, each exhaust fan will be controlled with an ECM Motor per fan via a Modbus interface. An option for controlling a single VFD connected to one or more exhaust fan motors will also be provided. In this case, the VFD will be controlled via modbus signal from the unit controller. The exhaust fan capacity of the fan will be controlled between an adjustable minimum and maximum fan capacity.

Exhaust Fan Operation

Exhaust Fan

When a unit is equipped with an **Exhaust Fan**, the exhaust fan On/Off command logic will depend on the selected exhaust fan control method.

Exhaust Fan Control Types

Constant Volume Control (CAV)

When the EF Ctrl is set to **CAV**, the exhaust fans will be controlled to the MaxEF Capacity.

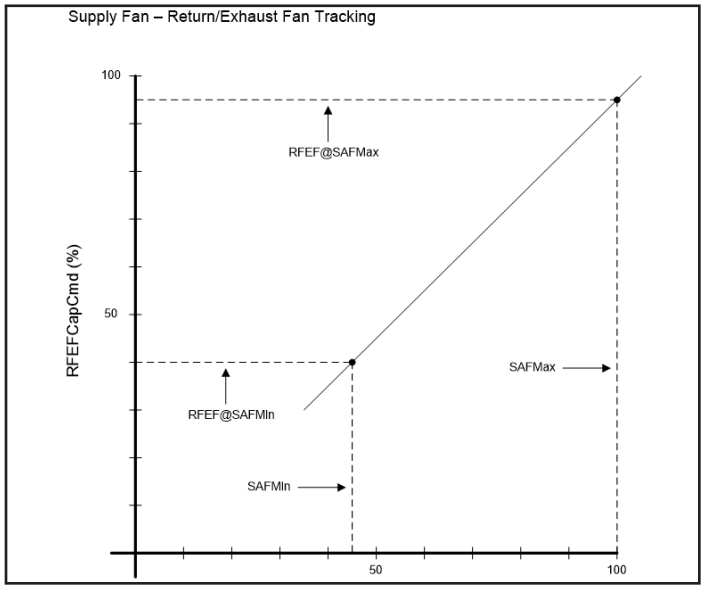
Building Static Pressure Control (BSP)

When the EF Ctrl is set to **BSP** the exhaust fan's capacity will be modulated to maintain the building static pressure at the building static pressure setpoint (BldgSPSpt).

Fan Tracking Control (Tracking)

When the EF Ctrl is set to **Tracking** the or exhaust fan capacity is varied to maintain an adjustable offset between the Exhaust Fan capacity and the Supply Fan Capacity. The user specifies the offset at maximum supply fan capacity and the offset at minimum supply fan capacity and the EF controls linearly between the two points.

Figure 21: Exhaust Fan Tracking



The field process for setting these parameters will be as follows:

1. With the unit running and the outdoor air dampers at minimum position (in Fan Only State for example), the VAV box system will be manipulated to simulate a call for maximum airflow.
2. The Supply air fan will be allowed to stabilize (normally under DSP control) and the SAFMax parameter will be set to the steady-state SAF Capacity value.
3. The EF@SAFMax value will then be adjusted until the desired building pressure is obtained (usually slightly positive).
4. The VAV Box system will then be manipulated to simulate call for minimum airflow.
5. The supply air fan will be allowed to stabilize (normally under DSP control) and the SAFMin Parameter will be set to the steady-state SAF Capacity value.
6. The EF@SAFMin Value will be adjusted until the desired building pressure is obtained (generally slightly positive).

NOTE: Ideally the minimum and maximum conditions should be checked with the outdoor dampers at minimum and maximum positions to assure there are not significantly different requirements depending on the outdoor damper position. If the differences are significant then the parameters may be manually adjusted to compromise between the two conditions. If the differences are too great, it may be necessary to change to building pressure EAF control for the application.

NOTE: Setting the minimum and maximum tracking points will not necessarily establish minimum and maximum SAF modulation ranges, but rather simply establishes the slope of the tracking curve. The curve line will be projected up to effective max SAF capacity and down to the effective minimum SAF capacity.

Speed/Network Control(Spd/Net)

When the EF Ctrl is set to **Spd/Net** the fan capacity is set to the remote exhaust fan capacity parameter value (RemEFCap). These values may be set via the HMI or a network input signal.

Airflow Control(Flow)

When a unit is equipped with a exhaust airflow measuring station and the EF Ctrl is set to **Flow**, the Exhaust fan capacity will be modulated to maintain the airflow at the airflow setpoint.

Flow Differential Control (FlowDiff)

When the unit is equipped with a supply airflow measuring station and a exhaust fan airflow measuring station and the EFCtrl is set to **Flow Diff**, the Exhaust fan capacity will be modulated to maintain an adjustable flow differential between exhaust fan flow and the supply fan flow. The flow differential setpoint will vary linearly between an adjustable maximum differential (MaxFlwDiff) when the supply air fan airflow is at a maximum flow (SAFHiFlow) to a minimum differential(MinFlwDiff) when the supply fan airflow is at minimum flow (SAFLoFlow).

Outdoor Air Damper Control (OAD)

When the unit is equipped with an exhaust fan and the EF Ctrl is set to **OAD** the exhaust fan capacity will be varied based on the current outdoor air damper position. The exhaust fan capacity will vary linearly between the minimum exhaust fan capacity (MinEF Cap) and the maximum (MaxEFCap) as the OA damper varies between the exhaust on outdoor air damper position (ExhOnOA Pos) and the exhaust maximum outdoor air position (ExhMxOAPos).

Passive Ventilation Sequence

An optional **Passive Ventilation Sequence** will be performed when the passive ventilation digital input on the control is closed (on) Or when the Network passive ventilation input is set to On. When passive ventilation is active several actions occur.

- Unit state is switched to OFF
- The Supply Fan is switched of OFF
- The Exhaust Fan is Held on and set to the exhaust air fan ventilation capacity
- The OA Damper is set to 0%

Exhaust Fan Menus

EF Control Menu

The EF Control Menu is a view status menu that displays all relevant exhaust fan control parameters.

Table 60: Main Menu \ View Status \ EF Control

Menu Display Name	Default	Range	Description
EF Capacity	-	0-100%	EF Capacity is a status only item that indicates the current exhaust fan capacity.
EF Cap Cmd	-	0-100%	EF Cap Cmd is a status only item that indicates the current exhaust fan commanded capacity.
Bldg Press	-	-0.250-0.250in	Bldg Press is a status only item indicated the current building static pressure reading.
EF Flow	-	0-60000CFM	EF Flow is a status only item which displays the current exhaust air fan airflow reading.

EF Set-Up Menu

The EF Set-Up menu is a commissioning menu that provides access to adjustable parameters to set the exhaust fan operating controls.

Table 61: Main Menu \ Commission Unit \ EF Set-Up

Menu Display Name	Default	Range	Description
EF Ctrl	BSP	CAV BSP Tracking DSP Spd/Net Flow OAD FlowDiff	EF Ctrl is an adjustable parameter used to select how the exhaust fans are to be controlled. The exhaust fans can be controlled by the building static pressure (BSP), A fixed Speed that can be adjusted through a building automation system (Spd/Net), a CFM setpoint (Flow), and Outdoor air damper position (OAD) where the exhaust fan speed changes with the OA damper position. In 100% Outside air application with exhaust fans, tracking of the supply fan can be used.
SPEED CONTROL			
Rem EF Cap	5%	0-100%	Rem EF Cap is an adjustable item for setting the exhaust fan capacity by the keypad or by a network control signal.
BSP CONTROL			
Bldg Press	-	-0.250-0.250in	Bldg Press is a status only item indicated the current building static pressure reading.
Bldg SP Spt	0.050in	-0.250-0.250in	BldgSP Spt is an adjustable item which sets the current building static pressure setpoint.
BSP DB	0.010in	0.000-0.100in	BSP DB is an adjustable item that sets the deadband around the Bldg SP setpoint that the PI Loop will modulating the exhaust air fan capacity to maintain.
FAN TRACKING CONTROL			
Sup Fan Max	100%	0-100%	Sup Fan Max is an adjustable item used to set the supply fan maximum capacity when the EF control method is set to tracking.
Sup Fan Min	30%	0-100%	Sup Fan Min is an adjustable item used to set the supply fan minimum capacity when the EF control method is set to tracking.
FLOW CONTROL			
EF Flow	-	0-60000CFM	EF Flow is a status only item that displays the current exhaust air fan airflow CFM.
EF Flow Spt	2000CFM	0-60000CFM	EF Flow Spt is an adjustable item that sets the EF Flow CFM setpoint that the PI_Loop will modulate the exhaust air fan capacity to maintain.
EF Flow DB	3%	0-100%	EF Flow DB is an adjustable item that set a deadband around the EF Flow Setpoint. No action is taken when the current EF Flow input is within this deadband.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
FLOW DIFF CONTROL			
SAF Flow	-	0-60000CFM	SAF Flow is a status only item that displays the current supply air fan airflow CFM.
EF Flow	-	0-60000CFM	EF Flow is a status only item that displays the current exhaust air fan airflow CFM.
OAD POSITION CONTROL			
ExhOn OA Pos	40%	0-100%	ExhOn OA Pos is an adjustable item that sets the damper position that the exhaust fan turns on at minimum capacity. Less than this position, the exhaust fan is off.
ExhMx OA Pos	100%	0-100%	ExhMx OA Pos is an adjustable item that sets the damper position that the exhaust fan is operating at maximum capacity.
EF SETUP			
MaxEF Hz	60Hz	0-100Hz	Max RF/EF Hz is an adjustable item that sets the maximum exhaust fan value. The maximum value settings must also be changed in the VFDs to match this setting. This is only for units with VFDs.
MaxEF RPM	2600RPM	0-2600RPM	MaxEF RPM is an adjustable item that sets the maximum exhaust air fan speed (RPM) that the exhaust air fans will be allowed to operate at in units that are us the ECM fans. Note, this is set based on the Exhaust fan model size and the system specifications.
Min EF Cap	5%	0-100%	MinEF Cap is an adjustable item used to set the minimum capacity that the Exhaust fans will be allowed to operate at.
Max EF Cap	100%	0-100%	MaxEF Cap is an adjustable item used to set the maximum capacity that the Exhaust fans will be allowed to operate at.
EF1 Status=	-	Fault OK	A status only item which indicates the current status of Exhaust Fan 1.
EF2 Status=	-	Fault OK	A status only item which indicates the current status of Exhaust Fan 2.
EF3 Status=	-	Fault OK	A status only item which indicates the current status of Exhaust Fan 3.
EF Status	-	Fault OK No Comm	EF Status is a status only item that indicates if there are any Faults with the EF operation for units using the VFD analog output control.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
EF(1-6)Status	-		EF(1-6)Status is a status only value that indicates any faults detected in the operation of exhaust air fans.
		OK	OK = no faults detected
		HLL	HLL = hall effect sensor error
		TFEI	TFEI = electronics interior overheated
		TFM	TFM = motor overheated
		TFE	TFE = power mod overheated
		BLK	BLK = locked motor
		SKF	SKF = communication error
		PHA	PHA = power phase error
		UzLow	UzLow = DC link undervoltage
		UzHigh	UzHigh = DC link overvoltage
		UeLow	UeHigh = mains power overvoltage
		UeHigh	UeLow = mains power undervoltage
		NoComm	NoComm = loss of communication
		OC	OC = DC bus overcurrent protection
		OT	OT = over temperature protection
		RRP	RRP = fan reverse run error
		EEPROM	EEPROM = EEPROM read/write failure
		P_OC	P_OC = DC bus peak overcurrent
		AC_OV	AC_OV = AC bus overvoltage
		AC_UV	AC_UV = AC bus undervoltage

Compressors

Compressor States

The Compressor State determines the operation of the following devices:

- Variable Speed Compressor
- Fixed Speed Compressor (if present)
- Outdoor Fan(s)
- 4 Way Reversing Valve (4WV) (Heat Pump only)
- Outdoor Expansion Valve (EVO) (Heat Pump only)
- Indoor Expansion Valve (EVI)

Off State

Compressor cooling operation begins in the Cooling Off state. All devices are OFF or closed except for EVIs or EVO.

  - EVI remains closed if not configured for heat pump or 4WV is in Cool position. EVI will be 100% open if unit is configured for heat pump and 4WV is in Heat position.
  - EVO remains closed if 4WV is in Cool position. EVO will be 100% open if 4WV is in Heat position.

The state remains OFF until there is a call for cooling, dehumidification, or compressorized heating.

PreStart State

Operation in this state for lasts for 30 seconds. When in the PreStart state, all devices are off or closed, except the Outdoor Fan and 4WV.

  - The Outdoor fan speed is set to 50% for heat pump configured units and if compressor control mode is Cooling, Dehum, or DXBP.
  - 4WV is Off (Cool) if unit state is Cooling or Dehum is Active. 4WV is On (Heat) if unit state is Heating or MinDAT.

Initialization State

Before normal compressor control begins, the circuit will enter the Initialization state. The compressor capacity will be slowly ramped up if necessary to establish an acceptable differential pressure (PTD-PTS) and compressor speed relationship.

Initialization State may have between 3 and 5 total ramping steps, depending on unit size and configuration.

Normal State

In the Normal State, the following processes are enacted:

- Indoor coil expansion value is modulated to maintain the suction superheat at the suction superheat set point.
- Outdoor coil expansion valve is controlled to maintain outdoor coil subcooling at the outdoor coil subcooling set point (heat pump configurations).
- Outdoor fans are modulated to maintain the discharge saturation temperature at the discharge saturation temperature set point.
- Compressors are controlled to their normal capacity control sequences.

Pumpdown State

Before shutting off the last compressor on the circuit, the circuit will enter the Pumpdown State before entering the Standby for Restart State. In the Pumpdown State, the following processes are enacted:

- Outdoor fans are controlled normally if the compressor control mode is Cooling, Dehum, or DXBP. Outdoor fans are controlled to the configuration outdoor fan maximum value if the compressor control mode is Heating or MinDAT.
- 4WV is Off (Cool) if unit state is Cooling or Dehum is Active. 4WV is On (Heat) if unit state is Heating or MinDAT.
- Variable compressor capacity command will at first be held at the current capacity (while MHGRht Valve is driven to 0%). Then the variable compressor will be commanded to go to a minimum capacity.
- If a variable compressor on the circuit is off, the operating fixed compressor will remain On. If the variable compressor is on, the fixed compressor will be off.
- EVI Operation:
  - If the unit is not a heat pump unit or 4WV is in Cool position, EVI will be held at the position is was when the circuit entered pumpdown state while MHGRht valve is driven to 0%. Once the MHGRht valve is at 0%, normal EV state control resumes and is driven closed once the variable compressor is at minimum capacity or the pumpdown Step 2 timer is elapsed (30 or 60 seconds).
  - If unit is a heat pump and 4WV is in Heat position, EVI will be 100% open.
- EVO Operation:
  - If 4WV is in Cool position, EVO will be 100% open.
  - If 4WV in Heat position, EVO will be held at the position is was when the circuit entered pumpdown state while MHGRht Valve is driven to 0%. Once the MHGRht Valve is at 0%, normal EV state control resumes and is driven closed once the variable compressor is at minimum capacity or the pumpdown Step 2 timer is elapsed (30 or 60 seconds).

Standby for Restart State

The Standby for Restart state guarantees at least one Clg Stg Time period elapses before re-entering the Initialization and Normal states after circuit pumpdown is complete.

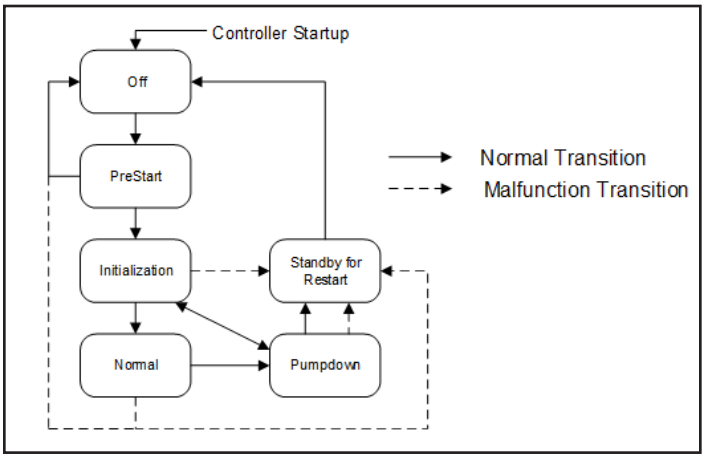
When in the Standby for Restart state, all devices are off or closed, except the Outdoor Fan and 4WV.

- Outdoor fan speed is set to 50% of the effective outdoor fan PI loop maximum value if there is a variable compressor on the circuit and effective OAT is greater than 86°F (30°C). Otherwise, it will be set to Off.
- 4WV is Off (Cool) if unit state is Cooling or Dehum is active. 4WV is On (Heat) if unit state is Heating or MinDAT.

Compressor Transitions

This section applies to all cooling only and heat pump units. When compressorized cooling or heating is enabled, the compressor transitions through the states listed in the compressor circuit state diagram (Figure 22).

Figure 22: Compressor Circuit State Diagram



Off to Prestart

The Compressor Heating/Cooling State transitions from OFF to Prestart when the unit enters the MinDAT or Heating operating state.

Prestart to Off

The Compressor Heating/Cooling State transitions from Prestart to OFF if there is no longer a call for MinDAT or Heating operation.

Prestart to Initialization

The Compressor Heating/Cooling State transitions from Prestart to initialization after ninety seconds.

Initialization to Normal

The Compressor Heating/Cooling State transitions from Initialization to Normal when the initialization sequence is complete.

Initialization to Pumpdown

The Compressor Heating/Cooling State transitions from Initialization to Pumpdown if there is no longer a call for cooling, MinDAT, or heating operation.

Initialization to Standby for Restart

The Compressor Heating/Cooling State transitions from Initialization to Standby for Restart if one of the Compressor Protection functions force a transition to Standby for Restart, the inverter compressor or outdoor fan board requests a transition to Standby for Restart or if all compressor operation becomes disabled for any reason.

Normal to Pumpdown

The Compressor Heating/Cooling State transitions from Normal to Pumpdown if there is no longer a call for cooling, MinDAT, or heating operation.

Normal to Standby for Restart

The Compressor Heating/Cooling State transitions from Normal to Standby for Restart if one of the Compressor Protection functions force a transition to Standby for Restart, the inverter compressor or outdoor fan board requests a transition to Standby for Restart or if all compressor operation becomes disabled for any reason.

Pumpdown to Standby for Restart

The Compressor Heating/Cooling State transitions from Pumpdown to Standby for Restart if one of the Compressor Protection functions force a transition to Standby for Restart, the inverter compressor or outdoor fan board requests a transition to Standby for Restart or if all compressor operation becomes disabled for any reason.

Pumpdown to Initialization

The Compressor Heating/Cooling State transitions from Pumpdown to initialization if there is a call for cooling MinDAT or Heating operation.

Standby for Restart to Off

The Compressor Heating/Cooling State transitions from Standby for Restart to OFF after the heating stage timer expires.

Evacuation/Charging Mode

A refrigerant circuit evacuation mode will be provided when the unit is equipped with electric expansion valves to open and close refrigeration circuit valves and turn on crankcase heaters to expedite the refrigeration circuit evacuation process. An Evac/ChrgMode (Off/C1Evac/C2Evac/ EvacAll) parameter will be provided on the HMI to active the evacuation mode on and individual circuit or all the circuits that are present.

When the Evac/ChrgMode parameter is set to Circ1, Circ2 or AllCirc, the Unit Status will change to OffEvac.

The Evac/ChrgMode parameter will not be allowed to be changed from Off when the unit is running nor when the when the Manual Ctrl parameter is set to ManCtrl.

Whenever the Evac/ChrgMode parameter is set to Circ1, Circ2 or AllCirc the follow parameters in the Cmp Circ Man Ctrl Menu will be automatically set as indicated in Table 62.

Table 62: Evac/ChrgMode Setting Parameters

HMI Name	Setting
EHGBP1 Cap=	100% open
EHGBP2 Cap=	100% open
CondSol1 Circ1=	On
CondSol2 Circ1=	On
CondSol1 Circ2=	On
CondSol2 Circ2=	On
C1 EVI1 Cap=	100% open
C1 EVI2 Cap=	100% open
C2 EVI1 Cap=	100% open
C2 EVI2 Cap=	100% open
C1 EVO Cap=	100% open
C2 EVO Cap=	100% open
4WV1=	Off
4WV2=	Off
MHGRht Valve=	50% open (Only when Evac/ChrgMode parameter is set to Circ1 or AllCirc)
RH Bleed Valve=	On (Only when Evac/ChrgMode parameter is set to Circ1 or AllCirc)
LSCRht Valve=	50% open (Only when Evac/ChrgMode parameter is set to Circ1 or AllCirc)

The following rules will apply to setting the Evac/ChrgMode parameter:

- The Evac/ChrgMode parameter will not be allowed to be changed from Off unless the applicable CircState parameters are Off.
- When the Evac/ChrgMode parameter is set to Circ1 or AllCirc, the Unit Status will change to OffEvac.
- When the Evac/ChrgMode parameter is set to Off the Cmp Circ Man Ctrl parameters on the HMI listed in the table above will automatically revert to Off or 0%.
- The Evac/ChrgMode parameter will revert to Off upon a controller reset.

Cooling

Zone Temperature Control

Variable Speed Compressors

In units equipped with **Variable Speed Compressors** that are configured for Zone Temperature control, the compressor capacity will modulate to maintain the control temperature (Space or RAT). The control temperature being maintained is the occupied or unoccupied cooling setpoint. Compressor capacity will increase or decrease if the current reading of the control temperature is above, or below, the occupied or unoccupied cooling temperature setpoint by more than half of the cooling deadband.

Staged Compressors

Unit sizes 020-031 will be equipped with a fixed compressor in addition to variable compressors. Generally, fixed compressors will be commanded 'On' once the variable compressors reaches 100% available capacity and remains at 100% for the duration of the Cooling Stage timer. Once the fixed compressor is commanded 'On', the variable compressor will be modulated to the minimum capacity, and then modulated up to reach the required total unit cooling capacity. Once the cooling capacity goes down, the variable compressor capacity will be modulated down to the minimum, then the fixed compressor will be commanded 'Off', and the variable compressor capacity will be modulated up to reach the required total unit cooling capacity.

NOTE: There are exceptions to how the variable and fixed compressor are controlled, depending on the sequence of operations.

In units equipped with staged compressors that are configured for zone temperature control, the compressors stage on and off to maintain the control temperature (Space or RAT). The control temperature being maintained is the occupied or unoccupied cooling setpoint.

When a unit first enters the cooling state, the unit goes directly to Cooling Stage #1 so that the first compressor is turned On immediately. During normal cooling operation, the number of compressor stages increases when the time since last stage exceeds the Cooling Stage Timer (Default=5 min) and the projected control temperature is greater than the occupied or unoccupied cooling setpoint by more than half of the cooling deadband. Compressor stages decrease when the time since the last stage exceeds the cooling stage timer and the projected control temperature is less than the occupied or unoccupied cooling setpoint by more than half of the cooling deadband.

During normal cooling operation, the compressor stages may also decrease when the time since the last stage exceeds the cooling stage timer and the discharge air temperature is less than the minimum DAT cooling setpoint.

Discharge Air Temperature Control

Variable Speed Compressors

In units equipped with **Variable Speed Compressors** that are configured for discharge air temperature control or single zone VAV, the compressor capacity is modulated to maintain the cooling discharge air temperature setpoint. Compressor capacity is increased if the projected discharge air temperature reading is greater than the cooling discharge air temperature setpoint by more than ½ the cooling DAT deadband. Conversely, the compressor capacity is decreased if the projected discharge air temperature reading is less than the cooling discharge air temperature setpoint by more than ½ the cooling DAT deadband.

Staged Compressors

Unit sizes 020-031 will be equipped with a fixed compressor in addition to variable compressors. Generally, fixed compressors will be commanded 'On' once the variable compressors reaches 100% available capacity and remains at 100% for the duration of the Cooling Stage timer. Once the fixed compressor is commanded 'On', the variable compressor will be modulated to the minimum capacity, and then modulated up to reach the required total unit cooling capacity. Once the cooling capacity goes down, the variable compressor capacity will be modulated down to the minimum, then the fixed compressor will be commanded 'Off', and the variable compressor capacity will be modulated up to reach the required total unit cooling capacity.

NOTE: There are exceptions to how the variable and fixed compressor are controlled, depending on the sequence of operations.

In units equipped with staged compressors that are configured for discharge air temperature control or 1ZnVAV operation, the compressors are staged on and off to maintain a cooling discharge air temperature setpoint. A time average control method is used to stage compressors up and down to provide smooth, average temperature control around the cooling discharge air temperature setpoint.

Cooling DAT Reset

The **Cooling DAT Setpoint** may be reset for units with DAT Cooling Control. The reset type may be set to one of the following:

- **None:** Discharge Cooling Spt is user adjustable
- **Network:** Discharge Cooling Spt is equal to the Network DAT Clg Setpoint when it is valid
- **Space**: Discharge Cooling Spt is based on the Space Sensor
- **Return**: Discharge Cooling Spt is based on the Return Air Sensor
- **OAT**: Discharge Cooling Spt is based on the Outdoor Air Temperature
- **Ext mA**: Discharge Cooling Spt is determined by a 0-20 mA signal
- **Ext V**: Discharge Cooling Spt is determined by a 0-10 VDC signal

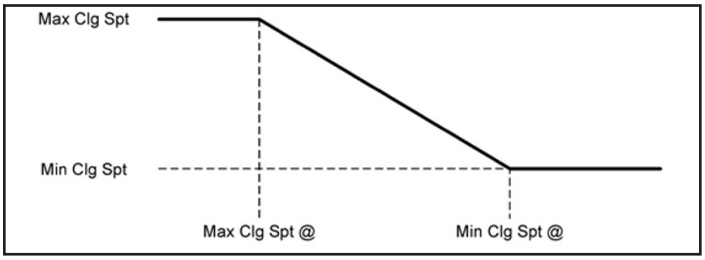
- **Airflow**: Discharge Cooling Spt is based on the airflow as indicated by the variable frequency drive speed
- **SpaceH1**: Discharge Cooling Spt is based on the humidity based on humidity sensor 1.
- **SpaceH2**: Discharge Cooling Spt is based on the humidity based on humidity sensor 2.
- **SpcDwpt1**: Discharge Cooling Spt is based on the calculated dew point based on dew point sensor 1
- **SpcDwpt2**: Discharge Cooling Spt is based on the calculated dew point based on dew point sensor 2
- **OADwpt**: Discharge Cooling Spt is based on the calculated Outdoor Air Dew point
- **RADwpt**: Discharge Cooling Spt is based on the calculated Return Air Dew point

Reset reverts from Return to None when a Return Air Sensor opens or Shorts. Reset Reverts from Space to None when a Space Sensor opens or shorts. Reset Reverts from OAT to None when an Outdoor Air Sensor opens or shorts.

When Space, Return, OAT, Airflow, SpaceH1, SpaceH2, SpcDwpt1, SpcDwpt2, OADwpt, RADwpt, Ext mA or ExtV is selected, the Discharge Cooling Spt equals the Max Clg Spt when the selected value equals the Max Clg Spt @ value. Similarly, the Discharge Cooling Spt equals the Min Clg Spt when the selected value equals the Min Clg Spt @ Value.

When the Space, Return, OAT, SpaceH1, SpaceH2, SpcDwpt1, SpcDwpt2, OADwpt, RADwpt, or Airflow is selected, the reset schedule should be set so that the DAT Cooling Setpoint decreases as the selected temperature increases as shown in the graph.

Figure 23: Cooling DAT Setpoints



When Airflow, Hum1, or Hum2 is selected, the values “Min Clg Spt@” and “Max Clg Spt @” are entered as percentage values. When ExtmA is Selected, the values “Min Clg Spt@” and “Max Cl Spt @” are entered as mA values. When Ext VDC is selected, the values “Min Clg Spt@” and “Max Cl Spt @” are entered as VDC values.

If Ext mA or Ext V is selected as the type of reset, the Min Clg Spt@ value may be set above the Max Clg Spt@ value to cause a decrease in the DAT setpoint as the external signal or the Min Clg Spt @ value may be set below the Max Clg @ Spt Value to cause an increase in the DAT setpoint as the external setpoint increases.

The Min Clg Spt@ value can be set below the Max Clg Spt @ Value for all types of reset, but it only makes sense for external reset.

Cooling DAT Reset Application Considerations

These examples are just some common uses of DAT reset, other building/application factors may require different values or schedule sources.

Table 63: Cooling DAT Reset

	1		2		3	
	OAT	**Clg DAT**	**Airflow**	**Clg DAT**	**ExtSig**	**Clg DAT**
Min	45F	60F	40%	65F	0V	65F
Max	65F	55F	60%	55F	10V	50F

1. **OAT:** OAT is an effective reset control strategy if all the zones served have similar loads and are mostly dependent on outdoor air temperatures. Examples would be west facing perimeter zones with the same lighting/equipment/ occupancy loads. This reset strategy is problematic if zones require cooling regardless of outdoor air temperature. This could be due to internal gains or general interior spaces of large buildings.
2. **Airflow:** This is an effective reset control strategy for single zone or multizone VAV units because airflow is a close indicator of cooling demand. If a typical VAV unit supply fan speed range is 40-100% a good airflow capacity to being to reset the DAT is roughly 60-65%. By the time the fan speed is down to 50% the DAT can be reset to a warmer temperature.
3. **Network, ExtSig:** It is recommended that a network control the DAT reset schedule when a rooftop unit is applied in a multizone VAV system with diverse loads. In this case, the network can combine a building specific reset sequence based on the polling of VAV boxes and synchronizing the reset with a duct static pressure reset that maximizes energy efficiency.

Cooling Menus

Compressor Status

The Cooling Menu is a view status menu that displays all relevant Cooling Status items.

Table 64: Main Menu \ View Status \ Compressor Status

Menu Display Name	Default	Range	Description
Clg Capacity	-	0-100%	Clg Capacity is a status only item which indicates the percentage of the unit cooling capacity currently operating.
Clg Status	-	Enabled None OffAmb OffAlm OffNet OffMan CfgErr	Clg Status is a status only item which indicates whether or not mechanical cooling is currently allowed. If cooling is disabled, the reason is indicated.
REFRIG CIRCUIT 1			
VCmp1	-	On Off	Vcmp1 is a status only item which indicates whether or not the variable compressor on circuit #1 is on or off.
C1FCmp3	-	On Off	A status only item which indicates the current state of Circuit 1 Fixed Compressor 3.
PTS1	-	0-725.2psi	A status only item which indicates the Suction Pressure in Refrigerant Circuit 1.
PTD1	-	0-725.29psi	A status only item which indicates the Discharge Pressure in Refrigerant Circuit 1.
SSH1	-	-100.0-100.0°F	A status only item which indicates the Suction Super Heat in Refrigerant Circuit 1.
DSH1	-	-100.0-100.0°F	A status only item which indicates the Discharge Super Heat in Refrigerant Circuit 1.
Subcooling1	-	-100.0-100.0°F	A status only item which indicates the Liquid Sub Cooling in Refrigerant Circuit 1.
Te1	-	-50.0-212.0°F	A status only item which indicates the Sat. Evap. Temperature in Refrigerant Circuit 1.
Tc1	-	-50.0-212.0°F	A status only item which indicates the Sat. Cond. Temperature in Refrigerant Circuit 1.
C1DRT1	-	-50.0-392.0°F	A status only item which indicates the Discharge Temperature of Comp. 1 in Refrigerant Circuit 1.
C1DRT3	-	-83.2-392.0°F	A status only item which indicates the Discharge Temperature of Comp. 3 in Refrigerant Circuit 1.
SRT1	-	-50.0-392.0°F	A status only item which indicates the Saturated Suction Temperature of Refrigerant Circuit 1.

Cooling Setup

The Cooling Setup Menu is a view status menu that displays all relevant cooling status items.

Table 65: Main Menu \ View Status \ Cooling Set-Up

Menu Display Name	Default	Range	Description
Circ1 CmpState	-	Off Start Init1 Init2 Init3 Normal Pmpdn1 Pmpdn2 Pmpdn3 Standby	Circ1 CmpStat is a status only item that displays the current state/activity for each cooling circuit.
Circ1Status	-	Enabled Disabled	Circ1Status is a status only item that displays if the refrigeration circuit is enabled or disabled for cooling operation.
VCmp1 Cap	-	0-110%	A status only item which indicates the current Capacity of Variable Compressor 1.
VCmp1 Cmd	-	0-100%	A status only item which indicates the current Commanded speed of Variable Compressor 1.
VCmp1 Rps	-	0-150	A status only item which indicates the current speed (RPS) of Variable Compressor 1.
C1FCmp3	-	Off On	A status only item which indicates the status (on/off) of Circuit 1/ Fixed Compressor 3.
Control Temp	-	-461.2-525.2.0°F	Control Temp is a status only item which displays the current value of the “Control Temperature.” The “Control Temperature” is defined as the temperature input selected by the Control Temperature Source parameter. For example, if the Control Temperature Source parameter is set to “Return,” then the control temperature parameter reads the same value as the Return Air parameter.
Occ Clg Spt	72.0°F	0.0-100.0°F	Occ Clg Spt is an adjustable item which indicates the temperature in which the unit will go into the cooling mode of operation.
Occ Clg DB	2.0°F	0.0-10.0°F	Occ Clg DB is an adjustable item which sets a dead band around the Occ Cooling Setpoint parameter. For example, if the Occ Cooling Setpoint parameter is set to 75ºF and the Clg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 76.0ºF to 74.0ºF.
Disch Air	-	-50.0-250.0°F	Disch Air is a status only item which displays the current temperature reading from the unit’s discharge air temperature sensor (DAT). This sensor is standard on all units.
DAT ClgSpt	55.0°F	40.0-100.0°F	DAT Clg Spt is an adjustable item which sets the temperature that the DAT should be maintained at when it is in the cooling mode of operation. This value is adjustable on DAC and 1ZnVAV units. It is not adjustable on CAV units.
DAT Clg DB	2.0°F	1.0-10.0°F	DAT Clg DB is an adjustable item which sets the deadband around the DAT Clg Spt. If the disch air is within the DB no action is take. For example, if the discharge cooling setpoint is set to 55°F and the Clg DB is set to 2°F the dead band around the setpoint would be from 56.0°F to 54.0°F.
Eff Space T	-	0.0-150.0°F	Eff Space T is a status only item that displays the current effective space temperature.
Unocc Clg Spt	85.0°F	40.0-100.0°F	Unocc Clg Spt is an adjustable item which sets the zone temperature above which the unit starts up and provides unoccupied cooling (night setup) during unoccupied periods. Note: setting this to its maximum value will disable unocc cooling.
Unocc Diff	3.0°F	0-10.0°F	Unocc Diff is an adjustable item which sets a differential above and below the Ucc Clg Spt. Mechanical Cooling operation is enabled when the Control temp is above the Unocc Clg spt by the unocc diff. Conversely, mechanical cooling operation is disabled when the control temp is below the Unocc Clg Spt by the Unocc Diff.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Clg Stg Time	5 min	5-60min	Clg Stage Time is an adjustable item used to set a minimum time period between compressor stage changes.
OA Temp	-	-50.0-200.0°F	OA Temp is a status only item which displays the current temperature reading from the unit mounted Outdoor air temperature sensor. This sensor is standard on all units.
Clg Lo OAT Lk	25°F	-20.0-100°F	Clg Lo OAT Lk is an adjustable item which sets the low outdoor air temperature mechanical cooling lockout point. Mechanical cooling operation is disabled when the outdoor air temperature sensor input falls below this setpoint.
OAT Diff	2.0°F	0-10.0°F	OATDiff is an adjustable item which sets a differential above the OAT Clg Lock parameter. Mechanical cooling operation is re-enabled when the outdoor air temperature sensor input rises above the OAT Clg Lock value by more than this differential.
Clg Reset	None	None Network Space Return OAT ExtmA ExtV Airflow SpaceH1 SpaceH2 OAH RAH SpcDpt1 SpcDpt2 OADwpt RADwpt	Clg Reset is an adjustable item that is used to set the type of cooling reset to be used. Notes: Space (Not selectable when SpaceTCfgis none) ExtmA (Not selectable when RemSptSrc is Yes) ExtV (Not Selectable when RemSptSrc is Yes)
Min Clg Spt	55.0°F	40.0-100.0°F	Min Clg Spt is an adjustable item which sets the minimum cooling discharge setpoint for use with a cooling discharge air temperature setpoint reset schedule.
Min Clg Spt@	0	0-100/ NA °F °C mA V %	Min Clg Spt @ is an adjustable item which sets the value of the sensor input, selected with the Cooling Reset parameter, at which the DAT cooling setpoint parameter is reset to the minimum DAT cooling setpoint value.
Max Clg Spt	65.0°F	40.0-100.0°F	Max Clg Spt is an adjustable item which sets the maximum cooling discharge setpoint for use with a cooling discharge air temperature setpoint reset schedule.
Max Clg Spt@	100	0-100/ NA °F °C mA V %	Max Clg Spt @ is an adjustable item which sets the value of the sensor input, selected with the Cooling Reset parameter, at which the DAT cooling setpoint parameter is reset to the maximum DAT cooling setpoint value.

Dehumidification

Dehumidification is an operating mode that is only allowed when the unit is in either the Fan Only or Cooling States. When dehumidification is active, the unit is not allowed to operate in the Economizer or MinDAT states. Normal temperature control is overridden and mechanical cooling will instead be used to lower the air temperature enough to wring out moisture and subsequently, reheat will be used to raise it back up to achieve the unit discharge air temperature requirements. Reheat types can be Hot Gas Reheat or the standard heating equipment (Gas or Steam/Hot Water).

Dehumidification Initiation

Dehumidification operation is available in both the Cooling and Fan Only unit states, and is initiated by one or two analog or network humidity sensors that are mounted in the return duct, space, or outdoors to sense relative humidity. The unit may be set up to dehumidify based on relative humidity, dew point, or continuously. Each humidity sensor can have a separate setpoint, Hum1, Hum2, or Dwpt1 and Dwpt2. Humidity sensors are configured in the Humidity Sensor Set-Up Menu and the setpoints are configured in the Dehumidification Set-Up menu.

- **Relative Humidity or Dew point**: When configured for relative humidity or dew point, the basis of dehumidification will be determined by one or two relative humidity sensors.
- **Always**: When configured to dehumidify continuously, dehumidification and reheat will operate regardless of relative humidity or dew point, and will operate any time the unit is in the Cooling or Fan Only unit states.
- **Unoccupied**: Dehumidification default settings allow dehum to operate in occupied only. The unoccupied operation is an adjustable setting to allow unoccupied dehumidification.

Dehumidification Operation

The left psychrometric chart in Figure 24 on page 64 shows typical cooling operation. The space is 74°F and 50% and the rooftop unit is in mechanical cooling, providing 55°F air leaving the unit. If the space humidity rises above its 50% RH setpoint, Dehumidification is activated.

The right psychrometric chart (as seen in Figure 24 on page 64) shows cooling operation in dehumidification. In dehumidification operation, the unit is cooling the air temperature lower to provide a lower dew point supply air and latent dehumidification.

The air is cooled to provide 50°F dew point and is reheated to the DAT Cooling setpoint of 55°F to continue providing the same sensible cooling load. With this example in mind, the MicroTech has several methods for initiating dehumidification, and several variations of temperature and reheat control parameters that modify and enhance dehumidification performance.

Variable Speed Compressor

When dehumidification is active, **Variable Speed Compressor** capacity is modulated to maintain the leaving coil temperature within the deadband near the leaving coil temperature setpoint.

Reheat Control

The reheat process is a critical component of the dehumidification process. All MicroTech controlled rooftops use a fully modulating reheat control to provide precise discharge temperature control during dehumidification. There are several forms of reheat that can be used. Reheat types can be Hot Gas Reheat or the standard heating equipment (Gas or Steam/Hot Water).

- **Cooling**: In the cooling state, the modulating hot gas and standard heat reheat will be controlled to the DAT Cooling. For DAT controlled units this is the normal DAT Cooling setpoint resulting from any reset. For Zone Control units, this setpoint is the result of a calculation based on the control temperature.
- **Fan Only**: In the fan only, state, the modulating hot gas and standard heat reheat will be controlled to the reheat setpoint. The reheat setpoint equals an editable MaxReheatSpt (Default = 65°F) when the control temperature drops to the Occupied or Unoccupied Heating Setpoint, and equals an editable MinReheatSpt (Default = 55°F) when the control temperature rises to the Occupied or Unoccupied Cooling setpoint. The Dehumidification Reheat Setpoint varies linearly between these two points. Users can choose to set these to be the same value (Example = 65°F) if they desire neutral air when there is no sensible cooling load.

