Operation and Maintenance Manual OM-1141-5

Group: **Applied Air Systems**
Part Number: **OM 1141**
Date: **January 2021**

MicroTech® III Unit Controller for Rebel® Commercial Packaged Rooftop Systems

Model DPS 003 – 028 Ton

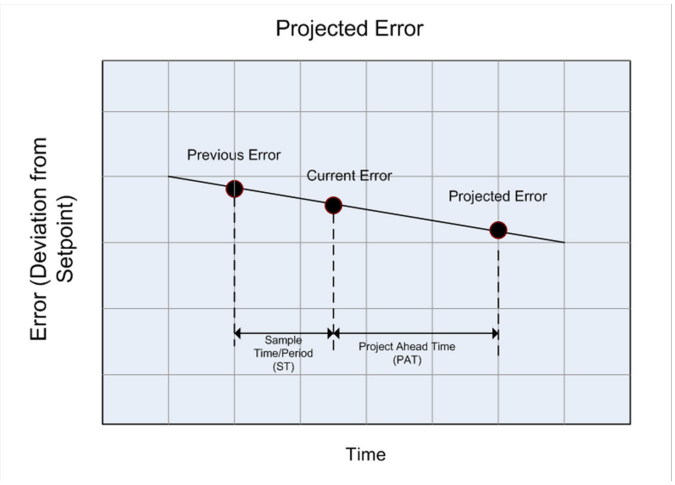
This manual provides information regarding the MicroTech® III control system. It specifically describes the operation and programmable options for units with constant air volume (CAV) control and variable air volume (VAV) control.

The MicroTech III Controller is a self contained device that is capable of complete, stand-alone operation. Information in the controller can be displayed and modified by using the keypad/display in the units main control panel.

Adjusting PI Control Parameters

The rooftop MicroTech III controller uses a “velocity” form of the traditional PI loop arranged such that the output is adjusted based on a “gain” parameter multiplied by the “projected” error. The projected error is determined based on the rate the error is changing as shown in Figure 1.

Figure 1: Projected Error Timeline



The change in output (Do) after each sample period (ST) is given by the following equation:

Do= Gain × Projected Error.

Although it is generally recommended that they are left at the factory settings there are four PI loop adjustment parameters available via the MicroTech III HMI. These are Gain, Period (ST), Project Ahead Time (PAT) and Max Change.

Generally speaking, the PAT should be set roughly equal to the “time constant” of the system being controlled and the Period (ST) one quarter to half the PAT. The Gain is then set to achieve control stability. If the system is unstable (hunting) the control is too fast and the Gain should be decreased to slow the control response. If the system takes excessively long to reach setpoint during transient conditions (sluggish) the Gain can be increased to speed the control response. The goal is an acceptable balance between these two conditions. When in doubt these parameters should be set to the factory settings.

Example for tuning PI loop:

Put the unit into a cooling mode with a DAT set point that is relatively in reach considering the conditions of the outdoor air and the conditions of the temperature within the building. Watch the unit operate and mark the time when you see it operating at a steady state holding discharge temperature within the dead band. Then make an incremental change to the set point, lowering for (cooling PID) start a timer and again observe the temperature noting time when the system again is delivering a discharge temp within the dead band. Record the time it took to re-stabilize. 63% of this time is the system time constant and you should set the PAT to that value. Then you should set the Period to ¼ to ½ the PAT (this is not super critical). From that point forward these values should be locked down and all you need to worry about is adjusting the Gain until the control is fast enough but not too fast that it is unstable. As an example starting DAT temp is 60°F and it is stable, the DAT setpoint is changed to 55°F it takes 5 minutes to reach 55°F and stabilize. Using that theory 300 seconds, multiplied by 65% is 195 seconds, the PAT would be set to 195 seconds, Period would be set somewhere between 49 and 98 seconds

Additional Instructions and Information

For installation and startup instructions and general information regarding a Rebel® rooftop unit, refer to the applicable model-specific installation and maintenance manual (Table 1).

Table 1: Installation and Maintenance Resources

Unit	Manual
MicroTech III Rooftop and Self Contained unit controller protocol information	ED 15112
MicroTech III Unit Controller	IM 919
MicroTech III Remote Unit Interface	IM 1005
DPS 003 – 028	IM 1125

Hazardous Information Messages

⚠ CAUTION

Extreme temperature hazard. Can cause damage to system components.

The MicroTech III controller is designed to operate in ambient temperatures from -20°F to 125°F. It can be stored in ambient temperatures from -40°F to 140°F. It is designed to be stored and operated in relative humidity up to 95% (non-condensing).

⚠ WARNING

Excessive moisture in the control panel can cause hazardous working conditions and improper equipment operation.

When servicing this equipment during rainy weather, the electrical components in the main control panel must be protected from the rain.

⚠ CAUTION

Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components.

Discharge any static electrical charge by touching the bare metal inside the main control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, relay modules, or power plugs while power is applied to the panel.

⚠ NOTICE

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user is required to correct the interference at his own expense. **Daikin Applied disclaims any liability resulting from any interference or for the correction thereof.**

⚠ WARNING

Electric shock hazard. Can cause personal injury or equipment damage.

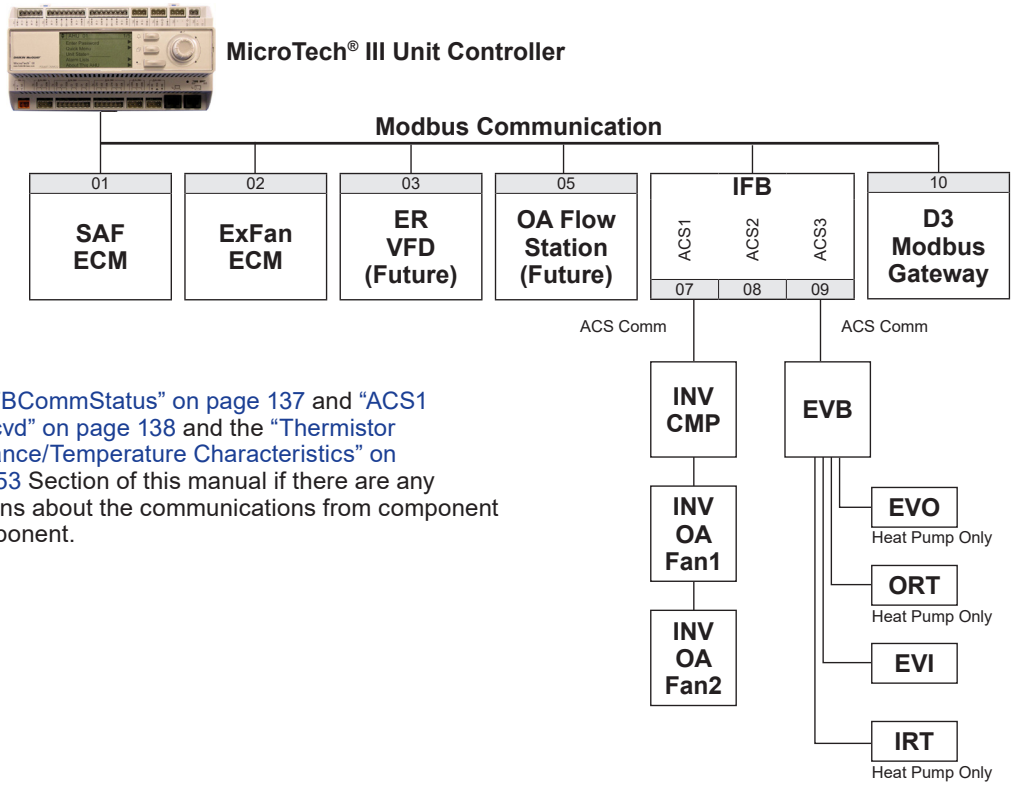
This equipment must be properly grounded. Connections and service to the MicroTech II control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

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
- DSP (Duct Static Pressure) Setpoint
- BSP (Building Static Pressure) Setpoint
- Heat/Cool Changeover (Occupied Setpoints)
- DAT (Discharge Air Temperature) Clg Setpoint
- DAT (Discharge Air Temperature) Htg Setpoint
- Clg Enable (OAT [Outdoor Air Temperature] lockout)
- Htg Enable (OAT [Outdoor Air Temperature] lockout)
- Econo Enable (Changeover temp/Enthalpy Switch)
- Ventilation Limit/OA Damper

Figure 2: Inter Component Communications Diagram



NOTE: See "IFBCommStatus" on page 137 and "ACS1 DataRcvd" on page 138 and the "Thermistor Resistance/Temperature Characteristics" on page 153 Section of this manual if there are any questions about the communications from component to component.

IFB Board

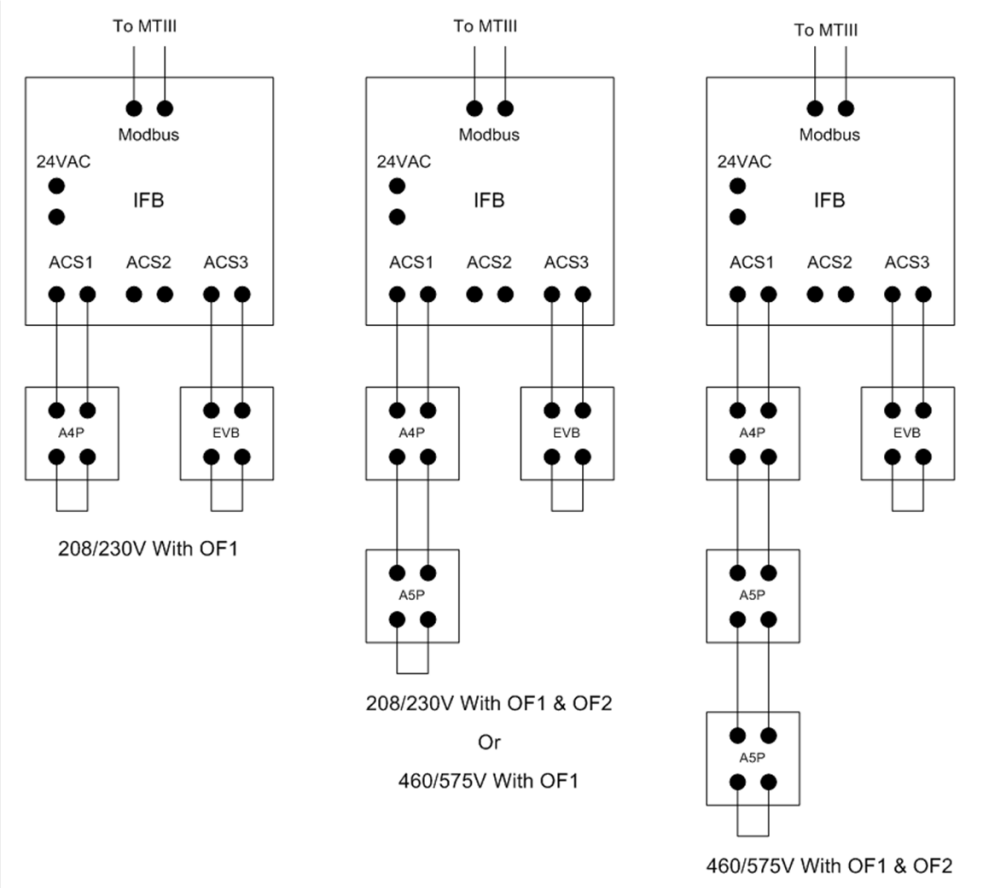
The IFB board is used to translate between the MicroTech III controller Modbus and the Daikin inverter compressor/outdoor fan boards' proprietary protocol.

There are three "ACS" communication current loop channels available on the IFB board; ACS1, ACS2 and ACS3. ACS1 is use for control of the inverter compressor (INV) and one or two outdoor fans (OF1 and OF2). ACS3 is use for control of the indoor expansion valve (EVI) and if the unit is a heat pump the outdoor expansion valve (EVO). ACS2 is not currently used.

INV, OF1 and OF2 are controlled by a combination of circuit boards designated A4P and A5P. These boards are interconnected forming the ACS1 communication loop. On 208/230V units the A4P board controls both INV and OF1. On 460/575V units the A4P board controls only INV and there is a separate A5P board that controls OF1. If a unit is equipped with an OF2 it is controlled by a separate A5P control board. Figure 3 shows the three possible board/loop arrangements that make up the ACS1 loop.

Expansion valves EVI and if applicable EVO are controlled by an expansion valve driver board EVB. The EVB board is connected to the IFB board forming the ACS3 communication loop. Figure 3 shows the ACS3 communication loop.

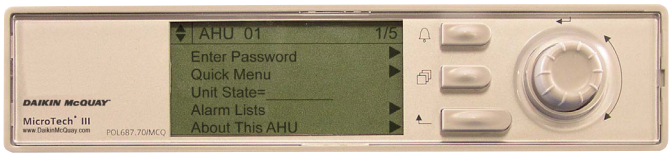
Figure 3: ACS Communication Current Loop Arrangements



For Troubleshooting Module-to-Module Communication, See page 137.

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.

Figure 4: Keypad Controls



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/Set Unit 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 this unit. The Quick Menu provides access to status information indicating the current operating condition of the unit. The View/Set Unit Menus include basic menus and items required to setup the unit for general operation. These include such things are 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.

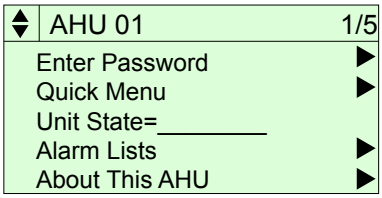
Passwords

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/Set Unit 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.

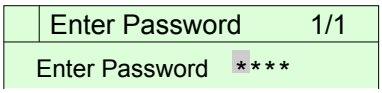
The main password page is displayed when the keypad/display is first accessed, the Home Key is pressed, the Back Key is pressed multiple times, or if the keypad/display has been idle longer than the Password Timeout (default 10 minutes). The main password page provides access to enter a password, access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

Figure 5: 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 6: 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 30 minutes via the 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 cause 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 240 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 Time count 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.

Manual Control

A user may manually control outputs to check operation of components when Manual Control is set to ManCtrl. When Manual Control is set to ManCtrl, the unit is disabled and the unit is shut down in the normal manner if it is operating. Outputs listed in the Manual Control menu of the Keypad/Display section can then be controlled directly until Manual Control is set to Normal.

NOTE: Manual Control will be set to Normal automatically after 240 minutes so that a person could not put the unit into Manual Mode control and walk away from the unit and let it run at the manual settings.

When Manual Control is set to Yes, the Control Mode is set to Off so that the unit will not restart automatically.

When Manual Control is set to Normal all digital outputs in the Manual Control menu are set to Off and all the analog outputs are set to 0.0% so that all outputs are in the Off or minimum position when Manual Control is set to ManCtrl.

All alarms except those listed below are overridden during Manual Control.

During manual control, the unit will respond in the normal manner to the following alarms.

- Emergency Stop Fault
- Duct High Limit
- High Return Temperature
- High Discharge Temperature
- Low Discharge Temperature
- High Pressure - Cooling and Heating*
- Low Pressure - Cooling and Heating*
- Inverter and Standard Compressor High Discharge Temperature*
- Inverter Compressor High Current*
- Inverter Compressor Board Temperature*
- High and Low Pressure Differential*

* The unloading routines normally used before shut down are not active in manual modes. These safeties will immediately shut down the unit.

Controller Warranty Statement

MicroTech III controllers with a blown internal fuse will not be covered by warranty. All MicroTech III controllers are factory tested and their results are documented prior to shipping. This is to ensure that the MicroTech III is functioning properly before it leaves the Daikin factory.

In the text below, IM 919 clearly states that miswiring will damage the MicroTech III. Daikin is not responsible for mishandling of our equipment in the field.

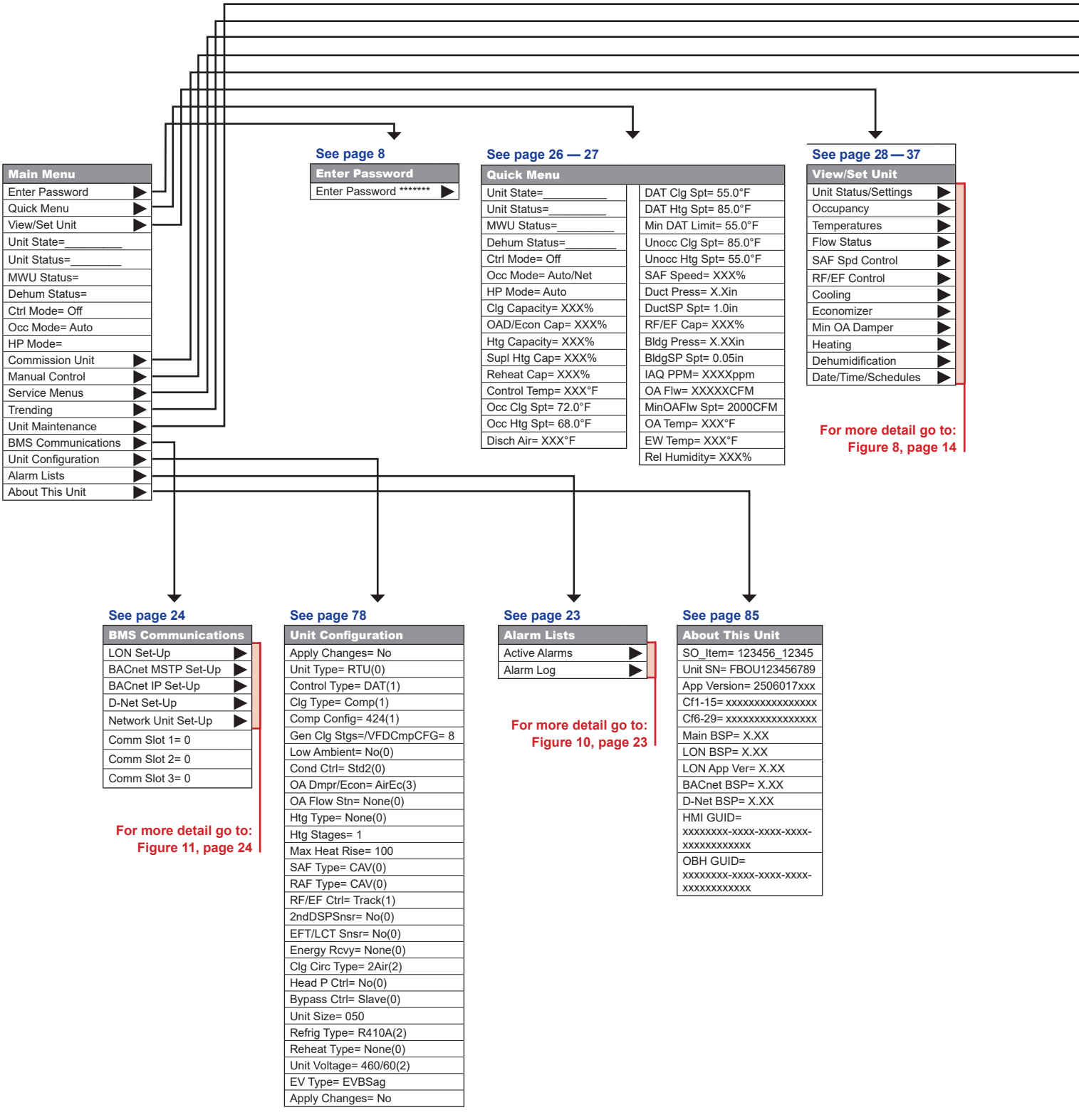
“The field needs to be careful not to ground their transformer for a field signal to chassis ground. They need to use the same ground as the controller to prevent a voltage potential above 3V. This voltage potential can damage the Microtech III Controller.” -IM 919, page 25

Also, as indicated in Form No. 933-430285Y-00-A of Daikin Applied Americas Limited Product Warranty, it states that defects as a result of negligence, misuse etc. will not be covered by warranty.

“This warranty shall not apply to products or parts which (a) have been opened, disassembled, repaired, or altered by anyone other than Company or its authorized service representative; or (b) have been subjected to misuse, negligence, accidents, damage, or abnormal use or service; or (c) have been operated, installed, or startup has been provided in a manner contrary to Company’s printed instructions, or (d) were manufactured or furnished by others and which are not an integral part of a product manufactured by Company; (e) have been exposed to contaminates, or corrosive agents, chemicals, or minerals, from the water supply source, or (f) have not been fully paid for by Owner.” -Daikin Applied Americas Inc. Limited Product Warranty

The following is a description of the MicroTech III menu structure. These menus and items can all be displayed with the keypad/display. Menu items displayed will change based on the selected unit configuration.

Figure 7: Main Menu – *Keypad/Display Menu Structure*



See page 38 — 66

Commission Unit
Unit Set-Up ▶
Timer Settings ▶
SAF Set-Up ▶
RF/EF Set-Up ▶
Htg/Clg ChgOvr Set-Up ▶
Cooling Set-Up ▶
INV Cmp Set-Up ▶
Var Cmp Set-Up ▶
Econo Set-Up ▶
Min OA Set-Up ▶
Heating Set-Up ▶
OA Fan Set-Up ▶
Exp Valve Set-Up ▶
Defrost Set-Up ▶
Dehum Set-Up ▶
Energy Rec Set-Up ▶
Head Pressure Set-Up ▶
D3 Set-Up ▶
Alarm Configuration ▶

For more detail go to:
Figure 9, page 16

See page 68 — 69

Manual Control	
Manual Ctrl= Normal	CFan Outpt 2= Off
Supply Fan= Off	CFan Outpt 3= Off
SAF Spd Cmd= 0%	BP/WR Valve= 0%
INV/OF Ena= Off	CW Valve= 0%
INV Cmp= Off	ExhFan Out 1= Off
INV Cmp Cmd= 0%	ExhFan Out 2= Off
Comp 3= Off	ECond VFD= Off
OA Fan= Off	ECFan Spd Cmd= 0%
OA Fan Cmd= 0%	EC Dm Valve= Close
4 Way Valve= Off	Sump Pump= Off
RcvSol Valve=Off	Sep Flsh Vlv= Off
BP Sol Valve= Off	SV1= Off
EVI Cmd= 0%	SV2= Off
EVO Cmd= 0%	Gas Htg On/Off= Off
RF/EF Fan= Off	Htg Valve= 0%
RF/EF Spd Cmd= 0%	SCR Out= 0%
OAD/Econo= 0%	F&BP Damper= 0%
OAD OpCl= Close	Htg Stg 1= Off
Var Cmp= Off	SCR Ena 1= Off
Var Cmp Cmd= 0%	Htg Stg 2= Off
VCmp Emg Stop= Nrml	SCR Ena 2= Off
Comp 1= Off	Htg Stg 3= Off
Comp 2= Off	Htg Stg 4= Off
Comp 3= Off	Htg Stg 5= Off
Comp 4= Off	Htg Stg 6= Off
Comp 5= Off	Reheat Valve= 0%
Comp 6= Off	RH Output= Off
Comp 7= Off	LSCRH Valve= Off
Comp 8= Off	HGBP Valve= Off
U1 Comp 1= Off	ERec Wheel= Off
U1 Comp 2= Off	ER Whl Cmd= 0%
U2 Comp 1= Off	ERBP Dmpr Cl= Off
U2 Comp 2= Off	ERBP Dmpr Op= Off
Cond Sol 1= Off	Cond Wtr Pump= Off
Cond Sol 2= Off	Alm Output= Off
CFan Outpt 1= Off	Fan Op Out= Off

See page 70 — 76

Service Menus
Timer Settings ▶
Operating Hours ▶
Save/Restore Settings ▶
Active Alarms ▶
Alarm Log ▶
Event Log ▶
Data Shapshots ▶
Alarm/Event Configuration ▶
Analog Input Status ▶
Universal I/O Status ▶
Digital Input Status ▶
Digital Output Status ▶
Network Input Status ▶
Modbus Status ▶
IP Set Up ▶
D3 Status ▶
Sensor Offsets ▶
HMI Set Up
Reset Counter= XXXX
LastResetInfo

For more detail go to:
Figure 10, page 20

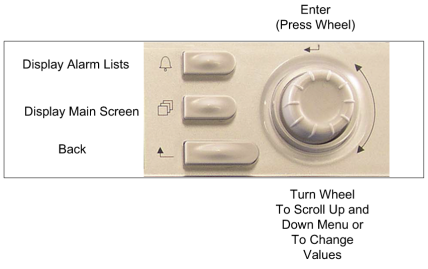
See page 79 — 85

Trending
Trending Ena= No
Apply Chgs= No
Sample Time= 300s
TrendOnOff= Off
AutoExpTimeDefault= 1440m
Export Data= No
Clear Trend= Done
Trend Full Default= Wrap
Default Trend Default= No
Points 1–8 (Fixed) ▶
Points 9–24 (from List) ▶
Points 25–27 (with IDs) ▶
Points 28–30 (with IDs) ▶

For more detail go to:
Figure 11, page 24

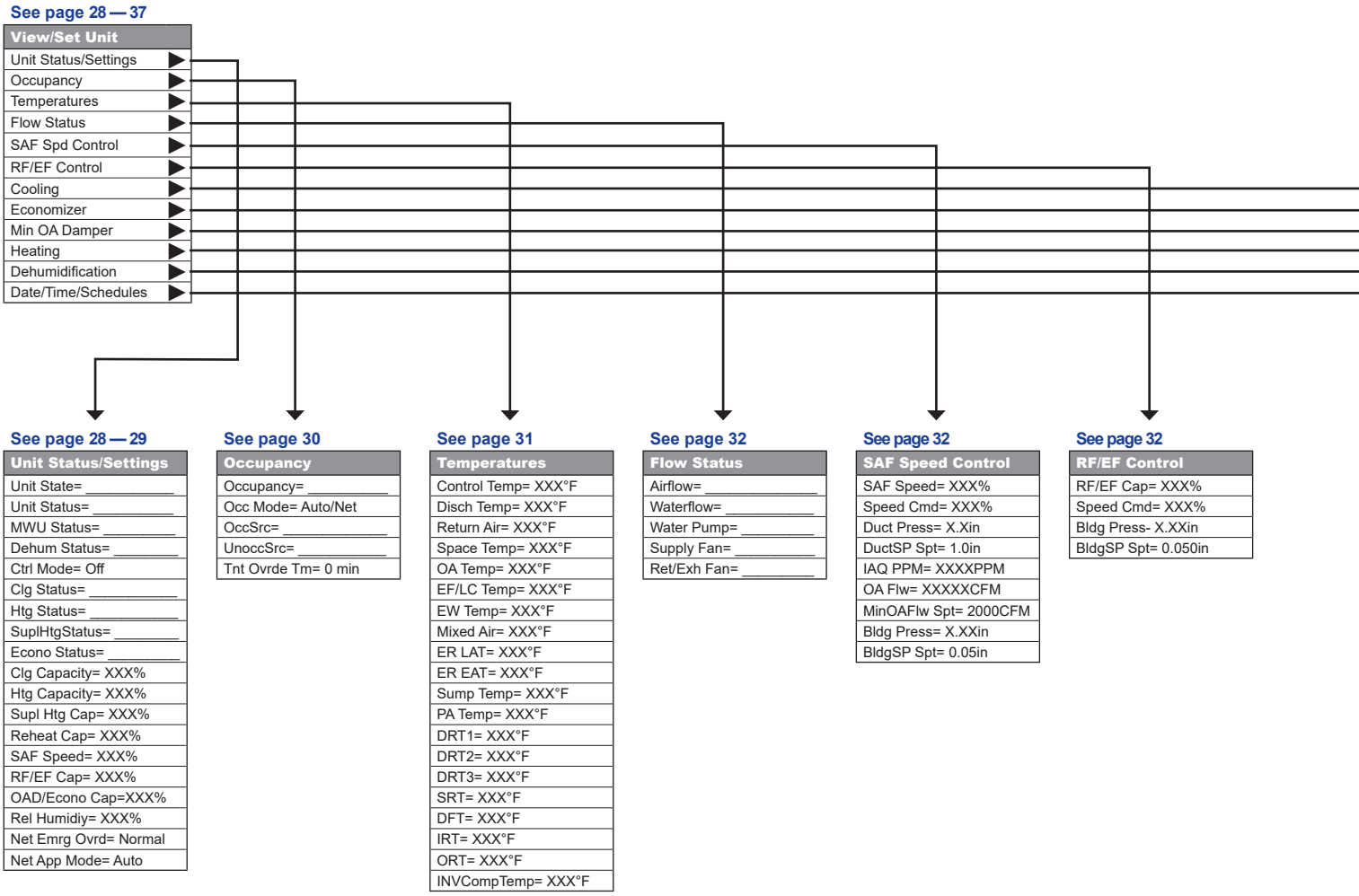
See page 70

Unit Maintenance
Operating Hours



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 8: View/Set Unit** – Keypad/Display Menu Structure*



See page 33

Cooling
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F
DAT Clg Spt= 55.0°F

See page 33

Economizer
OAD/Econo Pos= XXX%
DAT Clg Spt= 55.0°F
Min OA Pos= XXX%
FreeClgStatus = _____
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F

See page 33

Min OA Damper
Min OA Pos= XXX%
Vent Limit= 20%
LoFlo V Lmt= 30%
DCV Limit= 10%
Min OA Src= _____

See page 35

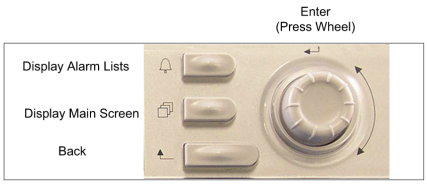
Heating
Occ Htg Spt= 68.0°F
Unocc Htg Spt= 55.0°F
MWU Spt= 70.0°F
DAT Htg Spt= 85.0°F

See page 35

Dehumidification
Dehum Status= _____
Rel Humidity= XXX%
Dewpoint= XXX°F
Dehum Method= None
RH Setpoint= 50%
Dewpoint Spt= 50°F
Reheat Spt= XXX°F
Reheat Cap= XXX%

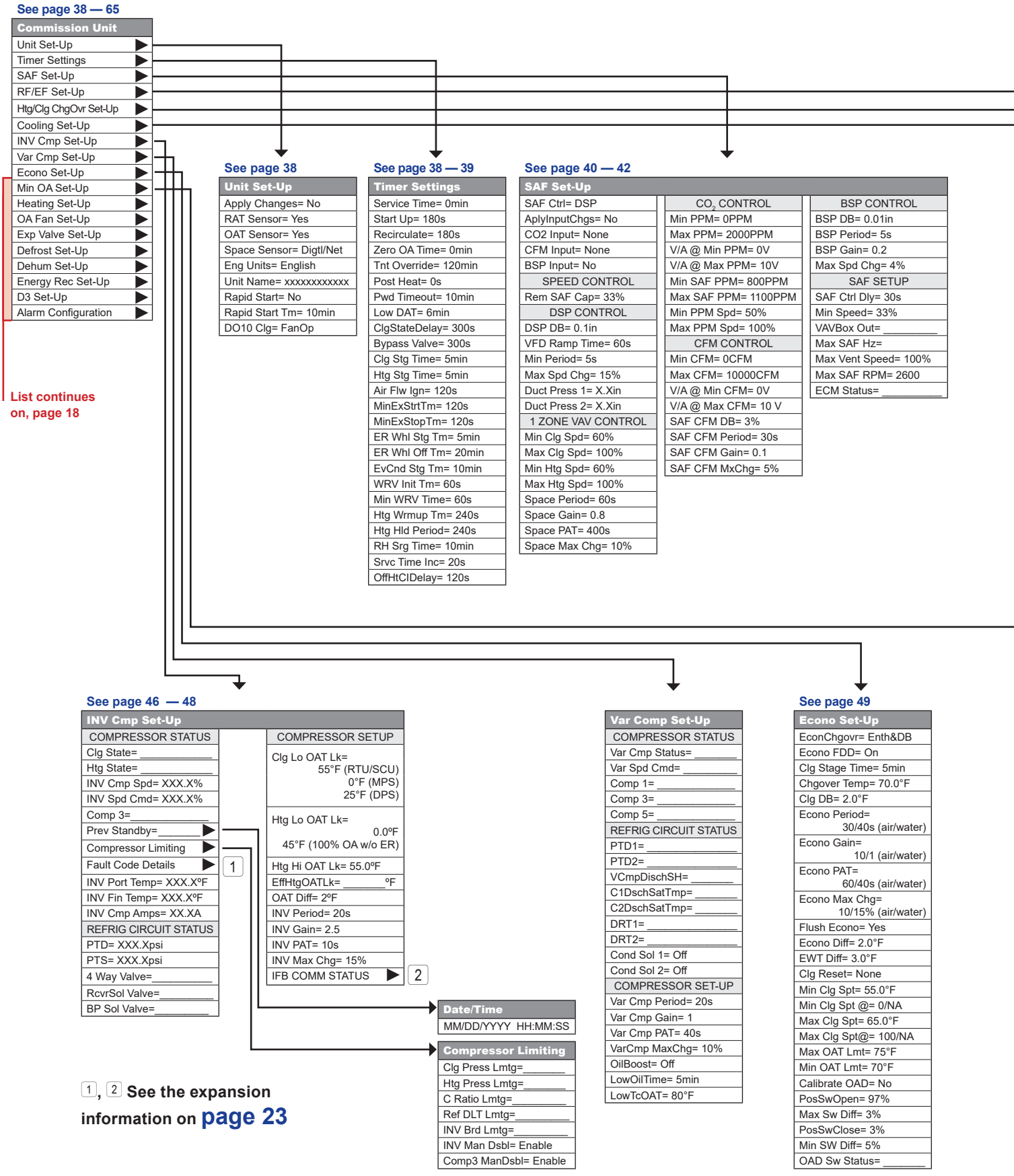
See page 36

Date/Time/Schedules
Time= hh:mm:ss
Date= MM/DD/YY
UTC Diff= -60min
DAILY SCHEDULE
Mon= HH:MM-HH:MM
Tue= HH:MM-HH:MM
Wed= HH:MM-HH:MM
Thu= HH:MM-HH:MM
Fri= HH:MM-HH:MM
Sat= HH:MM-HH:MM
Sun= HH:MM-HH:MM
Hol= HH:MM-HH:MM
HOLIDAY DATES
Hol 1=MMMDD/YY-MMMDD/YY
Hol 2=MMMDD/YY-MMMDD/YY
Hol 3=MMMDD/YY-MMMDD/YY
Hol 4=MMMDD/YY-MMMDD/YY
Hol 5=MMMDD/YY-MMMDD/YY
Hol 6=MMMDD/YY-MMMDD/YY
Hol 7=MMMDD/YY-MMMDD/YY
Hol 8=MMMDD/YY-MMMDD/YY
Hol 9=MMMDD/YY-MMMDD/YY
Hol 10=MMMDD/YY-MMMDD/YY
ONE EVENT SCHEDULE
Beg= MMMDD/YY@HH:MM
End= MMMDD/YY@HH:MM
OPTIMAL START
Enable= No
Htg Range= 0.4 °F/min
Htg OAT= 35 °F
Des Htg OAT= 0 °F
Clg Rate= 0.4 °F/min
Clg OAT= 85 °F
Des Clg OAT= 95 °F
DAYLIGHT SAVINGS
DLS Strt Mon= Mar
DLS Strt Wk= 2nd Week
DLS End Mon= Nov
DLS End Wk= 1st Week
DLS Enable= Auto
PURGE
Max Purge= 0min



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 9: Commission Unit** – Keypad/Display Menu Structure*



1, 2 **See the expansion information on page 23**

See page 43

RF/EF Set-Up	
RF/EF Ctrl= Tracking	MinExStrtTm= 120s
Rem RAF Cap= 5%	MinExStopTm= 120s
Rem ExhF Cap= 5%	MinExOAPos= 5%
BSP DB= 0.01in	MinExSAFCap= 10%
BSP Period= 5s	ExhOnOAPos= 40%
BSP Gain= 0.2s	ExhMxOAPos= 100%
Max Spd Chg= 4%	Exh Stg 1 On= 40%
Sup Fan Max= 100%	Exh Stg 1 Off= 30%
RF @ SF Max= 95%	Exh Stg 2 On= 55%
Sup Fan Min= 30%	Exh Stg 2 Off= 40%
RF @ SF Min= 25%	Exh Stg 3 On= 70%
Lo Fan Diff= 75%	Exh Stg 3 Off= 50%
Hi Fan Diff- 75%	Max RF/EF Hz= 60Hz
RFEF Ctrl Dly= 30s	Max Vent Spd= 100%
Min Speed= 5% (with Exhaust Fan) 33% (with Return Fan)	Max RFEF RPM= 2600
	ECM Status= _____

See page 44

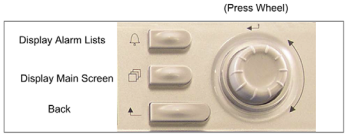
Htg/Clg ChgOvr Set-Up
Ctlr Temp Src= RAT
AplyTstatchg= No
Use Tstat Spt= No
Occ Clg DB= 2.0°F
Clg Period= 60s
Clg Gain= 0.1
Clg PAT= 600s
Max Clg Chg= 5.0°F
Occ Htg DB= 2.0°F
Htg Period= 60s
Htg Gain= 0.1
Htg PAT= 600s
Max Htg Chg= 5.0°F
CalDRemSpt@10°C= No
CalDRemSpt@50°F= No
CalDRemSpt@30°C= No
CalDRemSpt@86°F= No
DemandShed= Ena
ClgDmdShdInc= 4°F
HtgDmdShdInc= 4°F
ClgShedRate= 2.0°F/hr
HtgShedRate= 2.0°F/hr

See page 45

Cooling Set-Up
Clg Stage Time= 5min
RHTBleedDwn
Clg DB= 2.0°F
Clg Period= 20s
Clg Gain= 1
Clg PAT= 40s
CW Max Chg= 15%
Clg Lo OAT Lk= 55ºF (RTU/SCU) 0°F (MPS) 25°F (DPS or RTU w/ VFD Cmps)
Clg OAT Diff= 2.0°F
Min EWT= 55°F
Clg Reset= None
Min Clg Spt= 55.0°F
Min Clg Spt @= 0/NA
Max Clg Spt= 65.0°F
Max Clg Spt@= 100/NA
Lead Circuit= #1
Staging Type= Std
CFanOut1 Spt= 55°F
CFanOut2 Spt= 65°F
CFanOut3 Spt= 75°F
Cond Fan Diff= 5°F
Unocc Diff= 3°F
DT Above Spt= _____
DT Below Spt= _____

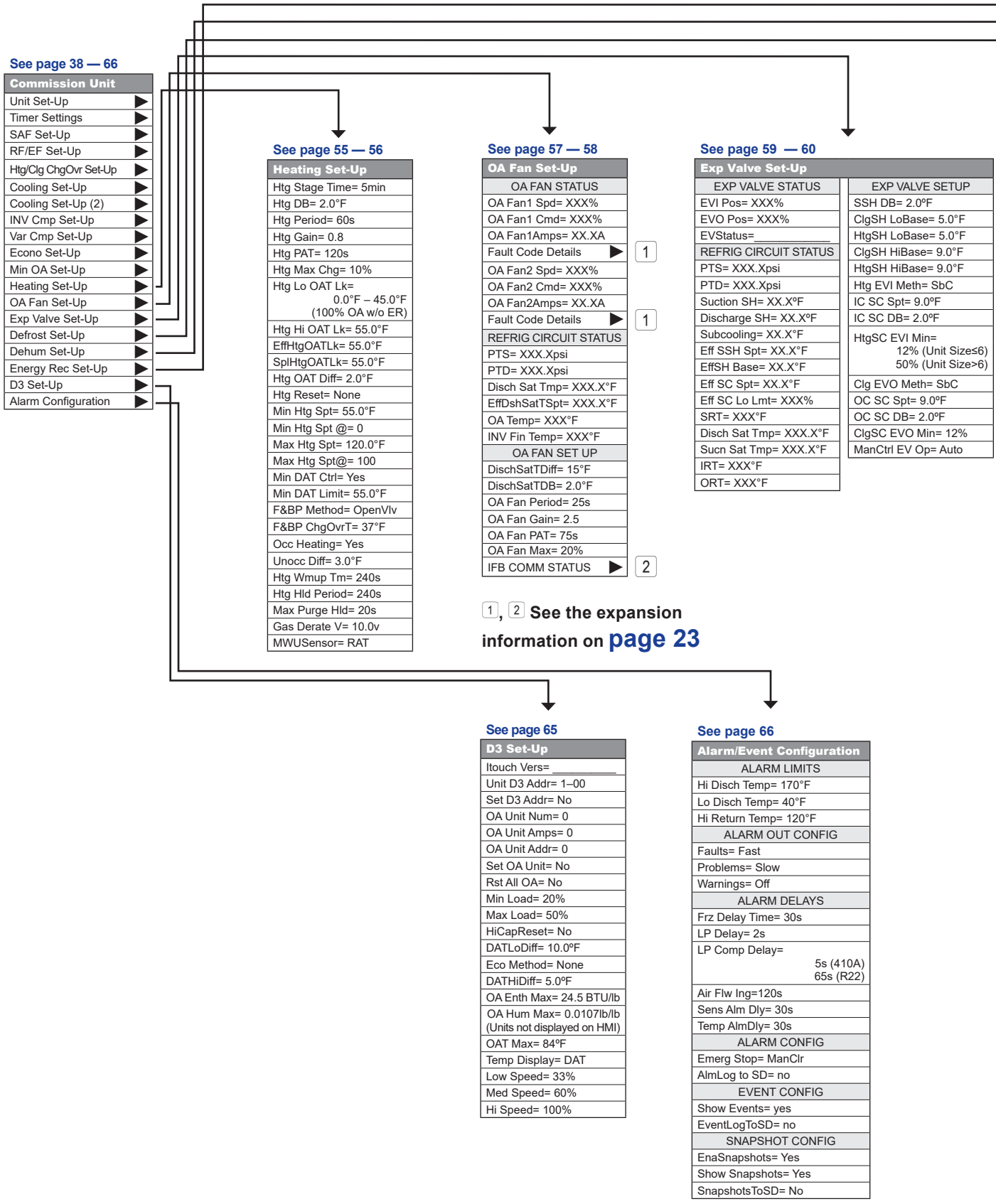
See page 52 — 54

Min OA Set-Up		
AplyMinOAChg= No (Uses MinOAT Type Instance Name)	CFM RESET	FAN SPEED RESET
Min OA Reset= None	OA Flow= XXXXXCFM	Min Fan Diff= 20%
BSPOAOvrd= No	MinOAFlwSpt= 2000CFM	Max Fan Diff= 50%
RstLmtSnsr= None	Field Stn Rst= No	Min Clg Spd= 40%
EXTERNAL RESET	Field Stn Cfg= VDC	Des Clg Spd= 100%
OA @ MinV/mA= 0%	Min CFM= 0 CFM	BSP RESET
OA @ MaxV/mA= 100%	Max CFM= 10000 CFM	MinRFEFTm= 120s
Min V/mA= 0.0/V	V/A @Min CFM= 0.0/V	BSP OvdST= 5s
Max V/mA= 10.0/V	V/A @Max CFM= 10.0/V	BSP OvdGain= 0.2
CO_2 RESET	OA CFM DB= 3%	BSP OvdMaxChg= 4%
IAQ Reset= Yes	OA CFM Period= 30s	DAMPER LIMITING
PPM@DCVLmt= 800PPM	OA CFM Gain= 0.1	RstTLmt= 32.0ºF
PPM@VntLmt= 1000PPM	OA CFM Max Chg= 5%	RstTSmplTm= 5s
IAQ PPM= XXXXPPM	Design Flow= Yes	RstTGain= 0.2
Min PPM= 0 PPM	Des Flo DB= 3%	RstPAT= 60s
Max PPM= 2000 PPM	DF Period= 30s	RstTMaxChg= 4%
V/A @Min PPM= 0.0/V	Des Flo Gain= 0.1	0–30% OA Max= 30%
V/A @Max PPM= 10.0/V	DF Max Chg= 5%	Min Inc Rate= 0.03
	RH Lvl Pos= _____	Max Inc Rate= 2.0
	LH Lvl Pos= _____	



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Figure 9 continued: Commission Unit – *Keypad/Display Menu Structure*



See page 61

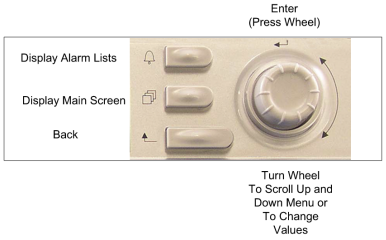
Defrost Set-Up
Defrost State= _____
Manual DF= No
MinCmpOpTm= 10min
MinAccCmpTm= 40min
MaxFrostTm= 120min
Defrost Temp= XXºF
Tdef Adj= 0.0ºF
CmpOpTm= XXXmin
AccCmpOpTm= XXXmin
LoFrstAccTm= XXXmin
HiFrstAccTm= XXXmin

See page 62

Dehum Set-Up
Dehum Method= None
RH DB= 6%
Dewpoint DB= 2°F
RH Period= 30s
RH Gain= 1
LSC Lo Gain = 0.2
RH PAT= 30s
RH Max Chg= 10%
RH Stg Time= 10min
Stg Rht DB= 5.0°F
Unocc DeHum= No
Sensor Loc= Return
Min LCT (RTU/MPS)= 45°F Min LCT (DPS)= 52°F
Mx Lvg Coil T= 52.0°F
Rht Cmp Lmtg= Yes
Min Rheat Spt= 55.0°F
Max Rheat Spt= 65.0°F
RH Sens Type= VDC
RH Min Sig= 0.0V
RH Max Sig= 10.0V
Min Dehum Spd= 33%
Max Dehum Spd= 100%
Rht Min Pos= 10% (RPS) 15% (MPS) 5% (DPS, DPH)
RH Dec Rate= 1
RHOutMaxV (MPS/DPS)= 8.5V RHOutMaxV (RTU)= 10.0V
Backup RH Enable= No

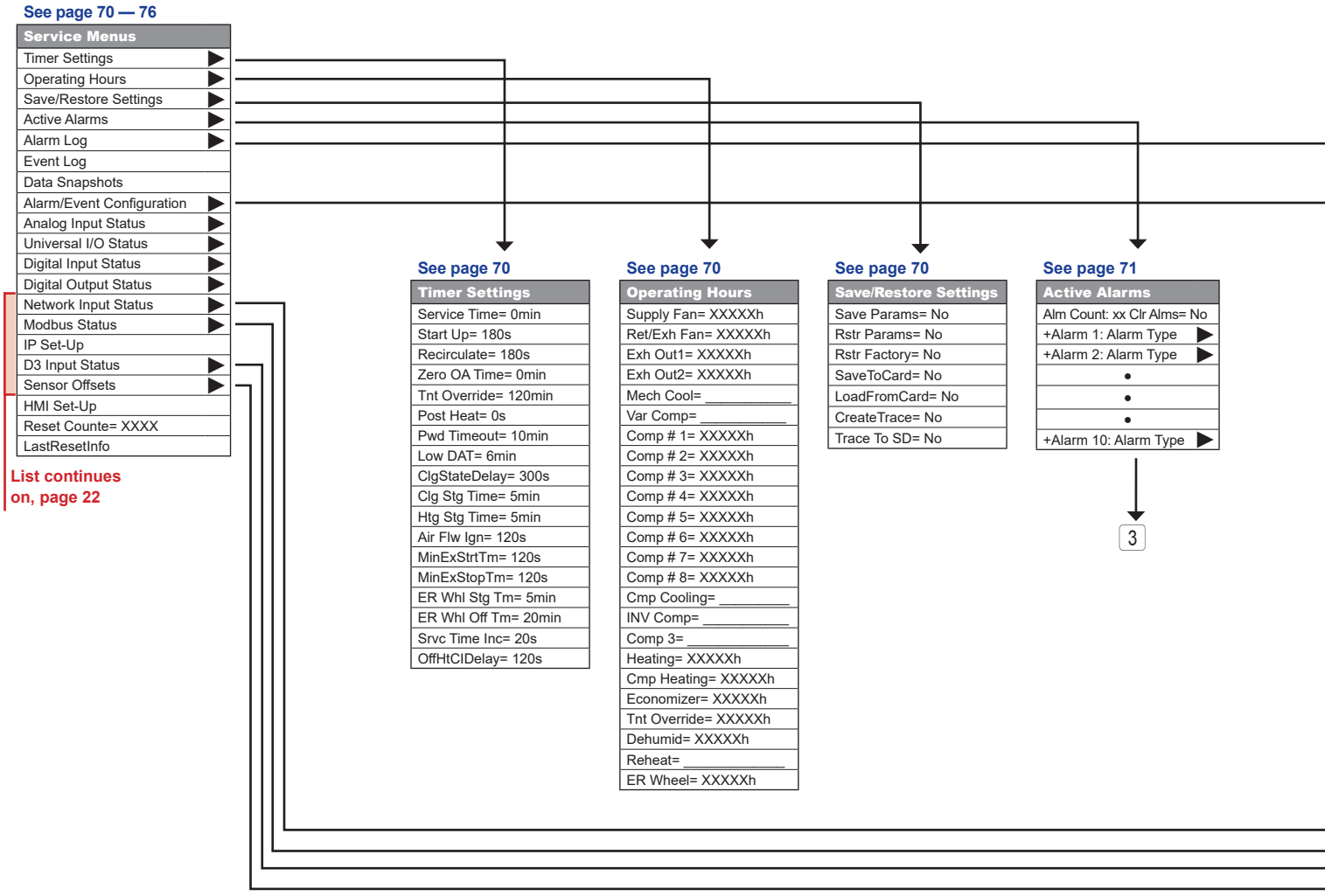
See page 64

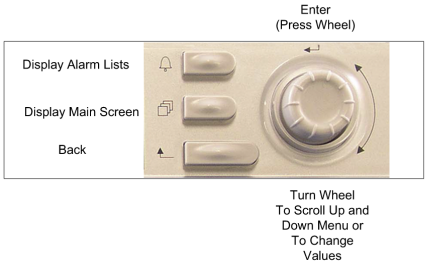
Energy Rec Set-Up
Energy Rcvy= Yes
ER Wheel= _____
Wheel Speed= XXX%
Whl Spd Cmd= XXX%
ER LAT= XXX°F
ER EAT= XXX°F
Min ExhT Diff= 2.0°F
Max ExhT Diff= 6.0°F
ER Whl Stg Tm= 5min
ER Whl Off Tm= 20min
Rel Humidity= XXX%
Min Whl Spd= 5%
Intersect Pt= XXX.XºF
Fst Mgnt Meth= Timed
OA Frst Temp= -5°F
Defrost Time= 5min
Defrost Period= 60min
Defrst On Tm= 1s
Defrst Off Tm= 24s
ER Whl Period= 30s
ER Whl Gain= 1.0
ER Whl PAT= 30s
ER Max Chg= 10%
LoERLATCmpLk= 45.0°F
Cap Limiting= Yes



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Figure 10: Service Menu *– Keypad/Display Menu Structure*





This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

See page 71

Alarm Log
Log Count: xx Clr Log= No ▶
+/-Alarm 1: Alarm Type ▶
+/-Alarm 2: Alarm Type ▶
•
•
•
+/-Alarm 10: Alarm Type ▶
•
•
•
+/-Alarm 50: Alarm Type ▶

4

See page 71

Alarm/Event Configuration
ALARM LIMITS
Hi Disch Temp= 170°F
Lo Disch Temp= 40°F
Hi Return Temp= 120°F
ALARM OUT CONFIG
Faults= Fast
Problems= Slow
Warnings= Off
ALARM DELAYS
Frz Delay Time= 30s
LP Delay= 5s (410A) 65s (R22)
LP Comp Delay= 5s
Air Flw Ing=120s
Sens Alm Dly= 30s
Temp AlmDly= 30s
ALARM CONFIG
Emerg Stop= ManClr
AlmLog to SD= no
EVENT CONFIG
Show Events= yes
EventLogToSD= no
SNAPSHOT CONFIG
EnaSnapshots= Yes
Show Snapshots= Yes
SnapshotsToSD= No

3, 4 See connection on page 23

See page 73

Analog Input Status
MCB AI1= XXXXXXXX
MCB AI2= XXXXXXXX
MCB AI3= XXXXXXXX

See page 73

Universal I/O Status	
MCB X1= XXXXXXXX	EMC X1= XXXXXXXX
MCB X2= XXXXXXXX	EMC X2= XXXXXXXX
MCB X3= XXXXXXXX	EMC X3= XXXXXXXX
MCB X4= XXXXXXXX	EMC X4= XXXXXXXX
MCB X5= XXXXXXXX	EMC X5= XXXXXXXX
MCB X6= XXXXXXXX	EMC X6= XXXXXXXX
MCB X7= XXXXXXXX	EMC X7= XXXXXXXX
MCB X8= XXXXXXXX	EMC X8= XXXXXXXX
EMA X1= XXXXXXXX	EMD X1= XXXXXXXX
EMA X2= XXXXXXXX	EMD X2= XXXXXXXX
EMA X3= XXXXXXXX	EMD X3= XXXXXXXX
EMA X4= XXXXXXXX	EMD X4= XXXXXXXX
EMA X5= XXXXXXXX	EMD X5= XXXXXXXX
EMA X6= XXXXXXXX	EMD X6= XXXXXXXX
EMA X7= XXXXXXXX	EMD X7= XXXXXXXX
EMA X8= XXXXXXXX	EMD X8= XXXXXXXX
EMB X1= XXXXXXXX	EME X1= XXXXXXXX
EMB X2= XXXXXXXX	EME X2= XXXXXXXX
EMB X3= XXXXXXXX	EME X3= XXXXXXXX
EMB X4= XXXXXXXX	EME X4= XXXXXXXX
EMB X5= XXXXXXXX	EME X5= XXXXXXXX
EMB X6= XXXXXXXX	EME X6= XXXXXXXX
EMB X7= XXXXXXXX	EME X7= XXXXXXXX
EMB X8= XXXXXXXX	EME X8= XXXXXXXX

See page 73

Digital Input Status
MCB DI1= _____
MCB DI2= _____
MCB DI3= _____
MCB DI4= _____
MCB DI5= _____
MCB DI6= _____
EMD DLA1= _____

See page 74

Digital Output Status	
MCB DO1= _____	EMC DO1= _____
MCB DO2= _____	EMC DO2= _____
MCB DO3= _____	EMC DO3= _____
MCB DO4= _____	EMC DO4= _____
MCB DO5= _____	EMC DO5= _____
MCB DO6= _____	EMC DO6= _____
MCB DO7= _____	EMD DO1= _____
MCB DO8= _____	EMD DO2= _____
MCB DO9= _____	EMD DO3= _____
MCB DO10= _____	EMD DO4= _____
EMA DO1= _____	EMD DO5= _____
EMA DO2= _____	EMD DO6= _____
EMA DO3= _____	EME DO1= _____
EMA DO4= _____	EME DO2= _____
EMA DO5= _____	EME DO3= _____
EMA DO6= _____	EME DO4= _____
EMB DO1= _____	EME DO5= _____
EMB DO2= _____	EME DO6= _____
EMB DO3= _____	
EMB DO4= _____	
EMB DO5= _____	
EMB DO6= _____	

Figure 10 continued: Service Menu – *Keypad/Display Menu Structure*

See page 70 — 76

Service Menus
Timer Settings ▶
Operating Hours ▶
Save/Restore Settings ▶
Active Alarms ▶
Alarm Log ▶
Event Log
Data Snapshots
Alarm/Event Configuration ▶
Analog Input Status ▶
Universal I/O Status ▶
Digital Input Status ▶
Digital Output Status ▶
Network Input Status ▶
Modbus Status ▶
IP Set-Up
D3 Input Status ▶
Sensor Offsets ▶
HMI Set-Up
Reset Counte= XXXX
LastResetInfo

See page 74

Network Input Status
Net OAT In= XXX.X°F
Net Space In= XXX.X°F
NetCurrState= _____
NetNextState= _____
NetTmToNxtSt= XXXXXmin
Net App Mode= _____
Net Cl Ena Sw= X.X
Net Cl Ena Vl= XXX%
Net Ht Ena Sw= X.X
Net Ht Ena Vl= XXX%
Net Ec Ena Sw= X.X
Net Ec Ena Vl= XXX%
Net SAF Cap= XXX%
Net RAF Cap= XXX%
Net ExhF Cap= XXX%
Net CFlw Sw= XXX%
Net Flw Val= XXX%
Net Space IAQ= XXXXPPM
Net Rel Humid= XXX%
Net DATClgSpt= XXX.X°F
Net DATHtgSpt= XXX.X°F
nviSetpoint= XXX.X°F
OccManCmd= _____
Net Min OA= XXX%
nvoEffSpt= XXX.X°F
nciOccClgSpt= XXX.X°F
nciOccHtgSpt= XXX.X°F
nciHVACType= _____

See page 75

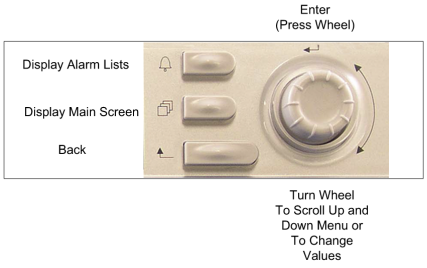
Modbus Status
SF MB Status=_____
RF/EF MB Status=_____
ER MB Status=_____
OF MB Status= _____
IFB MB Status= _____
D3 MB Status=_____
SAFVFD Ex Flt= _____
RxFVFD Ex Flt= _____
ER VFD Ex Flt= _____
OF VFD Ex Flt= _____
MB Resistance= Yes
ECM Config= Done

See page 75

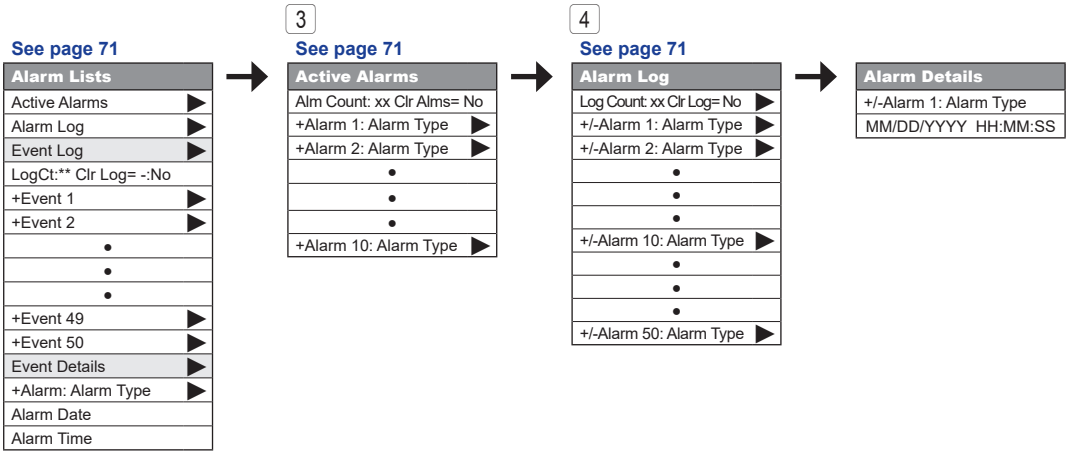
D3 Status
D3 Comm Sts= _____
D3 Addr Err= _____
D3 On/Off= _____
D3 Mode= _____
D3 Clg Spt= XXX.X°F
D3 Htg Spt= XXX.X°F
D3 Fan Spd= _____
D3 Min Load= XXX%
D3 Max Load= XXX%
D3 Eco Ena= _____
OA Enthalpy= XXXBTU/lb
OA Hum Ratio= g/kg
D3 SWVers= XXXXXXXXXX
OAAdd1–16= _____
OAAdd17–32= _____
OAAdd33–49= _____
OAAdd50–64= _____
SetOAAddr= XX
CurrOAAddr= XX
CurrOAAmps= XXXA
CurrOARLA= XXXA

See page 76

Sensor Offsets
Disch Air= 0.0°F
Return Air= 0.0°F
Space Temp= 0.0°F
OA Temp= 0.0°F
EF/LC Temp= 0.0°F
EW Temp= 0.0°F
Mixed Air= 0.0°F
MAT LON SCC= 0.0°F
ER LAT= 0.0°F
ER EAT= 0.0°F
Sump Temp= 0.0°F
DRT1= 0.0°F
DRT3= 0.0°F
SRT= 0.0°F
DFT= 0.0°F
IRT= 0.0°F
ORT= 0.0°F



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.