Figure 24: Cooling/Dehumidification Psychrometric Charts

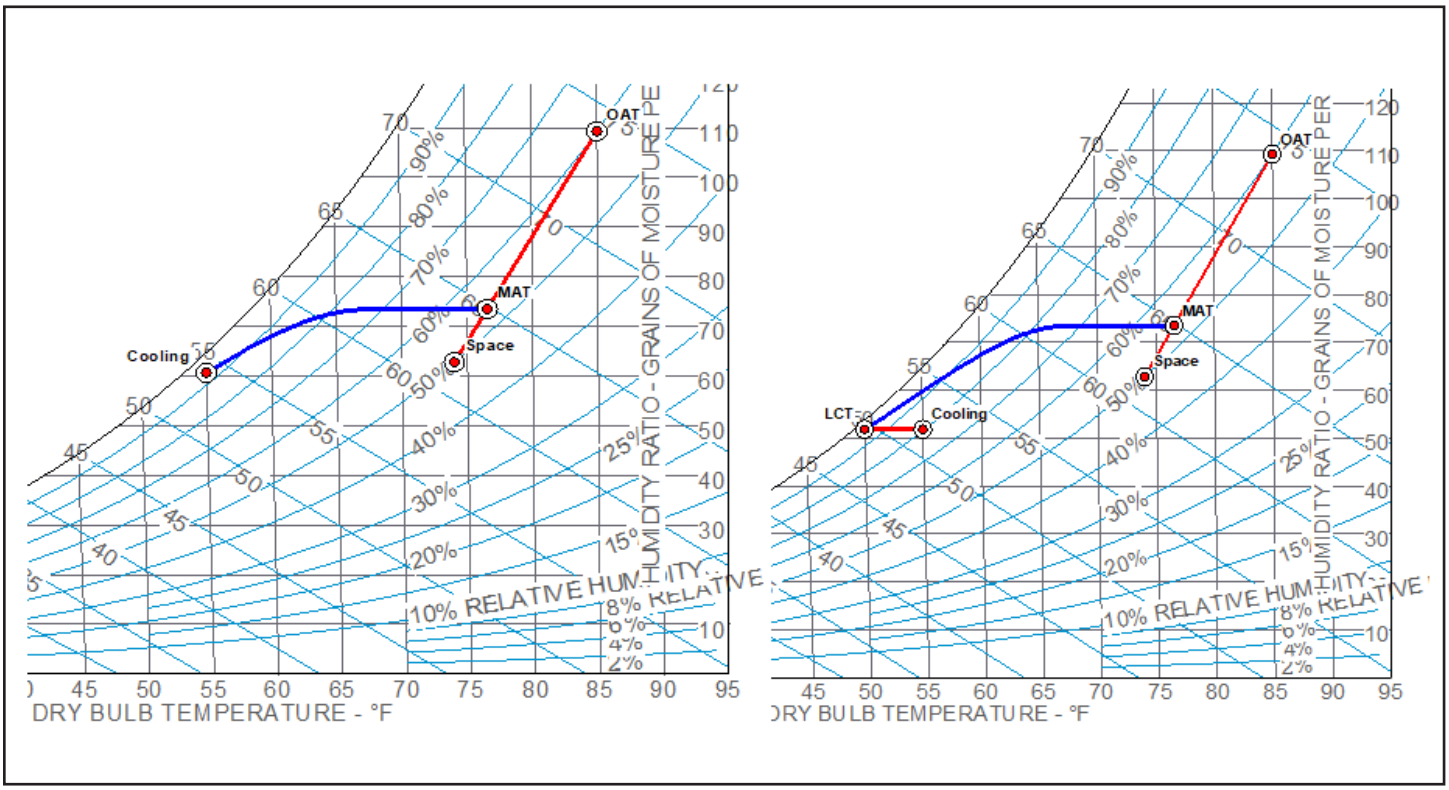
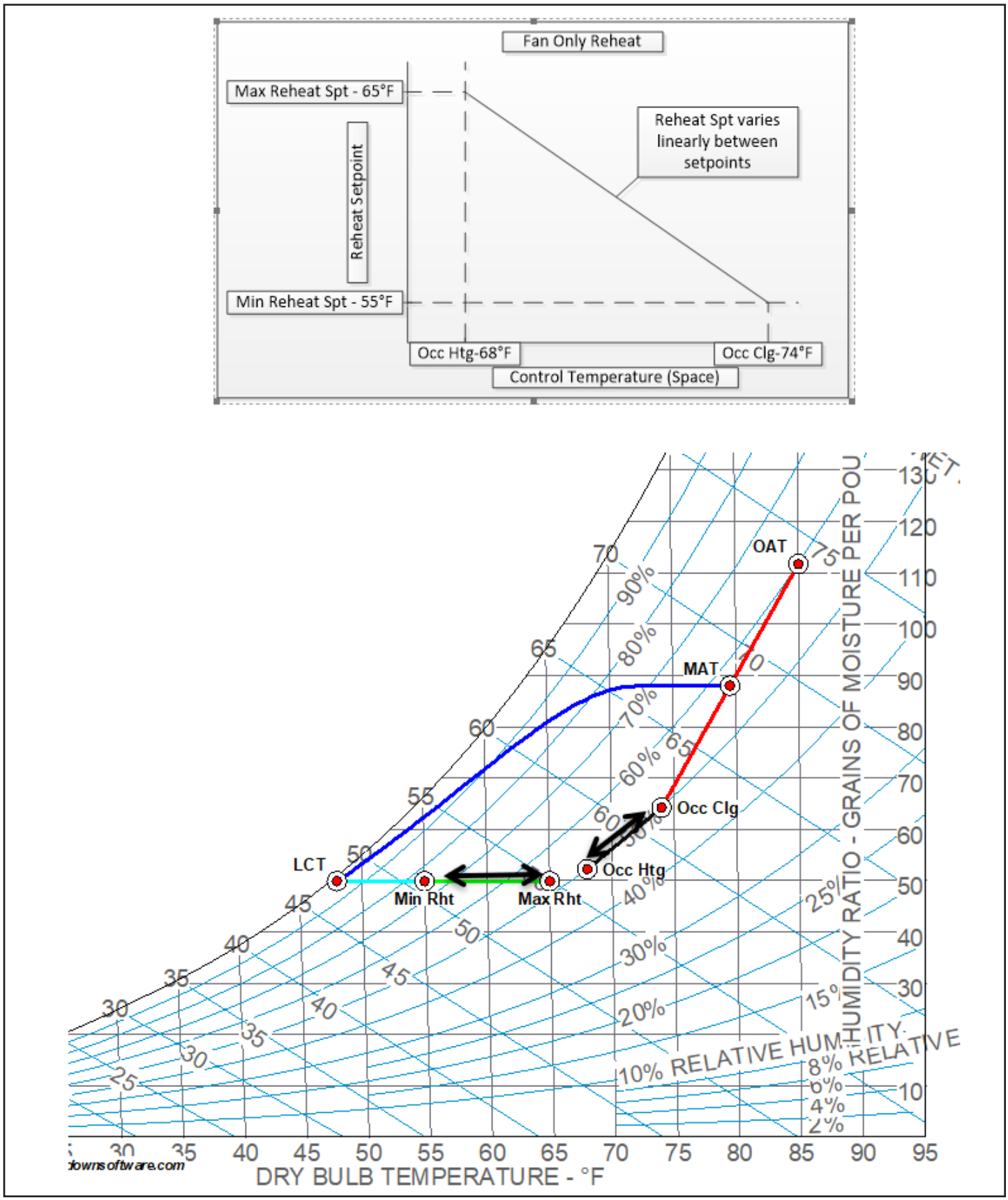


Figure 25: Reheat Control



LCT (Leaving Coil Temperature) Reset

Using a **Leaving Coil Temperature Reset** can be useful in humidity control applications where dehumidification loads vary greatly with occupancy or climate. By implementing a reset of the leaving coil temperature based on feedback from load driving variables, dehumidification control is enhanced by reacting to changing dehumidification loads throughout operation.

Table 66: Recommended LCT Reset Schedules

	1		2		3		4	
	Space/RAT	**LCT**	**Space RH/ Dwpt**	**LCT**	**Airflow**	**LCT**	**Outdoor RH**	**LCT**
Min	74°F	50°F	50%	52°F	100%	52°F	70%	52°F
Max	70°F	45°F	60%	45°F	30%	45°F	100%	45°F

1. **Space/RAT**: Space Air Temperature is a good reset temperature source for LCT when the primary dehumidification fluctuations happen during periods of little or no cooling load and the unit is most likely to be in the Fan Only state. If we consider a space with occupied cooling and heating setpoints of 74°F and 70°F respectively, at 74°F and 50% the dew point is 54.2°F and at 70°F and 50% RH the dew point is 50.5°F. As the space/ unit operates in fan only and the temperature drops the dew point required to maintain 50% RH also drops. If a unit is likely to require dehumidification operation during fan only, this will requires the LCT setpoint to drop as the space temperature drops in order to maintain a 50%RH space setpoint. Maintaining a constant LCT during fan only could result in a space humidity to increase by as much as 10%.
2. **Space RH or Dew point**: Space Relative Humidity or Dew Point is a good source for LCT reset source when the dehumidification operation is likely to occur in both cooling and fan only operation. As the space humidity rises above the 50% RH or 55°F Dew point setpoint the LCT should be reduced proportional to the increase in RH or dew point so that any extra moisture in the space can be removed effectively.
3. **Airflow**: Airflow is a good LCT reset source for most modulating supply fan applications. As fan speed slows proportionally with load, to provide the same moisture removal to the space (#/hr) a lower supply dew point is required. As an example, a 10,000 CFM air handler that delivers 52°F dew point air in dehumidification to a 74°F/50% space is removing 35.6 lbs/hr. At 50% airflow, that same air handler needs to supply 49°F dew point air to provide the same amount of dehumidification. Note: this reset type may be less effective in duct pressure VAV systems that have significant duct static pressure resets schedules being used.
4. **Outdoor RH or Dew point**: Outdoor RH or Dew point is a good LCT reset source in 100% outdoor air applications, where constant dehumidification and reheat is being performed. As the outdoor air humidity becomes more mild, the need to dehumidify to lower LCT's is reduced and can be reset higher to save energy. For example, a 100% OA unit may be designed to supply 68°F/52°F dew point air at design summer conditions, but during cool rainy whether a lower LCT may be desired to provide extra dehumidification to the space. Resetting based on outdoor air humidity above 70% could provide added dehumidification under rainy conditions.

Dehumidification Menus

Dehumidification Status

The Dehumidification Menu is a view status menu that displays all relevant Dehumidification Status items.

Table 67: Main Menu \ View Status \ Dehumidification

Menu Display Name	Default	Range	Description
Dehum Status	-	Inactive Active	Dehum Status is a status only item which indicates the status of operation of the dehumidification operation. Dehumidification operation can be active or inactive.
Rel Hum 1	-	0-100%	Rel Hum1 is a status only item that displays the current relative humidity reading from the optional relative humidity sensor at user defined location 1.
Rel Hum 2	-	0-100%	Rel Hum2 is a status only item that displays the current relative humidity reading from the optional relative humidity sensor at user defined location 2.
Dew point 1	-	-50.0-150.0°F	Dew point 1 is a status only item that displays the current dew point value that is calculated by the controller using the Rel humidity and Temperature at user defined location 1.
Dew point 2	-	-50.0-150.0°F	Dew point 2 is a status only item that displays the current dew point value that is calculated by the controller using the Rel humidity and Temperature at user defined location 2.
Reheat Spt	-	40.0-100.0°F	Reheat Spt is a status only item that displays the current reheat setpoint the reheat system is controlling to during dehumidification operation.
Rht Capacity	-	0-100%	Reheat Cap is a status only item that indicates the current reheat capacity value.

Dehumidification Setup

The Dehumidification Menu is a view status menu that displays all relevant Dehumidification status items.

Table 68: Main Menu \ View Status \ Dehum Set-Up

Menu Display Name	Default	Range	Description
Rel Hum2	-	0-100%	Rel Hum2 is a status only item that displays the current relative humidity of humidity sensor 2.
Hum1 Spt	50%	0-100%	Hum1 Spt is an adjustable item used to set the relative humidity value at sensor location 1 at which the relative humidity will be controlled to during dehumidification operation.
Hum2 Spt	50%	0-100%	Hum2 Spt is an adjustable item used to set the relative humidity value at sensor location 2 at which the relative humidity will be controlled to during dehumidification operation.
Dew point 1	-	-50.0-150.0°F	Dew point 1 is a status only item that indicates the current dew point value that is calculated by the controller using the Rel Humidity= value and either the Space Temp= Air= value, depending on the setting of the Humidity Sensor Location. This parameter can either be set to “Space” or “Return”.
Dew point 2	-	-50.0-150.0°F	Dew point 2 is a status only item that indicates the current dew point value that is calculated by the controller using the Rel Humidity= value and either the Space Temp= Air= value, depending on the setting of the Humidity Sensor Location. This parameter can either be set to “Space” or “Return”.
Dewpnt 1 Spt	50°F	0.0-100.0°F	Dewpnt Spt 1 is an adjustable item used to set the dew point value at location 1 at which the dew point with will be controlled to during dehumidification operation.
DewPnt 2 Spt	50°F	0.0-100.0°F	Dewpnt Spt 2 is an adjustable item used to set the dew point value at location 2 at which the dew point with will be controlled to during dehumidification operation.
Rel Hum DB	6%	0-10%	Rel Hum DB is an adjustable item that sets a dead band around the relative humidity setpoint. For example, if the RH Setpoint parameter is set to 50% and the RH Db parameter is set to 2% the dead band around the setpoint would be from 49% to 51%.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Dew point DB	2.0°F	2-10.0°F	Dew point DB is an adjustable item that sets a dead band around the dew point setpoint. For example, if the Dew Point Spt parameter is set to 50ºF and the DewPntDb parameter is set to 2ºF the dead band around the setpoint would be from 49ºF to 51ºF.
LCT Setpoint	55°F	42.0-70.0°F	LCT Setpoint is an adjustable item which is used to set the leaving coil temperature setpoint the compressors control to maintain during Dehumidification operation.
LCT Deadband	2.0°F	1.0-10.0°F	An adjustable item used to set the Leaving Coil Setpoint Deadband.
LCT Spt Reset	None	None Network Space Return OAT Airflow SpaceH1 SpaceH2 OAH RAH SpcDpt1 SpcDpt2 OADwpt RADwpt Hum1PI Hum2PI Dwpt1PI Dwpt2PI	LCT Spt Reset is an adjustable item which is used to set the variable that will be used to reset the leaving coil temperature setpoint.
Min LCT Spt	45°F	42.0-70.0°F	Min LCT Spt is an adjustable item which sets the minimum leaving coil temperature setpoint for use with a leaving coil temperature setpoint reset schedule.
Min LCT Spt@	0	0-100/ NA °F °C %	Min LCT Spt@ is an adjustable item which sets the value of the sensor input, selected with the leaving coil temperature reset parameter, at which the leaving coil temperature setpoint is reset to the Min LCT Spt value.
Max LCT Spt	52°F	42.0-70.0°F	MaxCT Spt is an adjustable item which sets the maximum coil temperature setpoint for use with a leaving coil temperature setpoint reset schedule.
Max LCT Spt	52°F	32.0-70.0°F	
LCTRstRHSpt	50°F	0-100°F	An adjustable item used to set the Leaving Coil Reset Relative Humidity Setpoint.
LCTRstDptSpt	50°F	0-100°F	An adjustable item used to set the Leaving Coil Reset Dew point Setpoint.
Max LCT Spt@	0	0-100/ NA °F °C %	Max LCT Spt@ is an adjustable item which sets the value of the sensor input, selected with the leaving coil temperature reset parameter, at which the leaving coil temperature setpoint is reset to the Max LCT Spt value.
Min Reheat Spt	55°F	40-100°F	Min Reheat Spt is an adjustable item which is used to set the minimum DAT during dehumidification.
Max Reheat Spt	65°F	40-100°F	Max Reheat Spt is an adjustable item which is used to set the maximum DAT during dehumidification.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Reheat Spt	-	40-100°F	Reheat Spt is an adjustable value which is used to set the discharge air temperature setpoint when the unit is in dehumidification.
DAT Htg DB	2.0°F	1-10.0°F	DAT Htg DB is an adjustable item which sets the deadband around the DAT Htg Spt. If the disch air is within the DB no action is take. For example, if the discharge heating setpoint is set to 85°F and the Htg DB is set to 2°F the dead band around the setpoint would be from 83.0°F to 87.0°F.
Unocc Dehum	No	No Yes	Unocc Dehum is an adjustable item which sets if dehumidification is allowed in Unoccupied operation.

Heating

Heating Operation

Cooling Only units unit may be configured with one of several optional types of primary **Heating**: Hot Water, Steam, Natural Gas, Propane, or Electric Heat. Units configured with a heat pump will use heat pump operation as the primary heating source but may use a supplemental heating source such as hot water, natural gas, propane, or electric heat in tandem to trim to the desired discharge air setpoint if the heat pump cannot satisfy the load independently. The other options will either be staged or modulating controlled. The unit enters the Heating operating state from the Fan Only operating state when the control temperature falls below the Occupied or Unoccupied Heating Setpoint by more than half the Occupied or Unoccupied Heating Deadband. The unit transitions from the Heating to Fan Only operating state when the control temperature rises above the Occupied or Unoccupied Heating Setpoint by more than half the Occupied or Unoccupied Heating Dead Band. The unit will also transition from the Heating to Fan Only operating state if heating operation is disabled due to OA ambient lockout.

Staged Control

Staged Control is available for electric and gas heat types.

- **Zone Control**: When the unit first enters the Heating operating state the unit goes directly to Stage # 1.The number of heating stages increases when the time since the last stage change exceeds the stage time, the Projected Control Temperature and the actual Control Temperature are less then the Occ Htg Spt (minus ½ the deadband), and the DAT is less than the Max DAT Htg Spt. The number of heating stages decreases when the time since the last stage change exceeds the stage time, and the Projected Control Temperature and actual Control Temperature are greater then the Occ Htg Spt (plus ½ the deadband). The number of heating stages also decreases when the time since the last stage change exceeds the stage time, and the DAT is greater than the MaxDATHtgSpt.
- **DAT Control (Control Type = DTC or 1ZnVAV)**: When the unit enters the Heating or Minimum DAT states and all heating is off, the unit goes directly to Heating Stage # 1 so that the first stage of heat is turned on immediately. The number of heating stages increases when the time since the last stage change exceeds the stage time, and DAT is less than the effective DAT setpoint (DAT staging) or the Min DAT limit (MinDAT staging) by ½ the deadband. One exception to this is that if the current heating stage is zero, the heating stage can increase without regard to the stage timer. The last stage change exceeds the stage time, and the DAT is greater than the effective DAT setpoint (DAT staging) or the Min DAT limit (MinDAT staging) by ½ the deadband.
- **Min DAT**: The unit enters the Min DAT operating state during occupied operation when neither cooling nor heating is required based on the unit heat/cool changeover function but the discharge air temperature falls below a minimum discharge temperature limit by more than ½ the deadband. The Min DAT operating state prevents cold discharge air temperatures during what would normally be the Fan Only operating state.

Modulating Control

Modulating heating control is available with heat pump, gas, electric, hot water, and steam heating types. There are some differences in the control sequence depending on the heat type installed. The different types are described in the following sections.

- **Zone Control**. When a unit is equipped with a modulating heat type and is performing zone temperature control, the controller will calculate the required Heating DAT setpoint to maintain the desired Control Temperature (Space or RAT) at the OccHeating Setpoint. The DAT heating setpoint will not be user adjustable and will be continuously reset between the Minimum discharge air heating setpoint(MinHtg Spt) and the maximum discharge air heating setpoint(MaxHtgSpt).
- **DAT Control (Control Type = DTC or 1ZnVAV)**. When a unit is equipped with a modulating heating type and is the heating operating state, the modulating valve or control is modulated to maintain the discharge temperature setpoint.
- **Min DAT**. If heating is enabled and there is no heating load (normally Fan Only operating state), the controller activates the units heating equipment as required to prevent the discharge air temperature from becoming too cool if the Min DAT Flag (DAT units only) is set to yes in the Heating Menu. The unit enters the Min DAT operating state during occupied operation when neither cooling nor heating is required based on the heat/cool changeover function but the discharge temperature falls below a minimum discharge temperature limit. If the discharge air temperature falls below this minimum discharge temperature limit by more than half the discharge heating deadband, the unit operating state changes from Fan Only to Min DAT. (Note: On VAV or CAV Discharge Control Units, the DAT cooling setpoint parameter in the Cooling Menu acts as the minimum discharge temperature limit. On CAV Zone Control Units the Min DAT Limit in the Heating Menu acts as the minimum discharge temperature limit.)
- **Gas heat**. On units equipped with modulating gas heat, the Discharge heating setpoint is limited according to the maximum heat exchanger temperature rise limit. This factory set limit varies by burner model and can be found on the gas heat data plate attached to the unit. The controller does not allow the Discharge heating setpoint to be set above the current temperature entering the discharge fan by more than this maximum heat exchanger temperature rise limit.

Heating DAT Reset

The **Heating DAT Setpoint** may be reset for units with DAT Heating Control. The Discharge Air Temperature Setpoint will never be set below the Minimum DAT Heating Setpoint or above the Maximum DAT heating Setpoint on the Heating Reset menu. The reset type may be set to one of the following:

- **None**: Discharge Heating Spt is user adjustable
- **Network**: Discharge Heating Spt is equal to the Network DAT Htg Setpoint when it is valid
- **Space**: Discharge Heating Spt is based on the Space Sensor
- **Return**: Discharge Heating Spt is based on the Return Air Temperature
- **OAT**: Discharge Heating Spt is based on the Outdoor Air Temperature
- **Ext Signal**: Discharge Heating Spt is determined by a 0-20 or 4-20 mA signal or by a 0-10 or 2 - 10 VDC signal

Reset reverts from Return to None when the return air sensor opens or shorts. Reset reverts from Space to None when the space sensor opens or shorts. Reset reverts from OAT to None when the outdoor air sensor opens or shorts.

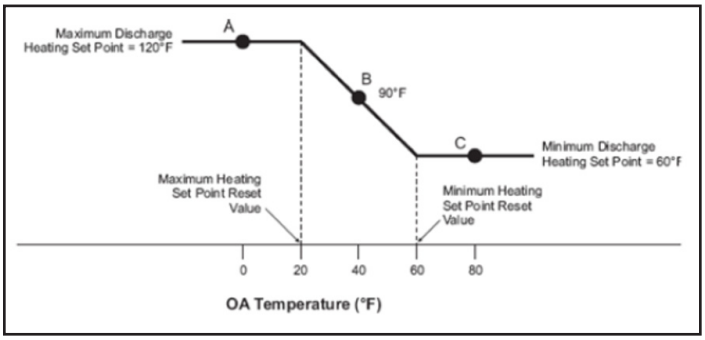
When Space, Return, OAT, Ext mA, or Ext V is selected, the Discharge Heating Spt equals the Max Htg Spt when the selected value equals the Max Htg Spt @ value. Similarly, the Discharge Heating Spt equals the Min Htg Spt when the selected value equals the Min Htg Spt @ value.

When Space, Return, or OAT is selected, the reset schedule should be set so that the DAT Heating setpoint decreases as the selected temperature increases as shown in the graph.

When Ext mA is selected, the values “Min Htg Spt @” and “Max Htg Spt @” are entered as mA values. When Ext VDC is selected, the values “Min Htg Spt @” and “Max Htg Spt @” are entered as VDC values.

If Ext mA or Ext V is selected as the type of reset, the Min Htg Spt @ value may be set above the Max Htg Spt @ value to cause a decrease in the DAT setpoint as the external signal or the Min Htg Spt @ value may be set below the Max Htg Spt @ value to cause an increase in the DAT setpoint as the external signal increase.

Figure 26: Heating DAT Reset



Special Gas Heat Start Up for 100% OA Units

A special start sequence is used for 100% outdoor air units with gas heat. The special start sequences applies to both Zone Control and DAT Control units. If heat is required at unit start up, the furnace enters a special burner startup sequences as the unit enters its Startup operating state. Pre-firing the burner allows the gas heat pre-purge sequences to occur and the burner to fire and warm up so that tempered air is available immediately when the fans start.

- **Initiation 100% OA Zone Control**: The 100% OA gas heat sequence is initiated at startup if the control temperature is less than the Effective Occupied or Unoccupied Heating Setpoint by ½ of the Heating deadband or the OAT is less than the Min DAT Limit by the amount of the DAT heating deadband.
- **Initiation 100% OA DAT Control**: The 100% OA gas heat sequence is initiated at start up if the Min DAT Ctrlk parameter is set via the keypad and the OAT is less than the DAT Clg Spt by the amount of the DAT heating deadband.
- **The Sequence**: The special start up sequence is initiated during the Start up operating state, the fans remain off, and the main gas valve is energized so the burner starts during the Warm up Time (default =45s) and operates at low fire. At the end of the warmup time, the modulating gas valve is set to a position based on the calculated application requirements. Once the gas valve is set to the calculated position, a HeatUpDely starts (default =240s) to allow the heat exchanger to heat up. After this delay, since the unit is 100% Outside Air, the unit immediately transitions from Startup to the Fan Only State. As soon as the unit enters the Fan Only Stat, the unit will immediately transition to the Heating State or MinDAT.

Outdoor Air Ambient Heating Lockout

Heating is disabled whenever the outdoor air temperature is greater than the Outdoor Air Ambient Heating Lockout Setpoint. When the outdoor air temperature drops below the Outdoor Air Ambient Heating Lockout Setpoint by more than the Heating Lockout Differential, heating operation is re-enabled. Cooling is disabled if outdoor air temperature or entering water temperature is too low for operation. The outdoor air temperature becomes too low for operation when it drops below the Outdoor Air Ambient Cooling Lockout Setpoint. Outdoor air temperature becomes high enough for operation when it rises above the Outdoor Air Ambient Cooling Lockout Setpoint by more than the Cooling Lockout Differential. The entering water temperature becomes too low for operation when it drops below the Minimum Entering Water Temperature Setpoint. Entering water temperature becomes high enough for operation when it rises above the Minimum Entering Water Temperature Setpoint by more the Cooling Lockout Differential.

Post Heat Operation

Post Heat Operation is a time delay feature used in duct pressure VAV systems that utilize the VAVBoxOut digital output or network command (DO10, or network variable) in the unit MicroTech controller. The VAV Box output varies from off (heat mode to On (cool mode) to tell the VAV boxes what state the unit is operating in. Post heat operation is a time delay for switching the VAV box output function from heat to cool. The intention of this timer is to allow the supply fan capacity to be reduced to the Minimum supply fan capacity to help prevent high duct pressure conditions during transitions that may otherwise occur due to the relative faster response of the VAV boxes versus the supply fan. Post heat operation remains active until either the discharge fan capacity reaches the minimum value, or until the Post Heat Timer Expires, which ever occurs first.

NOTE: During “post heat” operation and for 120 seconds afterward, the proof of airflow input is ignored. This is to prevent nuisance Fan Fail fault alarms that may occur if the airflow switch opens during or following post heat operation. The unit cannot leave Fan Only or Min DAT operation while the airflow switch is being ignored.

Freezestat

When a unit is equipped with chilled water, hot water, or steam coil, a freeze problem occurs when the optional Freezestat contacts open as a result of detecting an abnormally low water or steam coil temperature while the fans are off.

When the freeze problem occurs, the controller opens the chilled water and heating valves and sets a 10-minute timer. When the 10-minute timer expires, the controller checks the freezestat input again. If the freezestat contacts are closed, the pump output is de-energized and the valves close. If the freezestat contacts are still open, the pump output remains energized, the valves remain open, and the 10-minute timer resets. This continues while the unit remains off. Whenever the freezestat closes, the Freeze problem automatically clears. This feature protects the coil(s).

Morning Warm-Up

Morning Warm-Up operates when the space temperature is below the Occupied or Unoccupied Heating Setpoint by ½ the Zone Htg Deadband. During Morning Warm-up operation the outside air damper is kept closed and the unit heating is used to warm-up the space while recirculating air. The timer, ZeroOATime, is set equal to the time to occupancy during optimal start so that the OA dampers will open at the start of occupancy. DAT units have a Morning Warm-Up setpoint available.

- **Zone Control Units:** When a Zone Control Unit (Ctrl Type=Zone) first starts in the morning, it enters the Heating operating state if the Control Temperature is below the Occupied Heating Setpoint by more that ½ the heating dead band. In this case, the Occupied Heating Setpoint is the “morning warmup setpoint”
- **DAT Control Units:** For Discharge Temperature Control units (Ctrl Type=DAC or 1ZnVAV) there are two additional morning warmup related adjustable parameters; MWU Heating Setpoint and MWU Sensor. When a Discharge Temperature Control unit first starts in the morning it enters the Heating operating state if the sensor selected by the MWU Sensor parameter (RAT or Space) is below the MWU Heating Setpoint by more that ½ the Heating dead band. The MWU Sensor can also be set to None. If the MWU Sensor is set to None the MWU Heating Setpoint has no effect and the unit only enters heating based on the Occupied Setpoint in the normal manner.

Heat Pump Operating State

When a unit is configured for heat pump operation the primary source of heating is provided by operating the compressors in a heating mode of operation. When this primary heat is unavailable or at is maximum capacity and more heating is required, any available supplemental heating is controlled as described in that section. When this primary heating is enabled the compressor transitions through the heating states shown on page 56. Control based on discharge air temperature (DAT) occurs in the Normal Heating state.

Heat Pump Control

Heat pump units are designed to operate with the heat pump as the primary heating source for a unit. When the unit transitions into heating state or MinDAT, the unit will modulate the compressor speed to maintain an effective discharge air temperature setpoint.

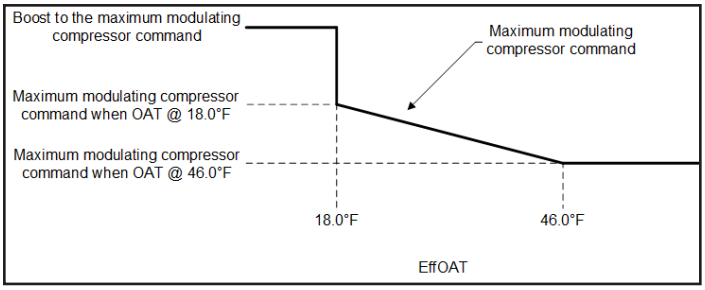
- DATHtgSpt in Heating or DATClgSpt in MinDAT (Control Type = DTC or 1ZnVAV).
- DATHtgSpt in Heating or MinDATLim in MinDAT (Control Type = ZTC).

If the heat pump heat is inadequate or unavailable to provide the necessary capacity while in the MinDAT or Heating state, the standard heat source (Heating Type), if available, will be used to supplement or in place of the compressor heating source. The heat pump units offer period defrost operation.

The only instances the heat pump will not operate during heating or MinDAT state is if the EffOAT is below the compressor heating low OAT lock out (CmpHtgLoOATLK), compressor heating is unavailable, or the network disables heat pump operation.

In order to achieve higher total compressor heating capacity during low ambient conditions, a maximum compressor speed boost function will be put in effect. This function will increase the effective maximum modulating compressor command of the variable compressor as the outside air temp (EffOAT) varies between 46.0°F (7.8°C) and 18.0°F (-7.8°C). The speed will increase as the temperature goes lower. The compressor speed will then boost to the maximum value when the EffOAT falls below 18.0°F (-7.8°C) value as shown in Figure 27.

Figure 27: Compressor Boost Function Diagram



Defrost Control - Heat Pump Units

Defrost Operation

This section applies to all mixed air, full circulation, or 100% outside air units with energy recovery. Defrost operation is required when compressor operation is in the Normal Circuit state when frost build up on the outdoor coil interferes with the normal heat transfer from the outdoor coil to the ambient air. When defrost operation is active, compressor operation remains in the Normal Circuit state but the control is overridden until the defrost operation is complete. While defrost operation is active, the auxiliary supplemental heat source (if available) in the unit is used to maintain comfort conditions.

Defrost Initiation

Heat pump units require a defrost cycle to remove frost build-up that can accumulate on the outdoor coil during certain heating operating conditions. The controller assumes there is a potential for frost build-up on the coil when the Defrost Temperature (DFT) is less than 28.4°F (-2°C) and the saturated suction temperature is below 32°F (0°C).

When the compressor operates under potential frosting conditions for at least the minimum compressor operation time (MinCmpOpTm=10 minutes default) and the total accumulated run time since the last defrost exceeds the minimum threshold (MinAccCmpTm=40 minutes default), the controller may initiate a defrost cycle based on one of three conditions:

- Temperature Defrost
- Timed Defrost
- Manual Defrost

Temperature Defrost

A defrost cycle is initiated based on temperature when the Defrost Temperature (DFT) drops below a defrost temperature value (DefrostT) and the saturated discharge temperature is below 109°F. The DefrostT value is a calculated value (+) 14°F and (-) 13.0°F based on outdoor air temperature. This value is not directly adjustable but can be “biased” by setting the DefrostTAdj= parameter (Default=0°F) between -3.6°F and +3.6°F. Note: To improve performance the DefrostT value is also automatically adjusted after each defrost cycle depending on the length of the cycle.

Timed Defrost

A defrost cycle is initiated based on time when the compressors have accumulated enough time operating in potential frosting conditions. The controller accumulates minutes of operation in low frost potential (LoFrstAccTm=) and high frost potential (HiFrstAccTm=) conditions. Whenever the HiFrstAccTm= time plus ½ the LoFrstAccTm= time exceed the MaxFrostTm= setting (Default=120minutes) a defrost cycle is initiated.

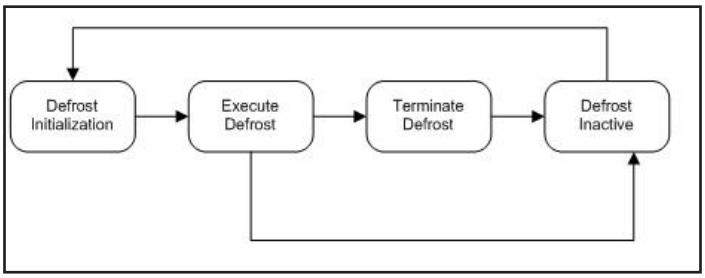
Manual Defrost

A defrost cycle is manually initiated when the Manual DF= parameter is set from No to Yes. Note: Once the defrost cycle begins the Manual DF= parameter automatically reverts to “No”.

Defrost Operation State

Once the unit has determined a defrost cycle is necessary (due to Temperature, Timed, or Manual Defrost), defrost operation transitions through different states as shown in Figure 28.

Figure 28: Defrost Operating States



Defrost Initialization

This state prepares the system for switching the 4-way valve to the cooling position by slowing the compressor and allowing refrigerant level to rise in the suction accumulator. Upon initialization, the outside air damper is driven closed (except for 100% OA with preheat configured units) and an auxiliary panel heater will energize to prevent ice buildup on units with the outdoor coil mounted on the roof (03-17 units). The auxiliary defrost heater can be set to energize every defrost cycle, every other defrost cycle, every 3rd defrost cycle, or be overridden through the AuxDFHtgMode setting in the advanced menus.

Execute Defrost

The 4-way valve is switched to the cooling position to defrost the coil. This state manages the refrigerant in the system and assures the 4-way valve is seated before defrosting the coil. Execute Defrost continues for 10 minutes or until the Defrost Temperature (DFT) exceeds 51.8ºF (11.0 ºC) or the discharge pressure exceeds 426.7 psi.

Terminate Defrost

After the defrost operation is complete, the 4-way valve is switched to the heating position. Terminate Defrost state manages the system refrigerant and assures the 4-way valve is seated before returning to normal heating compressor operation.

Defrost Inactive

When defrost operation is in the inactive state, the outside air damper resumes minOA operation (except for 100% OA with preheat configured units) and the compressor will resume regular operation by modulating the speed as the heating load demands. On units with an auxiliary panel heater, the defrost heater will be de-energized if either the EffOAT is greater than the AuxDFOATLmt (default = 35°F (2°C)), or the AuxDFTime (default = 5 minutes) has elapsed since the heat pump state changed from terminate to inactive.

100% OA Heat Pump With Preheat

This section details operation for units configured with heat pump, 100% Outside Air (OA) without energy recovery, and the preheat type is set to either HW_Stm, F&BP, or SCR. In this arrangement, heat pump operation will still follow all normal sequences for heating operation and defrost operation but with the following exceptions:

NOTE: Preheat will not be used in lieu of (or as supplement to) other heating sources in the unit to maintain heating discharge air temperature.

- **Heating**
  Heat pump will operate as the primary source of heating when in heating or MinDAT mode. When the heat pump capacity cannot satisfy the required heating load, the supplemental heater will modulate as required to satisfy the effective heating DAT set point. Once the heat pump is no longer able to maintain the Preheat LCT setpoint (PrhtLCTSpt default = 50°F(10°C)), to protect the refrigeration system, the controller will then modulate the preheater to maintain the leaving indoor coil temp to the PrhtLCTSpt. As long as the preheat is sized correctly (for example, the system can heat the outside air to PrhtLCTSpt between the preheater and the Heat Pump) this will allow the CmpHtgLoOATLK to be set as low as -10°F(-23°C).
- **Defrost**
  The unit will determine if defrost operation is necessary using the same logic detailed in “” on page 73. Upon the Execute Defrost state, the unit will continue to use the preheater to maintain the PrhtLCTSpt until the preheater is operating at maximum capacity. Once the preheater is operating at maximum capacity and the leaving coil temperature falls below the PrhtLCTSpt, the unit will continue to operate in defrost state until the completion of the defrost cycle. The supplemental heater will be used to maintain the effective heating DAT setpoint.

Special 100% OA Low Ambient Lockout

When a unit is configured with 100% Outside Air (OA) on a heat pump unit without energy recovery, heat pump defrost is not possible. Since the OA dampers cannot be closed during the defrost process, this could lead to the indoor coil freezing and damaging the refrigeration system. In order to allow as much frost-free heating operation as possible, the OA temperature, OADewpoint, and refrigerant circuit Te values will be used to disable heat pump heating operation where operation could potentially lead to frosting of the OA coil. This will be accomplished with two actions:

1. CmpHtgLoOATLock will not be allowed set below 25°F (-4°C) when Damper Type is 100OA.
2. CmpHtgLoOATLock will be overridden and set to 43°F (6°C) if the CmpHtgLoOATLock is less than 43°F (6°C), if the Te is less than or equal to the OADewpoint, and if the OADewpoint is less than 33°F (1°C).

Once the CmpHtgLoOATLock is overridden, the CmpHtgLoOATLock setting will remain at 43°F (6°C) until either of the following are true, after which it will revert to the setting prior to being overridden:

- EffOAT is above 43°F (6°C).
- The difference between the EffOAT and OATDewpoint (EffOAT – OADepoint) is greater than or equal to the difference captured at the moment when the CmpHtgLoOATLock setting was overridden, plus an additional 2°F (1.1°C).

Heat Pump Electric Heat Limiting

When a unit is configured for heat pump operation, compressor heating will always be defined as the “primary” heating and additional heating sources will be defined as the “secondary” or “supplementary” heat source. If the heat pump heat is inadequate or unavailable to provide the necessary heating capacity while in the MinDAT or Heating state, the supplementary heat source (Heating Type), if available, will be used to supplement or fully replace the compressor heating source.

For units with electric supplemental heat, the heating output from the electric heater can be limited to 75%, 50%, 25%, or 0% of the total heating output while the unit is in the heating or defrost state to limit the amount of energy usage within the system. If the compressor heating capacity CmpHtgCap is 100%, and the SCR heating capacity is at maximum capacity, and the discharge air temp is less than the effective discharge air heating setpoint (EffDATHtgSpt) by more than half the DAThtgDB for more than 5 minutes, heat pump operation will be disabled. This will allow the SCR heater to increase capacity to the full kW output so the unit will be more likely to reach the EffDATHtgSpt. The heat pump disable event will be entered into the event log, and the heat pump will be enabled again once the outside air temperature is above the outside air temperature at which the heat pump was disabled by more than 5°F (2.8°C).

Heating Menus

Table 69: Main Menu \ View Status \ Heating

Menu Display Name	Default	Range	Description
Htg Capacity	-	0-100%	Htg Capacity is a status only item which indicates the percentage of the unit heating capacity currently operating.
2nd Htg Cap	-	0-100%	2nd Htg Cap is a status only item that displays the current secondary heat source capacity.
Htg Status	-	Enabled None OffAmb OffAlm OffNet OffMan	Htg Status is a status only item which indicates whether or not heating is currently allowed. If heating is disabled, the reason is indicated.
2nd Htg Status	-	Enabled None OffAmb NA OffNet OffMan NA	A status only item indicating the current Secondary Heating source Status.
Htg Stg 1	-	On Off	Htg Stg 1 is an adjustable item that turns on the first stage of heat on units equipped with staged heating.
Htg Stg 2	-	On Off	Htg Stg 2 is an adjustable item that turns on the second stage of heat on units equipped with staged heating.
Htg Stg 3	-	On Off	Htg Stg 3 is an adjustable item that turns on the third stage of heat on units equipped with staged heating.
Htg Stg 4	-	On Off	Htg Stg 4 is an adjustable item that turns on the fourth stage of heat on units equipped with staged heating.

Table 70: Main Menu Commission Unit \ Heating Set-Up Menu

Menu Display Name	Default	Range	Description
Circ1 CmpState	-	Off Start Init1 Init2 Init3 Normal Pmpdn1 Pmpdn2 Pmpdn3 Standby	Circ1 CmpStat is a status only item that displays the current state/activity for each cooling circuit.
Circ1Status	-	Enabled Disabled	Circ1Status is a status only item that displays if the refrigeration circuit is enabled or disabled for cooling operation.
VCmp1 Cap	-	0-110%	A status only item which indicates the current Capacity of Variable Compressor 1.
VCmp1 Cmd	-	0-100%	A status only item which indicates the current Commanded speed of Variable Compressor 1.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
VCmp1 Rps	-	0-150	A status only item which indicates the current speed (RPS) of Variable Compressor 1.
C1FCmp1	-	Off On	A status only item which indicates the status (on/off) of Circuit 1/ Fixed Compressor 1.
Occ Htg Spt	68.0°F	0.0-100.0°F	Occ Htg Spt is an adjustable item which indicates the temperature in which the unit will go into the heating mode of operation.
Occ Htg DB	2.0°F	0.0-10.0°F	Occ Htg DB is an adjustable item which sets a dead band around the Occ Heating Setpoint parameter. For example, if the Occ Heating Setpoint parameter is set to 68ºF and the Htg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 70.0ºF to 66.0ºF.
Disch Air	-	-50.0-250.0°F	Disch Air is a status only item which displays the current temperature reading from the unit's discharge air temperature sensor (DAT). This sensor is standard on all units.
DAT HtSpt	85.0°F	40.0-105.0°F	DAT Htg Spt is an adjustable item which sets the temperature that the DAT should be maintained at when it is in the heating mode of operation. Tis value is adjustable on DAC and 1ZnVAV units. It is not adjustable on CAV units.
DAT Htg DB	2.0°F	1.0-10.0°F	DAT Htg DB is an adjustable item which sets the deadband around the DAT Htg Spt. If the disch air is within the DB no action is take. For example, if the discharge heating setpoint is set to 85°F and the Htg DB is set to 2°F the dead band around the setpoint would be from 83.0°F to 87.0°F.
Eff Space T	-	0.0-150.0°F	Eff Space T is a status only item that displays the current effective space temperature.
Unocc Htg Spt	55.0°F	40.0-100.0°F	Unocc Htg Spt is an adjustable item which sets the zone temperature below which the unit starts up and provides unoccupied heating (night setup) during unoccupied periods. NOTE: Setting this to its maximum value will disable unocc heating.
Unocc Diff	3.0°F	0-10.0°F	Unocc Diff is an adjustable item which sets a differential above and below the Ucc Htg Spt. Heating operation is enabled when the Control temp is below the Unocc Htg spt by the unocc diff. Conversely, Heating operation is disabled when the control temp is above the Unocc HtgSpt by the Unocc Diff.
Htg Stg Time	5 min	2-60min	Htg Stage Time is an adjustable item used to set a minimum time period between compressor stage changes.
OA Temp	-	-50.0-200.0°F	OA Temp is a status only item which displays the current temperature reading from the unit mounted Outdoor air temperature sensor. This sensor is standard on all units.
Htg Hi OAT Lk	55°F	0-100°F	Htg Hi OAT Lk is an adjustable item which sets the maximum outdoor air temperature heating lockout point. Heating operation is disabled when the outdoor air temperature sensor input rises above this setpoint.
CmpHtgHiOAT Lk	55°F	0-100°F	CmpHtgHiOATLk is an adjustable item which sets the high outdoor air temperature compressorized heating (heat pump heating) lockout point. Heat pump heating operation is disabled when the outdoor air temperature sensor input rises above this setpoint.
CmpHtgLoOATLK	25°F[1]	-20.0-50.0°F[2]	CmpHtgLoOATLk is an adjustable item which sets the low outdoor air temperature compressorized heating (heat pump heating) lockout point. Heat pump heating operation is disabled when the outdoor air temperature sensor input falls below this setpoint.
[1] Default is 0°F if Preheat Type is SCR, damper type is 100OA, and Refrigerant type is R32 R32HP, R32HP75, R32HP50, R32HP25 or R32HP0. [2] The typical lowest value is either 0°F or 25°F, but if the configuration and conditions allow, it may be set as low as -20°F.			
OAT Diff	2.0°F	0-10.0°F	OATDiff is an adjustable item which sets a differential below the OAT Htg Lock parameter. Heating operation is re-enabled when the outdoor air temperature sensor input falls below the OAT Htg Lock value by more than this differential.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Htg Reset	None	None Network Space Return OAT ExtmA ExtV	Htg Reset is an adjustable item that is used to set the type of heating reset to be used.
Min Htg Spt	55.0°F	40.0-130.0°F	Min Htg Spt is an adjustable item which sets the minimum heating discharge setpoint for use with a heating discharge air temperature setpoint reset schedule.
Min Htg Spt@	0	0-100/ NA °F °C mA V	Min Htg Spt @ is an adjustable item which sets the value of the sensor input, selected with the Heating Reset parameter, at which the DAT heating setpoint parameter is reset to the minimum DAT heating setpoint value.
Max Htg Spt	65.0°F	40.0-105.0°F	Max Htg Spt is an adjustable item which sets the maximum heating discharge setpoint for use with a heating discharge air temperature setpoint reset schedule.
Max Htg Spt@	100	0-100/ NA °F °C mA V	Max Htg Spt @ is an adjustable item which sets the value of the sensor input, selected with the Heating Reset parameter, at which the DAT heating setpoint parameter is reset to the maximum DAT heating setpoint value.
Min DAT Ctrl	Yes	No Yes	Min DAT Ctrl is an adjustable item which determines whether or not MinDAT operation is allowed. When set to No, the unit will not enter MinDAT tempering during Fan Only Operation.
Min DAT Limit	55.0°F	0.0-70.0°F	Min DAT Limit is a status item that indicates the discharge air low limit temperature on CAV zone control units. Heating will be activated to maintain this setting when the discharge temperature falls below it during the Fan Only operating state. On VAV or CAV discharge control units, the minimum discharge temperature limit is the DAT Clg Spt. Once a valid password has been entered this item becomes an adjustable item.
MWU Sensor	CtrlTemp	CtrlTemp RAT Space None	MWU Sensor is an adjustable item that sets the temperature sensor input to be used for morning warmup heating operation on discharge air control units. Setting this parameter to none disables morning warm up operation.
StgGPriState	-	Lckout Retry Off PrePg IgnOn GasOn Warmup Run No Comm	StgGPriState is a status item that indicates the Previous State of the staged gas furnace control board. This board is communicating via modbus. For detail on the gas heat states see the Appendix Section labeled Gas Furnace Controller Diagnostics.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
StgG1PriState=	-	Lckout Retry Off PrePg IgnOn GasOn Warmup Run No Comm	A status only item which indicates the state of the staged furnace Primary control board 1.
StgG2PriState=	-	Lckout Retry Off PrePg IgnOn GasOn Warmup Run No Comm	A status only item which indicates the state of the staged furnace Primary control board 2.
StgG3PriState=	-	Lckout Retry Off PrePg IgnOn GasOn Warmup Run No Comm	A status only item which indicates the state of the staged furnace Primary control board 3.
StgGSpltState=	-	Lckout Retry Off PrePg IgnOn GasOn Warmup Run No Comm	A status only item which indicates the state of the furnace Split manifold control board.
StgG1DiagCode=	-	None 11-15 21-25 31-35 41-45 51 54-55 NoComm NA	StgGDiagCode is a status item that indicates a diagnostics codes for the staged gas furnace control board. For detail on the gas heat diagnostic codes see the Appendix Section labeled Gas Furnace Controller Diagnostics.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
StgG2DiagCode=	-	None 11-15 21-25 31-35 41-45 51 54-55 NoComm NA	A status only item which indicates a diagnostics code for the staged gas furnace control board 2.
StgG3DiagCode=	-	None 11-15 21-25 31-35 41-45 51 54-55 NoComm NA	A status only item which indicates a diagnostics code for the staged gas furnace control board 3.
ModGState		Lckout Retry Off PrePg IgnOn GasOn Warmup Run No Comm	ModGState is a status item that indicates the current state of the modulating gas furnace control board. This board is communicating via modbus. For detail on the gas heat states see the Appendix Section labeled Gas Furnace Controller Diagnostics.
ModGDiagCode		None 1-15 18-20 22-24 33-34	ModGDiagCode is a status item that indicates a diagnostics codes for the modulating gas furnace control board. For detail on the gas heat diagnostic codes see the Appendix Section labeled Gas Furnace Controller Diagnostics.
ModGErrCode		None 3-4 6-8 10 18 22 26 28-29 NoComm	ModGDiagCode is a status item that indicates a diagnostics codes for the modulating gas furnace control board. For detail on the gas heat diagnostic codes see the Appendix Section labeled Gas Furnace Controller Diagnostics.
EF/LC Temp	-	-50.0-200.0°F	A status only item which indicates the air Temperature between the DX coil and supply fan.

Outside Air Damper

Outside Air Damper Operation

Units may be configured with a 100% **Outdoor Air (OA) Damper**, a 0-100% OA Economizer, or a 0-30% OA damper. During occupied normal operation, units with a 0-30% OA or 0-100% OA economizer damper control to a minimum outdoor air position, which is determined from a number of control factors, including: fans speed, CO2, or other reset methods. Control of the dampers in the Economizer state is described “Economizer Control” on page 87.

100% Outside Air Damper Operation

100% Outside Air (OA) two position actuators are controlled by an analog output so the OA damper is driven to 100% open position when the OA damper analog output is at its maximum value and it is driven closed when the OA damper analog output is at its minimum value. In units equipped with a 100% OA Damper the OA damper is open during the start period and it remains open during all operating states. The OA damper remains open after the fan is turned off until 30 seconds after the airflow status indicates a loss of airflow. This keeps the outside air damper open in case there is a failure or external override that keeps the fan running after it is turned off by controller logic.

0-30% Outside Air Operation

A two position **0-30% Outside Air** (OA) actuator is controlled by a modulating analog output. This actuator is driven to its fully open position, nominally 30%, when the OA damper analog output is at its maximum value, and it is closed when the OA damper analog output is at its minimum value. The desired minimum open position between 0 and 30% is normally set by an editable keypad menu item (Vent Limit). The two position damper is driven to the closed position when the supply fan is OFF (OFF and Startup state), the unit is in the Recirculation state, unoccupied operation is active, or the fan has been on for less than the Zero OA Time. As a result, the OA dampers are driven closed in unoccupied operation, and morning start-up situations. The two position damper is driven to the desired minimum open position in all other conditions.

0-100% Outside Air Economizer Operation

A 0-100% outdoor air economizer damper is controlled by a modulating analog output. This actuator is driven to its fully open position - nominally 100%, when the OA damper analog output is at its maximum value, and it is closed when the OA damper analog output is at its minimum value. The desired minimum open position between 0 and 100% is normally set by an editable keypad menu item (Vent Limit). The modulating damper is driven to the closed position when the supply fan is OFF, (OFF and Start up states), the unit is the recirculation state, unoccupied operation is active, or the fan has been on for less than the Zero OA time. The modulating damper is driven to the desired minimum open position in all other conditions. Control of the dampers in the Economizer state is described “Economizer Control” on page 87.

Outside Air Damper States

The minimum OA Position is set to zero, or the closed position, when the supply fan is Off, the unit is in the recirculation state, Occupancy is set to Unocc, or the fan has been on for less than the Zero OA Time.

Outdoor air damper control varies, by damper type, occupancy and unit state. If unoccupied operation occurs, the OA damper is always closed and unoccupied condition occurs while recirculating air. In occupied operation, the OA damper will operate in one of three control states: closed, Min OA control, or Economizer control.

Table 71: Main Menu \ View Status \ Dehumidification

	Unit State	OA Damper Control States/Damper Type		
		0-30% OA	0-100% OA Econo	100% OA
Occupied	Off, Start Up, Recirculation	Closed	Closed	Closed
	Cooling, Heating, Fan Only, Min DAT	Min OA Control	Min OA Control	100%
	Economizer	NA	Economizer Control	NA
Unoccupied	Any State	Closed	Closed	Closed (if unit is set to Off) 100% (if unit is set to Unocc)

Closed Operation

In the occupied mode in the Off, Start-up and Recirculation unit states the OA damper position is always closed. In the unoccupied mode the outdoor air damper is always closed and with a 0-100% economizer damper, the recirculation damper is open.

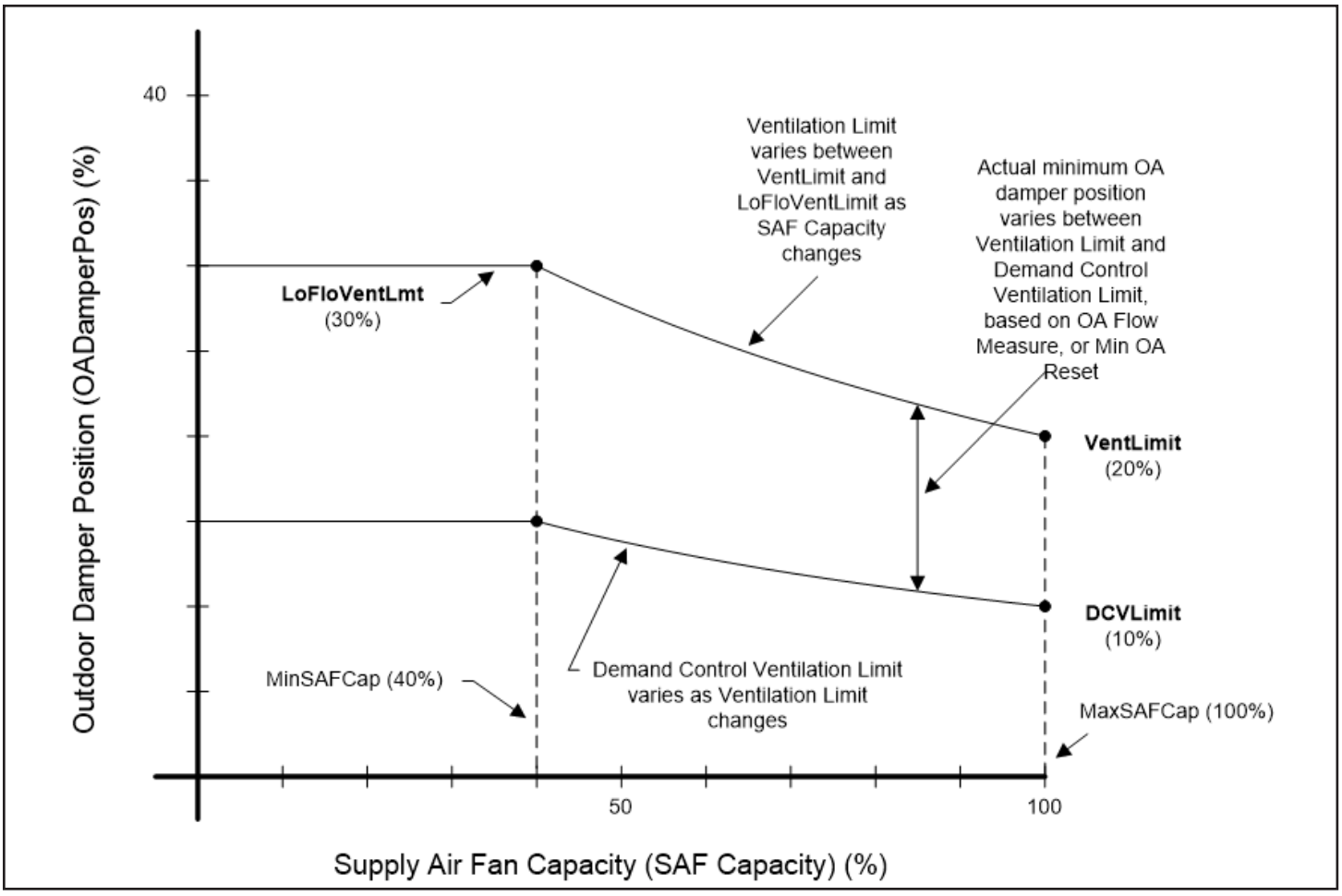
Minimum Outside Air Damper Control

When a unit is equipped with a 0-30% OA or 0-100% OA modulating economizer damper the effective minimum ventilation position (Min OA position) is controlled using a minOA process. In occupied cooling, heating, fan only, and min DAT unit state operation, the damper will operate following the Minimum OA control Sequences.

There are several key minimum outside air damper control process definitions required to understand this process.

- **Ventilation Limit**: Ventilation limit process line sets the maximum outdoor air damper position required based on the outdoor air volume required space and occupancy during regular occupied operation. This damper position varies between two setpoints, the VentLimit, and the LoFlow Vent limit (LoFloVentLmt) as the SAF capacity varies from maximum to minimum respectively.
- **Outdoor Airflow Reset**: Units equipped with an Outdoor air flow measuring station will control the minimum damper position based on the greater of the three damper positions, DCV Limit (minimum), the Minimum OA Reset Method or The Outdoor Airflow Reset. If the Outdoor Airflow setpoint, CFM, requires a greater damper position than the Min OA Reset, then the minimum OA damper position will be driven based on the Outdoor Airflow Setpoint.
-
- **Demand Control Ventilation Limit**: The DCV limit process line sets the minimum damper positioned allowed based on the a minimum outdoor air reset. For this line to be relevant the minimum outside air reset type cannot be set to None. This process line will vary based on fan speed and varies based on the variation in the ventilation limit. The DCV Limit cannot be set higher than the Vent Limit.
- **Minimum Outdoor Air Reset**: The Min OA Reset varies the effective damper position between the DCV limit (DCVLimit) (minimum) and the Ventilation Limit (VentLimit) (maximum) based on an external variable like a network signal, external signal, or a CO2 Sensor.

Figure 29: Outdoor Air Damper Reset



Minimum Outside Air Reset Types

- **None**: If The minimum Outside Air Reset is selected as None, the Minimum OA Damper position is always equal to the Ventilation Limit. The Demand Control Ventilation Limit is not applicable, and can be ignored.
- **Network Control**: If Network is selected as the Min OA Reset Type and a valid value for the minimum position is provided via a network the Minimum OA position is set equal to that value. The network is only allowed to write a value that is between the Ventilation Limit and the Demand Control Ventilation Limit. If the Min OA Reset Type is set to Network and a valid minimum position is not provided, the Min OA Damper Position is set equal to the Ventilation Limit.
- **External Signal**: If the ExtSig is selected as the Min OA Reset Type, the Minimum OA position is calculated based on an external analog 0-10 VDC, 0-20 mA signal or a CO2 sensor input. The CO2 sensor range can be adjusted to control between the Demand Control Ventilation Limit CO2 PPM (minimum) and a Ventilation Limit CO2 PPM (maximum). The Minimum OA damper position will vary linearly between the DCV and Vent Limit positions as these the CO2 input (PPM) varies between these points.

Recommended Reset Settings

These example settings are for illustration purposes; real application settings may vary.

- For units with the Reset Type selected as None the only parameters that require commissioning are the Vent Limit and LoFlow Vent Limit (if the unit is VAV).
- For units with Reset Type selected as Network, to give the network complete control over the damper, the DCV and Vent Limits need to be set to 0% and 100% respectively.
- For units with Reset Type selected as Ext Signal, to give the external signal complete control over the damper the for the 0-10 VDC and 0-20 mA signal ranges the DCV and Vent limits need to be set to 0% and 100% respectively.
- For units with Reset Type selected as Ext Signal for use with CO2, the minimum signal is the MinPPM@ the DCV limit damper position and the max signal is the MaxPPM@ the Vent limit damper position.

Table 72: Main Menu \ Commission Unit \ OA Damper Set-Up

OA Damper Set-Up Parameters	None	Network	Ext Signal		
			VDC (0-10)	mA (0-20)	CO2 (See Note)
Min Signal	NA	0%	0V	0 mA	4 PPM
DCV Limit	NA	0%	0%	0%	1
Max Signal	NA	100%	10V	20 mA	4 PPM
Vent Limit	2	100%	100%	100%	2
LoFlow Vent Limit	3	100%	100%	100%	3
OA @ Min	NA	NA	0%	0%	NA
OA @ Max	NA	NA	100%	100%	NA

NOTE 1: NA = Not Available.

NOTE 2: DCV Limit damper position is set at 100% SAF Capacity minimum occupancy outside air volume required by application.

NOTE 3: Vent Limit damper position is set at 100% SAF Capacity maximum occupancy outside air volume required by application.

NOTE 4: LoFloVent Limit damper position is set at minimum SAF Capacity, maximum occupancy outsider air volume required by application.

NOTE 5: Min Signal is PPM @ DCVlimit and Max Signal is PPM@Vent Limit.

Damper Override Operations

There are several scenarios where a unit operating in occupied minimum outside air control can be configured to override damper position.

- **Zero OATime**: Upon Occupied start up, a zero OA timer can be configured to hold the damper shut for a predetermined time. This timer starts once the unit first enters Fan Only upon occupied start up. See Timer Settings on how to set this Timer.
- **Optimal Start**: During Optimal Start operation, the outdoor air damper is held shut for a the duration of the optimal start sequence where the Zero OA Timer is set equal to the Optimal start time. See “Optimal Start” on page 32 for details on how this sequence works.
- **Building Static Pressure Override**: When the unit is equipped with a 0-30% OA or 0-100% OA modulating economizer and a building static pressure sensor the minimum outside air position may be overridden to maintain building pressure when the exhaust fan is at minimum capacity, off, or not present. To activate this override feature, the building pressure override flag must be set to yes. The damper position will be overridden when the exhaust fan, if present, is at minimum capacity and the building static pressure is below the building static pressure setpoint by more than half of the dead band for a stage timer. Once building pressure override is active, the damper will modulate to maintain the building pressure setpoint.

Cold Start Operation

A special “**Cold Start**” sequence will slow the opening of the dampers when it is cold outdoors and the unit is equipped with either Hot water/Steam or Face and Bypass heating. This is to try to prevent nuisance freezestat trips associated with dampers opening up rapidly to minimum position before the heat has a chance to ramp up. The “cold start” sequence is initiated if the following conditions are all true.

- OAT is below the current LoDAT Limit
- The unit equipped with an Air side Economizer
- The current Unit State is beyond the Recirc
- The current Minimum Outdoor Damper Position setpoint is greater than 0%
- The unit is equipped with Hot water/Steam or F& BP heating

When the sequence is active the dampers will move more slowly the colder it is outdoors. The minimum and maximum ramp rates are adjustable via the keypad by navigating to the commission unit/Min OA Set-Up menu. The effective ramp rate will vary from Minimum 40% 100% (Minimum) Airflow rate at OAT equal to -30°F to the maximum at OAT equal to 100°F. Once the damper position reaches a point 1% below the actual effective minimum position normal operation will begin. If the unit enters the Economizer operating state before the damper regulation begins, the regulation will begin from the current economizer position.

OA Damper Commissioning

Common **OA Damper** menu items that need to be configured at commissioning are the Vent Limit, LoFloVent Limit, DCV Limit, and MinOA Reset, CO2, or Flow reset.

OA Damper Menus

OA Damper Set-Up

Table 73: Main Menu \ Commission Unit \ OA Damper Set-Up

Menu Display Name	Default	Range	Description
DCV Limit	10%	0-100%	DCV Limit is an adjustable item that sets the value of the Demand Control Ventilation Limit on a CAV unit or when a VAV unit is at 100% discharge fan speed. This item is only used when the “CO2 Reset” is set to “Yes”.
OAD Position	-	0-100%	OAD Position is a status only item which displays the current OAD position.
Min OA Pos	-	0-100%	Min OA Pos is a status only item which indicates the current minimum position of the outdoor damper. This value does not go above a value called the Ventilation Limit and does not go below a value called the Demand Control Ventilation Limit.
Min OA Src	-	VentLmt OAFlw ExtSig CO2 Network BSP RstTLmt FanDIff ZeroOA	Min OA Src is a status only item that indicates the action that is winning for control of the OA damper position.
NETWORK RESET			
Network Reset	No	No Yes	An adjustable input to enable/ disable Network Reset of the effective minimum ventilation position.
Net Min OA	-	0-100%	A status only item which indicates the Network Minimum Outside Air Damper position.
EXT AI RESET			
Ext AI Reset	Yes	No Yes	An adjustable input to enable/ disable External Analog Input Reset of the effective minimum ventilation position.
OA @ MinV/mA	0%	0-100%	OA @ MinV/mA is an adjustable item used when Min OA Reset= is set to “ExtSig” to define the Min OA Pos= is when the field signal is at minimum value. NOTE: Min OA Pos= is limited above the Demand Control Ventilation Limit.
OA @ MaxV/mA	100%	0-100%	OA @ MaxV/mA is an adjustable item used when Min OA Reset= is set to “Ext VDC” or “ExtSig” to define the Min OA Pos= when the field signal is at the minimum value. NOTE: Min OA Pos= is limited below the ventilation limit.
Ext Signal	-	0-50.0	A status only item which indicates the External Minimum Outside Air Damper position.
CO2 RESET			
CO2 Reset	Yes	No Yes	CO2 Reset is an adjustable item used to determine if CO2 reset is being used to control the Min OA damper position.
PPM @ DCV Lmt	800ppm	0-5000ppm	PPM @ DCV Lmt is an adjustable item used when Min OA Reset= is set to “ExtSig” to define at what PPM value the Min OA Pos= is to be at the Demand Control Ventilation Limit value.
PPM @ Vnt Lmt	1000ppm	0-5000ppm	PPM @ Vent Lmt is an adjustable item used when Min OA Reset= is set to “ExtSig” to define at what PPM value the Min OA Pos= is to be at the Ventilation Limit value.
CO2 PPM	-	0-5000ppm	CO2 PPM is a status only item which displays the current CO2 PPM reading.
CO2SensorSrc	QMX1	QMX1 QMX2 QMX3	An adjustable input to select CO2 Sensor Source.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
FLOW RESET			
OA Flow Reset	No	No Yes	OA Flow Reset is an adjustable item that allows or disallows the Outdoor air flow to reset the Outdoor air damper.
OA Flow	-	0-60000CFM	OA Flow is a status only item that displays the current outdoor air flow CFM.
OA Flow Spt	2000CFM	0-60000CFM	OA Flow Spt is an adjustable item that sets the Outdoor airflow cfm that the PI_ loop will modulating the SAF capacity to maintain.
OA Flow DB	3%	0-100%	OAFlow DB is an adjustable item that sets a deadband around the OA Flow Setpoint.
BSP RESET		-	
BSP OA Ovrd	No	No Yes	BSP OA Ovrd is an adjustable Setting that allows or disables the building static pressure override feature.
Bldg Press	-	-0.250-0.250in	Bldg Press is a status only item indicated the current building static pressure reading.
BldgSP Spt	0.050in	-0.250-0.250in	BldgSP Spt is an adjustable item which sets the current building static pressure setpoint.
BSP DB	0.010in	0.000-0.100in	BSP DB is an adjustable item that sets the deadband around the Bldg SP setpoint that the PI Loop will modulate the exhaust air fan capacity to maintain within.

Economizer Control

Economizer Operation

If a unit is equipped with a 0-100% Outside Air **Economizer**, and the outdoor air is suitable for free cooling, the unit attempts to satisfy the cooling load by using the outdoor air before using mechanical cooling. If the control temperature is above the Occupied Cooling Setpoint by half the deadband and the outdoor air is suitable for free cooling, the unit will enter the Econo State.

The transition from the Econo to Cooling operating state occurs when the economizer is unable to satisfy the cooling load and mechanical cooling is available. This will occur when the commanded economizer position indicates more than 95% open and the discharge air temperature (DAT control units), or the control temperature (Zone control units) is above the applicable Cooling Setpoint by more than half the applicable Cooling Deadband for longer than the Cooling Stage Timer.

Fixed Drybulb Economizer

All units equipped with an **Economizer** can be configured to determine if the outdoor air is suitable for free cooling by using a single, fixed outdoor air dry bulb setpoint. When the outdoor air temperature is below this setpoint, the unit will enter economizer mode.

Comparative Drybulb Economizer

Units equipped with a **Comparative Drybulb Economizer** determine the outdoor air is suitable for free cooling by comparing the return air temperature with the outdoor air temperature.

Comparative Energy/Enthalpy Economizer

Units equipped with a **Comparative Energy Economizer** determines if the outdoor air is suitable for free cooling by comparing the energy enthalpy of the outdoor air and return air, and the energy to cool to meet the cooling DAT or Zone Setpoint. There are four operating cases the MicroTech controller compares to evaluate energy efficient economizer control. These cases are summarized in Table 74 The economizer logic evaluates if free cooling is more energy efficient by comparing the Return air dew point against the DAT Spt – an Offset. The offset is to account for fan heat or other factors that move the discharge air away from the saturation line. The default offset is 0.0°F.

Table 74: Energy/Enthalpy Economizer Offsets

	Economize Decision Matrix	**Outside Air Dewpt (DP2)**	
		> DAT Stpt - Offset (DB3)	**< DAT Stpt - Offset (DB3)**
Return Air Dewpt (DP1)	> DAT Stpt - Offset (DB3)	Case 1 Economize if h2 < Rh1	Case 2 Economize if 0.245*(DB2 - DB3) < (h1 -h3)
	< DAT Stpt - Offset (DB3)	Case 3 Economize if 0.245*(DB1 - (DB3-Offset)) < (h2 -h3)	Case 4 Economize if DB2 < DB1

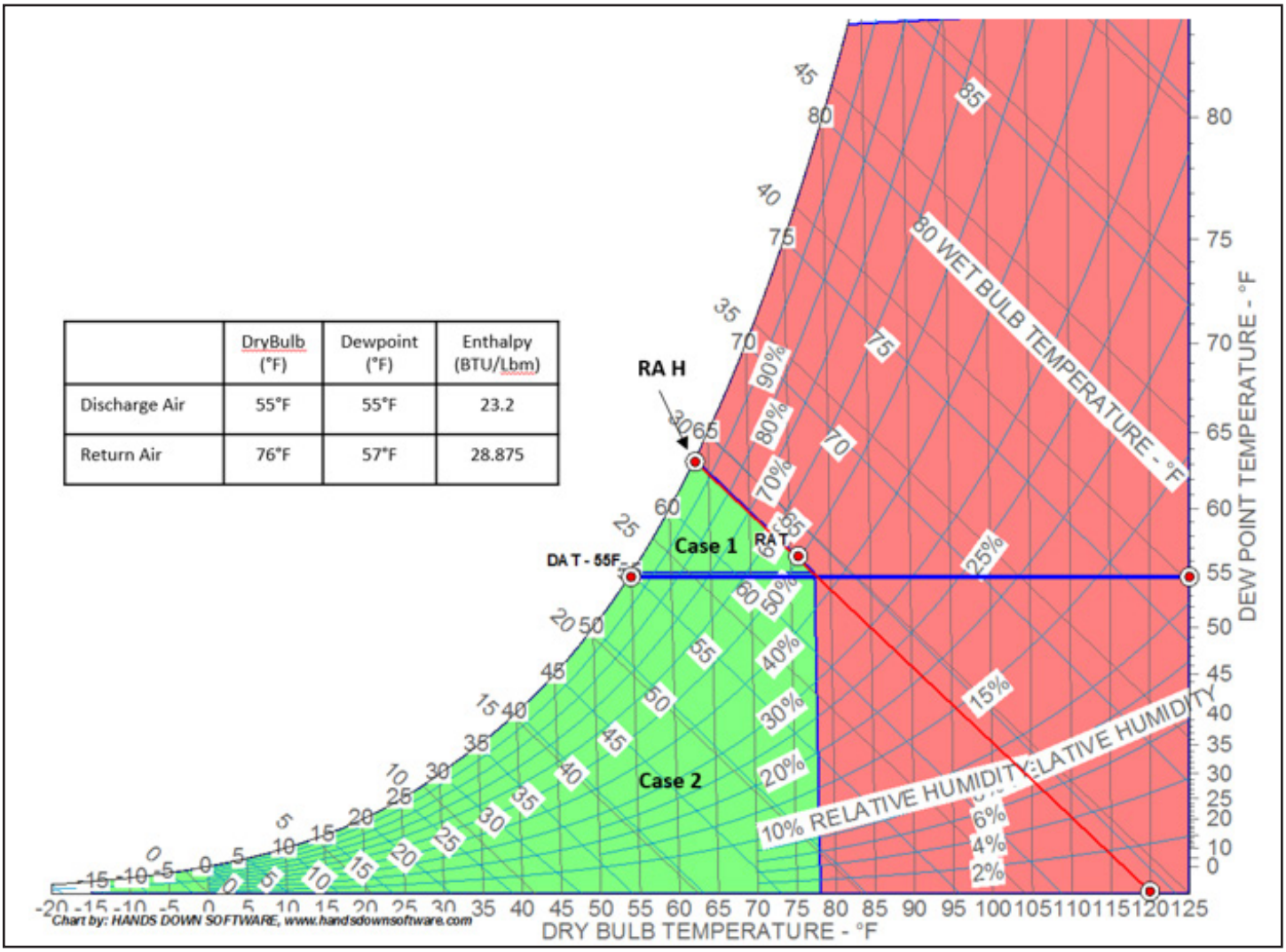
NOTE 1: A key assumption of this table is that DATsetpoint is at saturation and therefore equal to the DAT dew point. This is not always the case and will need to subtract an offset to cover the various applications like remote mounted DAT sensors. The DAT offset should be between 0-10°F.

NOTE 2: Case 2 and Case 3 use simplified formulas for sensible heat transfer rates (q = m x Cp x ΔT, where m= mass flow rate of the air, Cp =0.245 BTU/ lbm °F, ΔT is the change in dry bulb temperature (°F)) and total heat transfer (q = m x Δh, where m= mass flow rate of the air, Δh is the change in enthalpy).

Case 1 and 2

The light blue row in Table 74 is represented by Figure 30 The green shaded areas of this chart represents outdoor air conditions where economizing is allowed to occur for cases 1 and 2. Cases 1 and 2 are only valid for cases where the return air dew point is greater than the discharge air setpoint dew point.

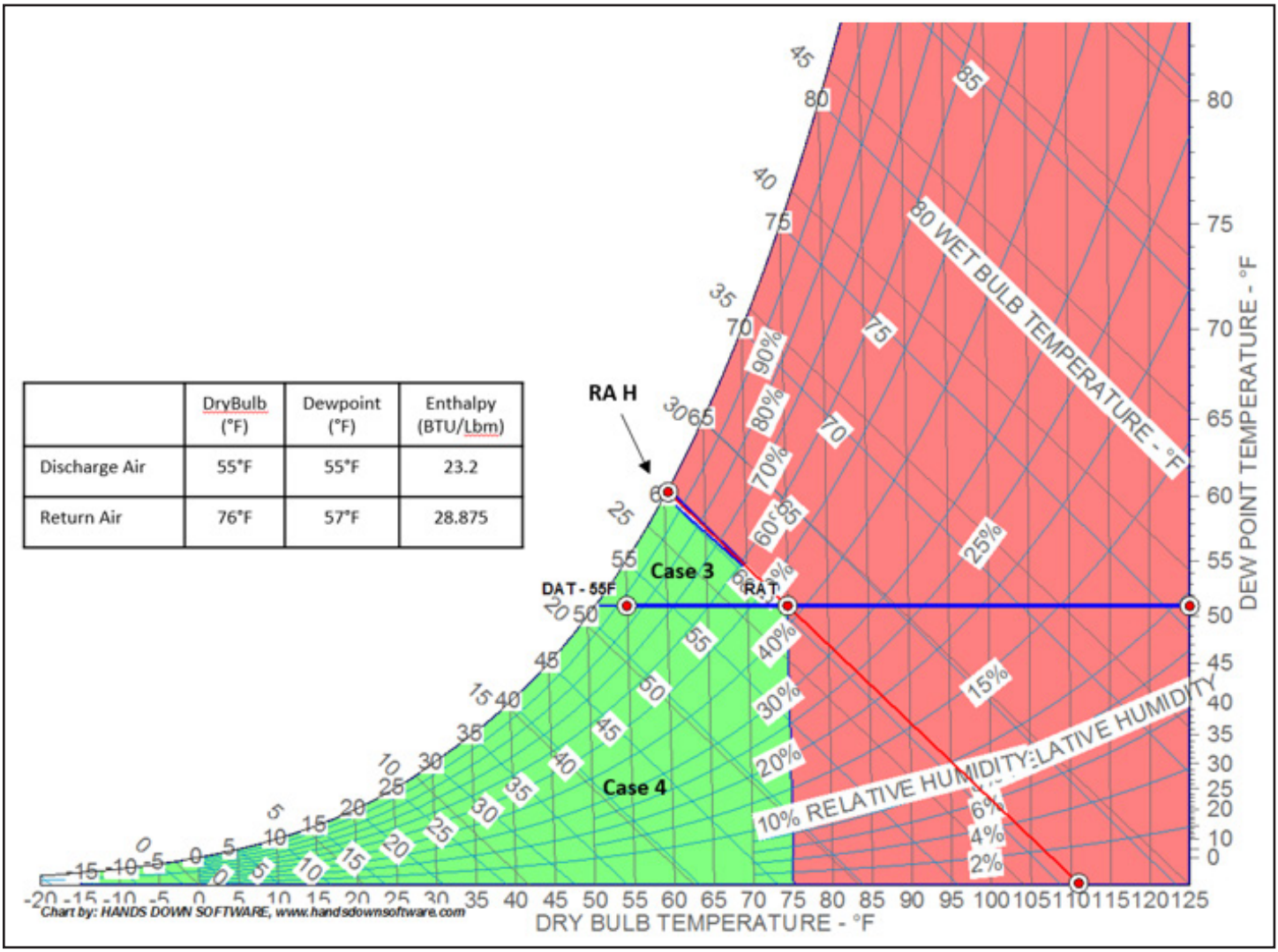
Figure 30: Case 1 and 2



Case 3 and 4

The light red row in Table 74 on page 87 is represented by Figure 31 below. The shaded greed areas of this chart represent the Outdoor air conditions where economizing is allowed to occur for cases 3 and 4. Cases 3 and 4 are valid if the Return air dew point is less than the discharge air setpoint less the offset.

Figure 31: Case 3 and 4



Economizer Fault Detection Diagnostics

The comparative drybulb and comparative enthalpy economizers are available with an optional Fault Detection Diagnostics function. The economizer fault detection and diagnostics function provides a warning alarm indication of over economizing, under economizing, stuck dampers and excess outdoor air.

OAD End Switch Calibration

The Outdoor Air Damper (OAD) End Switch input requires calibration function that captures the command position, at which the switches open and close at the closed and open ends of the damper modulation range. This function consists of a manually initiated sequence that strikes the dampers fully open, then fully closed, and detects the changes of state of the switch input and records the points where changes occur. The sequence must be initiated while the Unit State is Off and starting with the end switch input in the closed position.

When the Calibrate OAD parameter is set from No to Yes, the following sequence occurs:

1. The damper command is increased 1% every 2 seconds until the OAD End Switch opens.
2. The damper command is then be decreased 1% every 2 seconds until the OAD End Switch input closes. At this point the current command % is captured.
3. The damper command is increased 1% every 2 seconds until the OAD End Switch input opens. At this point the difference between the current command % and the damper end switch closed value is captured.
4. The damper command is increased and held at 100% until the OAD End Switch input closes.
5. The damper command is decreased 1% every 2 seconds until the OAD End Switch input opens.
6. The damper command is increased 1% every 2 seconds until the OAD End Switch input closes. At this point the current command % is captured.
7. The damper command is decreased 1% every 2 seconds until the OAD End Switch input opens. At this point the difference between the damper open end switch value and the current command % value is captured.
8. The damper command is decreased and held at 0% until the OAD End Switch input closes at which point the values captured in Step 2, Step 3, Step 6, Step 7 are written to the damper end switch open (posSwOpen%). Minimum switch differential (MinSwDiff), damper end switch closed (PosSwClose%) and maximum switch differential (MaxSwDiff) parameters respectively.

Calibrate OAD= parameter is then be set back to No and normal unit operation resumes.

Economizer DAT Setpoint

When the unit is in the Econo operating state, the outdoor air dampers are modulate as required to maintain the Discharge Cooling Setpoint unless the UseDATClgSpt flag is set to No. If the UseDATClgSpt flag is set to N, then the Economizer DAT Spt is used. The benefit of using the separate economizer DAT spt is that it allows buildings to balance fan or economizer energy to reduce compressor run hours during economizing where possible.

Economizer DAT Reset

Units with the UseDATClg Spt =No can configure the DAT Econo Spt for use with a Economizer Reset schedule. The Economizer Reset schedule can be used with the following reference sources:

- **None**: Discharge Cooling Spt is user adjustable
- **Network**: Discharge Cooling Spt is equal to the Network DAT Clg Setpoint when it is valid
- **Space**: Discharge Cooling Spt is based on the Space Sensor
- **Return**: Discharge Cooling Spt is based on the Return Air Sensor
- **OAT**: Discharge Cooling Spt is based on the Outdoor Air Temperature

Economizer Menus

Economizer Status

The Economizer Menu is a view status menu that displays all relevant Economizer status item

Table 75: Main Menu \ View Status \ Economizer

Menu Display Name	Default	Range	Description
OAD Position	-	0-100%	OAD Position is a status only item which indicates the percentage that the outdoor air damper is currently open.
Min OA Pos	-	0-100%	Min OA Pos is a status only item which indicates the current minimum position of the outdoor air damper.
Econo Status	-	Enabled None OffAmb OffAlm OffNet OffMan Off Dehum	Econo Status is a status only item which indicates whether or not the economizer is currently enabled. If economizer is enabled, the reason is indicated.
FreeClgStatus	-	Unavail Avail	Free Clg Status is a status only item that indicates whether air side economizer free cooling is available or unavailable based on a definable ambient temperature range.

Econo Set-Up Menu

Table 76: Main Menu \ Commission Unit \ Econo Set-Up Menu

Menu Display Name	Default	Range	Description
Occ Clg DB	2.0°F	0.0-10.0°F	Occ Clg DB is an adjustable item which sets a dead band around the Occ Cooling Setpoint parameter. For example, if the Occ Cooling Setpoint parameter is set to 75ºF and the Clg Deadband parameter is set to 2ºF the dead band around the setpoint would be from 76.0ºF to 74.0ºF.
Disch Air	-	-50.0-250.0°F	Disch Air is a status only item which displays the current temperature reading from the unit's discharge air temperature sensor (DAT). This sensor is standard on all units.
UseDATClgSpt	Yes	No Yes	UseDATClgSpt is an adjustable parameter that sets the DAT setpoint used during economizer. When set to Yes, the DAT cooling setpoint is used. When set to No, the DAT Econ Spt is used.
DAT Econ Spt	55.0°F	40.0-100°F	DAT Econo Spt is an adjustable item which sets the DAT setpoint the cooling capacity is controlled to maintain when the UseDATClgSpt is set to No.
DAT Econ DB	2.0°F*	1.0-10.0°F	DAT Econ DB is an adjustable item which sets the deadband around the DAT Econ Spt. If the disch air is within the DB no action is take. For example, if the discharge cooling setpoint is set to 55°F and the Clg DB is set to 2°F the dead band around the setpoint would be from 56.0°F to 54.0°F.
* 2.0°F when UseDATClgSpt= Yes 4.0°F when UseDATClgSpt= No			
Clg Stg Time	5 min	5-60min	Clg Stage Time is an adjustable item used to set a minimum time period between compressor stage changes.
Econ Chgovr	Energy	None OAT OAT_RAT Energy	EconChangovr is an adjustable item used to set the method that will be used to determine how economizer operation will be enabled.
OA Temp	-	-50.0-200.0°F	OA Temp is a status only item which displays the current temperature reading from the unit mounted Outdoor air temperature sensor. This sensor is standard on all units.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Chngover Temp	70°F	-20.0-120.0°F	Chngover Temp is a adjustable item that sets the maximum outdoor air temp at which economizer is allowed.
Econo Diff	2.0°F	0.0-10.0°F	Econo Diff is an adjustable item which sets a differential above the ChgoverTemp parameter. Economizer operation is disabled when the OA Temp parameter indicates a value above the ChgoverTemp= parameter by more than this differential.
Econo FDD	On	Off On	Econo FDD is an adjustable item used to enable or disable the Economizer Fault Detection and Diagnostics function.
Econ Reset	None	None Network Space Return OAT	Clg Reset is an adjustable item that is used to set the type of cooling reset to be used.
Min Econ Spt	55.0°F	40.0-100.0°F	Min Econ Spt is an adjustable item which sets the minimum cooling discharge setpoint for use with a economizer discharge air temperature setpoint reset schedule.
Min Econ Spt@	0	0-100/ NA °F °C mA V %	Min Econ Spt @ is an adjustable item which sets the value of the sensor input, selected with the Cooling Reset parameter, at which the DAT Econ setpoint parameter is reset to the minimum DAT Econ setpoint value.
Max Econ Spt	65.0°F	40.0-100.0°F	Max Econ Spt is an adjustable item which sets the maximum economizer discharge setpoint for use with a economizer discharge air temperature setpoint reset schedule.
Max Econ Spt@	100	0-100/ NA °F °C mA V %	Max Econ Spt @ is an adjustable item which sets the value of the sensor input, selected with the Econ Reset parameter, at which the DAT Econ setpoint parameter is reset to the maximum DAT Econ setpoint value.
Max OAT Lmt	75°F	50.0-100.0°F	Max OAT Lmt is an adjustable item which sets the maximum outdoor air temperature for the applicable climate zone above which economizer should not be enabled.
Min OAT Lmt	70°F	50.0-100.0°F	Min OAT Lmt is an adjustable item which sets the minimum outdoor air temperature for the applicable climate zone below which economizer should be enabled.
Calibrate OAD	No	No Yes	Calibrate OAD is an adjustable item used to initiate the calibration function that captures the command position at which the outdoor damper position end switches open and close at the closed and open ends of the damper modulation range.
Pos Sw Open	97%	0-100%	PosSwOpen is an item that indicates the captured command position at which the outdoor damper position end switch closes at the open end of the damper modulation range. This parameter can also be manually adjusted.
Max Sw Diff	3%	0-100%	Max Sw Diff is an item that indicates the captured switch differential at the open (maximum) end of the damper modulation. This parameter can also be manually adjusted.
Pos Sw Close	3%	0-100%	PosSwClose is an item that indicates the captured command position at which the outdoor damper position end switch closes at the closed end of the damper modulation range. This parameter can also be manually adjusted.
Min Sw Diff	5%	0-100%	Min SW Diff is an item that indicates the captured switch differential at the closed (minimum) end of the damper modulation. This parameter can also be manually adjusted.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
OAD Sw Status	-	Open Closed	OAD Sw Status is a status only item that indicates the current condition of the damper end switch position input (Open/Closed).
OAEOffset	0.0°F	0.0-10.0°F	OAEOffset is an adjustable item used to account for fan heat or for the discharge air temperature setpoint dew point calculation used to enable energy economizers.
OADewpoint	-	-50.0-150.0°F	OADewpoint is a status only item that indicates the current calculated outdoor air dew point.
OARelHum	-	0-100%	OARelHum is a status only item that indicates the current outdoor air relative humidity reading.
OAEnthalpy	-	TBD BTU/lb	OAEnthalpy is a status only tem that indicates the current calculated outdoor air enthalpy.
RADewpoint	-	-50.0-150.0°F	RADewpoint is a status only item that indicates the current calculated return air dew point.
RARelHum	-	0-100%	RARelHum is a status only item that indicates the current return air relative humidity reading.
RAEnthalpy	-	TBD BTU/lb	RAEnthalpy is a status only tem that indicates the current calculated return air enthalpy.
DATSptEnth	-	TBD BTU/lb	A status only item that indicates the current Discharge Air Temperature Enthalpy Setpoint.

Energy Recovery

Energy Recovery is provided by drawing outside air across half of an energy recovery wheel and drawing exhaust air across the other half. Latent and sensible heat is transferred from the hotter, moister air stream, to the colder dryer air stream. In summer operation the direction of transfer is from the outdoor air to the exhaust air. In winter operation, the direction of transfer is from the warm exhaust air to the cold dry outdoor air. Control of the wheel consists of starting and stopping the wheel, and modulating the speed. The outdoor air dampers and supply and exhaust fans are controlled normally during wheel operation.

Energy Wheel Operation

The energy recovery wheel is turned on whenever the unit is occupied, the exhaust fans are on, the OA dampers are at the minimum position, the unit is not in economizer, and the wheel has not been shut off due to frost prevention,Enthalpy override or capacity limiting control. Exhaust fans and outdoor air dampers are controlled to their normal states when equipped with energy recovery wheels.

- **Enthalpy Override**: During Cooling or Dehumidification operation, the MicroTech will evaluate if the energy wheel should be operating or if it is more energy efficient to bring outdoor air directly. Enthalpy override is decided by following the same cases as the energy economizer option except for case 4 (see “Table 74: Energy/Enthalpy Economizer Offsets” on page 87) where the LWT must less than the RAT. Review Energy Economizer for details. Enthalpy override is true when the Clg/DHERWOvrdOff Flag is True. Once True this flag will be held true for at least the ERWStgTime before changing to false.
- Heating Override: During Heating, Fan Only, or MinDAT operation, if the energy recovery wheel heat transfer is in cooling, the wheel will shut off and the HtgERWOvrdOff flag will be set to true. Once True, this flag will be held true for at least the ERWStgTime before changing to false.

Energy Recovery Wheel Bypass

For units equipped with an **Energy Recovery Wheel** and a 0-100% modulating mixed air damper, a bypass damper may be provided for economizer operation or Enthalpy or Heating override conditions. During economizer, enthalpy override, and heating override operation, the energy wheel is turned Off and the bypass damper is opened to bypass the outside air around the energy wheel. This lowers the total air pressure drop and increases the effectiveness of economizer operation.