Expansion Information

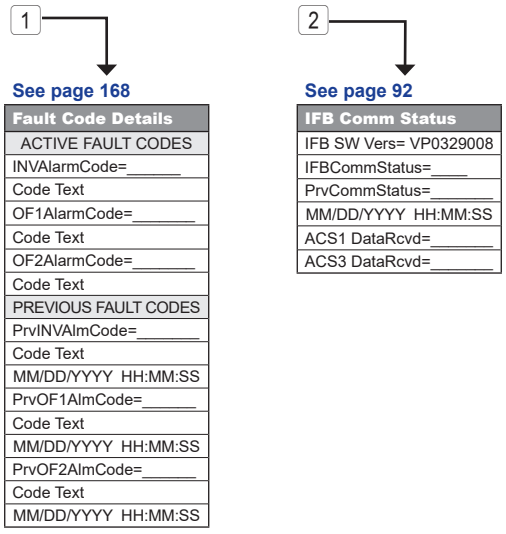


Figure 11: BMS Communications *– Keypad/Display Menu Structure*

See page 77

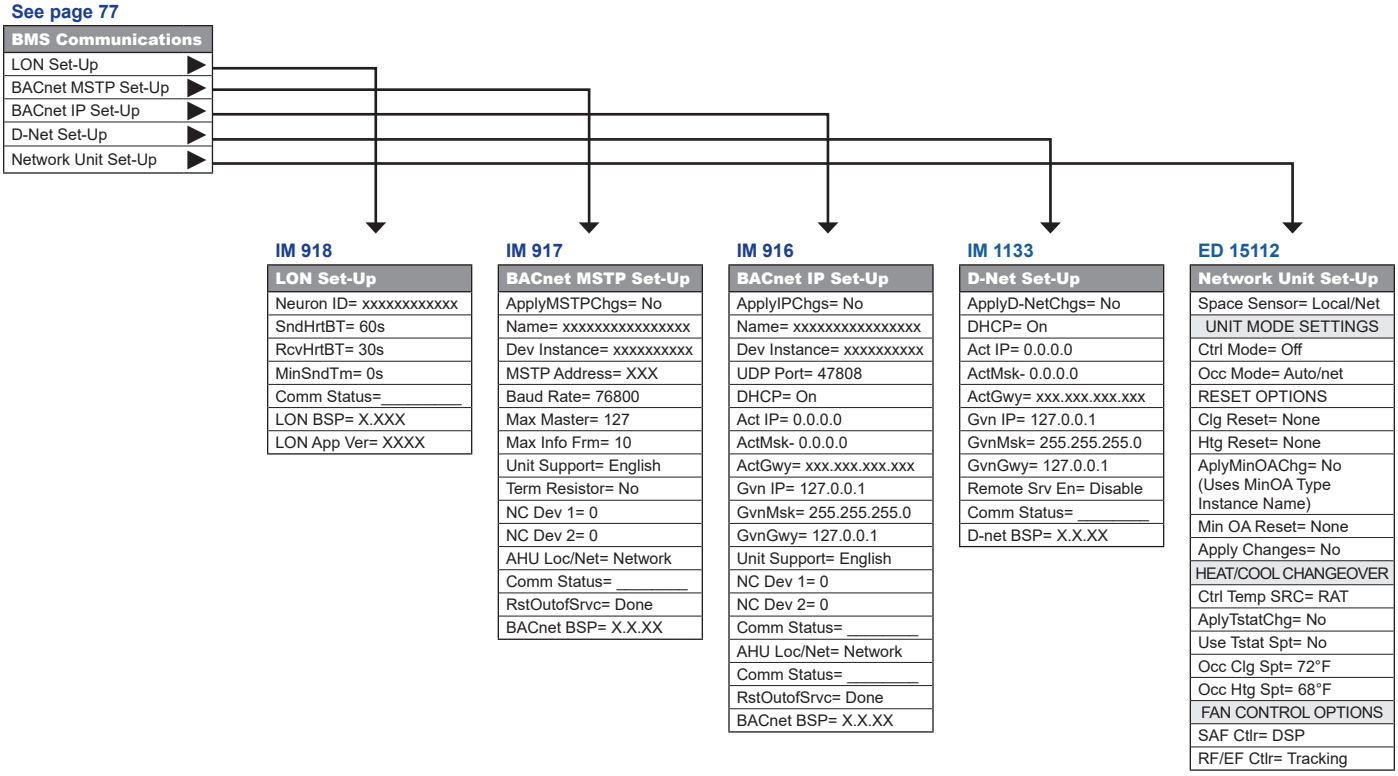
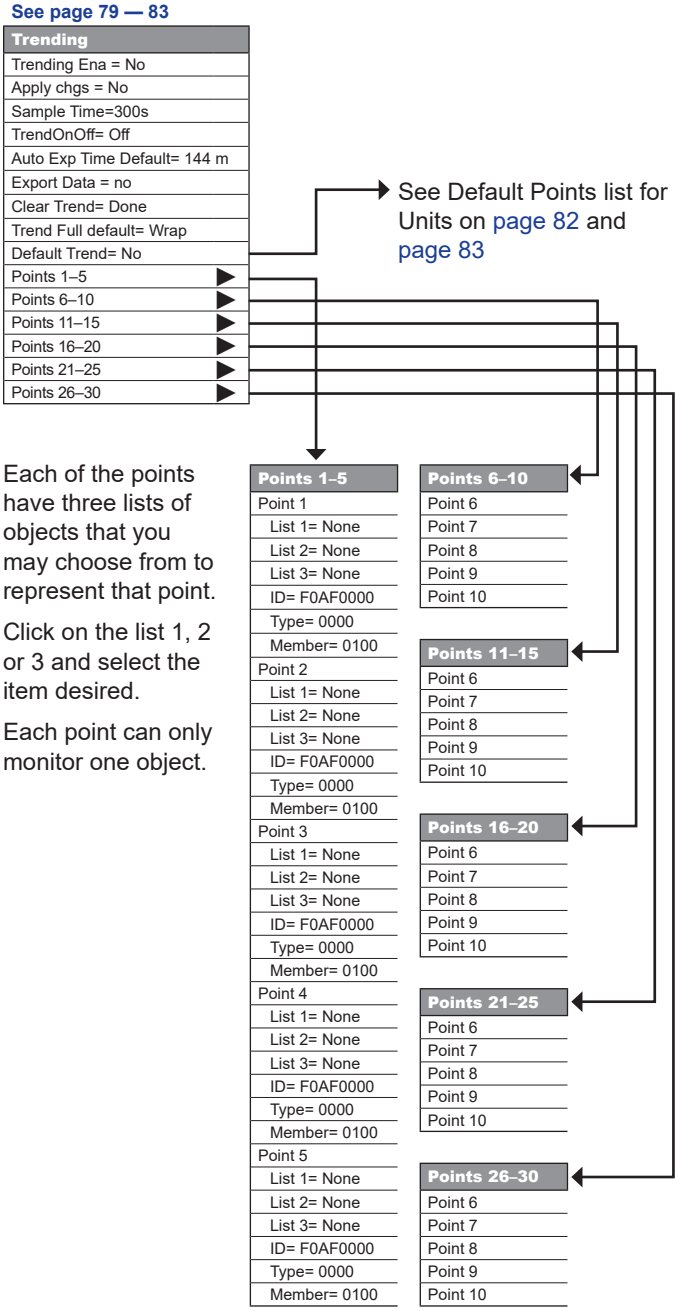


Figure 12: Trending *– Keypad/Display Menu Structure*

See page 79 — 83



Each of the points have three lists of objects that you may choose from to represent that point.

Click on the list 1, 2 or 3 and select the item desired.

Each point can only monitor one object.

After selecting the object to represent that point you must also enter the ID number. When the ID is selected the first four letters will highlight turn the radial knob to select the matching ID number from the list below, hit enter, the rest of the entries for the ID number are done individually until the object ID matches the one associated with the object in the list to the right matches. It is the same proceedure for the object type. The member number will always be 0100 when trending the present value.

Points list 1		
Enum Text	Object ID	Type
ACS1	0xF0AFC5F0	0x230B
ACS3	0xF0AF08FE	0x230B
ActEvnt	0xF0AFA993	0x230A
AFSts	0xF0AFB26D	0x2204
Alm	0xF0AFCF76	0x230A
BSP	0xF0AFC4BB	0x2203
Clg%	0xF0AFF4B5	0x230A
ClgSt	0xF0AF3991	0x230B
ClgSts	0xF0AFF6A6	0x230B
CO2	0xF0AF7F77	0x2203
CtlCrdT	0xF0AFE952	0x2203
CtrlT	0xF0AF3701	0x2203
DAClgSp	0xF0AF64FD	0x2300
DAHtgSp	0xF0AF6054	0x2300
DAT	0xF0AF538E	0x2203
DeHmSts	0xF0AF56EA	0x230B
Dewpt	0xF0AF532C	0x230A
DewptSp	0xF0AF75C1	0x2300
DFSt	0xF0AFBD68	0x230B
DFT	0xF0AFCA19	0x2203
DRT1	0xF0AFD8D7	0x2203
DRT3	0xF0AFF895	0x2203
DSH	0xF0AF33F2	0x230A
DSP	0xF0AF143C	0x230A
EcoSts	0xF0AFC1AB	0x230B
EFMBSts	0xF0AFAB24	0x230B
EfMnlNV	0xF0AF3D0A	0x230A
EfMxlNV	0xF0AFB58E	0x230A
EFT/LCT	0xF0AF356B	0x2203
EREAT	0xF0AF0DBB	0x2203
ERLAT	0xF0AFFD44	0x2203
ERWhl%	0xF0AF101D	0x2203
EVI%	0xF0AF3028	0x2203
EVICmd	0xF0AF2EAF	0x2206
EVO%	0xF0AF17B1	0x2203
EVOCmd	0xF0AF0936	0x2206

Points list 2		
Enum Text	Object ID	Type
HDRT1	0xF0AF4A6D	0x230A
HDRT3	0xF0AF6A2F	0x230A
Htg%	0xF0AFF01C	0x230A
HtgSt	0xF0AF4BE8	0x230B
HtgSts	0xF0AFD173	0x230B
HtSnkT	0xF0AFF487	0x2203
IFBCom	0xF0AF6D75	0x230B
INV%	0xF0AFDA3E	0x2203
INVAmps	0xF0AFA7E2	0x2203
INVCmd	0xF0AFEC72	0x2206
INVFC	0xF0AF3BDA	0x230A
INVFT	0xF0AF88A8	0x2203
INVTmp	0xF0AFE60D	0x2203
IRT	0xF0AFE8B8	0x2203
MinOA%	0xF0AFEEC9	0x230A
OAD%	0xF0AF6259	0x230A
OAFCmd	0xF0AF9E45	0x2206
OAFlw	0xF0AFF10A	0x230A
OAFlwSp	0xF0AF6B95	0x2300
OAT	0xF0AFA37F	0x2203
OcClgSp	0xF0AFF8A8	0x2300
OcHtgSp	0xF0AF8A33	0x2300
OcSrc	0xF0AFF838	0x230B
OF1FC	0xF0AFC9EB	0x230A
OF2FC	0xF0AFE4AF	0x230A
OF1Spd	0xF0AFB55B	0x2203
OF2Spd	0xF0AF2E87	0x2203
OilMng	0xF0AF2D66	0x2302
OilSts	0xF0AF1150	0x2204
ORT	0xF0AF6559	0x2203
PTD	0xF0AF229A	0x2203
PTS	0xF0AF404C	0x2203

Points list 3		
Enum Text	Object ID	Type
RAT	0xF0AFA24D	0x2203
ReHt%	0xF0AF00F8	0x230A
RemEF%	0xF0AF1969	0x2300
RemRF%	0xF0AF57A7	0x2300
RemSF%	0xF0AF211F	0x2300
RFEF%	0xF0AFAECF	0x2203
RH	0xF0AF1DDC	0x2203
RHSp	0xF0AFFA18	0x2300
RhtSp	0xF0AF335D	0x230A
SAF%	0xF0AF5BDF	0x2203
SbClg	0xF0AF842E	0x230A
SBEvnt	0xF0AFCB3E	0x230B
SFMBSts	0xF0AF2BDE	0x230B
SpaceT	0xF0AFF74A	0x2203
SpHtSts	0xF0AF7D21	0x230B
SRT	0xF0AFC35D	0x2203
SSH	0xF0AFB846	0x230A
SSHSpt	0xF0AF3144	0x230A
STD3	0xF0AF03CC	0x2207
SupHt%	0xF0AF1FEA	0x230A
Tc	0xF0AF19E9	0x230A
TcSpt	0xF0AF7FC1	0x230A
TDef	0xF0AF45E1	0x230A
Teg	0xF0AFDCFF	0x230A
Tp	0xF0AF3BBB	0x230A
UnOcSrc	0xF0AFF6B4	0x230B
UnitSt	0xF0AF9E60	0x230B
UntSts	0xF0AF4FF0	0x230B
VFDSts	0xF0AF64EC	0x230B

Items in the Quick Menu (see Table 2) contain basic unit operating status and control set point 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 2: Quick Menu

Menu Display Name	Default Setting	Range	Password Level
Unit State=	—	Off	None
		Start	
		Recirc	
		Fan Only	
		Min DAT	
		Htg	
		Econo	
		Clg	
Unit Status=	—	Enable	6
		Off Man	
		Off Mn Ctl	
		Off Net	
		Off Alm	
		Off Fn Rty	
Dehum Status=	—	Active/Inactive	6
Ctrl Mode=	Off	Off	6
		Heat Only	
		Cool Only	
		Fan Only	
		Heat Cool	
		Auto/Net	
Occ Mode=	Auto/Net	Occ	6
		Unocc	
		Tnt Ovrd	
		Auto/Net	
HP Mode=	Auto	Cool Only/Auto	6
Clg Capacity=	—	0–100%	None
OAD/Econo Cap=	—	0–100%	None
Htg Capacity=	—	0–100%	None
Supl Htg Capacity	—	0–100%	None
Reheat Capacity=	—	0–100%	None
Control Temp=	—	-50.0–200.0°F	None
Occ Clg Spt=	72.0°F	0.0–100.0°F	None
Occ Htg Spt=	68.0°F	0.0–100.0°F	None
Disch Air=	—	-50.0–250.0°F	None
DAT Clg Spt=	55.0°F	40.0–100.0°F	None
DAT Htg Spt=	85.0°F	40.0–140.0°F	None
Unocc Clg Spt=	85.0°F	40.0–100.0°F	None
Unocc Htg Spt=	55.0°F	40.0–100.0°F	None
Min DAT Limit=	55.0°F	0.0–70.0°F	None
SAF Speed=	—	0–100%	None
Duct Press=	—	0.2–4.0 in	None
Duct SP Spt=	1.0 in	0.2–4.0 in	None
RF/EF Cap=	—	0–100%	None
Bldg Press=	—	-0.25–0.25 in	None
Bldg SP Spt=	0.050 in	-0.25–0.25 in	None
IAQ PPM=	—	0-5000ppm	4
OA Flow=	—	0–60000 CFM	4
MinOAFlw Spt=	2000 CFM	0–60000 CFM	4
OA Temp=	—	-50.0–200.0°F	None
Rel Humidity=	—	0–100%	None

Unit State is a status only item which indicates the state of operation in which the unit is currently operating. The unit can be in any of the operating states shown.

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.

Dehum Status is a status only item which indicates the status of operation of the dehumidifier. The dehumidifier can be active or inactive.

Ctrl Mode is an adjustable item which sets the operating mode of the unit. The unit can be in any of the modes shown

Occ Mode is an adjustable item which sets the occupancy mode of the unit. The unit can be in occupied, unoccupied, tenant override, or auto modes.

HP Mode (Heat Pump only) allows the user to lockout heat..

Clg Capacity is a status only item which indicates the percentage of the unit maximum cooling capacity currently operating.

OAD/Econo Cap is a status only item which indicates the percentage that the outdoor damper or economizer valve is currently open.

Htg Capacity is a status only item which indicates the percentage of the unit maximum heating capacity currently operating.

Supl Htg Capacity is a status only item which indicates the percentage of the unit maximum reheat capacity currently operating.

Reheat Capacity is a status only item which indicates the percentage of the unit maximum reheat capacity currently operating.

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 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 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.

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 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.

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.

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. 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.

Unocc Clg Spt is a status only item which indicates the space temperature above which unoccupied cooling operation (night set up) is activated. Once a valid password has been entered this item becomes an adjustable item.

Unocc Htg Spt is a status only item which indicates the space temperature below which unoccupied heating operation (night set back) is activated. Once a valid password has been entered this item becomes an adjustable item.

SAF Capacity is a status only item which indicates the capacity of the supply air fan.

Duct Press is a status only item which displays the current duct static pressure reading.

DuctSP Spt is a status only item which indicates the duct static pressure set point used for controlling the variable speed supply air fan. The variable speed supply air fan is modulated to maintain the duct pressure at this value. Once a valid password has been entered this item becomes an adjustable item.

RF/EF Capacity is a status only item indicating the capacity of the return fan/exhaust air fans.

Bldg Press is a status only item which displays the current building static pressure reading.

BldgSP Spt is a status only item which indicates the building static pressure set point used for controlling the variable speed exhaust air fan. The variable speed exhaust air fan is modulated to maintain the building static pressure sensor input to this value. Once a valid password has been entered this item becomes an adjustable item.

IAQ PPM is a status only item which indicates the current reading from the CO_2 sensor.

OA Flow is a status only item which indicates the current outdoor airflow based on an optional OA airflow sensor input used when the unit is equipped with a field supplied OA measuring station.

Min OAFlw Spt is an adjustable item that is used to set the minimum CFM when the unit is equipped with a field supplied OA measuring station.

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 Humidity is a status only item that displays the current relative humidity reading from the optional humidity sensor.

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 3: Unit Status Settings

For more detail	Item Display Name	Default Setting	Range	Password Level
See page 98, 107	Unit State=	—	Off	6
			Start	
			Recirc	
			Fan Only	
			Min DAT	
			Htg	
			Econo	
			Clg	
See page 107	Unit Status=	—	Enable	6
			Off Man	
			Off Mn Ctl	
			Off Net	
			Off Alm	
			Off Fn Rty	
See page 35, 116	Dehum Status=	—	Active/Inactive	6
See page 107	Ctrl Mode=	Off	Off	6
			Heat Only	
			Cool Only	
			Fan Only	
			Heat Cool	
			Auto	
See page 108	Clg Status=	—	Enabled	6
			None	
			Off Amb	
			Off Alarm	
			Off Net	
			Off Man	
See page 108	Htg Status=	—-	Enabled	6
			None	
			Off Amb	
			Off Alarm	
			Off Net	
			Off Man	
See page 109	Supl Htg Status=	—	Enabled	6
			None	
			Off Amb	
			Off Alarm	
			Off Net	
			Off Man	
See page 109	Econo Status=	—	Enabled	6
			None	
			OffAmb	
			OffAlarm	
			OffNet	
			OffMan	
			OffDehum	
See page 109	Clg Capacity=	—	0–100%	6
	Htg Capacity=	—	0–100%	6
	Reheat Cap	—	0–100%	6
	SAF Capacity=	—	0–100%	6
	RF/EF Capacity=	—	0–100%	6
	OAD/EconoCap=	—	0–100%	6
See page 35, 62	Rel Humidity=	—	0–100%	6
	Net Emrg Ovrd=	Normal	Normal, Off	6
See page 110	Net App Mode=	Auto	Off	6
			Heat Only	
			Cool Only	
			Fan Only	
			Auto	

Unit State is a status only item which indicates the state of operation in which the unit is currently operating. The unit can be in any of the operating states shown.

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.

Dehum Status is a status only item which indicates the status of operation of the dehumidifier. The dehumidifier can be active or inactive.

Ctrl Mode is an adjustable item which sets the operating mode of the unit. The unit can be in any of the modes shown.

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 is a status only item which indicates whether or not heating is currently allowed. If heating is disabled, the reason is indicated. If the unit is a heat pump, this applies to compressor heat.

Supl Htg Status (Heat Pump only) is a status only item which indicates whether or not supplemental heating is currently enabled. If supplemental heating is disabled the reason is indicated.

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.

Clg Capacity is a status only item which indicates the percentage of the unit maximum cooling capacity currently operating.

Htg Capacity is a status only item which indicates the percentage of the unit maximum heating capacity currently operating. If the unit is a heat pump, this applies to the compressor heat.

Supl Htg Cap (Heat Pump only) is a status only item which indicates the percentage of the unit maximum supplemental heating capacity currently operating.

Reheat Capacity is a status only item which indicates the percentage of the unit maximum reheat capacity currently operating.

SAF Capacity is a status only item which indicates the capacity of the supply air fan.

RF/EF Capacity is a status only item indicating the capacity of the return fan/exhaust air fans.

OAD/EconoCap is a status item which indicates the percentage that the outdoor damper is currently open.

Rel Humidity is a status only item that displays the current relative humidity reading from the optional humidity sensor.

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 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.”

Occupancy Menu

Menus in the Occupancy menu contain status and control items that relate to unit occupied/unoccupied operation.

Table 4: Occupancy Menu

For more detail	Item Display Name	Default Setting	Range	Password Level
See page 110	Occupancy=	—	Occ	6
			Unocc	
			Tnt Ovrd	
See page 111	Occ Mode=	Auto/Net	Occ	6
			Unocc	
			Tnt Ovrd	
			Auto/Net	
See page 111	Occ Src=	—	None	6
			Net Schd	
			Int Schd	
			One Evnt	
			Remote Sw	
			Occ Man Cmd	
			Occ Mode	
			TStat TO	
			Man TO	
See page 112	Unocc Src=	—	Unocc Dehum	6
			Unocc Clg	
			Unocc Htg	
			Int Opt Strt	
			Net Opt Strt	
			None	
See page 115	Tnt Ovrde Time=	0	0–300 min	6

Occupancy is a status only item which indicates whether the unit is currently in an occupied, unoccupied, or tenant override mode of operation.

OccMode is an adjustable item which allows the unit to be set for manual occupied or unoccupied operation, automatic operation based on a time schedule input or manual tenant override operation.

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.”

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.”

TntOvrd Time is an adjustable item which indicates the amount of time remaining for unit operation since tenant override operation was activated.

Temperature Menu

Menus in the Temperatures menu contain unit temperature status information.

Table 5: Temperature Menu

Item Display Name	Default Setting	Range	Password Level
Control Temp=	—	-50.0–200.0°F	6
Disch Air=	—	-50.0–250.0°F	6
Return Air=	—	-20.0–200.0°F	6
Space Temp=	—	-0.0–150.0°F	6
OA Temp=	—	-50.0–200.0°F	6
EF/LC Temp=	—	-50.0–250.0°F	6
ER LAT=	—	-50.0–200.0°F	6
ER EAT=	—	-50.0–200.0°F	6
PA Temp=	—	-50.0–200.0°F	2
DRT1=	—	-50.0–392.0°F	6
DRT3=	—	-50.0–392.0°F	6
SRT=	—	-50.0–200.0°F	6
DFT=	—	-50.0–200.0°F	6
IRT=	—	-50.0–150.0°F	6
ORT=	—	-50.0–150.0°F	6
INVCompTemp=	—	-50.0–392.0°F	6

Control Temp is a status only item which indicates the current Control Temperature value.

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 is a status only item which displays the current temperature reading from the unit's return air temperature sensor (RAT).

Space Temp is a status only item which displays the current space (or zone) temperature reading from the optional unit space air temperature sensor input. If an optional space temperature sensor is not installed and space temperature value is not supplied by a network, the SpaceT Present= item in the Setup menu should be set to "No" to disable the alarm function associated with an open circuit at the space temperature sensor input.

OA Temp is a status only item which displays the current temperature reading from the unit mounted outdoor air temperature sensor.

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 LAT is status only item which displays the current discharge air temperature leaving the optional energy recovery wheel.

ER EAT is status only item which displays the current exhaust air temperature leaving the optional energy recovery wheel.

PA Temp is a status only item which displays the current projected Control Temperature value used in the project ahead function.

DRT1 is a status only item which displays the current inverter compressor discharge refrigerant line temperature sensor reading.

DRT3 is a status only item which displays the current fixed compressor (Comp 3) discharge refrigerant line temperature sensor reading.

SRT is a status only item which displays the current suction refrigerant line temperature sensor reading.

DFT (Heat Pump only) is a status only item which displays the current defrost temperature sensor reading.

IRT (Heat Pump only) is a status only item which displays the current indoor refrigerant temperature sensor reading.

ORT (Heat Pump only) is a status only item which displays the current outdoor refrigerant temperature sensor reading.

INVCompTemp (15 ton unit size only) is a status only item which displays the current inverter compressor body temperature sensor reading.

Flow Status Menu

Table 6: Flow Status Menu

Item Display Name	Default Setting	Range	Password Level
Airflow=	—	No Flow	6
		Flow	
Supply Fan=	—	Off	6
		On	
Ret/Exh Fan=	—	Off	6
		On	

Airflow is a status only item that indicates whether or not discharge airflow is detected. Airflow status is sensed by a binary input delivered to the controller by a differential pressure switch (PC7). On VAV units duct static pressure is also a factor in the indication of airflow.

Supply Fan is a status only item which indicates whether or not the controller is commanding the unit supply fan on.

Ret/Exh Fan is a status only item which indicates whether or not the controller is commanding the unit RF/EF fan on.

RF/EF Control Menu

Table 7: Return/Exhaust Fan Speed Menu

Item Display Name	Default Setting	Range	Password Level
RF/EF Speed=	—	0–100%	6
Speed Cmd=	—	0–100%	6
Bldg Press=	—	-0.25–0.25in	6
BldgSP Spt=	0.050in	-0.25–0.25in	6

RF/EF Speed a status only item that indicates the current return/exhaust fan speed.

Speed Cmd is a status only item that indicates the current return/exhaust fan commanded speed.

Bldg Press is a status only item which indicates the building static pressure at the building static pressure sensor location.

BldgSP Spt is an adjustable item which sets the building static pressure set point used for controlling the speed of the exhaust air fan. The variable speed exhaust air fan is modulated to maintain the building pressure at this value.

SAF Spd Control Menu

Table 8: Supply Fan Speed Menu

Item Display Name	Default Setting	Range	Password Level
SAF Speed=	—	0–100%	6
Speed Cmd=	—	0–100%	6
Duct Press=	—	0.0–5.0in	6
DuctSP Spt=	1.0 in	0.2–4.0in	6
IAQ PPM=	—	0–5000ppm	4
OA Flow=	—	0–60000 CFM	4
MinOAFlw Spt=	2000 CFM	0–60000 CFM	4
Bldg Press=	—	-0.25–0.25 in	4
BldgSP Spt=	0.050 in	-0.25–0.25 in	4

SAF Speed is a status only item that indicates the current supply fan speed.

Speed Cmd is a status only item that indicates the current supply fan commanded speed.

Duct Press is a status only item which indicates the current pressure of the supply air ductwork. The duct pressure is measured at the location in which the duct static pressure tap was field installed. This device is not factory installed.

The correct location for field installation is 2/3rds of the way down the longest duct, away from transitions or turns.

DuctSP SPT is an adjustable item which sets the duct static pressure set point used for controlling the speed of the supply air fan. The variable speed supply air fan is modulated to maintain the duct pressure at this value.

IAQ PPM is a status only item which indicates the current reading from the CO_2 sensor.

OA Flow is a status only item which indicates the current outdoor airflow based on an optional OA airflow sensor input used when the unit is equipped with a field supplied OA measuring station.

Min OAFlw Spt is an adjustable item that is used to set the minimum CFM when the unit is equipped with a field supplied OA measuring station.

Bldg Press is a status only item which displays the current building static pressure reading.

BldgSP Spt is a status only item which indicates the building static pressure set point used for controlling the exhaust fan speed. The exhaust fan speed is modulated to maintain the building static pressure sensor input to this value. Once a valid password has been entered this item becomes an adjustable item.

Cooling Menu

Table 9: Cooling Menu

Item Display Name	Default Setting	Range	Password Level
Occ Clg Spt=	72.0°F	0.0-100.0°F	6
Unocc Clg Spt=	85.0°F	40.0-100.0°F	6
DAT Clg Spt=	55.0°F	40.0-100.0°F	6

Occ Clg Spt an adjustable item which sets the temperature above which the unit will go into the cooling mode of operation.

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 unoccupied cooling.

DAT Clg Spt is an adjustable item used by the controller to set the DAT cooling set point. This value is adjustable only on DAC units when it is not being set by a reset schedule. It is not adjustable on CAV units.

Economizer Menu

Table 10: Economizer Menu

Item Display Name	Default Setting	Range	Password Level
OAD/Econo Cap=	—	0–100%	6
DAT Clg Spt=	55.0°F	40.0–100.0°F	6
Min OA Pos=	—	0–100%	6
Occ Clg Spt=	72.0°F	0.0–100.0°F	6
Unocc Clg Spt=	85.0°F	40.0–100.0°F	6

OAD/Econo Cap is a status only item that is used to indicate percentage that the economizer dampers/waterside economizer valve is open.

DAT Clg Spt is an adjustable item used by the controller to set the DAT cooling set point. This value is adjustable only on DAC units when it is not being set by a reset schedule. It is not adjustable on CAV units.

Min OA Pos is a status only item which indicates the current minimum position of the outdoor air damper.

Occ Clg Spt an adjustable item which sets the temperature above which the unit will go into the cooling mode of operation.

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 unoccupied cooling.

Min OA Damper Menu

Table 11: Min OA Damper Menu

Item Display Name	Default Setting	Range	Password Level
Min OA Pos=	—	0–100%	6
Vent Limit=	20%	0–100%	6
LoFlo V Lmt=	30%	0–100%	6
DCV Limit=	10%	0–100%	6
Min OA Src=	—	VentLmt	4
		DesFlw	
		FldFlw	
		Network	
		Ext VDC	
		Ext mA	
		IAQ VDC	
		BSPOvrd	
		FanDiff	
		DCVLmt	
		ZeroOA	

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.

On CAV units the Ventilation Limit and the Demand Control Ventilation Limit are fixed values set equal to the Vent Limit= and DCV Limit= parameters. On VAV units the OA Damper Position increases from the Vent Limit= value to the LoFloVent Limit= value as the variable speed supply air fan speed goes from 100% down to the Min Clg Spd= value. The Demand Control Ventilation Limit in this VAV case is determined by the Ventilation Limit X DVC Limit=/Vent Limit=. When the Min OA Reset= parameter is set to “None” the Min OA Pos= value is set to the Ventilation Limit. If Min OA Reset= is set to Network, Ext VDC, Ext mA, IAQ VDC, or IAQ mA, the Min OA Pos= varies between the Ventilation Limit and the Demand Control Ventilation Limit as the reset signal varies from its maximum to minimum value.

Vent Limit is an adjustable item that sets the value of the Ventilation Limit on a CAV unit or when a VAV unit is at 100% discharge fan speed.

LoFlo Vent Limit is an adjustable item that sets the maximum value for the Ventilation Limit on a VAV unit. The ventilation limit is raised toward this value as the discharge fan speed decreases toward the Min Clg Spd value.

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 “Min OA Reset=” is set to something other than “None.”

Min OA Src is a status only item which indicates dominant internal function that is resetting the current minimum outdoor air position. Refer to the Operator’s Guide, Outside Air Damper Control section for details on these functions.

Examples of Minimum Position Control by:

Design Flow:.
Design Flow is only available when for RTU units with Airside Economizers. When the HMI DesignFlow parameter is set to Yes, the Minimum OA Position value is adjusted based on the measured amount of outdoor air being brought into the unit using a PI Loop function. If the airflow is below the desired value, the Minimum OA Position is increased and if the airflow is above the desired value, Minimum OA Position is decreased.

NetWork:
The Minimum OA Position is set equal to the Ventilation Limit if the valid value is above the Design Ventilation Limit.

If the Network Value is below the Design Ventilation Limit, the Minimum OA Position is set equal to the largest of the following items. Value provided by the network or the Demand control ventilation limit

Ext VDC:
If ExtV is selected as the Min OA Type, the Minimum OA Position is calculated based on an external 0–10 VDC signal. This calculated Minimum OA Position varies linearly from zero % at the editable minimum external signal to the maximum value (100% on economizer units and the 0–30%OAMax value on 0–30% OA units) at the editable maximum external signal, but it is set no lower than the Demand Control Ventilation Limit and no higher than the Ventilation Limi

ExtmA:
If ExtmA is selected as the Min OA Type, the Minimum OA Position is calculated based on an external 0–20 mA signal. This calculated Minimum OA Position varies linearly from zero % at the editable minimum external signal to the maximum value (100% on economizer units and the 0–30%OAMax value on 0–30% OA units) at the editable maximum external signal, but it is set no lower than the Demand Control Ventilation Limit and no higher than the the Ventilation Limit.

IAQ V or IAQ mA:
If either IAQV or IAQ mA is selected as the Min OA Type, the Minimum OA Position is calculated based on a 0–10V or 0–20 mA CO_2 sensor input respectively. The CO_2 level is expressed as Parts Per Million. The minimum and maximum sensor input values (0–10V or 0–20 mA) and the corresponding minimum and maximum PPM values will be user editable. The Minimum OA Position is set equal to the larger of the following; calculated position based on the CO_2 level, a value provided by an OA flow station, a return fan capacity override value, or a building static pressure override value

BSP Ovrd:
The minimum position determined by any method may be overridden for a variable speed return fan or exhaust fan controlled by building static pressure (RFEF Method=Bldg) when the return fan speed is at minimum or 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 (BSPOAOvrd=Yes) and the return fan has been at the minimum speed or the exhaust fan has been stopped for a minimum return/exhaust fan OFF time MinRFEFTm (default = 120 seconds) the control will begin modulating the Min OA Pos setpoint upward to maintain the building static pressure at the building static pressure setpoint.

FanDiff:
The minimum position determined may be overridden for a variable speed return fan when the return fan speed is below the supply fan speed by more than an adjustable value. In this situation, the outdoor air damper minimum position is reset up based on the schedule shown below if normal control of the minimum position would result in a lower value.

0 (Zero) OA:
The would indicate the OA dampers are under the control of the Zero OA timer. The Zero OA Timer should be set long enough to accomplish morning warmup with the dampers closed to minimum energy usage during the warmup period. OA dampers are driven closed in night setback, night setup, morning warm-up, and morning cool down situations

Heating Menu

The Heating menu provides a summary of the control parameters for units with heating. The unit's heating mode of operation is controlled by the control temperature and the heating set point temperature. The unit goes into the heating mode of operation by analyzing the control temperature. The control temperature can be return temperature, space temperature or outside air temperature. The unit goes into the heating mode of operation when the control temperature is below the heating set point by more than ½ the deadband.

Table 12: Heating Menu

Item Display Name	Default Setting	Range	Password Level
Occ Htg Spt=	68.0°F	0.0–100.0°F	6
Unocc Htg Spt=	55.0°F	40.0–100.0°F	6
MWU Spt=	70.0°F	40.0–100.0°F	6
DAT Htg Spt=	85.0°F	40.0–140.0°F	6

Occ Htg Spt is an adjustable item which sets the control temperature below which the unit will go into the heating mode of operation.

Unocc Htg Spt is an adjustable item which sets the zone temperature below which the unit starts up and provides unoccupied heating (night setback) during unoccupied periods.

MWU Spt is an adjustable item which sets the heating set point to be used during morning warm up on a discharge temperature control unit. CAV units use the Occ Htg Spt for morning warmup operation.

DAT Htg Spt is an adjustable parameter which sets the heating discharge set point.

Dehumidification Menu

Table 13: Dehumidification Menu

Item Display Name	Default Setting	Range	Password Level
Dehum Status=	—	Disabled	6
		Enabled	
Rel Humidity=	—	0–100%	6
Dewpoint=	—	-50–150°F	6
Dehum Method=	None	None	6
		Rel Hum	
		DewPt	
		Always	
RH Setpoint=	50%	0–100%	6
Dewpoint Spt=	50°F	0–100°F	6
Reheat Spt=	—	40.0–100.0°F	6
Reheat Cap=	—	0–100%	6

Dehum Status is a status only item that indicates whether dehumidification is enabled or disabled.

Rel Humidity is a status only item that indicates the current relative humidity reading of the sensor.

DewPoint 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= or Return Air= value, depending on the setting of the Humidity Sensor Location. This parameter can either be set to "Space" or "Return."

Dehum Method is an adjustable item used to set the dehumidification method to either "RH" or "DewPt." When this parameter is set to "RH," dehumidification operation is controlled to maintain the Rel Humidity= value at the RH Setpoint=.When this parameter is set to "DewPt," dehumidification operation is controlled to maintain the Dew Point value at the Dewpoint Spt=.When this parameter is set to "Always" dehumidification will be active as long as mechanical cooling is not disabled.

RH Set Point is an adjustable item used to set the relative humidity value at which the relative humidity will be controlled to during dehumidification operation.

Dewpoint Spt is an adjustable item used to set the dewpoint value at which the dewpoint with will be controlled to during dehumidification operation.

Reheat Spt is a status only item which is used to indicate the DAT temperature to which the HGRH valve will be controlled in the Cooling and Fan Only operating states while dehumidification operation is active. The Reheat Spt= parameter always equals the DAT Clg Spt whenever the Ctrl Temp Src parameter is set to None or the unit is not in the Fan Only operating state. When the unit is in the Fan Only operating state (and the Ctrl Temp Src = None) the Reheat Spt will vary between the Min Reheat Spt= and Max Reheat Spt= as the Control Temperature input varies between Occ Clg Spt= and the Occ Htg Spt=.

Reheat Cap is a status only item that indicates the current reheat capacity value.

Date, Time and Schedules Menu

Time/Date

Table 14: Time/Date

Item Display Name	Default Setting	Range	Password Level
Time=	—	HH:MM:SS	6
Date=	—	MM/DD/YYYY	6
UTC Diff=	—	—	6

Time is an adjustable item that sets the current time.

Date is an adjustable item that sets the current date.

UTC Diff It 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 (UTC).

Daily Schedule Menu

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.

Table 15: Daily Schedule Menu

Item Display Name	Default Setting	Range	Password Level
Mon=	HH:MM – HH:MM	00:00 – 23:59	6
Tue=	HH:MM – HH:MM	00:00 – 23:59	6
Wed=	HH:MM – HH:MM	00:00 – 23:59	6
Thu=	HH:MM – HH:MM	00:00 – 23:59	6
Fri=	HH:MM – HH:MM	00:00 – 23:59	6
Sat=	HH:MM – HH:MM	00:00 – 23:59	6
Sun=	HH:MM – HH:MM	00:00 – 23:59	6
Hol=	HH:MM – HH:MM	00:00 – 23:59	6

Holiday Schedule Menu

The Holiday Schedule is used to set the start and stop times for up to 10 different holidays.

Table 16: Holiday Schedule Menu

Item Display Name	Default Setting	Range	Password Level
Hol 1=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 2=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 3=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 4=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 5=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 6=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 7=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 8=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 9=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6
Hol 10=	MMMDD/99–MMMDD/99	00/00/00–12/31/99	6

One Event Schedule Menu

The One Event Schedule is used to set the start and stop times for one event.

Table 17: One Event Schedule Menu

Item Display Name	Default Setting	Range	Password Level
Beg=	MMMDD/99 @ HH:MM	00/00/00–12/31/99 @ 00:00 – 23:59	6
End=	MMMDD/99 @ HH:MM	00/00/00-12/31/99 @ 00:00 – 23:59	6

Optimal Start Menu

The Optimal Start menu is used to set up the unit so it starts at the most efficient time before building occupancy.

Table 18: Optimal Start Menu

Item Display Name	Default Setting	Range	Password Level
Enable=	No	No, Yes	6
Htg Rate=	0.4°F/min	0.0–1.0°F/min	2
Htg OAT=	35°F	-40–60°F	2
Des Htg OAT=	0°F	-40–60°F	2
Clg Rate=	0.4°F/min	0.0–1.0°F/min	2
Clg OAT=	85°F	-60–140°F	2
Des Clg OAT=	95°F	-60–140°F	2

Enable is an adjustable item that turns on the optimal start feature. Setting the value to yes will activate this function.

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 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.”

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 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 is an adjustable item that sets the outdoor air temperature when the unit was last started optimally in cooling.

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.

Daylight Savings Menu

Table 19: Daylight Savings Menu

Item Display Name	Default Setting	Range	Password Level
DLS Strt Mon=	Mar	NA Jan-Dec	2
DLS Strt Wk=	2ndWeek	1stSun	2
		2ndSun	
		3rdSun	
		4thSun	
		5thSun	
DLS End Month=	Nov	NA Jan-Dec	2
DLS End Week=	1stWeek	1stSun	2
		2ndSun	
		3rdSun	
		4thSun	
		5thSun	
DLS Enable=	Auto	Off/Auto	2

DLS Strt Mon is an adjustable item that sets the month for daylight savings time to begin.

DLS Strt Wk is an adjustable item that sets the week of the month for daylight savings time to begin.

DLS End Month is an adjustable item that sets the month for daylight savings time to end.

DLS End Week is an adjustable item that sets the week of the month for daylight savings time to end.

DLS Enable is an adjustable item that sets whether or not daylight savings time is enabled.

Unit Setup

Table 20: Unit Setup Menu

Item Display Name	Default Setting	Range	Password Level
Space Sensor=	Digtl/Net	None, Anlog/Net, Digtl/Net	4
Eng Units=	English	English, SI	4
Unit Name=	—	—	4
Rapid Start=	No	No, Yes	2
Rapid Start Tm=	10 min	0–20 min	2
DO10 Cfg=	FanOp	FanOp VAVBox	2

Space Sensor is an adjustable item to indicate if a space sensor is connected to the unit controller or provided via a network signal.

Eng Units is an adjustable item to indicate if the unit is to display English or Metric units of measure.

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.

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 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.

DO10 Cfg is an adjustable item that redefines the functionality of digital output DO10 on the main control board. This output is either a supply fan operation indication or a VAV box signal depending on how this parameter is set.

Timer Settings Menu

Table 21: Timer Settings Menu

Item Display Name	Setting	Range	Password Level
Service Time	0 min	0–240min	4
Start Up	180s	1800s	4
Recirculate	180s	3600s	4
Zero OA Time	0 min	0–240min	4
Tnt Override	120 min	0–300min	4
Post Heat	0s	0–180s	4
Pwd Timeout	10 min	3–30min	4
Low DAT	6 min	0–60min	4
ClgStateDelay	300s	0–600s	4
Clg Stg Time	5 min	5–60min	4
Clg Stg Time (INV)	5 min	Range 2–60 Min	4
Htg Stg Time	5 min	2–60min	4
Min Ex Strt Tm	120s	60–300s	4
Min Ex Stop Tm	120s	60–300s	4
ER Whl Stg Tm	5 min	1–100min	4
ER Whl Off Tm	5 min	1–100min	4
Air Flw Ign	120s	0–999S	2
Htg Wrmup Tm	240s	0–999s	2
Htg Hld Period	240s	0–999s	2
Srvc Time Inc	20s	0–300s	2
Off HtCl Delay	120s	0–999s	2

Service Time is an adjustable item that sets the amount of time the internal control timers can be temporarily sped up.

Startup is an adjustable item that sets the time in seconds that the unit will perform its startup operation.

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.

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 Override 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 is an adjustable item that sets the duration of the post heat function available on VAV units.

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-enter of the password.

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.

ClgStateDelay is an adjustable item that sets the amount of time between the fan only operating state and the mechanical cooling state. The unit will not enter the mechanical cooling state until this time has passed. This only applies on discharge control units following morning warm up heating operation.

Clg Stg Time is an adjustable item used to set a minimum time period between compressor stage changes.

Clg Stg Time (INV) is an adjustable item used to set a minimum time period between inverter controlled compressor stage changes

Htg Stg Time is an adjustable item used to set a minimum time period between heating stage changes.

MinExStrtTime is an adjustable item that sets the minimum exhaust fan on time (Default = 120 seconds).

MinExStopTime is an adjustable item that sets the minimum exhaust fan stop time (Default = 120 seconds).

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 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.

Air Flw Ign is an adjustable item that sets the amount of time the air proving switch is ignored after the supply fan is started.

Htg Wrmup Tm is an adjustable item which is used to set the amount of time the gas burner will remain at a low fire position on 100% OSA units (default 240 seconds).

Htg Hld Period 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). This is to allow the temperature to approach equilibrium with the modulating gas heating valve at a fixed position.

Srvc Time Inc is an adjustable item used to set the internal stage time delay when the Service Timer is not zero, the times listed below are set to the ServiceTime (Default = 20 seconds) instead of the normal values.

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

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.

SAF Set-up

(See page 127 for more information)

Table 22: Supply Fan Speed Menu

Item Display Name	Default Setting	Range	Password Level
SAF Ctrl=	DSP	DSP	4
		Spd/Net	
		1ZnVAV	
		BSP	
		CO2	
		CFM	
AplyInputChgs=	No	No	2
		Yes	
CO2 Input=	None	None	2
		VDC	
		MA	
CFM Input=	None	None	2
		VDC	
		MA	
BSP Input=	No	No	2
		Yes	
SPEED CONTROL			
Rem SAF Cap=	33%	0–100%	4
DSP CONTROL			
DSP DB=	0.1in	0–0.5in	4
SAF Ramp Time=	60s	0–999s	4
Min Period=	5s	0–999s	4
Max Spd Chg=	15%	0–100%	4
DuctPress1=	—	0.0–5.0in	2
DuctPress2=	—	0.0–5.0in	2
1 ZONE VAV CONTROL			
Min Clg Spd=	60%	0–100%	4
Max Clg Spd=	100%	0–100%	4
Min Htg Spd=	60%	0–100%	4
Max Htg Spd=	100%	0–100%	4
Space Period=	30s	0–999s	4
Space Gain=	1.5	0.0–100.0s	4
Space PAT=	100s	0–999s	4
Space Max Chg=	10%	0–100%	4
CO_2 CONTROL			
Min PPM=	0ppm	0–5000ppm	2
Max PPM=	2000ppm	0–5000ppm	2
V/A @ Min PPM=	0.0/V	0.0–20.0/V/mA	2
V/A @ Max PPM=	10.0/V	0.0–20.0/V/mA	2
Min SAF PPM=	800	0–5000ppm	4
Max SAF PPM=	1100	0–5000ppm	4
Min PPM Spd=	50	0–100%	4
Max PPM Spd=	100	0–100%	4

Item Display Name	Default Setting	Range	Password Level
CFM CONTROL			
Min CFM=	0CFM	0–60000CFM	2
Max CFM=	10000CFM	0–60000CFM	2
V/A @Min CFM=	0.0/V	0.0–20.0/V/mA	2
V/A @Max CFM=	10.0/V	0.0–20.0/V/mA	2
SAF CFM DB=	3%	0–100%	4
SAFCFM Period=	30s	0–999s	4
SAF CFM Gain=	0.1	0.0–100.0	4
SAF CFM MxChg=	5%	0–100%	4
BSP CONTROL			
BSP DB=	0.01in	0.0–0.1in	4
BSP Period=	5s	0–999s	4
BSP Gain=	0.2	0.0–100.0s	4
Max Spd Chg=	4%	0–100%	4
SAF SETUP			
SAF Ctrl Dly=	30s	0–999s	4
Min Speed=	33%	0–100%	4
VAVBox Out=	—	Heat	2
		Cool	
MaxVentSpd=	100%	0–100%	2
Max SAF RPM=	2600	0–5000	2
ECM Status= **Failure Codes** are described in the Appendix on page 168	—	OK	2
		HalSnsr	
		ElctHiT	
		MtrHiT	
		PmodHiT	
		MtrLckd	
		PhzFail	
		LoDCVlt	
		HiDCVlt	
		LoMainV	
		HiMainV	
		NoComm	

SAF Ctrl is an adjustable parameter used to select how the supply fan is to be controlled. The supply fan can normally be controlled by duct pressure, space temperature (single zone VAV or 1ZnVAV) or by a percentage of supply air fan speed from 33% to 100%. On 100% OA unit applications the fan can be controlled to maintain building static pressure, space carbon dioxide level or and airflow based on a field supply airflow station. The speed option is typically used with a building automation system. When single zone VAV control is selected, the supply fan is controlled with a PI_Loop to maintain the Control Temperature input at the Occupied Cooling Set Point or Occupied Heating Set Point. When BSP is selected the supply fan is controlled with a PI_Loop to maintain the building static pressure at a building static pressure Set Point. When CO_2 is selected the supply fan is controlled to maintain the CO_2 ppm between adjustable limits by varying the supply fan speed between an adjustable range. When CFM is selected the supply fan is controlled with a PI_Loop to maintain the measured CFM at a CFM set point.

AplyInputChgs is an adjustable item for applying changes to the CO_2 Input=, CFM Input= and BSP Input= parameters. Applying the changes causes the controller to reset before the changes can take effect.

CO_2 Input is an adjustable item used to select the type of input for a field installed CO_2 sensor. If this is set to None the controller ignores any CO_2 sensor input. If CO_2 control and/or monitoring is desired this parameter is set to VDC or mA to match the input type of the field supplied CO_2 sensor input. This parameter applies only to 100% OA unit configurations.

CFM Input is an adjustable item used to select the type of input for a field installed airflow station. If this is set to None the controller ignores any field airflow station input. If CFM control and/or monitoring is desired this parameter is set to VDC or mA to match the input type of the field supplied airflow input. This parameter applies only to 100% OA unit configurations.

BSP Input is an adjustable item used to select whether on not a building static pressure sensor is connected to the unit controller. If this is set to No the controller ignores any building static pressure input. If BSP control of the supply fan is desired this parameter must be set to Yes. This parameter applies only to 100% OA unit configurations.

Remote SF Cap is an adjustable item for setting the supply fan speed by the keypad or by a network control signal.

DSP DB is an adjustable item which sets a dead band around the DuctSP Spt= parameter. No duct static pressure control action is taken when the current duct static pressure input is within this dead band.

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 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 Spd Chg is an adjustable item that sets the maximum value for a speed increase or decrease. This speed change (either a positive or negative value) is added to the current fan speed whenever the duct static pressure is outside of the deadband, and the Min Period time has passed since the previous speed change.

DuctPress1 is a status only item that indicates the current value for the duct status pressure sensor.

DuctPress2 is a status only item that indicates the current value for the duct status pressure sensor If a second pressure sensor is used configuration spot 18 should indicate yes, the controller will use the lower reading of the two sensors installed.

Min Clg Spd is an adjustable item that sets the minimum supply fan speed used for cooling operation when 1ZnVAV is selected as the method of supply fan control.

Max Clg Spd is an adjustable item that sets the maximum supply fan speed used for cooling operation when 1ZnVAV is selected as the method of supply fan control.

Min Htg Spd is an adjustable item that sets the minimum supply fan speed used for heating operation when 1ZnVAV is selected as the method of supply fan control.

Max Htg Spd is an adjustable item that sets the maximum supply fan speed used for heating operation when 1ZnVAV is selected as the method of supply fan control.

Space 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.

Space 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.

Space 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.

Space 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 1ZnVAV supply fan control is selected.

Min PPM is an adjustable item that sets the minimum PPM value of the field supplied CO_2 input signal.

Max PPM is an adjustable item that sets the maximum PPM value of the field supplied CO_2 input signal.

V/mA @ Min PPM is an adjustable item that sets the DC voltage or mA value at the minimum PPM value of the field supplied CO_2 input signal.

V/mA @ Max PPM is an adjustable item that sets the DC voltage or mA value at the maximum PPM value of the field supplied CO_2 input signal.

Min SAF PPM is an adjustable item that sets the PPM value at which the supply fan speed is controlled to minimum when CO_2 supply fan control is selected.

Max SAF PPM is an adjustable item that sets the PPM value at which the supply fan speed is controlled to maximum when CO_2 supply fan control is selected.

Min PPM Spd is an adjustable item that sets the supply fan speed when the CO_2 input signal is at minimum when CO_2 supply fan control is selected.