Capacity Limiting

Energy wheel Capacity Limiting control is a means to limit the capacity of an energy wheel during part load conditions. Normally, wheels are sized for the worst case winter/summer load. Therefore, at part load the wheel may be oversized. Capacity limiting control is allowed when the energy recovery wheel leaving air temperature sensor is present and the outdoor air temperature is colder than the return air temperature.

- **Fan Only**: When the unit is in the Fan Only state, the energy recovery wheel is slowed do due to capacity limiting whenever the discharge air temperature (DAT) is above the MinDAT Limit setpoint by more than ½ the discharge air heating deadband. The wheel will modulate to maintain the DAT at the MinDAT Limit setpoint. If the DAT falls back below the MinDAT Limit setpoint plus the ½ discharge heating deadband, the wheel will modulate back to full speed.
- **Heating**: When the unit is operating in the Heating state, the energy recovery wheel is slowed down due to capacity limiting whenever all heating is OFF and the discharge air temperature (DAT) is above the discharge heating setpoint by more than ½ the discharge air heating deadband. The wheel will modulate to maintain the heating discharge air setpoint when all other heating is OFF and capacity limiting is active. The wheel is modulated back to full speed when the DAT falls back to or below the discharge heating setpoint plus ½ the discharge air heating deadband.
- **Cooling**: When the unit is operating in the Cooling state, the energy recovery wheel is slowed down due to capacity limiting whenever all cooling is OFF and the discharge air temperature is below the discharge cooling setpoint by more than ½ the discharge air cooling deadband. The wheel will modulate to maintain the cooling discharge air setpoint when all other cooling is OFF and the capacity limiting is active. The wheel is modulated back to full speed when the DAT falls back to or above the discharge cooling setpoint plus ½ the discharge air cooling deadband.

Energy Wheel Frost Prevention

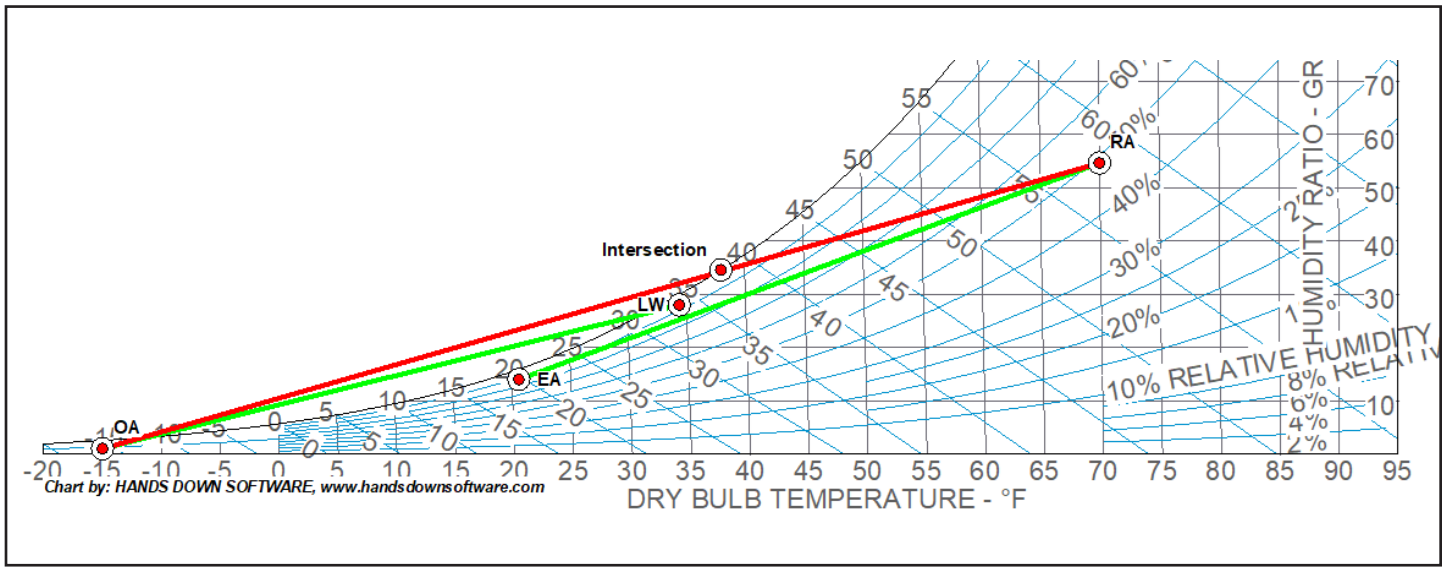
Two different **Energy Wheel Frost Prevention** methods are provided depending on whether or not the unit is supplied with an electric preheat energy wheel defrost coil. When there is a threat of frost or condensation on the enthalpy wheel, a wheel with a electric preheat will be defrosted by modulating the electric preheat to raise the outdoor air temperature coming into the wheel to eliminate the frost potential. A variable speed wheel may be first slowed down, and then stopped so that less enthalpy transfer occurs and frosting or condensation on the energy wheel is avoided. In either case, the frost control action is based on a calculated psychrometric intersection point.

Condensation and frosting on the energy recovery wheel is possible when the exhaust air leaving the wheel is saturated. This condition is only possible when the energy recovery psychrometric saturation process line between the indoor and outdoor design points intersect the psychrometric saturation curve. The two ends of the energy recovery process line will be the outdoor air temperature at 95% relative humidity, and the return air temperature at the return air relative humidity. The process line examples shown below depict one process line that intersects the saturation curve, and one that does not. The one that does intersect does so at two points which indicates a potential for energy recovery wheel frosting. The higher of the two points is the intersection point that will be used by the frost prevention functions. The curve that does not intersect indicates no potential for frosting.

Energy Wheel Frost Prevention Initiation

Condensation and frosting on the energy recovery wheel is possible when the exhaust air leaving the wheel is saturated. This condition is only possible when the energy recovery psychrometric saturation process line between the indoor and outdoor design points intersect the psychrometric saturation curve. The two ends of the energy recovery process line will be the outdoor air temperature at 95% relative humidity and the return air temperature at the return air relative humidity. The process line example shown below depicts one process line that intersects the saturation curve, and one that does not. The one that does intersect does so at two points, which indicates a potential for energy recovery wheel frosting. The higher of the two points is the intersection point that will be used by the frost prevention functions. The curve that does not intersect indicates no potential for frosting.

Figure 32: Frost Prevention Curve

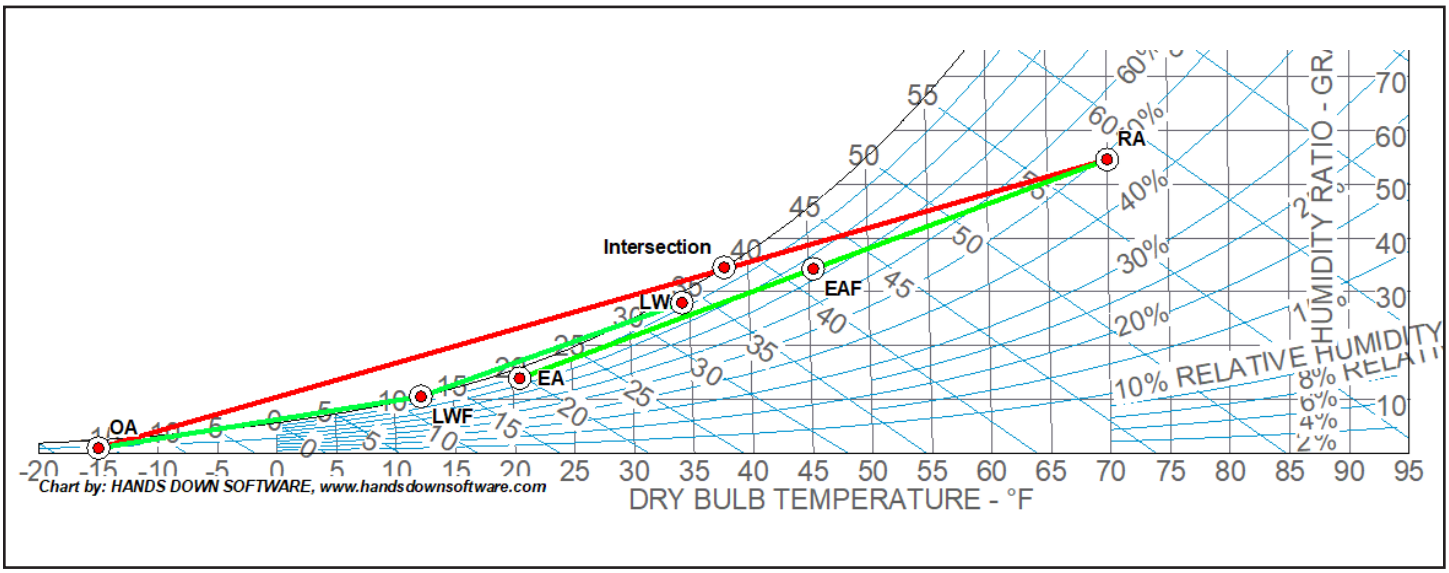


Modulating Wheel Frost Prevention

Modulating Wheel Frost Prevention is initiated when the exhaust air temperature leaving the wheel is below the intersection point, plus an adjustable minimum temperature difference. In the example below, the Exhaust air (EA) is significantly below the intersection point.

During modulating wheel frost prevention, the wheel is controlled to its minimum wheel speed (default 15%) When the wheel is at its minimum speed, the wheel effectiveness is reduced. The resulting exhaust air temperature during frost prevention (EAF) is warmer than the intersection point and frost is prevented. The leaving wheel temperature (LWF) during frost prevention is also reduced.

Figure 33: Modulating Wheel Frost Prevention Curve



Energy Recovery Wheel Commissioning

Energy Recovery Wheel units should come from the factory pre-programmed with the correct control requirements. There is nothing to commission during start up. The menu below displays energy recovery operating information. Advanced menu energy recovery options can be viewed in Table 151 on page 166.

Table 77: Main Menu \ Commission Unit \ Energy Rec Set-Up

Menu Display Name	Default	Range	Description
Energy Rec	Yes	No Yes	Energy Rec is an adjustable item which states if there is an energy recovery system or not.
ER Wheel	-	On Off	ER Wheel is a status only item used to indicate whether the energy recovery wheel is currently ON or OFF.
ER Whl Cap	-	0-100%	ER Wheel Cap is a status only item that displays the current wheel capacity/ speed.
ER Whl CapCmd	-	0-100%	ER Wheel CapCmd is a status only item that displays the capacity the wheel is being commanded to operate at.
ER LWT	-	-50.0-200.0°F	ER LWT is status only item which displays the current discharge air temperature leaving the optional energy recovery wheel.
ER EWT	-	-50.0-200.0°F	ER EWT is a status only item which displays the current exhaust air temperature leaving the optional energy recovery wheel.
RARelHum	-	0-100%	RARelHum is a status only item that displays the current relative humidity of the return air Humidity sensor.

Other Configurations

This Other Configurations section covers commissioning items and miscellaneous Rebel features.

Timer Settings

The Timer Settings menu contains adjustable timers for various unit functions. This menu is also available in the Service menu (Main Menu \ Service Menu \ Timer Settings)

Table 78: Main Menu \ Commission Unit \ Timer Settings

Menu Display Name	Default	Range	Description
Start Up	180s	10-1800s	Startup is an adjustable item that sets the time in seconds that the unit will perform its startup operation.
Recirculate	180s	10-3600s	Recirculate is an adjustable item that sets the time in seconds that the unit operates with only the fan, recirculating the building air upon unit start up.
Clg Stg Time	5min	5-60min	Clg Stg Time is an adjustable item used to set a minimum time period between compressor stage changes.
Htg Stg Time	5min	2-60min	Htg Stg Time is an adjustable item used to set a minimum time period between heating stage changes.
Zero OA Time	0min	0-240min	Zero OA Time is an adjustable item that sets the time in minutes that the outdoor air damper stays at a zero position upon unit start up.
Tnt Ovrd Incr	120min	0-300min	Tnt Ovr Incr is an adjustable item that sets the amount of time that the unit will go into operation when the tenant override function is activated. Tenant override can be activated by the space sensor button, the network occupancy mode parameter or the keypad Occ Mode= parameter.
Post Heat	0s	0-180s	Post Heat is an adjustable item that sets the duration of the post heat function available on VAV units.
Low DAT	6min	0-60min	Low DAT is an adjustable item that sets the duration of a time period upon unit start up during which the Low Discharge Temperature fault is ignored. This may be particularly important in colder climates when a unit has been off for a significant time period during which the unit, including the discharge air temperature sensor, has become very cold. This time period allows the unit to run long enough to turn the unit heat on and warm the discharge sensor above the alarm limit, preventing nuisance unit alarm shutdown. This time period begins when the supply fan starts.
Service Time	0min	0-60min	Service Time is an adjustable item that sets the amount of time the internal control timers can be temporarily sped up.

Humidity Sensor Set-Up

The Humidity Sensor Set-Up menu is important to set up at commissioning, as it is critical to proper unit function. All humidity sensors that are connected and reliable are usable for temperature reset, and can be configured for use with dehumidification control. Dehumidification will control to maintain the source location of the sensors set for Hum Sensor1 and Hum Sensor 2. See "Dehumidification" on page 63 for details on dehumidification operation.

Table 79: Main Menu \ Commission Unit \ Humidity Sensor Set-Up

Menu Display Name	Default	Range	Description
Hum Sensor 1	SpaceH1	None SpaceH1 SpaceH2 RAH OAH	Hum Sensor 1 is an adjustable item used to set the location of sensor used for humidity setpoint 1. This humidity setpoint is configured to drive dehumidification in the Dehum Set-Up menu.
Hum Sensor 2	None	None SpaceH1 SpaceH2 RAH OAH	Hum Sensor 2 is an adjustable item used to set the location of sensor used for humidity setpoint 2. This humidity setpoint is configured to drive dehumidification in the Dehum Set-Up menu.
SpaceRH1Src	QMX1 if SpaceTCfg = QMX+1, QMX+2, QMX+3 Otherwise Analog	Analog QMX1 QMX3 IAQMB	SpaceRH1Src is an adjustable item that sets the type of sensor located at the Humidity Sensor 1 location.
SpaceRH2Src	QMX2	Analog QMX2 QMX3	SpaceRH2Src is an adjustable item that sets the type of sensor located at the Humidity Sensor 2 location.
SpcHumSensTyp	VDC	VDC mA	SpcHumSensType is an adjustable item that sets the signal type for when either the SpaceRH1Src and SpaceRH2Src is set to Analog.
SpcHum MinSig	0.0V	0.0-20.0 V/ mA	SpcHum MinSig is an adjustable item that sets the minimum of the signal range for when either the SpaceRH1Src and SpaceRH2Src is set to Analog.
SpcHum MaxSig	10.0V	0.0-20.0 V/ mA	SpcHum MaxSig is an adjustable item that sets the maximum of the signal range for when either the SpaceRH1Src and SpaceRH2Src is set to Analog.
SpaceRel Hum 1	-	0-100%	SpaceRel Hum 1 is a status only item that shows the current space relative humidity reading of space sensor 1.
SpaceDwpnt1	-	-50-150°F	SpaceDwpnt1 is a status only item that shows the current calculated space dew point of space sensor 1.
SpaceRel Hum2	-	0-100%	SpaceRel Hum 2 is a status only item that shows the current space relative humidity reading of space sensor 2.
SpaceDwpnt2	-	-50-150°F	SpaceDwpnt2 is a status only item that shows the current calculated space dew point of space sensor 2.
RARelHum	-	0-100%	RARel Hum is a status only item that shows the current relative humidity reading of Return air.
RADewpoint	-	-50-150°F	RADewpoint is a status only item that shows the current calculated dew point of the Rreturn air.
OARelHum	-	0-100%	OARel Hum is a status only item that shows the current relative humidity reading of Outdoor air.
OADewpoint	-	-50-150°F	OADewpoint is a status only item that shows the current calculated dew point of the Outdoor air.

Remote Sensor Set-Up

When one or more network space sensors (up to three will be supported) are present, the sensors must be commissioned using the **Remote Sensor Set-Up** menu. Before network space sensors can be commissioned, the SpaceTCfg in the Unit Configuration Menu of the MicroTech must be set to QMXS1, QMXS2, QMXS3, QMX+1. QMX+2, or QMX+3. The QMXS# is a space temperature and setpoint adjust only sensor; the QMX+# is a Combo sensor with Temperature, adjustment, humidity, and CO^2. For the unit to use the QMX+ Combo sensor for CO2 OA reset, the Unit configuration ExtOAInput must be set to CO2QMX+. The sensors will be identified by MicroTech based on a sensor ID number that is unique to each individual device. Write this number on the Box and on the sticker on each sensor. Write down the Room Zone name, and the ID (SN) for each room Zone Sensor. This will make it easier to name them during commissioning.

Set-Up and Commissioning Sensors

1. **Turn Unit Off**: The Unit State must be Off before the commissioning process can be activated and the unit will not be allowed to start while the commissioning process is active.
2. **Verify Unit Configuration**: Go To the Unit Configuration Menu: Main Menu \ Advanced Menus \ Unit Configuration Menu.
   - Verify the SpaceTCfg parameter matches the number and type of sensors you have.
     - Option 1 Temperature Only: (1)QMXS, (2) QMXS, or (3) QMXS. Sensor Model number/Type: QMX3.P34 or QMX3.P34-1WSB.
     - Option 2 Temperature/Humidity/CO^2: (1)QMX+, (2) QMX+, or (3) QMX+. Sensor Model number/Type: QMX3.P74 or QMX3.P74-1WSB
   - Verify the ExtOAInput parameter matches the type and quantity of sensors.
     - ExtOAInput = CO2QMX+
     - CO^2 capable network sensors you have. The QMX3.74 or QMX3.74-1WSB have CO^2.
   - If any changes to the Unit Configuration were made you will need to “Apply Changes” on the Advanced Menus “Unit Configuration” Screen. The controller will reset.
3. **Verify the Unit Commissioning Set-Up**:
   - In the Unit Set-Up Menu, set the Eng Units= English or SI based on the application.
   - In the HtgClg ChgOver Set-up Menu, set Rem Spt Src = QMX1, QMX2 or QMX3 based on which sensor you want to drive the setpoint.
4. **Name Each Sensor**: Name Each Enabled QMX Sensors Room Zone (As Applicable) Each enabled Sensor can be named to correspond to the particular Room Zone Location it is in (recommended). The Name is limited to 7 Alpha numeric characters.
   - Navigate: Commission Unit \ Remote Sensor Set-Up \ Snsr#:RoomZn# Info. The default name is RoomZn# where # is the sensor number.
   - While in the Snsr#:RoomZn# Info Screen change the associated name of Sensor# by selecting the Sensor#Name= RoomSn# and edit as desired. There is a max length of 7 alpha/numeric characters.
   - After editing the Room Zone Names of each sensor exit back to the Remote Sensor Set-Up Screen to initiate a Commissioning Sensor Sequence.
5. **Commissioning QMX Sensors**:
   - Navigate: Main Menu \ Commission Unit \ Remote Sensor Set-Up
   - While in the Remote Sensor Set-Up Screen review the status (Valid/Invalid) of each Room Zone QMX Space Sensor and compare the ID(s) currently displaying on the HMI for each Sensor to the documented physical Sensor Room Zone ID(s) as denoted Above. Also inspect each sensor in its associated Room Zone location for proper IDs (as documented) and for proper operation and configured display. The configured display on each QMX Space Sensor should match the current “Unit Configuration”.
   - Determine which, if any, Sensor(s) need to be commissioned. Note that if any Sensor currently has its “Status=Invalid” the QMX Space Sensor “Commission Procedure” needs to be performed prior to the QMX Space Sensor System being ready and usable for Space Control Operations. In order to initiate the Sensor(s) Commissioning Procedure the “Unit” must also be in the “Off State”. If the “Unit” is not currently in the “Off State” proceed back to the Main “Daikin AHU” Menu Screen and put the “Unit” in the “Off State” when it is safe to do so and then proceed to the next step to initiate the “Commissioning Procedure” as desired.
   - Proceed to the next step to initiate the “QMX Room Zone Space Sensor Commission Process”.

NOTE: Commissioning is required if any Room Zone Sensor is considered “Invalid” or if any of the currently displayed IDs for a Room Zone Sensor on the “Remote Sensor Set-Up” Screen does not match the documented ID(s) for those Sensor’s Room Zone.

   - Initiate the QMX Commissioning Process: In the “Remote Sensor Set-Up” Screen initiate the QMX Space Sensor(s) Commissioning Process by Selecting “CommissionMode=On”. If there is not a current Sensor Fault preventing the “CommissionMode” from turning “On”, the MicroTech Controller will automatically “re-start” after a short time delay of Commissioning Mode becoming “Active”.
   - Main “Commissioning Active” (Chg&/orCnfrmIDs) Screen: (Once the controller re-starts proceed to the Main Commissioning Active “Chg&/orCnfrmIDs” Menu Screen when prompted to do so on the HMI. The status of the commissioning process should be on the HMI:
     - “Commission Sts=Active”
     - “CommissionMode=On”

- "ConfirmSnsrIDs=No"

NOTE: If there was a Sensor "Alarm" upon restart of the controller the commissioning mode sequence will reset to "Off", with the controller re-starting after a short time delay. The "Alarm" will need to be remedied prior to re-initiating the "Commissioning Process"

– Reset a Room Zone QMX Space Sensor Status to "Invalid": Only Sensor(s) with a "SensorX Status=Invalid" will go thru the "Commissioning Process". So, if you want a "Valid" QMX Space Sensor to go thru the "Commissioning Process" it will need to have its status reset to "Invalid" first.

- Go to the "Reset Sensors" Screen to reset Sensor(s) status from "Valid" to "Invalid" as required.

NOTE: This is not a typical step you will have to perform and is only needed if you suspect or denote that a particular Room Zone Sensor that has its "Status=Valid" is not configured or working properly.

– Change (Update) a Room Zone QMX Space Sensor(s) ID: To change a Room Zone Sensor's ID currently displaying on the HMI that does not match the ID of the documented Sensor located in that Room Zone proceed to the "Chg Sensor IDs" Menu Screen. Then go to the corresponding "SnsrX:'RoomZnX' ID Chg" Screen and update the ID of the selected Sensor accordingly.

NOTE: You can only change the ID of a Sensor that currently has its "SensorX Status=Invalid".

– Confirm Displayed Sensor(s) IDs are Correct: Once the desired Sensor(s) to be "Commissioned" have an "Invalid" Status and the displayed IDs for each Room Zone Sensor on the Main Commissioning Active "Chg&/orCnfrmIDs" Screen match the documented IDs of the Sensors physically located in those Room Zones, initiate the "Confirm Space Sensor IDs" Step by setting "ConfirmSnsrIDs=Yes". After a short time delay the Controller will "reset".

NOTE: If the "Commissioning Mode" is manually turned "Off" while it is "Active, the controller will re-start after a short time delay and have to be re-initiated from step 1

– Main "Commissioning Active" (Config Sensors) Screen: Once the controller re-starts proceed back to the Main Commissioning Active "Config Sensors" Menu Screen when prompted to do so on the HMI. The Sensor(s) "Reset" and "ID Change" Functions are disabled once the "ConfirmSnsrIDs=Done".

If the confirm process was successful, the status of the commissioning process should be on the HMI:

- "Commission Sts=Active"
- "CommissionMode=On"
- "ConfirmSnsrIDs=Done"
- "Config Sensors=Off"

NOTE: If there was a Sensor "Alarm" upon restart of the controller the commissioning mode sequence will reset to "Off", with the controller re-starting after a short time delay. The "Alarm" will need to be remedied prior to re-initiating the "Commissioning Process" from step 4.5.1.

– Initiate the QMX Space Sensor(s) Assignment & Configuration Phase: To Initiate the "Assignment & Configuration" Phases of the Sensor(s) "Commissioning Process" for each "Invalid" Sensor, set "Config Sensors=Execute". This will initiate each "Invalid" sensor's assignment and configuration steps. When the process has successfully started "Config Sensors=Active" on the HMI.

– QMX Space Sensor(s) Assignment & Configuration Phases are In-Process:Monitor the "SensorX State=" displays on the HMI. The State of each Sensor going thru the "Commissioning Process" should go from "OK" to "Init" and back to "OK" when it has completed the "assignment" step. When the "assignment" phase for all of the sensor(s) has successfully completed the "Configuration" phase for those sensor(s) will begin. For each Sensor going thru the "Commissioning Process" the State of that Sensor will go from "OK" to "Config" and back to "OK" as the configuration phase of each sensor proceeds and completes. Each Sensor's status will transition from "Invalid" to "Valid" as its "Commissioning Process" is completed.

NOTE: If there is an "Alarm", or Commissioning Mode is turned "Off" during this step, the commissioning sequence will reset to "Off and will have to be re-initiated from Step 1.

– QMX Space Sensor(s) Commissioning Complete: Once each QMX Space Sensor's Commissioning Process is complete its status will go from "Invalid" to "Valid". When all of the Sensor status's are "Valid" and their respective State(s) are back to "OK", the "Commissioning Mode will turn "Off" and the controller will reset one final time after a short time delay to complete the commissioning process.

– Once the controller re-starts the QMX Space Sensor(s) Commissioning Process is Complete. With "CommissionMode=Off" after the controller re-start, you will now be able to proceed back to the Main "Daikin AHU" Menu Screen when pressing the back button on the HMI when prompted to.

6. **Verify that the Remote Sensor (s) are Configured and Working Properly**: Once the "Commissioning Process" of the Room Zone Sensor(s) is complete, proceed back to the "Remote Sensor Set-Up" Screen. All of the Enabled Sensors should be displayed with a "non-zero" ID and all should have a "Valid" status. Make sure after the long initialization and start-up delay that the "AllSnsrsReady=Yes". Once "AllSnsrsReady=Yes" go to each individual Sensor's Room Zone information screen (located towards the bottom of the "Remote Sensor Set-Up" Menu Screen) and verify that the "Relative Humidity, CO^2, and/or Temperature" values being displayed on the QMX Space Sensor's display are correct for the Sensor(s) physically located in those rooms and are correctly being transmitted back to and displayed on the MicroTech Controller HMI.

Table 80: Main Menu \ Commission Unit \ Remote Sensor Set-Up

Menu Display Name	Default	Range	Description
Snsr3 ID	-	000000000000-ffffffffffffh	Snsr3 ID = “…..h” is a status only item that indicates the current remote sensor ID connected as “Sensor3” (RoomZn3).
Commission Sts	-	Inactive Active	Commission Sts is a status only item that Indicates current status of commission mode. “Active” means sensor commissioning mode is in process.
CommissionMode	Off	Off On	CommissionMode is an adjustable item that allows you to turn “Commission Mode” On or Off. Turn “Commission Mode” to “On” to initiate the Remote Networked Sensor(s) Commissioning Mode that defines the Sensor ID assigned to each configured Room Zone and the type of QMX Sensor they are. Turn “Commission Mode” to “Off” to disable currently “Active” Commissioning Mode. Controller will perform a “reset” upon turning “Commissioning Mode “Off”.
AllSnsrsReady	-	No Yes	AllSnsrsRady is a status only item that Indicates whether all of the system Networked Remote QMX Sensors are configured and ready to operate or not. A status of “Yes” indicates all remote sensors on the network are properly configured and are ready for operation with valid values. A status of “No” indicates one or more of the remote sensors are not configured, commissioned, or ready for operation yet.
Sensor1Sts	-	Invalid Valid	Sensor1Sts is a status only item that Indicates whether the Remote QMX Space Sensor assigned to Sensor1 (RoomZn1) on the network is currently considered “Valid” (Commissioned) or “Invalid” (Commissioning Required). A “Valid” Sensor has been assigned, is Configured correctly, and is communicating with the controller properly with the assigned ID for that sensor.
Sensor2Sts	-	Invalid Valid	Sensor2Sts is a status only item that Indicates whether the Remote QMX Space Sensor assigned to Sensor2 (RoomZn2) on the network is currently considered “Valid” (Commissioned) or “Invalid” (Commissioning Required). A “Valid” Sensor has been assigned, is Configured correctly, and is communicating with the controller properly with the assigned ID for that sensor.
Sensor3Sts	-	Invalid Valid	Sensor3Sts is a status only tem that Indicates whether the Remote QMX Space Sensor assigned to Sensor3 (RoomZn3) on the network is currently considered “Valid” (Commissioned) or “Invalid” (Commissioning Required). A “Valid” Sensor has been assigned, is Configured correctly, and is communicating with the controller properly with the assigned ID for that sensor.
Sensor1 State, Sensor2 State, Sensor3 State	-	OK Init DAA Absence Config Error	Sensor1,2,3 State is a status only item that indicates the current state of the remote QMX Sensor. (0) “OK” – Indicates any given Device Command has finished successfully and the sensor with the assigned ID for this Room Zone is communicating properly with the C600 Controller. (1) “Init” – Indicates a sensor initialization is in process or is needed. An initialization is done for each PL-Link Device on the network when the controller is re-starting. If a given sensor state stays in “Init” indefinitely it is an indication that there is no sensor attached to the network with the given sensor ID or an incorrect sensor is attached to the network for that Room Zone. (2) “DAA” – Indicates a Device Command to assign an address to a network remote QMX sensor is in process. (3) “Absence” – Indicates that the Sensor with the assigned sensor ID for this Room Zone has not been detected on the PL-Link network by the ProcessBus Communications for a length of time. If the sensor with the assigned ID for the Room Zone is detected again on the network before a communications fault has occurred the system and sensor ready status can return to normal “Valid – OK” status. (4) “Config” – The remote QMX Sensor with the given room zone ID is currently being configured with all of the properties and parameters in the configuration XML file being downloaded to it. (5) “Error” – Indicates that the QMX Sensor with the given room zone ID is currently faulted.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Sensor1:RmZn1	Menu	0.0-150°F	Select this to access additional information for Sensor1 “RoomZn1”. The default room name for Sensor1 is within the parenthesis “RoomZn1”. The name of Sensor1 within the “..” can be changed on the “Snsr1 Information” Screen. The “name” is limited to 7 characters.
Sensor2:RmZn2	Menu	0.0-150°F	Select this to access additional information for Sensor2 “RoomZn2”. The default room name for Sensor2 is within the parenthesis “RoomZn2”. The name of Sensor1 within the “..” can be changed on the “Snsr2 Information” Screen. The “name” is limited to 7 characters.
Sensor3:RmZn3	Menu	0.0-150°F	Select this to access additional information for Sensor3 “RoomZn3”. The default room name for Sensor3 is within the parenthesis “RoomZn3”. The name of Sensor3 within the “..” can be changed on the “Snsr3 Information” Screen. The “name” is limited to 7 characters.

Table 81: Main Menu \ Commission Unit \ Sensr1:RmZn1, 2, or 3

Menu Display Name	Default	Range	Description
Rem Space CO^2	-	0-5000ppm	Actual “CO^2” concentration value detected by SensorX in that space.
Rem Space RH	-	0-100%	Actual “Relative Humidity” value detected by SensorX in that space.
Rem Space Spt	-	50.0-86.0°F	Space Temperature Setpoint. This setpoint may or may not be adjustable via the Remote QMX SensorX in the Space. That depends on the Remote Setpoint Source.
Rem Occupancy	-	UnOcc Occ	This displays the current occupancy of the space. The Occupancy can be put into Tenant Override Occupancy locally at the Remote QMX Space Sensor by using the Local Tenant Override on the QMX Space Sensor. The Sensor will also display whether the Space is currently in Occupancy or not. Pressing the Tenant Override button on the QMX Space Sensor, while the Space is already Occupied in Tenant Override, will reset the Tenant Override time back to its starting default value and re-start time down.
Snsr1 ID	-	000000000000-ffffffffffffh	This displays the current ID(SN) assigned for SensorX for this Room Zone. The SensorX “ID” on the physical sensor in this Room Zone must match this value or the sensor and C600 Controller will not communicate or transmit data properly. If the display shows “000000000000h”s then the Sensor ID assignment for this Room Zone is unknown. In this case the sensor is not present on the network, it is in alarm, a different sensor ID is attached to this room zone, a wrong type of sensor is in this room zone, or the sensor for this room zone has yet to be commissioned. In any case, if this displays “0…0h” then the physical wiring and operation of the sensor in this Room Zone must be verified and the Sensor Commissioning Procedure Performed. Initially when Sensor Commissioning is started the Sensor ID shown here could be incorrect to what is physically in this Room Zone if more than one sensor is on the network.
Sensor 1 Addr	-	000-999	This displays the actual “KNX” address of this device on the PL-Link Network. It is only valid when the “SnsrX ID” above has a valid 13 character ID and the sensor has been Commissioned.
Snsr1 Alm Sts	-	OK Fault	This displays the current Alarm Status of this Sensor.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Sensor1 Cmd	-	OK Init AddrPMode AddrSnr Auto Config AssignPMode	This indicates the current “Cmd” the C600 Controller is issuing to the currently Assigned QMX Sensor for this Room Zone on the KNX PL-Link Network. A value of “OK” means that no current command is in process. A value of “Init” means that Sensor is in an “initialization” command state on the network. Note that the “Init” command happens automatically when the controller starts. A value of “Config” means that this sensor is in the process of being configured. Note that “AddrPMode/AddrSnr/AssignPMode” are not used for the QMX Sensor Device use on the PL-Link Network in this application.
Sensor1 State	-	OK Init DAA Absence Config Error	This indicates the current state of the QMX SensorX for this Room Zone. See Section 2.2 for detailed description of each possible state.
Snsr1 Rdy Sts	-	No Yes	This indicates that the remote QMX Space Sensor for this Room Zone is commissioned, “Valid”, communicating properly, and is ready for operation on the KNX PL-Link Network.
ID Assign Done	-	No Yes	This indicates if this particular QMX Space Sensor’s Room Zone Network Assign Address Step of the Commissioning Process is complete or not. Note that this possibly can indicate whether this sensor is causing the “SnsrX Rdy Sts” and/or “AllSnsrReady” Display Status to not indicate “Yes”.
Config Done	-	No Yes	This indicates if this particular QMX Space Sensor Configuration Step of the Commissioning Process is complete or not. Note that this possibly can indicate whether this sensor is causing the “SnsrX Rdy Sts” and/or “AllSnsrReady” Display Status to not indicate “Yes”.

Configurable I/O

A MicroTech can be equipped with a field configurable I/O module (expansion module B) which allows for field added sensors or inputs and Outputs to be read by the MicroTech and displayed to the Building Automation System. Outputs can be written through the BAS to a third party device. Outputs can be analog 0-10V or 0-20.0mA and can be used to modulate field/BAS controlled devices. Digital inputs and outputs are also available.

NOTE: Configurable I/O menu items will not be viewable unless Expansion Module B is installed. Refer to Table 113 on page 133.

Table 82: Main Menu \ Commission Unit \ Configurable I/O

Menu Display Name	Default	Range	Description
ApplyIOChgs	No	No Yes	ApplyIOChgs is a adjustable item that configures the IO when changes are made to the X1—X8 Cfg or the input ranges.
X1…X8 Cfg	AI_V	DI AI_V AI_mA NTC10k AO_V AO_mA	X1…X8 Cfg is an adjustable item that configures the IO type that will be used at that input or out on the expansion module. There are 8 configurable IO on the I/O Module.
Input X1…X8 DI	-	Open Close	Input X1…X8 DI is a status only item of the current digital input device.
Input X1…X8 AI	-	0-10.0V	Input X1…X8 AI is a status only item that shows the current analog input voltage.
Input X1…X8 AI	-	4-20.0mA	Input X1…X8 AI is a status only item that shows the current analog input mA.
Input X1…X8 Temp	-	-50-250°F	Input X1…X8 Temp is the status only item that shows the current temperature reading of the input.
Output X1…X8 AO	-	0-10.0V	Output X1…X8 AO is a status only item that shows the current analog output voltage at this output.
Output X1…X8 AO	-	0-20.0mA	Output X1…X8 AO is a status only item that shows the current analog output mA at this output.
Output DO1-DO6	-	Off On	A status only item that shows the current state of the digital output.

Trending Set-Up

The MicroTech ships from the factory with four pre-configured Trend Sets and one freely definable trend set. One or all of these sets may be activated at anytime. Trend Set 1 will come from the factory configured to trend. Each trend set contains up to 30 data points. The data collected may be manually or automatically exported to an SD card (factory provided) inserted into the controllers built in SD card reader. All of the defined points in all activated trend sets will be trended as one group when the TrendOnOff automation object is set to On. The trending method will be fixed as a cyclic trend with an adjustable CycleTime.

Table 83: Main Menu \ Trending Set-Up

Menu Display Name	Default	Range	Description
Apply Chgs	No	No Yes	Apply Chgs is an adjustable item used to reset the controller when changes to the trending have been made. This flag must be set to yes for changes in this menu to become active.
Sample Time	60s	1-3600s	Sample Time is an adjustable item that sets how frequently trended data points are collected and recorded.
TrendOnOff	Off	Off On	TrendOnOff is an adjustable item that sets if trending is active or not.
Enable Trend 1	Yes	No Yes	Enable Trend 1 is an adjustable item that sets if Trend set 1 is being recorded or not.
Enable Trend 2	No	No Yes	Enable Trend 2 is an adjustable item that sets if Trend set 2 is being recorded or not.
Enable Trend 3	No	No Yes	Enable Trend 3 is an adjustable item that sets if Trend set 3 is being recorded or not.
Enable Trend 4	No	No Yes	Enable Trend 4 is an adjustable item that sets if Trend set 4 is being recorded or not.
Enable Trend 5	No	No Yes	Enable Trend 5 is an adjustable item that sets if Trend set 5 is being recorded or not.
Ena Free Trend	No	No Yes	Ena Free Trend is and adjustable item that allows the user to select up to 30 of their own trend points using the Free Trend Points menu.
AutoExpTime	1440min	0-1440min	AutoExpTime is an adjustable item that sets the time interval that all accumulated trend data in the controller is exported to the SD card. The default value of 1440 means the data would transfer once a day at 11:59 PM. When the AutoExp Time is set to any value less than 1440 all the accumulated trend data in the controller will be exported to the SD cart at intervals equal to that value.
Export Data	No	No Yes	Export Data is an adjustable item initiates an export of all currently accumulated trend data. When ExportData is set to Yes, all the accumulated trend data in the controller will be exported to the SD card. ExportData will automatically revert to No when export is complete.
Clear Trend	Done	Done ClrData ClrCfg	ClearTrend is an adjustable item that is used to clear the Trend Archive Memory. ClrData will delete all the data and the trend set-up will remain. When ClrCfg is used the trend memory will be completely erased including all of the data.
TrendFull	Wrap	Wrap Stop	TrendFull is an adjustable item that is used to determine if the data should overwrite the oldest data on the card when the memory is full “Wrap”, or if it should strop trending when the memory is full.

Table 84: Trend Set 1 Names and Descriptions

Trend Set 1		
Point #	**Point Name**	**Description**
1	UnitState	Unit State
2	ClgCapacity	Cooling Capacity
3	HtgCapacity	Heating Capacity
4	ReheatCapacity	Reheat Capacity
5	OADmprOut	Outdoor Air Damper Position
6	MinOASrc	Minimum Outdoor Air Source
7	SAFCapOut	Supply Fan Capacity Command
8	SAFCapFbk	Supply Fan Capacity Feedback
9	SAFDSP	Duct Static Pressure
10	EFCapOut	Exhaust Fan Command
11	EFCapFbk	Exhaust Fan Capacity Feedback
12	BSP	Building Static Pressure
13	UnitStatus	Unit Status
14	ClgStatus	Cooling Status
15	DehumStatus	Dehumidification Status
16	EconStatus	Economizer Status
17	HtgStatus	Heating Status
18	ControlTemp	Control Temperature
19	CtrlTempSrc	Control Temperature Source
20	DAT	Discharge Air Temperature
21	RAT	Return Air Temperature
22	EffOAT	Outdoor Air Temperature
23	SpaceTemp1	Space Temperature 1
24	SpaceTemp2	Space Temperature 2
25	SpaceTemp3	Space Temperature 3
26	EFT_LCT	Entering Fan/Leaving Cooling Coil Temperature
27	ActiveAlarmEnu	Current Alarm Enumeration
28	CurrentClgStg	Current Cooling Stage
29	CurrentHtgStg	Current Heating Stage

Table 85: Trend Set 2 Names and Descriptions

Trend Set 2		
Point #	**Point Name**	**Description**
1	AirFlwStatus	Airflow Status
2	OccSrc	Occupancy Source
3	UnoccSrc	Unoccupied Source
4	OccClgSpt	Occupied Cooling Setpoint
5	OccHtgSpt	Occupied Heating Setpoint
6	DATClgSetpoint	Discharge Air Temperature Cooling Setpoint
7	DATHtgSetpoint	Discharge Air Temperature Heating Setpoint
8	MinOAPos	Effective Minimum Outdoor Air Position
9	OAFlow	Outdoor Airflow
10	OAFlowSpt	Outdoor Airflow Setpoint
11	PPM	Carbon Dioxide
12	RemEFCap	Remote Exhaust Air Fan Capacity
13	RemSAFCap	Remote Supply Air Fan Capacity
14	VFDAnlg_EFStatus	Supply Fan Drive Status (EFType=RFAnalog or EFAnalog)
	VFD_EFStatus	Supply Fan Drive Status (EFType=EFVFDMB(ABB))
	ECM_EF1Status	Exhaust Fan Drive Status
15	EF1CommStatus	Exhaust Fan Communication Status
16	VFDAnlg_SAFStatus	Supply Fan Drive Status
	VFD_SAFStatus	Supply Fan Drive Status
	ECM_SAF1Status	Supply Fan 1 Drive Status
17	SAF1CommStatus	Supply Air Fan 1 Communication Status
18	EconChgOvr	Economizer Changeover Method Status
19	FanInterlock	Supply Fan Interlock Input Status
20	EPSP	Exhaust Plenum Static Pressure

Table 86: Trend Set 3 Names and Descriptions

Trend Set 3		
Point #	**Point Name**	**Description**
1	ERWhlCapOut	Energy Recovery Wheel Capacity
2	ER_EWT	Energy Recovery Wheel Exhaust Air Temperature
3	ER_LWT	Energy Recovery Wheel Leaving Air Temperature
4	Hum_1	Relative Humidity Input 1
5	Hum_2	Relative Humidity Input 2
6	Hum1Spt	Relative Humidity Setpoint 1
7	Hum2Spt	Relative Humidity Setpoint 2
8	ReheatSpt	Reheat Setpoint
9	Dewpoint1	Calculated Dew point Input 1
10	Dewpoint2	Calculated Dew point Input 2
11	Dewpnt1Spt	Dew point 1 Setpoint
12	Dewpnt2Spt	Dew point 2 Setpoint
13	SpaceRelHum1	Space Relative Humidity Sensor 1
14	SpaceRelHum2	Space Relative Humidity Sensor 2
15	OARelHum	Outdoor Air Relative Humidity Sensor
16	RARelHum	Return Air Relative Humidity Sensor
17	SpaceDewpoint1	Calculated Dew point Space Input 1
18	SpaceDewpoint2	Calculated Dew point Space Input 2
19	OADewpoint	Calculated Outdoor Air Dew point
20	RADewpoint	Calculated Return Air Dew point
	EffHeatCoolIn	Refrigeration Only Control Effective Heat Cool Input
21	CmpCapOut	Refrigeration Only Control Compressor Capacity Out
22	EffCmpCapIn	Refrigeration Only Control Effective Compressor Capacity Command Input
23	EffRhtVlvIn	Refrigeration Only Control Effective Reheat Capacity Command Input
24	EffCmpInterlock	Refrigeration Only Control Effective Compressor Interlock Input
25	LocRemStatus	Refrigeration Only Control System Mode Status Output
26	AlarmReset	Refrigeration Only Control Alarm Reset Input
27	EffSAFCapIn	Refrigeration Only Control Effective Supply Fan Capacity Input
28	EffEFCapIn	Refrigeration Only Control Effective Exhaust Fan Capacity Input
29	PrhtVlvOut	Preheat Heating Valve On/Off Output
30	PreheatCap	Preheat Capacity

Table 87: Trend Set 4 Names and Descriptions

Trend Set 4		
Point #	**Point Name**	**Description**
1	PTS1	Suction Refrigerant Pressure Circuit 1
2	PTD1	Discharge Refrigerant Pressure Circuit 1
3	C1DRT1	Discharge Refrigerant Temperature Circuit 1
4	DSH1	Discharge Superheat Circuit 1
5	Subcooling1	Subcooling Circuit 1
6	VCmp1CommSts	Variable Compressor 1 Compressor Status
7	VCmp1RpsOut	Variable Compressor 1 Command Output
8	VCmp1HMICapOut	Variable Compressor 1 Capacity Output
9	VCmp1SSOut	Variable Compressor 1 Start/Stop Output
11	LCTSetpoint	Leaving coil setpoint
	LCTSptSCRRht	Leaving coil setpoint
12	SAFFlow	Supply Air Fan Airflow
13	EFFlow	Exhaust Air Fan Airflow
14	HtgCapCmd	Heating Capacity Command Input
15	SSH1	Suction Super Heat Circuit 1
16	Spare	

Table 88: Trend Set 5 Names and Descriptions

Trend Set 5		
Point #	**Point Name**	**Description**
1	C1OAF1Status	Circuit 1 Outdoor Fan 1 Status
2	CurrCmpHtgStg	Current Compressor Heating Stage
3	C1EVICapOut	Circuit 1 EVI Capacity Output Command
4	Spare	
5	Spare	
6	Spare	
7	Spare	
8	Spare	

BMS Communications

Refer to the installation manuals below for detailed instructions for each BMS communication type.