Max PPM Spd is an adjustable item that sets the supply fan speed when the CO_2 input signal is at maximum when CO_2 supply fan control is selected.

Min CFM is an adjustable item that sets the minimum CFM value of the field supplied airflow station input signal.

Max CFM is an adjustable item that sets the maximum CFM value of the field supplied airflow station input signal.

V/mA @ Min CFM is an adjustable item that sets the DC voltage or mA value at the minimum CFM value of the field supplied airflow station input signal.

V/mA @ Max CFM is an adjustable item that sets the DC voltage or mA value at the maximum CFM value of the field supplied airflow station input signal.

SAF CFM 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.

SAF CFM 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.

Space 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.

Space 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 airflow (CFM) supply fan control is selected.

BSP DB is an adjustable item that sets the “deadband” used in the PI control function to vary the supply fan speed when building static pressure (BSP) supply fan control is selected.

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 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.

Max Spd 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.

DSP 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 digital output. Control reverts to either duct pressure or speed after the fan has been on for the DSPCtrlDelay (default 30 seconds).

Min Speed is an adjustable item which is used to set the minimum supply fan speed (default 33%).

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.

Max Vent Speed is an adjustable item that sets the supply fan speed when an external ventilation override input to the supply fan is present.

Max SAF RPM is an adjustable item that sets the maximum RPM value for the supply air fan. Note this is set based on the supply fan model size and the system specifications.

ECM Status is a status only item that indicates the current status of the supply fan motor.

RF/EF Set-Up

(See page 127 for more information)

Table 23: Return Fan/Exhaust Fan Set-up Menu

Item Display Name	Default Setting	Range	Password Level
RF/EF Ctrl=	BuildingP	None	6
		Tracking*	
		BldgP	
		Spd/Net	
		OAD	
Rem ExhF Cap=	5%	0–100%	6
BSP DB=	0.01in	0.0–0.1in	4
BSP Period=	5s	0–999s	4
BSP Gain=	0.2	0.0–100.0s	4
Max Spd Chg=	4%	0–100%	4
RFEF Ctrl Dly=	30s	0–999s	4
Min Speed=	5%	0–100%	4
MinExStrtTime=	120s	60–300s	4
MinExStopTime=	120s	60–300s	4
MinExhOAPos=	5%	0–100%	4
MinExhSAFCap=	10%	0–100%	4
Exh On OA Pos	40%	0–100%	4
Exh Mx OA Pos	100%	0–100%	4
MaxVentSpd=	100%	0–100%	2
Max RFEF RPM=	2600	0–5000	2
ECM Status **Failure Codes** are described in the Appendix on page 168	—	OK	2
		HalSnsr	
		ElctHiT	
		MtrHiT	
		PModHiT	
		MtrLckd	
		PhzFail	
		LoDcVlt	
		HiDcVlt	
		LoMainV	
		HiMainV	
		NoComm	

* Not applicable on DPS Units

RF/EF Ctrl is an adjustable parameter used to select how the return/exhaust fans are to be controlled. The exhaust fans can be controlled by the building pressure or by a percentage of return/exhaust air fan speed from 5% to 100%. The speed option is typically used with a building automation system.

Remote RAF Cap is an adjustable item for setting the return fan speed by the keypad or by a network control signal.

Remote ExhF Cap is an adjustable item for setting the exhaust fan speed by the keypad or by a network control signal.

BSP DB is an adjustable item which sets a dead band around the BldgSP Spt parameter. No building static pressure control action is taken when the current building static pressure input is within this dead band.

BSP Period is an adjustable item which sets the “sampling period” used in the PI control function that modulates the return air or exhaust fan speed.

BSP Gain is an adjustable item which sets the “gain” used in the PI control function that modulates the return air or exhaust fan speed.

Max Spd Chg is an adjustable item that sets the maximum value for a exhaust speed increase or decrease. This speed change (either a positive or negative value) is added to the current fan speed whenever the building static pressure is outside of the deadband, and the BSP Period= time has passed since the previous speed change.

RFEF Ctrl Delay 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 return fan is started via a digital output. Control reverts to either building pressure or speed after the fan has been on for the BSPCtrlDelay (default 30 seconds).

Min Speed is an adjustable item the sets the minimum speed of the RF/EF fan.

MinExStrtTime is an adjustable item that sets the Minimum Exhaust Fan On Time (Default = 120 seconds). Once started, the exhaust fan must run for a minimum of this time before it is turned back OFF.

MinExStopTime is an adjustable item that sets the Minimum Exhaust Fan Stop Time (Default = 120 seconds). Once stopped, the exhaust fan must remain off for a minimum of this time before it can be re-started.

MinExhOAPos is an adjustable item that sets the Minimum Exhaust OA Position (default 5%). The outdoor air dampers must be open more that this value for prop exhaust fan operation.

MinExhSAFCap is an adjustable item that sets the Minimum Exhaust SAF capacity (default 10%). The supply air fan speed must be higher than this value for prop exhaust fan operation.

Exh On OA Pos is an adjustable item that turns on the exhaust fan when the OA damper position reaches this setting.

Exh Mx OA Pos is an adjustable item that sets the OA damper position at which the exhaust fan will be at is maximum speed.

MaxVentSpd is an adjustable item that sets the exhaust fan speed when an external ventilation override input to the exhaust fan is present.

Max RFEF RPM= is an adjustable item that sets the maximum RPM value for the exhaust air fan.

NOTE: This is set based on the exhaust fan model size.

ECM Status is a status only item that indicates the current status of the return/exhaust fan motor.

Heating/Cooling Changeover Set-Up

(See page 108 for more information)

Table 24: Htg/Clg ChgOvr Setup Menu

Item Display Name	Default Setting	Range	Password Level
Ctrl Temp Src=	RAT	RAT	4
		Space	
		MAT	
		OAT	
		None	
Use Tstat Spt=	No	No, Yes	4
Occ Clg DB=	2.0°F	0.0–10.0°F	4
Clg Period=	60s	0–999s	4
Clg Gain=	0.1	0.0–100.0	4
Clg PAT=	600s	0–999s	4
Max Clg Chg=	5.0°F	0.0–50.0°F	4
Occ Htg DB=	2.0°F	0.0–10.0°F	4
Htg Period=	60s	0–999s	4
Htg Gain=	0.1	0.0–100.0	4
Htg PAT=	600s	0–999s	4
Max Htg Chg=	5.0°F	0.0–50.0°F	4
AplyTstatChg=	No	No, Yes	4
CalDRemSpt=	No	@ 10°C	4
CalDRemSpt=	No	@ 50°F	4
CalDRemSpt=	No	@30°C	4
CalDRemSpt=	No	@86°F	4

Ctrl Temp Src is an adjustable item which selects the temperature sensor input to be used for the unit heating/cooling changeover or zone cooling and heating capacity change decisions. For example, if the CtrlTemp Src parameter is set to “Return,” then the Control Temp parameter reads the same value as the Return Air parameter.

Use Tstat Spt is an adjustable item used to set whether or not to use the Tstat set point adjustment value for the Occ Clg Spt and Occ Htg Spt.

Occ Clg DB is an adjustable item which sets a dead band around the Occ Cooling Set Point parameter. For example, if the Occ Cooling Set Point parameter is set to 75ºF and the Clg Deadband parameter is set to 2ºF the dead band around the set point would be from 76.0ºF to 74.0ºF.

Clg Period 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.

Clg Gain is an adjustable item which sets the “gain” used in the PI control function to vary the DAT Clg Spt in zone control applications.

Clg PAT 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.

Max Clg Change is an adjustable item that sets the maximum value for an increase or decrease of the DAT Clg Spt in zone control applications.

Occ Htg DB is an adjustable item which sets a dead band around the Occ Heating Set Point parameter. For example, if the Occ Heating Set Point parameter is set to 70ºF and the Htg Deadband parameter is set to 2ºF the dead band around the set point would be from 69.0ºF to 71.0ºF.

Htg Period 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.

Htg Gain is an adjustable item which sets the “gain” used in the PI control function to vary the DAT Htg Spt in zone control applications.

Htg PAT 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.

Max Htg Chg is an adjustable item that sets the maximum value for an increase or decrease of the DAT Htg Spt in zone control applications.

AplyTstatChg is an adjustable item that resets the controller. This is required to affect changes to the Use TstatSpt parameter.

NOTE: If using the t-stat as the setpoint adjustment value, the t-stat must be calibrated using the “CalDRemSPT” items listed in the menu. Using the degrees C when using SI unit, and the degrees F for English engineering units.

The technician should first set the thermostat and the lower set point for English units this would be 50°F, then change the default value at the CalDRemSpt @ 50°F to “YES”. After the controller accepts the value from the thermostat the default will return to “NO”. Then set the thermostat to the higher value 86°F, then select CalDRemSpt @86°F and change the default to “YES”. When the default returns to “NO” the calibration is complete.

Cooling Set-Up

(See page 122 for more information)

Table 25: Cooling Set-up Menu

Item Display Name	Default Setting	Range	Password Level
Clg Stage Time=	5min	5–60min	4
RhtBleedDwn	Inactive	Active	2
		Inactive	
Clg DB=	2.0°F	1.0–10.0°F	4
Clg Lo OAT Lk=	55°F	0–100°F	4
OAT Diff=	2°F	0–10°F	4
Clg Reset=	None	None	6
		Ntwrk	
		Space	
		Return	
		OAT	
		ExtmA	
		ExtV	
		Airflow	
Min Clg Spt=	65.0°F	40.0–100.0°F	6
Min Clg Spt @=	0/NA	0–100/	6
		NA	
		°F	
		°C	
		mA	
		%	
Max Clg Spt=	65.0°F	40.0–100.0°F	6
Max Clg Spt @=	100/NA	0–100/	6
		NA	
		°F	
		°C	
		mA	
		%	
Unocc Diff=	3°F	0–10°F	2

Clg Stage Time is an adjustable item used to set a minimum time period between compressor stage changes. This time changes with the configuration selected in place #3 Cooling type, Time is dependent on the compressor type.

RHTbleedDwn is a status point describing the active or inactive status of the re-heat bleed down.

Clg DB is an adjustable item which sets a dead band around the discharge cooling set point parameter. For example, if the discharge cooling set point parameter is set to 55ºF and the Clg Db parameter is set to 2ºF the dead band around the set point would be from 56.0ºF to 54.0ºF.

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 set point.

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 is an adjustable item that is used to set the type of cooling reset to be used.

Min Clg Spt is an adjustable item which sets the minimum cooling discharge set point for use with a cooling discharge air temperature set point reset schedule.

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 set point parameter is reset to the minimum DAT cooling set point value.

Max Clg Spt is an adjustable item which sets the maximum cooling discharge set point for use with a cooling discharge air temperature set point reset schedule.

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 set point parameter is reset to the maximum DAT cooling set point value.

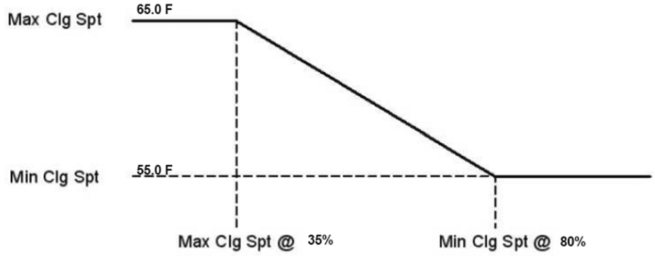
Figure 13 graphically shows the cooling reset operation. The normal DAT cooling set point is 55.0 F. The cooling reset scheme is set to airflow. The unit is to adjust the DAT from 55.0 F to 65.0 F. When the unit is at 35% of the design airflow the discharge temperature is to be 65.0 F. When the unit is at 80% of its airflow the DAT is to be 55.0F. This example would give the following inputs:

- Min Clg Spt= 55.0 F
- Min Clg Spt @= 80%
- Max Clg Spt= 65.0 F
- Max Clg Spt @= 35%

Based on the above, the unit will have a discharge air temperature set point of 55.0 F from 80% to 100% of the airflow.

Unocc Diff is an adjustable item that sets the unoccupied cooling differential.

Figure 13: Cooling Set Point



Inverter Compressor Set-Up

(See page 103 — 106 for more information)

Table 26: Inverter Compressor Set Up Menu

Item Display Name	Default Setting	Range	Password Level
Compressor Status			
Clg State=	—	Off	4
		Start	
		Init	
		Normal	
		Pumpdn	
		Standby	
Htg State=	—	Off	4
		Start	
		Init	
		Normal	
		Pumpdn	
		Standby	
INV Cmp Spd=	—	0–100%	4
INV Spd Cmd=	—	0–100%	4
Comp 3	—	Off	4
		On	
Prev Standby=	—	None	2
		CHP	
		HLP	
		CLP	
		HHP	
		INVDLT	
		LoDP	
		OAFail	
		OAFReq	
		INVReq	
		CmpDsbl	
INV Port Temp=	—	-50.0–200.0°F	2
INV Fin Temp=	—	-50.0–200.0°F	2
INV Cmp Amps=	—	0–50A	2
Refrig Circuit Status			
PTD=	—	0–5000kPa	4
PTS=	—	0–5000kPa	4
4 WayValve=	—	Cool	2
		Heat	
RcvrSol Valve=	—	Closed	2
		Open	
BP Sol Valve=	—	Closed	2
		Open	
Compressor Set Up			
Clg Lo OAT Lk=	25°F	0–100°F	4
Htg Lo OAT Lk=	0°F	-20–50°F	4
Htg Hi OAT Lk=	55°F	0–100°F	4
Eff Htg Hi OAT Lk=	—	0–100°F	4
OAT Diff=	2°F	0–100°F	4
INV Period=	20s	0–999s	4
INV Gain=	2.5	0.0–100.0	4
INV PAT=	10s	0–999s	4
INV Max Chg=	15%	0–100%	4

Item Display Name	Default Setting	Range	Password Level
Compressor Limiting			
Clg Press Lmtg=	—	None	2
		LP	
		LDP	
		HP	
		LPLDP	
		HPLDP	
		LDHP	
Htg Press Lmtg=	—	None	2
		LP	
		HP	
		HPP	
		LPHP	
		LPHPP	
		HPHPP	
		LPHPHPP	
C Ratio Lmtg	—	None	2
		Active	
Ref DLT Lmtg	—	None	2
		INV	
		STD	
		INVSTD	
INV Brd Lmtg=	—	None	2
		HiA	
		Req	
		FinT	
		HiAReq	
		HiAFinT	
		ReqFinT	
		HiARqFT	
INV Man Dsbl=	Enable	Enable	2
		Disable	
Comp3 ManDsbl=	STD2ManOff	Enable	2
		Disable	
Fault Code Details (Active Fault Codes)			
INVAlarmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
OF1AlarmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
OF2AarmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
Fault Code Details (Previous Fault Codes)			
PrvINVAlmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
MM/DD/YY HH:MM:SS	—	—	2
PrvOF1 Alm Code=	—	2 digit alpha-numeric	2
Code Text	—	String	2
MM/DD/YY HH:MM:SS	—	—	2
PrvOF2AlmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
MM/DD/YY HH:MM:SS	—	—	2
IFB Communication Status			
IFB SWVersion=	—	V022013	2
IFBCommStatus= See page 137	—	OK	2
		OF2Err	
		OF1Err	
		OF12Err	
		INVErr	
		ACS3Err	
		ACS1Err	
		ACS13Err	
		Init3Err	
		Init1Err	
		Init13Err	
		MBErr	
PrvCommStatus	—	Same as IFB Com-mStatus	2
MM/DD/YY HH:MM:SS	—	—	2
ACS1 DataRcvd= See page 138	—	ErrAll	2
		F1F2Err	
		INVF2Err	
		F2Err	
		INVF1Err	
		F1Err	
		INVErr	
		AllOK	
ACS3 DataRcvd= See page 138	—	Error	2
		OK	

Clg State is a status only item which displays the current compressor operating state when the unit is in the Cooling operating state or when dehumidification operation is active. See page 105 for compressor cooling operating state details.

Htg State (Heat Pump only) is a status only item which displays the current compressor operating state when the unit is in the Heating or Min DAT operating state. See page 132 for compressor heating operation state details.

INV Cmp Spd is a status only item which displays the current inverter compressor speed in percent of the maximum.

INV Spd Cmd is a status only item that indicates the current commanded speed of the inverter compressor.

Comp 3 is a status only item which displays the current on/off status of the fixe compressor.

Prev Standby is a status only item which displays the most recent abnormal event that caused the compressor Clg State or Htg State to transition directly from the Normal to Standby state. Pressing enter while viewing this item will display the date and time of that event.

INV Port Temp is a status only item which displays the current value of the calculated temperature (based on the current suction pressure reading) at the inverter compressors inlet port. This value is used in the inverter compressor discharge line higher temperature limiting protection function.

INV Fin Temp is a status only item which displays the current inverter compressor control board cooling fin temperature. This value is used in the inverter compressor fin temperature limiting protection function.

INV Cmp Amps is a status only item which displays the current amperage being drawn by the inverter compressor. This value is used in the inverter compressor current limiting protection function.

PTD is a status only item which displays the current value of the discharge line refrigerant pressure.

PTS is a status only item which displays the current value of the suction line refrigerant pressure.

4 Way Valve (Heat Pump only) is a status only item which displays the current Heat/Cool (Closed/Open) status of the heat pump four way reversing valve.

RcvrSol Valve (Heat Pump only) is a status only item which displays the current Open/Closed status of the heat pump receiver solenoid valve.

BP Sol Valve is a status only item which displays the current Open/Closed status of the refrigerant circuit bypass solenoid valve. This valve is normally closed but opens when needed to equalize the low and high side refrigerant pressures.

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 set point.

Htg Lo OAT Lk is an adjustable item that sets a low outdoor ambient temperature value below which compressor heating is locked out.

Htg Hi OAT Lk is an adjustable item that sets a high outdoor ambient temperature value above which compressor heating is locked out.

EffHtgOATLk is a status only item that displays the current value that is being used for high outdoor ambient compressor heating lock out. Normally this value reads the same as the Htg Hi OAT Lk but can be lower due to the low differential pressure limiting function while the unit is operating in the Heating or MinDAT states.

OAT Diff is an adjustable item that sets at differential above the Htg Lo OATLk and below the Htg Hi OATLk values for determining when heating becomes re-enabled after being locked out on outdoor ambient temperature.

INV Period is an adjustable item that sets the sample period for the PI loop used to control the compressor capacity to maintain the effective discharge air temperature set point.

INV Gain is an adjustable item that sets the Gain for the PI loop used for the PI loop used to control the compressor capacity to maintain the effective discharge air temperature set point.

INV PAT is an adjustable item that sets the project ahead time for the PI loop used for the PI loop used to control the compressor capacity to maintain the effective discharge air temperature set point.

INV Max Chg is an adjustable item that sets the maximum change value for the PI loop used for the PI loop used to control the compressor capacity to maintain the effective discharge air temperature set point.

Clg Press Lmtg is a status only item which displays the current compressor limiting function related to refrigerant pressure that is active during cooling operation [See page 95].

Htg Press Lmtg (Heat Pump only) is a status only item which displays the current compressor limiting function related to refrigerant pressure that is active during heating operation [See page 95].

C Ratio Lmtg is a status only item which displays whether or not the high compression ratio limiting function is active [See page 96].

Ref DTL Lmtg is a status only item which displays the current refrigerant discharge line high temperature limiting function that is active [See page 96].

INV Brd Lmtg is a status only item which displays the reason that the inverter compressor board is requesting limited inverter compressor operation [See page 97].

INV Man Dsbl is an adjustable item that can be used to manually disable the inverter compressor. The unit can operate with the fixed compressor while the inverter compress is disabled for any reason only when this parameter is set to Disable. This should only be used in emergency situations.

Comp3 ManDsbl is an adjustable item that can be used to manually disable the fixed speed compressor.

INVAlarmCode is a status only item which displays the active inverter fault code. The INV Comp: Problem alarm is generated when a fault code is active.

Code Text is a status only item which displays a text description of the active inverter fault code.

OF1AlarmCode is a status only item which displays the active outdoor fan 1 fault code. The OA Fan: Problem alarm is generated related to a fault code being active.

Code Text is a status only item which displays a text description of the active outdoor fan 1 fault code.

OF2AlarmCode is a status only item which displays the active outdoor fan 2 fault code. The OA Fan: Problem alarm is generated related to a fault code being active.

Code Text is a status only item which displays a text description of the active outdoor fan 2 fault code.

PrvINVAlmCode is a status only item which displays the most recent inverter fault code that was active.

Code Text is a status only item which displays a text description of the previous inverter fault code.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the previous inverter fault code.

PrvOF1AlmCode is a status only item which displays the most recent outdoor fan 1 fault code that was active.

Code Text is a status only item which displays a text description of the previous outdoor fan 1 fault code.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the previous outdoor fan 1 fault code.

PrvOF2AlmCode is a status only item which displays the most recent outdoor fan 2 fault code that was active.

Code Text is a status only item which displays a text description of the previous outdoor fan 2 fault code.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the previous outdoor fan 2 fault code.

IFB SW Vers is a status only item which displays the current version of software in the IFB communication board.

IFB Comm Status is a status only item which displays the active IFB board communication status. The IFB Comm: Problem alarm is generated based on this status.

Prv Comm Status is a status only item which displays the most recent active IFB board communication status.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the most recent active IFB board communication status.

ACS1 DataRcvd is a status only item which indicates whether on not the initialization data is received by the controller from the inverter compressor and outdoor fan boards via the IFB board. The controller does not start the communication loop with these devices until this data is received.

ACS3 DataRcvd is a status only item which indicates whether on not the initialization data is received by the controller from the expansion valve driver board (EVB) via the IFB board. The controller does not start the communication loop with these devices until this data is received.

Var Comp Set-up

(See page 16 for more information)

Table 27: Var Comp Setup Menu

COMPRESSOR STATUS
Var Cmp Status= _____
Var Spd Cmd= _____
Comp 1= _____
Comp 3= _____
Comp 5= _____
REFRIG CIRCUIT STATUS
PTD1= _____
PTD2= _____
VCmpDischSH= _____
C1DschSatTmp= _____
C2DschSatTmp= _____
DRT1= _____
DRT2= _____
Cond Sol 1= Off
Cond Sol 2= Off
COMPRESSOR SET-UP
Var Cmp Period= 20s
Var Cmp Gain= 1
Var Cmp PAT= 40s
VarCmp MaxChg= 10%
OilBoost= Off
LowOilTime= 5min
LowTcOAT= 80°F

Var Cmp Status is a status only item that indicates whether variable speed compressor on circuit # 2 is ON or OFF.

Var Spd Cmd is a status only item that indicates the current commanded speed of variable speed compressor on circuit # 2

Comp 1 is a status only item that indicates whether the fixed speed compressor# 1 is ON or OFF.

Comp 3 is a status only item that indicates whether the fixed speed compressor# 3 is ON or OFF.

Comp 5 is a status only item that indicates whether the fixed speed compressor# 5 is ON or OFF

PTD 1 is a status only item which displays the current value of the discharge line refrigerant pressure for circuit #1.

PTD 2 is a status only item which displays the current value of the discharge line refrigerant pressure for circuit #2.

VCmpDischSH is a status only item that indicates the current discharge superheat value for the variable compressor circuit based on discharge refrigerant temperature minus the discharge saturation temperature.

DRT 1 is a status only item which displays the current discharge refrigerant line temperature sensor reading for inverter compressor on circuit #1.

DRT 2 is a status only item which displays the current discharge refrigerant line temperature sensor reading for variable speed compressor on circuit #2.

C1DschSatTmp is a status only item which displays the current discharge pressure equivalent saturation temperature for circuit #1.

C2DschSatTmp is a status only item which displays the current discharge pressure equivalent saturation temperature for circuit #2.

Cond Sol 1 is a status only item that indicates whether the condenser coil splitter valve for circuit #1 is ON or OFF.

Cond Sol 2 is a status only item that indicates whether the condenser coil splitter valve for circuit #2 is ON or OFF.

VarCmp Period is an adjustable item that sets the sample period for the PI loop used to control the variable speed compressor capacity to maintain the effective discharge air temperature setpoint.

Var Cmp Gain is an adjustable item that sets the Gain for the PI loop used for the PI loop used to control the variable speed compressor capacity to maintain the effective discharge air temperature setpoint.

Var Cmp PAT is an adjustable item that sets the project ahead time for the PI loop used for the PI loop used to control the variable speed compressor capacity to maintain the effective discharge air temperature setpoint.

Var Cmp MaxChg is an adjustable item that sets the maximum change value for the PI loop used for the PI loop used to control the variable speed compressor capacity to maintain the effective discharge air temperature setpoint.

OilBoost is an item that indicates whether the l variable speed compressor oil boost sequence is On or Off and also allows the sequence to be manually initiated or terminated.

LowOilTime is an adjustable item that sets the amount of time a low oil level signal must be detected before the variable speed compressor low oil boost sequence is initiated.

LowTcOAT is an adjustable item that sets the OAT solenoid valve setpoint used with condenser coil splitter valve control.

Economizer Set-up

(See page 122 for more information)

Table 28: Economizer Setup Menu

Item Display Name	Default Setting	Range	Password Level
EconChgovr	Enth&DB	None	4
		OAT	
		OAT& RAT	
		Enth & OAT	
Econo FDD	On	On	4
		Off	
Clg Stage Time	5min	5–60min	4
Chgover Temp=	70.0°F	0.0–100.0°F	6
Clg DB=	2.0d°F	1.0–10.0d°F	4
Econo Period=	30/40s (air/water)	0–999s	4
Econo Gain=	10/1 (air/water)	0.0–100.0	4
Econo PAT=	60/40s (air/water)	0–999s	4
Econo Max Chg=	10/15% (air/water)	0–100%	4
Econo Diff=	3°F	0–10°F	4
Clg Reset=	None	None	6
		Ntwrk	
		Space	
		Return	
		OAT	
		ExtmA	
		ExtV	
		Airflow	
Min Clg Spt=	55.0°F	40.0–100.0°F	6
Min Clg Spt @	0/NA	0–100/	6
		NA	
		°F	
		°C	
		mA	
		%	
Max Clg Spt=	65.0°F	40.0–100.0°F	6
Max Clg Spt @	100/NA	0–100/	6
		NA	
		°F	
		°C	
		mA	
		%	
Max OAT Lmt=	75.0°F	50.0–100.0°F	6
Min OAT Lmt=	70.0°F	50.0–100.0°F	6
Calibrate OAD=	No	No	6
		Yes	
PosSwOpen=	97%	0–100%	6
Max Sw Diff=	3%	0–100%	6
PosSwClose=	3%	0–100%	6
Min Sw Diff=	5%	0–100%	6
OAD Sw Status=	—	Open	6
		Closed	

EconChgovr is an adjustable item used to set the type of Economizer change over to be used.

Econo FDD is to meet the California Title 24 economizer fault detection and diagnostics requirements warning alarm indication of over economizing, under economizing, stuck dampers and excess outdoor air will be provided. This item enables operation of this fault detection.

Clg Stage Time is an adjustable item used to set a minimum time period between compressor stage changes.

Chgover Temp is an adjustable item which sets the OA dry bulb temperature at which the units changes over to the economizer operation.

Clg DB is an adjustable item which sets a dead band around the discharge cooling set point parameter. For example, if the discharge cooling set point parameter is set to 55ºF and the Clg DB parameter is set to 2ºF the dead band around the set point would be from 56.0ºF to 54.0ºF.

Econo Period is an adjustable item which sets the “sampling time” used in the PI control function of the economizer actuator.

Econo Gain is an adjustable item which sets the “Gain” used in the PI control function of the economizer actuator.

Econo PAT is an adjustable item which sets the “project ahead time” used in the PI control function of the economizer actuator.

Econo Max Chg is an adjustable item that sets the maximum value for an increase or decrease of the economizer actuator.

Econo Diff is an adjustable item which sets a differential above the EconChgovrT parameter. Economizer operation is disabled when the OA Temp parameter indicates a value above the EconChgovrT= parameter by more than this differential.

Clg Reset is an adjustable item used to set the type of cooling reset to be used.

Min Clg Spt is an adjustable item which sets the minimum cooling discharge set point for use with a cooling discharge air temperature set point reset schedule.

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 set point parameter is reset to the minimum DAT cooling set point value.

Max Clg Spt is an adjustable item which sets the maximum cooling discharge set point for use with a cooling discharge air temperature set point reset schedule.

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 set point parameter is reset to the maximum DAT cooling set point value.

Max OAT Lmt= is an adjustable item that sets the maximum usable temperature value of the Outside air Dampers.

Min OAT Lmt= is an adjustable item that sets the minimum usable temperature value of the Outside air Dampers.

Calibrate OAD= is a selectable item that will initiate the calibration procedures of the OAD

PosSwOpen= is an adjustable item which indicates the position of the OAD End switch when it opens.

Max Sw Diff= is an adjustable item that sets the maximum % differential of the OAD End Switch operation. During the calibration procedure the differential will be written to the ClosedDmpSw%, MinSwDiff, OpenDmpSw% and MaxSwDiff parameters respectively.

PosSwClose= is an adjustable item which indicates the position of the OAD End switch when it closes.

Min Sw Diff= is an adjustable item that sets the minimum % differential of the OAD End Switch operation. During the calibration procedure the differential will be written to the ClosedDmpSw%, MinSwDiff, OpenDmpSw% and MaxSwDiff parameters respectively.

OAD Sw Status= is a status only item that indicates the position of the OAD end switch.

Min OA Set-Up Menu

(See page 120 for more information)

Table 29: Min OA Damper Menu

Item Display Name	Default Setting	Range	Password Level
AplyMinOAChg=	No	No, Yes	4
Min OA Reset=	None	None	4
		Network	
		Ext VDC	
		Ext mA	
		IAQ VDC	
		IAQ mA	
BSPOAOvrd=	No	No, Yes	2
RstLmtSnsr=	None	None	2
		DAT	
		EFT	
		MAT	
External Reset			
OA @ MinV/mA=	0%	0-100%	4
OA @ MaxV/mA=	100%	0-100%	4
Min V/mA=	0.0/V	0.0-20.0/	4
		V	
		mA	
Max V/mA=	10.0/V	0.0-20.0/	4
		V	
		mA	
CO_2 Reset			
IAQ Reset=	Yes	No	4
		Yes	
PPM @DCV Lmt=	800ppm	0-5000ppm	4
PPM @Vnt Lmt=	1000ppm	0-5000ppm	4
IAQ PPM=	—	0-5000ppm	4
Min PPM=	0ppm	0-5000ppm	4
Max PPM=	2000ppm	0-5000ppm	4
V/A @Min PPM=	0.0/V	0.0-20.0/	4
		V	
		mA	
V/A @Max PPM=	10.0/V	0.0-20.0/	4
		V	
		mA	

Item Display Name	Default Setting	Range	Password Level
CFM Reset			
OA Flow=	—	0–60000CFM	4
MinOAFlw Spt=	2000CFM	0–60000CFM	4
Field Stn Rst=	No	No	4
		Yes	
Field Stn Cfg=	VDC	VDC	4
		mA	
Min CFM	0CFM	0-60000CFM	4
Max CFM	10000CFM	0-60000CFM	4
V/A @Min CFM=	0.0/V	0.0-20.0/	4
		V	
		mA	
V/A @Max CFM=	10.0/V	0.0-20.0/	4
		V	
		mA	
OA CFM DB=	3%	0–100%	4
OA CFM Period=	30s	0–999s	4
OA CFM Gain=	0.1	0.0–100.0	4
OA CFM Mx Chg=	5%	0–100%	4
Fan Speed Reset			
Min Clg Spd=	40%	0-100%	4
Des Clg Spd	100%	0-100%	4
BSP Reset			
MinRFEFTm=	120sec	0-3600sec	2
BSPOvdST=	5Sec	0-999Sec	2
BSPOvdGain=	0.2	0-999	2
BSPOvdMxChg=	4%	0-100%	2
Damper Limiting			
ResetTLmt=	32.0°F	0-100°F	2
RstTSmplT=	5Sec	0-999Sec	2
RstTGain=	0.2	0-999	2
RstTPAT=	60Sec	0-999Sec	2
RstTMaxChg=	4%	0-100%	2
0-30% OA Max=	30%	0-100%	2
Min Inc Rate=	0.03	0.0-100.0	2
Max Inc Rate=	2.0	0.0-100.0	2

AplyMinOAChg this flag must be changed from NO to YES in order for the controller to recognize the changes to the MinOA Reset parameter. Setting this flag to YES will automatically reset the controller.

Min OA Reset is an adjustable item that sets the type of minimum OA damper position reset to be used. When this is set to “None” the Min OA Pos= parameter is set to the Ventilation Limit. When this is set to “Network,” “Ext VDC,” “Ext mA,” “IAQ VDC,” or “IAQ mA” then the Min OA Pos= parameter varies from the Ventilation Limit down to the Demand Control Ventilation Limit as the reset signal goes from its maximum to minimum value.

NOTE: When the Min OA Reset type is set to Network and the Apply changes flag is set to yes, the value of the Vent Limit is automatically set to 100%, the value of the DCV limit is set to 0% and the LoFlo V Lmt is set to 0%.

BSP OA Ovrd is an adjustable item used to enable/disable the building static pressure override feature. If the user elects to use this function (BSPOAOvrd=Yes) and the return fan has been at the minimum speed or the exhaust fan has been stopped for a minium return/exhaust fan off time a PI_Loop will begin modulating the Min OA Pos setpoint upward to maintain the building static pressure at the building static pressure setpoint.

Rst Lmt Snsr is an adjustable item used to set the sensor to be used in conjunction with the OA reset limit function. The user can choose the override sensor by setting the RstLmtSnsr 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 Min OA Pos setpoint downward when the selected temperature input drops below the ResetTLmt.

OA @ MinV/mA is an adjustable item used when Min OA Reset= is set to “Ext VDC” or “Ext mA” 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 is an adjustable item used when Min OA Reset= is set to “Ext VDC” or “Ext mA” 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.

Min V/mA is an adjustable item used to set the minimum value of the field input signal.

Max V/mA is an adjustable item used to set the maximum value of the field input signal.

IAQ Reset is an adjustable item which enables and disables outside air minimum position reset based on a field supplied CO_2 sensor input.

PPM @ DCV Limit is an adjustable item used when Min OA Reset= is set to “IAQ VDC” or “IAQ mA” to define at what PPM value the Min OA Pos= is to be at the Demand Control Ventilation Limit value.

PPM @ Vent Limit is an adjustable item used when Min OA Reset= is set to “IAQ VDC” or “IAQ mA” to define at what PPM value the Min OA Pos= is to be at the Ventilation Limit value.

IAQ PPM is a status only item which indicates the current reading from the CO_2 sensor.

Min PPM is an adjustable item that sets the minimum PPM value.

Max PPM is an adjustable item that sets the maximum PPM value.

V/mA @ Min PPM is an adjustable item that sets the minimum PPM value at the minimum DC voltage or mA value of the CO_2 sensor used when Min OA Reset= is set to “IAQ VDC” or “IAQ mA.”

V/mA @ Max PPM is an adjustable item that sets the maximum PPM value at the maximum DC voltage or mA value of the CO_2 sensor used when Min OA Reset= is set to “IAQ VDC” or “IAQ mA.”

OA Flow is a status only item which indicates the current outdoor airflow based on an optional OA airflow sensor input used when the unit is equipped the DesignFlow OA control feature, or a field supplied OA measuring station.

Min OAFlw Spt is an adjustable item that is used to set the minimum design flow CFM’s when the unit is equipped with the optional DesignFlow OA control feature, or a field supplied OA measuring station.

Field Stn Reset is an adjustable item which enables and disables outside air minimum position reset based on a field supplied airflow station input.

Field Stn Cfg is an adjustable item used to select the type of input for a field installed airflow station. This parameter is set to VDC or mA to match the input type of the field supplied airflow input.

Min CFM is an adjustable item that sets the minimum CFM value of the field supplied flow station.

Max CFM is an adjustable item that sets the maximum CFM value of the field supplied flow station.

V/A @ Min CFM is an adjustable item that sets the sensor input value at minimum CFM reading.

V/A @ Max CFM is an adjustable item that sets the sensor input value at maximum CFM reading.

OA CFM DB is an adjustable item which sets the “deadband” used in the control function that modulates Min OA Pos parameter to maintain the OA Flow parameter at the MinOA Flow set point when a unit is equipped with the optional DesignFlow outdoor airflow measuring feature, or a field supplied OA measuring station.

OA CFM Period is an adjustable item which sets the “sampling time” used in the PI control function that modulates the Min OA Pos parameter to maintain the OA Flow parameter at the MinOA Flow set point when a unit is equipped with the optional DesignFlow outdoor airflow measuring feature, or a field supplied OA measuring station.

OA CFM Gain is an adjustable item which sets the “Gain” used in the PI control function that modulates the Min OA Pos parameter to maintain the OA Flow parameter at the MinOA Flow set point when a unit is equipped with the optional DesignFlow outdoor airflow measuring feature, or a field supplied OA measuring station.

OA CFM Max Chg is an adjustable item which sets the “maximum *step*” used in the control function that modulates the Min OA Pos parameter to maintain the OA Flow parameter at the MinOA Flow set point when a unit is equipped with the optional DesignFlow outdoor airflow measuring feature, or a field supplied OA measuring station.

Min Clg Spd is an adjustable item that sets the discharge fan speed on a VAV unit at which the Ventilation Limit reaches the LoFloVent= value.

Des Clg Spd is an adjustable item used to adjust the design cooling speed set point.

MinRFEFTm is an adjustable item used to set the time period for which the return/exhaust fan must operate at the minimum speed before the building static pressure override function is activated.

BSPOvdST an adjustable item which sets the “sampling time” used in the PI control function used for the building static pressure override feature.

BSPOvdGain is an adjustable item which sets the “Gain” used in the PI control function used for the building static pressure override feature.

BSPOvdMxChg 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.

ResetTLmt 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.

RstTSmpIT an adjustable item which sets the “sampling time” used in the PI control function used for the Reset Temperature Limit feature.

RstTGain is an adjustable item which sets the “Gain” used in the PI control function used for the Reset Temperature Limit feature.

RstTPAT is an adjustable item which sets the “project ahead time” used in the PI control function used for the Reset Temperature Limit feature.

RstTMaxChg is an adjustable item that sets the maximum change value PI loop used for the Reset Temperature Limit feature.

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 is an adjustable item used to set the maximum increase rate for the outside air damper “cold start” sequence.

0-30% OA Max is an adjustable item used to set the maximum outside air damper position when the unit is configured for a 30% damper.

Heating Set-Up

(See page 99 and 124 for more information)

The Heating Set-Up menu provides a summary of the control parameters for non-heat pump units with heating or heat pump units with supplemental heating. The unit's heating mode of operation is controlled by the control temperature and the heating set point temperature. The unit goes into the heating mode of operation by analyzing the control temperature. The control temperature can be return temperature, space temperature or outside air temperature. The unit goes into the heating mode of operation when the control temperature is below the heating set point by more than ½ the deadband.

Table 30: Heating Set-Up Menu

Item Display Name	Default Setting	Range	Password Level
Htg Stage Time=	5min	2–60min	4
Htg DB=	2.0°F	1.0–10.0°F	4
Htg Period=	60s	0–999s	4
Htg Gain=	0.8	0.0–100.0	4
Htg PAT=	120s	0–999s	4
Htg Max Chg=	10%	0–100%	4
Htg Lo OAT Lock=	0°F	-50–50°F	4
Htg Hi OAT Lk=	55°F	0–100°F	4
Eff Htg Hi OAT Lk=	—	0–100°F	4
SuplHtg Hi OAT Lock=	55°F	0–100°F	4
Htg OAT Diff=	2°F	0–10°F	4
Htg Reset=	None	None	6
		Ntwrk	
		Space	
		Return	
		OAT	
		ExtmA	
		ExtV	
Min Htg Spt=	55.0°F	40.0–140.0°F	6
Min Htg Spt @=	0/	0–100/	6
	NA	NA	
		°F	
		°C	
		mA	
Max Htg Spt=	55.0°F	40.0–140.0°F	6
Max Htg Spt @=	0/	0–100/	6
	NA	NA	
		°F	
		°C	
		mA	
Min DAT Ctrl=	Yes	Yes, No	6
Min DAT Limit=	55.0°F	0.0–70.0°F	4
Occ Heating=	Yes	Yes, No	6
Unocc Diff=	3°F	0–10°F	2
Htg Warmup Tm=	60s	0–999s	2
Htg Hld Period=	240s	0–999s	2
MWU Sensor=	RAT	NonRAT Space	4

Htg Stage Time is an adjustable item used to set a minimum time period between heating stage changes.

Htg DB is an adjustable item which sets a dead band around the discharge heating set point parameter. For example, if the discharge heating set point parameter is set to 100ºF and the Htg DB= parameter is set to 2ºF, the dead band around the set point would be from 101.0ºF to 99.0ºF.

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 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 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 is an adjustable item that sets the maximum value for an increase or decrease of the heating valve or face & bypass damper position.

Htg Lo OAT Lk is an adjustable item that sets a low outdoor ambient temperature value below which compressor heating is locked out.

Htg Hi OAT Lk is an adjustable item that sets a high outdoor ambient temperature value above which compressor heating is locked out.

EffHtgOATLk is a status only item that displays the current value that is being used for high outdoor ambient compressor heating lock out. Normally this value reads the same as the Htg Hi OAT Lk but can be lower due to the low differential pressure limiting function while the unit is operating in the Heating or MinDAT states.

SuplHtg Hi OAT Lk is an adjustable item that sets a high outdoor ambient temperature value above which supplemental heating is locked out.

Htg OAT Diff is an adjustable item which sets a differential below the OATHtg Lock parameter. Heating operation is re-enabled when the outdoor air temperature sensor input falls below the OATHtg Lock value by more than this differential.

Htg Reset is an adjustable item used to set the type of heating reset to be used.

Min Htg Spt is an adjustable item which sets the minimum heating discharge set point for use with a heating discharge air temperature set point reset schedule.

Min Htg Spt @ is an adjustable item which sets the value of the sensor input, selected with the heating reset parameter, at which the heating set point is reset to the Min Htg Spt value.

Max Htg Spt is an adjustable item which sets the maximum heating discharge set point for use with a heating discharge air temperature set point reset schedule.

Max Htg Spt @ is an adjustable item which sets the value of the sensor input, selected with the heating reset parameter, at which the heating set point is reset to the Max Htg Spt value.

Min DAT Ctrl is an adjustable item used on VAV or CAV discharge control units to activate or deactivate the low discharge temperature limit function available on units equipped with modulating or multistage heat.

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. On VAV or CAV discharge control units, the minimum discharge temperature limit is the DAT Clg Spt.

Occ Heating 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.

Unocc Diff is an adjustable item that sets the unoccupied heating differential.

Htg Warmup Tm is an adjustable item which is used to set the amount of time the gas burner will remain at a low fire position on 100% OSA units (default 60 seconds) during the special cold start sequence.

Htg Hld Period 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.

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 disables morning warm up operation. Setting this parameter to None disables the morning warm up operation.

Outdoor Air Fan Set-Up

Table 31: Outdoor Air Fan Set Up Menu

Item Display Name	Default Setting	Range	Password Level
OA Fan Status			
OA Fan1 Spd=	—	0–100%	4
OA Fan1 Cmd=	—	0-100%	4
OAFan1 Amps=	—	0–50A	4
OA Fan2 Spd=	—	0–100%	4
OA Fan2 Cmd=	—	0-100%	4
OAFan2 Amps=	—	0–50A	4
Refrig Circuit Status			
PTD=	—	0–5000kPa	4
PTS=	—	0–5000kPa	4
Disch Sat Tmp=	—	-50.0–212.0°F	4
EH DshSatTSpt=	—	-50.0–212.0°F	2
OA Temp=	—	-50.0–200.0°F	4
INV Fin Temp=	—	-50.0–200.0°F	2
OA Fan Set Up			
DischSatTDiff=	15°F	10.0–50.0°F	2
DischSatTDB=	2.0°F	0–10.0°F	2
OA Fan Period=	25s	0–999s	2
OA Fan Gain=	2.5	0–100	2
OA Fan PAT=	75s	0–999s	2
OA Fan Max (3–15 Tn)	75%	—	2
OA Fan Max (Other Tn)	100%	50–100	2
IFB Comm Status			
IFB SWVersion=	—	V0222013	2
IFBCommStatus=	—	OK	2
		OF2Err	
		OF1Err	
		OF12Err	
		INVErr	
		ACS3Err	
		ACS1Err	
		ACS13Err	
		Init3Err	
		Init1Err	
		Init13Err	
		IFBRst	
		MBErr	
PrvCommStatus	—	Same as IFB CommStatus	2
MM/DD/YY HH:MM:SS	—	—	2
ACS1 DataRcvd=	—	ErrAll	2
		F1F2Err	
		INVF2Err	
		F2Err	
		INVF1Err	
		F1Err	
		INVErr	
		AllOK	
ACS3 DataRcd=	—	Error	2
		OK	
Fault Code Details (Active Fault Codes)			
INVAlarmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
OF1AlarmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
OF2AlarmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
Fault Code Details (Previous Fault Codes)			
PrvINVAlmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
MM/DD/YY HH:MM:SS	—	—	2
PrvOF1AlmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
MM/DD/YY HH:MM:SS	—	—	2
PrvOF2AlmCode=	—	2 digit alpha-numeric	2
Code Text	—	String	2
MM/DD/YY HH:MM:SS	—	—	2

OA Fan1 Spd is a status only item that displays the current speed of outdoor fan 1 in percent of maximum speed.

OA Fan1 Cmd= is is a status only item that indicates the current command speed of outdoor fan 1.

OA Fan1 Amps is a status only item which displays the current amperage being drawn by outdoor fan 1.

OA Fan2 Spd is a status only item that displays the current speed of outdoor fan 2 in percent of maximum speed.

OA Fan2 Cmd= is is a status only item that indicates the current command speed of outdoor fan 2.

OA Fan2 Amps is a status only item which displays the current amperage being drawn by outdoor fan 2.

PTD is a status only item which displays the current discharge refrigerant line pressure sensor reading.

PTS is a status only item which displays the current suction refrigerant line pressure sensor reading.

Disch Sat Tmp is a status only item which displays the current discharge pressure equivalent saturation temperature.

EffDshSatTSpt is a status only item which displays the effective discharge saturation temperature set point used to control the outdoor air fans in the cooling mode of operation.

OA Temp is a status only item which displays the current temperature reading from the unit mounted outdoor air temperature sensor.

INV Fin Temp is a status only item which displays the current inverter compressor control board cooling fin temperature. This value is used in the inverter compressor fin temperature limiting protection function.

DischSatTDiff is an adjustable item which sets a differential above the current outdoor air temperature reading which is used to establish the EffDshSatTSpt.

DischSatTDB is an adjustable item which sets a control deadband around the EffDshSatTSpt.

OA Fan Period is an adjustable item that sets the sample period for the PI loop used to control the outdoor fans in the cooling mode of operation to maintain the EffDshSatTSpt.

OA Fan Gain is an adjustable item that sets the Gain for the PI loop used for the PI loop used to control the outdoor fans in the cooling mode of operation to maintain the EffDshSatTSpt.

OA Fan PAT is an adjustable item that sets the project ahead time for the PI loop used for the PI loop used to control the outdoor fans in the cooling mode of operation to maintain the EffDshSatTSpt.

OA fan Max is an adjustable item which sets the maximum speed percentage of the OA Fan.

INVAlarmCode is a status only item which displays the active inverter fault code. The INV Comp: Problem alarm is generated when a fault code is active.

Code Text is a status only item which displays a text description of the active inverter fault code.

OF1AlarmCode is a status only item which displays the active outdoor fan 1 fault code. The OA Fan: Problem alarm is generated related to a fault code being active.

Code Text is a status only item which displays a text description of the active outdoor fan 1 fault code.

OF2AlarmCode is a status only item which displays the active outdoor fan 2 fault code. The OA Fan: Problem alarm is generated related to a fault code being active.

Code Text is a status only item which displays a text description of the active outdoor fan 2 fault code.

PrvINVAlmCode is a status only item which displays the most recent inverter fault code that was active.

Code Text is a status only item which displays a text description of the previous inverter fault code.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the previous inverter fault code.

PrvOF1AlmCode is a status only item which displays the most recent outdoor fan 1 fault code that was active.

Code Text is a status only item which displays a text description of the previous outdoor fan 1 fault code.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the previous outdoor fan 1 fault code.

PrvOF2AlmCode is a status only item which displays the most recent outdoor fan 2 fault code that was active.

Code Text is a status only item which displays a text description of the previous outdoor fan 2 fault code.

MM/DD/YYYY HH:MM:SS is a status only item which displays the time stamp of the previous outdoor fan 2 fault code.

Expansion Valve Set-Up

Table 32: Expansion Valve Set Up Menu

Item Display Name	Default Setting	Range	Password Level
Expansion Valve Status			
EVI Pos=	—	0–100%	4
EVO Pos=	—	0–100%	4
EV Status=	—	OK	4
		EVIErr	
		EVOErr	
		EVI&OErr	
		InitErr	
		MBErr	
Refrigerant Circuit Status			
PTS=	—	0–5000kPa	4
PTD=	—	0–5000kPa	4
Suction SH=	—	-100.0–100.0°F	4
Discharge SH=	—	-100.0–100.0°F	4
Subcooling=	—	-100.0–100.0°F	4
Eff SSH Spt=	—	3.0–22.0°F	2
EffSH Base=	—	5.0–9.0°F	2
Eff SC Spt=	—	0.0–15.0°F	2
Eff SC Lo Lmt=	—	0–100%	2
SRT=	—	-50.0–200.0°F	2
Disch Sat Tmp=	—	-50.0–212.0°F	2
Sucn Sat Tmp=	—	-50.0–212.0°F	2
IRT=	—	-50.0–200.0°F	2
ORT=	—	-50.0–200.0°F	2
Communication Board Status			
IFB SWVersion=	—	V022013	2
IFBCommStatus= See page 137	—	OK	2
		OF2Err	
		OF1Err	
		OF12Err	
		INVErr	
		ACS3Err	
		ACS1Err	
		ACS13Err	
		Init3Err	
		Init1Err	
		Init13Err	
		IFBRst	
		MBErr	
PrvCommStatus	—	Same as IFB CommStatus	2
MM/DD/YY HH:MM:SS	—	—	2
ACS1 DataRcvd=	—	Error	2
		OK	
ACS3 DataRcvd=	—	Error	2
		OK	
Expansion Valve Set Up			
SSH DB=	0.5°F	2.0–5.0°F	2
ClgSHLoBase=	5.0°F	2–20.0°F	2
HtgSHLoBase=	5.0°F	2–20.0°F	2
ClgSHHiBase=	9.0°F	2–20.0°F	2
HtgSHHiBase=	9.0°F	2–20.0°F	2
Htg EVI Meth=	Sbc	100% or Sbc	2
IC SC Spt=	9.0°F	0–15.0°F	2
IC SC DB=	2.0°F	0.0–10.0°F	2
HtgSC EVI Min=	12% unit size <6, 50% for unit size >6	12% – 100%	4
Clg EVO Meth=	Sbc	100% or Sbc	2
OC SC Spt=	9.0°F	0–15.0°F	2
OC SC DB=	2.0°F	0.0–10.0°F	2
ClgSC EVI Min=	0%	0–100%	4
ManCtrl EV Op=	Auto	Man	2
		Auto	

EVO Pos (Heat Pump only) is a status only item which displays the current position of the outdoor expansion valve.

EVI Pos is a status only item which displays the current position of the indoor expansion valve.

EVI Status is a status only item which displays the current status of the connection between the IFB communication board and the expansion valve control board (EVB).

PTS is a status only item which displays the current suction refrigerant line pressure sensor reading.

PTD is a status only item which displays the current discharge refrigerant line pressure sensor reading.

Suction SH is a status only item which displays the current suction superheat value based on suction temperature minus saturated suction pressure.

Discharge SH= is a status only item that indicates the current discharge superheat value based on discharge refrigerant temperature minus the discharge saturation temperature.

Subcooling (Heat Pump only) is a status only item which displays the current discharge subcooling value.

Eff SSH Spt is a status only item which displays the effective suction superheat set point. This value varies depending on suction and discharge superheat conditions.

Eff SH Base is a status only item which displays the effective suction superheat base set point value. This value is normally set equal to the SH Hi Base value but can be lowered toward the SH Lo Base value during steady state supply fan and compressor operation.

Eff SC Spt (Heat Pump only) is a status only item which displays the effective subcooling set point. This value is normally set equal to the IC SC Spt (or OC SC Spt) value but can be raised toward 15°F during steady state supply fan and compressor operation.

Eff SC Lo Lmt (Heat Pump only) is a status only item which displays the effective subcooling expansion valve position low limit. This value is normally set to the 50% but can be lowered during steady state supply fan and compressor operation.

SRT is a status only item which displays the current suction refrigerant line temperature sensor reading. This value is used to calculate suction superheat.

Disch Sat Tmp is a status only item which displays the current discharge pressure equivalent saturation temperature.

Sucn Sat Tmp is a status only item which displays the current suction pressure equivalent saturation temperature.

IRT (Heat Pump only) is a status only item which displays the current indoor refrigerant temperature sensor reading.

ORT (Heat Pump only) is a status only item which displays the current outdoor refrigerant temperature sensor reading.

SSH DB is an adjustable item that sets deadband around the Eff SSH Spt for superheat control of either the indoor expansion valve (cooling operation) or outdoor expansion valve (EVO).

SSH Lo Base is an adjustable item that sets a low limit for the EffSH Base value. This parameter is for test purposes and should not generally be changed in the field.

SSH Hi Base is an adjustable item that sets a high limit for the EffSH Base value. This parameter is for test purposes and should not generally be changed in the field.

Htg EVI Method (Heat Pump only) is an adjustable item that sets the method of control of the indoor expansion valve (EVI) during heating operation. EVI is driven continuously to 100% open during heating operation. If set to subcooling “Sbc” then EVI is control to maintain the Eff SC Spt during heating operation.

IC SC Spt is an adjustable item that sets a base value for the Eff SC Spt during heating operation.

IC SC DB is an adjustable item that sets a deadband around the Eff SC Spt during heating operation.

HtgSC EVI Min= is an adjustable item which sets a minimum indoor expansion valve position for steady-state sub cooling reset control during heat pump heating operation.

Clg EVO Method (Heat Pump only) is an adjustable item that sets the method of control of the outdoor expansion valve (EVO) during cooling operation. EVO is driven continuously to 100% open during cooling operation. If set to “Sbc” then EVO is control to maintain the Eff SC Spt during cooling operation.

OC SC Spt is an adjustable item that sets a base value for the Eff SC Spt during cooling operation.

OC SC DB is an adjustable item that sets a deadband around the Eff SC Spt during cooling operation.

ClgSC EVO Min= is an adjustable item which sets a minimum outdoor expansion valve position for steady-state sub cooling reset control during heat pump cooling operation.

ManCtrl EV Op is an adjustable item that sets the mode of expansion valve control during Manual Control operation. If set to “Auto” the expansion values are automatically controlled during Manual Control operation. If set to “Man” the expansion valves are manually controlled during Manual Control operation.

Expansion Valve Control (EVI or EVO, EVO supplied only on heat pumps)

The EVI valve is modulated use a PI Loop during cooling operation to maintain the effective suction superheat set point. On heat pump units EVI is either driven to the 100% open position or modulated to maintain the effective subcooling set point during heating operation.

The EVO valve is modulated use a PI Loop during heating operation to maintain the effective suction superheat set point. EVO is either driven to the 100% open position or modulated to maintain the effective subcooling set point during cooling operation.