- IM 916 MicroTech Unit Controller – BACnet IP
- IM 917 MicroTech Unit Controller – BACnet MSTP
- IM 918 MicroTech Unit Controller – LON
- IM 1374 MicroTech Unit Controller – Modbus

BACnet IP Set-UP

Table 89: Main Menu \ BMS Communications \ BACnet IP Set-Up

Menu Display Name	Default	Range	Description
Dev Instance	-	0-4194302	Device Instance of the BACnet communication module.
UDP Port	47808	0-65535	UDP Port is the User Datagram Protocol. The UDP Port allows host to host communication via the IP network and is used to identify the application process in the destination unit. Only change the UDP Port if there are multiple subnets. See a network administrator before modification.
DHCP	On	On Off	DHCP is the Dynamic Host Configuration Protocol. The DHCP is a network protocol that enables a server to automatically assign an IP Address. Set to Off if a static IP address is needed.
Act IP	0.0.0.0	-	Act IP Is the Actual IP Address of the BACnet Communication module.
ActMsk	0.0.0.0	-	ActMsk is the actual Subnet Mask of the BACnet Communication Module.
ActGwy	-	-	ActGwy is the actual gateway address.
Gvn IP	127.0.0.1	-	Gvn IP is the Given IP Address of the BACnet Communication Module.
GvnMsk	255.255.255.0	-	Gvn Msk is the Given Subnet Mask of the BACnet Communication Module.
GvnGwy	127.0.0.1	-	GvnGwy is the Given Gateway address of the BACnet Communication Module.
Unit Support	English	SI English	Unit Support is an adjustable item that sets the types of units passed through BACnet. (English or Metric)
NC Dec 1	0	0	NC Dev 1 is an adjustable item that sets the device instance of the BACnet workstation or device that will receive the alarm notifications.
NC Dev 2	0	0	NC Dev 2 is an adjustable item that sets the device instance of the BACnet workstation or device that will receive the alarm notifications.
EnaWebSrvr	Off	Off On	EnaWebSrvr is a flag to enable the web server.
Comm Status	-	OK(0) Hardware(1) Init(2) Memory(3) ID(4) COVReg(5) Other (6)	Comm Status shows the status of the communications.
BACnet BSP	-	-	Board Support Package. Displays the version of firmware loaded in the BACnet communication module.

BACnet MSTP Set-Up

Table 90: Main Menu \ BMS Communications \ BACnet MSTP Set-Up

Menu Display Name	Default	Range	Description
ApplyMSTPChgs	No	No Yes	ApplyMSTPChgs is an adjustable flag that when set to yes will cycle power to the controller to allow the network setup changes to take place.
Name	-	-	Up to a 17 Character Device Object Name. Change this value as needed to match installation parameters.
Dev Instance	-	0-4194302	Device Instance of the BACnet communication module.
MSTP Address	-	0-127	This is the MS/TP address (or MAC address) of the BACnet communication module.
Baud Rate	38400	9600 19200 38400 76800	Baud Rate is an adjustable item that is the Data Transfer speed.
Max Master	127	1-127	Max Master is an adjustable item that specifies the highest possible address for master nodes and shall be less than or equal to 127.
Max Info Frm	10	1-32	Max Info Frm is an adjustable item that specifies the maximum number of information frames the BACnet communication module may send before it must pass the token.
Unit Support	English	SI English	Unit Support is an adjustable item that sets the types of units passed through BACnet. (English or Metric).
Term Resistor	No	No Yes	Term Resistor is an adjustable item that be set to yes – no.
NC Dec 1	0	0-4194302	NC Dev 1 is an adjustable item that sets the device instance of the BACnet workstation or device that will receive the alarm notifications.
NC Dev 2	0	0-4194302	NC Dev 2 is an adjustable item that sets the device instance of the BACnet workstation or device that will receive the alarm notifications.
Comm Status	-	OK(0) Hardware(1) Init(2) Memory(3) ID(4) COVReg(5) Other (6)	Comm Status shows the status of the communications.
BACnet BSP	-	-	Board Support Package. Displays the version of firmware loaded in the BACnet communication module.

LON Set-Up

Table 91: Main Menu \ BMS Communications \ LON Set-Up

Menu Display Name	Default	Range	Description
Rcv Hrt Bt	0s	0-6553s	Receive Heartbeat. Defines the maximum time that elapses after the last update to a specified network variable input before the unit starts to use default values. nclRCvHrBt can also be used to change these values.
Min Snd Tm	0s	0-6553s	Minimum Send Time. Controls the minimum period of time that expires before certain network variables are transmitted. nclMinSendTime can also be used to change these values.
Comm Status	-	OK(0) Hardware(1) Init(2) Memory(3) ID(4) COVReg(5) Other (6)	Comm Status shows the status of the communications.
LON BSP	-	-	Board Support Package. Displays the version of firmware loaded in the LonWorks communication module.
Lon App Ver	-	-	LonWorks application version. Displays the version of the application loaded in the LonWorks communication module. This parameter remains blank until the communication module is commissioned.

Modbus Set-Up

Table 92: Main Menu \ BMS Communications \ Modbus Unit Set-Up

Menu Display Name	Default	Range	Description
Apply Changes	No	No Yes	Apply Changes is an adjustable flag that when set to Yes will cycle power to the controller to allow the network setup changes to take place.
Status	-	OK Hardware Init Memory ID COVReg Other	Status confirms the current state of the MODBUS module. OK = communication module is properly functioning Hardware = hardware problem detected Init = module is initializing Memory = memory ID = identification COVReg = change of value register status Other = communication module is not properly functioning for a reason other than the other status options
Address	1	1-247	Sets the address of the Unit Controller on the MODBUS network.
Parity	None	Even Odd None	Sets the MODBUS Network Parity.
Two Stop Bits	Yes	No Yes	Sets the number of stop bits for the MODBUS Network (Yes = 2 or No = 1).
Baud Rate	19200	4800 9600 19200 38400	Select Baud Rate of the MODBUS Network.
Load Resistor	No	No Yes	Confirms if a load resistor is present on the network. Yes = RS485 bus terminator switched on. No = RS485 bus terminator switched off.
Response Dly	5ms	0-3000ms	Delay in response time to accommodate slow networks.
Com LED Tmout	3s	0-3600s	Time before the communication timeout LED is turned on. Setting to 0 turns off the function and sets the LED to green.
Modbus BSP	-	**.**	Version of the MODBUS module Board Support Package (BSP).

Network Unit Set-Up

Table 93: Main Menu \ BMS Communications \ Network Unit Set-Up

Menu Display Name	Default	Range
Ctrl Mode	Off	Off HeatOnly CoolOnly FanOnly HeatCool Auto/Net
Occ Mode	Auto/Net	Occ Unocc TntOvrd Auto/Net
Clg Reset	None	None Network Space Return OAT ExtmA ExtV Airflow SpaceH1 SpaceH2 OAH RAH
Econo Reset	None	None Network Space Return OAT
Htg Reset	None	None Network Space Return OAT ExtmA ExtV
Min OA Reset	None	None Network ExtSig
Ctrl Temp Src	RAT	RAT Space OAT None
Rem Spt Src	None	None AI QMX1 QMX2 QMX3
Occ Clg Spt	72.0°F	0.0-100.0°F
Occ Htg Spt	68.0°F	0.0-100.0°F
SAF Ctrl	CAV	DSP Spd/Net 1ZnVAV BSP CO2 Flow CAV
EF Ctrl	BSP	CAV BSP Tracking DSP Spd/Net Flow OAD FlowDiff

Network Input Status

Table 94: Main Menu \ BMS Communications \ Network Input Status

Menu Display Name	Default	Range
Net OAT In	-	-50.0-200.0°F
Net SpaceT In	-	0.0-150.0°F
NetCurrState	-	Occ Unocc TntOvrd Standby NUL
NetNextState	-	Occ Unocc TntOvrd Standby NUL
NetTmToNxtSt	-	0-65534min
Net App Mode	-	Off HeatOnly CoolOnly FanOnly Auto NA
Net CI Ena S	-	-1.0-1.0
Net CI Ena V	-	0-255%
Net HT Ena S	-	-1.0-1.0
Net Ht Ena V	-	0-255%
Net Ec Ena S	-	-1.0-1.0
Net Ec Ena V	-	0-255%
Net SAF Cap	-	0-100%
Net EF Cap	-	0-100%
Net Space PPM	-	0-5000ppm
Net Rel Humid	-	0-100%
Net DATClg Spt	-	40.0-100.0°F
Net DATHtgSpt	-	40.0-140.0°F
Net DATHtgSpt	-	40.0-105.0°F
NetLCTSpt	-	45.0-65.0°F
NetDXBPLCTSpt	-	45.0-65.0°F
NetDemandShed	-	Inactive Auto Manual
nviSetpoint	-	0.0-100.0°F

(continued)		
Menu Display Name	**Default**	**Range**
NetOccManCmd	-	Occ Unocc TntOvrd Standby Auto
Net Min OA	-	0-100%
nvoEffSpt	-	0.0-100.0°F
nciOccClgSpt	-	0.0-100.0°F
nciOccHtgSpt	-	0.0-100.0°F
nciHVACType	-	Generic FanCoil VAV Hpump RTU UV ChilCeil Rad AHU SCU

Unit Maintenance and Service Menus

Unit Maintenance

The **Unit Maintenance** section covers several menus that will be useful while maintaining the equipment.

Operating Hours Menu

Table 95: Main Menu \ Commission Unit \ Unit Maintenance \ Operating Hours

Menu Display Name	Default	Range	Description
Supply Fan	-	0.0-999999.0h	Supply Fan is a status only item that displays the number run hours on the Supply Fan
Exh Fan	-	0.0-999999.0h	Exh Fan is a status only item that displays the number run hours on the Exhaust Fan
Cooling	-	0.0-999999.0h	Cooling is a status only item that displays the number run hours spent in Cooling
Heating	-	0.0-999999.0h	Heating is a status only item that displays the number run hours spent in Heating
2nd Heating	-	0.0-999999.0h	A status only item that displays the number of operating hours of the auxiliary heater
Economizer	-	0.0-999999.0h	Economizer is a status only item that displays the number run hours spent in Economizer
Tnt Override	-	0.0-999999.0h	Tnt Override is a status only item that displays the number run hours spent in Tnt Override
VCmp1	-	0.0-999999.0h	VCmp1 is a status only item that displays the number run hours for Variable Compressor 1
Dehumid	-	0.0-999999.0h	Dehumid is a status only item that displays the number run hours spent in Dehumidification
Reheat	-	0.0-999999.0h	Reheat is a status only item that displays the number run hours spent in Reheat
ER Wheel	-	0.0-999999.0h	ER Wheel is a status only item that displays the number run hours for the Energy Recovery Wheel
ER Preheat	-	0.0-999999.0h	ER Preheat is a status only item that displays the number run hours for the Energy Recovery Pre-heater
UV Lights	-	0.0-999999.0h	UV Lights is a status only item that displays the number of operating hours for the UV Lights

Air Filters

Table 96: Main Menu \ Commission Unit \ Unit Maintenance \ Air Filters

Menu Display Name	Default	Range	Description
MainFltrSpt1=	0.5in	0.0-5.0in	An adjustable input to select the pressure at which a “dirty filter” flag becomes true for Filter bank 1
MainFltrPres1=	-	0.0-5.0in	A status only item which indicates the Pressure drop across Filter bank 1
MainFltrSpt2=	0.5in	0.0-5.0in	An adjustable input to select the pressure at which a “dirty filter” flag becomes true for Filter bank 2
MainFltrPres2=	-	0.0-5.0in	A status only item which indicates the Pressure drop across Filter bank 2
MainFltrSw=	-	Open Closed	A status only item which indicates the state of the Main Filter Switch

Operating Hours

The Operating Hours menu contains status items that display the number run hours for various components and operating states. This menu is also available in the Commission unit menu (Main Menu \ Commission Unit \ Unit Maintenance \ Operating Hours).

Table 97: Main Menu \ Service Menus \ Operating Hours

Menu Display Name	Default	Range	Description
Supply Fan	-	0.0-999999.0h	Supply Fan is a status only item that displays the number run hours on the Supply Fan
Exh Fan	-	0.0-999999.0h	Exh Fan is a status only item that displays the number run hours on the Exhaust Fan
Cooling	-	0.0-999999.0h	Cooling is a status only item that displays the number run hours spent in Cooling
Heating	-	0.0-999999.0h	Heating is a status only item that displays the number run hours spent in Heating
2nd Heating	-	0.0-999999.0h	A status only item that displays the number of operating hours of the auxiliary heater
Economizer	-	0.0-999999.0h	Economizer is a status only item that displays the number run hours spent in Economizer
Tnt Override	-	0.0-999999.0h	Tnt Override is a status only item that displays the number run hours spent in Tnt Override
VCmp1	-	0.0-999999.0h	VCmp1 is a status only item that displays the number run hours for Variable Compressor 1
Dehumid	-	0.0-999999.0h	Dehumid is a status only item that displays the number run hours spent in Dehumidification
Reheat	-	0.0-999999.0h	Reheat is a status only item that displays the number run hours spent in Reheat
ER Wheel	-	0.0-999999.0h	ER Wheel is a status only item that displays the number run hours for the Energy Recovery Wheel
UV Lights	-	0.0-999999.0h	A status only item that displays the number of operating hours of the UV Lights

Temperatures

The Temperatures menu displays the current reading of many of the key temperature sensors throughout the unit.

Table 98: Main Menu \ View Status \ Temperatures

Menu Display Name	Default	Range	Description
Control Temp	-	-50.0-200.0°F	Control Temp is a status only item which indicates the current Control Temperature value.
Disch Air	Auto/Net	-50.0-250.0°F	Disch Air is a status only item which displays the current temperature reading from the unit's discharge air temperature sensor (DAT). This sensor is standard on all units.
Return Air	-	-50.0-200.0°F	Return Air is a status only item which displays the current temperature reading from the unit's return air temperature sensor (RAT).
Eff Space T	-	0.0-150.0°F	Effective Space Temperature is a status only item that identifies the source of the physical space temperature used by the MicroTech controller. The effective space temperature is compared to the temperature setpoint to control HVAC equipment operation.
Space Temp 1		0.0-150.0°F	Space Temp 1 is a status only item which displays the current temperature reading from a space temperature sensor. Up to 3 sensors can be attached to the unit.
Space Temp 2		0.0-150.0°F	Space Temp 2 is a status only item which displays the current temperature reading from a space temperature sensor. Up to 3 sensors can be attached to the unit.
Space Temp 3		0.0-150.0°F	Space Temp 3 is a status only item which displays the current temperature reading from a space temperature sensor. Up to 3 sensors can be attached to the unit.
OA Temp		-50.0-200.0°F	OA Temp is a status only item which displays the current temperature reading from the unit mounted outdoor air temperature sensor.
EF/LC Temp		-50.0-250.0°F	EF/LC Temp is a status only item which displays the current entering fan/leaving coil temperature reading from the unit mounted temperature sensor. This sensor is available on RTU units with dehumidification capability. This sensor is also installed on RTU units equipped with either gas or electric heat and is used by the controller to calculate the heat rise across the heat exchanger by comparing it to the discharge air temperature input. The controller uses this information to protect the heat exchanger against overheating.
ER LWT		-50.0-200.0°F	ER LWT is status only item which displays the current discharge air temperature leaving the optional energy recovery wheel.
ER EWT		-50.0-200.0°F	ER EWT is status only item which displays the current exhaust air temperature leaving the optional energy recovery wheel.
C1DRT1	-	-83.2-392.0°F	A status only item which indicates the Discharge Refrig. Temperature of Circ 1/ Comp 1
C1DRT3	-	-83.2-392.0°F	A status only item which indicates the Discharge Refrig. Temperature of Circuit 1/ Comp 3
SRT1		-50.0-200.0°F	SRT1 is a status only item which displays the current suction refrigerant line temperature sensor reading on Circuit #1
DFT1	-	-83.2-212.0°F	A status only item which indicates the Defrost Refrig. Temperature of Circuit 1
VCmp1 Temp		-50.0-392.0°F	VCmp1Temp is a status only item which displays the current temperature of variable Compressor 1
LRT1	-	-83.2-212.0°F	LRT1 is a status only item which displays the current liquid refrigerant line temperature sensor reading on Circuit #1

Alarms and Events

Alarms provide the user with information about abnormal conditions that affect unit operation. The cause of the alarm should be investigated and eliminated before the unit or any disabled equipment in it is placed back into service.

Viewing Alarms

The **Active Alarms** menu displays up to 10 active alarms. Pushing the scroll wheel in, will show details about the alarm, as well as when it occurred. The Alarm Log, shows the same information, but up to 50 of the latest alarms - both active and previous alarms.

Alarms are categorized as **Warnings, Problems or Faults**.

Faults are conditions that are serious enough to shut down the unit. The alarm must be manually cleared to allow unit operation.

Problems are conditions that result in some limitation of unit operation, but the unit is allowed to continue to operate. Some of these alarms must be cleared manually, but others clear automatically.

Warnings inform the user of conditions that should be addressed, but do not limit operation in any way. The alarm condition needs to be fixed and the alarm must be manually cleared to cause this alarm to no longer be active.

All active alarms as well as the date and time that they were detected are displayed on the Active Alarm menu. These alarms are displayed in order of priority. Higher priority alarms are displayed first. The last 50 alarm “events” detected, as well as the date and times that they were detected, are displayed on the Alarm Log menu. An alarm “event” is either an alarm becoming active, or being cleared. A “+” symbol precedes the active alarm event and a “-” symbol precedes the cleared alarm event. These alarms are displayed in the order that they were detected. The alarm that was detected most recently is displayed first. Multiple occurrences of the same alarm may appear.

Table 99: Main Menu \ Service Menus \ Active Alarms

Menu Display Name	Default	Range	Description
Alarm Ct: ** Clr Alms	- : No	0-78: No Flts Prbs Wrns All	The top of the alarm menu will show the current count of alarms and their types.
Alarm1: Alarm Type	-	Dirty Filter: Warning – Freeze: Fault	The Alarm will display the alarm name : Alarm Type
Alarm Date Alarm Time	-	01/01/1970-01/01/9999 00:00:00-23:59:59	Each alarm will display the date and time the alarm occurred.

Table 100: Main Menu \ Service Menus \ Alarm Log

Menu Display Name	Default	Range	Description
LogCt:** Clr Log:	- : No	0-78: No Yes	The top of the alarm menu will show the current count of alarms and their types.
+Alarm:Alarm Type	-	Dirty Filter: Warning – Freeze: Fault	The Alarm will display the alarm name : Alarm Type
Alarm Date Alarm Time	-	01/01/1970-01/01/9999 00:00:00-23:59:59	Each alarm will display the date and time the alarm occurred.

Alarm and Event Descriptions

Warnings

Warnings are notifications only. No action is taken by the controller in response to a Warning.

Table 101: Main Menu \ Service Menus \ Active Alarms

Alarm Number	Alarm Display Name	Description
0	No Active Warnings	No Active Warnings are indicated.
24	Main Filter: Warning	A warning alarm indicating the unit Main filter bank is dirty. The filter is considered dirty when the FilterSw1 (PSMF) across the Main filter bank is in alarm continuously for 60 seconds or Filter press 1 or 2 analog inputs is above the HiFltPress1Spt continuously for 60 seconds. This alarm requires a manual clear.
34	Exh Fan: Warning	A warning alarm indicating the unit Exh Fan status is not as expected. This warning occurs only on units equipped with exhaust fans when the EF Status is expected to be true and it is false for at least 30 seconds. This alarm will automatically clear if status changes to the expected vale.
50	Over Econo: Warning	A warning alarm indicating the unit is economizing when it should not be will be generated whenever the outdoor air dampers are stuck open while operating in the Econo or Cooling operating state. The dampers are considered stuck open when either of the following abnormal situations occurs: The damper command value is less than the calibrated damper end switch closed value continuously for 180 seconds yet the outside air damper end switch input remains open. The damper end switch input does not change from closed to open with 30 seconds of the damper command value dropping (and remaining) below the calibrated damper end switch open value (less the calibrated maximum switch differential). The over economizing warning will also be generated if the Econo Status is Enabled when the OAT is greater than the Max OAT Limit setting (default 75F). Exception: This case is ignored when the economizer enable decision is being controlled by a network input or when the economizer changeover method (EconChgovr) is set for OAT/RAT dry bulb comparison (OAT/RAT). The alarm will automatically clear when the conditions causing the alarm are no longer present. NOTE: The damper end switch open (PosSwOpen%), Minimum switch differential (MinSwDiff), damper end switch closed (PosSwClose%) and maximum switch differential (MaxSwDiff) values are determined during the OAD damper end switch calibration process.
52	Under Econo: Warning	A warning alarm indicating the unit is not economizing when it should be will be generated whenever the outdoor air dampers are stuck closed while operating in the Econo or Cooling state. The dampers are considered stuck closed when either of the following abnormal situations occurs: The damper command value is greater than the calibrated damper end switch open value continuously for 180 seconds yet the outside air damper end switch input remains open. The damper end switch input does not change from closed to open with 30 seconds of the damper command value rising above the calibrated damper end switch closed value (plus the calibrated minimum switch differential). The under economizing alarm will also be generated if the Econo Status is not Enabled when the OAT is less than the Min OAT Limit setting (default 70F). Exception: This case is ignored when the economizer enable decision is being controlled by a network input or when the economizer changeover method (EconChgovr) is set for OAT/RAT dry bulb comparison (OAT/RAT). The under economizing alarm will also be generated when the OAT sensor is unreliable or the RAT sensor is unreliable while the OAT is below the Min OAT Limit setting (default 70F) and the economizer changeover method (EconChgovr) is set for OAT/RAT dry bulb comparison (OAT/RAT). The alarm will automatically clear when the conditions causing the alarm are no longer present. NOTE: The damper end switch open (PosSwOpen%), Minimum switch differential (MinSwDiff), damper end switch closed (PosSwClose%) and maximum switch differential (MaxSwDiff) values are determined during the OAD damper end switch calibration process.

(continued)		
Alarm Number	**Alarm Display Name**	**Description**
54	Excess OA: Warning	A warning alarm indicating the unit is delivering excessive outdoor air will be generated whenever the outdoor air dampers are stuck open. The outdoor dampers are considered stuck open when either of the following abnormal situations occurs: The damper command value is less than the calibrated damper end switch closed value continuously for 180 seconds yet the outside air damper end switch input remains open. The damper end switch input does not change from closed to open with 30 seconds of the damper command value dropping (and remaining) below the calibrated damper end switch open value (less the calibrated maximum switch differential). The excess outdoor air warning will also be generated while operating in the Econo or Cooling state when the Econo Status is Enabled and the OAT is greater than the Max OAT Limit setting (default 75F). Exception: This case is ignored when the economizer enable decision is being controlled by a network input or when the economizer changeover method (EconChgovr) is set for OAT/RAT dry bulb comparison (OAT/ RAT). The alarm will automatically clear when the conditions causing the alarm are no longer present. NOTE: The damper end switch open (PosSwOpen%), Minimum switch differential (MinSwDiff), damper end switch closed (PosSwClose%) and maximum switch differential (MaxSwDiff) values are determined during the OAD damper end switch calibration process. The alarm will automatically clear when the conditions causing the alarm are no longer valid.
56	OADStuck: Warning	A warning alarm indicating the outdoor air dampers are stuck and not modulating will be generated whenever the damper are stuck open or stuck closed. The dampers are considered stuck open when either of the following abnormal situations occurs: The damper command value is less than the calibrated damper end switch closed value continuously for 180 seconds yet the outside air damper end switch input remains open. The damper end switch input does not change from closed to open with 30 seconds of the damper command value dropping (and remaining) below the calibrated damper end switch open value (less the calibrated maximum switch differential). The dampers are considered stuck closed when either of the following abnormal situations occurs: The damper command value is greater than the calibrated damper end switch open value continuously for 180 seconds yet the outside air damper end switch input remains open. The damper end switch input does not change from closed to open with 30 seconds of the damper command value rising above the calibrated damper end switch closed value (plus the calibrated minimum switch differential). The damper stuck warning will also be generated when the damper end switch operation is unreliable. The ends switches are considered unreliable when the end switch input remains closed when the damper command value is between the calibrated end switch closed and open values (plus and minus the calibrated minimum and maximum switch differentials). The alarm will automatically clear when the conditions causing the alarm are no longer present.
58	ERWheel: Warning	Some units are equipped with a wheel rotation detection capability. This is present if the wheel is using an ECM motor. The ERWheel Warning flag is present if the wheel rotation is not detected. The alarm will automatically clear when the conditions causing the alarm are no longer present.

Problems

Problems class alarms will not cause the unit to shut down completely but generally mean unit operation is altered in some way.

Table 102: Main Menu \ Service Menus \ Problem Alarms

Alarm Number	Alarm Display Name	Description
0	No Active Problems	No Active Problems are indicated.
62	Condensate Overflow Problem	The condensate overflow problem occurs when the condensate overflow sensor digital input has been open for 10 seconds or more. As a result, the cooling system will be disabled. The alarm must be manually cleared once corrective action is taken.
101	MHGRhtVlv1: Problem	The MHGRhtVlv1 Problem occurs when MHGRht valve synchronization sequence has started and is not completed successfully. As a result, the Dehumidification operation will be disabled unless primary heat back up reheat is available. This problem requires a Manual clear of the alarm.
105	DRT1 Sensor: Problem	This alarm occurs when the DRT1 (Discharge Refrigerant Temperature) sensor input is shorted or open circuited for the Sensor Alarm Delay (default 30 seconds). It can also occur when the variable speed compressor is off and the input is above 329°F or the compressor has been off for 20 minutes and the input is below -4°F. When this alarm is active compressor cooling operation is disabled. The alarm must be manually cleared once corrective action is taken.
107	4WV1 Problem	The 4WV problem alarm is triggered during compressorized heating or cooling when the differential between the PTD (Discharge Pressure Transducer) and PTS (Suction Pressure Transducer) drops below 57 psi for more than 15 minutes. The PTD and PTS differential is ignored during defrost state when the compressor enters initialization state.
109	ProtIntrlck: Problem	When configured for refrigeration only control there is generic interlock digital input defined that must be made to allow cooling operation (for an airflow switch for example). If the field calls for cooling but this input in not made you end up with the ProtIntrlck: Problem alarm.
110	VCmp1: Problem	If the Variable Speed Compressor on Circuit 1 is enabled and commanded to run for 30 seconds but the controller fails to receive the variable speed run verification input the variable speed compressor is cycled OFF (a variable speed Compressor Emergency Stop Control Event is logged) for 5 secondes and then back on. The variable speed compressor is then ramped to 45%. If this occurs 5 times in a 100 min period the variable speed compressor is shut off and the VCmp1 Problem alarm is generated. This alarm must be manually cleared once corrective action is taken.
115	SRT Sensor 1: Problem	This alarm occurs when the SRT1 Sensor (Suction Refrigerant Temperature) sensor input is shorted or open for the Sensor Alarm Delay (default 30s) It can also occur when the variable speed compressor is off and the input is above 329°F.
120	Hi DL Temp_1: Problem	Normal compressor control is limited when a high discharge line temperature conditions occur. If the variable speed compressor is operating and the discharge line temperature is greater than 250F for 15 seconds a High Discharge Line Temperature Event is generated and the variable speed compressor capacity is reduced every 15 seconds until the discharge line temperature falls below 220F. If the discharge line temperature is above 250F continuously for 3 minutes the variable speed compressor is stopped and a High Discharge Line Temperature problem alarm is generated. The alarm must be manually cleared.
125	Exp Valve 1: Problem	Exp Valve 1 Problem indicates the EVI valve resync Counter is greater than or equal to 4 or that EVI synchronization sequence is not completed within 60 seconds. This alarm must be manually cleared once corrective action is taken.
130	OA Fan 1: Problem	Outdoor Fan 1 Problem indicates
133	Refrigerant Leak Problem	The refrigerant leak problem occurs when a refrigerant leak sensor detects a refrigerant concentration above 15% of the refrigerant lower flammability level. As a result, compressors will be locked out and the supply fan speed may be overridden. See “A2L Detection and Mitigation” on page 175 for details. The alarm must be cleared manually once corrective action is taken.
134	Refrigerant Sensor Problem	The refrigerant sensor problem occurs when a refrigerant leak sensor is determined to be faulty by the leak detection control board. As a result, compressors will be locked out and the supply fan speed may be overridden. See “A2L Detection and Mitigation” on page 175 for details. The alarm must be cleared manually once corrective action is taken.

(continued)		
Alarm Number	**Alarm Display Name**	**Description**
135	PTS1 Sensor: Problem	PTS1 or 2 Sensor Problem indicates the a sensor malfunction. This alarm is present when the following is true for 30 seconds where PTS<96kPa and the CircState is not in pumpdown or where the following is true for 30 minutes; the SSH1-SSHSpt >20.0F, DSH1<5.0F, and EVI Pos >95%. This alarm must be manually cleared once corrective action has been taken.
140	PTD1 Sensor: Problem	This alarm occurs when either the circuit 1 discharge line pressure inputs (PTD1) remains above 705 psi for 10 seconds. When this alarm is active compressor cooling operation is disabled. The alarm must be manually cleared once corrective action is taken.
145	Lo Charge 1: Problem	The Lo Charge 1 Problem alarm indicates a condition that is consistent with a low refrigerant charge on circuit 1. This alarm occurs when the suction super heat is more than 20F greater than the setpoint, the expansion valve is >95% open for more than 30 min. This alarm must be manually cleared once corrective action has been taken.
150	ChargeLoss 1: Problem	The ChargeLoss 1 or 2 Problem alarm indicates a condition where the charge is not present. This alarm occurs when the suction superheat is more than 20F greater than the setpoint, the expansion valve is >95% open and the HDRT is > 150.0F for 30 minutes. This alarm must be manually cleared once corrective action has been taken.
155	VCmp1LoDSH: Problem	The VCmp1LoDSH Problem alarm indicates a condition where the variable compressor has been disabled due to 3 lo discharge super heat events. This alarm must be manually cleared once corrective action has been taken.
160	Lo Press 1: Problem	The Lo Press 1 Problem alarm indicates a condition a low pressure condition on a circuit. This condition occurs when the low pressure switch input has been in alarm (open) position for longer than the LP Pressure Switch Delay (Default = 2 Seconds). This alarm will automatically reset if the Lo Pressure Event has not occurred more than 4 times in 24 hours. Otherwise a manual clear is required once action has been taken.
165	Hi Press 1: Problem	Normal variable speed compressor control is limited when a high discharge pressure conditions occur on the variable speed compressor circuit. If the variable speed compressor is operating and the discharge pressure (PTD) is greater than 525 PSI, a High Pressure Unloading Control Event is generated and the variable speed compressor is slowed every 10 seconds until either the discharge pressure falls to less than 525 PSI or remains higher than 575 PSI for 10 minutes. If the discharge pressure is above 575 PSI for 10 minutes the variable speed compressor is shut off and a High Pressure Problem alarm is generated. If the OAT is below 45F at the time the variable speed compressor is shut off immediately and a High Pressure Problem alarm is generated anytime the discharge pressure rises above 575 PSI. The alarm must be manually cleared.
170	Lo Press Diff 1: Problem	The Lo Pressure Diff Problem alarm indicates a condition where the differential pressure between the high and low side of the refrigeration circuit becomes too low for proper oil lubrication in the inverter compressor. This alarm occurs when the counter exceeds 3 events in a 45 min period. Alarm requires manual reset once corrective action is taken.
175	HiVCmpTmp 1: Problem	The HiVCmpTmp Problem alarm indicates a condition where the variable speed compressor exceeds its maximum temperature of 248F for 5 seconds. The alarm automatically resets after 100 min if the condition does not occur again.
180	VCmpTSnsr 1: Problem	The VCmpTSnsr Problem alarm indicates a condition where the compressor temp sensor is present and shorted. The alarm requires manual clearing after manually cleared.
185	VCmp1HiDSH: Problem	The VCmp1HiDSH Problem alarm indicates a condition where the discharge super heat is detected and the compressor is forced to standby to prevent the variable speed compressor from operating under high motor, discharge port or oil temperature conditions. The alarm requires manual clearing.
190	IFB1 Comm: Problem (VCmp1)	The IFB1 Comm Problem alarm indicates a condition where the HP switches are normal and the IFB comm module has a loss of communication. This alarm automatically clears when comms are re-established unless there are 5 occurrences in a 100 minute period.
192	EFT/LCT Snsr: Problem (Control Type: ZTC, DTC or 1ZnVAV)	This alarm occurs when the Entering Fan Temperature/Leaving Coil Temperature sensor is present and either shorted or open circuited for longer than the Sensor Alarm Delay (Default = 30 seconds). When this alarm occurs the unit continues to operate however dehumidification operation is disabled until the sensor becomes reliable. The maximum DAT limit function associated with gas or electric heat is also disabled until the sensor becomes reliable.

(continued)		
Alarm Number	**Alarm Display Name**	**Description**
193	RAT Sensor: Problem (Control Type: ZTC, DTC or 1ZnVAV)	If the return air temperature sensor (RAT) is present and either shorted or open circuited for longer than the Sensor Alarm Delay (default is 30 seconds), the Return Air Sensor problem occurs. When the RAT Sensor problem occurs, the unit continues to operate with the following modifications: Cooling Reset and Heating Resets revert to None if they are set to Return and Control temperature Source reverts from return to space temperature if a space temperature is present and reliable. When the alarm condition is no longer present, the RAT sensor problem automatically clears.
194	Space Sensor 1: Problem (Control Type: ZTC, DTC or 1ZnVAV)	If the space air temperature sensor is present and either shorted or open circuited for longer than the Sensor Alarm Delay (default is 30 seconds), the space sensor problem occurs. When the space air temperature sensor problem occurs, the unit continues to operate with the following modifications: Cooling Reset and Heating Resets revert to None if they are set to space and control temperature source reverts from space to return temperature if a return temperature is present and reliable. When the alarm condition is no longer present, the space sensor problem automatically clears.
195	Space Sensor 2: Problem (Control Type: ZTC, DTC or 1ZnVAV)	
196	Space Sensor 3: Problem (Control Type: ZTC, DTC or 1ZnVAV)	
197	OAT Sensor: Problem	If the outside air temperature sensor (OAT) is present, a valid OAT value is not provided via the network and the local OAT sensor is either shorted or open circuited for longer than the Sensor Alarm Delay (default is 30 seconds), the Outside Air Sensor problem occurs. When the OAT Sensor problem occurs, the unit continues to operate with the following modifications: Heating is not locked out due to high OAT, Cooling is not locked out due to low OAT, Cooling Reset and Heating Reset revert to none if they are set to OAT and Economizer is locked out due to high OAT. When the alarm condition is no longer present, the OAT Sensor problem automatically clears.
198	Freeze: Problem (Control Type: ZTC, DTC or 1ZnVAV)	When a unit is equipped with chilled water, hot water, or steam coil, the Freeze problem occurs when the optional freezestat contacts open as a result of detecting an abnormally low water or steam coil temperature while the fans are off. When the Freeze problem occurs, the controller opens the chilled water and heating valves, and sets a 10-minute timer. When the 10-minute timer expires, the controller checks the freezestat input again. If the freezestat contacts are closed the valves close. If the freezestat contacts are still open, the valves remain open, and the 10-minute timer resets. This continues while the unit remains off. Whenever the freezestat closes the Freeze problem automatically clears. This feature protects the coil(s) and allows the system to start normally when an occupied command is received.
199	Heat Fail: Problem (Control Type: ZTC, DTC or 1ZnVAV)	When a unit is equipped with a Natural Gas or Propane Burner and the modulating burner Modbus status is Fault for 20 seconds. This automatically clears once communications are reestablished.

Faults

Faults class alarms will cause the unit to shut down completely.

Table 103: Main Menu \ Service Menus \ Fault Alarms

Alarm Number	Alarm Display Name	Description
0	No Active Faults	No Active Faults are indicated.
208	Airflow: Fault	The Airflow Fault occurs when the fan does not provide flow feedback after 5 start tries. This requires a manual clear once corrective action has been taken.
212	Lo Disch Temp: Fault	The Lo Disch Occurs If the unit is not in the operating state and the discharge air temperature is less than the Low Discharge Temperature Limit (Default = 40°F) for longer than 35 seconds and the supply fan has been on for longer than the LowDAT temperature alarm delay (Default = 6 minutes), the Low Discharge Air Temperature fault occurs. When the Low Discharge Air Temperature fault occurs, the unit is shut down. It remains shut down until the Low Discharge Air Temperature fault is manually cleared through the unit keypad or via a network signal.
216	Hi Disch Temp: Fault	If the discharge air temperature is greater than the High Discharge Temperature Limit (Default = 170°F) and the supply fan has been on for longer than the Temperature Alarm Delay (Default = 35 seconds), the High Discharge Air Temperature fault occurs. When the High Discharge Air Temperature fault occurs, the unit is shut down. It remains shut down until the High Discharge Air Temperature fault is manually cleared through the unit keypad or via a network signal.
220	Hi Return Tmp: Fault	If the return air temperature is greater than the Return Air Temperature Limit (Default = 120°F) and the supply fan has been on for longer than the temperature alarm delay (Default= 35 seconds), the High Return Air Temperature fault occurs. When the High Return Air Temperature fault occurs, the unit is shut down. It remains shut down until the High Return Air Temperature fault is manually cleared through the unit keypad or via a network signal.
224	Duct Hi Limit: Fault	If the unit is variable air volume, the contacts of the duct high pressure limit control (DHL) open, and the unit state is not Off or Startup, the Duct High Limit fault occurs. When the Duct High Limit fault occurs, the unit is shut down. The unit remains shut down until the Duct High Limit fault is manually cleared through the unit keypad or via a network signal.
228	Disch Tmp: Fault	If the discharge air temperature sensor (DAT) is open or short circuited for longer than the Sensor Alarm Delay (Default= 30 seconds), the Discharge Air Sensor fault occurs. When the Discharge Air Sensor fault occurs, the unit is shut down. It remains shut down until the Discharge Air Sensor fault is manually cleared through the unit keypad or via a network signal.
244	Control Temp: Fault	If the temperature sensor (ZNT1, RAT, OAT, MAT) selected as the control temperature source is not reliable for longer than the Sensor Alarm Delay (Default= 30 seconds), a Control Temperature Fault occurs. When the Control Temperature Fault occurs, the unit is shut down. It remains shut down until the Control Temperature Fault is manually cleared through the unit keypad or via a network signal.
250	Emerg Stop: Fault	An Emergency Stop Fault will occur if either of the following conditions is true: Emergency Stop Input in the Alarm (Open) condition Or The Net Emrg Ovrd input is set to Off via a network signal or the keypad/display.
252	Freeze: Fault	When a unit is equipped with chilled water, hot water, or steam coil, the Freeze Fault occurs when the optional freezestat contacts open as a result of detecting an abnormally low water or steam coil temperature while the fans are running. When the Freeze fault occurs, the controller shuts down the fans, opens the chilled water, economizer, and heating valves and set a 10-minute timer. When the 10-minute timer expires, the controller checks the freezestat input again. If the freezestat contacts are closed the pump output is de-energized and the valves close. If the freezestat contacts are still open the pump output remains energized, the valves remain open, and the 10-minute timer resets. This continues until the fault is manually cleared through the keypad or via a network signal.

Inverter Board Fault Codes

The MicroTech unit controller communicates with the fan and compressor inverter boards via Modbus. If the inverter boards detect an unsafe condition, they issue the appropriate control commands and an error code can be read at the MicroTech HMI display as follows:

- Go to Main menu – Alarm lists – Active alarms – Alarm details - INV/OF Flt Code Details
- The error code is shown at “INVAlarmCode” and the error description is shown at “Code text” as shown in Table 104.

Table 104: Inverter Compressor Fault Codes

Fault Code	HMI Code Text	Extended Text
E5	Compressor Lock	Compressor Locked
L1	Current Sensor Alm	Current Sensor Alarm
L1	DC Cur Sensor Alm	DC Current Sensor Alarm
L1	EEPROM Setup Problem	EEPROM Setup Problem
L1	IGBT Problem	Insulated Gate Bipolar Transistor Problem
L1	JP Setup Problem	LP Setup Problem
L1	Momntry Ovrcurrent	Momentary Over Current
L4	Fin Temp Rise	Fin Temperature Rise
L5	Momntry Ovrcur (DC)	Momentary DC Over Current
L8	Elec Therm (Cur1)	Electrical Thermal (Current 1)
L8	Elec Therm (Cur2)	Electrical Thermal (Current 2)
L8	Elec Therm (Step)	Electrical Thermal (Out of Step)
L8	Elec Therm (Surge)	Electrical Thermal (Surge)
L8	Time Lag Ovr Current	Time Lag Over Current
L9	Stall Prevent (Strt)	Startup Prevention (Startup)
P1	Pwr Sup Imbalance	Power Supply Imbalance
P4	Fin Temp Sensor Alm	Fin Temperature Sensor Alarm
PJ	Model Setup Problem	Model Setup Problem
U2	Phase Pwr Loss	Phase Power Loss
U2	PN Short Circuit Alm	PN Electrical Short Circuit Alarm
U2	Pwr Sup Insufficient	Power Supply Insufficient

Table 105: Outdoor Fan Fault Codes

Fault Code	HMI Code Text	Extended Text
E7	IPM Prot Active	IPM Protection Active
E7	Momntry Ovrcurrent	Momentary Over Current
E7	Motor Lock	Motor Locked
H7	Motor Alarm	Motor Alarm
L1	EEPROM Problem	EEPROM Problem
L1	EEPROM Setup Problem	EEPROM Setup Problem
L1	JP Setup Problem	JP Setup Problem
L4	Fin Temp Rise	Fin Temperature Rise
P4	Fin Temp Sensor Alm	Fin Temperature Sensor Alarm
PJ	Model Setup Problem	Model Setup Problem
U2	Pwr Sup Voltage Alm	Power Supply Voltage Alarm

Table 106: Inverter Board Fault Codes

ACTIVE FAULT CODES
INVAlarmCode=_____
Code Text
OF1AlarmCode=_____
Code Text
OF2AlarmCode=_____
Code Text
PREVIOUS FAULT CODES
PrvINVAlmCode=_____
Code Text
MM/DD/YYYY HH:MM:SS
PrvOF1AlmCode=_____
Code Text
MM/DD/YYYY HH:MM:SS
PrvOF2AlmCode=_____
Code Text

Viewing Events

Event Log

Table 107: Main Menu \ Service Menus \ Events

Event Name	Description
FanRetry_Event (Control Type: ZTC, DTC or 1ZnVAV)	Supply Fan Retry Active
TenantOR_Event (Control Type: ZTC, DTC or 1ZnVAV)	Tenant Overridden Operation Active
Passive Vent_Event	Passive Ventilation Sequence Active
Passive Ventilation Sequence Active	Circuit 1 High Pressure Unloading Control Active
HPUL1_Event	Circuit 1 VCmp High Pressure Unloading Control Active
LPUL1_Event	Circuit 1 VCmp or FCmp Low Pressure Unloading Control Active
HDLTUL1_Event	Circuit 1 VCmp or FCmp High Discharge Line Temperature Unloading Control Active
HiAmpUL1_Event	Circuit 1 High Current Unloading Control Active
ReqUL1_Event	Circuit 1 Unload Request Control Active
HCRUL1_Event	Circuit 1 High Compression Ratio Unloading Control Active
FinTUL1_Event	Circuit 1 High Fin Temperature Unloading Control Active
LDPUL1_Event	Circuit 1 Low Differential Pressure Unloading Control Active
Reheat Lmtg_Event	Reheat Compressor Limiting Control Active
HiAmb1Lmtg_Event	Fixed Compressor Circuit 1 High Ambient Limiting Control Active
LoSSH1_Event	Circuit 1 Low Suction Superheat Conditions Present
HiSSH1_Event	Circuit 1 High Suction Superheat Conditions Present
LoSubClg1_Event	Circuit 1 Low Subcooling Conditions Present
LoDSH1_Event	Circuit 1 Low Discharge Superheat Conditions Present
HiDSH1_Event	Circuit 1 High Discharge Superheat Conditions Present
LoTc1_Event	Circuit 1 Low Tc Conditions Present
HiTc1_Event	Circuit 1 High Tc Conditions Present
LoTe1_Event	Circuit 1 Low Te Conditions Present
HiTe1_Event	Circuit 1 High Te Conditions Present
HiDRT1_Event	Circuit 1 High Discharge Refrigerant Temperature Conditions Present
HiSRT1_Event	Circuit 1 High Suction Refrigerant Temperature Conditions Present
LowOilPrevent1_Event	Circuit 1 Low Oil Prevent Conditions Present
HeatRiseLmiting_Event	DAT – EF/LC Temp Exceeding Max Heat Rise

Standby Events

Table 108: Main Menu \ Service Menus \ Standby Events

Event Name	Description
HPSB_Event	CircState forced to standby by the High Pressure Unloading Control function
LPSB_Event	CircState forced to standby by the Low Pressure Unloading Control function
HDLTSB_Event	CircState forced to standby by the High Discharge Line Temperature Unloading Control function
LDPSB_Event	CircState forced to standby by the Low Differential Pressure Protection Unloading Control function
HiTSB_Event	CircState forced to standby by the Compressor Body High Temperature Protection function
OAFSB_Event	CircState forced to standby due to a fault detected by the outdoor fan control board
VCmpReqSB_Event	CircState forced to standby due to a request from the variable compressor control board
VCmpPrbSB_Event	CircState forced to standby by the due to a fault detected by the variable compressor control
EVSyncSB_Event	CircState forced to standby by the expansion valve resychronization function
LoDSHDsbl_Event	CircState forced to standby by the Low Discharge Superheat Protection function
HiDSHSB_Event	CircState forced to standby by the high discharge superheat protection function
OAFReqSB_Event	CircState forced to standby due to an outdoor fan control board request

Event Troubleshooting

Table 109: Main Menu \ Service Menus \ Event Troubleshooting

MicroTech Event Name	Event Description	Possible Field Actions			
LoSSH1_Event	Low Suction Superheat	TXV adjustment	Low evap airflow	TXV Malfunction	
HiSubClg1_Event	High Suction Superheat	TXV adjustment	TXV Malfunction	Low charge	
LoDSH1_Event	Low Subcooling	Low charge	Dirty/fouled condenser coil	Condenser Fan motor issue	
HiDSH1 Event	High Subcooling	Overcharge			
LoDSH1_Event	Low Discharge superheat	TXV adjustment	TXV Malfunction		
HiDSH1_Event	High Discharge superheat	TXV adjustment	TXV Malfunction	Low charge	
LoTc1_Event	Low Condensing Temp	Condenser Fan Staging/ Modulation	Cond Splitter Solenoid Malfunction		
HiTc1_Event	High Condensing TempD	Dirty/fouled condenser coil	Cond Splitter Solenoid Malfunction	Condenser Fan motor issue	Overcharge
LoTe1_Event	Low Evaporator Temp	Dirty filter	Low load/Low RA Temp		
HiTe1_Event	High Evaporator Temp	High load/High RA Temp			
HiDRT1_Event	High Discharge Temp	Low charge	TXV Malfunction		
HiSRT1_Event	High Suction Temp	TXV adjustment	TXV Malfunction	Low charge	

Alarm/Event Configurations

Some Alarm/Event Configurations can be customized based on application. Several temperature limits can be adjusted and logging of alarms can be customized and captured to SD cards based on the configurations set in the Alarm Config Menu.

Data Snapshots will provide a means of recording certain unit operating conditions at the moment of an alarm or event occurrence. The MicroTech controller is capable of capturing up to 10 snapshots (sets of data) each containing up to 25 data points for each alarm or event. "Data Set 1-5" on page 181 and "Data Set 6-10" on page 182 for data snapshots that are captured whenever any alarm or event becomes active.

Table 110: Main Menu \ Service Menus \ Alarm/Event Config Menu

Menu Display Name	Default	Range	Description
ALARM LIMITS			
Hi DAT Limit	170°F	90.0-250.0°F	Hi DAT Limit is a adjustable setpoint for the Hi Discharge air temperature limit alarm.
Lo DAT Limit	40°F	-50.0-50.0°F	Lo DAT Limit is an adjustable setpoint for the Lo Discharge Air Temperature Limit alarm.
Hi RAT Limit	170°F 120°F	90-175°F	Hi RAT Limit is an adjustable setpoint for the Hi Return Air Temperature Limit.
ALARM OUT CONFIG			
Faults	Fast	On Off Fast Slow	Choose whether this output will be on, flashing fast, flashing slow, or off when there is one or more active alarms. Faults are conditions serious enough to shut down the unit operation. The alarm must be manually cleared to allow unit operation.
Problems	Slow	On Off Fast Slow	Choose whether this output will be on, flashing fast, flashing slow, or off when there is one or more active alarms. Problems are conditions that result in some limitation of unit operation, but the unit is allowed to continue to operate. Some of these alarms must be cleared manually, but others clear automatically.
Warnings	Off	On Off Fast Slow	Choose whether this output will be on, flashing fast, flashing slow, or off when there is one or more active alarms. Warnings Inform the user of conditions that should be addressed, but do not limit the operation in any way. The alarm condition needs to fixed and the alarm must be manually cleared to cause this alarm to no longer be active.
AlmLogToSD	No	No SI English	AlmLogToSD sets if the alarms are logged on the SD card.
EVENT CONFIG			
Show Events	Yes	No Yes	Show Events is a flag that allows for masking HMI display of events.
EventLogToSD	No	No SI English	EventLogToSD is the Flag that sets if the event log is saved to the SD Card.
SNAPSHOT CONFIG			
SnaptshotsToSD	No	No SI English	SnaptshotsToSD is the Flag that sets if the snapshot log is saved to the SD Card.

MicroTech Inputs/Outputs

The complete set of Inputs and Outputs that are possible on a MicroTech are listed below. These vary by configuration and may or not be included on any given unit based on the features selected and shipped from the factory.

NOTE: Configuration code information can be found on page 142.

Table 111: Main Control Board

Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
X1		X			Space Temperature Sensor 1	10K Thermistor Coefs/InputType = 7	(20=1,2 or 3) & 1≠3 or 4
		X			Compressor Capacity Command Input	0-10VDC or 4-20 mA	1=3 or 4
X2		X			CO2/ExtOAReset	0-10VDC or 4-20 mA	1≠3 or 4
				X	Actual Compressor Capacity Output	0-10VDC	1=3 or 4
X3		X			Reheat Capacity Input	0-10VDC or 4-20 mA	1=3 or 4
				X	Heating Valve	2-10 VDC	[7=1 or 2] & 1≠3 or 4
				X	SCR	1-10 VDC	[7=3,4,5,6,7,8,9,A,B,G,H,J,K,L,M or N] & 1≠3 or 4
X4				X	OA Damper	0-10 VDC	6≠0 & [1≠3 or 4]
X4		X			Heating Capacity Input	0-10 VDC or 4-20 mA	1=4 & [7=3,4,5,6,7,8,9,A,B,C,D,E,F,G,H,J,K,L,M or N]
X5		X			Zone Setpoint	5 – 15 kOhm	1≠3 or 4
		X			DAT Reset	0-10VDC or 4-20mA	(1=1 or 2) & (1≠3 or 4)
		X			Supply Fan Cap Command	0-10 VDC or 4-20 mA	1=3 or 4
X6		X			SAF Duct Static Pressure	4-20mA	[19=1,2 or 3] & [1≠3 or 4]
		X			Return/Exhaust Fan Cap Command	0-10 VDC or 4-20 mA	[1=3 or 4] & 12≠0
X7		X			Building Static Pressure (BPS)	4-20mA	[19=3,4 or 6] & 1≠3 or 4
		X			Return Air Fan Duct Static Pressure (RAFDPS)	4-20mA	[19=2 or 5] & 1≠3 or 4
				X	SCR	1-10 VDC	[7=G or H] & 1=4
X8		X			Return Air Temperature	10K Thermistor Coefs/ InputType = 7	{[6≠2] OR [6=2 & 13≠0]} & {1≠3 or 4}
		X			OA Damper Input	0-10 VDC	1=3 or 4 & [(6≠0 & 26=3,4,5,6 or 7) OR (6=2 & 26=2,3,4,5,6 or 7)]
X9		X			Discharge Air Temperature	10K Thermistor Coefs/(InputType = 7	1≠3
X10		X			Outdoor Air Temperature	10K Thermistor Coefs/InputType = 7	All
X11		X			Entering Fan/Leaving Cooling Coil Temperature	10K Thermistor Coefs/InputType = 7)	{[7=3,4,5,6,7,8,9,A,B,C,D,E,F,G,H,J,K,L,M or N] OR [14≠0] OR [28≠0]} & {1≠3}

(continued)			
Digital Inputs – Dry Contacts			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI1	Emergency Off (Fault/ Normal)		1≠3 or 4
	Alarm Reset Input	Dry Contact	1=3 or 4
DI2	Fan Interlock Input	Dry Contact	1≠3 or 4
	Compressor System Protection Interlock Input	Dry Contact	1=3 or 4
Digital Inputs – 24V			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI3	RemoteSwitch (Stop/Start)		1≠3 or 4
	HeatCool Command Input		1=3 or 4
DI4	Passive Ventilation Input		All & 1≠3 or 4
DI4	Emergency Off (Fault/ Normal)		1=4
Digital Inputs – 115V			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI5	DHL (Fault/Normal)		1≠3 or 4
DI6	Filter Switch Input 1 (Main Filter Section)		1≠3 or 4
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO1	Local/Remote Status Output		1=3 or 4
DO2	Not Used		
DO3	Aux. Defrost Heater		26=3,4,5,6 or 7
DO4	Defrost Status		1=3 or 4 & 26 = 3,4,5,6 or 7
DO5	Heat (On/Off)		[7=2,3,4,5,6,7,8,9,A,B,G,H,J,K,L ,M or N]
	Heat Stage 1		(7=C or E)
DO6	Heat Stage 2		(7=C or E)
DO7	Heat Stage 3		7=E
DO8	Heat Stage 4		7=E
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO9	Alarm		All
DO10	Auxiliary Output		1≠3 or 4
EEV Drivers			
#	**Point**	**Comments**	
EV1	Not Used		
EV2	Not Used		

Expansion Module A I/O (POL965 or POL96E/U)

POL96 module will be used when the unit is equipped with analog Space Temperature Sensor 3 (SpaceTCfg is 3AI) Otherwise, POL965 will be used.

Table 112: Expansion Module A I/O (Main Control Panel)

Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
X1				X	Chilled Water Valve	2-10 VDC	2=0 & 3=0 & 4=1 & 1≠3 or 4
X2		X			RA Humidity Sensor	4-20 mA	1≠3 or 4
X3		X			OA Humidity Sensor	4-20 mA	1≠3 or 4
X4		X			OAFlow Input	0-10VDC or 4-20 mA	16=1 or 2 & [17≠0 or (6≠2 or 5)] & 1≠3 or 4
X5	X				OADPosSw (Open/Closed)	Dry Contact	6=4 & 1≠3 or 4
X6		X			Supply Air Temp Leaving Wheel (ER_LWT)	10K Thermistor Coefs/ InputType = 7	13≠0
X7		X			Exhaust Air Temp Exiting Wheel (ER_EWT)	10K Thermistor Coefs/ InputType = 7	
X8		X			Space Humidity Sensor 1	0-10 VDC or 4-20 mA	All & 1≠3 or 4
X9		X			Space Temperature Sensor 3	10K Thermistor Coefs/ InputType = 7	20=3 & 1≠3 or 4
X10					Not Used		
X11					Not Used		
X12					Not Used		
Digital Input – 115V-230V							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI1					Freezestat		{[7=1 or 2] OR [2=0 & 3=0 & 4=1]} & {1≠3 or 4}
Digital Inputs – Dry Contacts							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI1					Not Used		
DI2					Not Used		
DI3					Not Used		
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO1					Energy Recovery Wheel On/ Off	Energy Recovery	13=6 or 13=1 or 2
DO2					Bypass Damper Closed	Energy Recovery	[13≠0]
DO3					Bypass Damper Open	Energy Recovery	[13≠0]
DO4					Not Used		
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO5					Not Used		
DO6					Not Used		

(continued)			
EV Drivers			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
EV1	Not Used		
EV2	Not Used		

Expansion Module B I/O (POL965)

Table 113: Expansion Module B I/O (Main Control Panel)

Universal Inputs/Outputs						
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**
X1	X	X			Configurable Input 1	DI/AI/NTC
X2	X	X			Configurable Input 2	DI/AI/NTC
X3	X	X			Configurable Input 3	DI/AI/NTC
X4	X	X			Configurable Input 4	DI/AI/NTC
X5	X	X			Configurable Input 5	DI/AI/NTC
X6	X	X			Configurable Input 6	DI/AI/NTC
X7	X	X			Configurable Input 7	DI/AI/NTC
X8	X	X			Configurable Input 8	DI/AI/NTC
X9					Not Used	
X10					Not Used	
X11					Not Used	
X1 2					Not Used	
Digital Input – 115V-230V						
#					**Point**	**Comments**
DI1					Not Used	
DI4					Not Used	
Digital Inputs – Dry Contacts						
#					**Point**	**Comments**
DI1					Not Used	
DI2					Not Used	
DI3					Not Used	
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)						
#					**Point**	**Comments**
DO1					Generic BO1	
DO2					Generic BO2	
DO3					Generic BO3	
DO4					Generic BO4	
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A						
#					**Point**	**Comments**
DO5					Generic BO5	
DO6					Generic BO6	

Expansion Module E I/O (POL98U)

POL98 module will be used when the unit is equipped with R32 refrigerant (Refrig Type is R32, R32HP,R32HP75, R32HP50, R32HP25 or R32HP0). Otherwise, POL96 will be used.

Table 114: Expansion Module E I/O (Refrigeration Circuit 1)

Analog Inputs –NTC							
AI1					Not Used		
AI2					Not Used		
AI3					Not Used		
Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
X1		X			VCmp 1 Body Temperature	50K Thermistor Coefs/InputType = 8	
X2		X			Discharge Refrigerant Pressure 1 (PTD1)	0.5-4.5VDC 0-700psi	
X3		X			VFD Compressor 1 Discharge Line Temperature (C1DRT1)	50K Thermistor Coefs/InputType = 8	
X4				X	DX Bypass Damper	0-10 VDC	14 = 2,4,6,7 & 26≠3,4,5,6 or 7
X4				X	OA Damper	0-10 VDC	6≠0 & [1=3 or 4] & [(26=3,4,5,6 or 7) OR (26=2 & 6=2)]
X5		X			C1FCmp3Temp	50K Thermistor Coefs/InputType = 7	26=2,3,4,5,6 or 7 & [(3=1 & 2>2) OR (3=2 & 2>0)]
X6		X			Suction Refrigerant Pressure 1 (PTS1)	0.5-4.5VDC 0-350psi	
X7		X			Defrost Temperature 1 (DFT1)	10K Thermistor Coefs/ InputType = 7	26=3,4,5,6 or 7
X8		X			FCmp3 Discharge Line Temperature (C1DRT3)	50K Thermistor Coefs/InputType = 7	26=2,3,4,5,6 or 7 & [(3=1 & 2>2) OR (3=2 & 2>0)]
X9		X			VFD Compressor 1 Suction Refrigerant Temperature (SRT1)	10K Thermistor Coefs/ InputType = 7	
X10		X			Liquid Line Refrigerant Temperature 1 (LRT1)	10K Thermistor Coefs/ InputType = 7	24=1
X11							
X12							
Digital Input – 115V-230V							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI1							
DI4					High Pressure 1 (High/ Normal)		26≠2,3,4,5,6 or 7
Digital Inputs – Dry Contacts							
#					**Point**	**Comments**	
DI1					Condensate Drainpan Overflow		26=2,3,4,5,6 or 7
DI2							
DI3							

(continued)			
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO1	VCmp1 Board Enable		
DO2	VCmp1 Crankcase heater (CCH1)		
DO3	C1:Cond Solenoid 1		5=2,3,4,5,6,7
DO4	FCmp3SSOut	Compressor 3	[(3=1 & 2>2) OR (3=2 & 2>0)]
POL98E/U **Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)**			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO5	4 Way Valve 1 (4WV1)		26=3,4,5,6 or 7
DO6	Reheat Bleed Valve		14=3,4,5 or 6
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO7	Not Used		
DO8	Not Used		
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO9	Not Used		
DO10	Not Used		
EV Drivers			
#	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
EV1	C1EVI1		
EV2	MHGRH Valve 1		[14=3,4,5 or 6]

Expansion Module H I/O (POL965)

Table 115: Expansion Module H I/O (Return/Outdoor Panel)

Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
X1				X	Energy Recovery SCR Preheat	1-10VDC	13≠0
X2		X			Space Humidity Sensor 2	0-10 VDC or 4-20 mA	All & 1≠3 or 4
X3		X			Space Temperature Sensor 2	10K Thermistor Coefs/ InputType = 7	(20=2 or 3) & 1≠3 or 4
X4				X	Relief Dampers	0-10 VDC	19=2 or 5
X5		X			SAF Flow Input	4-20 mA	17≠0 & 1≠3 or 4
X6		X			RFEF Flow Input	4-20 mA	18≠0
X7		X			Filter Transducer 1 (Main Filter Section)	4-20mA	
X8		X			Filter Transducer 2 (Main Filter Section)	4-20mA	
Digital Input – 115V-230V							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DI1					Filter Switch Input 2 (Final Filter Section)		1≠3 or 4
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO1					Positive Rel Damper Closure		
DO2					Econo Operation Signal		
DO3					Not Used		
DO4					Not Used		
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A							
#					**Point**	**Comments**	**Configuration Code Condition Pos. 30=1**
DO5					Not Used		
DO6					Not Used		

Expansion Module J I/O (POL965)

Table 116: Expansion Module J I/O (Main Control Panel)

Universal Inputs/Outputs							
#	**DI**	**AI**	**DO**	**AO**	**Point**	**Comments**	**Config. Code Condition Pos. 30=1**
X1				X	SAF Capacity Command	0-10VDC	11=0
X2		X			SAF Capacity Feedback	0-10VDC or 4-20mA fro VFD	11=0
X3				X	RFEF Capacity Command	0-10VDC	12=1 or 2
X4		X			RFEF Capacity Feedback	0-10VDC or 4-20mA fro VFD	12=1 or 2
X5	X				SAF Status Input (Fault/OK)	Digital Input from VFD	11=0
X6	X				RFEF Status Input (Fault/OK)	Digital Input from VFD	12=1 or 2
X7					Not Used		
X8					Not Used		
X9					Not Used		
X10					Not Used		
X11					Not Used		
X1 2					Not Used		
Digital Input – 115V-230V							
#					**Point**	**Comments**	**Config. Code Condition Pos. 30=1**
DI1					Not Used		
DI4					Not Used		
Digital Inputs – Dry Contacts							
#					**Point**	**Comments**	**Config. Code Condition Pos. 30=1**
DI1					Not Used		
DI4					Not Used		
Digital Outputs – Relay (SPST, Normally Open, 230 VAC 3 Amp)							
#					**Point**	**Comments**	**Config. Code Condition Pos. 30=1**
DO1					SAF VFD On/Off		11=0
DO2					RF/EFF VFD On/Off		12=1 or 2
DO3					Not Used		
DO4					Not Used		
Digital Outputs – Solid State Relays, 24-230 VAC, 0.5 A							
#					**Point**	**Comments**	**Config. Code Condition Pos. 30=1**
DO5					Not Used		
DO6					Not Used		

Expansion Board Settings

Figure 34: Expansion Boards

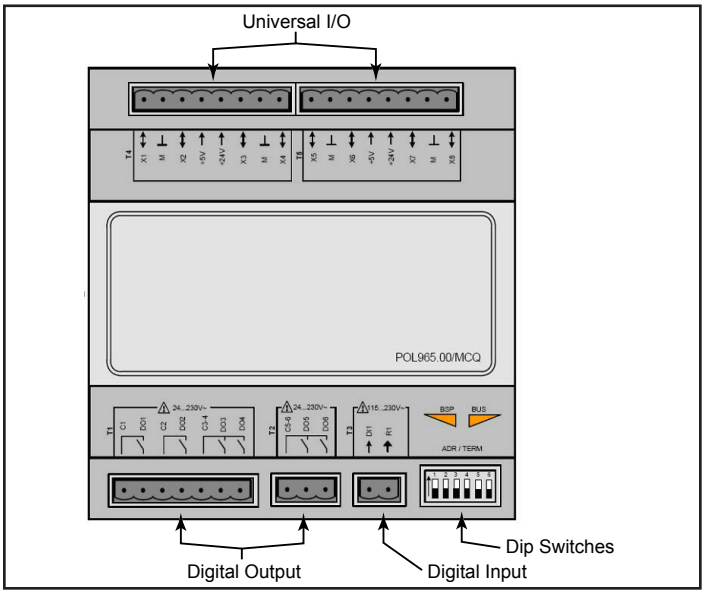


Figure 35: Expansion Board Side Views

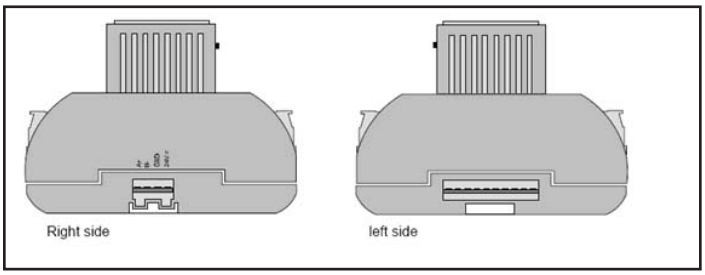


Figure 36: Dip Switch Settings

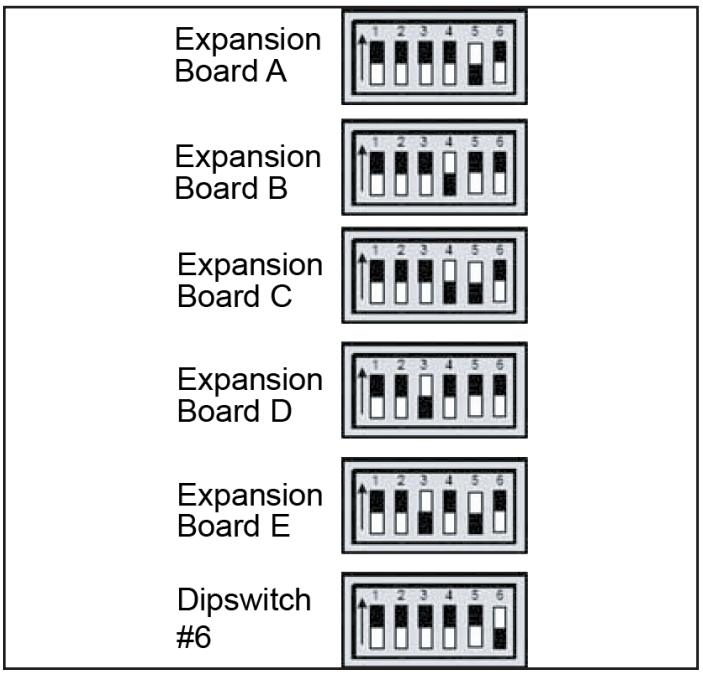


Table 117: Dip Switch Setting Descriptions (see Figure 36)

Expansion Boards	Description
Expansion Board A	Switch #5 in the up position (all others down)
Expansion Board B	Switch #4 in the up position (all others down)
Expansion Board C	Switch #4 and #5 in the up position (all others down)
Expansion Board D	Switch #3 in the up position (all others down)
Expansion Board E	Switch #3 and #5 in the up position (all others down)
Other Expansion Boards	Positions 1-5 on the dip switch are interpreted by the controller as a binary number. The number represents the position in the alphabet of the expansion board name. Example: Expansion Board “A” = 1. The number 1 is represented in binary as 00001. Therefore, the fifth switch in the up position.
Dipswitch #6	Switch #6 **must** be in the up position on the last expansion board in the string regardless whether it is A, B, C, D, or E.

Table 118: MCB I/O Connection Labeling

MCB I/O	Connection Label
T1	24 VOLT POWER SUPPLY
T2	DIGITAL OUTPUT 1,
T3	DIGITAL OUTPUT 2, 3, 4
T4	DIGITAL OUTPUT 5, 6, 7, 8
T5	DIGITAL OUTPUT 9, 10
T6	DIGITAL INPUT 5, 6
T7	ANALOG INPUT 1, 2, 3
T8	UNIVERSAL I/O 1, 2, 3, 4
T9	UNIVERSAL I/O 5, 6, 7, 8
T10	DIGITAL INPUT 1, 2
T11	DIGITAL INPUT 3, 4
T12	MODBUS/VFD
T13	PROCESS BUS/FUTURE

Service Menu Statuses

Table 119: Main Menu \ Service Menus \ Digital Input Status

Menu Display Name	Default	Range	Description
DIGITAL INPUT STATUS: MCB, EMA, EMB, EME, EMH, EMJ			
DI1…DI6	Off	Off On	Displays the current Digital Input status for each DI point

Table 120: Main Menu \ Service Menus \ Digital Output Status

Menu Display Name	Default	Range	Description
DIGITAL OUTPUT STATUS: MCB, EMA, EMB, EME, EMH, EMJ			
DO1…DO6	Off	Off On	Displays the current Digital Output status for each DO point

Network Input Status

Table 121: Main Menu \ Service Menus \ Network Input Status

Menu Display Name	Default	Range
Net OAT In	-	-50.0-200.0°F
Net SpaceT In	-	-0.0-150.0°F
NetCurrState	-	Occ Unocc TntOvrd Standby NUL
NetNextState	-	Occ Unocc TntOvrd Standby NUL
NetTmToNxtSt	-	0-65534min
Net App Mode	-	Off HeatOnly CoolOnly FanOnly Auto NA
Net CI Ena S	-	-1.0-1.0
Net CI Ena V	-	0-255%
Net HT Ena S	-	-1.0-1.0
Net Ht Ena V	-	0-255%
Net Ec Ena S	-	-1.0-1.0
Net Ec Ena V	-	0-255%
Net SAF Cap	-	0-100%
Net EF Cap	-	0-100%
Net Space PPM	-	0-5000ppm
Net Rel Humid	-	0-100%
Net DATClg Spt	-	40.0-100.0°F
Net DATHtgSpt	-	40.0-140.0°F 40.0-105.0°F
NetLCTSpt	-	45.0-65.0°F
NetDXBPLCTSpt	-	45.0-65.0°F
NetDemandShed	-	Inactive Auto Manual
nviSetpoint	-	0.0-100.0°F
NetOccManCmd	-	Occ Unocc TntOvrd Standby Auto
Net Min OA	-	0-100%
nvoEffSpt	-	0.0-100.0°F
nciOccClgSpt	-	0.0-100.0°F
nciOccHtgSpt	-	0.0-100.0°F
nciHVACType	-	Generic FanCoil VAV Hpump RTU UV ChilCeil Rad AHU SCU

Modbus Status

Table 122: Main Menu \ Service Menus \ Modbus Status

Menu Display Name	Default	Range	Description
SAF1 MB Status	-	Fault OK	SAF1 MB Status is a status only item that displays the current Modbus Device Status
EF1 MB Status	-	Fault OK	EF1 MB Status is a status only item that displays the current Modbus Device Status
EF2 MB Status	-	Fault OK	EF2 MB Status is a status only item that displays the current Modbus Device Status
EF3 MB Status	-	Fault OK	EF3 MB Status is a status only item that displays the current Modbus Device Status
EF4 MB Status	-	Fault OK	EF4 MB Status is a status only item that displays the current Modbus Device Status
ER MB Status	-	Fault OK	ER MB Status is a status only item that displays the current Modbus Device Status
C1OF1 MB Status	-	Fault OK	OAF1 MB Status is a status only item that displays the current Modbus Device Status
Fgas1 MB Status	-	Fault OK	A status only item that displays the current Modbus status for the staged furnace board 1
Fgas2 MB Status	-	Fault OK	A status only item that displays the current Modbus status for the staged furnace board 2
Fgas3 MB Status	-	Fault OK	A status only item that displays the current Modbus status for the staged furnace board 3
MGas MB Status	-	Fault OK	MGas MB Status is a status only item that displays the current Modbus Device Status
IFB MB Status	-	Fault OK	A status only item that displays the current Modbus status for the Interface Board
VCmp1 MB Status	-	Fault OK	VCmp1 MB Status is a status only item that displays the current Modbus Device Status
A2L MB Status	-	Fault OK	A status only item that displays the current Modbus status for the A2L leak detection board
MB Resistance	-	No Pol1 Pol2 Pol12 Term2 T2P1 T2P2 T2P1P2	MB Resistance is a status only item that displays the current MB Resistance State
Default Type	-	NA EBM Delta	An adjustable item that allows the selection of the fan type to be controlled by Modbus.
DefaultECMSts	-	Fault OK	DefaultECMSts is a status only item that displays the current Modbus Device Status.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
ECM Chg From	Default	Default SAFM1 SAFM2 SAFM3 SAFM4 EFM1 EFM2 EFM3 EFM4	ECM Chg From is an adjustable item that sets which master fan address will be changed from during the field addressing process.
ECM Chg To	Default	Default SAFM1 SAFM2 SAFM3 SAFM4 EFM1 EFM2 EFM3 EFM4	ECM Chg To is an adjustable item that sets which master fan address will be changed to during the field addressing process.
ECM Cfg	Done	Done ApplChg	ECM Cfg is an adjustable item that applies an ECM Master Address configuration change.

Advanced Menus

Unit Configuration

⚠ WARNING

Operational settings should only be made with the advisement of a qualified person; changing key configurations away from factory settings may result in damage to equipment or surrounding property. Recommended settings may vary based on application specific requirements.

Unit Configuration String

After the main control board application software is loaded into the MCB, it must be “configured” for the specific control application. This consists of setting the value of 30 configuration variables within the MCB. These variables define things such as the type of cooling, number of compressors, cooling stages, and the type of heat. If all of these items are not set appropriately for the specific unit, the unit will not function properly. The correct settings for these parameters are defined for a given unit by the unit “Software Configuration Code.”

The “Software Configuration Code” consists of a 30-character string of numbers and letters. The code can be found on the unit software Identification label located on the back side of the control panel door.

The table below lists the configuration code variables, including the position within the code, description of the parameter, and the applicable settings for each. The default values are shown in bold font. The unit is configurated at the factory however may also be configured in the field by accessing the **Unit Configuration** menu. Once changes have been made to the Unit Configuration menu, the Apply Changes flag must be changed from no to yes in order for the controller to recognize the changes. Setting the Apply Changes Flag to Yes will automatically reset the controller.

Table 123: Main Menu \ Advanced Menus \ Unit Configuration

Configuration Code Position	Description	Values	Notes
1	Control Type	0= Zone Temperature Control (ZTC)	
		1= Discharge Temperature Control (DTC)	
		2= Single Zone VAV Control (1ZnVAV)	
		3= Refrigeration Only Control - Fans/ Comps Via MT4 (RO_FC)	
		4= Refrigeration Only Control - Fans/ Comps/GasHt/ElecHt Via MT4 (RO_FCGE)	
		5 = RO_DCSA (5)	
2	Fixed Compressors	0-6	
3	Variable Compressors	0-4	
4	Compressor Circuits	0-3	
5	OAFanCfg	0=None	
		1=OnOffT	
		2= OnOffP	
		3=VarVFD	
		4=VarECM1	
		5=VarECM2	
		6=VarDK1	
		7=VarDK2	

(continued)			
Configuration Code Position	**Description**	**Values**	**Notes**
6	Damper Type	0=None	
		1=Single Position 0-30% (30OA)	
		2=Single Position 100% (100OA)	
		3=Modulating Economizer Air side (Econ)	
		4= Modulating Economizer Air side with FDD (EconFDD)	
		5=Single Position 100% with Recirc (100wRec)	
7	Heating Type	0=None	
		1=F&BP Control (F&BP)	
		2=Steam or Hot Water (HW_Stm)	
		3=Modulated Gas, 5-1 (M1G5-1) (was L200)	
		4=Modulated Gas, 5-1 (M1G5-1) (was L400)	
		5=Modulated Gas, 5-1 (M1G5-1) (was L600)	
		6=Modulated Gas, 10-1 (M1G10-1) (was H400)	
		7=Modulated Gas, 10-1 (M1G10-1) (was H600)	
		8=Modulated Gas, 10-1 (M2G10-1) (was L800)	
		9=Modulated Gas, 10-1 (M3G10-1) (was L1200)	
		A=Modulated Gas, 20-1 (M2G20-1) (was H800)	
		B=Modulated Gas, 20-1 (M3G20-1) (was H1200)	
		C=2 Stage Electric (2StgE)	
		D=2 Stage Gas (2StgG)	
		E=4 Stage Electric (4StgE)	
		F=4 Stage Gas (4StgG)	
		G=SCR Electric (SCR)	
		H=SCR Electric/Supplemental Reheat (SCRSRht)	
		I=Not Used	
		J=Modulating Gas, 10-1 (M4G10-1)	
		K= Modulating Gas, 20-1 (M4G20-1)	
		L=Modulating Gas, 12-1 (M1G12-1)	
		M= Mod Gas Drum & Tube, 5-1 (MDT5-1)	
		N= Mod Gas Drum & Tube, 20-1 (MDT20-1)	
8,9,10	Max Heat Rise	Three Digits (Default = 100, Range 0-100)	

(continued)			
Configuration Code Position	**Description**	**Values**	**Notes**
11	SAFType	0=Analog1/None (AO/None)	
		1=1 ECM Modbus Master Fan (1M)	
		2=2 ECM Modbus Master Fans (2M)	
		3=3 ECM Modbus Master Fans (3M)	
		4=4 ECM Modbus Master Fans (4M)	
		5= 6 ECM Modbus Master Fans (6M)	
		6=SAF VFD Modbus (VFDMB)	
12	RFEFType	0=None	
		1=RF Analog1 (RFAnlg1)	
		2=EF Analog1 (EFAnlg1)	
		7= 1 ECM Modbus Exhaust Fan (1ECMEF)	
		8= 2 ECM Modbus Exhaust Fans (2ECMEF)	
		9= 3 ECM Modbus Exhaust Fans (3ECMEF)	
		A= 6 ECM Modbus Exhaust Fans (6ECMEF)	
		C= Exhaust Fan VFD Modbus (EFVFDMB)	
13	ER Config	0=None	
		1=Constant Speed Wheel (CS)	
		2=Constant Speed Wheel w/ RH (CSRH)	
		3=NA	
		4=NA	
		5=VFD Modbus (VFD)	
		6=Analog (Anlg)	
14	Reheat Type	0=None	
		1=Primary Heat Reheat (PriHtg)	
		2=Primary Heat Reheat w/DXBP (PriHtBP)	
		3=Modulating Hot Gas (MHG)	
		4=Modulating Hot Gas w/DXBP (MHGBP)	
		5=Modulating Hot Gas & Liquid Subcooling Reheat (HG_LSC)	
		6=Modulating Hot Gas & Liquid Subcooling Reheat w/DXBP (HGLSCBP)	
		7=DX Bypass Only (DXBP)	
		8=Modulating Liquid Subcooling Reheat (MLSC)	
15	ExtOA Input	0=None	
		1=ExtVDC	
		2=ExtmA	
		3=CO2VDC	
		4=CO2mA	
		5=CO2QMX+	

(continued)			
Configuration Code Position	**Description**	**Values**	**Notes**
16	OA Flow Input	0=None	
		1=VDC	
		2=mA	
17	SA Flow Input	0=None	
		1=1Fan	
		2=2Fan	
		3=3Fan	
		4=4Fan	
		5=6Fan	
18	RFEF Flow Input	0=None	
		1=1Fan	
		2=2Fan	
19	StaticPCfg	0=NA:NA	SAFSPS:EFSPS
		1=DSP:NA	
		2=DSP:DSP	
		3=DSP:BSP	
		4=BSP:NA	
		5=NA:DSP	
		6=NA:BSP	
20	SpaceTCfg	0=None	
		1=1 Sensors (1AI)	
		2=2 Sensors (2AI)	
		3=3 Sensors (3AI)	
		4=1 Sensors Space Temp Only (1QMXS)	
		5=2 Sensors Space Temp Only (2QMXS)	
		6=3 Sensors Space Temp Only (3QMXS)	
		7=1 Sensors Space/Hum/CO2 (1QMX+)	
		8=2 Sensors Space/Hum/CO2 (2QMX+)	
		9=3 Sensors Space/Hum/CO2 (3QMX+)	
		A=1 Sensor IAQ SpacMB (1IAQMB)	
21,22,23	Unit Size	Three digits (default 050, Range 0-999)	
24	MonitorPkgs	0=None	
		1=Refrig System Only (RefSys)	
25	EHGBPCfg	0=None	
		1=Circ1	

(continued)			
Configuration Code Position	**Description**	**Values**	**Notes**
26	Refrig Type	0=None	
		1=R410A (no heat pump)	
		2=R32 (no heat pump)	
		3=R32HP (heat pump no aux heat limit)	
		4=R32HP75 (heat pump 75% aux heat limit)	
		5=R32HP50 (heat pump 50% aux heat limit)	
		6=R32HP25 (heat pump 25% aux heat limit)	
		7=R32HP0 (heat pump 0% aux heat limit)	
27	Unit Voltage	0=208/60Hz	
		1=230/60Hz	
		2=460/60Hz	
		3=575/60Hz	
28	Preheat Type	0=None	
		1=HW_Stm	
		2=F&BP	
		3=SCR	
29	EV Type	0=None	
		1=Danfoss ETS (DFETS)	
		2=Danfoss Colibri (DFCol)	
		3=Fujikoki_PAM 2000 (FJPAM2)	
		4=Fujikoki_PAM 3000 (FJPAM3)	
		5=Sporlan (Spln)	
		6=Fujikoki_PAM 3000/Fujikoki_PAM 2000 (Fj3/Fj2)	
		7=Fujikoki_PAM 2000/Fujikoki_PAM 3000 (Fj2/Fj3)	
		8=Danfoss Colibri/Fujikoki_PAM 2000 (DFC/Fj2)	
		9=Danfoss Colibri/Fujikoki_PAM 3000 (DFC/Fj3)	
		A=Sporlan/Fujikoki_PAM 2000 (Spr/Fj2)	
		B=Sporlan/Fujikoki_PAM 3000 (Spr/Fj3)	
		C=Sporlan/Danfoss Colibri (Spr/DFC)	
		D=Fujikoki_PAM 2000/Sporlan (Fj2/Spr)	
		E=Fujikoki_PAM 3000/Sporlan (Fj3/Spr)	
		F= Danfoss Colibri/Sporlan (DFC/Spr)	
30	IOConfig	0=RebApp	
		1=Rebel	
		2=DCSA	
31	Sensor Cfg	0-8	

Unit Set-Up

Rapid Start Operation

The user may elect to initiate a **Rapid Start** sequence at unit power up by setting the rapid start flag to Yes. When this flag is set to Yes, the Rapid Start timer and Service Timer is set to 10 min whenever the power is reset to the controller. When the service timer is not zero, the times for the Cooling Stage Time, Heating Stage Time, Start Initial Time, Recirculation Time, and ZeroOATime are set to the Service time value (SrvcTime Inc = default 30s) instead of running through the normal values. This allows the unit to be run through its operating states without having to wait for the normal time delays to expire. These times revert to the standard values when the Service Timer Count Down is zero.

Table 124: Main Menu \ Advanced Menus \ Unit Set-Up

Menu Display Name	Default	Range	Description
Rapid Start	No	No Yes	Rapid Start is an adjustable item that allows the user to select to initiate a rapid startup sequence at unit power up.
Rapid Start Tm	10min	0-20 min	Rapid Start Tm is an adjustable item that allows the user to set the Rapid Start timing whenever the power is reset to the controller and the controller finishes its startup sequence.
Aux Out Cfg	FanOp	FanOp VAVBox	Aux Out Cfg is an adjustable item that defines the functional it of the digital output (DO10) on the main control board. The output is either a supply fan operation output indication or a VAV box signal depending on how this parameter is set.

Advanced Timers

⚠ WARNING

Operational settings should only be made with the advisement of a qualified person; changing key configurations away from factory settings may result in damage to equipment or surrounding property. Recommended settings may vary based on application specific requirements.

Table 125: Main Menu \ Advanced Menus \ Advanced Timers

Menu Display Name	Default	Range	Description
Pwd Timeout	10min	3-720min	Pwd Timeout is an adjustable item that sets the amount of time in minutes that the controller will allow access to applicable menus without re-entering the necessary password. If the keypad display remains idle for this time period the display will revert to the “main menu” requiring a re-entering of the password.
Airflow Ign	120s	0-999s	Air Flw Ign is an adjustable item that sets the amount of time the air proving signal from the fans is ignored after the supply fan is started.
Htg WrmupTm	45s	0-45s	Htg WrmupTm is an adjustable item that sets the amount of time in seconds the controller will stay in Cold Start Sequence. Applies if Heating Type is Modulating Gas or Electric Heat.
	60s	60-300s	Htg WrmupTm is an adjustable item that sets the amount of time in seconds the controller will stay in Cold Start Sequence. Applies if Heating Type is MDT5-1 or MDT20-1.
Htg HldPeriod	240s	0-999s	HtgHldPeriod is an adjustable item which is used to set the amount of time the gas heating valve remains at its calculated value on units equipped as 100% OA (default 240s). This is to allow the temperature to approach equilibrium with the modulating gas heating valve at a fixed position.
LoDATEmSCRTm	5min	0-60min	LoDATEmSCRTm is an adjustable item that sets the amount of time in minutes the unit operates at maximum heating capacity before going into Emergency Auxiliary Heat mode.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Srvc Time Inc	30s	30-300s	Srvc Time Inc is an adjustable item used to set the internal stage time delay when the Aux is not zero, the times listed below are to set to the Service Time (Default = 30s) instead of the normal values. • Cooling Stage Timer • Heating Stage Timer • Start Initial Timer • Recirculation • Zero OA Timer
OffHtClDelay	120s	0-999s	OffHtClDelay is an adjustable item that sets a delay in turning off the supply air fan when the unit is shut off while cooling or heating operation is active.
MinExStartTm	120s	60-300s	MinExStartTm is an adjustable item that sets the minimum exhaust fan on time (Default = 120 seconds).
MinExStopTm	120s	60-300s	MinExStopTm is an adjustable item that sets the minimum exhaust fan stop time (Default = 120 seconds).
ERWhl Stg Tm	5min	1-100min	ERWhl Stg Tm is an adjustable item used to set a minimum time period for operating at either the minimum or maximum speed before action is taken to change speed during the frost protect mode of operation.
ERWhl Off Tm	20min	1-100min	ERWhl Off Tm is an adjustable item used to set the minimum amount of time the energy wheel will remain off after being turned off due to a frosting/condensation condition.
SAF Ctrl Dly	60s	60-300s	SAF Ctrl Dly is an adjustable item that sets the duration of time that the minimum speed signal is sent to the variable speed supply air fan after the supply fan is started via a modbus or digital output. Control reverts to either duct pressure or speed after the fan has been on for the SAF CtrlDelay (default 30 seconds).
EF Ctrl Dly	60s	60-300s	EF Ctrl Dly is an adjustable item that sets the duration of time that the minimum speed signal is sent to the variable speed exhaust air fan after the exhaust fan is started via a modbus or digital output. Control reverts to either duct pressure or speed after the fan has been on for the EF CtrlDelay (default 30 seconds).
Frz Delay Tm	30s	0-180s	Frz Delay Tm is an adjustable item that is used to set the freeze alarm delay time.
LP Delay	2s	0-10s	LP Delay is an adjustable item used to set the low pressure switch delay time.
LP Comp Delay	5s	0-60s	LP Comp Delay is an adjustable item that is used to set the low pressure compressor delay time.
Sens Alm Dly	30s	0-300s	Sens Alm Dly is an adjustable item that is used to set the sensor alarm delay time.
Tmp Alm Dly	35s	0-300s	Tmp Alm Dly is an adjustable item is an adjustable item used to set the temperature alarm delay time.