Defrost Set-Up

(See page 134 for more information)

Table 33: Defrost Set Up Menu

Item Display Name	Default Setting	Range	Password Level
Defrost State=	—	Off	4
		Init	
		Exec	
		Term	
Manual DF=	No	No	4
		Yes	
MinCmpOpTm=	10min	0–60min	2
MinAccCmpTm=	40min	0–300min	2
MaxFrostTm=	120min	40–360min	2
Defrost Temp=	—	-64–64°F	2
Tdef Adj=	0°F	-4.0–4.0°F	2
CmpOpTm=	—	0–50000.0min	2
AccCmpOpTm=	—	0–50000.0min	2
LoFrstAccTm=	—	0–50000.0min	2
HiFrstAccTm=	—	0–50000.0min	2

Defrost State (Heat Pump only) is a status only item which displays the current state of defrost operation. The states are Off, Initialization, Execute and Terminate.

Manual DF (Heat Pump only) is an adjustable item that allows for manual initiation of defrost operation.

MinCmpOpTm (Heat Pump only) is an adjustable item that sets minimum time that compressor heating operation must active in the current run cycle before defrost operation can be initiated.

MinAccCmpTm (Heat Pump only) is an adjustable item that sets minimum accumulated compressor heating run time since the last defrost cycle before defrost operation can be initiated.

MaxFrostTm (Heat Pump only) is an adjustable item that defines the maximum time during periods of potential coil frosting that can accumulated without initiating a defrost cycle.

Defrost Temp (Heat Pump only) is a status only item which displays the effective temperature value the defrost temperature input must fall below before defrost operation is initiated base on temperature.

Tdef Adj (Heat Pump only) is an adjustable item that allows a manual bias adjustment to be used in the internal calculation of the Defrost Temp. Increasing this value would cause defrost to be initiated at a warmer defrost temperature value and vise versa.

CmpOpTime (Heat Pump only) is a status only item which displays the time that compressor heating operation has been active in the current run cycle.

AccCmpOpTm (Heat Pump only) is a status only item which displays the accumulated time of compressor heating operation since the last defrost cycle.

LoFrstAccTm (Heat Pump only) is a status only item which displays the accumulated time since the last defrost cycle of low frost potential.

HiFrstAccTm (Heat Pump only) is a status only item which displays the accumulated time since the last defrost cycle of high frost potential.

Dehumidification Set-Up

(See page 116 for more information)

Table 34: Dehumidification Menu

Item Display Name	Default Setting	Range	Password Level
Dehum Method=	None	None	4
		Rel Hum	
		DewPt	
		Always	
RH DB=	6%	0–10%	4
Dewpoint DB=	2°F	2–10°F	4
RH Period=	10s	0–999s	4
RH Gain=	1	0.0–100.0	4
LCS Lo Gain=	0.2	0.0–100.0	4 or 5
RH PAT=	20s	0–999s	4
RH Max Chg=	16%	0–100%	4
Unocc Dehum=	No	Yes	4
		No	
Sensor Loc=	Return	Return	4
		Space	
		OAT	
Mn LCT Coil T=	45.0°F (RTU/MPS) 52°F (DPS)	40–100°F	4
Rht Cmp Lmtg=	Yes	Yes	2
		No	
Min Rheat Spt=	55.0°F	40.0–100.0°F	4
Max Rheat Spt=	65.0°F	40.0–100.0°F	4
RH Sens Type=	VDC	VDC	2
		mA	
RH Min Signal=	0.0V	0.0–20.0	2
		V/mA	
RHOutMaxV=	8.5V (MPS/DPS) 10.0V (RTU)	0.0–20.0	2
		V/mA	
Min Dehum Spd=	33%	0–100%	2
Max Dehum Spd=	100%	0–100%	2
Rht Min Pos=	15%	0–100%	2
RH Dec Rate=	1.00	0–10.00%/s	2
Backup RH Enable=	No	Yes	2
		No	

Dehum Method is an adjustable item used to set the dehumidification method to either “RH” or “DewPt.” When this parameter is set to “RH,” dehumidification operation is controlled to maintain the Rel Humidity value at the Relative Humidity Set Point. When this parameter is set to “DewPt,” dehumidification operation is controlled to maintain the Dew Point= value at the Dew Point Set Point. When this parameter is set to “Always” dehumidification will be active as long as the mechanical cooling is not disabled.

RH DB is an adjustable item that sets a dead band around the relative humidity set point. For example, if the RH Set Point parameter is set to 50% and the RH Db parameter is set to 2% the dead band around the set point would be from 49% to 51%.

Dewpoint DB is an adjustable item that sets a dead band around the dew point set point. For example, if the DewPoint Spt parameter is set to 50ºF and the DewPntDb parameter is set to 2ºF the dead band around the set point would be from 49ºF to 51ºF.

RH Period is an adjustable item which sets the “sampling time” used in the PI control function for controlling the reheat valve.

RH Gain is an adjustable item which sets the “Gain” used in the PI control function for controlling the reheat valve.

LSC Lo Gain is an adjustable item which set the “Gain “of the PID loop to maintain proper sub-cooling during dehumidification

RH PAT is an adjustable item which sets the “project ahead time” used in the PI control function for controlling the reheat valve.

RH Max Chg an adjustable item that sets the maximum value for an increase or decrease for controlling the reheat valve.

Dehum Ctrl is an adjustable item used to select whether dehumidification as “always” allowed or only during “occupied” modes of operation.

Sensor Loc is an adjustable item which is used to select the location of the humidity sensor. The location is selected by setting the Sensor Location value on the keypad to Return, Space, or OAT. The significance of the sensor location is that this determines which temperature sensor is use to calculate the Dewpoint. OAT can only be selected for units with DAT control.

Mn Lvg Coil T is an adjustable item which is used to set the minimum leaving coil temperature (Default = 45°F).

Rht Cmp Lmtg is a selectable item which allows special cooling capacity limiting function is used when a unit with refrigerant circuit sourced reheat (ex: MHGRH) cannot provide enough reheat to meet the reheat requirements. When active this limiting function will act to reduce the cooling capacity of the circuit opposite the reheat circuit (multiple circuit units only) in an attempt to increase the leaving coil temperature and therefore the reheat temperature

Min Reheat Spt is an adjustable item which is used to set the minimum DAT during dehumidification.

Max Reheat Spt is an adjustable item which is used to set the maximum DAT during dehumidification.

RH Sen Type is an adjustable item used to define the field supplied humidity sensor input signal type.

RH Min Signal is an adjustable item used to define the minimum value of the field supplied humidity sensor current or voltage signal.

RH Max Signal is an adjustable item used to define the maximum value of the field supplied humidity sensor current or voltage signal.

Min Dehum Spd is an adjustable item used to set the minimum supply fan variable speed supply air fan speed during dehumidification.

Max Dehum Spd is an adjustable item used to set the maximum supply fan variable speed supply air fan speed during dehumidification.

Rht Min Pos is an adjustable item used to set the minimum position of the reheat valve when the PI loop is active.

RH Dec Rate is an adjustable item used to set the rate of decrease for the reheat valve, where the unit leaves the dehumidification operation.

Backup RH Enable is an adjustable item that will enable or disable supplemental gas reheat. Dehumidification process must be active for a minimum of 30 minutes, the HGRH valve must be 95% open or better continuously for 2 minutes, and the RH or Dewpoint is more that twice the applicable deadband away from the humidity control set-point. These conditions will enable the supplemental gas heating to come on and assist reaching the re-heat setpoint.

Energy Recovery Set-up

(See page 117 for more information)

The Energy Recovery Set-up menu contains parameters that relate to or are used to control the enthalpy wheel and exhaust fan when a unit is equipped with an optional energy recovery wheel system.

Table 35: Energy Recovery

Item Display Name	Default Setting	Range	Password Level
Energy Rvcy=	Yes	Yes, No	4
ER Wheel=	—	On, Off	4
Wheel Speed=	—	0–100%	4
Whl Spd Cmd=	—	0–100%	4
ER LAT=	—	-50.0–200.0°F	4
ER EAT=	—	–50.0–200.0°F	4
Min ExhT Diff=	2.0°F	1.0–20.0°F	4
Max ExhT Diff=	6.0°F	1.0–20.0°F	4
ER Whl Stg Tm=	5min	1–100min	4
ER Whl Off Tm=	20min	1–100min	4
Rel Humidity=	—	0–100%	4
Min Whl Spd	5%	0–100%	4
Intersect Pt=	—	-146.2.0–150.0°F	2
Fst Mgmt Meth=	Timed	Timed ExhAir	4
OA Fst Temp=	-5°F/ -20.65°C	-40.0 – 37.78°C	4
Defrost Time=	5min	0–60min	4
Defrst Period=	60min	0–1440min	4
Defrst On Tm=	1s	0–999s	2
Defrst Off Tm=	24s	0–999s	2
ER Whl Period=	30.0s	0–999.0s	2
ER Whl Gain=	1.0	0–100	2
ER Whl PAT=	30.0s	0–999.0s	2
ER Max Chg=	10%	0–100%	2
LoERLAT CmpLK=	45°F	44–100°F	2
Cap Limiting=	Yes	Yes No	2

Energy Rvcy is an adjustable item which turns the optional energy recovery system ON /OFF.

ER Wheel is a status only item used to indicate whether the energy recovery wheel is currently ON or OFF.

Wheel Speed is a status only item that indicates the energy wheel variable speed supply air fan speed.

Wheel Spd Cmd is a status only item that indicates the current energy wheel variable speed supply air fan commanded speed.

ER LAT is status only item which displays the current discharge air temperature leaving the optional energy recovery wheel.

ER EAT is status only item which displays the current exhaust air temperature leaving the optional energy recovery wheel.

Min Exh T Diff is an adjustable item that sets a differential below the calculated potential energy recovery exhaust air frosting point. When the ER Exh T falls below the calculated frosting point by more that this value, the energy wheel will be driven to its minimum speed, or turned OFF, to prevent frosting.

Max Exh T Diff is an adjustable item that sets a differential above the calculated potential energy recovery exhaust air frosting point. Once the wheel is driven to minimum speed, or turned OFF, to prevent frosting, it is driven back to maximum speed, or turned ON, only when ER Exh T rises back above the calculated frosting point by more that this value.

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 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.

Rel Humidity is a status only item that indicates the current relative humidity reading of the sensor.

Min Whl Spd is an adjustable item used to set the energy recovery minimum wheel speed.

Intersect Pt is a status only item used to indicate the current intersection point value from the psychometric chart where potential for wheel frosting exists.

Fst Mgmt Meth is an adjustable item used to select the frost protection method to be used on a constant speed energy wheel application.

OA Fst Temp is an adjustable item used to set the outside air frost temperature.

Defrost Time is an adjustable item used to set the duration of a defrost cycle.

Defrst Period is an adjustable item used to set how often a defrost cycle will be initiated.

Defrst On Tm is an adjustable item used to select how long the constant speed energy wheel is energized during defrost.

Defrst Off Tm is an adjustable item used to select how long the constant speed energy wheel is de-energized during defrost.

ER Whl Period an adjustable item which sets the “sampling time” used in the PI control function.

ER Whl Gain is an adjustable item which sets the “Gain” used in the PI control function.

ER Whl PAT is an adjustable item which sets the “project ahead time” used in the PI control function.

ER Max Chg is an adjustable item that sets the maximum value for an increase or decrease of the energy recovery wheel speed.

LoERLAT Cmp Lk is an adjustable temperature setting that determines the lockout of the energy wheel operation determined by the leaving air temperature of the energy wheel.

CAP Limiting previously called “Variable effectiveness operation” Wheel is not disabled by this function when OAT is greater or equal to the RAT

D3 Set-Up Menu

The D3 Set-Up menu is provided for setting up an interface with the unit via a D3 gateway. Refer to IM 1133 – DIII-Net Communication Gateway for detailed information.

Table 36: D3 Setup Menu

Item Display Name	Default Setting	Range	Password Level
Itouch Vers=	—	XXXXXXX	2
Unit D3 Addr=	1–100	1–00 to 8–15	2
Set D3 Addr=	No	No/Yes	2
OA Unit Num=	0	0–10	2
OA Unit Amps=	0	0–200 Amps	2
OA Unit Addr=	0	0–64	2
Set OA Unit=	No	No/Yes	2
Rst All OA=	No	No/Yes	2
Min Load=	20%	0–100%	2
Max Load=	50%	0–100%	2
HiCapReset=	No	No/Yes	2
DATLoDiff=	10.0ºF	0–30ºF	2
Eco Method=	None	None	2
		Enth	
		OAT Hum	
		EnOAT Hum	
DATHiDiff=	50ºF	0–20ºF	2
OA Enth Max=	25.5 BTU/lb	0–64.49 BTU/lb	2
OA Hum Max=	0.0107lb/lb	0–0.0300lb/lb	2
OAT Max=	84ºF	0–64.49ºF	2
Temp Display=	DAT	None	2
		DAT	
		Space	
		RAT	
		OAT	
Low Speed=	33%	0–100%	2
Med Speed=	66%	0–100%	2
Hi Speed=	100%	0–100%	2

Alarm Configuration Menu

Alarm Limits Menu

The Alarm Limits menu is used to set the limits of the discharge air temperature sensor and the return air temperature sensor.

Table 37: Alarm Limits Setup Menu

Item Display Name	Default Setting	Range	Password Level
Hi Disch Temp=	170°F	90–250°F	4
Lo Disch Temp=	40°F	-50–50°F	4
Hi Return Temp=	120°F	90–150°F	4

Hi Disch Alm is an adjustable item that sets the high temperature limit for the DAT sensor. When the discharge air temperature sensor reaches this set point the unit will go into the high discharge air alarm.

Lo Disch Alm is an adjustable item that sets the low temperature limit for the DAT sensor. When the discharge air temperature sensor reaches this set point the unit will go into the low discharge air alarm.

Hi Return Alm is an adjustable item that sets the high temperature limit for the return air temperature. When the RAT sensor reaches this set point the unit will go into the high return air temperature alarm.

Alarm Output Config Menu

Table 38: Alarm Out Configuration Setup Menu

Item Display Name	Default Setting	Range	Password Level
Faults=	Fast	On	4
		Off	
		Fast	
		Slow	
Problems=	Slow	On	4
		Off	
		Fast	
		Slow	
Warnings=	Off	On	4
		Off	
		Fast	
		Slow	

The digital alarm output indicates the alarm group that contains the highest priority active alarm. This output is On when no alarms are active. The options for the action of this output when an alarm in a group occurs are ON, Fast Blink, Slow Blink, or OFF. These can be edited via the keypad/display.

The default values for the three groups of alarms are:

- Warnings – OFF
- Problems – Slow Blink
- Faults – Fast Blink

A user could eliminate any signal of a particular group of alarms through this output by selecting ON for that alarm group in the keypad/display.

Alarm Delays Menu

The Alarm Delays Setup Menu can be accessed when a level 2 password has been entered. The default settings are the result of many years of testing and should not be changed.

Table 39: Alarm Delays Setup Menu

Item Display Name	Default Setting	Range	Password Level
Frz DelayTime=	30s	0–180s	2
Aflw Ignr Tm=	120s	0–999s	2
Sens Alm Dly=	30s	0–300s	2
Temp Alm Dly=	30s	0–300s	2
LP Delay=	2s	0–10s	2
LP Comp Delay=	5s (410A) 65s (R22)	0–300s	2
Alarm Config			
Emerg Stop=	Man Clr	Man Clr Auto Clr	2
AlmLog to SD	No	Yes No	4
Event Config			
Show Events=	Yes	No Yes	2
EventLogToSD=	No	No English SI	2
Snapshot Config			
Ena Snapshots=	Yes	No Yes	2
Show Snapshots	Yes	No Yes	2
Snapshots to SD	No	No English SI	2

Frz DelayTime is an adjustable item used to set the freeze alarm delay time.

Aflw Ignr Tm is an adjustable item that sets the amount of time the air proving switch is ignored after the supply fan is started.

Sens Alm Dly is an adjustable item used to set the sensor alarm delay time.

Temp Alm Dly is an adjustable item used to set the temperature alarm delay time

LP Delay is an adjustable item used to set the Low pressure switch alarm delay time.

LP Comp Delay is an adjustable item used to set the Low pressure compressor alarm delay time.

Emerg Stop is an adjustable item used to set the emergency shutdown to either manual or automatic restart.

AlmLogToSD= is a selectable item that will enable the transfer of the alarm log to the controllers SD Card reader in English or SI units or not at all.

Show Events= is a selectable item to allow for masking the HMI display of events. Controller reset is required when “show events” is changed.

EventLogToSD= is a selectable item that will enable the transfer of the event log to the controllers SD Card reader in English or SI units or not at all.

Ena Snapshots= is a selectable item to enable or disable the recording of certain unit operating conditions at the moment of an alarm or event occurance.

Show Snapshots is a selectable item to allow for masking the HMI display of snapshots. Controller reset is required when “show snapshots” is changed.

Snapshots to SD= is a selectable item that will enable the transfer of the snapshots to the controllers SD Card reader in English or SI units or not at all.

Manual Control

The manual control of operation is a function that is used for operating the unit during a service call only. The unit must not be operated in this mode for any extended period of time.

Table 40 is an example of the most common entries for Manual control Menu in the Rebel unit. What is available in this list is completely dependent on the configuration of the unit in question.

Table 40: Manual Control Menu

Item Display Name	Default Setting	Range	Password Level
Manual Ctrl=	Normal	Normal ManCtrl	4
Supply Fan=	Off	Off, On	4
SAF Spd Cmd=	0%	0–100%	4
INV/OF Ena=	Off	Off, On	4
INV Cmp=	Off	Off, On	4
INV Spd Cmd=	0%	0–100%	4
Comp 3=	Off	Off, On	4
OA Fan=	Off	Off, On	4
OA Fan Cmd=	0%	0–100%	4
4 Way Valve=	Off	Off, On	4
Revr Sol Valve=	Off	Off, On	4
BP Sol Valve=	Off	Off, On	4
EVI Cmd=	Off	Off, On	4
EVO Cmd=	Off	Off,On	4
RF/EF=	Off	Off, On	4
RF/EF Spd Cmd=	0%	0–100%	4
OAD/Econo=	0%	0–100%	4
GasHtgOnOff=	Off	Off, On	4
Htg Valve=	0%	0–100%	4
SCR Out=	0%	0–100%	4
Htg Stg 1=	Off	Off, On	4
SCR Ena 1=	Off	Off, On	4
Htg Stg 2=	Off	Off, On	4
Htg Stg 3=	Off	Off, On	4
Htg Stg 4=	Off	Off, On	4
Reheat Valve=	0%	0–100%	4
ERec Wheel=	Off	Off, On	4
ER Whl Cmd=	0%	0–100%	4
ERBP Dmpr Cl=	Off	Off, On	4
ERBP Dmpr Op=	Off	Off, On	4
Alm Output=	Off	Off, On	4
Fan Op Out=	Off	Off, On	4

Manual Ctrl is an adjustable item that puts the unit into manual control. Major components of the unit are turned ON and OFF by this control. The units normal control sequences are overridden in this state with the exception of all the “fault” alarms and the cooling circuit high pressure and low pressure alarms.

Supply Fan is an adjustable item that turns on the supply fan.

SAF Spd Cmd is an adjustable item only on VAV units that sets the speed of the supply air fan.

INV/OF Ena is an adjustable item used to turn the inverter compressor/outdoor fan enable output ON and OFF. Inverter compressor or outdoor fans cannot be manually controlled without first turning this output ON.

INV Comp is an adjustable item used to turn the inverter compressor ON and OFF. Note that the inverter compressor cannot be manually turned on unless the SAF Spd Cmd is first set to at least 33% and the INV/OF Ena output is turned ON.

INV Spd Cmd is an adjustable item that sets the speed of the inverter compressor. Note that the inverter compressor speed cannot be manually adjusted until the compressor operating state reaches Normal after the INV Comp output is turned ON.

Comp3 is an adjustable item used to turn the fixed speed compressor ON and OFF. Note that the fixed speed compressor cannot be manually turned on unless the SAF Spd Cmd is first set to at least 33%.

OA Fan is an adjustable item used to turn the outdoor fan(s) ON and OFF.

OA Fan Cmd is an adjustable item that sets the speed of the outdoor fan(s). Note that once the INV Comp or Comp3 output is turned ON the outdoor fan speed cannot be manually adjusted until the compressor operating state reaches Normal.

4 Way Valve (Heat Pump only) is an adjustable item used to change the 4 way reversing valve from the Cool to Heat position. Note that this setting determines whether the compressors operate in the cooling or heating mode when they are manually started.

RcvrSol Valve (Heat Pump only) is an adjustable item used to open and close the receiver solenoid valve.

BP Sol Valve is an adjustable item used to open and close the bypass solenoid valve.

EVI Cmd is an adjustable item used to set the position of the indoor expansion valve. Note that this can only be manually adjusted when the ManCtrl EV Op parameter is set to “Man”.

EVO Cmd (Heat Pump only) is an adjustable item used to set the position of the outdoor expansion valve. Note that this can only be manually adjusted when the ManCtrl EV Op parameter is set to “Man”.

RF/EF is an adjustable item that turns ON the return/exhaust fan.

RF/EF Spd Cmd is an adjustable item for units with variable speed supply air fan on the return/exhaust fans that sets the speed of the return/exhaust fan.

OAD/Econo is an adjustable item which is used to set the economizer damper position.

GasHtgOnOff is an adjustable item used to turn the gas heat enable output ON and OFF.

Htg Valve is an adjustable item used to manually drive the modulating heating valve open and closed.

SCR Out is an adjustable item used to manually drive the output signal to the SCR.

Htg Stg 1 is an adjustable item that turns on the first stage of heat on units equipped with staged heating.

SCR Ena 1 is an adjustable item that enables the SCR heater.

Htg Stg 2 is an adjustable item that turns ON the second stage of heat on units equipped with staged heating.

Htg Stg 3 is an adjustable item that turns ON the third stage of heat on units equipped with staged heating.

Htg Stg 4 is an adjustable item that turns ON the fourth stage of heat on units equipped with staged heating.

Reheat Valve is an adjustable item used to manually drive the reheat valve open and closed.

ERec Wheel is an adjustable item which is used to turn ON/OFF the energy recovery wheel output.

ERec Whl Cmd is an adjustable item is an adjustable item which is used to set the energy recovery wheel variable speed supply air fan speed.

ERBP Dmpr Cl is an adjustable item which is used to close the energy recovery bypass damper.

ERBP Dmpr OP is an adjustable item which is used to open the energy recovery bypass damper.

Alm Output is an adjustable item which is used to turn ON/OFF the alarm output.

FanOp is an adjustable item which is used to turn ON/OFF the fan operation output.

When Manual Control is set to ManCtrl, the Control Mode is set to OFF so that the unit will not restart automatically. When Manual Control is set to Normal all digital outputs in the Manual Control menu are set to OFF and all the analog outputs are set to 0.0% so that all outputs are in the OFF or minimum position when Manual Control is set to ManCtrl

NOTE: Upon completion of running the unit in Manual mode, you must change the Manual mode back to Normal and re-select the control mode desired.

Timer Settings Menu

The Timer Settings Menu is also available from the Commission Unit Menu, and is described on page 38.

Save/Restore Menu

The Save/Restore menu can be used to save or restore the user configured parameters as well as reset the controller back to the factory default parameters.

Table 41: Save/Restore Menu

Item Display Name	Default Setting	Range	Password Level
Save Params=	No	No/Yes	2
Rstr Params=	No	No/Yes	2
Rstr Factory=	No	No/Yes	2
SaveToCard=	No	No/Yes	2
LoadFromCard=	No	No/Yes	2
Create Trace=	No	Yes	2
		No	
Trace to SD=	No	Yes	2
		No	

Save Params is an adjustable item used to save the current parameters and configuration.

Rstr Params is an adjustable item used to restore the current parameters and configuration.

Rstr Factory is an adjustable item used to restore the factory parameters and configuration.

SaveToCard is an adjustable item used to save the current parameters and configuration to an SD card.

LoadFromCard is an adjustable item used to restore the current parameters and configuration from an SD card.

Create Trace is a selectable item to create a trace. Creating a trace develops files that include the history of operational events, errors, upgrades and system events that can be investigated if problems and or issues warrant. Note, this feature is not currently in use by Daikin.

Trace to SD card is a selectable item that will transfer the trace created to the internal SD card slot.

NOTE: The controller will automatically perform a reset when the value of Load From Card is changed from No to Yes and the enter button is pushed.

Operating Hours

The Operating Hours menu gives a summary of the hours of operation for each of the supply fans, return/exhaust fans, compressors, heating and economizer operation.

Table 42: Operating Hours Menu

Item Display Name	Default Setting	Range	Password Level
Supply Fan=	—	0–50000H	6
Ret/Exh Fan=	—	0–50000H	6
Cmp Cooling=	—	0–50000H	6
INV Comp=	—	0–50000H	6
Comp3=	—	0–50000H	6
Heating=	—	0–50000H	6
Cmp Heating=	—	0–50000H	6
Economizer=	—	0–50000H	6
Tnt Override=	—	0–50000H	6
Dehumid=	—	0–50000H	6
ER Wheel=	—	0–50000H	6
Reheat=	—	0–50000H	6

Supply Fan is a status item which gives the number of hours the supply fan has operated.

Return/Exhaust Fan is a status item which gives the number of hours the return/exhaust fans have operated.

Cmp Cooling is a status item which indicates the number of hours compressor cooling has operated.

INV Comp is a status item which indicates the number of hours the inverter compressor has operated.

Comp 3 is a status item which indicates the number of hours the fixed speed compressor has operated.

Heating is a status item which gives the number of hours that the heating mode has operated.

Cmp Heating is a status item which indicates the number of hours compressor heating has operated.

Economizer is a status item which gives the number of hours that the economizer has operated.

Tnt Override is a status item which gives the number of hours that the unit has operated in the Tenant Override mode of operation.

Dehumid is a status item which gives the number of hours that the dehumidification has operated.

ER Wheel is a status item which gives the number of hours that the energy recovery wheel has operated.

Reheat is a status item which gives the number of hours the reheat has operated.

Active Alarms Menu

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 group priority: Faults first, Problems second, and Warnings last. Within each group, alarms are displayed in the order that they were detected.

Table 43: Active Alarm Menu

Item Display Name	Default Setting	Range	Password Level
Active Alm Count=	—	0-10	None
ClrAlms=	No	No	None
		ClrFlts	
		ClrPrblms	
		ClrWrngs	
		ClrAllAlms	
+Alarm 1: Alarm Type	—	—	None
+Alarm 2: Alarm Type	—	—	None

Alarm Log Menu

The last fifty alarm events (alarm detection and return to normal) as well as the date and times that they were detected are displayed on the Alarm Log menu. These alarm events are displayed in the order that they were detected. The alarm event that was detected most recently is displayed first. Multiple occurrences of the same alarm may appear.

Table 44: Alarm Log Menu

Item Display Name	Default Setting	Range	Password Level
Log Alm Count=	—	0-50	None
ClrLog=	No	No	None
		Yes	
+Alarm 1: Alarm Type	—	—	None
+Alarm 2: Alarm Type	—	—	None

Once an alarm is cleared there will be two entries in the Alarm Log. A (+) sign will be shown next to the entry added when the alarm became active and a (-) sign will be shown next to the entry added when the alarm has been cleared.

Event Log

Events provide a means of recording the occurances of certain operating sequences or actions that are important to know about but do not necessarily indicate a defect with the unit functionality. Example: A number of limiting functions can become active to keep a variable compressor running within its safe operating envelope. These limiting functions are defined as Events rather than Alarms as they generally indicate that the compressor is being asked to operating beyond its capability rather than that the compressor is broken. The last fifty Events (initiation and return to normal) detected as well as the date and time that they were detected are displayed in the Alarm Lists/Event Log menu. These events are displayed in the order that they were detected. The alarm that was detected most recently is displayed first. Multiple occurrences of the same event may appear. When the Event Log is filled with 50 events and another event occurs the oldest event is purged from log. The event log can be cleared with a LogClr=No/Yes parameter. The alarm log data can be exported to an SD card using an EvntLogToSD= No/Yes parameter.

Possible Standby Events

Table 45: Possible Standby Events

StandbyEvent Enumeration	Enumeration Text	Description
0	None	No Active Standby Events
1	ClgLP	Cooling Low Pressure Unloading Control Stanby
2	ClgHP	Cooling High Pressure Unloading Control Stanby
3	HtgLP	Heating Low Pressure Unloading Control Stanby
4	HtgHP	Heating High Pressure Unloading Control Stanby
5	ClgLoDP	Cooling Low Differential Pressure Protection Control Stanby
6	HtgLoDP	Heating Low Differential Pressure Protection Control Stanby
7	INVDLT	Inverter Compressor High Discharge Line Temperature Unloading Control Stanby
8	OfanFlt	Outdoor Fan Fault Standby
13	INVPrb	Inverter Compressor Problem Standby (Modbus)
14	EVSync	Expansion Valve Synchronization Standby

StandbyEvents is an enumerated object that displays an integer value that depends on which inverter compressor protection function has caused the compressor state to enter Standby for Restart.

ClgLP= is a standby event that will take place when the PTS < 9.957 PSI.

ClgHP= is a standby event that will take place when the PTD > 579 PSI. continuously for 10 minutes or PTD> 579 PSI and OAT < 45°F.

HtgLP= is a standby event that will take place when the PTS < 9.67 PSI. while in heating mode and not in defrost mode.

HtgHP= is a standby event that will take place when the PTD > 527.6 PSI.

ClgLoDP= is a standby event that will take place when the PTD-PTS <73.9 PSI continuously for stage time plus 40 seconds.

HtgLoDP= is a standby event that will take place when the PTD-PTS <73.9 PSI continuously for stage time plus 40 seconds, in the heating mode.

INVDLT= is a standby event that will take place when the HDRT1 > 250°F continuously for 3 minutes or HDRT1 > 275°F

OfanFlt= is a standby event that will take place when the controller receives a condenser fan fault from the VFD.

INVCmpT= is a standby event that will take place when the controller receives a high compressor body temperature reference.

Possible Active Standby Events

Table 46: Possible Active Standby Events

Bit Number	Event Name	Description
0	ClgLPUL	Cooling Low Pressure Unloading Control Active Standard condition during pumpdown
s1	ClgHPUL	Cooling High Pressure Unloading Control Active
2	HtgLPUL	Heating Low Pressure Unloading Control Active
3	HtgHPUL	Heating High Pressure Unloading Control Active
4	ClgLoDPUL	Cooling Low Differential Pressure Protection Control Active
5	HtgLoDPUL	Heating Low Differential Pressure Protection Control Active
6	HtgHPProt	Heating High Protection Control Active
8	INVDLTUL	Inverter Compressor High Discharge Line Temperature Unloading Control Active
10	INVFinTUL	Inverter Compressor Fin Temperature Unloading Control Active
11	INVHiAmpUL	Inverter Compressor High Current Unloading Control Active
13	VCOilBalance	Variable Compressor Oil Balance Sequence Active
14	VCOilLoBoost	Variable Compressor Oil Low Boost Sequence Active
15	VCOilHiBoost	Variable Compressor Oil High Boost Sequence Active
16	VCLoDschPUL	Low Discharge Pressure Unloading Control Active
17	VarCmpHPUL	High Pressure Unloading Control Active
18	VCLoDSHUL	Low Discharge Superheat Unloading Control Active
19	VCHiDSHUL	High Discharge Superheat Unloading Control Active
20	VarCmpDLTUL	High Discharge Line Temperature Unloading Control Active
21	VCEmrgStop	VFD Compressor Emergency Stop Control Active
22	ClgHiTeUL	Cooling High Suction Pressure Unloading Control Active
23	Not Used	Not Used
24	Not Used	Not Used
25	RhtStgLmtg	Reheat Compressor Limiting Control Active
26	NetDmdShed	Network Demand Shed Function Active
27	Not Used	Not Used

Active Events is a real value that when converted to binary the individual bits indicate which Event or Events are currently active.

Data Snapshots

Data Snapshots will provide a means of recording certain unit operating conditions at the moment of an alarm or event occurrence. The MicroTech III controller is capable of capturing up to 10 snapshots each containing up to 25 data points. All existing captured snapshots can be cleared with a ClrAllEntries=No/Yes parameter. The snapshot data can be exported to an SD card using an SnapshotsToSD= No/Yes parameter.

Alarm/Event Configuration Menu

The Alarm Configuration menu is also available under the Commission Unit menu. Refer to page 66.

Analog Input Status Menu

The Analog Input Status Menu provides diagnostic information to qualified service personnel. The items listed in this menu will provide current status information of the unit's analog inputs. The value shown is the input resistance shown in 1/10th of an ohm scale. Example: MCB-AI1 (DAT sensor) shows a value of 181380, the actual resistance would be 18,138 ohms. This would translate to a temperature of 53.5 ºF.

Table 47: Analog Input Status Menu

Item Display Name	Default Setting	Range	Password Level
MCB AI1=	—	0–99999999	2
MCB AI2=	—	0–99999999	2
MCB AI3=	—	0–99999999	2

Universal I/O Status Menu

The Universal I/O Status Menu provides diagnostic information to qualified service personnel. The items listed in this menu will provide current status information of the Universal inputs & outputs. If the universal I/O is configured for resistance, the value will be displayed in 1/10th ohm scale. If the I/O is configured for mA, the value will be displayed in micro amps (1 mA = 1000 micro amps). If I/O is configured for voltage, the value is displayed in 1/1000th volt scale. Example: MCB-X7 (OA Damper analog output) shows a value of 3000, this would translate into 3 VDC.

Table 48: Universal I/O Status Menu

Item Display Name	Default Setting	Range	Password Level
MCB X1=	—	0–9999999	2
MCB X2=	—	0–9999999	2
MCB X3=	—	0–9999999	2
MCB X4=	—	0–9999999	2
MCB X5=	—	0–9999999	2
MCB X6=	—	0–9999999	2
MCB X7=	—	0–9999999	2
MCB X8=	—	0–9999999	2
EMB X1=	—	0–9999999	2
EMB X2=	—	0–9999999	2
EMB X3=	—	0–9999999	2
EMB X4=	—	0–9999999	2
EMB X5=	—	0–9999999	2
EMB X6=	—	0–9999999	2
EMB X7=	—	0–9999999	2
EMB X8=	—	0–9999999	2
EMD X1=	—	0–9999999	2
EMD X2=	—	0–9999999	2
EMD X3=	—	0–9999999	2
EMD X4=	—	0–9999999	2
EMD X5=	—	0–9999999	2
EMD X6=	—	0–9999999	2
EMD X7=	—	0–9999999	2
EMD X8=	—	0–9999999	2

Digital Input Status Menu

The Digital Input Status Menu provides diagnostic information to qualified service personnel. The items listed in this menu will provide current status information of the controller's digital inputs.

Table 49: Digital Input Status Menu

Item Display Name	Default Setting	Range	Password Level
MCB DI1=	Off	Off/On	2
MCB-DI2=	Off	Off/On	2
MCB DI3=	Off	Off/On	2
MCB DI4=	Off	Off/On	2
MCB DI5=	Off	Off/On	2
MCB DI6=	Off	Off/On	2
EMD DI1=	Off	Off/On	2

Digital Output Status Menu

The Digital Output Status Menu provides diagnostic information to qualified service personnel. The items listed in this menu will provide current status information of the controller's digital outputs.

Table 50: Digital Output Status Menu

Item Display Name	Default Setting	Range	Password Level
MCB DO1=	Off	Off/On	2
MCB DO2=	Off	Off/On	2
MCB DO3=	Off	Off/On	2
MCB DO4=	Off	Off/On	2
MCB DO5=	Off	Off/On	2
MCB DO6=	Off	Off/On	2
MCB DO7=	Off	Off/On	2
MCB DO8=	Off	Off/On	2
MCB DO9=	Off	Off/On	2
MCB DO10=	Off	Off/On	2

Item Display Name	Default Setting	Range	Password Level
EMB DO1=	Off	Off/On	2
EMB DO2=	Off	Off/On	2
EMB DO3=	Off	Off/On	2
EMB DO4=	Off	Off/On	2
EMB DO5=	Off	Off/On	2
EMB DO6=	Off	Off/On	2
EMD DO1=	Off	Off/On	2
EMD DO2=	Off	Off/On	2
EMD-DO3=	Off	Off/On	2
EMD-DO4=	Off	Off/On	2
EMD DO5=	Off	Off/On	2
EMD DO6=	Off	Off/On	2

Network Input Status Menu

The Network Input Status Menu provides diagnostic information to qualified service personnel. The items listed in this menu will provide current status information of the controller's network inputs.

Table 51: Network Input Status Menu

Item Display Name	Default Setting	Range (No Network value in Bold)	Password Level
Net OAT In=	—	-50.0–200.0°F **(621.8°F)**	2
Net SpaceT In=	—	-0.0–150.0°F **(621.8°F)**	2
NetCurrState=	—	Occ	2
		Unocc	
		TntOvrd	
		Standby	
		Auto	
		(NULL)	
NetNextState=	—	Occ	2
		Unocc	
		TntOvrd	
		Standby	
		Auto	
		(NULL)	
NetTmToNxtSt=	—	0–65534min **(65535min)**	2
Net App Mode=	—	Off	2
		HeatOnly	
		CoolOnly	
		FanOnly	
		Auto	
		(Auto)	
Net Cl Ena Sw=	—	-1.0–1.0**(-1.0)**	2

Item Display Name	Default Setting	Range (No Network value in Bold)	Password Level
Net Cl Ena Vl=	—	0–255% **(255%)**	2
Net Ht Ena Sw=	—	-1.0–1.0 **(-1.0)**	2
Net Ht Ena Vl=	—	0–255% **(255%)**	2
Net Ec Ena Sw=	—	-1.0–1.0 **(-1.0)**	2
Net Ec Ena Vl=	—	0-255% **(255%)**	2
Net SAF Cap=	—	0–100% **(164%)**	2
Net ExhF Cap=	—	0–100% **(164%)**	2
Net Space IAQ=	—	0–5000ppm **(65535ppm)**	2
Net Rel Humid=	—	0-100% **(164%)**	2
Net DATClgSpt=	—	40.0–100.0°F	2
Net DATHtgSpt=	—	40.0–140.0°F	2
nviSetpoint=	—	0.0-100.0°F **(621.8°F)**	2
OccManCmd=	—	Occ	2
		Unocc	
		TntOvrd	
		Standby	
		Auto	
Net MinOA=	—	0–100%	2
nvoEffSpt=	—	0.0–100.0°F	2
nciOccClgSpt=	—	0.0–100.0°F	2
nciOccHtgSpt=	—	0.0–100.0°F	2
nciHVACType=	—	HVT_GEN	2

Modbus Status Menu

The Modbus Status Menu provides diagnostic information to qualified service personnel. The items listed provide the status of the Modbus communications with the various devices controlled by the internal Modbus network

Table 52: Modbus Status Menu

Item Display Name	Default Setting	Range	Password Level
SF MB Status=	—	Fault/OK	2
RFEF MB Status=	—	Fault/OK	2
ER MB Status=	—	Fault/OK	2
IFB MB Status=	—	Fault/OK	2
D3 MB Status=	—	Fault/OK	2
MB Resistance=	Yes	Yes/No	2
ECM Config=	Done	Set Add 1 Set Add 2 Set AICtl	2

SF MB Status is a status only item which indicates the status of the Modbus communications between the main controller and the supply fan motor.

RFEF MB Status is a status only item which indicates the status of the Modbus communications between the main controller and the return/exhaust fan motor.

ER MB Status is a status only s item which indicates the status of the Modbus communications between the main controller and the energy recover wheel variable speed supply air fan.

D3 MB Status is a status only item which indicates the status of the Modbus communications between the main controller and the D3 gateway interface board.

MB Resistance Is an adjustable item used to turn the main controllers internal Modbus termination resistor ON and OFF.

ECM Config is an adjustable item used to set or change the internal Modbus address in the supply and exhaust fan motors.

IP Set-up:

An Internet Protocol address (IP Address) a numerical label assigned to each device connected to the unit controller. The IP address serves two principle functions: Host or interface identification and location addresses.

D3 Status Menu

The D3 Status menu is provided for viewing the status of an interface with the unit via a D3 gateway. Refer to IM 1133 – DIII-Net Communication Gateway for detailed information.

Table 53: D3 Status Menu

Item Display Name	Default Setting	Range	Password Level
D3 Comm Sts=	—	OK Error	2
D3 Addr Err=	—	OK Error	2
D3 On/Off=	—	On Off	2
D3 Mode=	—	Auto Cooling Heating Fan	2
D3 Clg Spt=	—	0–100ºF	2
D3 Htg Spt=	—	0–120ºF	2
D3 SAF Spd=	—	NA Low Med High	2
D3 Min Load=	—	0–100%	2
D3 Max Load=	—	0–100%	2
D3 Eco Ena=	—	Enabled Disabled	2
OA Enthalpy=	—	0–86 BTU/lb	2
OA Hum Ratio= g/kg	—	0–30 g/Kg	2
D3 SWVers=	—	XXXXXXXXXX	2
OAAdd1–16=	—	XXXXXXXX	2
OAAdd17–32=	—	XXXXXXXX	2
OAAdd33–49=	—	XXXXXXXX	2
OAAdd50–64=	—	XXXXXXXX	2
SetOAAddr=	0	0–64	2
CurrOAAddr=	—	0–64	2
CurrOAAmps=	—	0–200A	2
CurrOARLA=	—	0–200A	2

Sensor Offsets Menu

The Sensor Offsets Menu provides a means of calibrating the various temperature sensor inputs to the unit. Each sensor can be “biased” by as much as +/- 10.0°F.

Table 54: Sensor Offset Menu

Item Display Name	Default Setting	Range	Password Level
Disch Air=	0.0°F	0.0-10.0°F	2
Return Air=	0.0°F	0.0-10.0°F	2
SpaceTemp=	0.0°F	0.0-10.0°F	2
OA Temp=	0.0°F	0.0-10.0°F	2
ER LAT=	0.0°F	0.0-10.0°F	2
ER EAT=	0.0°F	0.0-10.0°F	2
DRT1=	0.0°F	0.0-10.0°F	2
DRT3=	0.0°F	0.0-10.0°F	2
SRT=	0.0°F	0.0-10.0°F	2
DFT=	0.0°F	0.0-10.0°F	2
IRT=	0.0°F	0.0-10.0°F	2
ORT=	0.0°F	0.0-10.0°F	2

HMI Set-up is a menu to assist operator in viewing HMI display, Contrast, Back lighting and Power supply settings

Last Re-set info= is a diagnostic status information on the cause of the last re-set.

LON/BACnetIP/BACnetMSTP Setup Menu

See the Installation & Maintenance Manuals for detailed instructions

- IM 916, IM 917, IM 918 manuals have been condensed into one manual for all protocols ED 15112

Network Unit Set-up Menu

The Network Unit Set-up menu provides one location for the Set-up of items that can be controlled via a network BMS system.

Table 55: Network Unit Set-up Menu

Item Display Name	Default Setting	Range	Password Level
Space Sensor=	Digtl/Net	None	4
		Anlog/Net	
		Digtl/Net	
Unit Mode Settings			
Ctrl Mode=	Off	Off	4
		Heat Only	
		Cool Only	
		Fan Only	
		Heat/Cool	
		Auto/Net	
Occ Mode=	Auto/Net	Occ	4
		Unocc	
		TntOvrd	
		Auto/Net	
Reset Options			
Clg Reset=	None	None	4
		Network	
		Space	
		Return	
		OAT	
		ExtmA	
		ExtV	
		Airflow	
Htg Reset=	None	None	4
		Network	
		Space	
		Return	
		OAT	
		ExtmA	
		ExtV	
		Airflow	
AplyMinOAChg=	No	No, Yes	4
Min OA Reset=	None	None	4
		Network	
		Ext VDC	
		Ext mA	
		IAQ VDC	
		IAQ mA	

Item Display Name	Default Setting	Range	Password Level
Heat/Cool Changeover			
Ctrl Temp Src=	RAT	RAT	4
		Space	
		MAT	
		OAT	
		None	
AplyTstatChg=	No	No	4
		Yes	
UseTstatSpt=	No	No	4
		Yes	
Oc c Clg Spt=	72.0°F	0.0-100.0°F	4
Occ Htg Spt=	68.0°F	0.0-100.0°F	4
Fan Control Options			
SAF Ctrl=	DSP	DSP	4
		Spd/Net	
		1ZnVAV	
		BPS	
		CO_2	
		CFM	
RFEF	BldgP	None	4
		Tracking	
		BldgP	
		Spd/Net	
		OA Damper	

Unit Configuration Setup Menu

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 25 configuration variables within the MCB. These variables define things such as the type of cooling, number of compressors and 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 29-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. Table 56 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 configured 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 rest the controller.

Table 56: Unit Configuration Menu

Configuration Code Position	Description	Values (Default in Bold)	DPS Applicability
1	Unit Type	3=Rebel Cool Only (DPS)	•
		4=Rebel Heat Pump (DPH)	•
2	Control Type	0=Zone Control	•
		1=DAT Control	
		2=1ZoneVAV	
3	Cooling Type	0= None	NA
		2= Chilled Water	
		4=Inverter Compressorized Clg	•
4	Compressorized Cooling Configuration	0=None	NA
		1=Generic Condenser	NA
		L=1INV/1Circ	
		M=1INV/1STD/1Circ	•
5	Generic Condenser Stages	1 – 8 Stages **(Default = 8)**	NA
6	Low Ambient	1= Yes	NA
		2=No	
7	Condenser Control	0=Standard Method	•
		1=Std Method 2	
		7=EBM	
		8=INV	
		9=Invw/MicroC OA coil	
8	Damper Type	0=None	•
		1=Single Position 30%	
		2=Single Position 100%	
		3=Economizer Airside	
		5=100%OA_DOAS	
		6=AirEcon_DOAS	
		7=30%_DOAS	
		8=EconoAirsideFDD	
		9=EconFDDD3	
9	OA Flow Station	0=None	•
		5=Generic Flow Station	
		6=Generic Flow Station w/CO2	
10	Heating Type	0=None	•
		1=F&BP Control	NA
		2=Staged	•
		3=Modulated Gas, 3-1	
		4= Modulated Gas, 20-1	
		5=Steam or Hot Water	
		6=SCR Electric	
		7=MPSLoGas	
		8=MPSHiGas	
11	Max Heating Stages	Three Digits (Default = 100)	•
12, 13, 14	Max Heat Rise	Three Digits (Default 050)	•

Configuration Code Position	Description	Values (Default in Bold)	DPS Applicability
15	Supply Fan Type	0=Constant Volume	•
		6=EBMVAV_DD	
		7=EBMCAV_DD	
		8=ABBVAV_DD	
		9=ABBCAV_DD	
16	Return Fan Type	0=CAV	•
		B=None	
		F=EBMVAV_DD	
		G=EBMCAV_DD	
		H=ABBVAV_DD	
		J=ABBCAV_DD	
17	RF / EF CTRL	0=None	•
		1=Tracking	
		2=Building Pressure	
		3=Speed	
		4=OADamper	
18	Second Duct Sensor	0=No	•
		1= Yes	
19	Entering Fan Temp Sensor	0=No	•
		1=Yes	
20	Energy Recovery	0=None	•
		1=ConstSpdWhl/NoRH	
		2=VarSpdWhl/Danfoss	
		3=VarSpdWhl/MD2	
		4=VarSpdWhl/MD3	
		5=VarSpdWhl/ABB	
		6=ConstSpdWhl/wRH	
21	Cooling Circuit Type	2=1Air	•
22	Head Pressure Control	0=No	•
		1=Yes	
23	Bypass Valve Control	0=Slave	NA
		1=Bypass	
24, 25, 26	Unit Size	Three digits **(Default 050)**	•
27	Refrigerant Type	0=R22	NA
		1=R407C	
		2=R410A	
28	Reheat Type	0=None	•
		2=ModHG	•
		3=StdHtRht	•
29	Unit Voltage	0=208/60Hz	•
		1=230/60Hz	
		2=460/60Hz	
		3=575/60Hz	
		4=208/50Hz	
		5=230/50Hz	
		6=460/50Hz	
		7=575/50Hz	
30	EV Type	0=None	•
		1=EVBSg	
		4=MTDF	

Trending Menus

The Trending Menus allow for setting up and managing onboard trending of up to 30 data points within the controller. This data can then be exported to an SD card. The trending memory will begin over-writing the oldest existing data in the controller's memory when the allocated trending memory fills up. If an SD card is installed in the controllers SD card reader slot, an automatic export of the data will occur every night at midnight.

Table 57: Trending Menu

Item Display Name	Default Setting	Range	Password Level
Trending Ena=	No	No	2
		Yes	
Apply Chgs=	No	No	2
		Yes	
Sample Time=	300s	1–3600s	2
TrendOnOff=	Off	Off	2
		On	
AutoExpTime=	1440m	0–1440m	2
Export Data=	No	No	2
		Yes	
Clear Trend=	Done	Done	2
		ClrData	
		ClrCfg	
Trend Full=	Wrap	Stop	2
		Wrap	
Default Trend=	No	Yes	2
		No	

Trending Ena is an adjustable item which enables and disables the on board trending function.

Apply Changes is an adjustable item which must be set to make changes to trending point definitions and sampling rate take effect.

Sample Time is an adjustable item used to the sampling rate for trending data points.

TrendOnOff is an adjustable item which starts and stops the on board trending function.

Auto Exp Time is an adjustable item that determines when the trends are loaded onto the SD card. If left at the default 1440 trends data is exported to the SD card once a night at 11:59 PM. If set at something other than 1440 all accumulated trend data will be transferred to the SD card at that interval.

Export Data is an adjustable item which initiates a manual export of the current on board trend data to an SD card.

Clear Trend is an adjustable item used to either clear only the current trend data or the entire trend configuration.

Trend Full is a changeable item that determines when the trend data is full does it wrap the data or stop.

Default Trend data is a selectable item that will select a predetermined set of data to be trended 30 points for all units, if selected to Yes.

There is a total of 30 points that can be monitored and recorded in the MT III controller. The user has a choice of 97 different items that can be selected to make up the 30 total points.

The points are divided up in to six groups of five. In the process of determining what items you choose to have recorded the technician must enter the name of the point desired, the object ID, the type and the member number.

Example:

We are going to select the discharge air temperature for point 1, space temperature for point 2 and return temperature for point 3

Enter the password into the MT III control scroll down to “Trending “select enter, scroll down to Trend Points 1-5, select enter.

Referring to the three points list (Page 24) locate DAT 15th entry in Points list 1. Now highlight list 1 and enter, scroll down until you get to DAT, select enter. The screen will return back to Point 1, scroll down to the ID number select enter, the first four figures will be highlighted turn the rotary dial until you see FOAF select enter the next figure will be highlighted turn the rotary dial until you see the number 5, select enter, the next figure will be highlighted turn the dial until you see 3 select enter, follow the same procedure for the remaining figures. When complete you should see FOAF538E which matches the object ID in list one just to the right of the name minus the Ox in front of the object ID number.

Scroll down to “Type” and using the same procedure changing the figures until they show 2203.

Scroll down to “Member” and using the same procedure changing the figures until they show 0100. The member number will always be 0100 as that represents the present value of the point at the time of recording.

When complete the first point should look like this:

Point 1		
List 1=		DAT
List 2=		None
List 3=		None
ID	F0AF538E	
Type	2303	
Member	0100	

Complete the same process of selecting the corresponding information found for Space T, and RAT found in list 3.

When you have finished all three entries your lists should look like this.

Point 1		
List 1=		DAT
List 2=		None
List 3=		None
ID	F0AF538E	
Type	2203	
Member	0100	
Point 2		
List 1=		None
List 2=		None
List 3=		space T
ID	F0AFF74A	
Type	2203	
Member	0100	
Point 3		
List 1=		None
List 2=		None
List 3=		RAT
ID	F0AFA24D	
Type	2203	
Member	0100	

You can follow this procedure to fill all thirty points or you may select “yes” for the default trend in the trending menu. See page 75 for the complete default menu.