Supply Fans

SAF Set-Up

Table 126: Main Menu \ Advanced Menus \ SAF Set-Up

Menu Display Name	Default	Range	Description
SAF Ctrl Dly	60s	0-300s	SAF Ctrl Dly is an adjustable item that sets the duration of time that the minimum speed signal is sent to the variable speed supply air fan after the supply fan is started via a modbus or digital output. Control reverts to either duct pressure or speed after the fan has been on for the SAF CtrlDelay (default 30 seconds).
SAFCtrlDlyCap	25.0%	0-100.0%	SAFCtrlDlyCap is an adjustable item that sets the capacity that the fan will stay during the SAF Ctrl Dly Timer.
HtgClgOffCap	33.0%	33.0-100.0%	HtgClgOffCap is an adjustable item that sets the capacity the supply fan will operate at when the unit state is off but the fan is running due to the Htg/ClgOffDelay being true or if an compressorized cooling circuit state is Pumpdown.
SAFVentCap	0%	0-100%	SAFVentCap is an adjustable item that sets the supply fan speed with the external ventilation override input to the supply fan is present.
SAFIncTime	60s	0-999s	SAFIncTime is an adjustable value used to set the time it takes for the supply air fan to ramp from off to 100% speed.
SAFDecTime	60s	0-999s	SAFDecTime is an adjustable value used to set the time it takes for the supply air fan to ramp from 100% speed to off.
Min Fan Nmbr	Sets to the halfpoint of number or master SAF present (rounded down)	1-9	Min Fan Nmbr is an adjustable value that defines the minimum number of fans that are communicating before the unit controller generates Airflow Fault Alarm.
AgSAFStrtCap	75%	50-100%	AgSAFStrtCap is an adjustable item used in specific indoor agriculture applications. This item is used to set the supply fan starting speed.
AgSAFChgInc	5%	1-20%	AgSAFChgInc is an adjustable item used in specific indoor agriculture applications. This item is used to set the supply fan percentage change in speed.
AgSAFChgTm	20min	10-60min	AgSAFChgTm is an adjustable item used in specific indoor agriculture applications. This item is used to set the timer flag which is used when measuring the time since the supply fan speed has changed.
AgSAFRstChg	3°F	2-10°F	AgSAFRstChg is an adjustable item used in specific indoor agriculture applications. This item is used to set the value by which the occupied cooling setpoint changes in order to change the supply fan command to the Start Capacity.
SAF1-SAF6 Type	NA	NA EBM Delta	An adjustable item to select the number of Supply Air Fans.
Fan P/N	-	**********	Fan P/N is a status only item that indicates the supply fan part number.
Fan Size	630 (default read and established via Modbus)	000-999	An adjustable item to select the Supply Air Fan diameter.
KVal Ovrd	0	000-999	An adjustable item to enter a piezo ring K-Value which will override existing value.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
SAF Diameter	27	11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 40, 44	SAF Diameter is an adjustable value to set the supply air fan diameter.
SAFCapInType	VDC	VDC mA	SAFCapInType is the signal input type for units with analog controlled fans.
SAFCapMinSig	0.0V	0.0-20.0 V/mA	SAFCapMinSig is the minimum signal input corresponding to 0% fan capacity for units with analog controlled fans.
SAFCapMaxSig	10.0V	0.0-20.0 V/mA	SAFCapMaxSig is the maximum signal input corresponding to 100% fan capacity for units with analog controlled fans.

SAF Status

Table 127: Main Menu \ Advanced Menus \ SAF Set-Up \ SAF Status

Menu Display Name	Default	Range	Description
SAF1Status	-	0-65535	SAF1Status is a status only item which displays the Supply Fan Drive Status.

SAF DSP Control

Table 128: Main Menu \ Advanced Menus \ SAF Set-Up \ DSP Control

Menu Display Name	Default	Range	Description
SAF Ramp Time	60s	0-999s	SAF Ramp Time is an adjustable item that sets the amount of time it will take for the variable speed fan to drive from its minimum to maximum speed as well as its maximum to minimum speed. The SAF Ramp Time= value on the keypad must be changed whenever the ramp time of the variable speed fan is changed. The ramp up time must equal the ramp down time, and both must equal the SAF RampTime value to provide stable operation.
Min SAF Period	5s	0-999s	Min SAF Period is an adjustable item that sets the duration of the sample time between speed changes. The sample time must be long enough to allow the static pressure to get very close to its steady state value before another calculation is made.
Max SAF Chg	15%	0-100%	Max SAF Chg is an adjustable item that sets the maximum value for a speed increase or decrease (either positive or negative value) is added to the current fan speed whenever the control setpoint (example duct pressure) is outsize of the deadband and the Min Period time has passed since the last speed change.

1 Zone VAV Control

Table 129: Main Menu \ Advanced Menus \ SAF Set-Up \ 1ZnVAV Control

Menu Display Name	Default	Range	Description
1ZnVAV Period	60s	0-999s	1ZnVAV Period is an adjustable item that sets the “sampling time” used in the PI control function to vary the supply fan speed when 1ZnVAV supply fan control is selected.
1ZnVAV Gain	0.8	0.0-100.0s	1ZnVAV Gain is an adjustable item that sets the “gain” used in the PI control function to vary the supply fan speed when 1ZnVAV supply fan control is selected.
1ZnVAV PAT	400s	0-999s	1ZnVAV PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the supply fan speed when 1ZnVAV supply fan control is selected.
1ZnVAVMax Chg	10%	0-100%	1ZnVAVMax Chg is an adjustable item that sets the maximum value of increase or decrease of the supply fan speed each period used in the PI control function to vary the supply fan speed when 1ZnVAV supply fan control is selected.

OAFlow Control

Table 130: Main Menu \ Advanced Menus \ SAF Set-Up \ OAFlow Control

Menu Display Name	Default	Range	Description
Min OA Flow	0CFM	0-60000CFM	Min OA Flow is an adjustable item that sets the minimum CFM value of the airflow station input signal.
Max OA Flow	10000CFM	0-60000CFM	Max OA Flow is an adjustable item that sets the maximum CFM value of the airflow station input signal.
V/A@MinOAFlw	0.0/V	0.0-20.0V/mA	V/A@MinOAFlw is an adjustable item that sets the DC voltage or mA value at the minimum CFM value of the airflow station input signal.
V/A@MaxOAFlw	10.0/V	0.0-20.0V/mA	V/A@MaxOAFlw is an adjustable item that sets the DC voltage or mA value at the maximum CFM value of the airflow station input signal.
Flow DB	3%	0-100%	Flow DB is an adjustable item that sets the “deadband” used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.
Flw Period	30s	0-999s	Flow Period is an adjustable item that sets the “sample time” used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.
Flw Gain	0.1	0.0-100.0	Flow Gain is an adjustable item that sets the “gain” used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.
Flow MaxChg	5%	0-100%	Flow MxChg is an adjustable item that sets the maximum value of increase or decrease of the supply fan speed each period used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.

SAF Flow Control

Table 131: Main Menu \ Advanced Menus \ SAF Set-Up \ SAF Flow Control

Menu Display Name	Default	Range	Description
Flow DB	3%	0-100%	Flow DB is an adjustable item that sets the “deadband” used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.
Flow Period	30s	0-999s	Flow Period is an adjustable item that sets the “sample time” used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.
Flow Gain	0.1	0.0-100.0	Flow Gain is an adjustable item that sets the “gain” used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.
Flow MxChg	5%	0-100%	Flow MxChg is an adjustable item that sets the maximum value of increase or decrease of the supply fan speed each period used in the PI control function to vary the supply fan speed when airflow (CFM) supply fan control is selected.

SAF BSP Control

Table 132: Main Menu \ Advanced Menus \ SAF Set-Up \ SAF BSP Control

Menu Display Name	Default	Range	Description
BSP Period	5s	0-999s	BSP Period is an adjustable item that sets the “sample time” used in the PI control function to vary the supply fan speed when building static pressure (BSP) supply fan control is selected.
BSP Gain	0.2	0.0-100.0	BSP Gain is an adjustable item that sets the “gain” used in the PI control function to vary the supply fan speed when building static pressure (BSP) supply fan control is selected.
BSP Max Chg	4%	0-100%	BSP Max Chg is an adjustable item that sets the maximum value of increase or decrease of the supply fan speed each period used in the PI control function to vary the supply fan speed when building static pressure (BSP) supply fan control is selected.

Exhaust Fans

EF Set-Up

Table 133: Main Menu \ Advanced Menus \ EF Set-Up

Menu Display Name	Default	Range	Description
EF Ctrl Dly	60s	0-999s	EF Ctrl Dly is an adjustable item that sets the duration of time that the minimum speed signal is sent to the variable speed exhaust air fan after the Exhaust fan is started via a modbus or digital output. Control reverts to either normal control type after the fan has been on for the EF CtrlDelay (default 30 seconds).
EFVentCap	0%	0-100%	EFVentCap is an adjustable item that sets the exhaust fan speed with the external ventilation override input to the exhaust fan is present. Included with the Ventilation Override controls sequence.
MinExStrtTm	120s	60-300s	MinExStrtTm is an adjustable item that sets the minimum exhaust fan on time (default 120s).
MinExStopTm	120s	60-300s	MinExStopTm is an adjustable item that sets the minimum exhaust fan off time (default 120s).
EFIncTime	60s	0-999s	An adjustable item for the Exhaust Fan time it takes to go from off to full speed.
EFDecTime	60s	0-999s	An adjustable item for the Exhaust Fan time it takes to go from full speed to off.
EF1-6 Type	NA	NA EBM Delta	An adjustable item to select the type of Exhaust Fan Type.
EFCapInType	VDC	VDC mA	EFCapInType is the signal input type for units with analog controlled fans.
EFCapMinSig	0.0V	0.0-20.0 V/mA	EFCapMinSig is the minimum signal input corresponding to 0% fan capacity for units with analog controlled fans.
EFCapMaxSig	10.0V	0.0-20.0 V/mA	EFCapMaxSig is the maximum signal input corresponding to 100% fan capacity for units with analog controlled fans.
Fan P/N	-	**********	Fan P/N is a status only item that indicates the exhaust fan part number.
Fan Size	630 (default read and established via Modbus)	000-999	An adjustable item to select the diameter of the Exhaust Fan.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
KVal Ovrd	0	0-999	An adjustable item to enter a piezo ring K-Value which will override existing value.
RFEF Diameter	27	11, 12, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 40, 44	RFEF Diameter is an adjustable value to set the return fan/ exhaust fan diameter.

Cap Diff Control

Table 134: Main Menu \ Advanced Menus \ EF Set-Up \ Cap Diff Control

Menu Display Name	Default	Range	Description
Lo Fan Diff	100%	0-100%	Lo Fan Diff is an adjustable item that sets the low return fan capacity differential.
Hi Fan Diff	100%	0-100%	Hi Fan Diff is an adjustable item that sets the high return fan capacity differential.

RFEF Status

Table 135: Main Menu \ Advanced Menus \ EF Set-Up \ RFEF Status

Menu Display Name	Default	Range	Description
EF1Status	-	0-65535	EF1Status is a status only item which displays the Exhaust Fan Drive Status.

EF BSP Control

Table 136: Main Menu \ Advanced Menus \ EF Set-Up \ EF BSP Control

Menu Display Name	Default	Range	Description
BSP Period	5s	0-999s	BSP Period is an adjustable item that sets the “sample time” used in the PI control function to vary the exhaust fan capacity when building static pressure (BSP) EF control is selected.
BSP Gain	0.2	0.0-100.0	BSP Gain is an adjustable item that sets the “gain” used in the PI control function to vary the exhaust fan capacity when building static pressure (BSP) EF control is selected.
BSP Max Chg	4%	0-100%	BSP Max Chg is an adjustable item that sets the maximum value of increase or decrease of the exhaust fan capacity each period used in the PI control function to vary the exhaust fan capacity when building static pressure (BSP) EF control is selected.

EF Flow Control

Table 137: Main Menu \ Advanced Menus \ EF Set-Up \ EF DSP Control

Menu Display Name	Default	Range	Description
EF FlwPeriod	30s	0-999s	EF FlwPeriod is an adjustable item that sets the “sample time” used in the PI control function to vary the exhaust fan capacity when EF Flw Control is selected.
EF Flw Gain	0.1	0.0-100.0	EF Flw Gain is an adjustable item that sets the “gain” used in the PI control function to vary the exhaust fan capacity when Exhaust Fan Flow Control is selected.
EF Flw PAT	60s	0-999s	EF Flw PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the exhaust fan speed when EF Flow Control is selected.
EF Flw MxChg	5%	0-100%	EF Flw MxChg is an adjustable item that sets the maximum value of increase or decrease of the exhaust fan capacity each period used in the PI control function to vary the exhaust fan capacity when EF Flw Control) EF control is selected.

Flow Diff Control

Table 138: Main Menu \ Advanced Menus \ EF Set-Up \ Flow Diff Control

Menu Display Name	Default	Range	Description
FlwDiff Period	30s	0-999s	FlwDiff Period is an adjustable item that sets the “sample time” used in the PI control function to vary the exhaust fan capacity when EF Flow Diff Control is selected.
FlwDiff Gain	0.1	0.0-100.0	FlwDiff Gain is an adjustable item that sets the “gain” used in the PI control function to vary the exhaust fan capacity when Exhaust Fan Flow Diff Control is selected.
FlwDiff PAT	60s	0-999s	FlwDiff PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the exhaust fan speed when EF Flow Diff Control is selected.
FlwDiff MxChg	5%	0-100%	FlwDiff MxChg is an adjustable item that sets the maximum value of increase or decrease of the exhaust fan capacity each period used in the PI control function to vary the exhaust fan capacity when EF Flw Diff Control EF control is selected.

EF OAD Control

Table 139: Main Menu \ Advanced Menus \ EF Set-Up \ EF OAD Control

Menu Display Name	Default	Range	Description
ExhMinOAPos	5%	0-100%	ExhMinOAPos is an adjustable item that sets the OA position where the exhaust fan turns on when the EF control is set to Outdoor air damper.
ExhMinSAFCap	10%	0-100%	ExhMinSAFCap is an adjustable item that sets the minimum exhaust SAF capacity. The supply air fan speed must be higher than this value for exhaust operation.

Heating and Cooling Change Over

⚠ WARNING

Operational settings should only be made with the advisement of a qualified person; changing key configurations away from factory settings may result in damage to equipment or surrounding property. Recommended settings may vary based on application specific requirements.

Project Ahead

This section describes the projected control temperature used to turn On and Off stages of heating and cooling for Zone Control units. It is not used for DAT control units.

In Zone Control cooling and heating operation, the Projected Control Temperature reduces overshoot as the zone temperature approaches a setpoint after start up. It does this by causing stages to stop increasing before the actual control temperature reaches the setpoint. The rate of change to the control temperature is calculated once per minute by the controller and equals the change during the last 60 seconds. This rate of change is multiplied by the Effective Project Ahead Time and is added to the current control temperature. The rate of change may be negative or positive, so the Projected Control Temperature may be higher or lower than the actual control temperature. This value, the Projected Control Temperature, is the temperature that would exist after the **Project Ahead** time passes if the control temperature were to continue to change at the same rate for the Effective Project Ahead Time. The Effective Project Ahead time is set equal to the Cooling Project Ahead Time when the unit is in the Cooling state. The Effective Project Ahead Time is set equal to the Heating Project Ahead time when in the Heating State. It is set equal to zero under all other conditions, causing the projected Control Temperature to equal the actual control temperature.

HtgClg ChgOvr Set-up

Table 140: Main Menu \ Advanced Menus \ HtgClg ChgOvr Set-Up

Menu Display Name	Default	Range	Description
PA Ctrl Temp	-	-83.2-147.0°F	PA Ctrl Temp.
ClgSptPeriod	60s	0-999s	ClgSptPeriod is an adjustable item which sets the “sampling time” used in the PI control function to vary the DAT Clg Spt in zone control applications.
ClgSptGain	0.1	0.0-100.0	ClgSptGain is an adjustable item which sets the “gain” used in the PI control function to vary the DAT Clg Spt in zone control applications.
ClgSptPAT	600s	0.0-999s	ClgSptPAT is an adjustable item which sets the “project ahead time” used in the PI control function to vary the DAT Clg Spt in zone control applications.
MaxClgSptChg	5.0°F	0.0-50.0°F	MaxClgSptChg is an adjustable item that sets the maximum value for an increase or decrease of the DAT Clg Spt in zone control applications.
HtSptPeriod	60s	0-999s	HtSptPeriod is an adjustable item which sets the “sampling time” used in the PI control function to vary the DAT Htg Spt in zone control applications.
HtgSptGain	0.1	0.0-100.0	HtgSptGain is an adjustable item which sets the “gain” used in the PI control function to vary the DAT Htg Spt in zone control applications.
HtgSptPAT	600s	0.0-999s	HtgSptPAT is an adjustable item which sets the “project ahead time” used in the PI control function to vary the DAT Htg Spt in zone control applications.
MaxHtgSptChg	5.0°F	0.0-50.0°F	MaxHtgSptChg is an adjustable item that sets the maximum value for an increase or decrease of the DAT Htg Spt in zone control applications.
EcoSptPeriod	60s	0-999s	EcoSptPeriod is an adjustable item which sets the “sampling time” used in the PI control function to vary the DAT Econo Spt in zone control applications.
EcoSptGain	0.1	0.0-100.0	EcoSptGain is an adjustable item which sets the “gain” used in the PI control function to vary the DAT Econo Spt in zone control applications.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
EcoSptPAT	600s	0.0-999s	EcoSptPAT is an adjustable item which sets the “project ahead time” used in the PI control function to vary the DAT Econo Spt in zone control applications.
MaxEcoSptChg	5.0°F	0.0-50.0°F	MaxEcoSptChg is an adjustable item that sets the maximum value for an increase or decrease of the DAT Econo Spt in zone control applications.
ClgDmdShdInc	4.0°F	0.0-10.0°F	An adjustable item to increase the occupied Cooling setpoint.
HtgDmdShdInc	4.0°F	0.0-10.0°F	An adjustable item to reduce the occupied Heating setpoint.
ClgShedRate	2.0°F/h	1.0-60.0°F/h	An adjustable item to set the rate at which the Cooling Shed increments.
HtgShedRate	2.0°F/h	1.0-60.0°F/h	An adjustable item to set the rate at which the Heating Shed increments.

High Ambient Limiting

A Control Algorithm is included with the MicroTech that is intended to prevent nuisance high pressure trips during **High Ambient** excursions by staging down fixed speed compressor(s) to allow the unit to operate in a partial capacity state. This High Pressure Unloading protection can be disabled in the Cooling menu. Units that are equipped with Ambient based FanTrol will hold compressor staging (Up) if the OAT is greater than 115°F and will stage down a compressor if the OAT is greater than 118°F for five minutes. Units that are equipped with Pressure based FanTrol or SpeedTrol will hold compressor stage (Up) based on Tc>140°F for 30 seconds and will stage down when Tc > 148°F for 30 seconds.

SpeedTrol

Daikin Applied’s **SpeedTrol** head pressure control operates by modulating the motor speed of all the condenser fans on their respective refrigeration circuit in response to the condenser pressure.

This option allows for mechanical cooling operation down to 25°F for the standard ambient package and -10°F (-23C) when equipped as a Low ambient unit. In a SpeedTrol equipped unit, MicroTech senses refrigerant head pressure and varies the condenser fan speed accordingly. When the pressure rises, the SpeedTrol increases the speed of the fan. When the pressure falls, SpeedTrol decreases the speed of the fan.

The VFD throttling range is 250 to 400 psig, fixed, with a corresponding fan speed range of 10Hz to 60Hz. The fan motor is a three-phase motor, identical to the unit voltage (208V to 575V) and is controlled by a variable frequency drive. The variable frequency drive receives a signal from the MicroTech, which reads a pressure transducer and varies the speed of the condenser fan accordingly. As condenser fan speed reaches its minimum, fans will be staged Off, or cycled to keep a minimum dead pressure of 250 psig.

Cooling Set-Up

Table 141: Main Menu \ Advanced Menus \ Cooling Set-Up

Menu Display Name	Default	Range	Description
Lead Circuit	Circ1	Circ1 Auto	Lead Circuit is an adjustable item that sets which circuit is considered the lead circuit. If a unit is equipped with modulating hot gas reheat, Circuit 1 will always function as the lead circuit during dehumidification operation.
LoadMethod	CrossLoad	LeadLoad CrossLoad	LoadMethod is an adjustable item that sets if the compressors will be staged based on circuit.
DT Above Spt	-	0.0-250.0 F	DT Above Spt is a read only item.
DT Below Spt	-	0.0-250.0 F	DT Below Spt is a read only item.
HiOADwptValue	60°F	0-100°F	Adjustable value used to trigger a “High Dew point Cooling Fault”, which disables the entire unit. Applies only to DOAS units.
HiOADwptDiff	2.0°F	2-10°F	High Outside Air Dew point Differential is an adjustable value used with HIOADwptValue to trigger and clear alarm.
HiAmbLimiting	On	Off On	HiAmbLimiting is an adjustable item that sets if HiAmbinent Limiting turned on.
DXBP Period	60s	0-999s	DXBP Period is an adjustable item which sets the “sampling time” used in the PI control function to vary the DX BP damper.
DXBP Gain	0.8	0.0-100.0	DXBP Gain is an adjustable item which sets the “gain” used in the PI control function to vary the DX BP Damper.
DXBP PAT	120s	0-999s	DXBP PAT is an adjustable item which sets the “project ahead time” used in the PI control function to vary the DX BP Damper.
DXBP Max Chg	10%	0-100%	DXBP Max Chg is an adjustable item that sets the maximum value for an increase or decrease of the DXBP Damper Position.
Curr Clg Stg	-	0-8	Curr Clg Stg is a read only item that displays the current cooling stage.
REFRIG CIRCUIT 1			
PTS1	-	0-725psi	PTS1 is a status only item that displays the current suction line refrigerant pressure for circuit #1.
PTD1	-	0-725psi	PTD1 is a status only item that displays the current discharge line refrigerant pressure for circuit #1.
SSH1	-	-115-115°F	SSH1 is a status only item that displays the current suction super heat for circuit #1.
DSH1	-	-115-115°F	DSH1 is a status only item that displays the current discharge super heat for circuit # 1.
Tg1	-	-50.0-212.0°F	Te1 is a status only item that displays the circuit average suction pressure equivalent saturation temperature.
Tc1	-	-83-212°F	TC1 is a status only item that displays the circuit average discharge line pressure equivalent saturation temperature. Calculated from PTD1 using the standard ASHRAE conversion for R32.
C1DRT1	-	-83-212°F	A status only item which indicates the Discharge Temperature of Comp. 1 in Refrigerant Circuit 1.
C1DRT3	-	-83-392°F	A status only item which indicates the Discharge Temperature of Comp. 3 in Refrigerant Circuit 1.
SRT1	-	-83-212°F	SRT1 is a status only item that displays the current suction line refrigerant temperature.

OAF Set-Up

Table 142: Main Menu \ Advanced Menus \ OAF Circ1 Set-Up

Menu Display Name	Default	Range	Description
FAN STATUS			
OAF1	-	Off On	OAF1 is a status only item that indicates if the OAF1 is on or off
OA Fans	-	Off On	OA Fans is a status only item that indicates of any OA Fan is on
OA Fan Cmd	-	0-100%	OAF Fan Cmd is a status only item that indicates the commanded OAF Capacity
OA Fan Cap	-	0-100%	OAF Fan Cap is a status only item that indicates the actual OA fan capacity
REFRIG CIRCUIT STATUS			
PTS1	-	0.0-725.29psi	PTS1 is a status only item that displays the current suction line refrigerant pressure for circuit #1
PTD1	-	0.0-725.29psi	PTD1 is a status only item that displays the current discharge line refrigerant pressure for circuit #1
SSH1	-	-115-115°F	SSH1 is a status only item that displays the current suction super heat for circuit #1
DSH1	-	-115-115°F	DSH1 is a status only item that displays the current discharge super heat for circuit # 1
Te1	-	-83.2-212.0°F	Te1 is a status only item that displays the circuit average suction pressure equivalent saturation temperature
Tc1	-	-83.2-212.0°F	TC1 is a status only item that displays the circuit average discharge line pressure equivalent saturation temperature. Calculated from PTD1 using the standard ASHRAE conversion for R32.
C1 DRT1	-	-83.2-392.0°F	Discharge Refrigerant Temperature for Circuit 1, Compressor 1, status only item.
C1 DRT3	-	-83.2-392.0°F	Discharge Refrigerant Temperature for Circuit 1, (Fixed) Compressor 3, status only item.
FAN CONTROL			
Eff Tc1	-	-83.2-212°F	Eff Tc1 is a status only item that displays the current Tc setpoint on circuit 1
OAF Period	1s	0-300s	An adjustable input to set the Outdoor Air Fan speed control Period parameter
OAF Gain	0.1	0.0-10.0	An adjustable input to set the Outdoor Air Fan speed control Gain parameter
OAF PAT	20s	0-300s	An adjustable input to set the Outdoor Air Fan Project Ahead Time parameter
Max OAT Spt	120.0°F		Adjustable value at which the PID controls no longer are used to control head pressure. Fans are overridden to max speed when the ambient temperature exceeds setpoint.
Max PTD Spt	469.3psi		Adjustable value at which the PID controls no longer are used to control head pressure. Fans are overridden to max speed when the discharge pressure exceeds setpoint.
TcHPULOffset	5.4°F		A status only item that displays the Saturated Condensing Temperature High Pressure Unloading Offset
TcHPInhbtOfst	6.3°F		A status only item that displays the Saturated Condensing Temperature High Pressure Inhibit Offset

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
TcHPInhbtDiff	2.7°F if YC comp 3.6°F Otherwise	0.0-9.0°F	A status only item that displays the Saturated Condensing Temperature High Pressure Inhibit Differential.
OAF Direction	FWD	FWD REV	This items allows control of rotation direction of the ECM outdoor air fan.
C1 OAF(1-2) Status	-	OK DvEF HiAC LoV HiVDvOP OvrLd Stall DvLF DvIP TPwrO SpEr LAC OvrT ComF LvlEr NoComm.	A status only item that displays the current Outdoor Air Fan (1-2) Modbus status.

Economizer and Outside Air Damper

Building Pressure Override

The minimum position determined by any method described below may be overridden for a variable speed exhaust fan controlled by building static pressure when the exhaust fan has been stopped due to low building static pressure if the building pressure remains negative. If the user elects to use this function and the exhaust fan has been stopped for a minimum exhaust fan off time (default = 120 seconds), a PI_Loop will begin modulating the Min OA Pos setpoint upward to maintain the building static pressure at the building static pressure setpoint.

Limiting Control

The user has the option of setting a low temperature limit that will override all the outdoor air reset functions described in this section, except if entering fan temperature gets too cold as a result of the reset. The user can choose the override sensor by setting the Reset Temperature Limit to None, DAT, or EFT. When set to None the Reset Temperature Limit function is disabled. A Reset Temperature Limit PI_Loop will be used to reset the minimum outside air damper setpoint downward when the selected temperature input drops below the Reset Temperature Limit.

Econo Set-Up

Table 143: Main Menu \ Advanced Menus \ Econo Set-Up

Menu Display Name	Default	Range	Description
Econo Period	30s	0-999s	Econo Period is an adjustable item which sets the “sampling time” used in the PI control function to vary the Economizer Damper.
Econo Gain	10.0	0.0-100.0	Econo Gain is an adjustable item which sets the “gain” used in the PI control function to vary the Economizer Damper.
Econo PAT	60s	0-999s	Econo PAT is an adjustable item which sets the “project ahead time” used in the PI control function to vary the Economizer Damper.
Econo Max Chg	10%	0-100%	Econo Max Chg is an adjustable item that sets the maximum value for an increase or decrease of the Economizer Damper Position.
EconOutDiff	3%	0-100%	An adjustable item defined as the difference between the outside damper position and the effective minimum outside air position. Used in determining the Economizer Status output.

OA Damper Set-Up

OA Damper Set-Up - Ext Reset Control

Table 144: Main Menu \ Advanced Menus \ OA Damper Set-Up \ Ext Reset Control

Menu Display Name	Default	Range	Description
Min V/mA	0.0 / V	0.0-20.0 V/mA	Min V/mA is the minimum value of the voltage or mA range for the externally controlled reset input on the controller.
Max V/mA	10.0 / V	0.0-20.0 V/mA	Max V/mA is the maximum value of the voltage or mA range for the externally controlled reset input on the controller.

OA Damper Set-Up - Flow Reset Control

Table 145: Main Menu \ Advanced Menus \ OA Damper Set-Up \ Flow Reset Control

Menu Display Name	Default	Range	Description
Min OAFlow	0 CFM	0-60000CFM	Min OAFlow is the minimum OA flow that corresponds to the V/A@MinOAFlw Voltage or amperage for the Flow Reset.
Max OAFlow	10000CFM	0-60000CFM	Max OAFlow is the maximum OA flow that corresponds to the V/A@MaxOAFlw Voltage or amperage for the Flow Reset.
V/A@MinOAFlw	0.00 /V	0.0-20.0 V/mA	V/A@MinOAFlw is the minimum value of the voltage or mA range for the flow controlled reset input on the controller.
V/A@MaxOAFlw	10.00/V	0.0-20.0 V/mA	V/A@MaxOAFlw is the maximum value of the voltage or mA range for the flow controlled reset input on the controller.
Flow DB	3%	0-100%	Flow DB is an adjustable item that sets the “deadband” used in the PI control function to vary the OA Damper.
Flow Period	30s	0-999s	Flow Period is an adjustable item which sets the “sampling time” used in the PI control function for the OA Flow Damper Reset Control.
Flow Gain	0.1	0.0-100.0	Flow Gain is an adjustable item which sets the “project ahead time” used in the PI control function for the OA Flow Damper Reset Control.
Flow Mx Chg	5%	0-100%	Flow Mx Chg is an adjustable item that sets the maximum value for an increase or decrease of the Flow Reset Control Damper Position.

OA Damper Set-Up – Fan Diff Control

Table 146: Main Menu \ Advanced Menus \ OA Damper Set-Up \ Fan Diff Control

Menu Display Name	Default	Range	Description
Max Fan DiffOA	20%	0-100%	Max Fan DiffOA is and adjustable item which sets the maximum value for an increase or decrease of the outside air damper position due to the Max Fan Diff Control function.

OA Damper Set-Up – BSP Ovrd Control

Table 147: Main Menu \ Advanced Menus \ OA Damper Set-Up \ BSP Ovrd Control

Menu Display Name	Default	Range	Description
BSPOvrdPeriod	5s	0-999s	BSPOvrdPeriod is an adjustable item which sets the “sampling time” used in the PI control function used for the building static pressure override feature.
BSPOvrdGain	0.2	0-100.0	BSPOvrdGainis an adjustable item which sets the “Gain” used in the PI control function used for the building static pressure override feature.
BSPOvrdMxChg	4%	0-100%	BSPOvrdMxChg is an adjustable item that sets the maximum value for an increase or decrease of the outside air damper position due to the building static pressure override feature.
BSPOvrdTime	120s	60-300s	BSPOvrdTime is an adjustable item used to set the time period for which the exhaust fan must operate at the minimum speed before the building static pressure override function is activated.

OA Damper Set-Up – Limiting Control

Table 148: Main Menu \ Advanced Menus \ OA Damper Set-Up \ Limiting Control

Menu Display Name	Default	Range	Description
Max OA Pos	100% or 30%	0-100%	Max OA Pos is an adjustable item used to set the maximum outside air damper position.
Min Inc Rate	0.15%/s	0.00-100.00%/s	Min Inc Rate is an adjustable item used to set the minimum increase rate for the outside air damper “cold start” sequence.
Max Inc Rate	1.00%/s	0.00-100.00%/s	Max Inc Rate is an adjustable item used to set the maximum increase rate for the outside air damper “cold start” sequence.
Rst Limit Snsr	None	None DAT EFT ER_LWT	Rst Limit Snsr is an adjustable item used to set the sensor to be used in conjunction with the OA reset limit function.
Rst T Lmt	48.0°F	0-100°F	Rst T Lmt is an adjustable item which sets a temperature low limit which overrides functions that reset the outside air damper position if the temperature gets too cold.
RstT Period	5s	0-999s	RstT Period an adjustable item which sets the “sampling time” used in the PI control function used for the Reset Temperature Limit feature.
RstT Gain	0.2	0-100.0	RstT Gain is an adjustable item which sets the “Gain” used in the PI control function used for the Reset Temperature Limit feature.
RstT PAT	60s	0-999s	RstT PAT is an adjustable item which sets the “project ahead time” used in the PI control function used for the Reset Temperature Limit feature.
RstT MaxChg	4%	0-100%	RstT MaxChg is an adjustable item that sets the maximum change value PI loop used for the Reset Temperature Limit feature.

Heating

Heating Set-Up

Table 149: Main Menu \ Advanced Menus \ Heating Set-Up

Menu Display Name	Default	Range	Description
Gas Stg Zero	No	No Yes	Adjustable setting which allows for the gas furnace to stage down to zero capacity when the control source temperature is below the heating setpoint and the discharge air temperature is above the heating DAT setpoint.
Occ HtgEnable	Yes	No Yes	Occ HtgEnable is an adjustable item which enables and disables the “daytime” heating mode of operation. If the Occ Heating parameter is set to No, the unit will only go into heating during the initial morning warm-up cycle. If the Occ Heating parameter is set to Yes, the unit can go into the heating mode of operation any time during the day.
Cold Start Ena	Yes	No Yes	This item allows enabling or disabling the Cold Start feature on units with modulating heating and 100% outdoor air damper.
Htg Warmup Tm	45s	0-45s	Htg WrmupTm is an adjustable item that sets the amount of time in seconds the controller will stay in Cold Start Sequence. Applies if Heating Type is Modulating Gas or Electric Heat.
	60s	60-300s	Htg WrmupTm is an adjustable item that sets the amount of time in seconds the controller will stay in Cold Start Sequence. Applies if Heating Type is MDT5-1 or MDT20-1.
Htg HldPeriod	240s	0-999s	Htg HldPeriod is an adjustable item used to set the amount of time that the gas heating valve remains at its calculated value on units equipped with 100% OA (default 240 seconds) during the special cold start sequence. This is to allow the temperature to approach equilibrium with the modulating gas heating valve at a fixed position.
LoDATEmSCRTm	5min	0-60min	LoDATEmSCRTm is an adjustable item that sets the amount of time in minutes the unit operates at maximum heating capacity before going into Emergency Auxiliary Heat mode.
FrzHtgVlvPos	100%	0-100%	FrzHtgVlvPos is an adjustable item that sets the valve position the hot water or steam heating valve will hold during a freeze event. The valve will hold this position for a freeze timer.
Htg Period	60s	0-999s	Htg Period an adjustable item which sets the “sampling time” used in the PI control function that modulates the heating valve or face & bypass dampers.
Htg Gain	0.8	0.0-100.0	Htg Gain is an adjustable item which sets the “Gain” used in the PI control function that modulates the heating valve or face & bypass dampers.
Htg PAT	120s	0-999s	Htg PAT is an adjustable item which sets the “project ahead time” used in the PI control function that modulates the heating valve or face & bypass dampers.
Htg Max Chg	10%	0-100%	Htg Max Chg is an adjustable item that sets the maximum value for an increase or decrease of the heating valve or face& bypass damper position.
LoDATEmergSCR	Disabled	Disabled Enabled	LoDATEmergSCR is an adjustable item that allows enabling or disabling the Low DAT Emergency Auxiliary Heat control option.
ModGasSCREna	No	No Yes	ModGasSCREna is an adjustable item that sets if the unit is equipped to perform a combination SCR electric and natural gas heating sequence.
SCRCldStrtVal	30%	0-100%	An adjustable item to set the SCR Cold Start heating capacity Value.
SCR Min Volts	1.0V	0-10.0V	An adjustable item to set the SCR electric heater minimum voltage.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
SCR Max Volts	9.0V	0-10.0V	An adjustable item to set the SCR electric heater maximum voltage control signal.
Curr Htg Stg	0	0-4	Curr Htg Stg is a read only item that displays the current heating stage.
CurrCmpHtgStg	-	0-8	A status only item that displays the Current Compressor Heating Stage.
Prht Period	60s	0-999s	An adjustable input to set the Pre-Heater control Period parameter.
Preheat Gain	0.8	0.0-100.0	An adjustable input to set the Pre-Heater control Gain parameter.
Preheat PAT	120s	0-999s	An adjustable input to set the Pre-Heater control Project Ahead parameter.
Prht Max Chg	10%	0-100%	An adjustable input to set the Pre-Heater Maximum Capacity Change parameter.

Reheat

Reheat Compressor Limiting

Reheat Compressor Limiting is a function that limits the compressor capacity when a unit with refrigerant reheat, modulating hot gas cannot produce enough capacity to meet the reheat requirements. When this function is active, the controller will act to reduce the capacity of the circuit opposite the reheat circuit by turning Off a fixed capacity compressor in an attempt to increase the leaving coil temperature, and therefore, the discharge air temperature.

Standard Heat BackUp Reheat

When a unit is equipped with either a modulating gas, hot water, or steam primary heat, this heat may be used as a secondary **Backup Reheat** source. When the unit is equipped with refrigerant reheat and cannot product enough capacity to meet reheat the requirements, the primary heating source can be activated to maintain the discharge air temperature set-point. For this feature to be activated, the BackupRhtEna flag needs to be set to Yes.

Reheat Set-Up

Table 150: Main Menu \ Advanced Menus \ Reheat Set-Up

Menu Display Name	Default	Range	Description
MHG Min Pos	10%	0-100%	MHG Min Pos is an adjustable item used to set the minimum position of the hot gas reheat valve when the PI loop is active.
MHG Max Pos	85%	0-100%	MHG Max Pos is an adjustable item used to set the maximum position of the hot gas reheat valve when the PI loop is active.
Rht Dec Rate	1.00%/s	0-10.0%/s	Rht Dec Rate is an adjustable item used to set the rate of decrease for the reheat valve, where the unit leaves the dehumidification operation.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
MHGRht1Status	-		MHGRht1Status is a status only item that shows if status of control on the Modulating Hot Gas Reheat Valve.
		OK	MHGRht valve status is OK.
		VlvConn	Indicates if a motor is not connected. A power cycle is needed to reset.
		EMIHi	Indicates an over temperature event. A power cycle is needed to reset.
		EMHdw	Hardware error detected. Stepper will not run. A power cycle is needed to reset. Possible hardware defect.
		EMComm	No communication with the expansion module MHGRht Valve is connected to. Check BSP and BUS LEDs on the expansion module. Check connection between MCB and EM. Check dip switches settings.
BackupRhtEna	No	No Yes	BackupRhtEna is an adjustable item that sets if the unit is allowed to use its primary modulating heater as a secondary reheat source for cases where the primary refrigerant reheat cannot satisfy the discharge air temperature setpoint.
SCR Suplmt Rht	Yes	No Yes	An adjustable input to enable SCR Electric Heat for reheat.
RhtPeriod	30s	0-999s	RhtPeriod is an adjustable item which sets the “sampling time” used in the PI control function for controlling the reheat valve.
Rht Gain	1.0	0.0-100.0	Rht Gain is an adjustable item which sets the “Gain” used in the PI control function for controlling the reheat valve.
Rht PAT	30s	0-999s	Rht PAT is an adjustable item which sets the “project ahead time” used in the PI control function for controlling the reheat valve.
Rht Max Chg	10%	0-100%	Rht Max Chg an adjustable item that sets the maximum value for an increase or decrease for controlling the reheat valve.
PriHtgRstOAT	65.0°F	50.0-80.0°F	
DH Priority	LCT or Rht	Rht LCT	An adjustable item to choose Dehumidification compressor control; either Leaving Coil Temperature or Reheat control.
DH VCmp Min	50%	0-100%	An adjustable item to select the Minimum Variable Compressor Speed when DH Priority is LCT.
Curr Htg Stg	-	0-8	Curr Htg Stg is a status only item that displays the current heating stage of the unit.
Reheat Timer	600s	30-3600 min	An adjustable item to set the time of the first reheat valve or LSC is fully open for until the controller can bring on the second valve of MHGRht (depends on the unit configuration and build).
PriHtgRhtRstTm	600 min	60-1440min	An adjustable item to set the time that the Primary Heat Reheat can be active for until it needs to be reset.

Energy Rec Set-Up

Table 151: Main Menu \ Advanced Menus \ Energy Rec Set-Up

Menu Display Name	Default	Range	Description
ERWhl Stg Tm	5min	1-100min	ER Whl Stg Tm is an adjustable item used to set a minimum time period for operating at either the minimum or maximum speed before action is taken to change speed during the frost protect mode of operation.
ER Whel Off Tm	20min	1-100min	ER Whl Off Tm is an adjustable item used to set the minimum amount of time the energy wheel will remain off after being turned OFF due to a frosting/condensation condition.
ERWhl Min Cap	15%	10-100%	ERWhleMinCap is the minimum allowed energy wheel capacity.
EROAEOffset	0.0°F	0.0-10.0°F	
Intersect Pt	-	-146.2-150.0°F	Intersect Pt is the calculated intersection point with saturation line for the process line between the OAT at 95% RH and the actual return air temperature and return air humidity.
RARelHum	-	0-100	RARelHum is a status only item of the current sens air relative humidity reading.
FstMgmt Meth	None	None Timed WhlSpd Preheat	FstMgmtMeth is the selected frost management method.
OA Frst Temp	-5.0 °F	-40-100.0°F	OA Fst Temp is an adjustable item used to set the outside air frost temperature.
Defrost Time	5min	0-60min	Defrost Time is an adjustable item used to set the duration of a defrost cycle.
Defrst Period	60min	0-1440min	Defrst Period is an adjustable item used to set how often a defrost cycle will be initiated.
Defrst On Tm	1s	0-999s	Defrst On Tm is an adjustable item used to select how long the constant speed energy wheel is energized during defrost.
Defrost Off Tm	24s	0-999s	Defrst Off Tm is an adjustable item used to select how long the constant speed energy wheel is de-energized during defrost.
Cap Limiting	Yes	No Yes	Capacity Limiting is an adjustable item used to turn ON and OFF the energy wheel capacity limiting function.
ERWhl Period	30.0s	0-999s	ER Whl Period an adjustable item which sets the “sampling time” used in the PI control function.
ERWhl Gain	1.0	0.0-100.0	ER Whl Gain is an adjustable item which sets the “Gain” used in the PI control function.
ER Whl PAT	30.0s	0-999s	ER Whl PAT is an adjustable item which sets the “project ahead time” used in the PI control function.
ERWhl Max Chg	10%	0-100%	ERWhl Max Chg is an adjustable item that sets the maximum value for an increase or decrease of the energy recovery wheel speed.
EWTFrost Spt	32.0°F	23.0-41.0°F	EWTFrost Spt is an adjustable item that sets a minimum entering wheel temp that frost prevention will be allowed at.
SCRPreht Cap	-	0-100%	This is a status item for displaying SCR Preheat Capacity.
SCRPrhtPeriod	60.0s	0.0-999.0s	SCRPrhtPeriod is an adjustable item that sets the “sampling time” used in the PI control function to vary the SCR Preheat command.
SCRPrht Gain	0.8	0.0-100.0	SCRPrht Gain is an adjustable item that sets the “gain” used in the PI control function to vary the SCR Preheat command.
SCRPrht PAT	120.0s	0.0-999.0s	SCRPrht PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the SCR Preheat command.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
SCRPrhtMaxChg	10%	0-100%	SCRPrhtMaxChg is an adjustable item that sets the maximum value of increase or decrease of the cooling capacity each period used in the PI control function to vary the SCR Preheat command.