Table 58: Trending Points Lists for DPS Units

Trend Point List 1			
Enum Text	**Object Name**	**Object ID**	**Object Type**
ACS1	INV_IFInptStatus	0xF0AFC5F0	0x230B
ACS3	EV_IFInptStatus	0xF0AF08FE	0x230B
ActEvnt	ActiveEvents	0xF0AFA993	0x230A
AFSts	Airflow	0xF0AFB26D	0x2204
Alm	Alarm Enumeration	0xF0AFCF76	0x230A
BSP	Bldg Press	0xF0AFC4BB	0x2203
Clg%	ClgCapacity	0xF0AFF4B5	0x230A
ClgSt	Clg State	0xF0AF3991	0x230B
ClgSts	Clg Status	0xF0AFF6A6	0x230B
CO2	IAQ PPM	0xF0AF7F77	0x2203
CtlCrdT	CtrlCardTemp	0xF0AFE952	0x2203
CtrlT	ControlTemp	0xF0AF3701	0x2203
DAClgSp	DAT Clg Spt	0xF0AF64FD	0x2300
DAHtgSp	DAT Htg Spt	0xF0AF6054	0x2300
DAT	DAT	0xF0AF538E	0x2203
DeHmSts	Dehum Status	0xF0AF56EA	0x230B
Dewpt	Dewpoint	0xF0AF532C	0x230A
DewptSp	Dewpoint Spt	0xF0AF75C1	0x2300
DFSt	Defrost State	0xF0AFBD68	0x230B
DFT	DFT	0xF0AFCA19	0x2203
DRT1	DRT1	0xF0AFD8D7	0x2203
DRT3	DRT3	0xF0AFF895	0x2203
DSH	Discharge SH	0xF0AF33F2	0x230A
DSP	Duct Press	0xF0AF143C	0x230A
EcoSts	Econo Status	0xF0AFC1AB	0x230B
EFMBSts	RFEF MB Status	0xF0AFAB24	0x230B
EffMnINV	EffMinINVRps	0xF0AF3D0A	0x230A
EffMxINV	EffMaxINVRps	0xF0AFB58E	0x230A
EFT/LCT	EF/LC Temp	0xF0AF356B	0x2203
EREAT	ER EAT	0xF0AF0DBB	0x2203
ERLAT	ER LAT	0xF0AFFD44	0x2203
ERWhl%	Wheel Speed	0xF0AF101D	0x2203
EVI%	EVI Pos	0xF0AF3028	0x2203
EVICmd	EVICmd	0xF0AF2EAF	0x2206
EVO%	EVO Pos	0xF0AF17B1	0x2203
EVOCmd	EVOCmd	0xF0AF0936	0x2206

Trend Point List 2			
Enum Text	**Object Name**	**Object ID**	**Object Type**
HDRT1	HDRT1	0xF0AF4A6D	0x230A
HDRT3	HDRT3	0xF0AF6A2F	0x230A
Htg%	HtgCapacity	0xF0AFF01C	0x230A
HtgSt	Htg State	0xF0AF4BE8	0x230B
HtgSts	Htg Status	0xF0AFD173	0x230B
HtSnkT	HeatsinkTemp	0xF0AFF487	0x2203
IFBCom	ACSCommStatus	0xF0AF6D75	0x230B
INV%	INVSpd	0xF0AFDA3E	0x2203
INVAmps	INVSecAmps	0xF0AFA7E2	0x2203
INVCmd	INVCmd	0xF0AFEC72	0x2206
INVFC	INVAlarmDec	0xF0AF3BDA	0x230A
INVFT	INVFinTemp	0xF0AF88A8	0x2203
INVTmp	INVCompTemp	0xF0AFE60D	0x2203
IRT	IRTemp	0xF0AFE8B8	0x2203
MinOA%	Min OA Pos	0xF0AFEEC9	0x230A
OAD%	OAD_ EconCapOut	0xF0AF6259	0x230A
OAFCmd	OAFanCmd	0xF0AF9E45	0x2206
OAFlw	OA Flow	0xF0AFF10A	0x230A
OAFlwSp	MinOAFlw Spt	0xF0AF6B95	0x2300
OAT	OAT	0xF0AFA37F	0x2203
OcClgSp	Occ Clg Spt	0xF0AFF8A8	0x2300
OcHtgSp	Occ Htg Spt	0xF0AF8A33	0x2300
OcSrc	OccSrc	0xF0AFF838	0x230B
OF1FC	OF1AlarmDec	0xF0AFC9EB	0x230A
OF2FC	OF2AlarmDec	0xF0AFE4AF	0x230A
OF1Spd	OAFan1Spd	0xF0AFB55B	0x2203
OF2Spd	OAFan2Spd	0xF0AF2E87	0x2203
OilMng	OilManagement	0xF0AF2D66	0x2302
OilSts	VCmpOilStatus	0xF0AF1150	0x2204
ORT	ORTemp	0xF0AF6559	0x2203
PTD	PTD	0xF0AF229A	0x2203
PTS	PTS	0xF0AF404C	0x2203

Trend Point List 3			
Enum Text	**Object Name**	**Object ID**	**Object Type**
RAT	Return Air	0xF0AFA24D	0x2203
ReHt%	Reheat Cap	0xF0AF00F8	0x230A
RemEF%	Rem ExhF Cap	0xF0AF1969	0x2300
RemRF%	Rem RF Cap	0xF0AF57A7	0x2300
RemSF%	Rem SAF Cap	0xF0AF211F	0x2300
RFEF%	RF/EF Cap	0xF0AFAECF	0x2203
RH	Rel Humidity	0xF0AF1DDC	0x2203
RHSp	RH Setpoint	0xF0AFFA18	0x2300
RhtSp	Reheat Spt	0xF0AF335D	0x230A
SAF%	SFCapFbk	0xF0AF5BDF	0x2203
SbClg	Subcooling	0xF0AF842E	0x230A
SBEvnt	StandbyEvents	0xF0AFCB3E	0x230B
SFMBSts	SF MB Status	0xF0AF2BDE	0x230B
SpaceT	Space Temp	0xF0AFF74A	0x2203
SpHtSts	SuplHtgStatus	0xF0AF7D21	0x230B
SRT	SRT	0xF0AFC35D	0x2203
SSH	Superheat	0xF0AFB846	0x230A
SSHSpt	EffSHSpt	0xF0AF3144	0x230A
STD3	STD3	0xF0AF03CC	0x2207
SupHt%	Supl Htg Cap	0xF0AF1FEA	0x230A
Tc	Tc	0xF0AF19E9	0x230A
TcSpt	EffTcSpt	0xF0AF7FC1	0x230A
TDef	EffTDef	0xF0AF45E1	0x230A
Teg	Teg	0xF0AFDCFF	0x230A
Tp	INVPortTemp	0xF0AF3BBB	0x230A
UnOcSrc	UnoccSrc	0xF0AFF6B4	0x230B
UnitSt	UnitState	0xF0AF9E60	0x230B
UntSts	Unit Status	0xF0AF4FF0	0x230B
VFDSts	DFCompStatus	0xF0AF64EC	0x230B

Table 59: Trending Points Lists for MPS/RTU/SCU Units

Trend Point List 1			
Enum Text	**Object Name**	**Object ID**	**Object Type**
ActEvnt	ActiveEvents	0xF0AFA993	0x230A
AFSts	Airflow	0xF0AFB26D	0x2204
Alm	Alarm Enumeration	0xF0AFCF76	0x230A
BSP	Bldg Press	0xF0AFC4BB	0x2203
Clg%	ClgCapacity	0xF0AFF4B5	0x230A
ClgSts	Clg Status	0xF0AFF6A6	0x230B
CO2	IAQ PPM	0xF0AF7F77	0x2203
Comp1	Comp 1	0xF0AFAC75	0x2207
Comp2	Comp 2	0xF0AF9C16	0x2207
Comp3	Comp 3	0xF0AF8C37	0x2207
Comp4	Comp 4	0xF0AFFCD0	0x2207
Comp5	Comp 5	0xF0AFECF1	0x2207
Comp6	Comp 6	0xF0AFDC92	0x2207
Comp7	Comp 7	0xF0AFCCB3	0x2207
Comp8	Comp 8	0xF0AF3D5C	0x2207
CtrlT	ControlTemp	0xF0AF3701	0x2203
DAClgSp	DAT Clg Spt	0xF0AF64FD	0x2300
DAHtgSp	DAT Htg Spt	0xF0AF6054	0x2300
DAT	DAT	0xF0AF538E	0x2203
DeHmSts	Dehum Status	0xF0AF56EA	0x230B
Dewpt	Dewpoint	0xF0AF532C	0x230A
DewptSp	Dewpoint Spt	0xF0AF75C1	0x2300
DRT1	Comp1DRT	0xF0AF8C90	0x2203
DRT2	Comp2DRT	0xF0AF174C	0x2203
DSH	Discharge SH	0xF0AF3AF5	0x230A
DSP	Duct Press	0xF0AF143C	0x230A

Trend Point List 2			
Enum Text	**Object Name**	**Object ID**	**Object Type**
EcoSts	Econo Status	0xF0AFC1AB	0x230B
EFMBSts	RFEF MB Status	0xF0AFAB24	0x230B
EFT/LCT	EF/LC Temp	0xF0AF356B	0x2203
EREAT	ER EAT	0xF0AF0DBB	0x2203
ERLAT	ER LAT	0xF0AFFD44	0x2203
EWT	EW Temp	0xF0AFCD6B	0x2203
ERWhl%	Wheel Speed	0xF0AF101D	0x2203
HdPr1	Head P Circ 1	0xF0AFD3C4	0x2203
HdPr2	Head P Circ 2	0xF0AFE3A7	0x2203
Htg%	HtgCapacity	0xF0AFF01C	0x230A
HtgSts	Htg Status	0xF0AFD173	0x230B
MAT	Mixed Air	0xF0AFCD1F	0x2203
MinOA%	Min OA Pos	0xF0AFEEC9	0x230A
OAD%	OAD_EconCapOut	0xF0AF6259	0x230A
OAFlw	OA Flow	0xF0AFF10A	0x230A
OAFlwSp	MinOAFlw Spt	0xF0AF6B95	0x2300
OAT	OAT	0xF0AFA37F	0x2203
OcClgSp	Occ Clg Spt	0xF0AFF8A8	0x2300
OcHtgSp	Occ Htg Spt	0xF0AF8A33	0x2300
OcSrc	OccSrc	0xF0AFF838	0x230B
OilMng	OilManagement	0xF0AF2D66	0x2302
OilSts	VCmpOilStatus	0xF0AF1150	0x2204
PTD1	C1DischRefPressure	0xF0AF888A	0x2203
PTD2	C2DischRefPressure	0xF0AFB9AC	0x2203

Trend Point List 3			
Enum Text	**Object Name**	**Object ID**	**Object Type**
RAT	Return Air	0xF0AFA24D	0x2203
ReHt%	Reheat Cap	0xF0AF00F8	0x230A
RemEF%	Rem ExhF Cap	0xF0AF1969	0x2300
RemRF%	Rem RF Cap	0xF0AF57A7	0x2300
RemSF%	Rem SAF Cap	0xF0AF211F	0x2300
RFEF%	RF/EF Cap	0xF0AFAECF	0x2203
RH	Rel Humidity	0xF0AF1DDC	0x2203
RHSp	RH Setpoint	0xF0AFFA18	0x2300
RhtSp	Reheat Spt	0xF0AF335D	0x230A
SAF%	SFCapFbk	0xF0AF5BDF	0x2203
SBEvnt	StandbyEvents	0xF0AFCB3E	0x230B
SFMBSts	SF MB Status	0xF0AF2BDE	0x230B
SpaceT	Space Temp	0xF0AFF74A	0x2203
SumpT	Sump Temp	0xF0AF503D	0x2203
Tc1	Tc1	0xF0AF4C6A	0x230A
Tc2	Tc2	0xF0AF7C09	0x230A
UnOcSrc	UnoccSrc	0xF0AFF6B4	0x230B
UnitSt	UnitState	0xF0AF9E60	0x230B
UntSts	Unit Status	0xF0AF4FF0	0x230B
VCmp1%	Comp1Analog	0xF0AFEBE7	0x2206
VCmp2%	Comp2Analog	0xF0AF3365	0x2206
VCmpSts	Var Cmp Status	0xF0AFD3CE	0x230B
WFSts	Waterflow	0xF0AF2B89	0x2204

Table 60: Default Trend List for DPS Units

Trend number	Default Trend Set			
	Enum Text	Object Name	Object ID	Object Type
01	UnitSt	UnitState	0xF0AF9E60	0x230B
02	Clg%	ClgCapacity	0xF0AFF4B5	0x230A
03	Htg%	HtgCapacity	0xF0AFF01C	0x230A
04	SAF%	SFCapFbk	0xF0AF5BDF	0x2203
05	OAD%	OAD_EconCapOut	0xF0AF6259	0x230A
06	CtrlT	ControTemp	0xF0AF3701	0x2203
07	DAT	DAT	0xF0AF538E	0x2203
08	OAT	OAT	0xF0AFA37F	0x2203
09	ClgSt	Clg State	0xF0AF3991	0x230B
10	HtgSt	Htg State	0xF0AF4BE8	0x230B
11	INV%	HMIINVCmd	0xF0AF91E3	0x230A
12	INVCmd	INVCmd	0xF0AFEC72	0x2206
13	STDOut	STD3	0xF0AF03CC	0x2207
14	PTD	PTD	0xF0AF229A	0x2203
15	PTS	PTS	0xF0AF404C	0x2203
16	EVI%	EVI Pos	0xF0AF3028	0x2203
17	EVO%	EVO Pos	0xF0AF17B1	0x2203
18	OAFCmd	OAFanCmd	0xF0AF9E45	0x230A
19	OF1Spd	OAFan1Spd	0xF0AFB55B	0x2203
20	OF2Spd	OAFan2Spd	0xF0AFB55B	0x2308
21	Tc	Tc	0xF0AF19E9	0x230A
22	TcSpt	EffTcSpt	0xF0AF7FC1	0x230A
23	DSH	Discharge SH	0xF0AF33F2	0x230A
24	Teg	Teg	0xF0AFDCFF	0x230A
25	SSH	Superheat	0xF0AFB846	0x230A
26	SSHSpt	EffSHSpt	0xF0AF3144	0x230A
27	HDRT1	HDRT1	0xF0AF4A6D	0x230A
28	HDRT3	HDRT3	0xF0AF6A2F	0x230A
29	OilSts	VCmpOilStatus	0xF0AF1150	0x2203
30	OilMng	OilManagement	0xF0AF2D66	0x2302

If the end user wishes to change one of the points after the default has been selected they would go to that corresponding point on the list that is visible and make the change there. Example: On the default list point 23 is DSH (discharge superheat) and in lieu of that the technician wanted to have BSP (Building static pressure) they would scroll down to “Points 21-25” enter scroll down to “Point 23” they will see under list 1 DSH is listed, they would enter then scroll down to the point desired “BSP” and select enter.

Table 61: Default Trend List for MPS, RTU, and SCU Units

ao Trend number	Default Trend Set			
	Enum Text	Object Name	Object ID	Object Type
1	UnitSt	UnitState	0xF0AF9E60	0x230B
2	Clg%	ClgCapacity	0xF0AFF4B5	0x230A
3	Htg%	HtgCapacity	0xF0AFF01C	0x230A
4	SAF%	SFCapFbk	0xF0AF5BDF	0x2203
5	OAD%	OAD_EconCapOut	0xF0AF6259	0x230A
6	CtrlT	HtgCapacity	0xF0AF3701	0x2203
7	DAT	DAT	0xF0AF538E	0x2203
8	OAT	OAT	0xF0AFA37F	0x2203
9	DAClgSp	DAT Clg Spt	0xF0AF64FD	0x2300
10	DAHtgSp	DAT Htg Spt	0xF0AF6054	0x2300
11	OcClgSp	Occ Clg Spt	0xF0AFF8A8	0x2300
12	OcHtgSp	Occ Htg Spt	0xF0AF8A33	0x2300
13	MinOA%	Min OA Pos	0xF0AFEEC9	0x230A
14	UntSts	Unit Status	0xF0AF4FF0	0x230B
15	VCmp1%	Comp1Analog	0xF0AFEBE7	0x2206
16	VCmp2%	Comp2Analog	0xF0AF3365	0x2206
17	RH	Rel Humidity	0xF0AF1DDC	0x2203
18	ReHt%	Reheat Cap	0xF0AF00F8	0x230A
19	ClgSts	Clg Status	0xF0AFF6A6	0x230B
20	HtgSts	Htg Status	0xF0AFD173	0x230B
21	Comp1	Comp 1	0xF0AFAC75	0x2207
22	Comp2	Comp 2	0xF0AF9C16	0x2207
23	Comp3	Comp 3	0xF0AF8C37	0x2207
24	Comp4	Comp 4	0xF0AFFCD0	0x2207
25	Comp5	Comp 5	0xF0AFECF1	0x2207
26	Comp6	Comp 6	0xF0AFDC92	0x2207
27	DeHmSts	Dehum Status	0xF0AF56EA	0x230B
28	EFT/LCT	EF/LC Temp	0xF0AF356B	0x2203
29	OilMng	OilManagement	0xF0AF2D66	0x2302
30	OilSts	VCmpOilStatus	0xF0AF1150	0x2204

To modify the default trending list for any unit simply select yes for the Default trend. Then proceed to the point you wish to change and select “none” for the point listed then chose the list of the point desired, then select the the desired point. You must also enter the ID and type and Member number. Remember the member number is always 100 when trending the present value.

About this Unit

Table 62: About this Unit Menu

Menu Display Name	Item Display Name
About this Unit	SO_Item=
	Unit SN=
	App Version=
	Cf1-15=
	Cf16-29=
	Main BSP=
	LON BSP=
	LON App Ver=
	BACnet BSP=
	D-Net BSP=
	HMI GIUD=
	OBH GIUD=

SO_Item is an adjustable item which can be used to store the sales order number of the unit for reference purposes.

Unit SN is an adjustable item which can be used to store the serial number of the unit for reference purposes.

App Version is the version of application code loaded into the controller

Cf1-15 describe positions 1-15 of the unit configuration string

Cf16-29 describe positions 16-29 of the unit configuration string

Main BSP is the current version of firmware in the main controller

LON BSP is a status only item which indicates the current version of firmware in the LON communication module connected to the main controller.

LON App Ver is a status only item which indicates the current version of application code in the LON communication module connected to the main controller.

BACnet BSP is a status only item which indicates the current version of firmware in the BACnet communication module connected to the main controller.

D-Net BSP is a status only item which indicates the current version of firmware in the D-Net communication module connected to the main controller.

HMI GUID is the HMI software identifier number unique to each application code version

OBH GUID is the OBH software identifier number unique to each application code version

Warnings

Over Economizing

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.

Under Economizing

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.
Excess OA

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.

The previous four warnings; Over Economizing, Under economizing, Excess OA and OAD stuck, for these warnings to become active EconFDD under Commission unit\Econo Set up menu has to be selected “ON”, This Economizer function FDD was to provide criteria requirements to meet California title 24 which requires fault detection and diagnostic requirements warning alarm indication of these conditions.

OAD Stuck

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.

The previous four warnings, Over Economizing, Under economizing, Excess OA and OAD stuck, for these warnings to become active EconFDD under Commission unit\Econo Set up menu has to be selected “ON”, This Economizer function FDD was to provide criteria requirements to meet California title 24 which requires fault detection and diagnostic requirements warning alarm indication of these conditions.

Dirty Filter - (Dirty Filter: Warning)

If the pressure drop across the filter section in the unit exceeds the setting of the differential pressure switch the Dirty Filter warning occurs. When the Dirty Filter warning occurs, unit operation is not affected. The Dirty Filter warning must be manually cleared through the unit keypad or via a network signal.

Airflow Switch - (Airflow Sw: Warning)

If the unit has been in the OFF operating state for at least thirty minutes and the PC7 airflow switch input to the main controller indicates airflow, the Airflow Switch warning occurs. This normally indicates a problem with the PC7 airflow switch. When the Airflow Switch warning occurs, unit operation is not affected. When the alarm condition is corrected, the Airflow Switch warning must be manually cleared through the unit keypad or via a network signal.

Return/Exhaust Fan Warning

When the unit is equipped with a Return/Exhaust fan VFD or ECM motor and a loss of Modbus communications for longer than 10 seconds a Return/Exhaust fan warning alarm occurs. The alarm is automatically clears when the condition causing the alarm is corrected.

Alarms

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.

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.

Refrigeration and compressor alarms are generally a combination problem and fault alarm. The unit will first unload to try and stay online, then turn off if unsuccessful.

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 fifty 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.

Alarm Clearing

Active alarms can be cleared through the keypad/display or a BAS network. Alarms are automatically cleared when power is cycled. Alarms are cleared only if the conditions required to initiate the alarm do not exist. All alarms and groups of alarms can be cleared via the network or keypad by setting the ClearAlms variable to a non-zero value as indicated in the table below. Emergency Off Faults can be set to automatically clear once the condition that caused the alarm is corrected. This can be accomplished by navigating to Commission Unit/Alarm Configuration/Emerg Stop and changing the default ManClr value to AutoClr.

NOTE: The enumeration text is what shows up on the keypad/display not the number. The value of this variable automatically reverts to zero when the alarms are cleared. This variable may be set through the keypad in the Active Alarm menu. It may be set via LON using nviClearAlarms and via BACnet using the ClearAlarms object.

Alarm List Menu – see page 71.

Table 63: Alarm Clearing

Value	Action
0	None
1	Clear All Faults
2	Clear All Problems
3	Clear All Warnings
4	Clear All Alarms

Problems

Entering Fan Temperature/Leaving Coil Temperature Sensor Problem - (EFT/LCT Snsr: Problem)

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.

Return Air Temperature Sensor Problem - (RAT Sensor: Problem)

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 Reset revert to none if they are set to Return
- Control temperature source reverts from return to space if a space temperature sensor is present and reliable

When the alarm condition is no longer present, the RAT Sensor problem automatically clears.

Space Temperature Sensor Problem - (Space Sensor: Problem)

If the Space Sensor Present setting is set to Yes, a valid Space Temperature value is not provided via a network signal and the local space sensor is shorted or open circuited longer than the Sensor Alarm Delay (default is 30 seconds), the Space Temperature Sensor problem occurs. When the Space Temperature Sensor problem occurs, the unit continues to operate with the following modifications:

- Cooling Reset and Heating Reset revert to none if they are set to Space
- Control temperature source reverts from space to return if a return air sensor is present and reliable.

When the alarm condition is no longer present, the Space Temperature Sensor problem automatically clears.

If space is selected as control temp source and there is no space sensor present space temp will read 32° F.

OAT Temperature Sensor Problem - (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:

- Compressor heating and cooling operations are locked out.
- Cooling Reset and Heating Reset revert to none if they are set to OAT
- Economizer is locked out due to high OAT

When the alarm condition is no longer present, the OAT Sensor problem automatically clears.

Freeze Problem - (Freeze: Problem)

When a unit is equipped with a hot water 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 heating valve, 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 valve closes. If the freezestat contacts are still open the valve remains 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 and allows the system to start normally when an occupied command is received.

Indoor Refrigerant Temperature Sensor Problem (Heat Pump only) – (IRT Sensor: Problem)

This alarm occurs when the IRT sensor input is outside the range of -4°F to 150°F continuously for the Sensor Alarm Delay (default 30 seconds). When this alarm is active compressor heating operation is disabled if HtgEVIMethod is set to “Sbc”. Otherwise not action is taken. The alarm must be manually cleared once corrective action is taken.

Outdoor Refrigerant Temperature Sensor Problem (Heat Pump only) – (ORT Sensor: Problem)

This alarm occurs when the ORT sensor input is outside the range of -4 to 150°F continuously for the Sensor Alarm Delay (default 30 seconds).

When this alarm is active compressor cooling operation is disabled if ClgEVOMethod is set to “Sbc”. Otherwise not action is taken.

The alarm must be manually cleared once corrective action is taken.

Fixed Speed Compressor Discharge Line Refrigerant Temperature Sensor Problem – (DRT3 Sensor: Problem)

This alarm occurs when the DRT3 sensor input is shorted or open circuited for the Sensor Alarm Delay (default 30 seconds). It can also occur when the fixed 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 the fixed speed compressor is disabled.

The alarm must be manually cleared once corrective action is taken.

Inverter Compressor Discharge Line Refrigerant Temperature Sensor Problem – (DRT1 Sensor: Problem)

This alarm occurs when the DRT1 sensor input is shorted or open circuited for the Sensor Alarm Delay (default 30 seconds). It can also occur when the inverter 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 and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Inverter Compressor Problem – (INV Comp: Problem)

This alarm occurs whenever the inverter compressor board generates an internal fault code. Refer to the troubleshooting section of this document for fault code details.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Defrost Temperature Sensor Problem (Heat Pump only) – (DFT Sensor: Problem)

This alarm occurs when the DFT sensor input is shorted or open circuited for the Sensor Alarm Delay (default 30 seconds). It can also occur if the input is outside the range of -47°F to 194°F.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Suction Line Refrigerant Temperature Sensor Problem – (SRT Sensor: Problem)

This alarm occurs when the SRT sensor input is shorted or open circuited for the Sensor Alarm Delay (default 30 seconds). It can also occur if the input is outside the range of -47°F to 194°F.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

High Inverter Compressor Discharge Line Temperature Problem – (Hi DL Temp: Problem)

This alarm occurs when the High Discharge Line Temperature Unloading function has forced compressor operation to the Standby state for a third time in a 100 minute period.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Expansion Valve Problem – (Exp Valve: Problem)

This alarm occurs when the IFB communication board detects a faulty or disconnection between an expansion valve (EVI or EVO) and the expansion valve control board (EVB).

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

NOTE: The EVB only detects a change in the EVI or EVO condition upon power up of the EVB.

Outdoor Fan Problem – (OA Fan: Problem)

On a single outdoor fan unit this alarm occurs when compressor operation is forced to the Standby state due to an outdoor fan internal fault for a third time in a 30 minute period.

On a two outdoor fan unit this alarm occurs when compressor operation is forced to the Standby state due an outdoor fan 2 internal fault for a third time in a 30 minute period. Note that outdoor fan 2 in this configuration provides critical cooling for the inverter/outdoor fan control boards.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Low Refrigerant Charge Problem – (Lo Charge: Problem)

During compressor cooling operation this alarm occurs when the indoor expansion valve (EVI) is fully open (greater that 95%), the super heat is well above set point (greater than 20°F) and the lower of the two discharge line temperature inputs (DRT1 and DRT3) is hot (greater than 150°F) for more than 30 minutes continuously.

During compressor heating operation this alarm occurs when the outdoor expansion valve (EVO) is fully open (greater that 95%) and the super heat is well above set point (greater than 20°F) for more than 60 minutes continuously.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Refrigerant Charge Loss Problem – (ChargeLoss: Problem)

This alarm occurs when both the suction and discharge line pressure inputs (PTS and PTD) remain below 10 psi continuously for 5 seconds.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Suction Line Refrigerant Pressure Sensor Problem – (PTS Sensor: Problem)

This alarm occurs when the suction line pressure inputs (PTS) remains above 256 psi continuously for 12 minutes or below -14 psi continuously for 30 seconds.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Discharge Line Refrigerant Pressure Sensor Problem – (PTD Sensor: Problem)

This alarm occurs when the suction line pressure inputs (PTD) remains above 611.6 psi or below 1.42 psi continuously for 10 seconds, for unit sizes 3 to 15 ton. On larger units 16 to 28 tons alarm will occurs when (PTD) remains above 670 psi or below 1.42 psi continuously for 10 seconds.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Interface Board Communication Problem – (IFB Comm: Problem)

This alarm occurs when a communication problem is detected at any of the communication connections to the IFB board.

When this alarm is active compressor cooling and heating operation are generally disabled.

The alarm normally is cleared automatically when the communication problem is corrected. If the alarm occurs for a fifth time in a 24 hour period it must be manually cleared once corrective action is taken.

Low Refrigerant Pressure Differential Problem – (Lo Press Diff: Problem)

This alarm occurs when the Low Differential Pressure Unloading function has forced compressor operation to the Standby state for a third time in a 30 minute period.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

Low Refrigerant Pressure Problem – (Lo Press 1: Problem)

This alarm occurs when either the Cooling Low Pressure Unloading or the Heating Low Pressure unloading function has forced compressor operation to the Standby state for a third time in a 30 minute period.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken.

High Refrigerant Pressure Problem – (Hi Press 1: Problem)

This alarm occurs when either the Cooling High Pressure Unloading or the Heating High Pressure unloading function has forced compressor operation to the Standby state for a third time in a 30 minute period. This alarm also occurs if either of the mechanical high pressure switches (HP1 or HP3) open.

When this alarm is active compressor cooling and heating operation are disabled.

The alarm must be manually cleared once corrective action is taken

High Inverter Compressor Body Temperature – (HiINVCmpT: Problem)

If the inverter compressor body temperature rises above 248°F continuously for 5 seconds or 230°F for 10 minutes, the inverter compressor is shut down. After remaining in the standby for restart state for one cooling stage time period the compressor is allow to restart. If this occurs three times in a 100 minute time period, the High Inverter Compressor Body Temperature problem occurs. The cooling will then remain off until this alarm is manually cleared through the unit keypad or via a network signal.

Inverter Compressor Body Temperature Sensor Problem – (INVCmpTSnsr: Problem)

If the inverter compressor body temperature sensor becomes shorted or open circuited or out of range (-4°F to 329°F) for longer than the Sensor Alarm Delay (Default= 30 seconds). When this alarm is active compressor cooling and heating operation are disabled. The alarm must be manually cleared once corrective action is taken.

Low Oil Condition – (Low Oil: Problem)

All VFD compressors are equipped with an oil level sensor. If low oil is detected the compressor operation is altered for a time period to force oil to return to the compressor. Low oil condition is communicated to the MicroTech III controller via a digital input signal from the VFD compressor. Compressor operation can be one of four states, OFF, Balance, Lo Boost and High Boost. Any change of state is recorded in the Event Log. If the oil level problem persists after changing states, and the EffOilAlarmCnt reaches a count of 24 in a 24-hour operating period the VFD compressor is disabled and a manual clear low oil alarm is generated. When this alarm is active compressor cooling and heating operation are disabled.

4WV Problem: (Heat Pump Only)

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 57psi for more than 15 minutes. The PTD and PTS differential is ignored during defrost state when the compressor enters initialization state.

Faults

Airflow Fault - (Airflow: Fault)

Fan Retry

On units configured for variable volume supply fan, the Fan Fail fault only occurs if the fan retry condition described below has first occurred twice within the previous twenty-four hour period. The conditions that cause the fan retry, and the action taken, are the same as for the Fan Fail fault with the difference being that the fan retry condition is automatically reset once the unit is shut off. This allows the unit to attempt to restart, up to three times within a twenty-four hour period.

The Fan Retry conditions are:

- No Faults that would shut down the unit are active
- Airflow Switch is Open AND the duct static pressure is less than half of the Duct Static Pressure Set Point. If Modbus communication is lost between the MCB and the supply fan the duct static pressure is not considered in the Fan Fail logic.
- The Supply Fan has been on for longer than the Airflow Timer (Default =120 seconds)
- The unit is not in Post Heat Operation and has not been in Post Heat Operation for longer than 120 seconds. This means that fan retry is disabled during and after post heat operation

The Fan Fail alarm is initiated if these conditions are encountered three times between 2:00 am of one day and 2:00 am the following day. If the Fan Fail alarm is then cleared, the process may be repeated so that the unit may be shut down up to three more times.

If differential pressure switch PC7 fails to detect airflow for longer than the airflow timer (Default = 120 seconds) and on VAV units the current duct static pressure indication is less than half the static pressure set point after the unit leaves the Startup operating state or any time afterward, while the unit is running, the Fan Fail fault occurs. When the Fan Fail fault occurs, the unit is shut down. It remains shut down until the Fan Fail fault is manually cleared through the unit keypad or via a network signal.

NOTE: There is no Fan Retry function or three retry function when a unit has a CAV supply fan.

Low Discharge Air Temperature – (Lo Disch Temp: Fault)

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 30 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.

High Discharge Air Temperature – (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 = 30 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.

High Return Air Temperature – (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 = 30 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.

Duct High Limit Fault – (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.

Discharge Air Sensor Fault – (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.

Control Temperature Fault – (Control Temp: Fault)

If the temperature sensor (ZNT1, RAT, OAT) 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.

Emergency Stop Fault – (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
- The Net Emrg Ovrd input is set to Off via a network signal or the keypad/display

This alarm normally is set for manual clear operation but it can be changed to auto-clear by setting the Emerg Stop parameter in the Alarm Configuration menu to “AutoClr”.

Freeze Fault – (Freeze: Fault)

When a unit is equipped with a hot water 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 heating valve 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 valve closes. If the freezestat contacts are still open, the valve remains open, and the 10-minute timer resets. This continues until the fault is manually cleared through the keypad or via a network signal.

NOTE: The water valve remains open for 10 minutes after alarm conditions disappear.\

Low Discharge Superheat – (Discharge: Fault)

Normal compressor operation is altered by the PID loop when the discharge SH drops below 20°F continuously for 10 minutes. VFD speed is increased for 10 rps more than the current capacity for a period of five minutes, if symptoms do not improve another increase in speed by 10 rps is introduced. If the superheat remains less than 20°F after consecutive speed increases and the max speed is reached the VFD compressor is shut down on a low superheat alarm. When this alarm is active compressor cooling and heating operation are disabled.

High Discharge Superheat – (Discharge: Fault)

Under high discharge superheat conditions if the VFD circuit is a tandem arrangement the fixed speed compressor is prevented from starting. Assuming the VFD compressor is “ON” and the discharge SH is greater than 85°F for a period of 15 minutes the high SH is logged into the event log, and the compressor speed is reduced 10 rps from the current speed. A wait period of 10 minutes is initiated, if conditions still have the discharge SH greater than 85°F another reduction of speed will be introduced. This cycle repeats until the compressor discharge SH drops below 85°F or the compressor is at a minimum speed, at which time the compressor is shut down on “high superheat alarm”. When this alarm is active compressor cooling and heating operation are disabled.

Compressor Protection Unloading Control

There are a number unloading control functions that limit the staging and speed control of the compressors to protect them from damage under abnormal operating conditions. The following unload functions are provided:

- Cooling High Pressure Unloading Control
- Cooling Low Pressure Unloading Control
- Heating High Pressure Unloading Control
- Heating High Protection Control [anticipating high pressure]
- Heating Low Pressure Unloading Control
- Inverter Compressor High Discharge Line Temperature Unloading Control
- Standard Compressor High Discharge Line Temperature Unloading Control
- Inverter Compressor High Current Unloading Control
- Inverter Compressor Request for Unloading Control
- Compression Ratio Unloading Control
- Inverter Compressor Board Temperature Unloading Control
- Low Differential Pressure Protection Control

Cooling High Pressure Unloading Control

Normal compressor operation is limited during cooling operation when high discharge pressure conditions occur. When the discharge pressure rises above 503 psi the inverter compressor is immediately reduced by three *steps** and then reduced a further *step* every 10 seconds in an attempt to keep the pressure from rising above 515 psi. If reducing the compressor capacity fails to keep the pressure below 515 psi the inverter compressor is reduced to minimum and any fixed speed compressor running is stopped. If the discharge pressure continues to rise above 527 psi, compressor operation is forced to the Standby state where it remains for a cooling stage time period before being allowed to restart. If the unit is forced to Standby in this manner 3 times in a 30 minute period, a high pressure alarm is generated requiring manual reset.

Once active this limiting function remains active until the discharge pressure falls back below 469 psi.

Cooling Low Pressure Unloading Control

Normal compressor operation is limited during cooling operation when low suction pressure conditions occur. When the suction pressure falls below 50 psi the inverter compressor capacity is held at its current valve and the bypass solenoid valve (SVB) is opened in an attempt to keep the pressure from falling below 36 psi. If the pressure continues to fall below 36 psi the inverter compressor is slowed to minimum speed and any fixed speed compressor running is stopped. If the pressure continues to fall below 10 psi, compressor operation is forced to the Standby state where it remains for a cooling stage time period before being allowed to restart. If the unit is forced to Standby in this manner 3 times in a 30 minute period, a low pressure alarm is generated requiring manual reset.

Once active this limiting function remains active until the suction pressure rises back above 57 psi.

Heating High Pressure Unloading Control

Normal compressor operation is limited during heating operation when high discharge pressure conditions occur. When the discharge pressure rises above 481 psi the inverter compressor capacity is immediately reduced by seven *steps* and then reduced a further *step* every 10 seconds in an attempt to keep the pressure from rising above 497 psi. If the pressure continues to rise above 497 psi the inverter compressor is slowed to minimum speed and any fixed speed compressor running is stopped. If the pressure continues to rise above 527 psi, compressor operation is forced to the Standby state where it remains for a heating stage time period before being allowed to restart. If the unit is forced to Standby in this manner 3 times in a 30 minute period, a high pressure alarm is generated requiring manual reset.

Once active this limiting function remains active until the discharge pressure falls back below 427 psi.

* See page 102 for more information about what is a compressor *“step”.*

Heating High Pressure Protection Control

Normal compressor operation is limited during heating operation when high discharge pressure or high inverter compressor discharge line temperature conditions occur while the inverter compressor is operating alone (fixed speed compressor off or not present) at low speed. This is an indication that too much liquid is backing up in the condenser causing hot high pressure conditions. When the DRT1 sensor input rises above 234°F or the discharge pressure rises above 455 psi while the inverter compressor is operating alone at low speed, the inverter compressor capacity is immediately reduced to minimum speed and the indoor expansion valve (EVI) is driven fully open. Note the bypass solenoid valve is also opened if DRT1 is above 234°F or if the pressure is above 469 psi.

Once active this limiting function remains active until the discharge pressure falls back below 427 psi, DRT1 is below 225°F and Heating High Pressure Unloading is inactive.

Heating Low Pressure Unloading Control

Normal compressor operation is limited during heating operation when low suction pressure conditions occur. When the suction pressure falls below 24 psi the inverter compressor is reduced by three *steps* then reduced a further *step* every 10 seconds in order to keep the pressure from falling below 19 psi. If reducing the compressor capacity fails to keep the pressure above 19 psi, the inverter compressor is reduced to minimum and any fixed speed compressor running is stopped. If the suction pressure continues to fall below 10 psi, compressor operation is forced to the Standby state where it remains for a heating stage time period before being allowed to restart. If the unit is forced to Standby in this manner 3 times in a 30 minute period, a low pressure alarm is generated requiring manual reset.

Once active this limiting function remains active until the suction pressure rises back above 33 psi.

Inverter Compressor High Discharge Line Temperature Unloading Control

Normal compressor operation is limited when high inverter compressor discharge line temperature (DRT1) conditions occur. When DRT1 rises above 239°F or a calculated suction port temperature (Tp) value rises above 275°F, the inverter compressor capacity is immediately reduced by one *step* and then reduced a further *step* every 30 seconds in an attempt to keep the temperatures from rising further. If DRT1 continues to rise above 266°F or above 248°F continuously for 90 seconds, the inverter compressor is reduced to minimum and any operating fixed speed compressor is stopped. If DRT1 continues to rise above 275°F or above 248°F continuously for 10 minutes or Tp rises above 302°F, compressor operation is forced to the Standby state where it remains for a stage time period before being allowed to restart. If the unit is forced to Standby in this manner 3 times in a 100 minute period, a high inverter discharge line temperature alarm is generated requiring manual reset.

Once active this limiting function remains active until DRT1 falls back below 212°F and Tp is below 230°F.

Fixed Speed Compressor High Discharge Line Temperature Unloading Control

Normal fixed speed compressor operation is limited when high discharge line temperature (DRT3) conditions occur. When DRT3 rises above 275°F or above 248°F continuously for 5 minutes or when a calculated inverter compressor suction port temperature (Tp) value rises above 293°F for 1 minute, or above 266°F continuously for 10 minutes, the fixed is stopped.

Once active this limiting function remains active for 10 minutes.

Inverter Compressor High Current Unloading Control

When the internal inverter compressor amp draw exceeds 14.7A (460/575V unit) or 26.5A (208/230V unit) on units under 15 tons and 14.7A (460/575V unit) or 26.5A (208/230V unit) on 15 ton units, the inverter compressor capacity is immediately reduced by one step and then reduced a further step every 15 seconds in an attempt to keep the amps below these values.

Once active this limiting function remains active until the amps are above these values and the inverter capacity is back to the normal unlimited value.

Inverter Compressor Request for Unloading Control

Normal compressor operation is limited when inverter compressor control board provides a request to unload. This can occur for a number of internal compressor board built-in protection reasons (high amp draw for example). When the inverter unload request is active, the inverter compressor capacity is immediately reduced by one *step* and then reduced a further *step* every 15 seconds as long as the request remains active.

Once active this limiting function remains active until the request becomes inactive and the inverter capacity is back to the normal unlimited value.

High Compression Ratio Unloading Control

Normal compressor operation is limited when the ratio between the compression ratio between the discharge and suction pressure becomes too high. CmpRatio=(PTD + 14.7)/(PTS + 14.7). Note: in this equation PTD and PTS are in PSI. When the compression ratio exceeds 8.5 the inverter compressor is immediately reduced by three *steps* then reduced a further *step* every 10 seconds in an attempt to keep the compression ration from continuing to increase. If the compression ratio continues to rise above 8.9, the inverter compressor is reduced to minimum and any operating fixed speed compressor is stopped.

Once active this limiting function remains active until the compression ratio falls back below 8.0.

Inverter Compressor High Board Temperature Unloading Control

Normal compressor operation is limited when inverter compressor control board indicates an abnormally high board (fin) temperature value. This indicates the inverter compressor board is not receiving proper ventilation. When the inverter board temperature exceeds its limit, the inverter compressor is immediately reduced by one step then reduced a further step every 15 seconds in an attempt to keep the board temperature from continuing to increase. The outdoor fan(s) are increased to maximum speed. Once active this limiting function remains active until the inverter board temperature falls 5.4°F below the high limit. the inverter compressor is immediately reduced by one *step* then reduced a further *step* every 15 seconds in an attempt to keep the board temperature from continuing to increase. The outdoor fan(s) are increased to maximum speed.

Once active this limiting function remains active until the inverter board temperature falls 5.4°F below the high limit.

See chart below for the fin limit temperatures.

Table 64: Inverter Compressor Fin Temperature Limit

Unit Sizes 003-012 (8hp INV Cmp)
Default=84°C If Unit Voltage is 460 or 575
Default=82°C if Unit Voltage is 208 or 230
Unit Size 015 (12hp INV Cmp)
Default=84°C If Unit Voltage is 460 or 575
Default=95°C if Unit Voltage is 208 or 230

Low Differential Pressure Protection Control

Normal compressor operation is overridden when the differential pressure between the high and low side of the refrigeration circuit (PTD-PTS) is abnormally low. This condition can inhibit proper oil return for lubricating the inverter compressor. When the differential pressure falls below 85 psi continuously for 40 seconds, the inverter compressor capacity is increased by one *step* then increased a further *step* every 40 seconds in an attempt to increase the differential pressure. If the inverter compressor is at maximum speed for 40 seconds and the differential pressure is still below 85 psi, compressor operation is forced to the Standby state where it remains for a stage time period before being allowed to restart. If the unit is forced to Standby in this manner 3 times in a 30 minute period, a low differential pressure alarm is generated requiring manual reset.

Once active this limiting function remains active until the differential pressure rises back above 171 psi.

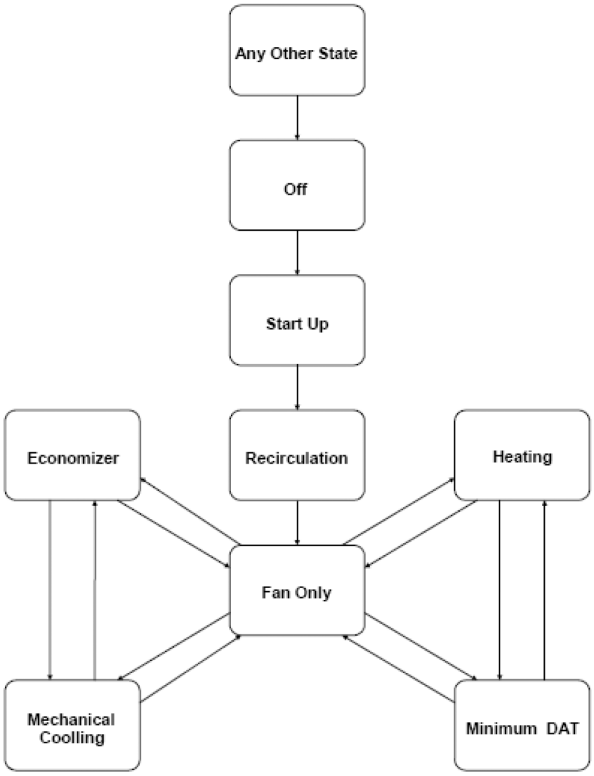
To prevent excessive cycling of the compressor heating on an off during moderate heating load conditions, special *steps* are taken if this protection function causes the unit to cycle out of heating while it is active. If this occurs, the current effective compressor heating ambient lock out setting is reduced 10°F below the current outdoor air temperature which will lock out compressor heating operation. The effective compressor heating ambient lock out setting remains at this lower value until any of the following occur:

- 120 minutes elapses
- The effective minimum outdoor damper position changes by more that 10%.
- The effective discharge air heating set point changes by more than 5°F.
- The outdoor air temperature falls below this lower effective compressor heating ambient lock out setting.

Operators Guide

The following "Operator's Guide" sections provide information regarding the day-to-day operation of the MicroTech III Unit Controller. Topics covered are such common tasks as scheduling, displaying and clearing alarms, and setting the controller for manual operation.

Figure 14: State Diagram



The transition from any operating state to another is graphically represented in this figure. With a "start up" command from an Off State the unit will always go into the "Start Up" state of operation for 3 minutes (adjustable). Next, it will transition into the "Recirculation" state of operation for another 3 minutes (adjustable) before finally going into the Fan Only state of operation. Then, based on sensor inputs it will go into any of the 4 remaining states of operation - heating, cooling, economizer, or minimum discharge air heating.

Determining Unit State

(See page 110 for more information)

The unit will operate in one of eight operating states. The current state will be displayed by the Unit State parameter in the system summary menu.

In the OFF state, all heating, cooling, and fans are OFF. The alarm output indicates the type of alarm, if any, that is active.

In the start up state, the Fan Operation output is turned ON to allow shut off dampers to be opened before any the supply fan is turned ON. The outdoor air dampers remain closed.

The supply fan is turned ON when the unit enters the Recirculation state. The supply fan in VAV units is controlled as described in the Supply Fan Capacity Control section, page 127. The outdoor dampers remain closed.

A separate morning warm-up state is not provided, but an edited ZeroOATime is used to keep the outside air damper closed when the unit first starts. The Minimum OA Position is set to zero as long as the as the fan has been on for less than the ZeroOATime.

DAT Control units have a MWU set point available.

The Minimum OA Position is set to zero as long as the as the fan has been on for less than the ZeroOATime. This allows the Return Air type units to cool down the space with mechanical cooling or to warm up the space with the dampers closed. If the ZeroOATime is set correctly, the OA dampers will be open only during occupied periods. When Optimum Start is used Zero OA Time is set equal to the time to occupancy when the unit starts so that the OA dampers will open at occupancy time.

Neither heating nor cooling is provided when the unit is in the fan only state, with the exception of when dehumidification is active. The outdoor dampers are opened to the minimum position in this state when the fan on time exceeds the Zero OA Time.

In the other four states, temperature is controlled as describe in the appropriate sections of this document. These states are Minimum DAT, Heating, Economizer, and Cooling. The outdoor dampers are opened to at least the minimum position in these states when the fan on time exceeds the Zero OA Time.

Off Operating State

In the OFF operating state the fans are OFF, the outside air dampers are closed and any variable speed supply air fan's are driven to 0%. Cooling and heating are disabled. The unit is in the OFF state when it is not enabled, or when it is in the unoccupied mode with no call for unoccupied operation. refer to "Determining Unit Status" on page 107 for reasons the unit can be disabled.

Start Up Operating State

When a unit is commanded to start it will always enter the Startup operating state from the Off operating state. The unit remains in the Startup operating state for an adjustable time period (default 180 seconds) before entering the Recirculating operating state.

During the Start up operating state the fans remain off, the outdoor air dampers are driven closed, and variable speed supply air fan's remain at 0%. Cooling and heating are disabled, except for 100% OA heating start sequences.

Recirculating Operating State

Units with return air always enter the Recirculating operating state after the completion of the Startup operating state. In the Recirculating operating state fans are started and operate while the outdoor air dampers remain closed. This allows temperature conditions throughout the unit and space to equalize before temperature control begins. Cooling and heating remain disabled. The unit remains in the Recirculating operating state until the Recirculate State Timer (default 180 seconds) expires.

NOTE: 100% outdoor air units do not transition through the Recirculating operating state.

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 into the Fan Only operating state. Once entering the Fan Only state of operation the unit will then, based on sensor inputs transition into any of the 4 remaining states of operation - heating, cooling, economizer, or minimum discharge air heating.

Min DAT

If heating is enabled and there is no heating load (normally FanOnly 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 Control Flag is set to yes via the Heating menu (Commission Unit/ Heating/MinDAT Ctrl). Only back up gas, electric or hot water is used. Heat Pump operation is not used because the required cycling at low head pressure may over stress the compressor oil management system. 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 the this minimum discharge temperature 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 VAV or CAV discharge control units, the DAT cooling set point parameter in the Cooling menu acts as the minimum discharge temperature limit. On CAV zone control units the Min DAT Limit parameter in the Heating menu acts as the minimum discharge temperature limit.

Heating

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

Economizer

(See page 49 and 122 for more information)

If the unit is equipped with a 0-100% modulating economizer (waterside or airside) and the conditions are suitable for free cooling, the unit attempts to satisfy the cooling load by using either outdoor air or the waterside economizer before using mechanical cooling.

If the unit is configured for Zone Temperature Control the transition to economizer operation will occur if all the following are true:

- The control temperature rises above the occupied cooling set point by more that ½ the occupied cooling high 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

If the unit is configured for Discharge Air Temperature Control the transition to Mechanical cooling will occur if all the following are true:

- The control temperature rises above the occupied cooling set point by more that ½ the occupied cooling deadband
- The discharge air temperature is greater than the DAT cooling set point by more than ½ the DAT cooling deadband
- Post heat operation is complete
- Economizer operation is not disabled

Mechanical Cooling

(See page 123 for more information)

The unit enters the mechanical cooling operating state when cooling is required and the economizer is disabled, not present, or already fully open.

If the unit is configured for Zone Temperature Control the transition to Mechanical cooling will occur if all the following are true:

- The control temperature rises above the occupied cooling set point by more that ½ the occupied 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
- Mechanical cooling is enabled

If the unit is configured for Discharge Air Temperature Control the transition to Mechanical cooling will occur if all the following are true:

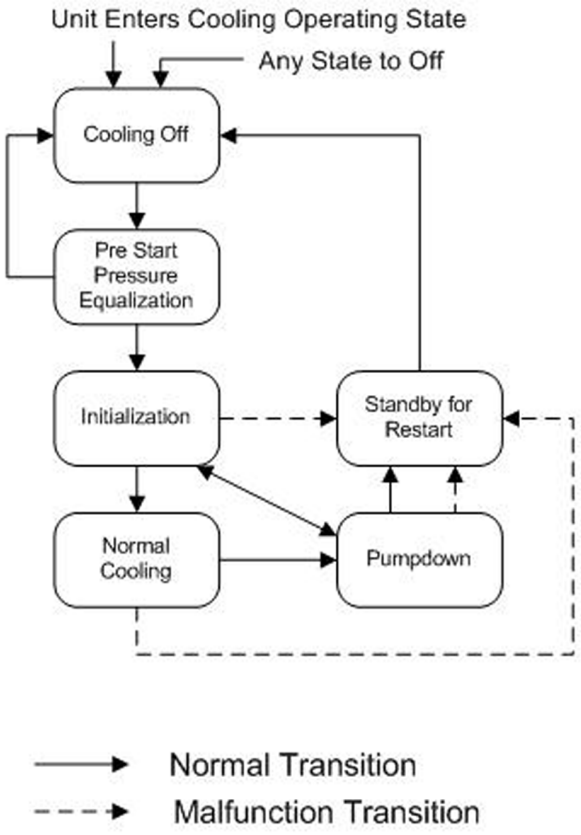
- The control temperature rises above the occupied cooling set point by more that ½ the occupied cooling deadband
- The discharge air temperature is greater than the DAT cooling set point by more than ½ the DAT cooling deadband
- Post heat operation is complete
- Economizer operation is disabled
- Mechanical cooling is enabled

Compressor Cooling Operation State

(See page 123 for more information)

When the unit enters the Cooling operating state, dehumidification operation becomes active or compressors are turned On via the manual control function, compressor operation transitions through the compressor cooling states shown in the following state diagram. Control based on discharge air temperature [DAT] occurs in the Normal Cooling state.

Figure 15: Cooling State Diagram



Off to Prestart Pressure Equalization

The Compressor Cooling State transitions from OFF to Prestart Pressure Equalization when the unit enters the Cooling operating state or the Dehumidification function becomes active.

Prestart Pressure Equalization to Off

The Compressor Cooling State transitions from Prestart Pressure Equalization to OFF if there is no longer a call for cooling or dehumidification operation.

Prestart Pressure Equalization to Initialization

The Compressor Cooling State transitions from Prestart Pressure Equalization to initialization after thirty seconds.

Initialization to Normal

The Compressor Cooling State transitions from Initialization to Normal when the initialization sequence is complete. See Initialization state description in the Inverter Compressor Cooling State Descriptions section, page 103.

Initialization to Pumpdown

The Compressor Cooling State transitions from Initialization to Pumpdown if there is no longer a call for cooling or dehumidification operation.

Initialization to Standby for Restart

The Compressor 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 Cooling State transitions from Normal to Pumpdown if there is no longer a call for cooling or dehumidification operation.

Normal to Standby for Restart

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

Standby for Restart to Off

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

Inverter Compressor Cooling Operation

Rebel units are always equipped with an inverter compressor. A fixed speed compressor is also provided on sizes 7.5–12.

The primary control devices related to inverter compressor operation are the following:

- Inverter and Fixed Speed Compressors (INV, Comp3)
- 1 or 2 Outdoor Fan(s)
- 4 Way Reversing Valve (4WV) – Heat Pump Units Only
- Refrigerant Receiver Solenoid Valve (SVR) – Heat Pump Units Only
- Refrigerant Discharge to Suction Bypass Solenoid Valve (SVB)
- Indoor Coil Expansion Valve (EVI)
- Outdoor Coil Expansion Valve (EVO) – Heat Pump Units Only

Control of these devices is described in the following sections.

Input Devices

PTS (suction refrigerant pressure) – MicroTech III AI

PTD (discharge refrigerant pressure) – MicroTech III AI

DRT1 (INV compressor discharge refrigerant line temperature) – MicroTech III AI

DRT3 (compressor discharge refrigerant line temperature) – MicroTech III AI

SRT (suction refrigerant temperature) – MicroTech III AI

DFT (defrost temperature) – MicroTech III AI

IRT (indoor refrigerant temperature) – IFB (heat pump)

ORT (outdoor refrigerant temperature) – IFB (heat pump)

Compressor Control

DPS units 3 to 15 ton will utilize one of the following compressor cooling configurations:

- Single inverter compressor (INV) on sizes 3-6 ton
- Single inverter compressor (INV) and a standard compressor on all other sizes up to 15 Ton

When compressor operation is active the combination of inverter and standard compressors is controlled to maintain the applicable discharge air temperature set point. The applicable set point varies depending on the unit operating state and whether or not dehumidification is active.

The control of the inverter compressor is accomplished by sending the analog output of a PI_Loop via Modbus to the inverter compressor control board. As the PI_Loop output varies from 0-100% the speed of the inverter compressor increases from 0 to maximum. In the case where the unit is also equipped with standard (fixed) compressor, the fixed compressor is started and stopped via a digital output.

Upon an increasing call for cooling the inverter compressor is modulated to its maximum capacity before the fixed compressor is turned ON. When the load is such that the fixed compressor is required, the inverter compressor is slowed to its minimum speed before turning on the fixed compressor. The inverter compressor is then modulated to maintain the load.

Upon a decreasing call for cooling the inverter compressor is modulated to its minimum speed before the fixed compressor is turned OFF. Once the fixed compressor is turned off the inverter compressor is modulated maintain the load.

Compressor Control PI_Loop

When normal inverter compressor operation is active, the inverter compressor is controlled via a PI_Loop to maintain the discharge air temperature at the applicable set point.

The compressor control PI_Loop is active when inverter operation is in either the Normal Cooling or, in the case of a heat pump configuration, the Normal Heating state. The PI_Loop is over-ridden when not in these states or when in these states and any of the Compressor Protection Unloading Control functions or Fixed Speed Compressor Step Transitions are active.

Compressor Output Control

Inverter Compressor (INV)

ON/OFF and speed commands are communicated to the inverter compressor control board via Modbus through the IFB Communication board.

Fixed Speed Compressor (Comp3)

A digital output is energized on the main control board controls the fixed speed compressor (Comp3).

Fixed Speed Compressor Step Transitions

Under normal compressor control, when the unit is equipped with a fixed speed compressor, special transition steps are taken when starting and stopping the fixed speed compressor. These steps are as follows:

Starting the Fixed Speed Compressor

Whenever the inverter compressor can not maintain sufficiently cold discharge air temperature at maximum speed, and timers are satisfied, the following fixed speed compressor stage up sequence occurs:

- Inverter Compressor speed is set to the minimum value. When the inverter compressor speed reaches the minimum value then the fixed speed compressor is turned ON.
- Inverter Compressor speed is held constant for 30 seconds
- Displayed compressor cooling/heating capacity is released to normal operation.

Stopping the Fixed Speed Compressor

Whenever the two compressors provide excessively cold discharge air temperature at minimum speed, and timers are satisfied, the following fixed speed compressor stage down sequence occurs:

- SVB bypass solenoid is opened
- Fixed speed compressor is turned OFF one second after SVB is opened
- SVB remains open for one second and then is turned OFF
- Inverter Compressor speed is set to maximum.
- When the inverter compressor speed reaches the maximum speed value, compressor cooling/heating control is released to normal operation.

Inverter Compressor Cooling State Descriptions

The Inverter Compressor Cooling State determines the operation of the following devices:

- Inverter 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)
- Receiver Solenoid Valve (SVR) (Heat Pump only)
- Bypass Solenoid Valve (SVB)

Cooling Off

Compressor cooling operation begins in the Cooling Off state. All devices are OFF or closed. The state remains OFF until there is a call for cooling or dehumidification

Pre Start Pressure Equalization

In the Pre Start Pressure Equalization state the SVB valve is opened to divert hot gas leaving the compressor directly to the suction line to equalize the pressures in the system before beginning compressor operation. Operation remains in this state for 30 seconds [adjustable.] When in the Pre Start Pressure Equalization state, all devices are off or closed, except the Outdoor Fan and SVB. The Outdoor fan speed is set to 50%.

Initialization

In the Initialization state either the Standard Initialization or Alternate Initialization sequence is used in order to manage refrigerant and to assure a 4-way valve is switched. The Alternate Initialization sequence is used on inverter compressor units the first time the unit enters cooling after unit power up, the compressors had last operated in heating, or if it has been a long time since cooling has operated and it is cold outdoors.

Otherwise the Standard Initialization Sequence is normally used.

Table 65: Standard Initialization Sequence

Device	Step 1	Step 2	Step 3	Step 4
Inverter Compressor & Comp 3	Inverter Compressor Speed= Minimum Comp3=Off	Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum Comp3=Off	←	A
Inverter Compressor Only	Inverter Compressor Speed= Minimum	If OAT≥50°F or RAT≥73°F, Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum If OAT<50°F & RAT<73°F, Inverter Compressor Speed= Minimum	←	A
Outdoor Fan	Outdoor Fan=0% if OAT<68°F Outdoor Fan=50% if OAT≥68°F	B	←	←
4 Way Valve (Heat Pump)	OFF	←	←	←
Outdoor Coil Expansion Valve (EVO) (Heat Pump only)	EVO=100%	←	←	←
SVR (Heat Pump only)	Closed	←	←	←
SVB	Normally Open Close if either of the following is true: 60 seconds elapses from the beginning of ***Step 1*** Discharge superheat>9°F	←	←	←
Indoor Coil Expansion Valve (EVI)	EVI= 0%	C	←	←
Time Duration	10 seconds	5 seconds	5 seconds	D

A. Inverter compressor speed is increased until the 4-way valve is seated (discharge minus suction pressure >57 psi) and as long as the suction pressure is above 43 psi. Comp 3 remains OFF

B. Outdoor fan capacity is controlled to maintain the discharge pressure between 256 psi and 313 psi. Outdoor fan capacity is set to 100% if discharge pressure is above 384 psi. Outdoor fan capacity runs at least at minimum capacity if inverter board (fin) temperature >167°F

C. The indoor expansion valve is controlled to keep the suction superheat between 3.6°F and 9.0°F.

D. Standard Initialization lasts a maximum 140 seconds. It is completed early anywhere between 20 seconds and 140 seconds if the saturated suction temperature is high (above 118°F), the suction pressure is low (below 79 psi) or once the 4-way valve is seated (differential pressure above 57 psi, suction pressure below 142 psi and suction or discharge superheat above 27°F).