A2L Sensors

Table 152: Main Menu \ Advanced Menus \ A2L Sensors

Menu Display Name	Default	Range	Description
A2L State=	-	Init Run Fault Alarm Mitig Testing NoComm	A status only item that displays the current A2L Senor Board Status.
A2L Level Spt=	-	Factory locked at 15%	A2L concentration Level Setpoint where Mitigation will be triggered.
A2L Sensor Cnt=	-	0-8	Status only value displaying the number of A2L leak sensors in the system.
RESET SENSORS			
Sensor Select=	1	1-8	An adjustable item to select which A2L sensor to reset.
Execute Reset=	No	Yes No	This item sends a reset command to the A2L sensor selected in “Sensor Select” menu item.
Reset Status=	OK	OK NoSnsr RstFail DupSnsr2	A status display of the sensor selected in “Sensor Select” menu after the reset.

Sensor Offsets

Table 153: Main Menu \ Advanced Menus \ Sensor Offsets

Menu Display Name	Default	Range	Description
OA Temp	0.0	-10.0-10.0°F	OA Temp is an adjustable setting that sets the sensor offset for the sensor.
Space Temp 1	0.0	-10.0-10.0°F	Space Temp 1 is an adjustable setting that sets the sensor offset for the sensor.
Space Temp 2	0.0	-10.0-10.0°F	Space Temp 2 is an adjustable setting that sets the sensor offset for the sensor.
Space Temp 3	0.0	-10.0-10.0°F	Space Temp 3 is an adjustable setting that sets the sensor offset for the sensor.
EF/LC Temp	0.0	-10.0-10.0°F	EF/LC Temp is an adjustable setting that sets the sensor offset for the sensor.
ER EWT	0.0	-10.0-10.0°F	ER EWT is an adjustable setting that sets the sensor offset for the sensor.
ER LWT	0.0	-10.0-10.0°F	ER LWT is an adjustable setting that sets the sensor offset for the sensor.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
C1 DRT1	0.0	-10.0-10.0°F	An adjustable setting for Circuit 1/ Compressors 1 Discharge Refrigerant Temperatures.
C1 DRT3	0.0	-10.0-10.0°F	An adjustable setting for Circuit 1/ Compressor 3 Discharge Refrigerant Temperatures.
VCmp1 Temp	0.0	-10.0-10.0°F	An adjustable setting for Variable Compressors 1 shell Temperatures.
C1FCmp3 Temp	0.0	-10.0-10.0°F	C1FCmp3 Temp is an adjustable setting that sets the sensor offset for the sensor.
SRT1	0.0	-10.0-10.0°F	SRT1 is an adjustable setting that sets the sensor offset for the sensor.
DFT1	0.0	-10.0-10.0°F	An adjustable setting for Circuits 1 Defrost Temperatures.
LRT1	0.0	-10.0-10.0°F	LRT1 is an adjustable setting that sets the sensor offset for the sensor.
CompCmdIn=	0.0	-2.0 – 2.0	An adjustable setting for Compressor Capacity Command Input for Refrigerant Only Controls.
HtgCmdIn=	0.0	-2.0 – 2.0	An adjustable setting for Heating Capacity Command Input for Refrigerant Only Controls.
C1HiTSnsrCfg=	NTC50K	Unknown NTC10K NTC50K NTC230K	An adjustable setting for Circuit 1 Discharge Refrigerant Temperature sensor type
C1EffHiTSnsrCfg=	-	Unknown NTC10K NTC50K NTC230K	A status only item specifying Circuit 1 Discharge Refrigerant Temperature sensor type

CW Clg Set-Up

Table 154: Main Menu \ Advanced Menus \ CW Clg Set-Up

Menu Display Name	Default	Range	Description
Clg Period	20s	0-999s	Clg Period is an adjustable item that sets the “sampling time” used in the PI control function to vary the cooling capacity.
Clg Gain	1.0	0.0-100.0	Clg Gain is an adjustable item that sets the “gain” used in the PI control function to vary the cooling capacity.
Clg PAT	40s	0-999s	Clg PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the cooling capacity.
Clg Max Chg	15%	0-100%	Clg Max Chg is an adjustable item that sets the maximum value of increase or decrease of the cooling capacity each period used in the PI control function to vary the cooling capacity.
FrzCWVlvPos	100%	0-100%	Chilled water cooling valve control will be overridden and the valve opened to the FrzCWVlvPos value when potential coil freezing conditions are detected.

VCmp Circuit1 Set-Up

Table 155: Main Menu \ Advanced Menus \ VCmp Circuit1 Set-Up

Menu Display Name	Default	Range	Description
Circ1 CmpState=	-	Off Start Init1 Init2 Init3 Init4 Init5 Normal Pmpdn1 Pmpdn2 Pmpdn3 Standby	Circ1 CmpState is a status only item that displays the current state/activity for the circuit 1 cooling/heating state.
VCmp1 Cap=	-	0-110%	A status only item that shows the capacity commanded for the variable speed compressor as a percentage.
VCmp1 Cmd=	-	0-100%	A status only that shows the command speed being sent to the variable speed compressor as a percentage.
VCmp1 Rps=	-	0-150	A status only that shows the revolutions per second (RPS) of the variable speed compressor.
VFD1 Status=	-	OK OvrTActv WrnActvAlmNoTrp AlmTrp Triplck No Comm	A status only that shows the status of the variable speed compressor that is given from the VFD drive on the compressor.
CCH1=	-	Off On	CCH1 is a status only item that shows if the crankcase heater on the compressors are on.
ACTIVE FAULT CODES			
VCmpFltCode=	-	NA, 00-ZZ	This item displays the fault code applicable for the variable speed compressor.
OAF1FltCode=	-	NA, 00-ZZ	This item displays the fault code applicable for outdoor fan #1.
OAF2FltCode=	-	NA, 00-ZZ	This item displays the fault code applicable for outdoor fan #2.
PREVIOUS FAULT CODES			
PrvVCmpFltCode=	-	NA, 00-ZZ	This item displays the most recent previous fault code for the variable speed compressor.
PrvOAF1FltCode=	-	NA, 00-ZZ	This item displays the most recent previous fault code for outside air fan 1.
PrvOAF2FltCode=	-	NA, 00-ZZ	This item displays the most recent previous fault code for outside air fan 2.
VFD1 Alm/Wrn=	-	None A**-W**	This item displays the fault code applicable for the variable speed compressor VFD.
IFB COMM STATUS			
IFB SW Vers=	-	VP0328008	Software version of the IFB board.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
IFB1CommStatus=	-	OK F2Er F1Er F12Er VCmpErr ACSErr InitErr IFBRst IFBReq VCmpReq MBErr	IFB1CommStatus is a status only item that displays the status of the IFB board.
PrvIFB1ComSts=	-	OK F2Er F1Er F12Er VCmpErr ACSErr InitErr IFBRst IFBReq VCmpReq MBErr	PrvIFB1ComSts is a status only item that displays the most recent previous comm status for the IFB Board.
ACS1 DataRcvd=	-	ErrAll F1F2Err VCmpF2Err F2Err VCmpF1Err F1Err VCmpErr AllOK	ACS1 DataRcvd is a status only item that displays if communication status between each of the inverters used on the compressor and condenser fans.
VCmp1 FinTmp=	-	-83.0-392.0°F	Vcmp FinTmp is a status only item that displays the compressor VFD fin temperature (03-06 ton only).
VFD1 HtSinkT=	-	-83.2-392.0°F	VFD1 HtSinkT is a status only item that displays the compressor VFD temperature (over 07 and up).
VFD1 CtrlCrdT=	-	-83.2-392.0°F	VFD1 CtrlCrdT is a status only item that displays.
REFRIG CIRCUIT STATUS			
PTS1=	-	0-725psi	PTS1 is a status only item that displays the current suction line refrigerant pressure for circuit #1.
PTD1=	-	0-725psi	PTD1 is a status only item that displays the current discharge line refrigerant pressure for circuit #1.
SSH1=	-	-115.2-115.2°F	SSH1 is a status only item that displays the current suction line super heat refrierant temperature for circuit #1.
DSH1=	-	-115.2-115.2°F	DSH1 is a status only item that displays the current discharge line super heat refrigerant temperature for circuit #1.
Te1=	-	-83.2-212.0°F	Te1 is a status only item that displays the circuit average suction pressure equivalent saturation temperature.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Tc1=	-	-83.2-212.0°F	TC1 is a status only item that displays the circuit average discharge line pressure equivalent saturation temperature. This value is calculated from PTD1 using the standard ASHRAE conversion for R32.
C1DRT1=	-	-83.2-392.0°F	A status only item which indicates the discharge temperature of compressor 1 in refrigerant circuit 1.
C1DRT3=	-	-83.2-392.0°F	A status only item which indicates the discharge temperature of compressor 3 in refrigerant circuit 1.
SRT1=	-	-83.2-212.0°F	SRT1 is a status only item that displays the current suction line refrigerant temperature.
Tp1=	-	-83.2-392.0°F	Tp1 is a status only that displays the current compressor discharge port temperature.
COMPRESSOR CONTROL			
VCmp Period=	20s	0-999s	An adjustable input to set the variable compressor speed control period parameter.
VCmp Gain=	1.0	0.0-100.0	An adjustable input to set the variable compressor speed control gain parameter.
VCmp PAT=	60s	0-999s	An adjustable input to set the variable compressor Project Ahead Time parameter.
VCmp MaxChg=	15%	0-100%	VCmp MaxChg is an adjustable item that sets the maximum value for an increase or decrease of the variable compressor speed.
CmpHtgHiOATLk=	55°F	0-100°F	An adjustable item which sets the high outdoor air temperature compressorized heating (heat pump heating) lockout point. Heat pump heating operation is disabled when the outdoor air temperature sensor input rises above this setpoint.
CmpHtgLoOATLk=	0°F (45°F if Damper Type is 100OA and Preheat Type is None)	-20-50.0°F (Low limit will be 25°F if Damper Type is 100OA and Preheat Type is None)	An adjustable item which sets the low outdoor air temperature compressorized heating (heat pump heating) lockout point. Heat pump heating operation is disabled when the outdoor air temperature sensor input falls below this setpoint.
CmpCmdInType=	VDC	VDC mA	An adjustable item that sets the compressor speed input command type signal for a refrigeration only controlled unit.

EV Circ1 Set-Up

Table 156: Main Menu \ Advanced Menus \ EV Circ1 Set-Up

Menu Display Name	Default	Range	Description
EVI Cmd=	-	0-100%	EVI1 Cmd is a status only item which displays the current EVI1 command.
EV State=	-	Closed Start ToSSH ToMOP SSH MOP DRT HPDF	EV State is a status only item which displays the current expansion valve state.
EVI1 Status=	-		EVI1 Status is a status only item which displays the current indoor expansion valve 1 status.
		OK	Electronic expansion valve status is OK.
		EVConn	Indicates if a motor is not connected. A power cycle is needed to reset.
		EVHiT	Indicates an over temperature scenario. A power cycle is needed.
		EVHdw	Stepper will not run. A power cycle is needed. There is a potential hardware defect.
		EMConn	No communication with the expansion module EEV is connected to. Check BSP and BUS LEDs on the expansion module. Check connection between MCB and EM. Check dip switches settings.
REFRIG CIRCUIT STATUS			
PTS1=	-	0-725 psi	A status only item which indicates the suction pressure in Refrigerant Circuit 1.
PTD1=	-	0-725psi	A status only item which indicates the discharge pressure in Refrigerant Circuit 1.
SSH1=	-	-115-115°F	A status only item which indicates the suction super heat in Refrigerant Circuit 1.
DSH1=	-	-115-115°F	A status only item which indicates the discharge super heat in Refrigerant Circuit 1.
Eff SSH1 Spt=	-	-115-115°F	A status only item which indicates the effective suction superheat setpoint in Refrigerant Circuit 1.
Eff PTS1 Spt=	-	0-290.0psi	A status only item which indicates the effective suction pressure setpoint in Refrigerant Circuit 1.
DRT1 Spt=	-	32.0-248.0°F	A status only item which indicates the discharge refrigerant temperature setpoint in Refrigerant Circuit 1.
SRT1=	-	-83.2-212.0°F	A status only item which indicates the saturated suction temperature of Refrigerant Circuit 1.
Te1=	-	-83.2-212.0°F	A status only item which indicates the saturated evaporator temperature in Refrigerant Circuit 1.
Tc1=	-	-83.2-212.0°F	A status only item which indicates the saturated condenser temperature in Refrigerant Circuit 1.
EV CONTROL			
LAT BasePTS=	87.8psi	0.0-145.0psi	LAT BasePTS is an adjustable item which sets the LAT BasePTS.
Min SSH1 Spt=	7.2°F	3.6-18.0°F	Min SSH1 Spt is an adjustable item which sets the minimum suction superheat setpoint value in Refrigerant Circuit 1.
Max SSH1 Spt=	14.4°F	3.6-18.0°F	Max SSH1 Spt is an adjustable item which sets the maximum suction superheat setpoint value in Refrigerant Circuit 1.

(continued)			
Menu Display Name	**Default**	**Range**	**Description**
Min DSH1 Spt=	21.6°F	18.0-72.0°F	Min DSH1 Spt is an adjustable item which sets the minimum discharge superheat setpoint value in Refrigerant Circuit 1.
Max DSH1 Spt=	30.6°F	18.0-72.0°F	Max DSH1 Spt is an adjustable item which sets the maximum dischange superheat setpoint value in Refrigerant Circuit 1.
SSH1 DB=	2.0°F	0.0-5.0°F	SSH1 DB is an adjustable item which sets the suction superheat deadband in Refrigerant Circuit 1.
PTS1 DB=	3.63.psi	0.0-14.5psi	PTS1 DB is an adjustable item which sets the suction pressure deadband in Refrigerant Circuit 1.
DRT1 DB=	2.0°F	2.0-5.0°F	DRT1 DB is an adjustable item which sets the discharge refrigerant temperature deadband in Refrigerant Circuit 1.

HP Defrost

Table 157: Main Menu \ Advanced Menus \ HP Defrost

Menu Display Name	Default	Range	Description
LAT BasePTS=	87.8psi	0.0-145.0psi	LAT BasePTS is an adjustable item which sets the LAT BasePTS.
Min SSH1 Spt=	7.2°F	3.6-18.0°F	Min SSH1 Spt is an adjustable item which sets the minimum suction superheat setpoint value in Refrigerant Circuit 1.
Max SSH1 Spt=	14.4°F	3.6-18.0°F	Max SSH1 Spt is an adjustable item which sets the maximum suction superheat setpoint value in Refrigerant Circuit 1.
Min DSH1 Spt=	21.6°F	18.0-72.0°F	Min DSH1 Spt is an adjustable item which sets the minimum discharge superheat setpoint value in Refrigerant Circuit 1.
Max DSH1 Spt=	30.6°F	18.0-72.0°F	Max DSH1 Spt is an adjustable item which sets the maximum dischange superheat setpoint value in Refrigerant Circuit 1.
SSH1 DB=	2.0°F	0.0-5.0°F	SSH1 DB is an adjustable item which sets the suction superheat deadband in Refrigerant Circuit 1.
PTS1 DB=	3.63.psi	0.0-14.5psi	PTS1 DB is an adjustable item which sets the suction pressure deadband in Refrigerant Circuit 1.
DRT1 DB=	2.0°F	2.0-5.0°F	DRT1 DB is an adjustable item which sets the discharge refrigerant temperature deadband in Refrigerant Circuit 1.

Dehum Set-Up

Table 158: Main Menu \ Advanced Menus \ Dehum Set-Up

Menu Display Name	Default	Range	Description
LCTSpt Period	60s	0-999s	LCTSpt Period is an adjustable item that sets the “sampling time” used in the PI control function to vary the LCT setpoint.
LCT Spt Gain	0.20	0.00-100.00	LCT Spt Gain is an adjustable item that sets the “gain” used in the PI control function to vary the LCT setpoint.
LCT Spt PAT	600s	0-5000s	LCT Spt PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the LCT setpoint.
LCTSpt MaxChg	5°F	0-50°F	LCTSpt MaxChg is an adjustable item that sets the maximum value of increase or decrease of the cooling capacity each period used in the PI control function to vary the LCT setpoint.

Relief Damper Set-Up

Table 159: Main Menu \ Advanced Menus \ Relief Damper Set-Up

Menu Display Name	Default	Range	Description
RelDmpr Period	5s	0-999s	RelDmpr Period is an adjustable item that sets the “sampling time” used in the PI control function to vary the relief damper command.
RelDmpr Gain	0.2	0.0-100.0s	RelDmpr Gain is an adjustable item that sets the “gain” used in the PI control function to vary the relief damper command.
RelDmpr PAT	0.0s	0.0-999.0s	RelDmpr PAT is an adjustable item that sets the “project ahead time” used in the PI control function to vary the relief damper command.
RelDmprMaxChg	4%	0-100%	RelDmprMaxChg is an adjustable item that sets the maximum value of increase or decrease of the cooling capacity each period used in the PI control function to vary the relief damper command.

SAF Status

Table 160: Main Menu \ Advanced Menus \ IAQ Sensor Set-Up

Menu Display Name	Default	Range	Description
CO^2 SENSOR			
Min PPM=	0ppm	0-5000ppm	Min PPM is an adjustable item that sets the minimum PPM value for the CO2 sensor when the unit is set to have external CO2 input signal.
Max PPM=	2000ppm	0-5000ppm	Max PPM is an adjustable item that sets the maximum PPM value for the CO2 sensor when the unit is set to have external CO2 input signal.
V/A @ Min PPM=	0.0 / V	0.0-20.0/ V mA	V/A @ Min PPM is an adjustable item that sets the signal that corresponds with the minimum PPM value for the CO2 sensor when the unit is set to have external CO2 input signal.
V/A @ Max PPM=	10.0/ V	0.0-20.0/ V mA	V/A @ Max PPM is an adjustable item that sets the signal that corresponds with the maximum PPM value for the CO2 sensor when the unit is set to have external CO2 input signal.

A2L Detection and Mitigation

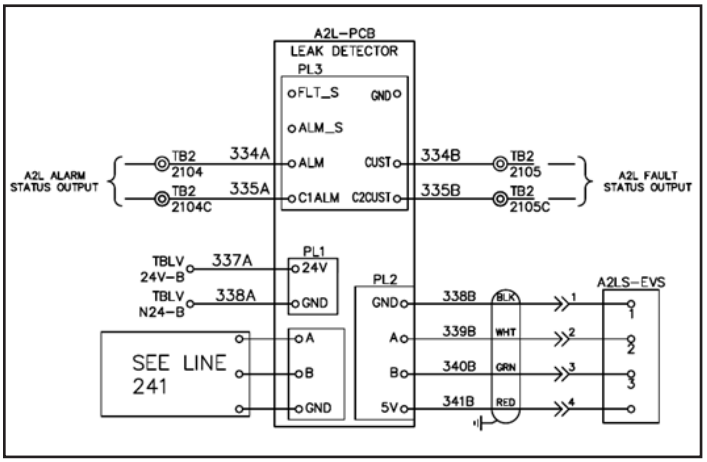
A2L Leak Detection System

Daikin Applied Rooftop units that use an A2L refrigerant have a factory installed leak detection system. The A2L leak detection system consists of the following parts:

- Refrigerant Sensor(s) (quantity 1 – 8)
  Part Number: 910419801
- A2L Leak Detection Control Board (quantity 1)
  Part Number: 910419225

The sensors, if more than one, are wired in a daisy chain configuration and terminated at the mitigation board. The A2L Main Control board communicates the leak detection system status to the MicroTech controller via Modbus. The MicroTech controller will communicate alarms based on this system status in the same way as any other alarm. In addition, 2 alarm relays are provided for the field to connect to directly, as an alternative method to receive the alarm status. See schematic example shown in Figure 37.

Figure 37: A2L Leak Detector Schematic Sample



Alarms

- Refrigerant Leak:
  - The leak detection control board will trigger a leak alarm when at least 1 sensor detects a refrigerant concentration above 15% of the refrigerant Lower Flammability Level (LFL).
  - Upon detection of a leak, the A2L-R1 and A2L-R2 contactors are energized and the alarm is communicated via Modbus to the MicroTech unit controller.
- Refrigerant Sensor Fault:
  - The leak detection control board will trigger a fault alarm when any connected sensor is determined to be faulty (self-test failure, loss of communications, etc.).
  - Upon detection of a sensor fault, the fault is communicated via Modbus to the MicroTech unit controller.

A2L Leak Mitigation

The MicroTech controller performs the following mitigation sequences to maintain safe operation in the event of an alarm condition:

Refrigerant Leak Detected

1. When unit is enabled:

   Upon notification from the leak detection system that a leak was detected, the MicroTech controller continues to operate the unit normally (conditioning the air: heating, cooling, humidifying, ventilating, and cleaning) with the following exceptions:

   - Refrigerant leak alarm is triggered and will remain on until alarm is manually cleared.
   - All compressors are deactivated and locked-out.
   - Supply fan minimum speed controls are overridden to prevent the fan from operating below a predetermined speed to maintain adequate airflow through the system to dilute any of the leaked refrigerant.
   - If the unit state is “OFF”, the unit will start up in the typical unoccupied mode of operation.
   - Manual Control operation is disabled.
   - The gas or electric heat Cold Start feature is disabled.
   - Specific Refrigeration Only Controls (ROC):
     - The field compressor cooling/heating control signal is ignored.
     - Compressors are deactivated and locked-out.
     - Supply fan minimum speed controls are overridden to prevent the fan from operating below a predetermined speed to maintain adequate airflow through the system to dilute any of the leaked refrigerant.
     - The field supplied outside air damper signal on a DOAS unit without a return air opening is ignored and the dampers are overridden to 100%.
     - The field controls are responsible for opening any isolation dampers to allow for airflow through the system.
     - The field controls are responsible for sending cooling and heating capacity signals.

   NOTE: The mitigation controls continue to monitor the refrigerant sensors in the system and notifies the MicroTech unit controller when no refrigerant has been detected for five minutes, allowing the unit to resume normal operation. However, the Refrigerant Leak Alarm will continue to be active, locking out compressor operation until the alarm is manually cleared.

2. When unit is disabled (see Table 161 on page 176 for typical causes of disabled units):

   Upon notification from the leak detection system that a leak was detected, the MicroTech controller performs the following tasks:

   - Refrigerant Leak Alarm is triggered and will remain active until manually cleared.

– Compressor operation remains locked-out.
– Supply fan is turned on and supply fan minimum speed controls are overridden to prevent the fan from operating below a predetermined speed to maintain adequate airflow through the system to dilute any of the leaked refrigerant.
– The outside air damper in a DOAS unit without a return air path will be opened to 100%.
– The outside air damper will remain closed with the exception of DOAS units without a return air path.
– Manual Control operation is disabled.
– Fan operation digital output closes.
– VAV box digital output opens (to open boxes).
– Heating and cooling are disabled.

Exceptions (MicroTech will not activate mitigation steps):

– If unit is disabled due to supply fan alarm, the fan will not operate.
– E-Stop circuit is open. E-Stop takes priority over A2L leak alarm.
– High Discharge Air temperature (>170°F) alarms are triggered.

NOTE: The mitigation controls will continue to monitor the the refrigerant sensors in the system and notifies the MicroTech unit controller when no refrigerant has been detected for 5 minutes. At that time, the unit will revert back to the previous Disabled state.

Table 161: Typical Causes for Disabled Units

Unit Status Enumeration	Description	Conditions
0	Enabled	Conditions for Unit Status Enumerations 1-7 are all false.
1	OffMan	Control Mode is set to Off
2	OffManCtrl	ManCtrActv flag is true.
3	Off Net	Both of the following are true: - Control Mode is set to Auto. - NetApplicMode is set to Off.
4	OffAlm	A fault alarm is active.
5	OffRetry	Fan Retry flag is true.
6	OffPassVnt	PassVentActv flag is true
7	OffSnsrCfg	All of the following are true: - CtlrTempSrc is set to Space. Either of the following is true: - QMX sensor configuration is in progress. - EffSpcTRel is false. Control Temperature fault is inactive.

Leak Detection Board Detects a Sensor Fault

A fault can be caused by a leak sensor malfunctioning or being disconnected, an A2L board malfunction or a loss of Modbus communication between the MicroTech unit controller and the A2L board.

1. When unit is enabled:

   Upon notification from the leak detection system that a sensor fault is detected, the MicroTech controller continues to operate the unit normally (conditioning the air: heating, cooling, humidifying, ventilating, and cleaning) with the following exceptions:

   – Refrigerant Sensor alarm is triggered and will remain on until alarm is manually cleared.
   – Supply fan minimum speed controls are overridden to prevent the fan from operating below a predetermined speed to maintain adequate airflow through the system to dilute any of the leaked refrigerant.
   – If the unit is “OFF”, it will start up in the typical unoccupied mode of operation.
   – The gas or electric heat Cold Start feature is disabled.
   – Specific Refrigeration Only Controls (ROC):
     • Supply fan mi nimum speed controls are overridden to prevent the fan from operating below a predetermined speed to maintain adequate airflow through the system to dilute any of the leaked refrigerant.
     • The field supplied outside air damper signal on a DOAS unit without a return air opening is ignored and the dampers are overridden to 100%.
     • The field controls are responsible for opening any isolation dampers to allow for airflow through the system.
     • The field controls are responsible for sending cooling and heating capacity signals.

   NOTE: The mitigation controls will continue until the fault is remedied and the alarm is manually cleared.

2. When unit is disabled:

   Upon notification from the leak detection system that a sensor fault was detected, the MicroTech controller performs the following tasks:

   – Refrigerant Sensor Fault alarm is triggered and will remain on until manually cleared.
   – Compressor operation remains locked-out.
   – Supply fan is turned on and supply fan minimum speed controls are overridden to prevent the fan from operating below a predetermined speed to maintain adequate airflow through the system to dilute any of the leaked refrigerant.
   – The outside air damper in a DOAS unit without a return air path will be opened to 100%.
   – The outside air damper will continue to be closed with the exception of DOAS unit without a return air path.
   – Fan operation digital output closes.

- VAV box digital output opens (to open boxes).
- Heating and cooling are disabled.

Exceptions (MicroTech will not activate mitigation steps):

- If unit is disabled due to supply fan alarm, the fan will not operate.
- E-Stop circuit is open. E-Stop takes priority over A2L Sensor Fault.
- High Discharge Air temperature (>170°F) alarms are active.
- Control Mode is set to Off.
- Duct High Limit Alarm is active.
- Freeze-stat alarm is active (DOAS units only).

NOTE: The mitigation controls will continue until the fault is remedied and the alarm is manually cleared.

A2L Leak Detection Sensor and Board Service

- The sensors are not considered “Limited Life Sensors” and therefore, under normal operation, are not expected to be replaced within the life expectancy of the unit.
- The sensors have self-reporting diagnostics, which are monitored by the mitigation board. In the event that the sensor fails, the mitigation board will trigger a “Fault” alarm.
- There are no servicing nor maintenance requirements for the sensor(s) and board.

Troubleshooting and Diagnostics

At power up, the Leak Detection Control Board display shows what sensors are detected (SX = 1 , sensor X is active and communicating), and what sensors are not detected (SX = 0, sensor X is not communicating or inactive). Where X, is the sensor number (from 1 to 8).

By pressing and holding the push button for:

- *Less than 2 seconds*
  The Leak Detection Control Board display shows the last 10 sensor faults (can be loss of communication or faulted state reported by a specific sensor). General configuration fault (Flt CFG) is also shown when the expected number of sensors does not match the number of sensors detected online.
- *More than 2 seconds and less than 5 seconds*
  The display shows sensor(s) status info:
  - The current LFL level.
  - Loss of communication or faulted state reported by a specific sensor.
- *More than 5 seconds and less than 10 seconds*
  The Leak Detection Control Board starts a mitigation test. The board will go into alarm mode and the MicroTech controller will begin the mitigation sequence. The mitigation test will last approximately 5 minutes.
- *More than 10 seconds*
  The display shows all the GID values supported by the sensor board as shown in Table 162 on page 178.

Table 162: GID Descriptions

GID id	Name	Min Limit	Max Limit	Default	Description
1	Number of Sensors	1	8	2	Number of sensors configured.
2	LFL Fault Threshold	1	10000	500	LFL Threshold for setting a fault.
3	LFL ALARM Threshold	1	1000	150	LFL Threshold setting an alarm. 150 = 15%
4	USB Baud Rate	19200	115200	115200	Baud Rate used for communicating with an external terminal.
5	MODbus Client Baud	19200	38400	38400	Baud Rate used for communicating with the sensors.
6	MODbus Server Baud	9600	115200	19200	Baud Rate used for communicating with an external controller.
7	Test Mitigation Time	10	300	300	Test Mitigation time in seconds.
8	Sensor Warm Up Time	5	180	30	Sensor warm up time during power up in seconds.
9	Mitigation Time	120	1200	300	Mitigation time in seconds after LFL alarm has disappear.
10	Num of Sensors Online	1	8	1	Number of sensors detected online.
11	A2L State	0	5	0	A2L System State. Value = 1, A2L State is "run"
12	Last Fault	0	2	0	Recent Fault, Fault_Codes_e
13	Modbus Server Address	1	10	9	A2L Modbus Address used in Modbus Server Network
14	Sensor Addr Min	45	50	48	Minimum address assigned to a recent discovered sensor.
15	EETbl Save Now	0	1	0	Command to save data on non volatile memory.
16	System Test	0	1	0	System Test Mitigation Request.
17	Display LFL	0	1	0	Display LFL Levels
18	EETbl LoadDefaults	0	1	0	Load Defaults values for those non volatile parameters.
19	EETbl Rev	1	1	1	EE Table Revision
20	Sensor 1 Address	GID14	GID14 + 7	0	Sensor 1 Address
21	Sensor 1 Level	0	65535	0	Sensor 1 LFL reported value. For instance value = 200, then LFL is 20%
22	Sensor 1 State	1	65535	0	Sensor 1 current state. Value = 2, then state is "run"
23	Sensor 1 Faults	0	65535	0	Sensor 1 internal faults reported. For instance value = 0, then no faults.
24	Sensor 1 Temperature	-400	940	0	Sensor 1 Temperature reported value. For instance value = 250, then Temp = 25 C
25	Sensor 1 Humidity	0	1000	0	Sensor 1 Humidity reported value. For instance value = 400, then Humidity = 40%
26	Sensor 1 Pressure	0	4000	0	Sensor 1 Pressure reported value. Not available for now.
27	Sensor 2 Address	GID14	GID14 + 7	0	Sensor 2 Address
28	Sensor 2 Level	0	65535	0	Sensor 2 LFL reported value. For instance value = 200, then LFL is 20%
29	Sensor 2 State	1	65535	0	Sensor 2 current state. Value = 2, then state is "run"
30	Sensor 2 Faults	0	65535	0	Sensor 2 internal faults reported. For instance value = 0, then no faults.

(continued)					
GID id	**Name**	**Min Limit**	**Max Limit**	**Default**	**Description**
31	Sensor 2 Temperature	-400	940	0	Sensor 2 Temperature reported value. For instance value = 250, then Temp = 25 C
32	Sensor 2 Humidity	0	1000	0	Sensor 2 Humidity reported value. For instance value = 400, then Humidity = 40%
33	Sensor 2 Pressure	0	4000	0	Sensor 2 Pressure reported value. Not available for now.
34	Sensor 3 Address	GID14	GID14 + 7	0	Sensor 3 Address
35	Sensor 3 Level	0	65535	0	Sensor 3 LFL reported value. For instance value = 200, then LFL is 20%
36	Sensor 3 State	1	65535	0	Sensor 3 current state. Value = 2, then state is "run"
37	Sensor 3 Faults	0	65535	0	Sensor 3 internal faults reported. For instance value = 0, then no faults.
38	Sensor 3 Temperature	-400	940	0	Sensor 3 Temperature reported value. For instance value = 250, then Temp = 25 C
39	Sensor 3 Humidity	0	1000	0	Sensor 3 Humidity reported value. For instance value = 400, then Humidity = 40%
40	Sensor 3 Pressure	0	4000	0	Sensor 3 Pressure reported value. Not available for now.
41	Sensor 4 Address	GID14	GID14 + 7	0	Sensor 4 Address
42	Sensor 4 Level	0	65535	0	Sensor 4 LFL reported value. For instance value = 200, then LFL is 20%
43	Sensor 4 State	1	65535	0	Sensor 4 current state. Value = 2, then state is "run"
44	Sensor 4 Faults	0	65535	0	Sensor 4 internal faults reported. For instance value = 0, then no faults.
45	Sensor 4 Temperature	-400	940	0	Sensor 4 Temperature reported value. For instance value = 250, then Temp = 25 C
46	Sensor 4 Humidity	0	1000	0	Sensor 4 Humidity reported value. For instance value = 400, then Humidity = 40%
47	Sensor 4 Pressure	0	4000	0	Sensor 4 Pressure reported value. Not available for now.
48	Sensor 5 Address	GID14	GID14 + 7	0	Sensor 5 Address
49	Sensor 5 Level	0	65535	0	Sensor 5 LFL reported value. For instance value = 200, then LFL is 20%
50	Sensor 5 State	1	65535	0	Sensor 5 current state. Value = 2, then state is "run"
51	Sensor 5 Faults	0	65535	0	Sensor 5 internal faults reported. For instance value = 0, then no faults.
52	Sensor 5 Temperature	-400	940	0	Sensor 5 Temperature reported value. For instance value = 250, then Temp = 25 C
53	Sensor 5 Humidity	0	1000	0	Sensor 5 Humidity reported value. For instance value = 400, then Humidity = 40%
54	Sensor 5 Pressure	0	4000	0	Sensor 5 Pressure reported value. Not available for now.
55	Sensor 6 Address	GID14	GID14 + 7	0	Sensor 6 Address
56	Sensor 6 Level	0	65535	0	Sensor 6 LFL reported value. For instance value = 200, then LFL is 20%
57	Sensor 6 State	1	65535	0	Sensor 6 current state. Value = 2, then state is "run"

(continued)					
GID id	**Name**	**Min Limit**	**Max Limit**	**Default**	**Description**
58	Sensor 6 Faults	0	65535	0	Sensor 6 internal faults reported. For instance value = 0, then no faults.
59	Sensor 6 Temperature	-400	940	0	Sensor 6 Temperature reported value. For instance value = 250, then Temp = 25 C
60	Sensor 6 Humidity	0	1000	0	Sensor 6 Humidity reported value. For instance value = 400, then Humidity = 40%
61	Sensor 6 Pressure	0	4000	0	Sensor 6 Pressure reported value. Not available for now.
62	Sensor 7 Address	GID14	GID14 + 7	0	Sensor 7 Address
63	Sensor 7 Level	0	65535	0	Sensor 7 LFL reported value. For instance value = 200, then LFL is 20%
64	Sensor 7 State	1	65535	0	Sensor 7 current state. Value = 2, then state is "run"
65	Sensor 7 Faults	0	65535	0	Sensor 7 internal faults reported. For instance value = 0, then no faults.
66	Sensor 7 Temperature	-400	940	0	Sensor 7 Temperature reported value. For instance value = 250, then Temp = 25 C
67	Sensor 7 Humidity	0	1000	0	Sensor 7 Humidity reported value. For instance value = 400, then Humidity = 40%
68	Sensor 7 Pressure	0	4000	0	Sensor 7 Pressure reported value. Not available for now.
69	Sensor 8 Address	GID14	GID14 + 7	0	Sensor 8 Address
70	Sensor 8 Level	0	65535	0	Sensor 8 LFL reported value. For instance value = 200, then LFL is 20%
71	Sensor 8 State	1	65535	0	Sensor 8 current state. Value = 2, then state is "run"
72	Sensor 8 Faults	0	65535	0	Sensor 8 internal faults reported. For instance value = 0, then no faults.
73	Sensor 8 Temperature	-400	940	0	Sensor 8 Temperature reported value. For instance value = 250, then Temp = 25 C
74	Sensor 8 Humidity	0	1000	0	Sensor 8 Humidity reported value. For instance value = 400, then Humidity = 40%
75	Sensor 8 Pressure	0	4000	0	Sensor 8 Pressure reported value. Not available for now.
76	DF Saving Time	15	120	15	Data Flash saving time in minutes. How frequent data is saved on non volatile memory.
77	Nominated Sensor Addr	48	55	55	Sensor address to be reset to the default value
78	Sensor Reset Command	0	1	0	Command to invoke sensor function reset, value = 1 then this command is invoked.
79	Sen Func Reset Result	0	1	0	Final result of the sensor reset function operation. Value = 0, the operation was successful.

Appendix

Data Snapshot Tables

The following tables show the data snapshots that are taken at the time of an alarm or event.

MCB = Main Control Board

EM = Expansion Module.

+ = Denotes the 96UE version of the Expansion Module

Table 163: Data Set 1-5

Data Set 1	Data Set 2	Data Set 3	Data Set 4	Data Set 5
'Unit\UnitState'	'Unit\nviEconEnaS'	'Unit\PassVentActv"	'Unit\Circuit1.EVState'	'Unit\C1EffDRT1'
'Unit\HtgStatus'	'Unit\ERCapFbk'	'Unit\HiPress1'	'Unit\Cir1EVI1Pos'	'Unit\C1EffDRT3'
'Unit\DehumStatus'	'Unit\ExtOAInput'	'Unit\HiPress2'	'Unit\Cir1EVI2Pos'	'Unit\C1EffDRT5'
'Unit\ReheatCapacity'	'Unit\DiagCodeStgG2'	'Unit\ER LWT'	'Unit\PTS1Avg'	'Unit\Tp1'
'Unit\OADmprOut'	'Unit\DiagCodeStgG3'	'Unit\MinSAFCap'	'Unit\PTD1Avg'	'Unit\SRT1'
'Unit\CtrlTempSrc'	'Unit\DiagCodeModG'	'Unit\MaxSAFCap'	'Unit\PTD2Avg'	'Unit\DSH1'
'Unit\ControlTemp'	'Unit\ErrCodeModG'	'Unit\ECM_SAF1Status'		'Unit\VCmp1Temp'
'Unit\EffOAT'	'Unit\ReheatSpt'	'Unit\VFDAnlg_ SAFStatus''	'Unit\Tc1'	
'Unit\EFT_LCT'	'Unit\nviPrmClgEnS'	'Unit\VFD_SAFStatus''	VFDAnlg_EFStatus	
'Unit\SpaceRelHum1'	'Unit\nviPrmClgEnV'	'Unit\ECM_EF1Status''	VFD_EFStatus	
'Unit\SpaceRelHum2'	'Unit\nviPrmHtgEnS'	'Unit\ECM_EF2Status''		
'Unit\SAFCapOut'	'Unit\nviPrmHtgEnV'	'Unit\ECM_EF3Status''		
'Unit\SAFCapFbk'	'Unit\RARelHum'	'Unit\ECM_EF4Status''		
'Unit\OAFlow'	'Unit\OARelHum'	'Unit\ECM_EF4Status''		
		'Unit\VFDAnlg_ EFStatus''		
		'Unit\VFD_EFStatus''		

Table 164: Data Set 6-10

Data Set 6	Data Set 7	Data Set 8	Data Set 9	Data Set 10
'Unit\C1CmpOnOff	'Unit\Circuit1.HMIState'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\VCmp1RPSOut'	'Unit\IFB1CommStatus'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\Circuit1.EffSSHSpt'	'Unit\C1IFInptStat'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\VCmpMB1. VCmpAlarmDec'	'Unit\C1OAF1Status'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\VCmpMB2. VCmpAlarmDec'	'Unit\VCmp1FinTemp'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\VCmpMB1. OF1AlarmDec'	'Unit\VCmp1HtSinkTmp'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\VCmpMB1. OF2AlarmDec'	'Unit\VCmp1CtrlCrdT'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\C1EVI1Status'	'Unit\VCmp1PriAmps'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL965'
'Unit\EHGBP1CapOut'	'Unit\VCmp1SecAmps'	'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL96E'
'Unit\RhtBldVlvOut'		'HW_UIO\MCB'	'HW_UIO\EME_POL98E'	'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMA_POL96E'
		'HW_UIO\MCB'		'HW_UIO\EMH_POL965'
		'HW_UIO\MCB'		'HW_UIO\EMH_POL965'
				'HW_UIO\EMH_POL965'
				'HW_UIO\EMH_POL965'
				'HW_UIO\EMH_POL965'
				'HW_UIO\EMH_POL965'
				'HW_UIO\EMJ_POL965'
				'HW_UIO\EMJ_POL965'
				'HW_UIO\EMJ_POL965'
				'HW_UIO\EMJ_POL965'

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WARRANTY

Daikin Applied Americas Inc. dba Daikin Applied ("Company") warrants to contractor, purchaser and any owner of the product (collectively "Owner") that, subject to the exclusions set forth below Company, at its option, will repair or replace defective parts in the event any product manufactured by Company, including products sold under the brand name Daikin and used in the United States or Canada, proves defective in material or workmanship within twelve (12) months from initial startup or eighteen (18) months from the date shipped by Company, whichever occurs first. Authorized replacement parts are warranted for the remainder of the original warranty. All shipments of such parts will be made FOB factory, freight prepaid and allowed. Company reserves the right to select carrier and method of shipment. In addition, Company provides labor to repair or replace warranty parts during Company normal working hours on products with rotary screw compressors or centrifugal compressors. Warranty labor is not provided for any other products.

Company must receive the Registration and Startup Forms for products containing motor compressors and/or furnaces within ten (10) days of original product startup, or the ship date and the startup date will be deemed the same for determining the commencement of the warranty period and this warranty shall expire twelve (12) months from that date. For additional consideration, Company will provide an extended warranty(ies) on certain products or components thereof. The terms of the extended warranty(ies) are shown on a separate extended warranty statement.

No person (including any agent, sales representative, dealer or distributor) has the authority to expand the Company's obligation beyond the terms of this express warranty or to state that the performance of the product is other than that published by Company.

EXCLUSIONS

1. If free warranty labor is available as set forth above, such free labor does not include diagnostic visits, inspections, travel time and related expenses, or unusual access time or costs required by product location.
2. Refrigerants, fluids, oils and expendable items such as filters are not covered by this warranty.
3. This warranty shall not apply to products or parts : (a) that have been opened, disassembled, repaired, or altered, in each case by anyone other than Company or its authorized service representative; (b) that have been subjected to misuse, abuse, negligence, accidents, damage, or abnormal use or service; (c) that have not been properly maintained; (d) that have been operated or installed, or have had startup performed, in each case in a manner contrary to Company's printed instructions; (e) that have been exposed, directly or indirectly, to a corrosive atmosphere or material such as, but not limited to, chlorine, fluorine, fertilizers, waste water, urine, rust, salt, sulfur, ozone, or other chemicals, contaminants, minerals, or corrosive agents; (f) that were manufactured or furnished by others and/or are not an integral part of a product manufactured by Company; or (g) for which Company has not been paid in full.
4. This warranty shall not apply to products with rotary screw compressors or centrifugal compressors if such products have not been started, or if such startup has not been performed, by a Daikin Applied or Company authorized service representative.

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