Table 66: Alternate Initialization Sequence

Device	Step 1	Step 2	Step 3
Inverter Compressor & Comp 3	Inverter Compressor Speed=Minimum Comp3=Off	Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum Comp3=Off	A
Inverter Compressor Only	Inverter Compressor Speed= Minimum	If OAT≥50°F or RAT≥73°F, Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum If OAT<50°F & RAT<73°F, Inverter Compressor Speed= Minimum	A
Outdoor Fan	Outdoor Fan=0%	B	←
4 Way Valve (Heat Pump only)	OFF	←	←
Outdoor Coil Expansion Valve (EVO) (Heat Pump only)	EVO=100%	←	←
SVR (Heat Pump only)	Closed	←	←
SVB	Normally Open Close if Discharge superheat>9°F	←	←
Indoor Coil Expansion Valve (EVI)	EVI= 0%	C	←
Time Duration	5 seconds	5 seconds	D

A. Inverter compressor speed is increased until the 4-way valve is seated (discharge minus suction pressure >57 psi) and as long as the suction pressure is above 43 psi. inverter compressor speed is also increased if the suction pressure remains above 71 psi. Comp 3 turns on if the inverter compressor speed is at maximum and these conditions are not met. Comp 3 is turned back OFF after 20 seconds if the suction pressure drops below 43 psi.

B. Outdoor fan capacity is controlled to maintain the discharge pressure between 171 psi and 221 psi. Outdoor fan capacity is set to 100% if discharge pressure is above 427 psi. Outdoor fan capacity runs at least at minimum capacity if inverter board (fin) temperature >167°F.

C. EVI is controlled to keep the suction superheat between 3.6°F and 14.4°F.

D. Alternate Initialization lasts a maximum 15 minutes. It is completed early anywhere between 10 seconds and 15 minutes if once the 4-way valve is seated (differential pressure above 57 psi and the discharge superheat above 9.0°F).

Normal Cooling

In the Normal Cooling state the following are accomplished:

- 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)
- Outdoor fan(s) are modulated to maintain the discharge saturation temperature at the discharge saturation temperature set point

When in the Normal Cooling state the action of the cooling control devices is as follows:

Table 67: Normal Cooling State

Device	Action
Compressors	Inverter Compressor Speed Controlled with PI Loop to Maintain DAT Setpoint Comp 3: Turned On when inverter speed is at Maximum Comp 3: Turned Off when inverter speed is at Minimum
Outdoor Fan	Outdoor Fan Capacity Controlled With PI Loop to Maintain condensing temperature setpoint
4 Way Valve (Heat Pump)	OFF
Outdoor Coil Expansion Valve (EVO) (Heat Pump only)	A
SVR (Heat Pump only)	Closed
SVB	SVB is normally closed during the Normal Cooling state except in the following cases: SVB is opened for one second before and after Comp 3 is stopped. During Low Pressure Unloading Control SVB is opened if PTS< 21 psi. It is closed again when PTS> 43 psi.
Indoor Coil Expansion Valve (EVI)	EVI Controlled With PI Loop to Maintain Suction Superheat Setpoint
Time Duration	While in Normal Cooling state

A. The outdoor expansion valve position is either driven fully open (100%) or varied based on outdoor coil subcooling as follows:
   - When the outdoor expansion valve Method is set to 100%, the outdoor expansion valve is driven to the 100% open position.
   - When the outdoor expansion valve Method is set to subcooling, the outdoor expansion valve is controlled to maintain the outdoor coil subcooling temperature set point.

Normal Cooling Outdoor Fan (OA Fan PI_Loop) Control

One or two outdoor fans are controlled via Modbus connections to the Inverter Compressor Board via the IFB communication board.

The outdoor fan control PI_Loop is active only during the Normal Cooling and Cooling Pumpdown operating states and the loop maintains the discharge saturation temperature at the set point between a minimum value of 86°F and a maximum value of 131°F. EER values will be improved by allowing the lower set points when appropriate.

Normal Heating OA Fan Control

During the Normal Heating state the outdoor fan speed is first set at the maximum value and is then controlled as follows:

- If discharge pressure is low (below 107 psi) or the INV Board (fin) Temp is high [above 176°F (172°F for 208/230 volt units) continuously for 15 seconds] the outdoor fan speed is increased by 2%. No further changes are made for 15 seconds.
- If discharge pressure is high (above 162 psi) or the INV Board (fin) Temp is low [below 172°F (169°F for 208/230 volt units) continuously for 15 seconds] the outdoor fan speed is decreased by 2%. No further changes are made for 30 seconds.

Outdoor Fan Fault Protection

If a unit is equipped with only one outdoor fan and it is shut off on one of its internal faults, compressor operation enters the Standby for Restart state.

If a unit is equipped with two outdoor fans and either outdoor fan 2 or both outdoor fans shut off on one of their internal faults, compressor operation enters the Standby for Restart state. Note: In the case of two fans outdoor fan 2 provides critical cooling for the inverter compressor/outdoor fan control boards.

Once compressor operation finishes the Standby for Restart state and if there is a call for cooling, compressor operation is allowed to sequence to the Normal operating state in the normal manner. If this cycle is repeated three times in a thirty minute period an OA Fan: Problem alarm is generated, locking out compressor operation, requiring a manual reset.

Pumpdown

When compressor operation is no longer needed, the compressor enters the Pumpdown state before entering the Standby for Restart state from either the Initialization or Normal Cooling state.

The following describes the operation of the cooling control devices in the Pumpdown state:

Table 68: Pumpdown State

	Step 1	Step 2
Compressors	Inverter Compressor speed = maximum Comp3= OFF	Inverter Compressor speed = minimum Comp3= OFF
Outdoor fan	Normal control	←
4 way valve	Off	←
Outdoor Expansion Valve (EVO) (Heat Pump only)	Outdoor Expansion Valve position = 100%	Outdoor Expansion Valve position = 50%
SVR (Heat Pump only)	Closed	Open except Closed after 10 seconds if suction super heat < 41°F
SVB	Open	Closed
Indoor Expansion Valve (EVI)	Closed	Closed
Time Duration	A	B

A. The inverter compressor speed is at maximum with the outdoor expansion valve open, SVR closed, SVB open and the indoor expansion valve closed for a maximum of 5 minutes. Step 1 is normally finished before 5 minutes when the suction pressure drops below 72 psi. Step 1 is terminated if the inverter compressor discharge line temperature is above 230°F, the inverter compressor port temperature is above 257°F or the discharge pressure is above 427 psi.

B. The inverter compressor speed is at minimum, the outdoor expansion valve is open 50% open, SVR closed, SVB open and indoor expansion valve closed. Pumpdown is normally complete when the suction pressure drops below 36 psi. Pumpdown is terminated if the inverter compressor port temperature rises above 320°F

Standby for Restart

The Standby for Restart state guarantees at least one Clg Stg Time period elapses before re-entering the Intialization and Normal Cooling states. The following describes the Standby for Restart state sequence:

Table 69: Standby for Restart State

	Stage 1	Stage 2
Compressors	Inverter Compressor speed = 0% and Comp3 OFF	←
Outdoor Fan	Outdoor Fan position = 50% if OAT > 86°F when entering Standby for Restart state Outdoor Fan position = 0% if OAT ≤ 86°F when entering Standby for Restart state	←
4 way valve, outdoor expansion valve (EVO) (Heat Pump only) and SVB	Off or closed	Off or closed
SVR (HeatPump only)	Open if saturated discharge pressure > 427 psi when entering Standby for Restart state Closed otherwise	Closed
Indoor expansion valve (EVI)	Closed	Closed
Time Duration	5 seconds	Remainder of Clg Stg Time
	Clg Stg Time (default=5 minutes)	

Determining Unit Status

Unit Status is a status only item which indicates whether or not the unit is enabled and if not why.

Enabled

Unit operation has not been disabled for any of the following reasons.

Off Manual

The unit operating state is OFF and the unit status is OffMan when the control mode is set to OFF via the keypad. The control mode can only be changed via the System menu on the keypad/display.

OffManCtrl

The unit operating state is OFF and the unit status is OffManCtl when the controller is set to manual control via the Manual Control menu.

Off Network

The unit operating state is OFF and the unit status is OffNet when the control mode is set to Auto via the System menu and the network Net App Mode is set to OFF.

Off Alarm

The unit operating state is OFF and the unit status is OffAlm when an active alarm of the "fault" type has the unit shutdown.

Off Fan Retry

The unit operating state is OFF and the unit status is OffFnRty when The fan retry conditions below indicate that the unit should be shutdown and restarted after airflow is lost.

The supply fan is configured for variable volume and, the airflow switch (PC7) is open and/or the duct static pressure is less than ½ the duct static pressure setpoint. Modbus communication between the VFD and the controller has been interrupted.

If any of these conditions are encountered three times between 2:00 am of one day and 2:00 am the following day. This output could be linked to the Airflow Switch Input and be use to generate the Fan Fail Airflow Fault if circuit is not opening when the fan is shut down for unoccupied operation.

Determining Control Mode

The unit cooling and heating can be set up for automatic heat/cool, cool only, heat only, fan only, or network cool/heat operation by setting the Control Mode. The unit can also be manually disabled via the Control Mode. The following are descriptions of the six available Control Mode selections.

Off

When the Control Mode is set to "OFF," the Unit Status is "Off Man" and the unit is completely disabled.

Heat Only

When the Control Mode is set to "Heat Only," heating operation is allowed to operate to maintain the heating set points. Cooling operation is disabled (Cooing Status is "Off Man").

Cool Only

When the Control Mode is set to "Cool Only," cooling operation is allowed to operate to maintain the cooling set points. Heating operation is disabled (Heating Status is "Off Man").

Fan Only

When the Control Mode is set to "Fan Only," the fans are allowed to operate but cooling and heating operation is disabled (Cooling Status and Heating Status are "Off Man").

Heat Cool

When the Control Mode is set to "Heat/Cool," both cooling and heating operation are allowed to operate as required to maintain the cooling and heating set points.

Auto

When the Control Mode is set to "Auto," the heat/cool, cool only, heat only, and fan only decision is determined by the network application mode parameter, which is set via a network signal as described below. The NetApp Mode parameter has no effect on unit operation unless the Control Mode is set to "Auto."

Determining Cooling Status

Clg Status is a status item which indicates whether or not mechanical cooling is currently allowed. If cooling is disabled, the reason is indicated.

The following are descriptions of cooling status states.

Enabled

Mechanical cooling is enabled if all the following are true:

- Control mode is not set via the keypad to fan only or heat only
- Control mode is set via the keypad to auto and not disabled via a network command
- The outdoor air temperature (OAT) is high enough for operation
- Compressor operation is not disabled by an alarm condition

None

Cooling capability is not provided.

Off Ambient

The outdoor air temperature (OAT) is too low for operation.

The OAT becomes too low for operation when it drops below the OAT cooling lockout setting. OAT becomes high enough for operation when it rises above the OAT cooling lockout setting by more than 2°F (adjustable - OAT Diff).

Off Alarm

Compressor operation is disabled by an alarm condition.

Off Network

Control mode is set via the keypad to auto and cooling is disabled via a network command.

Off Manual

Control mode is set to Fan Only or Heat Only via the keypad display.

Determining Heat Status

Htg Status is a status item which indicates whether or not the primary source of heating in the unit is currently allowed. On heat pump units this is the compressor heating. On non-heat pump units this is the gas, electric or hot water heat.

The following are descriptions of the heating status states:

Enabled

If the unit is a heat pump, compressor heating is enabled if all of the following are true:

- Control Mode is not set via the keypad to fan only or cool only
- Control Mode is set via the keypad to auto and heating is not disabled via a network command
- The outdoor air temperature (OAT) is warm enough (above 0°F default) and cool enough (below 55°F default) for compressor heating operation.

If the unit is not a heat pump, heating is enabled if all of the following are true:

- Heating capability is provided
- Control Mode is not set via the keypad to fan only or cool only
- Control Mode is set via the keypad to auto and heating is not disabled via a network command
- The outdoor air temperature (OAT) is cool enough (below 55°F default) for heating operation.

None

Unit is not a heat pump and heating capability is not provided

Off Ambient

If unit is a heat pump, the OAT is too high or too low for compressor heating operation. OAT becomes too high for compressor heat operation when it rises above the high OAT heating lock out set point. The OAT becomes low enough for compressor heat operation when it drops below the high OAT heating lock out set point by more than the heating lockout differential. The The OAT becomes too low for compressor heat operation when it falls below the low OAT heating lock out set point. The OAT becomes high enough for compressor heat operation when it rises above the low OAT heating lock out set point by more than the heating lockout differential.

If unit is not a heat pump, the OAT is too high for heating operation. The OAT becomes too high for heat operation when it rises above the high OAT heating lock out set point. The OAT becomes low enough for heat operation when it drops below the high OAT heating lock out set point by more than the heating lockout differential.

Off Network

Control Mode is set via the keypad to auto and heating is disabled via a network command.

Off Manual

Control Mode is set via the keypad to fan only or cool only..

Determining Supplemental Heat Status (Heat Pump only)

SuplHtgStatus is a status item which indicates whether or not the secondary or supplemental unit heat source is currently allowed. This is gas, electric, hot water or steam heat.

The following are descriptions of the heating status states:

Enabled

Control Mode is not set via the keypad to fan only or cool only

Control Mode is set via the keypad to auto and heating is not disabled via a network command

The outdoor air temperature (OAT) is cool enough (below 55°F default) for supplemental heating operation.

Off Ambient

The OAT is too high for supplemental heating operation. The OAT becomes too high for heat operation when it rises above the supplemental heat high OAT lock out set point. The OAT becomes low enough for heat operation when it drops below the supplemental heat high OAT lock out set point by more than the heating lockout differential.

Off Network

Control Mode is set via the keypad to auto and heating is disabled via a network command.

Off Manual

Control Mode is set via the keypad to fan only or cool only.

Determining Economizer Status

Econo Status is a status item which indicates whether or not economizer operation is currently allowed. If economizer operation is disabled, the reason is indicated.

The following are descriptions of economizer status states.

Economizer is enabled if all the following are true:

- Economizer capability is provided
- Dehumidification operation is not enabled
- The unit is configured for airside economizer, the enthalpy switch input indicates low enthalpy, and the outdoor air temperature (OAT) is low enough for operation

None

Economizer capability is not provided.

Off Ambient

Economizer status is Off Ambient if any of the following conditions exist:

- The unit is configured for airside economizer and the outdoor air temperature (OAT) is too high for operation.
- Unit is configured for airside economizer and the outdoor air temperature (OAT) sensor is unreliable.

Off Network

Economizer operation is disabled via a network command.

Off Dehumidification

Economizer operation is disabled if dehumidification operation is enabled.

Determining Cooling Capacity

Clg Capacity is a status item which indicates the percentage of the unit maximum cooling capacity currently operating.

Determining Heat Capacity

Htg Capacity is a status item which indicates the percentage of the unit maximum primary heating source that is currently operating. On heat pump units this is the compressor heating capacity. On non-heat pump units this is the gas, electric or hot water heating capacity.

Determining Supplemental Heat Capacity (Heat Pump only)

Supl Htg Cap is a status item which indicates the percentage of the unit maximum secondary or supplemental heating source that is currently operating. This is the gas, electric or hot water heating capacity.

Determining Supply Air Fan Capacity

SAF Speed is a status only item which indicates the supply air fan capacity. 0-100% of maximum speed is indicated if the unit is equipped with a variable volume supply air fan. 100% is indicated if the supply fan is constant volume and is running.

Determining RF/EF Capacity

RF/EF capacity is a status only item which indicates the current exhaust fan capacity. 0-100% of maximum speed is indicated if the unit is equipped with a variable volume exhaust fan. 100% is indicated if the exhaust fan is constant volume and is running.

Determining Outside Air Damper Position

OAD/Econo Cap is a status only item which indicates the current outdoor air damper or economizer valve position.

Determining Emergency Mode

Emergency Mode is an adjustable item which is used by a network system to shutdown the unit in an emergency situation.

Determining Application Mode

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

Off

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

Heat Only

When the Net App Mode is set to "Heat Only," heating operation is allowed to operate as required to maintain the heating set points. Cooling operation is disabled (Cooling Status is "Off Net").

Cool Only

When the Net App Mode is set to "Cool Only," cooling operation is allowed to operate as required to maintain the cooling set points. Heating operation is disabled (Heating Status is "Off Net").

Fan Only

When the Net App Mode is set to "Fan Only," the fans are allowed to operate but cooling and heating operation is disabled (Cooling Status and Heating Status are "Off Net").

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 set points.

Determining Occupancy Status

Occupancy is a status item which indicates whether the unit is in an occupied, unoccupied or tenant override mode of operation.

The following are descriptions of the various "Occupancy" states.

Occ

The Occupancy parameter indicates "Occ" when the unit is in the occupied mode. In this mode, the unit starts and runs continuously, cooling and heating as required to maintain the occupied temperature set points. The unit is in the occupied mode if any of the following conditions are true:

- The Occ Mode entry on the keypad is set to occupied
- The Occ Mode entry on the keypad is set to Auto, and a manual network occupancy command is sent to the controller
- The Occ Mode entry on the keypad is set to Auto, a manual network occupancy command is set to Auto, and any of the following is true:
- The External Start/Stop switch is closed
- A network schedule signal is set to Occupied or Standby
- The internal schedule function is in the Occupied condition
- A D3 gateway ON/OFF signal is set to ON.

Unocc

The Occupancy parameter indicates "Unocc" when the unit is in the unoccupied mode. In this mode, the unit remains off unless unoccupied operation becomes active. When unoccupied operation is active the unit operates normally except that Minimum OA Position is set to zero. See Unoccupied Operation below for information regarding when unoccupied operation is activated.

TntOvrd

The Occupancy parameter indicates "TntOvrd" when the unit is in the tenant override mode. In this mode, the unit starts and runs continuously, cooling and heating as required to maintain the occupied temperature.

Tenant override operation is initiated when the Tenant Override Timer is greater than zero. The Tenant Override Timer is set equal to the Local Tenant Override Time (Timer Settings menu) if the unit is enabled and any of the following is true:

- The Space Temperature sensor is present and its tenant override button is pressed for less than 10 seconds. Nothing happens if the button is pushed for more than 10 seconds but less than the time required to initiate a shorted sensor alarm (30 seconds). Subsequent presses on the button resets the Tenant Override Timer to the Local Tenant Override Time, i.e. the max time

- The Occ Mode entry on the keypad is set to Tenant Override. After the Tenant Override Timer is set, the Occ Mode entry on the keypad reverts to auto after a 2 second time delay
- The Occ Mode entry on the keypad is set to Auto or Unocc, and a manual network occupancy command is set to Bypass. After the Tenant Override Timer is set, the network occupancy command reverts to Auto

Subsequent presses on the button, setting of the keypad occupancy entry to Tenant Override again, or setting of the network occupancy command to Bypass again resets the Tenant Override Timer to the Local Tenant Override Time.

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 Occupancy Mode

Occ Mode is an adjustable item which sets the unit for manual occupied, unoccupied, tenant override or automatic operation.

Occ

When Occ Mode is set to "Occ," the unit is manually placed in the occupied mode of operation.

Unocc

When Occ Mode is set to "Unocc," the unit is manually placed in the unoccupied mode of operation.

TntOvrd

When Occ Mode is set to "TntOvrd," the unit is manually placed in the tenant override mode of operation.

NOTE: Once tenant override operation is activated the parameter automatically reverts back to "Auto."

Auto

When Occ Mode is set to "Auto" the unit is automatically changed between occupied, unoccupied and tenant override operation, via contact closure, internal schedule, network input.

Determining Occupancy Source

When the Occupancy parameter indicates Occ, the occupancy source is set to one of the following values to indicate the function responsible for placing the unit into the occupied mode of operation.

None The Occ Src= parameter indicates "None" when the Occupancy= parameter indicates "Unocc" or "Tnt Ovrd."

NetSchedule The Occ Src= parameter indicates "Net Schd" when the Occupancy= parameter indicates "Occ" due to a network schedule indicating an occupied period.

For Example: If the D3 gateway ON/OFF signal is ON, then, the OccSrc indicates "NetSchd".

IntSchedule The Occ Src= parameter indicates "Int Sched" when the Occupancy= parameter indicates "Occ" due to the unit internal schedule.

OneEventSchedule The Occ Src= parameter indicates "Int Sched" when the Occupancy= parameter indicates "Occ" due to the unit one event schedule.

RemoteSwitch The Occ Src= parameter indicates "Remote Sw" when the Occupancy= parameter indicates "Occ" due to a field supplied external time clock or a tenant override switch signal in the form of a set of dry contacts is closed across terminals 101 and102 on the unit field terminal block TB2, for rebel units 3 to 15 tons. On larger Rebel units 16 to 28 ton the terminal contacts are 200 and 201 on TB2.

OccManCmd The Occ Src= parameter indicates "OccManCmd" when OccMode is set to Auto and the network manual occupancy command is set to Occupied.

OccMode The Occ Src= parameter indicates "Occ Mode" when the Occupancy= parameter indicates "Occ" due to the Occupancy Mode being manually set to "Occ."

TStatTO The Occ Src= parameter indicates "TStatTO" when the Occupancy= parameter indicates "TntOvrd" due to the tenant override button on the zone thermostat being pushed. The button must be held for at least 1 second but not more than 10 seconds.

ManTO The TntOvrd Src= parameter indicates "ManTO" when the Occupancy= parameter indicates "Occ" due to the being manually set via the keypad/display. When the Tenant Override Timer is set to a non-zero value, the unit starts and runs in the tenant override mode regardless of any scheduling features. The unit stops when the timer expires. The Tenant Override Timer can be set from 0-300 minutes.

Unoccupied Operation

During unoccupied operation the unit operates normally except that Min OA Pos is set to zero so that the damper is closed to the outdoor air.

Unoccupied Dehumidification

Dehumidification may be initiated in the unoccupied mode only if Unocc Dehum is set to Yes. 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".

Unoccupied Cooling (Night Setup)

Unoccupied operation is initiated if the space sensor is reliable, the space temperature is greater than the Unoccupied Cooling Set Point, and the Unoccupied Cooling Set Point is set lower than its maximum setting. In this case, the unoccupied source indicates "UnoccClg".

Unoccupied Heating (Night Setback)

Unoccupied operation is initiated if the space sensor is reliable, the space temperature is less than the Unoccupied Heating Set Point, and the Unoccupied Heating Set Point 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 Unoocupied 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".

None

The Unoccupied Source is set to "None" when Unoccupied operation is inactive.

Scheduling

The Air Handling 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 operation. Therefore, any unused scheduling functions should be set for continuous unoccupied operation.

The next four sections: "Setting Controller Date and Time," "Internal Daily Scheduling," "Holiday Scheduling," and "One Event Scheduling" describe functions related to the internal unit scheduling functions. These are followed by a section describing the optimal start function which can be use with internal scheduling and network scheduling. This is followed by two sections that describe the external time scheduling and network time scheduling functions.

Setting Controller 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 forty-eight hours. The clock and date are settable 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 III uses "military" time. The current date can be set by entering the date (00-31), month (01- 12) and year (1999-2155) into the three fields of the Current Date.

Internal Daily Schedule

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 by 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 "12/24/08 - 12/25/08."

One Event Scheduling

A One-Event Schedule 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, 2008 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 "3/12/08 @ 17:00:00" and the One Event Ending Date/Time to "3/12/08 @ 22:00:00."

Optimal Start

When Optimal Start is active (Optimal Start= Yes), an early start time is determined before each scheduled start. The schedule must be based on an internal schedule or a signal via a connected network that indicates time to occupancy. 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 scheduled occupancy time. Optimal start based on heating operates when the space temperature is below the Occupied Heating Spt by ½ the Occupied Htg Deadband. Optimal start based on cooling operates when the space temperature is above the Occupied Cooling Spt by ½ the Occupied Clg Deadband. If space temperature is between the above two points, the unit starts at the occupancy time.

External Time Scheduling

An external time 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 Terminal block 2 (101 and 102 on Rebel Units 3 to 15 tons) Terminals (200 and 201 on Rebel unit 16 to 28 tons). In this case, all internal daily schedules should be set to "HH:MM-HH:MM" (default setting).

Temperature Control Configurations

Temperature control is based on a Control Type that may be set to either Zone, DAT or (single zone VAV).

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 set point. This configuration is used on units equipped with constant volume supply fans. Compressors and heating stages are controlled to maintain space or return temperature. The compressor capacity is decreased when it is too cold and increased when it is too hot. The heating capacity is decreased when it is too hot and increased when it is too cold.

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

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 set point while the variable volume supply fan is modulated to maintain the temperature of the zone at the desired heating and cooling set points. In heating mode the supply fan capacity is increased as the zone temperature falls and decreased as the zone temperature rises.

Heat/Cool Changeover

(See page 98 for State Diagram flowchart)

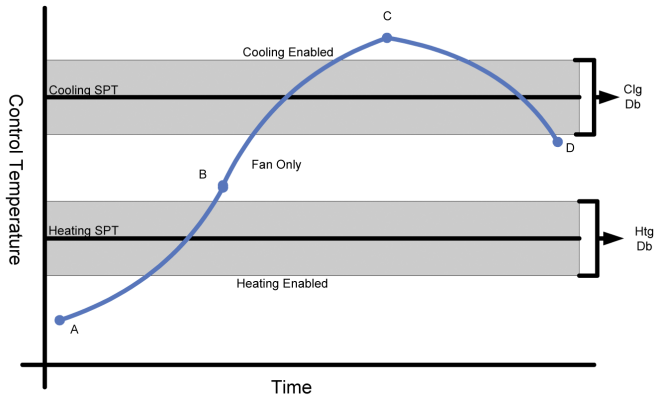
In general, a unit configured for discharge air temperature control either operates to deliver the cooling discharge temperature set point using economizer and/or mechanical cooling or the heating discharge air temperature set point using the heating equipment. Cooling and heating never operate simultaneously. A unit configured for zone (or space comfort) control either operates to maintain the Occupied Cooling Set Point using economizer and/or mechanical cooling or the Occupied Heating Set Point using the heating equipment. The Occupied Cooling/Occupied Heating Set Points can be set via the keypad/display or based on a signal from an optional space temperature sensor with set point adjustment capability. The following sections describe the unit heat/ cool changeover function.

Illustrative Heat/Cool Changeover Sequence

The following is an illustration of the heat/cool changeover function.

When the control temperature is below the Occupied heating set point 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 heating set point 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 cooling set point 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 cooling set point by more than ½ the deadband (point D), at which point the unit returns or fan only (or Min DAT) operating state.

Figure 16: Heat/Cool Changeover



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 user may select Space Temperature, Return Temperature, Outdoor Air Temperature or None for DAT units. Normally either the Return or Space Temperature is selected as the control temperature. Outdoor Air Temperature may be used as the control temperature for DAT units, but not for Zone Control units.

When the Control Temperature Source is set to 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 set point. 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 set point. The unit will only enter the Heating operating state and control to the discharge heating set point for morning warm up purposes.

The Control Temperature Source automatically reverts from Return to Space if both of the following are true:

- The Return Air Sensor is not present and reliable
- A network or local Space Sensor is present and reliable

The Control Temperature Source automatically reverts from Space to Return if both of the following are true:

- The space sensor is not reliable (a valid space temperature value is not provided via the network and the space temperature sensor is either in alarm or not present)
- The return air sensor is reliable (present and not in alarm)

The Control Temperature Source automatically reverts from either Outdoor Air or Mixed Air to Return if the Control Type is Zone (Not DAT). If the return air temperature is not reliable, the control temperature may then revert to space as described above.

The Control Temperature Source automatically reverts from Mixed Air to Outdoor Air if Unit Type is not SCU.

A Control Temperature Fault that shuts down the unit is initiated if any of the following is true.

- The return air sensor is not present and reliable and Return Air is selected as the control temperature and a space sensor is not available.
- A network or local space sensor is not present and reliable and Space is selected as the control temperature and a return temperature sensor is not available.
- The OAT Sensor is not present and reliable and Outdoor Air is selected as the control temperature
- The mixed air temperature sensor is not present or reliable and Mixed Air is selected as the control temperature

Occupied Temperature Set Points

(See page 45 for more information)

When the Use Tstat set point parameter is set to No, the Occupied Cooling Set Point and the Occupied Heating Set Point may be set through the keypad or via a network signal. In this case these set points are changed whenever the network or keypad value changes. When the Use Tstat set point parameter is set to Yes these set points can only be adjusted through the zone thermostat. Heating and cooling set points must not overlap. The Occupied Heating Set Point must be equal to or less than the Occupied Cooling Set Point. If a conflict occurs from values entered via the keypad or network, the Occupied Heating Set Point is automatically adjusted down to eliminate the conflict. When the Occupied Cooling Set point is changed by more than 0.5 degrees through the wall mounted sensor, the Occupied Heating Set Point is raised or lowered the same amount so that the difference between the Cooling and Heating set points does not change.

OAT Lockout

On heat pump units, compressor heating (primary heat) is disabled whenever the outdoor air temperature is below the Low Outdoor Air Ambient Heating Lockout set point or above the High Outdoor Air Ambient Heating Lockout set point. Whenever the outdoor air temperature rises above the Low Outdoor Air Ambient Heating Lockout set point or falls below the High Outdoor Air Ambient Heating Lockout set point by more than the Heating Lockout Differential, compressor heating operation is re-enabled.

Supplemental heating (secondary heat) is disabled whenever the outdoor air temperature is above the High Outdoor Air Ambient Supplemental Heating Lockout Set Point. Whenever the outdoor air temperature falls below the High Outdoor Air Ambient Supplemental Heating Lockout Set Point by more than the Heating Lockout Differential, supplemental heating operation is re-enabled.

Compressor cooling operation is disabled whenever the outdoor air temperature falls below the Low Outdoor Air Ambient Cooling Lockout Set Point. Whenever the outdoor air temperature rises above the Low Outdoor Air Ambient Cooling Lockout Set Point by more than the Cooling Lockout Differential, compressor cooling operation is re-enabled.

On non-heat pump units, heating is disabled whenever the outdoor air temperature is above the High Outdoor Air Ambient Heating Lockout Set Point. Whenever the outdoor air temperature falls below the High Outdoor Air Ambient Heating Lockout Set Point by more than the Heating Lockout Differential, heating operation is re-enabled.

Compressor cooling operation is disabled whenever the outdoor air temperature falls below the Low Outdoor Air Ambient Cooling Lockout Set Point. Whenever the outdoor air temperature rises above the Low Outdoor Air Ambient Cooling Lockout Set Point by more than the Cooling Lockout Differential, compressor cooling operation is re-enabled.

Tenant Override

(See page 110 for more detail)

The tenant-override button provided with the optional zone temperature sensor packages is used to override unoccupied operation for a pre programmed time period. This time period is set with the Tenant Override Time Increment. This value can be adjusted from 0 to 300 minutes (default is 120 minutes). When an occupant presses and releases the tenant override button on the zone temperature sensor (ZNT1), the Tenant Override Timer is set equal to the Tenant Override Time Increment. (The button must be held for at least 1 second but not more than 10 seconds.) The unit then starts and runs in the tenant override mode which is the same as occupied mode except that it is temporary.

The Tenant Override Timer begins timing out and the unit runs until the timer expires. If the tenant override button is pressed again while the unit is operating in tenant override mode, the Tenant Override Timer is reset to the Tenant Override Time Increment and the unit continues to operate. For example, assume that the Tenant Override Time Increment is 120 minutes. One press of the override button provides at least 120 minutes of unit operation. If the button is pressed again 60 minutes later, the Tenant Override Timer is reset to 120 minutes, and a total of 180 minutes of uninterrupted operation results.

NOTE: The same operation occurs if, instead of pressing the override button on a zone temperature sensor, the Occupancy Mode is set to "Tnt Ovrd." Once set to "Tnt Ovrd", the Occupancy Mode automatically reverts to the "Auto" setting once the Tnt Ovrd Timer is set to the Tnt Ovrd Time Increment. The same operation will also occur if the network occupancy manual command it set to bypass

Zero OA Time (Morning Warm-up)

A separate Morning Warm-up operating state is not provided, but an edited ZeroOATime is used to keep the Outside Air damper closed when the unit first starts. The Minimum OA Position is set to zero as long as the as the fan has been on for less than the ZeroOATime. This allows the Return Air type units to cool down the space with mechanical cooling or to warm up the space with the dampers closed. If the ZeroOATime is set correctly, the OA dampers will be open only during occupied periods. When Optimum Start is used ZeroOATime is set equal to the time to occupancy when the unit starts so that the OA dampers will open at occupancy time.

Post Heat Operation

After leaving the Recirc or Heating operating state and entering either the Fan Only or Min DAT operating state, the unit performs "post heat" operation if the Post Heat Timer is set to a non zero value. "Post heat" operation occurs within the Fan Only or MinDAT operating state. During "post heat" operation, the VAV Box Output remains open (heat) while the discharge fan capacity is forced to a minimum value (default 33% speed). By forcing the discharge fan capacity to a minimum value before the VAV Box Output closes (cool), "post heat" operation is designed to prevent duct over-pressurization by decreasing the duct pressure before the VAV boxes can close.

"Post heat" operation remains active until either the discharge fan capacity reaches the minimum value or until the Post Heat Timer expires, whichever occurs first. When "post heat" operation ends, normal duct static pressure or position control resumes.

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 the Fan Only or Min DAT operating state while the airflow switch input is being ignored. The VAV output is only available to the field via network communications.

Dehumidification

(See page 62 for more information)

In the dehumidification mode, mechanical cooling is used to cool air low enough to wring moisture out of it. Hot Gas Reheat or the standard unit heating equipment (Gas, SCR Electric or Steam/Hot water) is used to raise the temperature of this cooled air to a desirable value.

Dehumidification Initiation

Dehumidification operation can either be initiated based on a field installed (or network provided) humidity sensor input or set for constant operation without regard to a humidity input.

Sensor Based Operation

When the Dehum Method= parameter is set to either Rel Hum or DewPt, dehumidification initiation is based on a relative humidity input or dewpoint calculated from a relative humidity input. To calculate dewpoint from the humidity sensor input the controller uses the temperature input selected with the Sensor Loc = parameter. This can be set to Return, Space or OAT and should be set to match the physical location of the humidity sensor.

In this case dehumidification operation is initiated when the relative humidity (or dewpoint) input rises above the corresponding relative humidity (or dewpoint) set point by more than ½ the deadband.

Continuous Operation

When the Dehum Method= parameter is set to Always, dehumidification constantly active regardless of any relative humidity sensor input.

Dehumidification Termination

Dehumidification operation is always terminated if cooling operation is disabled for any reason, the Dehum Method= parameter is set to None or if the Unit Status= indicates Off Net, Off Sw, Off Alm or Off Man Ctrl.

In the case where the Dehum Method= parameter is set to Rel Hum or DewPt, dehumidification operation is terminated if the relative humidity (or dewpoint) input drops below the corresponding relative humidity (or dewpoint) set point by more than ½ the deadband.

In the case where the Dehum Method= parameter is set to Always, dehumidification operation is never terminated unless cooling operation is disabled or the Unit Status= indicates Off Net, Off Sw, Off Alm or Off Man Ctrl.

Dehumidification Cooling Control

During dehumidification, control of cooling is based on the Minimum Leaving Coil Temperature set point Mn Lvg Coil T (Default = 45°F).

Cooling is controlled by a PI Loop to maintain the temperature leaving the coil at the Mn Lvg Coil T. The normal DAT Cooling Deadband and PI Loop parameters are used in this PI Loop.

Dehumidification Reheat Control

During dehumidification control, an analog Hot Gas Reheat (HGRH) output or the standard modulating heating output is controlled with a PI Loop to maintain the current Reheat Set Point. If the Reheat Type software configuration parameter is set to Modulating Hot Gas, an analog HGRH output is controlled to maintain the Reheat Set Point. If the Reheat Type software configuration parameter is set to Standard Heat, then the normal heating analog output is controlled to maintain the Reheat Set Point.

The effective Reheat Set Point varies depending on the current unit operating state (Unit State=) as describe below.

Cooling Unit State

When dehumidification is active while the unit is in the Cooling operating state, the effective Reheat Set Point is set equal the current Discharge Air Cooling Set Point. For DAT units the current Discharge Air Cooling Set Point is either fixed or varies based on a cooling discharge air reset schedule. For zone control units the current Discharge Air Cooling Set Points varies up and down based on the Control Temperature input compared to the Occupied Cooling Set Point.

Fan Only Unit State

When dehumidification is active while the unit is in the Fan Only operating state, the effect Reheat Set Point is normally set based on the Control Temperature compared to the Occupied Cooling Set Point and the Occupied Heating Set Point.

The Reheat Set Point is set equal to the editable Maximum Reheat Setpoint (Default 65°F) when the Control Temperature drops to the Occupied Heating Setpoint and is set equal to the editable Minimum Reheat Setpoint (Default 55°F) when the Control Temperature rises to the Occupied Cooling Setpoint. The Reheat Setpoint varies linearly between the minimum and maximum when the Control Temperature is between the two occupied setpoint values. This means that the temperature leaving the unit is at a maximum just before the unit needs to transition to the Heating operating state and at a minimum just before needing to transition to the Cooling operating state.

The one exception is when the Control Temperature Source is set to None. In this case, the effective Reheat Setpoint is always set equal the current Discharge Air Cooling Setpoint

Modulating HGRH Control

In the Cooling and Fan Only states, a PI Loop is used to control the HGRH valve to maintain the discharge air temperature at the Dehumidification Reheat Setpoint. The PI Loop is enabled when the unit is in the Cooling or Fan Only operating state and dehumidification becomes active.

NOTE: When configured for modulating hot gas reheat the reheat valve is stroked open and then closed every day at 2:00 AM as long as dehumidification is inactive and the unit is not in the Cooling operating state at the time.

Energy Recovery

(See page 64 for more information)

Energy recovery is provided by drawing outside air across half of an enthalpy wheel and drawing exhaust air across the other half. Latent and sensible heat is transferred from the hotter, moister exhaust air to the colder dryer outside air in winter. Latent and sensible heat is transferred from the hotter more moist outside air to the cooler dryer exhaust air in summer. Control consists of starting and stopping an exhaust fan, modulating the speed of the exhaust fan, starting and stopping the enthalpy wheel, and optionally controlling the speed of the enthalpy wheel. The outdoor dampers are controlled in the normal manner. The current statuses as well as editable parameters associated with energy recovery are located in the Energy Rec Setup menu.

Enthalpy Wheel

Normally the enthalpy wheel is turned on whenever the exhaust fan is running and the outdoor air dampers are at the minimum position (i.e. the unit is not in the Econo operating state). The wheel is shut OFF if the exhaust fan ever turns OFF or if the unit enters the Econo operating state and the dampers are driven more than 3% above the effective minimum outdoor air position setpoint.

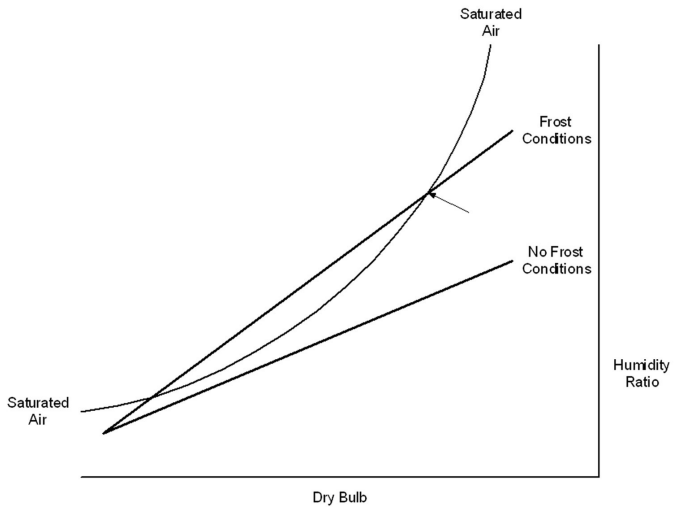
There are however a number of functions that can overridden normal wheel operation. These include Enthalpy Wheel Frost Prevention, Enthalpy Wheel Defrost Control and Enthalpy Wheel Capacity Limiting Control. These override functions are described in the following sections.

Enthalpy Wheel Frost Prevention

A unit equipped with a return or space humidity sensor includes a wheel frost prevention function that can be enabled by setting the Fst Mgmt Meth= parameter to ExhAir. When there is a threat of frost or condensation on the enthalpy wheel, the wheel may be slowed down or stopped so that less enthalpy transfer occurs and frosting or condensation on the enthalpy wheel is avoided. In this case the frost control is based on an Intersection Point described as follows:

Condensation and frosting can occur on the enthalpy wheel when the exhaust air leaving the wheel is saturated. This condition will occur when two lines intersect on a psychometric chart, and it will not occur when these two lines do not intersect. One of these lines is the Humidity Ratio versus the dry bulb for saturated air. The other line is the Humidity Ratio versus the dry bulb temperature of the exhaust air leaving the enthalpy wheel. The two ends of this second straight line on a psychometric chart are the OAT at 95% RH and the return air temperature at the return air relative humidity. One line showing frosting conditions and another line showing no frost conditions are shown on the sketch of a psychometric chart shown below. A continuous calculation determines if and at what temperatures these two lines intersect. If they do intersect they intersect at two points. The higher of the two points is referred to as the "Intersection Point". When they do not intersect, the enthalpy wheel runs at full speed. When they do intersect, the enthalpy wheel may be slowed or stopped to maintain the dry bulb temperature of the exhaust air leaving the enthalpy wheel high enough to eliminate the Intersection Point and therefore the threat of frosting conditions.

Figure 17: Exhaust Air Psychometric Chart



Constant Speed Wheel

The enthalpy wheel is stopped to prevent frosting whenever an Intersection Point exists and the exhaust air leaving the enthalpy wheel (ER EAT) is below the Intersection Point by more than an editable minimum temperature difference (Min ExhT Diff=) and the wheel has been running for a minimum time period (ER Whl Stg Tm=).

The enthalpy wheel is turned back ON when the exhaust air leaving the enthalpy wheel (ER EAT) rises above the Intersection Point by more than an editable maximum temperature difference (Max ExhT Diff=) and the wheel has been off for a minimum time period (ER Whl Off Tm=).

Variable Speed Wheel

The enthalpy wheel is first slowed to an editable minimum speed (Default 5%) to prevent frosting whenever an Intersection Point exists and the exhaust air leaving the enthalpy wheel (ER EAT) is below the Intersection Point by more than an editable minimum temperature difference (Min ExhT Diff=) and the wheel has been running at maximum speed for a minimum time period (ER Whl Stg Tm=).

The wheel is stopped if it has been operating at minimum speed for the ER Whl Stg Tm=period and the exhaust air leaving the enthalpy wheel (ER EAT) is below the Intersection Point by more than the Min ExhT Diff= value.

The enthalpy wheel is turned back ON when the exhaust air leaving the enthalpy wheel (ER EAT) rises above the Intersection Point by more than an editable maximum temperature difference (Max ExhT Diff=) and the wheel has been off for a minimum time period (ER Whl Off Tm=).

The enthalpy wheel speed is increased back to maximum speed after is has been operating at minimum speed for the Whl Stg Tm= and the exhaust air leaving the enthalpy wheel (ER EAT) is above the Intersection Point by more than the Max ExhT Diff= value.

Enthalpy Wheel Defrost Control (Constant Speed Wheels Only)

A unit equipped with a constant speed wheel includes a wheel defrost function that can be enabled in lieu of frost prevention by setting the Fst Mgmt Meth= parameter to Timed.

With this method there is nothing that prevents frost from forming on the wheel but the wheel is periodically stopped to allow the wheel to defrost. When this function is enabled, the wheel is stopped for a defrost time period Defrost Time= (Default=5 minutes) every defrost period Defrst Period= (Default=60 minutes).

When the wheel is stopped due to defrost operation, it must be slowly rotated so that both halve of the wheel are allowed to defrost by the relatively warm exhaust air leaving the wheel. This is accomplished by alternately turning the wheel control output OFF for and editable defrost OFF time Defrst Off Tm= (Default=24 seconds) and on for an editable defrost on time Defrst On Tm= (Default=1 second) during the Defrost Time period.

Enthalpy Wheel Capacity Limiting

Enthalpy wheel capacity limiting control is a means to limit the capacity of an energy wheel during part load conditions. Normally wheels are sized for worst case winter/summer load and, therefore, at part load the wheel may be oversized. Capacity limiting control is allowed when the energy recovery wheel leaving air temperature (ERDAT) sensor is present and reliable and the outdoor air temperature (OAT) is colder than the returning air temperature.

Capacity limiting control is not allowed during dehumidification operation or when either the wheel frost prevention or defrost operation are active.

Capacity limiting operation differs depending on whether the energy recovery wheel is constant or variable speed.

Constant Speed Wheel

The conditions that cause the energy recovery wheel to turn due to capacity limiting are different depending on the unit operation state as follows:

Fan Only

When the unit is operating in the Fan Only state, the energy recovery wheel is stopped due to capacity limiting whenever the discharge air temperature (DAT) is above the MinDATLimit setpoint by more than ½ the discharge air heating deadband. The wheel is re-started when the DAT falls back to or below the MinDATLimit setpoint plus ½ the discharge air heating deadband.

Heating

When the unit is operating in the Heating state, the energy recovery wheel is stopped 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 is re-started 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 stopped due to capacity limiting whenever the energy recovery wheel leaving air temperature (ER LAT) is above the discharge cooling setpoint by more than ½ the discharge air cooling deadband. The wheel is re-started when the ER LAT falls back to or below the discharge cooling setpoint plus ½ the discharge air cooling deadband.

Variable Speed Wheel

When capacity limiting is allowed the effective measured variable (ERDAT or DAT depending on the unit state as outline in the Constant Speed Wheel section above) is controlled to the effective discharge temperature setpoint using a PI loop.

Exhaust Fan Control

A DPS unit equipped with an energy recovery wheel is always equipped with an exhaust fan. This fan is shipped from the factory set up for VAV operation controlled based on building static pressure. Units equipped with the 0-100% modulating economizer operation should always remain set up for VAV control on building pressure. Unit's equipped with 0-30% OA or 100% OA hoods can be set up for either CAV or VAV operation.

VAV Exhaust Fan

A VAV exhaust fan can be set for one of three different methods of control with the RF/EF Ctrl= parameter. These are building static pressure, manual/network speed, or outdoor air damper position based control.

Building Static Pressure Control

When the RF/EF Ctrl= parameter is set for building pressure control (BldgP) and exhaust fan operation is enabled, the fan is turned on whenever the building static pressure input is above the building static pressure setpoint by more than ½ the deadband. Exhaust fan operation is enabled when outdoor air damper position is greater than the MinExhOAPos= setting (Default=5%) and the supply fan capacity is greater that the MinExhSAFCap= setting (Default=10%).

Once the fan is running the capacity of the fan is controlled with a PI Loop to maintain the building static pressure at the building static pressure setpoint.

The exhaust fan is turned OFF when the building static pressure input is below the building static pressure setpoint by more than ½ the deadband and the fan capacity is at its minimum value (Default=5%) for longer than the MinExStopTime= period (Default=120 seconds).

Speed/Network Control

When the RF/EF Ctrl= parameter is set for speed/network control (Spd/Net) and exhaust fan operation is enabled, the fan is turned on whenever the RemExhF Cap= parameter is set above the minimum value (Default=5%) via the keypad or a network signal for longer than the MinExStartTime= period (Default=120 seconds). Exhaust fan operation is enabled when outdoor air damper position is greater than the MinExhOAPos= setting Default=5%) and the supply fan capacity is greater that the MinExhSAFCap= setting (Default=10%).

Once the fan is running the capacity of the fan is controlled to the RemExhFCap= setting which is changed via the unit keypad or a network signal.

The exhaust fan is turned OFF when RemExhF Cap= parameter is set equal to or lower than the minimum value (Default=5%) via the keypad or a network signal for longer than the MinExStopTime= period (Default=120 seconds).

Outdoor Damper Position Control

When the RF/EF Ctrl= parameter is set for outdoor damper position control (OAD) the fan is turned on whenever the outdoor damper position t is above the ExhOnOAPos= setting (Default=40%) for longer than the MinExStartTime= period (Default=120 seconds).

Once the fan is running the capacity of the fan is controlled between the minimum value (Default=5%) and 100% as the outdoor damper position varies between the ExhOnOAPos= setting (Default=40%) and the ExhMxOAPos= setting (Defaut=100%).

The exhaust fan is turned OFF when the outdoor damper position t is below the ExhOnOAPos= setting (Default=40%) for longer than the MinExStopTime= period (Default=120 seconds).

CAV Exhaust Fan

A DPS unit can be configured for CAV exhaust fan operation via the Unit Configuration menu. When configure this way the exhaust fan is turned ON 4 seconds after the supply fan is started and runs at full speed as long as the supply fan is running. The exhaust fan is stopped whenever the supply fan stops.

Bypass Dampers (Not Applicable for 0–30% or 100% OA Units)

The bypass dampers are driven closed (Bypass Damper Closed output is energized) whenever the OA Damper position is less than or equal to the Minimum OA Position

The Bypass dampers are driven open (Bypass Damper Open output is energized) whenever the OA Damper Position exceeds the Minimum OA Damper Position by more that 3%

Outside Air Damper Control

(See page 52 for more information)

Minimum Outside Air Damper Control

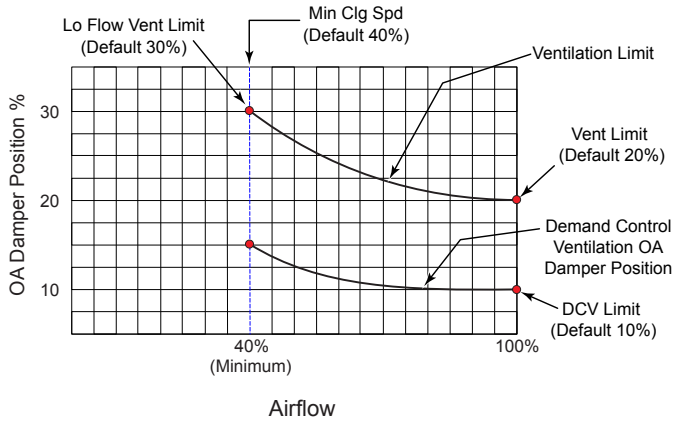
Control of the dampers in the Economizer state is described in the Economizer Control section. The outdoor air dampers are driven open in the cooling operating state if economizer operation is enabled and to the Minimum OA Position if economizer operation is disabled. For all other operating conditions, the outdoor air dampers are set to the Minimum OA Position. The Minimum OA Position is set to zero or 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.

As a result, the OA dampers are driven closed in night setback, night setup, morning warm-up, and morning cool down situations unless economizer operation is required. In all other conditions the Minimum OA Position is equal to or below a Ventilation Limit and equal to or above a Demand Control Ventilation limit. For CAV units, the Ventilation Limit equals the keypad editable Vent Limit and the Demand Control Ventilation Limit equals the keypad editable DCV Limit. For VAV units, the Ventilation Limit varies with fan speed between the editable Vent Limit at 100% Supply Fan speed and the editable LoFlo Vent Limit at the Min Clg Spd, as shown in Figure 18. For VAV units, the Demand Control Ventilation Limit varies as the Ventilation Limit value changes so that the ratio between them remains constant. In the example shown in Figure 18 the Demand Control Ventilation Limit would always be 1/2 the Ventilation Limit since the DCV Limit= parameter (10%) is half of the Vent Limit= parameter (20%).

The editable parameters are to be determined when the airflow for the unit is balanced and are located in the Min OA Set-up menu.

NOTE: The MinClgSpd is prevented from being set equal to the Design Cooling Speed. The DCV Limit is prevented from being set greater than the Vent Limit. If the VentLimit or the LoFloVent Limit is set to 0, the Ventilation Limit is overridden to 0.

Figure 18: Damper Position versus Fan Speed Chart



Cold Start Operation

A special "cold start" sequence will slow the opening of the dampers when it is cold outdoors. 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. This "cold start" sequence is initiated if the following conditions are all true:

- OAT is below the current LoDATLimit
- The unit is equipped with an Airside Economizer
- The current Unit State is beyond the Recirc
- The current Minimum Outdoor Damper Position set point is greater than 0%

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 the minimum 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.

Minimum Outside Air Reset - None

If None is selected as the Min OA Reset Type, the Minimum OA Position is set equal to the Ventilation Limit. The Demand Control Ventilation Limit value is ignored when Min OA reset is set to NONE.

Minimum Outside Air Reset - 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 current values. If Network is selected as the Min OA Reset Type and a valid value for the minimum position is not provided, the Min OA position is set equal to the Ventilation Limit.

Minimum Outside Air Reset - External Control

If ExtV is selected as the Min OA Reset Type, the Minimum OA Position is calculated based on an external 0-10 VDC signal. If ExtmA is selected as the Min OA Type, the Minimum OA Position is calculated based on an external 0-20 mA signal. This calculated Minimum OA Position varies linearly from zero % at the editable minimum external signal to the maximum value at the editable maximum external signal, but it is set no lower than the Demand Control Ventilation Limit and no higher than the Ventilation Limit.

Minimum Outside Air Reset -IAQ

If either IAQV or IAQ mA is selected as the Min OA Type, the Minimum OA Position is calculated based on a 0-10V or 0-20 mA CO_2 sensor input. The CO_2 level is expressed as Parts Per Million. The minimum and maximum sensor input values (0-10V or 0-20 mA) and the corresponding minimum and maximum PPM values are user defined. This calculated Minimum OA Position varies linearly from the Demand Control Ventilation Limit at the "PPM @ DCV Limit" to the Ventilation Limit at the "PPM @ VentLimit". The "PPM @ DCV Limit" is not allow to be set equal to or greater than the "PPM @ VentLimit"

Examples of typical Min OA reset schedules.

If IAQ VDC is selected as the Min OA Type, the Minimum OA Position is calculated based on a 0-10V CO_2 sensor input. The CO_2 level is expressed as PPM (Parts Per Million). The minimum and maximum sensor input values (0-10V) and the corresponding minimum and maximum PPM values are user changeable. This calculated Minimum OA Position varies linearly from the Demand Control Ventilation Limit at the value labeled "PPM @ DCV Limit" to the Ventilation Limit at the value labeled "PPM @ VentLimit". The "PPM @ DCV Limit" is not allow to be set equal to or greater than the "PPM @ VentLimit"

Example #1 Min OA reset type = IAQ VDC

If the requirement is to have the OA damper be at its minimum (Demand Control Ventilation Limit) when the CO_2 levels are less than 800PPM and to be at its maximum (Ventilation Limit) when the CO_2 levels are greater than 1000PPM, the controller would be set up as follow:

- Vent Limit= 100%
- Lo Flow Vent Limit= 100%
- DCV Limit= 0%
- Min OA reset type= IAQ VDC
- PPM@DCV Limit= 800
- PPM@Vent Limit= 1000
- IAQ PPM= Current PPM
- Min PPM= 0 (From CO2 transducer)
- Max PPM= 2000 (From CO2 transducer)
- V/A @ Min PPM= 0 VDC
- V/A @ Max PPM= 10 VDC

In this example the Minimum OA Position would vary linearly from 0% outside air at 800PPM or less to 100% outside air at 1000PPM or greater.

Examples of typical Min OA reset schedules.

If EXT VDC is selected as the Min OA Type, the Minimum OA Position is calculated based on an external 0-10 VDC signal. This calculated Minimum OA Position varies linearly from zero % at the changeable minimum external signal to 100% at the changeable maximum external signal, but it is set no lower than the Demand Control Ventilation Limit and no higher than the Ventilation Limit.

Example #2 Min OA reset type = EXT VDC

If the requirement is to have the OA damper be at its minimum (Demand Control Ventilation Limit) when the field supplied signal is at its minimum (0VDC) and to be at its maximum (Ventilation Limit) when the field supplied signal is at its maximum (10VDC), the controller would be set up as follow:

- Vent Limit= 100%
- Lo Flow Vent Limit= 100%
- DCV Limit= 10%
- Min OA reset type= EXT VDC
- OA@MinV/mA= 0%
- OA@MaxV/mA= 100%
- Min V/mA= 0 VDC
- Max V/mA= 10 VDC

In this example the Minimum OA Position would vary linearly from 0% outside air at 0 VDC to 100% outside air at 10 VDC.

Reset Temperature Limit

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 the Return Fan Capacity Override function if the discharge air temperature or 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.

Minimum Position Control - Field Supplied Outdoor Airflow Station Input

When the OA Flow Station parameter in the Software Configuration Code is set to Field Station or Flow Station with reset and the Field Station parameter on the keypad is set to VDC or mA, the Minimum OA Position value is adjusted based on the measured amount of outdoor air being brought into the unit from a field supplied airflow monitoring station. If the airflow is below the desired value, the Minimum OA Position is increased and if the airflow is above the desired value, Minimum OA Position is decreased.

The field airflow signal will be in the form of a 0-10V or 0-20 mA input. The minimum and maximum sensor input values (0-10V or 0-20 mA) and the corresponding minimum and maximum CFM values are user editable.

NOTE: The Minimum OA Position is reset up and down between the Ventilation Limit and the Demand Control Ventilation Limit by a PI_Loop function to maintain the field OA CFM value at an adjustable OA CFM Setpoint.

NOTE: When the OA Flow Station parameter in the Software Configuration Code is set to Field Station, the field air flow input is assigned to the MCB-X1 input and External of CO_2 reset of outdoor dampers is not available. When the OA Flow Station parameter in the Software Configuration Code is set to Field Station w/Reset, the field air flow input is assigned to the EMB-X1 input and External of CO_2 reset of outdoor dampers is available using the MCB-X1 input.

0-30%OA Units

A two position 0-30% 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 driven closed when the OA damper analog output is at its minimum value. The desired minimum open position between 0% and 30% normally is set by an editable keypad menu item (Vent Limit). If a valid value is provided via the network, that position is used as the desired minimum open position instead of the keypad value

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 night setback, night setup, morning warm-up, and morning cool down situations. The two position damper is driven to the desired minimum open position in all other conditions.

The Ventilation Limit equals the keypad editable Vent Limit and the Demand Control Ventilation Limit equals the keypad editable DCV Limit. The Vent Limit cannot be set higher than the 0-30%OAMax value. The DCV Limit cannot be set higher than the Vent Limit.

Building Static Pressure Override

The minimum position determined by the various available reset methods may be overridden for a variable 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.

100% Outside Air Damper Control, Two Position

100% OA two position actuators are controlled by a modulating analog output.

The OA damper is driven to its 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

The OA damper is open during the Start Initial 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 Switch digital input indicates loss of airflow. This keeps the outside air dampers open in case there is a failure or external override that keeps the fan running after it is turned off by controller logic. If the fan is turned on by bypassing the controls that have it off, the Damper Output is NOT turned on.

Airside Economizer

(See page 49 for more information)

If a unit is equipped with a 0-100% modulating economizer, and the outdoor air is suitable for free cooling, the unit attempts to satisfy the cooling load by using outdoor air before using mechanical cooling. When the control temperature is above the Occupied Cooling Set Point by more than half the Occupied Cooling Dead Band and the discharge air temperature is above the Discharge Cooling Set Point by more than half the Discharge Cooling Dead Band, the controller enters the Econo state. When the unit is in the Econo operating state, the outdoor air dampers are modulated as required to maintain the Discharge Cooling Set Point.

Economizer to Cooling Operating 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 control temperature (Zone control units) is above the applicable Cooling Setpoint by more than half the applicable Cooling Deadband for longer than the Cooling Interstage Timer.

Cooling

(See page 45 for more information)

Entering the Cooling Operating State

The unit enters the Cooling operating state from the Fan Only operating state when the control temperature rises above the Occupied Cooling Set Point by more than half the Occupied Cooling Dead Band and the discharge air temperature is above the discharge cooling setpoint by more than half the Occupied Cooling Dead Band. The unit transitions from Cooling to Fan only when the control temperature falls below the Occupied Cooling Set Point by more than half the Occupied Cooling Dead Band. The unit will also transition from the Cooling to Fan only operating state if Cooling operation is disabled due to OA ambient lockout.

DAT Control

In the Cooling state, compressors are modulated to maintain the Discharge Air Temperature at the Discharge Cooling Setpoint.

Zone Control

In the Cooling state, compressors are turned ON and modulated to maintain the control temperature at the Occupied Cooling Setpoint.

When Dehumidification is active, compressors are modulated to maintain the leaving coil temperature at the minimum leaving coil setpoint.

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 in DAT Control units.

In Zone Control cooling and heating operation, the Projected Control Temperature, reduces overshoot as the zone temperature approaches a setpoint after startup. It does this by causing stages to stop increasing before the actual control temperature reaches the setpoint. The rate of change of the control temperature is calculated once per minute by the controller and equals the change during the last sixty 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 the unit is 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

Discharge Air Temperature Setpoint Reset - Cooling

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

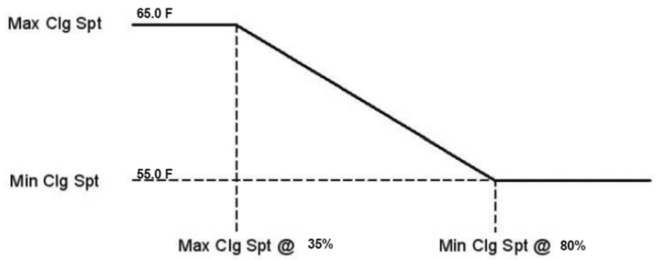
- None: Discharge Cooling Spt is user adjustable
- Network: Discharge Cooling Spt is equal to the Network DAT Clg Setpoint when it is valid
- Space: Discharge Cooling Spt is based on the Space Sensor
- Return: Discharge Cooling Spt is based on the Return Air Sensor
- OAT: Discharge Cooling Spt is based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

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, Ext mA, or Ext V 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 Space, Return, OAT, 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 below.

Figure 19: Cooling Setpoint



When Airflow is selected, the values "Min Clg Spt @" and "Max Clg Spt @" are entered as percentage values. When Ext mA is selected, the values "Min Clg Spt @" and "Max Clg Spt @" are entered as mA values. When Ext VDC is selected, the values "Min Clg Spt @" and "Max Clg 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 signal increase.

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.

When ever the Clg Reset Type or Engineering Units is changed, the Min Clg Spt @ and Max Clg Spt @ values revert to default values as follows:

- None: Min Clg Spt @=0NA, Max Clg Spt @=100NA
- Network: Min Clg Spt @=0NA, Max Clg Spt @=100NA
- Space, Return: Min Clg Spt @=73.0F, Max Clg Spt @=71.0F
- OAT: Min Clg Spt @=90.0F, Max Clg Spt @=70.0F
- ExtmA: Min Clg Spt @=4.0mA, Max Clg Spt @=20.0mA
- ExtVDC: Min Clg Spt @=0.0V, Max Clg Spt @=10.0V
- Airflow: Min Clg Spt @=100%, Max Clg Spt @=50%

Heating Control

(See page 55 and 99 for more information)

Entering Heating Operating State

The unit enters the Heating operating state from the Fan Only operating state when the control temperature falls below the Occupied Heating Set Point by more than half the Occupied Heating Dead Band. The unit transitions from the Heating to Fan Only operating state when the control temperature rises above the Occupied Heating Set Point by more than half the Occupied 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.

Heating: Staged 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 Contro 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.

Heating DAT Staging or MinDAT Staging

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 number of heating stages decreases when the time since 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.

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

Entering Heating Operating State

The unit enters the Heating operating state from the Fan Only operating state when the Control Temperature falls below the Occupied Heating Set Point by more than half the Occupied Heating Dead Band. The unit transitions from heating to Fan only when the Control Temperature rises above the Occupied Heating Set Point by more than half the Occupied 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. When the unit is in the Heating operating state, heating capacity is modulated to maintain the discharge air temperature at the Discharge Heating Set Point.

Gas Heating

When a unit is equipped with modulating gas heating and is in the Heating operating state, the gas valve is modulated to maintain the discharge air temperature at the Discharge Heating Set Point. The Discharge Heating Set Point is limited according to a maximum heat exchanger temperature rise limit. This factory set limit varies depending on the unit 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 (EFT) by more than this maximum heat exchanger temperature rise limit.

Minimum Discharge Air Temperature (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 Control Flag (DAT units only) is set to yes via 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 the 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 parameter in the Heating menu acts as the minimum discharge temperature limit.

The unit reverts to normal modulation of the gas heating valve when the Hold Period has elapsed since the unit entered Heating or MinDAT.

Sequence of Operation (Modulating Burner)

Low Heat Option with Modulation

The following details the sequence of operation for the low heat option.

- Unit DDC controller calls for heat.
- Furnace DDC control module receives a call for heat.
- Furnace safety switches and DDC control are checked for safe conditions.
- 45 second prepurge cycle starts. Proof of airflow switch is checked for combustion airflow.
- Spark ignitor is activated.
- Gas valve receives a signal to open fully.
- Burner is ignited and runs for 20 seconds in high fire.
- Note: if call for heat is interrupted during this timing, the furnace will be locked in for the 20 seconds cycle.
- Gas valve and induction blower motor receives a signal to modulate burner output to match the unit discharge air temperature setting.

Discharge Air Temperature Setpoint Reset - Heating

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 Sensor
- OAT: Discharge Heating Spt is based on the Outdoor Air Temperature
- Ext mA: Discharge Heating Spt is determined by a 0-20 or 4-20 mA signal
- Ext V: Discharge Heating Spt is determined 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 below.

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.

When ever the Htg Reset Type or Engineering Units is changed, the Min Htg Spt @ and Max Htg Spt @ values revert to default values as follows:

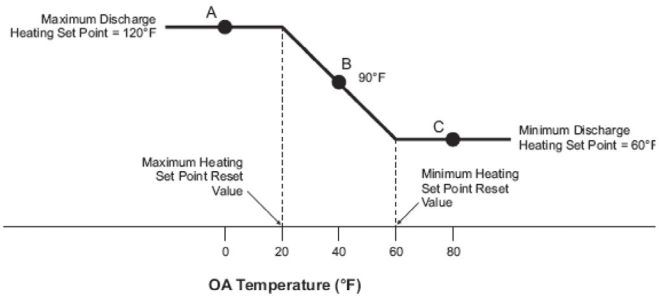
- None: Min Htg Spt @=0NA, Max Htg Spt @=100NA
- Network: Min Htg Spt @=0NA, Max Htg Spt @=100NA
- Space, Return: Min Htg Spt @=69.0°F, Max Htg Spt @=67.0°F
- OAT: Min Htg Spt @=60.0°F, Max Htg Spt @=20.0°F
- ExtmA: Min Htg Spt @=4.0mA, Max Htg Spt @=20.0mA
- ExtVDC: Min Htg Spt @=0.0V, Max Htg Spt @=10.0V

An example of discharge temperature reset based on outdoor air temperature is illustrated in Figure 20 (Heating Reset Type Flag is set to “OAT” in this example).When the current outdoor air temperature is less than or equal to the Minimum heating Set Point Reset Value (60°F in this example), the Discharge Heating Set Point is set equal to the Minimum Discharge Heating Set Point (60°F in this example).This is shown as Point C in Figure 20.

When the current outdoor air temperature is less than or equal to the Maximum Heating Set Point Reset Value (20°F in this example), the Discharge Cooling Set Point is set equal to the Maximum Discharge Heating Set Point (120°F in this example). This is shown as Point A in Figure 20.

When the current outdoor air temperature is between the Minimum Heating Set Point Reset Value and the Maximum Heating Set Point Reset Value, the Discharge Heating Set Point varies linearly between the Minimum Discharge Heating Set Point and Maximum Discharge Heating Set Point. This is shown as Point B in Figure 20.

Figure 20: Discharge Temperature Reset Based on Temperature



Fan Control

(See page 40 for more information)

Indoor Air Fan - On/Off Control

A supply fan is provided on every unit. This may be the only fan, but an exhaust fan can be provided also. The start/stop signal and the speed signal for fans are provided via an internal ModBus network.

Supply Fan

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 it stays on for a OffHtClDelayTime (Default- 120 seconds) if the unit is turned OFF while cooling or heating is active. The OffHtClDelayTime function is overridden when and Emergency Off or Duct High Limit fault is active.

Exhaust Fan On/Off Control

A DPS unit can be equipped with either a CAV or VAV exhaust fan. This fan is shipped from the factory set up for the operation based on the sales order. Units equipped with the 0-100% modulating economizer operation should always remain set up for VAV control on building pressure. Unit's equipped with 0-30% OA or 100% OA hoods can be set up for either CAV or VAV operation.

Supply Fan Capacity Control (VAV)

The speed of a modulating supply fan is controlled by a 0-100% signal provided to the fan motor via an internal Modbus network. Supply Fan Capacity Control for a modulating fan is controlled to maintain the duct static pressure at a desired value, maintain a fixed speed based on a signal provided via a network, or maintain space temperature conditions (1ZnVAV).

The choice of control method, SF Cap Ctrl, may be set to Duct Pressure, Speed or Single Zone VAVvia the keypad. After the supply fan is started, a speed signal of 33% is sent to the fan motor for the DSPCtrlDelay (Default=30 seconds). Control reverts to either duct pressure, speed or single zone VAV after the fan has been on for the duration of the DSPCtrlDelay time. The motor speed is not controlled below the minimum SAF speed setting (default 33%) while the fan is operating.

Duct Static Pressure Control

The control parameter for the fan speed is the duct static pressure setpoint. If the duct static pressure is below the duct static pressure setpoint by more than ½ the deadband, the fan speed will increase. Likewise if the duct static pressure is above the duct static pressure setpoint by more than ½ the deadband the fan speed will decrease. Example - if the duct static pressure setpoint is 1.2" and the deadband is 0.1", the duct static pressure must drop to 1.15 before the fan will increase in speed. The Duct Static Pressure setpoint may be set through the keypad or via a network signal. The active setpoint is changed whenever either of these values changes so it equals whichever value was changed most recently.

Speed/Network Control

When speed/network control is selected, the fan operates at the larger of its minimum speed or a value provided via a connected network or the keypad/display.

Single Zone VAV Control

When single zone VAV control is selected, the supply fan is controlled with a PI_Loop to maintain the Control Temperature input at the Occupied Cooling Setpoint or Occupied Heating Setpoint. This control choice is designed for DAC control type and will be used in applications where the unit will act as a single VAV box to control space temperature. Cooling and heating discharge air temperature control and outside air damper control will function in the normal manner as with VAV units.

Exhaust Fan Capacity Control

A DPS unit can be equipped with either a CAV or VAV exhaust fan. This fan is shipped from the factory set up for the operation based on the sales order. Units equipped with the 0-100% modulating economizer operation should always remain set up for VAV control on building pressure. Unit's equipped with 0-30% OA or 100% OA hoods can be set up for either CAV or VAV operation.

Building Static Pressure Control

Once the fan is running the capacity of the fan is controlled with a PI Loop to maintain the building static pressure at the building static pressure setpoint.

Speed/Network Control

Once the fan is running the capacity of the fan is controlled to the RemExhFCap= setting which is changed via the unit keypad or a network signal.

Outdoor Damper Position Control

Once the fan is running the capacity of the fan is controlled between the minimum value (Default=5%) and 100% as the outdoor damper position varies between the ExhOnOAPos= setting (Default=40%) and the ExhMxOAPos= setting (Defaut=100%).

Heat Pump Control, Rebel Units 3 to 15 Ton

If compressor heating is available it is used first to provide the heating source during the MinDAT and Heating states. If compressor heating is unavailable (as during defrost operation for example) or inadequate to meet the heating requirements during these states, supplemental heating will be used to add to or in lieu of the compressor heating.

When dehumidification operation is active, the compressors will operate in the cooling mode and the reheat will be provided by either hot gas reheat or by the supplemental heat in the unit depending on the configuration parameter setting. When a unit is configured for heat pump operation compressor heating will always be defined as the "primary" heating and the supplemental heating or hot gas reheat (whichever is currently active) is defined as the "secondary" heat source.

Heat Pump Cooling Operation

When the unit transitions from the Fan Only to Cooling operating state or if dehumidification operation becomes active while in the Fan Only state, compressor cooling operation begins. Refer to "Inverter Compressor Cooling State Descriptions" on page 103 for a detail description of the cooling compressor operating sequence.

Heat Pump Heating Operation

When the unit transitions from the Fan Only to MinDAT (page 125) or Heating operating state, compressor heating operation begins. Refer to "Inverter Compressor Heating State Descriptions" on page 130 for a detail description of the heating compressor operating sequence.

Heat Pump Defrost Operation

Defrost operation is required when compressor operation is in the Normal Heating state when frost build up on the outdoor coil interferes with the normal heat transfer from the outdoor coil to the ambient air. Refer to "Defrost Operation– Heat Pump Units Only" on page 134 for a detailed description.

Supplemental Heating/Compressor Heating Transitions

Special action is required when the unit transitions from using compressor (heat pump) heating to supplemental heating and vise versa. Normal operation is for the compressor heating to turn ON first and ramp to full capacity before turning on any supplemental heating. Once the compressor heating is at full capacity, the supplemental heating will then ramp up and down as necessary to satisfy the load. There will however be instances when heating is required and compressor heating is unavailable in which case the supplemental heating must turn ON first. These include the following cases:

- Compressor heating operation is disabled
- Heat pump defrost operation is active
- Dehumidification is active
- Unit is 100% OA and the OAT is below the low limit set point of about 0° F [adjustable.] This is adjustable such that heat pump operation can be locked out at ambients where gas heat is more economical.

In the cases where compressor heating becomes available while the supplemental heating is operating it is desirable to shift as much of the load as possible to the compressor heating. This is accomplished with the following sequence which occurs whenever compressor heating enters the Normal Heating state or leaves defrost operation while supplemental heating is active:

- Inverter compressor speed is increased 5% every 15 seconds up to maximum speed.
- Fixed speed compressor is turned ON when the inverter compressor reaches maximum speed.

Supplemental heating is allowed to cycle OFF normally while the compressor heating is ramping up. When the supplemental heating has been OFF for one stage time period, normal modulating compressor control begins from the current capacity.

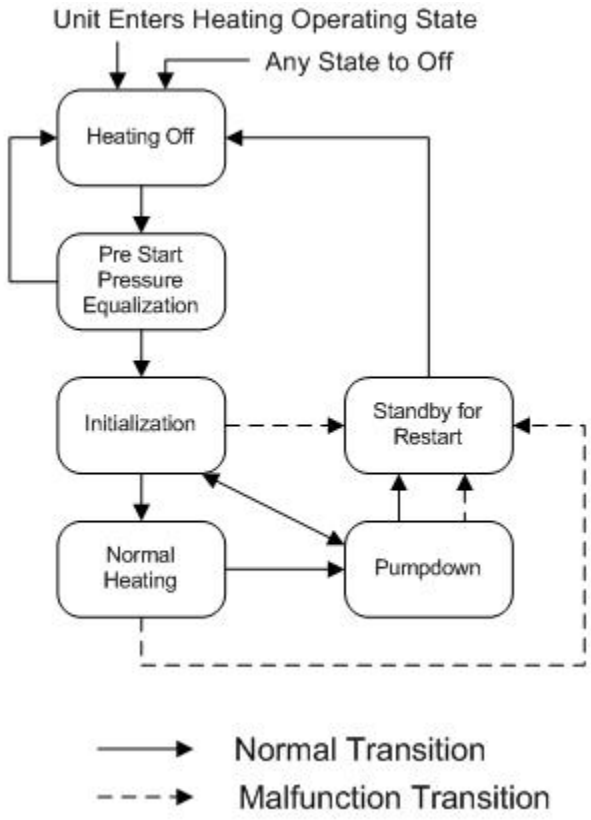
When compressor heating is operating while supplemental heating is inactive, the supplemental heating is held inactive until then compressor capacity has been operating at its maximum capacity and the fixed compressor is ON for one stage time period. At this point the supplemental heating is enabled to start cycling to meet the load.

Heat Pump Operating State

Compressor Heating Operation State Machine – Heat Pump Units Only

This section applies to heat pump units only. 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 in the following state diagram. Control based on discharge air temperature (DAT) occurs in the Normal Heating state.

Figure 21: Heating State Diagram



Off to Prestart Pressure Equalization

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

Prestart Pressure Equalization to Off

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

Prestart Pressure Equalization to Initialization

The Compressor Heating State transitions from Prestart Pressure Equalization to initialization after ninety seconds.

Initialization to Normal

The Compressor Heating State transitions from Initialization to Normal when the initialization sequence is complete. See Initialization state description in the "Inverter Compressor Heating State Descriptions" on page 130.

Initialization to Pumpdown

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

Initialization to Standby for Restart

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

Normal to Standby for Restart

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

Inverter Compressor Heating State Descriptions

The Inverter Compressor Heating State determines the operation of the following devices:

- Inverter Compressor
- Fixed Speed Compressor (if present)
- Outdoor Fan(s)
- 4 Way Reversing Valve (4WV)
- Outdoor Expansion Valve (EVO)
- Indoor Expansion Valve (EVI)
- Receiver Solenoid Valve (SVR)
- Bypass Solenoid Valve (SVB)

Heating Off

Compressor heating operation begins in the OFF state. When in the OFF state, all devices are off or closed. The state remains here until there is a call for heating.

Pre Start Pressure Equalization

In the Pre Start Pressure Equalization state the SVB valve is opened to divert hot gas leaving the compressor directly to the suction line to equalize the pressures in the system before beginning compressor operation. The outdoor fan is set at 50% speed. Operation remains in this state for 90 seconds. When in the Pre Start Pressure Equalization state, all devices are OFF or closed except the outdoor fan(s) and SVB. The outdoor fan(s) speed is set to 50%.

Initialization

In the Initialization state either the Standard Initialization or Alternate Initialization sequence is used in order to manage refrigerant and assure the 4-way valve is switched. The Alternate Initialization sequence is used the first time the unit enters heating after unit power up, or when the compressors had last operated in cooling, or if it has been a long time since heating has operated and it is cold outdoors. Otherwise the Standard Initialization Sequence is used.

Table 70: Standard Initialization Sequence

Device	Step 1	Step 2	Step 3	Step 4
Inverter Compressor & Comp 3	Inverter Compressor Speed=minimum Comp 3=Off	Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum Comp 3=Off	←	A
Inverter Compressor Only	Inverter Compressor Speed=minimum	If OAT≤59°F, Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum If OAT>59°F, Inverter Compressor Speed=minimum	←	A
Outdoor Fan	Outdoor Fan=100%	←	←	←
4 Way Valve (HeatPump)	ON	←	←	←
Outdoor Coil Expansion Valve (EVO) (HeatPump)	EVO=0%	←	B	←
SVR (HeatPump)	Closed	←	←	←
SVB	Normally Open Close if either of the following is true: 60 seconds elapses from the beginning of ***Step 1*** Discharge superheat>18°F	←	←	←
Indoor Coil Expansion Valve (EVI)	EVI=100%	C	←	←
Time Duration	10 seconds	5 seconds	5 seconds	D

A. Inverter compressor speed is increased until the 4-way valve is seated (discharge minus suction pressure >57 psi) and as long as the suction pressure is above 43 psi and. Comp 3 remains OFF

B. The outdoor expansion valve is controlled to keep the suction superheat between 3.6°F and 9.0°F.

C. Standard Initialization lasts a maximum 120 seconds. It is completed early anywhere between 10 seconds and 120 seconds if discharge pressure is high (above 384 psi) or when the 4-way valve has been seated for 60 seconds (differential pressure above 57 psi).

See page 102 for more information about what is a compressor *“step”.*

Table 71: Alternate Initialization Sequence

See page 102 for more information about what is a compressor *"step"*.

	Step 1	Step 2	Step 3
Inverter Compressor & Comp 3	Inverter Compressor Speed=minimum Comp 3=Off	Inverter Compressor Speed=Smaller of ***Step 12*** or Maximum Comp 3=Off	A
Inverter Compressor Only	Inverter Compressor Speed=minimum	If OAT≤59°F, Inverter Compressor Speed= Smaller of ***Step 12*** or Maximum If OAT>59°F, Inverter Compressor Speed=minimum	A
Outdoor Fan	Outdoor Fan=100%	←	←
4 Way Valve (HeatPump)	ON	←	←
Outdoor Coil Expansion Valve (EVO) (HeatPump)	B	←	←
SVR (HeatPump)	Closed	←	←
SVB	Normally Open Closed If Discharge superheat>18°F	←	←
Indoor Coil Expansion Valve (EVI)	EVI=100%	←	←
Time Duration	5 seconds	5 seconds	C

A. Inverter compressor speed is increased until the 4-way valve is seated (discharge minus suction pressure >57 psi) and as long as the discharge pressure is below 221 psi. inverter compressor speed is also increased if the discharge pressure remains below 171 psi. Comp 3 turns on if the inverter compressor speed is at maximum and these conditions are not met. Comp 3 is turned back OFF after 20 seconds if the discharge pressure rises above 221 psi.

B. The outdoor expansion valve is controlled to keep the suction superheat between 3.6°F and 5.4°F.

C. Alternate Initialization lasts a maximum 15 minutes. It is completed early anywhere between 10 seconds and 15 minutes if once the 4-way valve is seated (differential pressure above 57 psi and either the discharge superheat above 18°F or the discharge pressure is above 384 psi).

Normal Heat Pump Control

Normal Heating

In the Normal Heating state the following are accomplished:

- Compressor capacity (INV and Comp 3) is regulated to maintain the DAT at either the Discharge Air Temperature Heating Setpoint (Unit State=Heating) or the Minimum Discharge Air Temperature Spt (Unit State=MinDAT)
- Outdoor coil expansion value (EVO) is modulated to maintain the suction superheat at the suction superheat setpoint
- Indoor coil expansion valve (EVI) is controlled to maintain indoor coil subcooling at the indoor coil subcooling setpoint (heat pump)
- Outdoor fan(s) are set to maximum and then decreased if the suction pressure is high (above 162.2 psi) or increased back toward the maximum if the suction pressure is low (below 106.7 psi).

When in the Normal Heating state the action of the heating control devices is as follows:

Table 72: Normal Heating State

Device	Action
Compressors	Inverter Compressor Speed Controlled with PI Loop to maintain DAT Setpoint Comp 3: Turned On when Inverter Compressor at Maximum Comp 3: Turned Off when Inverter Compressor at Minimum
Outdoor Fan	A
4 Way Valve (HeatPump)	ON
Outdoor Coil Expansion Valve (EVO) (HeatPump)	EVO Controlled With PI Loop to maintain Suction Superheat Setpoint
SVR (HeatPump)	Closed
SVB	SVB is normally closed during the Normal Heating state except in the following cases: SVB is opened for one second before and after Comp 3 is stopped. During Low Pressure Unloading Control SVB is opened if PTS <147.1 kPa (21.34 psi). It is closed again when PTS>294.2 kPa (42.67 psi).
Indoor Coil Expansion Valve (EVI)	B
Time Duration	While in Normal Heating state

A. Outdoor fan(s) are set to maximum and then decreased if the suction pressure is high (above 162.2 psi) or increased back toward the maximum if the suction pressure is low (below 106.7 psi).

B. The indoor expansion valve is either driven fully open or varied based on indoor coil subcooling as follows:

   When the Htg EVI Method is set to 100%, the indoor expansion valve is driven to the 100% open position.

   When the Htg EVI Method is set to SbC, the indoor expansion valve is controlled to maintain the indoor coil subcooling at the indoor coil subcooling temperature setpoint.

Pumpdown

Compressor heating operation enters the Pumpdown state before entering the Standby for Restart state from either the Initialization or Normal Heating state.

The following describes the operation of the compressor heating control devices in the Pumpdown state:

Table 73: Pumpdown State

	Step 1
Compressors	Inverter Compressor Speed = Smaller of Step 12 or maximum Comp3=OFF
Outdoor Fan	Outdoor Fan speed = maximum
4 Way Valve (4WV)	ON
Outdoor Expansion Valve (EVO)	Outdoor Expansion Valve position = 0%
SVR	Closed
SVB	Open
Indoor Expansion Valve (EVI)	Indoor Expansion Valve Control position = 50%
Time Duration	See A below

A. Pumpdown is complete after 3 minutes or when the suction pressure drops below 34 psi. Pumpdown is terminated if either the discharge superheat rises above 230°F or if the Inverter Compressor port temperature rises above 284°F.

Standby for Restart

The Standby for Restart state guarantees at least one Htg Stg Time period elapses before re-entering the Intializaton and Normal Heating states. The following describes the Standby for Restart state sequence:

Table 74: Standby for Restart State

	Step 1	Step 2
Compressors	Inverter Compressor speed = 0% Comp3=OFF	←
Outdoor Fan	Outdoor Fan speed = 50% if OAT > 86°F when entering Standby for Restart state Outdoor Fan speed = 0% if OAT ≤ 86°F when entering Standby for Restart state	←
4 Way Valve (4WV)	ON	←
Outdoor Expansion Valve (EVO)	Outdoor Expansion Valve position = 0%	←
SVR	Closed	Closed
SVB	Closed	←
Indoor Expansion Valve (EVI)	Indoor Expansion Valve position = 0%	←
Time Duration	5 seconds	Remainder of Htg Stg Time
	Htg Stg Time (default = 5 minutes)	

Defrost Control

(See page 61 for more information)

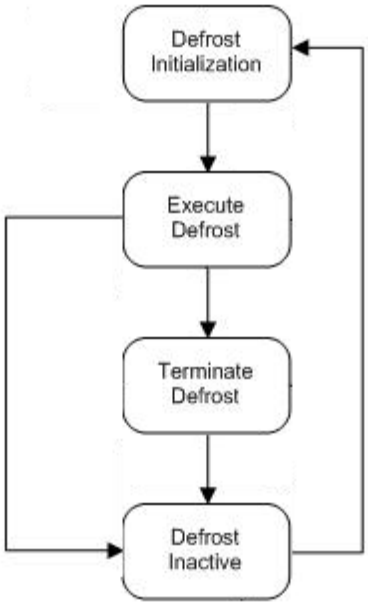
Defrost Operation– Heat Pump Units Only

This section applies to heat pump units only. Defrost operation is required when compressor operation is in the Normal Heating 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 Heating state but the device control is overridden until the defrost operation is complete. While defrost operation is active, the auxiliary supplemental heat source in the unit is use to maintain comfort conditions.

Defrost Operation State

When outdoor coil defrosting is required defrost operation transitions through the defrost states shown in the following state diagram:

Figure 22: Defrost Operating States



Defrost Initiation (Heat Pump)

DPS 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 14.0°F and the saturated suction temperature is below 32°F.

When a compressor is operating under these potential frosting conditions for at least the MinCmpOpTm= period (Default=10 minutes) and the accumulated compressor operation time since the last defrost cycle exceeds the MinAccCmpTm= value (Default=40 minutes), the controller can initiate a defrost cycle base on temperature, time or on a manual request as described in the following sections.

Temperature Defrost

A defrost cycle is initiated based on temperature when the Defrost Temperature (DFT) drops below a defrost temperature value (Tdef) and the saturated discharge temperature is below 109°F continuously for 3 minutes. The Tdef value is adjusted automatically between (+) 14°F and (-) 13.0°F based on outdoor air temperature. This value is not directly adjustable but can be “biased” by setting the Tdef Adj= parameter (Default=0°F) between -3.6°F and +3.6°F. Note: To improve performance the Tdef 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 Initialization

This state prepares the system for switching the 4-way valve to the cooling position

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 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 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, action of the compressor devices is a dictated by the applicable heating or cooling compressor state.

4 Way Reversing Valve Control (4WV) – Heat Pump Units Only

4WV is energized (On) when the unit is in the MinDAT or Heating operating state. 4WVG is de-energized (OFF) when the unit is in the Cooling operating state.

NOTE: Once switched, the 4WV remains in the new position until the unit's state changes from Cooling to MinDAT or Heating or viceversa.

Receiver Solenoid Valve Control (SVR)

DPS heat pump units include a receiver solenoid valve that is used to direct the refrigerant to the receiver while switching the valve during the defrost cycle. The SVR valve is closed most of the time but is opened at certain points in the defrost cycle and in the Pumpdown and Standby for Restart compressor operating states.

The SVR solenoid is typically controlled with the following sequence, Minimum 10 seconds ON, Off if (SRT)is less than 9°F, otherwise remains ON. Once Off SVR remains Off for the remainder of Terminate Defrost.

Bypass Solenoid Valve Control (SVB)

DPS units include a bypass solenoid valve that opens when necessary to bypass refrigerant from the high to the low side of the inverter compressor to reduce the load on the compressor. The bypass solenoid is closed most of the time. Refer to the descriptions of the compressor operating states and protection control functions for details regarding when the bypass valve is opened.

Troubleshooting

Inverter Board Fault Codes

MicroTech III 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 III 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 Figure 23.

Possible Inverter Compressor fault codes are listed in Table 75 below:

Table 75: Rebel 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

Possible outdoor fan fault codes are listed in Table 76 below.

Table 76: Rebel 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

Detailed description and diagnostic instructions are shown on the following pages.

Figure 23: Inverter Board Fault Codes

Fault Code Details
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
MM/DD/YYYY HH:MM:SS

Troubleshooting Module-to-Module Communication

There are three status parameters on the HMI that are designed to aid in diagnosing communication problems related to the IFB board. These are IFBCommStatus=, ACS1 DataRcvd= and ACS3 DataRcvd= and are described below. Also refer to Figure 3 on page 7.

IFBCommStatus

The IFB communication status parameter indicates problems with the communication between the MicroTech III controller and the INV, OF1, OF2 and the EVB devices via the IFB board. There are 13 possible conditions indicated by this parameter. These are described as follows:

OK: All communications related to IFB Board is OK

OF2Err: Communication between the A5P board controlling OF2 and the ACS1 communication loop has been interrupted for 65 seconds after communication had initially been established. Since a break anywhere in the communication current loop will result in an ACS1Err (described below) this indicator generally suggests a defect in the A5P board.

OF1Err:
460/575V Unit—Communication between the A5P board controlling OF1 and the ACS1 communication loop has been interrupted for 65 seconds after communication had initially been established. Since a break anywhere in the communication current loop will result in an ACS1Err (described below) this indicator generally suggests a defect in the A5P board.

208/230V Unit—Communication between the A4P board controlling OF1 and the ACS1 communication loop has been interrupted for 65 seconds after communication had initially been established. Since a break anywhere in the communication current loop will result in an ACS1Err (described below) this indicator generally suggests a defect in the A4P board.

OF12Err:
460/575V Unit—Communication between both of the A5P boards controlling OF1 and OF2 and the ACS1 communication loop has been interrupted for 65 seconds after communication had initially been established. Since a break anywhere in the communication current loop will result in an ACS1Err (described below) this indicator generally suggests a defect in both the A5P boards.

208/230V Unit—Communication between the A4P board controlling OF1 and the A5P board controlling OF2 and the ACS1 communication loop has been interrupted for 65 seconds after communication had initially been established. Since a break anywhere in the communication current loop will result in an ACS1Err (described below) this indicator generally suggests a defect in both the A4P and A5P boards.

INVErr: Communication between the A4P board controlling inverter compressor (INV) and the ACS1 communication loop has been interrupted for 20 seconds after communication had initially been established. If this indicator remains active more than 120 seconds it generally suggests a defect in the A4P board.

NOTE: A break anywhere in the communication current loop will result in an ACS1Err (described below).

ACS3Err: The ACS3 communication loop between the IFB board ACS3 connector and the EVB board has been interrupted for 65 seconds after communication had initially been established. This generally indicates a physical break in the communication current loop wiring between the IFB board and the EVB board, lack of power to the EVB board or a defect in the EVB board.

ACS1Err: The ASC1 communication loop between the IFB board ASC1 connector and the A4P and A5P boards has been interrupted for 65 seconds after communication had initially been established. This indicator generally suggests a physical break or interruption somewhere in the communication current loop wiring or possibly lack of power to both A4P and A5P.

ACS13Err: The ASC1 and ACC3 communication loops between the IFB board ACS1 connector and the A4P and A5P boards and between the IFB board ACS3 connector and the EVB board have been interrupted for 65 seconds after communication had initially been established. This indicates that both of the conditions described above for ACS1Err and ACS3Err exist.

Init3Err: Proper communication was not established within 65 seconds of power up between the EVB board and the IFB board ACS3 connector. Refer also to ACS3 DataRcvd below.

Init1Err: Proper communication was not established within 65 seconds of power up between the A4P and A5P boards and the IFB board ACS1 connector. Refer also to ACS1 DataRcvd below.

Init13Err: Proper communication was not established within 65 seconds of power up between neither the EVB board and the IFB board ACS3 connector nor the A4P and A5P boards and the IFB board ACS1 connector. Refer also to ACS1 DataRcvd and ACS3 DataRcvd below.

IFBRst: 24 VAC power to the IFB was interrupted and then re-established causing a reset of the ACS1 and ACS3 communication loops.

MBErr: Communication between the MicroTech III controller and the IFB board has been interrupted for 30 seconds.

ACS1 DataRcvd

Upon power up the IFB board receives initial confirmation data from all the devices that are connected to the ACS1 channel. Problems with this confirmation are indicated with this parameter. There are 8 possible conditions indicated. These are described as follows:

ErrAll: IFB did not receive initial confirmation data from any of the devices on the ACS1 communication channel. This generally indicates a physical break in the ACS1 communication loop wiring between the IFB board and the A4P and A5P boards or lack of power to both the A4P and A5P boards.

F1F2Err: IFB did not receive initial confirmation data from the OF2 nor OF1 on the ACS1 communication channel. This generally indicates a defect in both the boards controlling OF1 (A4P or A5P) and OF2 (A5P).

INVF2Err: IFB did not receive initial confirmation data from the INV nor OF2 on the ACS1 communication channel. This generally indicates a defect in both the boards controlling INV (A4P) and OF2 (A5P).

F2Err: IFB did not receive initial confirmation data from the OF2 on the ACS1 communication channel. This generally indicates a defect in the board controlling OF2 (A5P).

INVF1Err: IFB did not receive initial confirmation data from the INV or OF1 on the ACS1 communication channel. This generally indicates a defect in both the boards controlling INV (A4P) and OF1 (A4P or A5P).

F1Err: IFB did not receive initial confirmation data from the OF1 on the ACS1 communication channel. This generally indicates a defect in the board controlling OF1 (A4P or A5P).

INVErr: IFB did not receive initial confirmation data from the INV on the ACS1 communication channel. This generally indicates a defect in the board controlling INV (A4P).

AllOK: All initial confirmation data has been received from all the devices on the ACS1 communication loop.

ACS3 DataRcvd

Upon power up the IFB board receives confirmation data from all the devices that are connected to the ACS3 channel. Problems with this confirmation are indicated with this parameter. There are 2 possible conditions indicated. These are described as follows:

Error: IFB did not receive initial confirmation data from the EVB board on the ACS3 communication channel. This generally indicates a physical break in the ACS3 communication loop wiring between the IFB board and the EVB board, lack of power to the EVB board or a defect in the EVB board.

OK: All initial confirmation data has been received from all the EVB board on the ACS3 communication channel.

Figure 24: Unit will not Start with Compressor Cooling

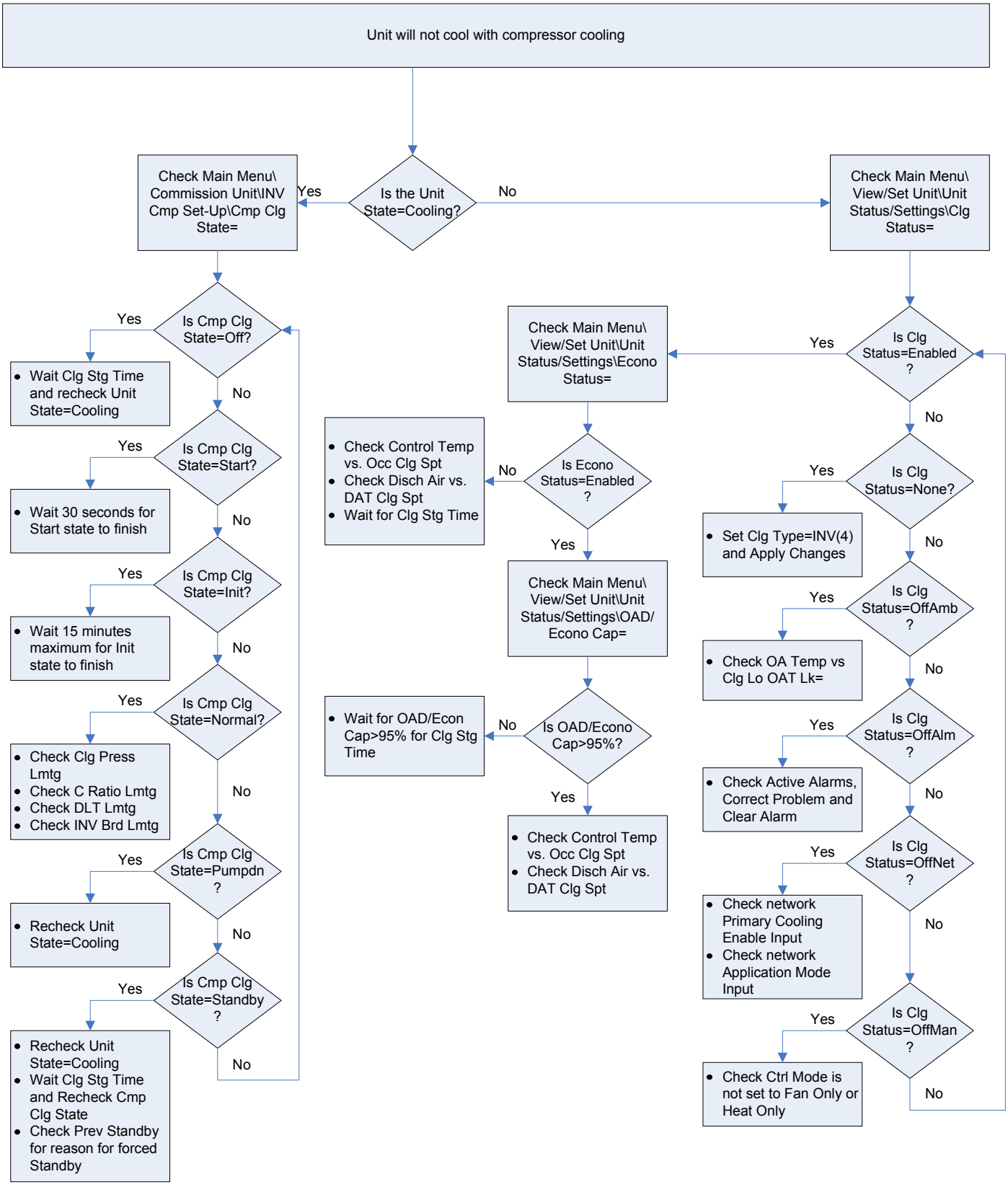


Figure 25: Unit wil not Heat with Compressor Heating

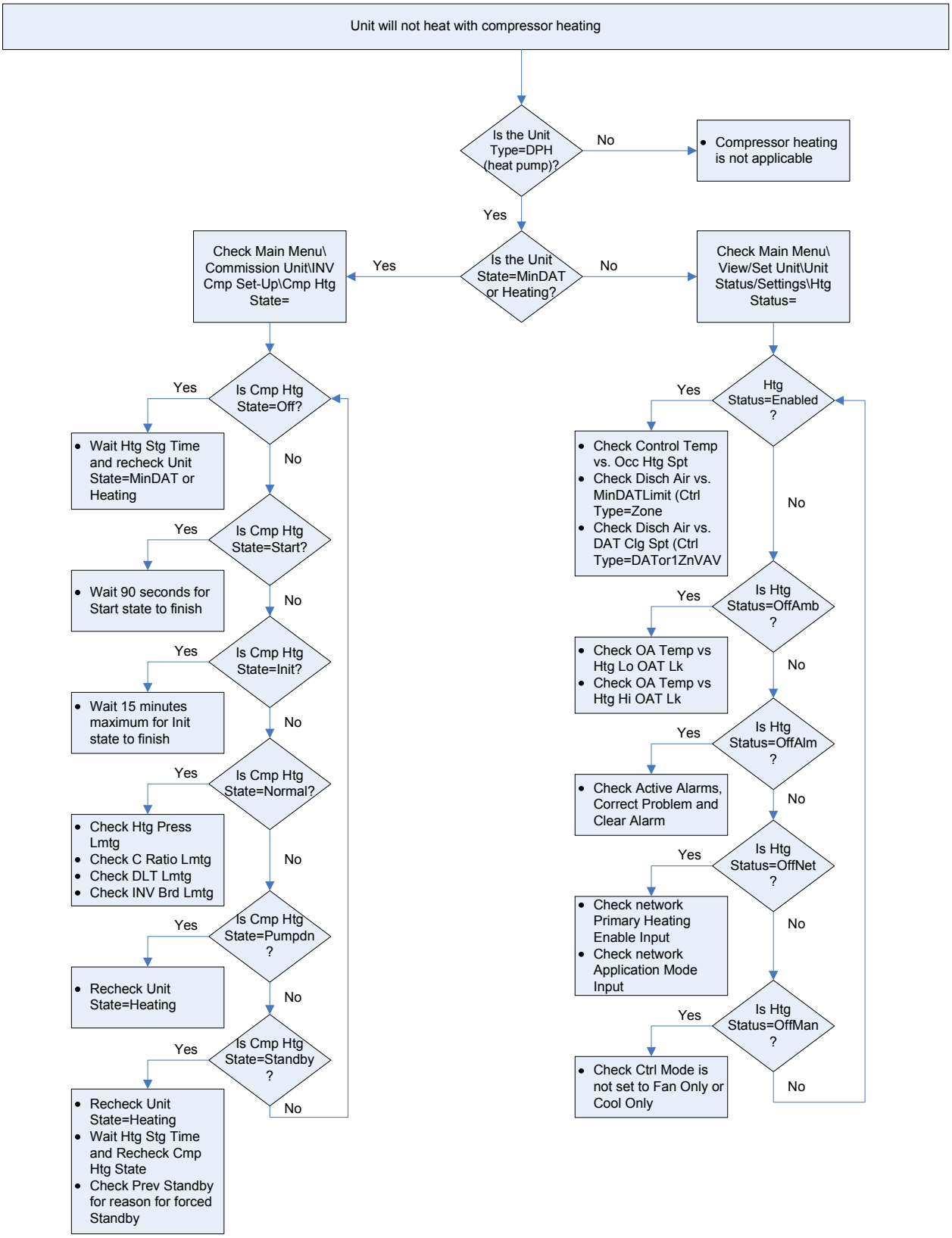
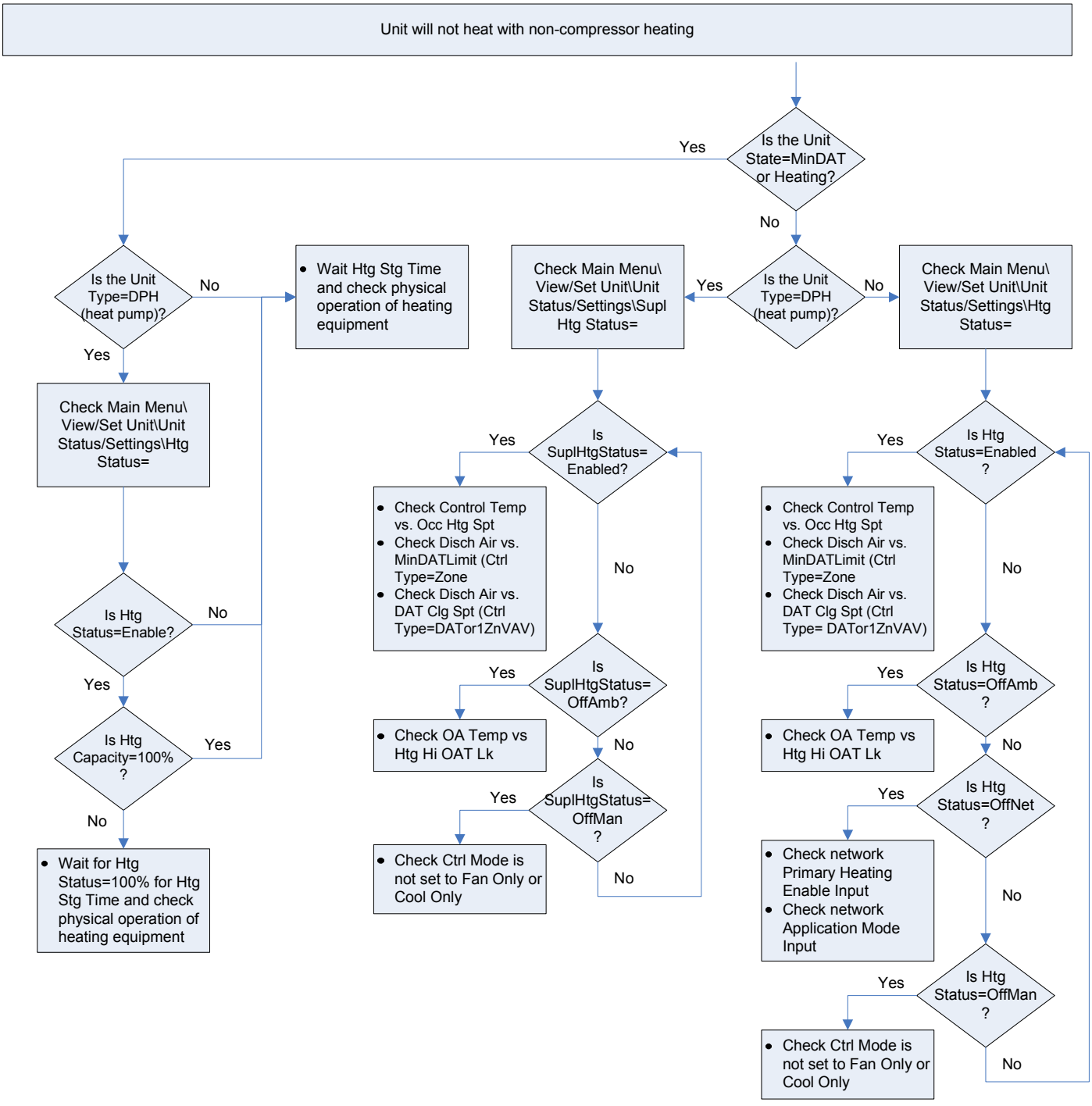


Figure 26: Unit will not heat with Non-Compressor Heating

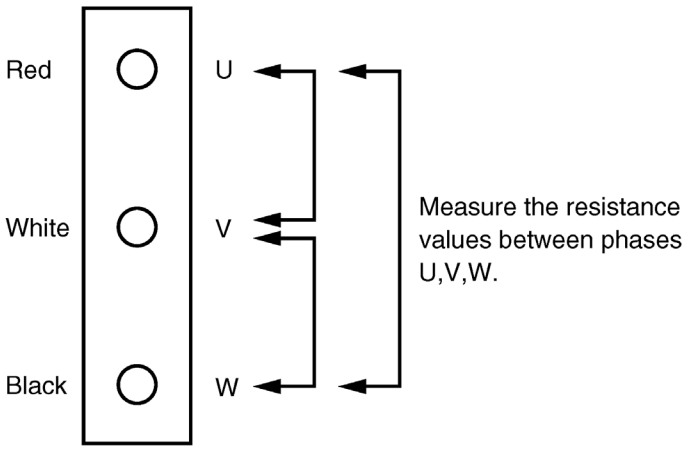


The Check 1, Check 2 and Check 3 procedures on page 142 and 143 are used to troubleshoot many error codes.

CHECK 1

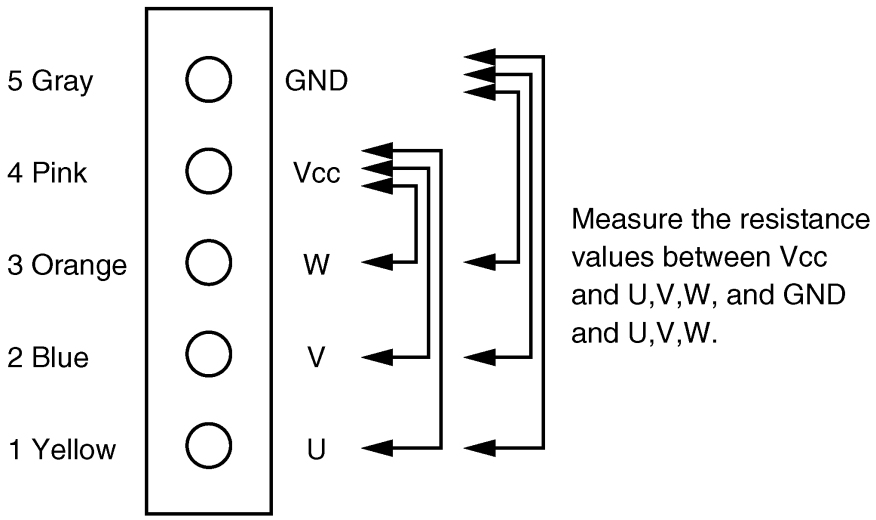
Check on connector of fan motor (Power supply cable)

1. Turn OFF the power supply.
   Measure the resistance between phases of U,V,W at the motor side connectors (three-core wire) to check that the values are balanced and there is no short circuiting, while connector or relay connector is disconnected.



CHECK 2

1. Turn OFF the power supply.
2. Measure the resistance between Vcc and each phase of U, V, W, and GND and each phase at the motor side connectors (five-core wire) to check that the values are balanced within the range of ± 20 %, while connector or relay connector is disconnected. Furthermore, to use a multimeter for measurement, connect the probe of negative pole to Vcc and that of positive pole to GND.

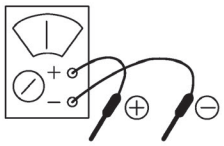


CHECK 3 – Power Resistor Check

Perform the following procedures prior to check.
(1) Power Off.
(2) Remove all the wiring connected to the PC board where power transistors are mounted on.

[Preparation]

· Tester



* Preparing a tester in the analog system is recommended. A tester in the digital system with diode check function will be usable.

[Point of Measurement and Judgment Criteria]

· Measure the resistance value using a tester at each point of measurement below, 10 minutes later after power OFF.

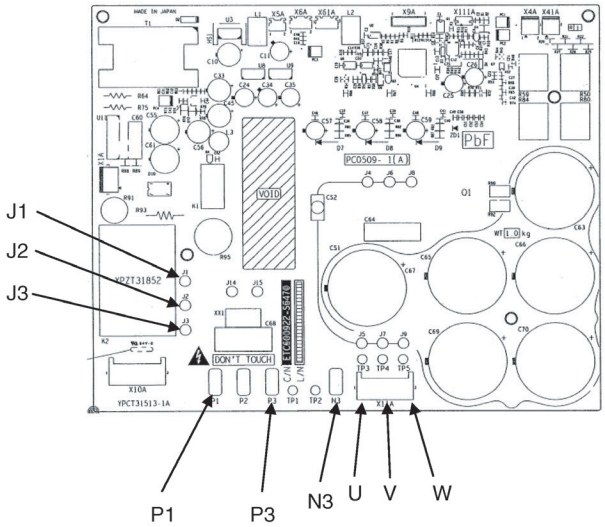
To use analog tester:
Measurement in the resistance value mode in the range of multiplying 1kΩ.

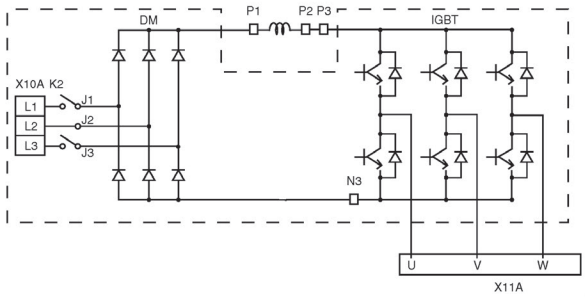
No.	Point of Measurement		Judgment Criteria	Remarks
	+	–		
1	P2	U	2 ~ 15kΩ	
2	P2	V		
3	P2	W		
4	U	P2	15kΩ and above (including ∞)	Due to condenser charge and so on, resistance measurement may require some time.
5	V	P2		
6	W	P2		
7	N3	U		
8	N3	V		
9	N3	W		
10	U	N3	2 ~ 15kΩ	
11	V	N3		
12	W	N3		

To use digital tester:
Measurement is executed in the diode check mode. (→|←)

No.	Point of Measurement		Judgment Criteria	Remarks
	+	–		
1	P2	U	1.2V and over	Due to condenser charge and so on, resistance measurement may require some time.
2	P2	V		
3	P2	W		
4	U	P2	0.3 ~ 0.7V	
5	V	P2		
6	W	P2		
7	N3	U		
8	N3	V		
9	N3	W		
10	U	N3	1.2V and over	Due to condenser charge and so on, resistance measurement may require some time.
11	V	N3		
12	W	N3		

[PC board and Circuit Diagram]



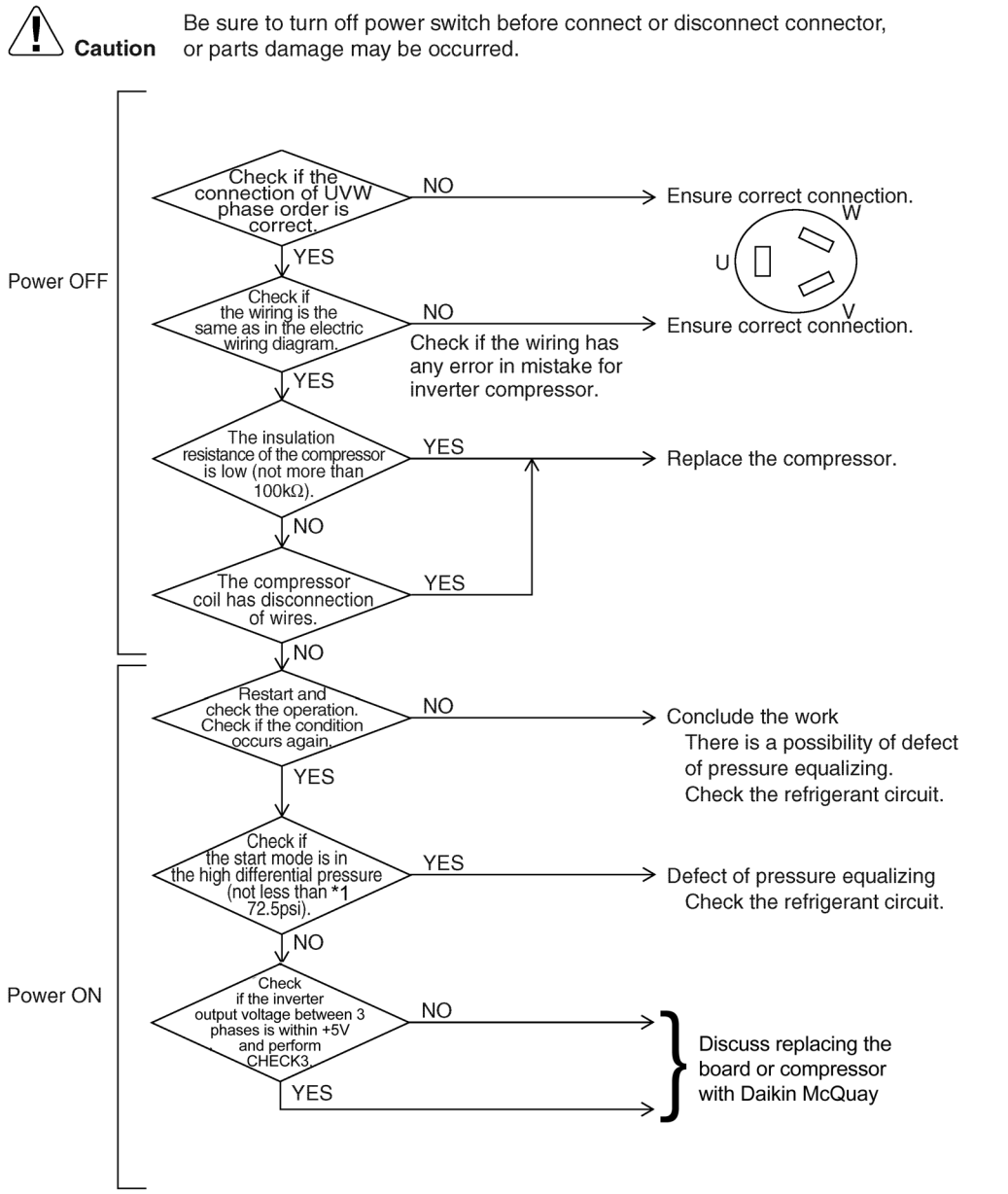


(V2895)

ERROR CODE: E5 – Inverter Compressor Motor Lock

Remote Controller Display	E5
Method of Malfunction Detection	Inverter PC board takes the position signal from UVW line connected between the inverter and compressor, and the malfunction is detected when any abnormality is observed in the phase-current waveform.
Malfunction Decision Condition	This malfunction will be output when the inverter compressor motor does not start up even in forced startup mode.
Supposed Causes	● Inverter compressor lock ● High differential pressure (72.5psi or more) ● Incorrect UVW wiring ● Faulty inverter PC board

Figure 27: E5 – Inverter Compressor Motor Lock

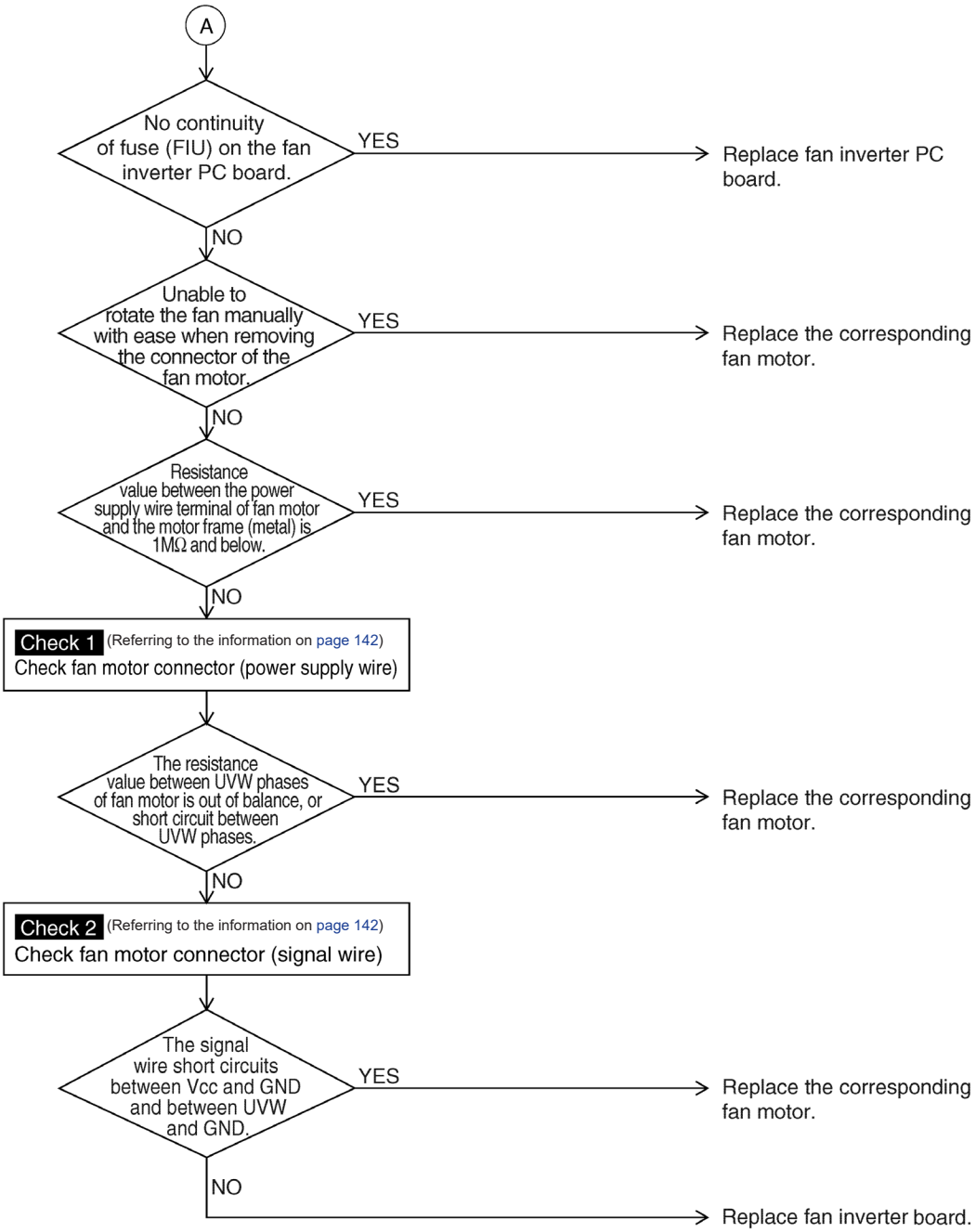


*1: Pressure difference between high pressure and low pressure before starting.
*2: The quality of power transistors/ diode modules can be judged by executing **Check 3** See page 143

ERROR CODE: E7 – Malfunction of Outdoor Unit Fan Motor

Remote Controller Display	E7
Method of Malfunction Detection	Detect a malfunction based on the current value in the INVERTER PC board (as for motor 2 current value in the fan PC board). Detect a malfunction for the fan motor circuit based on the number of rotation detected by hole IC during the fan motor operation.
Malfunction Decision Condition	● Overcurrent is detected for INVERTER PC board (A2P) or fan INVERTER PC board (A5P) (System down is caused by 4 times of detection.) ● In the condition of fan motor rotation, the number of rotation is below the fixed number for more than 6 seconds. (System down is caused by 4 times of detection.)
Supposed Causes	● Failure of fan motor ● Defect or connection error of the connectors/ harness between the fan motor and PC board ● The fan can not rotate due to any foreign substances entangled. ● Clear condition: Continue normal operation for 5 minutes

Figure 28: E7 – Malfunction of Outdoor Unit Fan Motor



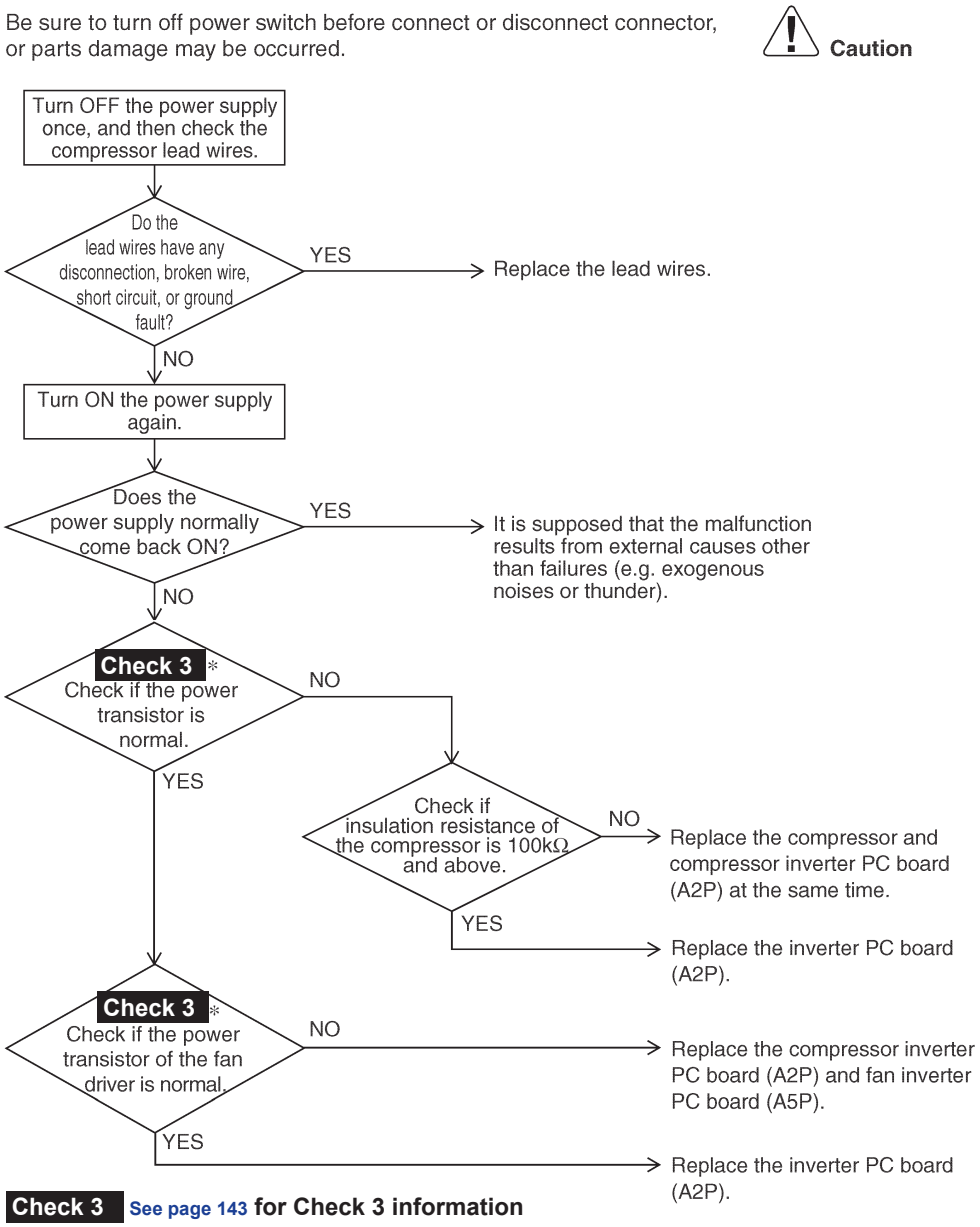
ERROR CODE: H7 – Abnormal Outdoor Fan Motor Signal

Remote Controller Display	H7
Method of Malfunction Detection	Detection of abnormal signal from fan motor.
Malfunction Decision Condition	In case of detection of abnormal signal at starting fan motor.
Supposed Causes	● Abnormal fan motor signal (circuit malfunction) ● Broken, short or disconnection connector of fan motor connection cable ● Fan Inverter PC board malfunction (A2P)
Perform	● Check 1 and Check 2 on page 142

ERROR CODE: L1 – Defective Inverter PC Board

Remote Controller Display	L1
Method of Malfunction Detection	Malfunction is detected based on the current value during waveform output before starting compressor. Malfunction is detected based on the value from current sensor during synchronous operation when starting the unit..
Malfunction Decision Condition	Overcurrent (OCP) flows during waveform output. Malfunction of current sensor during synchronous operation. IPM failure.
Supposed Causes	● Inverter PC board (A2P) – IPM failure – Current sensor failure – Drive circuit failure

Figure 29: L1 – Defective Inverter PC Board



ERROR CODE: L4 – Malfunction of Inverter Radiating Fin Temperature Rise

Remote Controller Display	L4
Method of Malfunction Detection	Fin temperature is detected by the thermistor of the radiation fin.
Malfunction Decision Condition	When the temperature of the inverter radiation fin increases above 188.6°F.
Supposed Causes	● Actuation of fin thermal (Actuates above 188.6°F) ● Defect of inverter PC board ● Defect of fin thermistor

Figure 30: L4 – Malfunction of Inverter Radiating Fin Temperature Rise

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

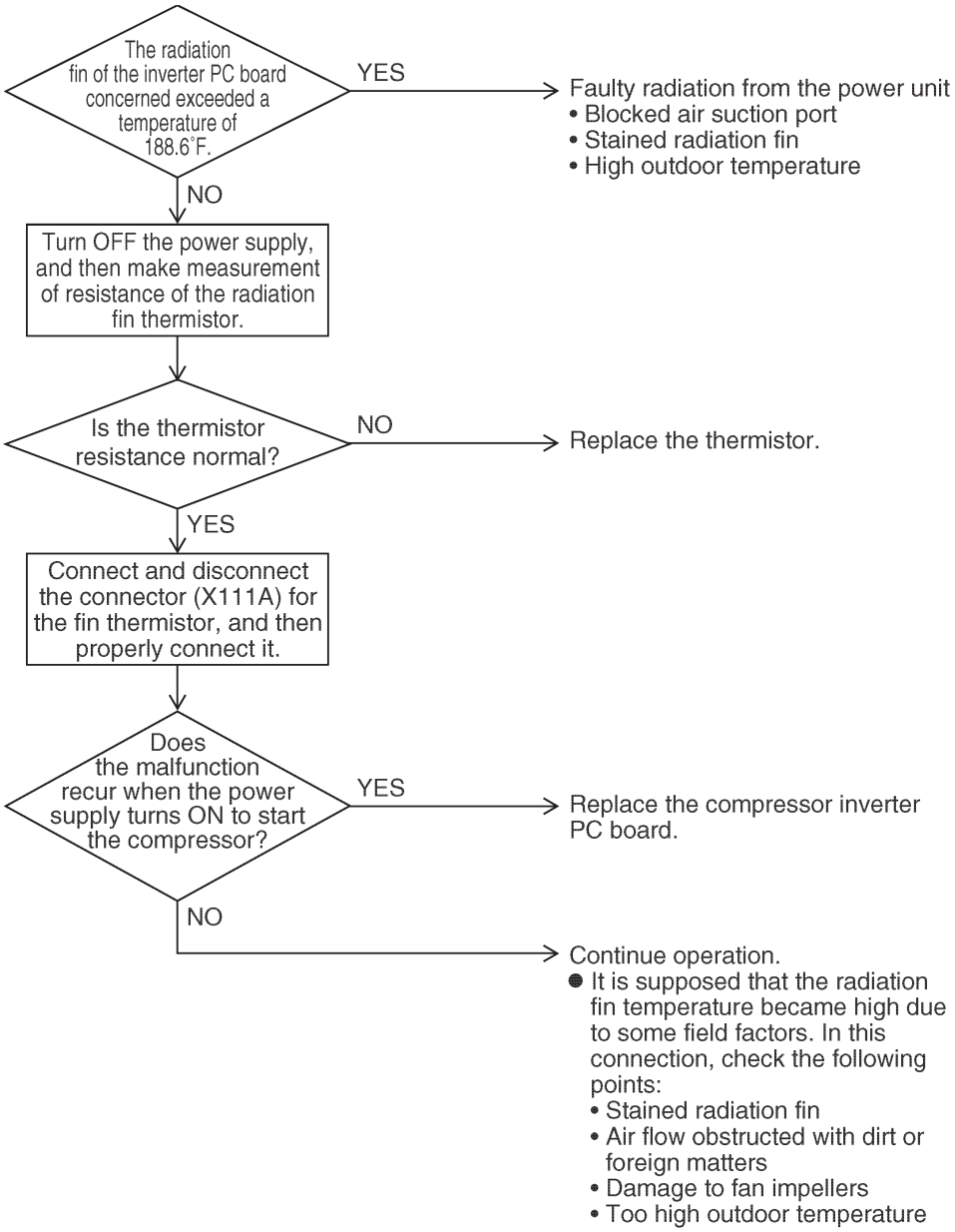
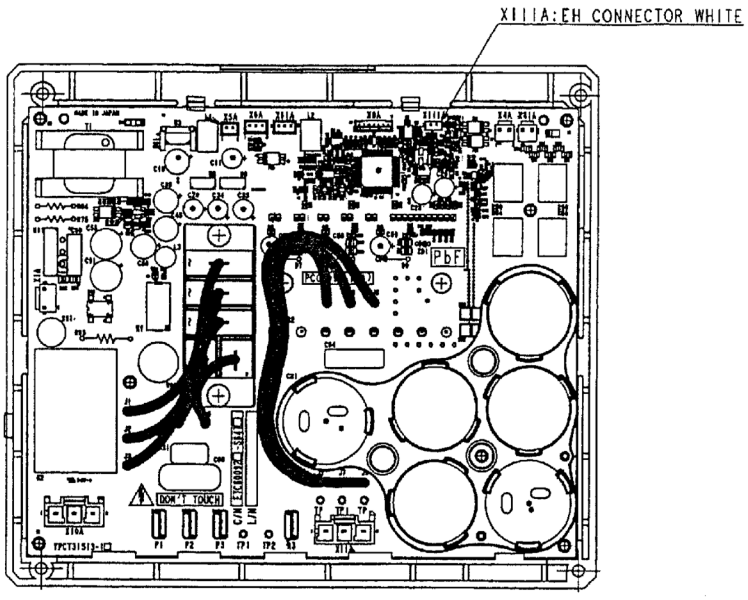


Figure 31: L4 – Malfunction of Inverter Radiating Fin Temperature Rise

Thermistor Resistance/Temperature Characteristics

Outdoor unit fin thermistor R1T

T°F	T°C	kΩ
14	-10	—
18	-8	—
21	-6	88.0
25	-4	79.1
28	-2	71.1
32	0	64.1
35	2	57.8
39	4	52.3
43	6	47.3
46	8	42.9
50	10	38.9
54	12	35.3
57	14	32.1
61	16	29.2
64	18	26.6
68	20	24.3
72	22	22.2
75	24	20.3
79	26	18.5
82	28	17.0
86	30	15.6
90	32	14.2
93	34	13.1
97	36	12.0
100	38	11.1
104	40	10.3
108	42	9.5
111	44	8.8
115	46	8.2
118	48	7.6
122	50	7.0
126	52	6.7
129	54	6.0
133	56	5.5
136	58	5.2
140	60	4.79
144	62	4.46
147	64	4.15
151	66	3.87
154	68	3.61
158	70	3.37
162	72	3.15
165	74	2.94
169	76	2.75
172	78	2.51
176	80	2.41
180	82	2.26
183	84	2.12
187	86	1.99
190	88	1.87
194	90	1.76
198	92	1.65
201	94	1.55
205	96	1.46
208	98	1.38



Inverter PC board for compressor

∗ Refer to “Thermistor Resistance / Temperature Characteristics” table

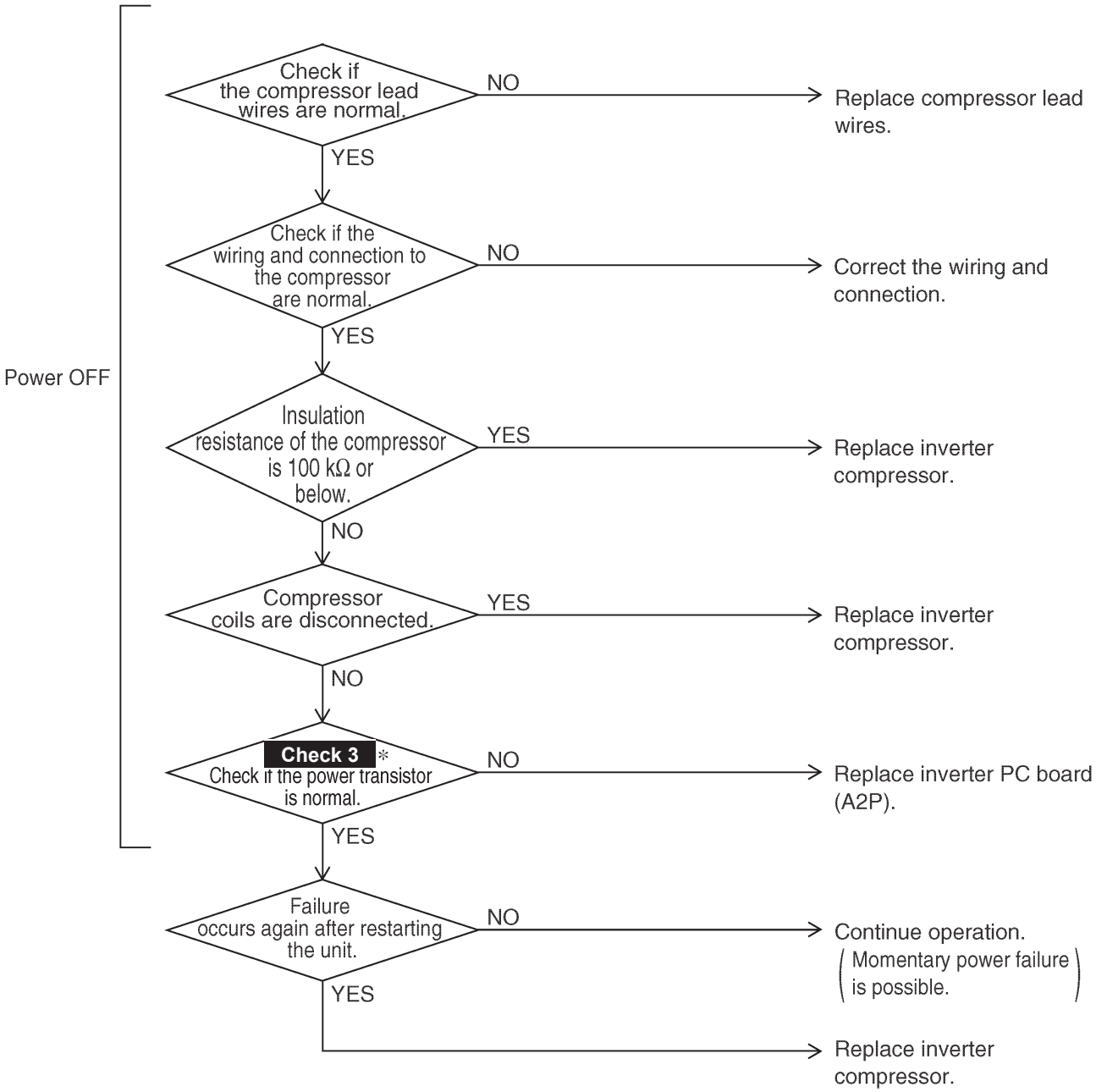
ERROR CODE: L5 – Momentary Overcurrent of Inverter Compressor

Remote Controller Display	L5
Method of Malfunction Detection	Malfunction is detected from current flowing in the power transistor.
Malfunction Decision Condition	When an excessive current flows in the power transistor. (Instantaneous overcurrent also causes activation.)
Supposed Causes	● Defect of compressor coil (disconnected, defective insulation) ● Compressor start-up malfunction (mechanical lock) ● Defect of inverter PC board

Figure 32: L5 – Momentary Overcurrent of Inverter Compressor

Compressor inspection

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



* **Check 3** See page 143

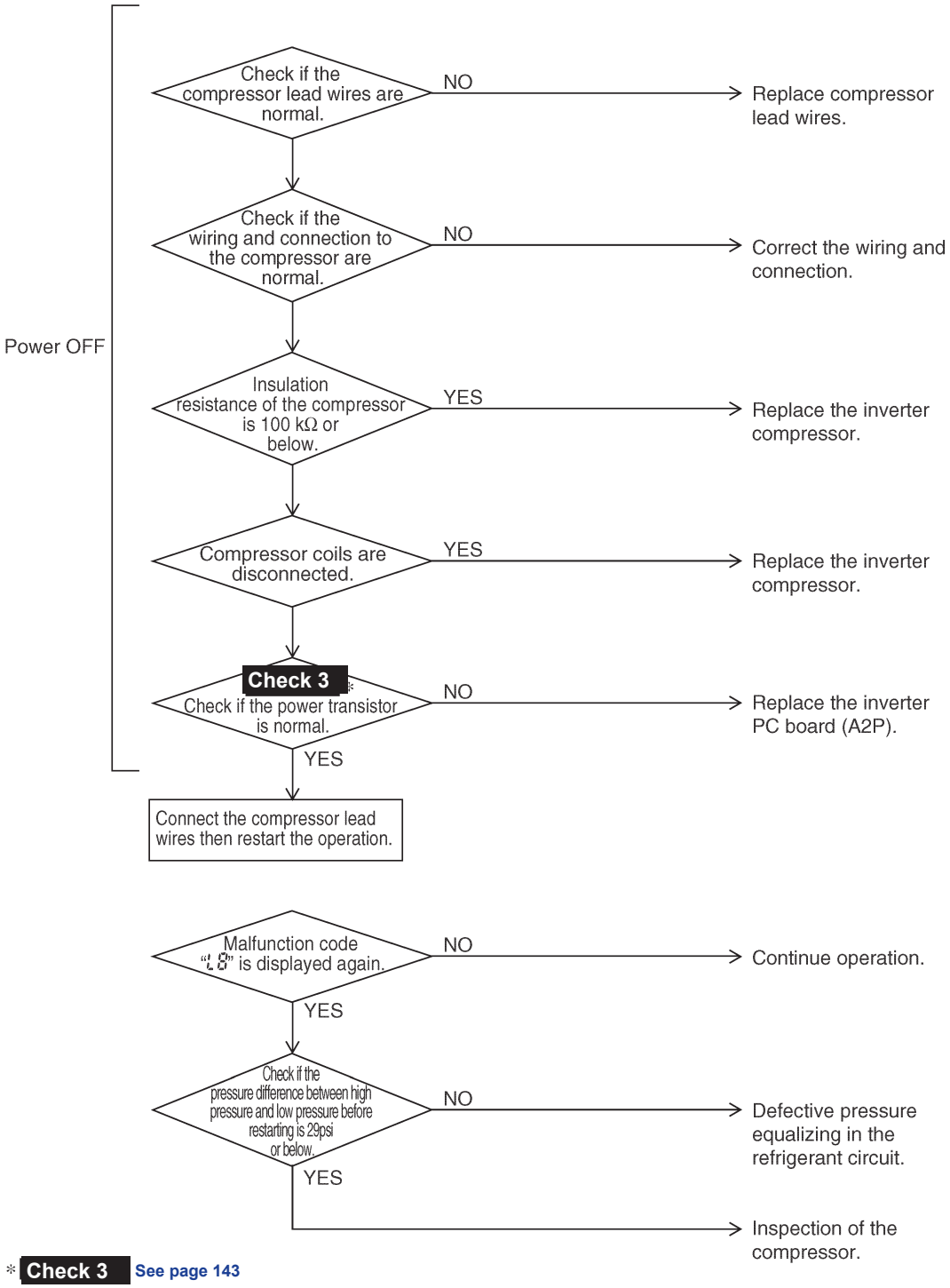
ERROR CODE: L8 – Momentary Overcurrent of Inverter Compressor

Remote Controller Display	L8
Method of Malfunction Detection	Malfunction is detected from current flowing in the power transistor.
Malfunction Decision Condition	When overload in the compressor is detected. (Inverter secondary current 16.1A) For 460V units (1) 19.0A and over continues for 5 seconds. (2) 16.1A and over continues for 260 seconds. For 230V units (1) A current of 33.5A or more continues for a period of consecutive 5 sec. (2) A current of 27.6A or more continues for a period of consecutive 260 sec.
Supposed Causes	● Compressor overload ● Compressor coil disconnected ● Defect of inverter PC board ● Faulty compressor

Figure 33: L8 – Momentary Overcurrent of Inverter Compressor

Output current check

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



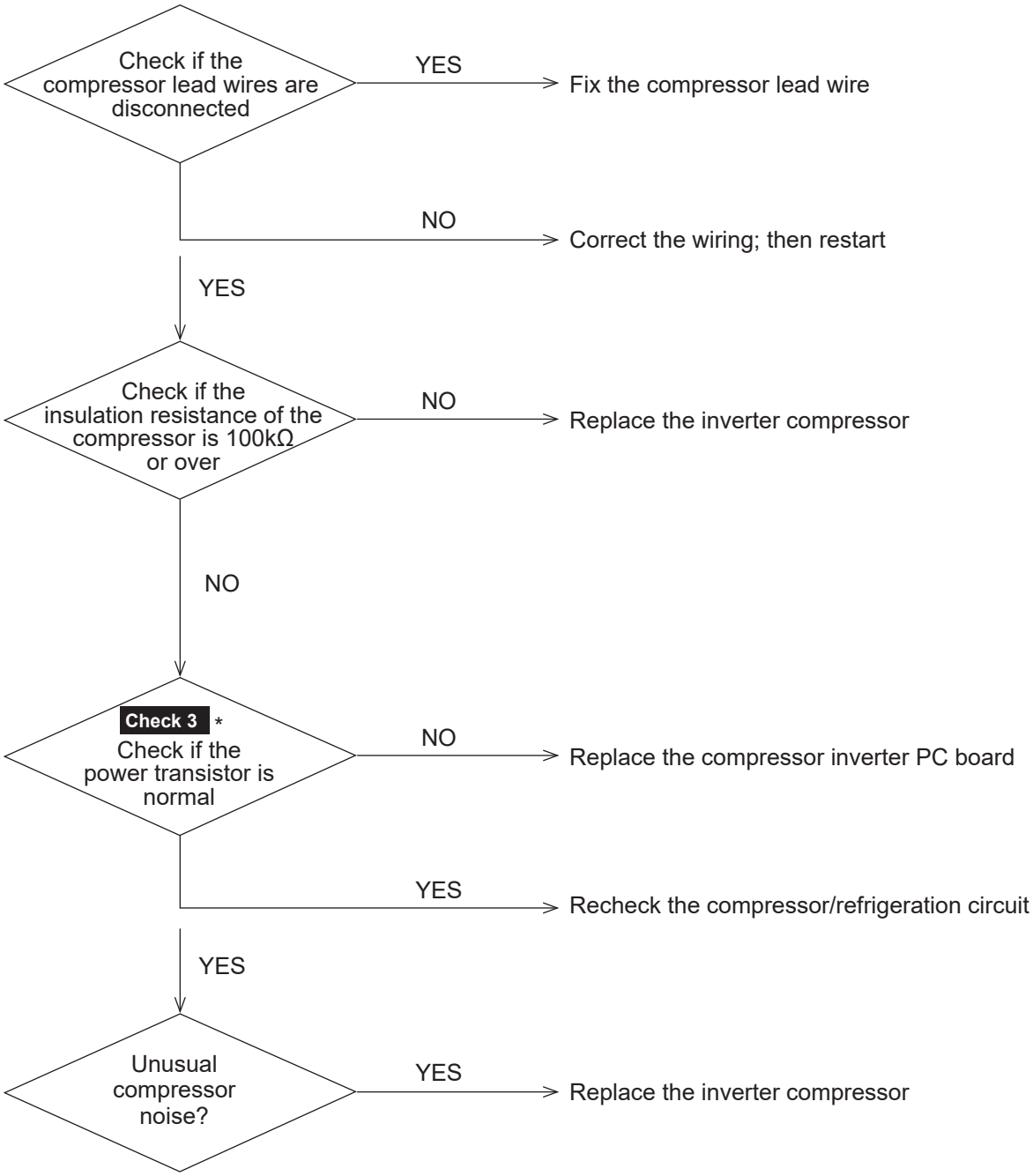
* **Check 3** See page 143

ERROR CODE: L9 – Inverter Compressor Starting Failure

Remote Controller Display	L9
Method of Malfunction Detection	Detect the failure based on the signal waveform of the compressor.
Malfunction Decision Condition	Starting the compressor does not complete.
Supposed Causes	● Defective compressor ● Wiring connection error to the compressor ● Large pressure difference before starting the compressor ● Defective inverter PC board

Figure 34: L9 – Inverter Compressor Starting Failure

Caution: Be sure to turn off power switch before connecting or disconnecting connectors to prevent parts damage.

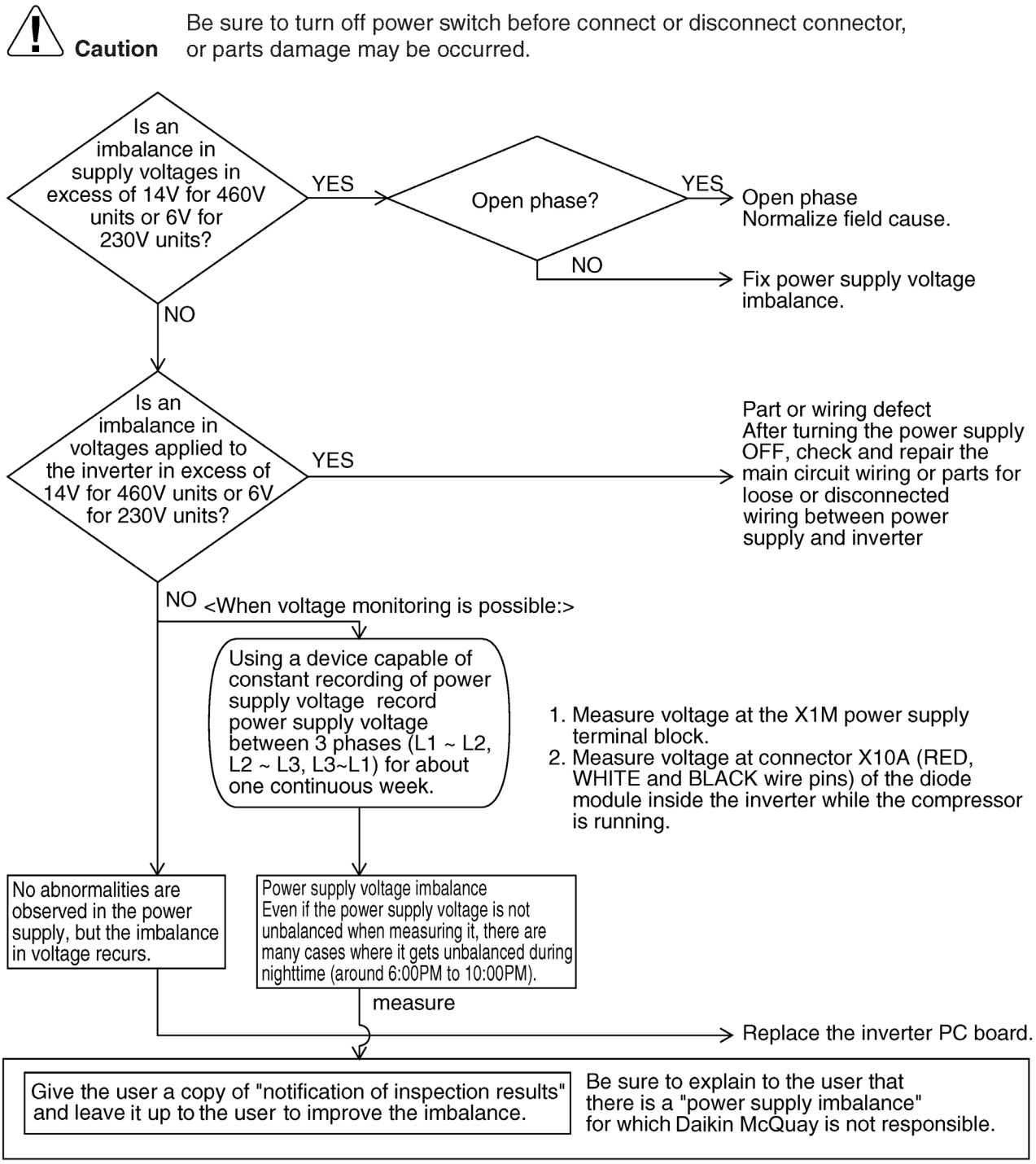


* Check 3 See page 143

ERROR CODE: P1 – Inverter Over-Ripple Protection

Remote Controller Display	P1
Method of Malfunction Detection	Imbalance in supply voltage is detected in PC board. Imbalance in the power supply voltage causes increased ripple of voltage of the main circuit capacitor in the inverter. Consequently, the increased ripple is detected.
Malfunction Decision Condition	"P1" will be displayed by pressing the inspection button. When the amplitude of the ripple exceeding a certain value is detected for consecutive 4 minutes.
Supposed Causes	● Open phase ● Voltage imbalance between phases ● Defect of main circuit capacitor ● Defect of inverter PC board ● Defect of K2 relay in inverter PC board ● Improper main circuit wiring

Figure 35: P1 – Inverter Over-Ripple Protection

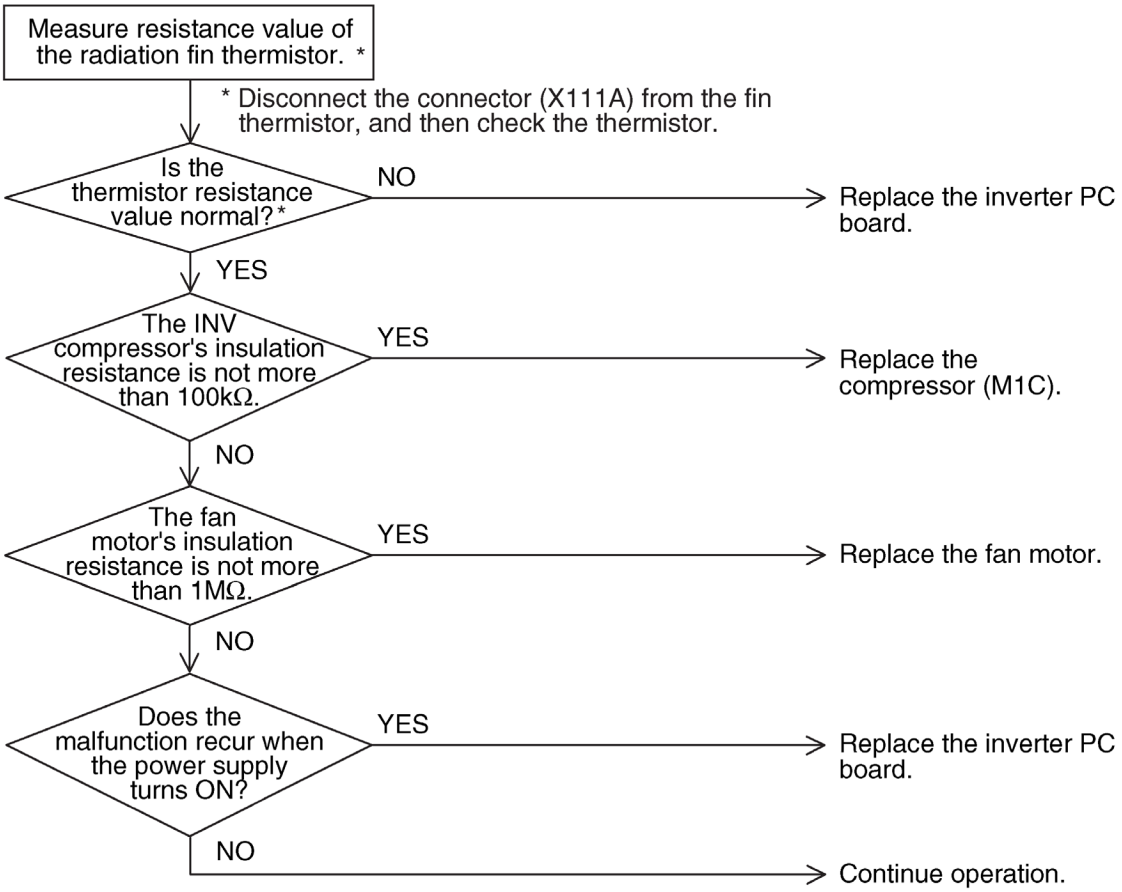


ERROR CODE: P4 – Malfunction of Inverter Radiating Fin Temperature Rise Sensor

Remote Controller Display	P4
Method of Malfunction Detection	Resistance of radiation fin thermistor is detected when the compressor is not operating. "P4" will be displayed by pressing the inspection button.
Supposed Causes	● Defect of radiator fin temperature sensor ● Defect of inverter PC board ● Faulty inverter compressor ● Faulty fan motor

Figure 36: P4 – Malfunction of Inverter Radiating Fin Temperature Rise Sensor

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



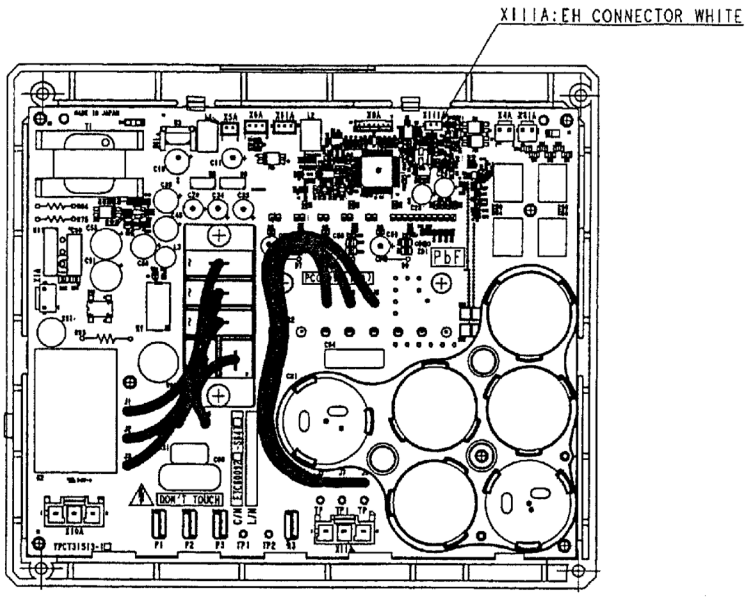
See Figure 37 on page 164

Figure 37: P4 – Malfunction of Inverter Radiating Fin Temperature Rise Sensor

Thermistor Resistance/Temperature Characteristics

Outdoor unit fin thermistor R1T

T°F	T°C	kΩ
14	-10	—
18	-8	—
21	-6	88.0
25	-4	79.1
28	-2	71.1
32	0	64.1
35	2	57.8
39	4	52.3
43	6	47.3
46	8	42.9
50	10	38.9
54	12	35.3
57	14	32.1
61	16	29.2
64	18	26.6
68	20	24.3
72	22	22.2
75	24	20.3
79	26	18.5
82	28	17.0
86	30	15.6
90	32	14.2
93	34	13.1
97	36	12.0
100	38	11.1
104	40	10.3
108	42	9.5
111	44	8.8
115	46	8.2
118	48	7.6
122	50	7.0
126	52	6.7
129	54	6.0
133	56	5.5
136	58	5.2
140	60	4.79
144	62	4.46
147	64	4.15
151	66	3.87
154	68	3.61
158	70	3.37
162	72	3.15
165	74	2.94
169	76	2.75
172	78	2.51
176	80	2.41
180	82	2.26
183	84	2.12
187	86	1.99
190	88	1.87
194	90	1.76
198	92	1.65
201	94	1.55
205	96	1.46
208	98	1.38



Inverter PC board for compressor

∗ Refer to “Thermistor Resistance / Temperature Characteristics” table

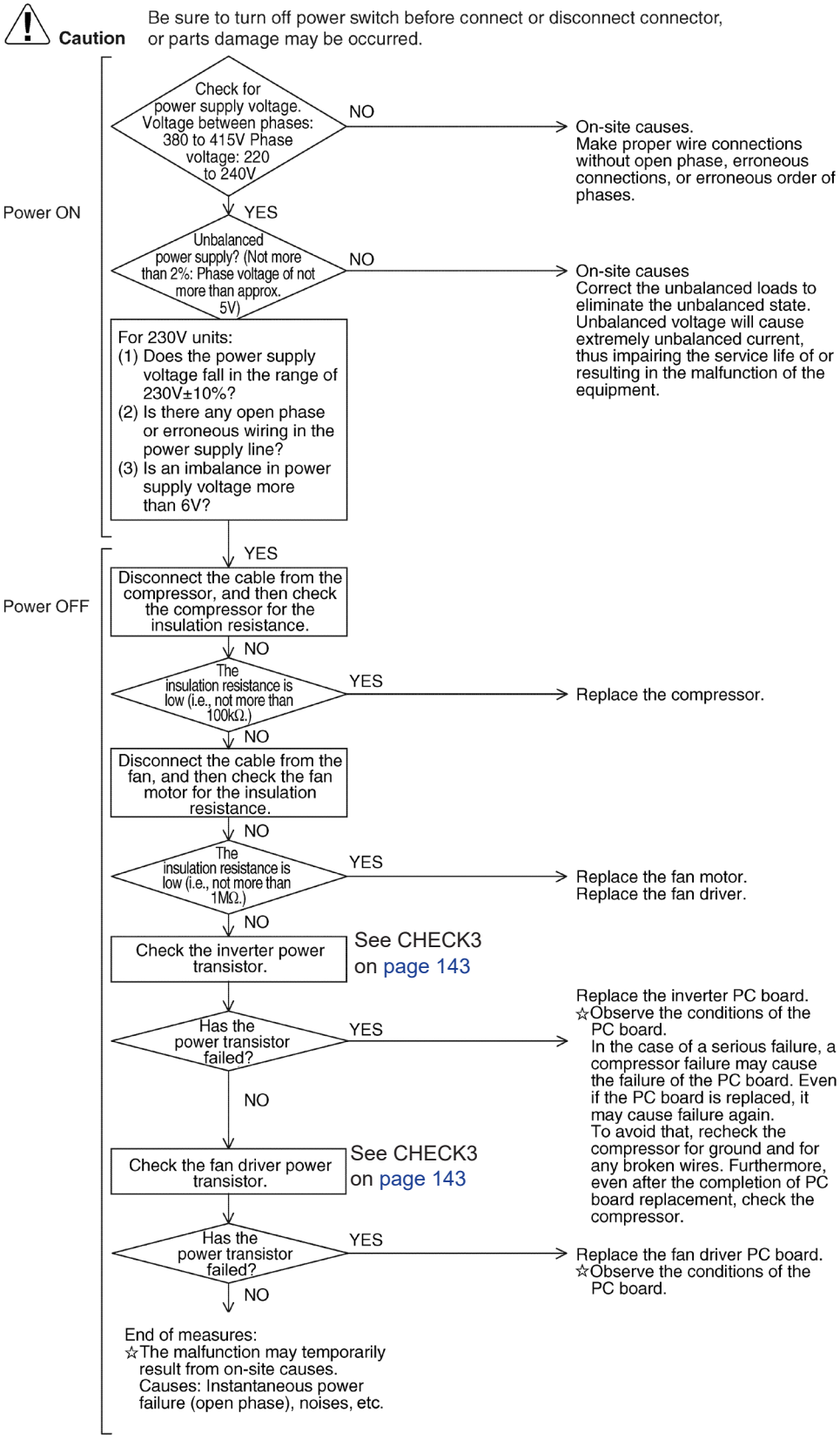
ERROR CODE: PJ – Faulty Field Setting after Replacing Main PC Board or Faulty Combination of PC Board

Remote Controller Display	PJ
Method of Malfunction Detection	This malfunction is detected according to communications with the inverter.
Malfunction Decision Condition	Make judgment according to communication data on whether or not the type of the inverter PC board is correct.
Supposed Causes	● Faulty (or no) field setting after replacing main PC board ● Mismatching of type of PC board
Recommended Action	● Contact the replacement parts supplier for resolution

ERROR CODE: U2 – Power Supply Insufficient or Instantaneous Failure

Remote Controller Display	U2
Method of Malfunction Detection	Detection of voltage of main circuit capacitor built in the inverter and power supply voltage.
Malfunction Decision Condition	When the voltage aforementioned is not less than 780V or not more than 320V, or when the current-limiting voltage does not reach 200V or more or exceeds 740V. For 230V units: When the voltage aforementioned is not more than 190V.
Supposed Causes	● Power supply insufficient ● Instantaneous power failure ● Open phase ● Defect of inverter PC board ● Defect of outdoor control PC board ● Main circuit wiring defect ● Faulty compressor ● Faulty fan motor ● Faulty connection of signal cable

Figure 38: U2 – Power Supply Insufficient or Instantaneous Failure



Supply Fan Failure Codes

HLL = Hall Sensor Error

First occurrence:

Power fluctuations may be responsible.

Corrective: Reset the failure; re-start the motor and observe it. If applicable, filter out the source of the disturbing voltage.

Repeated occurrence:

Question: Do other fans show the same failure?

Yes: Systematically search for voltage peaks.

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

TFEI = Electronics Interior Overheated

First occurrence:

Too high ambient temperature may be responsible.

Question:
- Could ambient temperature have been too high?
- Is it possible to connect the fan to EC Control in order to display the temperature? If so, is the displayed temperature within the expected temperature range?

Corrective: If the displayed temperature is above 95°C (the electronics switches off at 105°C,) double-check the ambient temperature in each operating mode.

Reset the failure; re-start the motor and observe it.

Repeated occurrence:

Question: Do other fans show the same failure?

Yes: Systematically search for the cause of excessive ambient temperature. Perhaps use a data logger or read out the electronics temperature via EC Control.

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

TFM = Motor Overheated

First occurrence:

Excessive ambient temperature may be responsible.

Question: Could ambient temperature have been too high? Or is the motor overloaded?
- Is it possible to connect the fan to EC Control in order to display the motor temperature?
- Is the displayed temperature within the expected temperature range?

Corrective: If the displayed temperature is too high:
- Double-check the motor temperature in each operating mode.
- Check of the fan load: Measure the input power at max. load/ operating point and compare the measured value with nominal data on the label. Is there any discrepancy?
- Reset the failure; re-start the motor and observe it.

Repeated occurrence:

Question: Do other fans show the same failure?

Yes: systematically search for the cause of excessive ambient temperature. Perhaps use a data logger or read out the electronics temperature via EC Control.

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

TFE = Power Mod Overheated

First occurrence:

Excessive ambient temperature may be responsible.

Question:
- Do other fans (temporarily) show the same failure within the arrangement? Could ambient temperature have been too high? Or is the motor overloaded?
- Is it possible to connect the fan to EC Control in order to display the temperature?
- Is the displayed temperature within the expected temperature range?

Corrective: If the displayed temperature is too high:
- Check the module temperature during operation in each operating mode (Tmodule <110°C; switching-off temperature 115°C)
- Check the fan load and supply voltage: Measure the input power at max. load/ operating point and compare the measured value with nominal data on the label. Is there any discrepancy?
- Reset the failure; re-start the motor and observe it.

Repeated occurrence:

Question: Do other fans show the same failure?

Yes: Systematic search for the reason of too high ambient temperature, overload, overvoltage or low voltage. Perhaps use a data logger.

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

BLK = Locked Motor

First occurrence:

Question:
- Is it possible that the motor was locked by an obstruction or ice?
- Do other fans show the same behaviour?

Corrective: Remove the reason for blocking. Caused by ice: activate the shake-loose functionality (starting with ModBus 5) or increase the starting phase control factor.

Repeated occurrence:

Question:
- Does increasing the starting phase control factor improve the situation?

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

SKF = Communication Error

First occurrence:

Power fluctuations may be responsible.

Corrective: Reset the failure; re-start the motor and observe it. If applicable, filter out the source of the disturbing signal.

Repeated occurrence:

Question:
- Do other fans show the same failure?

Yes: systematic search for peaks of disturbance voltage

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

PHA = Phase failure

UzLow = DC-Link Undervoltage

UzHigh = DC-Link Overvoltage

UeHigh = Mains Overvoltage

UeLow = Mains Undervoltage

Question: • Can the main voltage be measured at any spot; a data logger may be helpful.

No: Measure the voltage at the power supply input of the concerned fan.

Corrective: • Reset the failure; re-start the motor and observe it.

• If applicable, filter out the source of disturbing signal.

Repeated occurrence:

Question: • Do other fans show the same failure?

• How often does the failure occur?

• Get big electrical consumer loads switched at the same time when the failure occurs in the surrounding area?

• Are compressors or large asynchronous motors applied within the arrangement?

Yes: Systematic search for external disturbance voltage peaks; If applicable, usage of data logger for a longer period and analysis of the measured values.

• Are the voltage values within the specified range?

No: It seems to be a hardware problem of the fan. Fan need to be replaced.

Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied Representative for warranty details. To find your local Daikin Applied Representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.