

MicroTech[®] II Unit Controls For Maverick II[™] Commercial Packaged Rooftop Systems

Models MPS020E – 050E
20 to 50 Tons
R-410A Refrigerant

Group: Applied Systems

Part Number: OM 843

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Introduction

This manual provides information regarding the MicroTech[®] II control system used in the McQuay Commercial Packaged Rooftop Unit model MPS product line. It specifically describes the operation and programmable options for units with constant air volume (CAV) control and variable air volume (VAV) control.

Agency Listed



Note – LonMark and the LonMark Logo are managed, granted, and used by LonMark International under a license granted by Echelon Corporation.

For installation and startup instructions and general information regarding a particular rooftop unit, refer to the applicable model-specific installation and maintenance manual.

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. **McQuay International 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.

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

Extreme temperature hazard. Can cause damage to system components.
The MicroTech II 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).

⚠ 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.

Keypad Functions

The keypad consists of six keys to control the navigation of the cursor through the menus.

Figure 1: Keypad Controls



Menu (≡) – pressing this key at any location within the menu structure (other than Edit mode) will bring you to the beginning of the system menu. While in Edit mode, pressing it twice will bring you to the system menu.

Up (↑) – moves the cursor up the menu structure.

Down (↓) – moves the cursor down the menu structure.

Right (→) – moves the menu structure to the next available menu to the right.

Left (←) – moves the menu structure to the next available menu to the left.

Enter (↵) – pressing this key will allow the entry into a menu structure for editing. Pressing this key after a field edit will also save the changed input value.

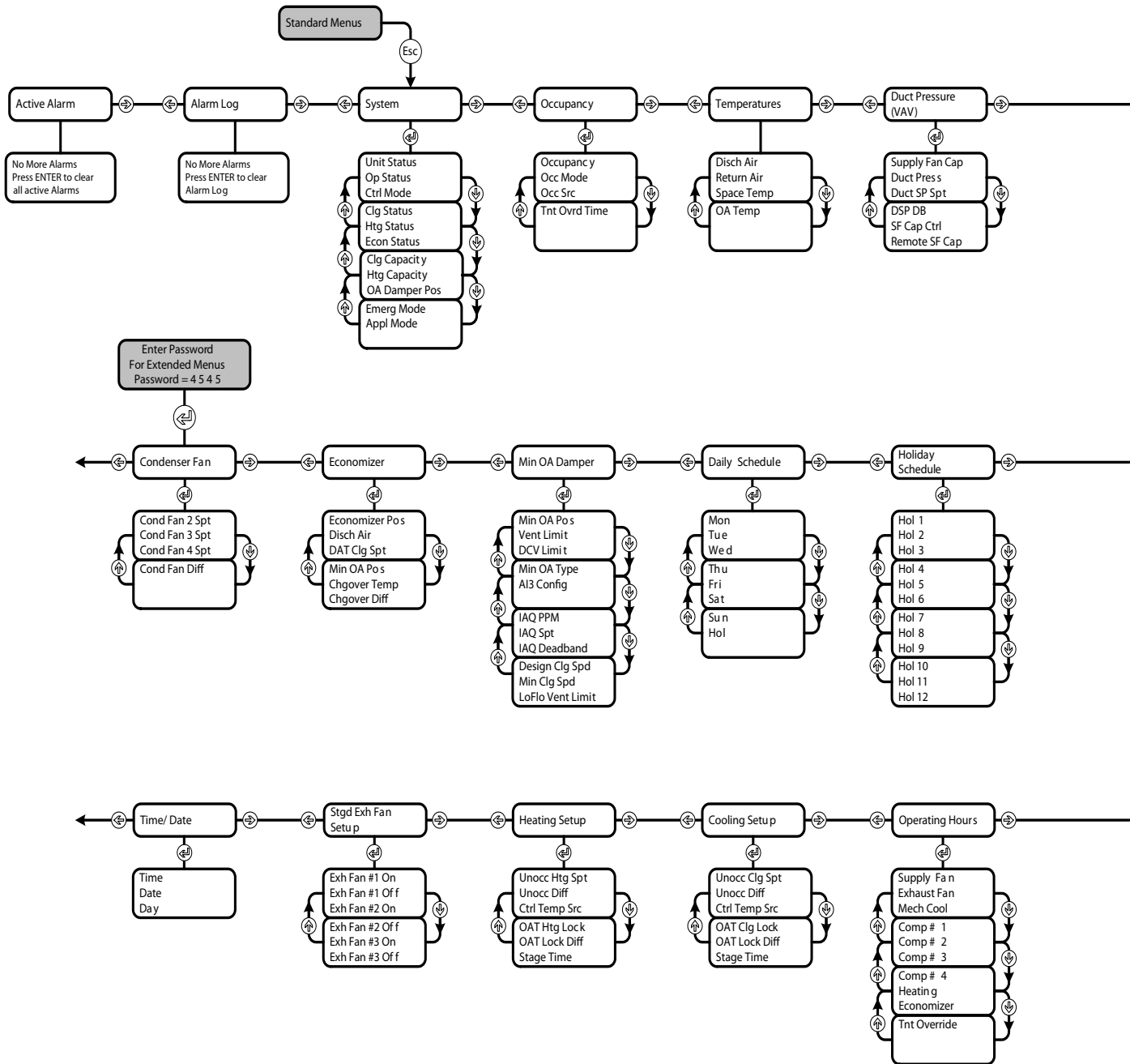
Keypad/Display Menu Structure

Keypad/Display Menu Structure

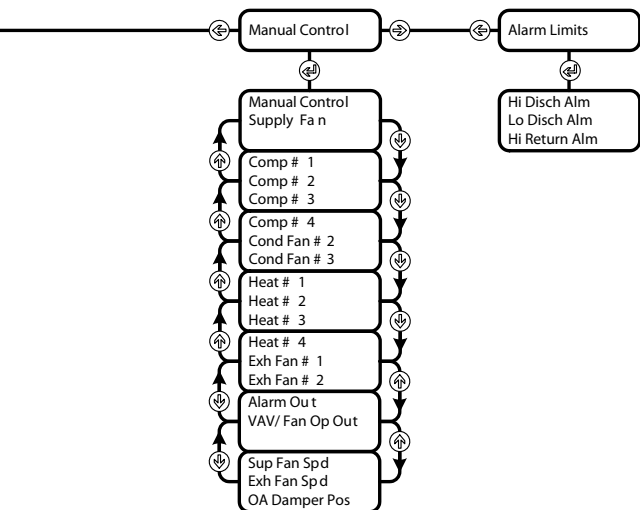
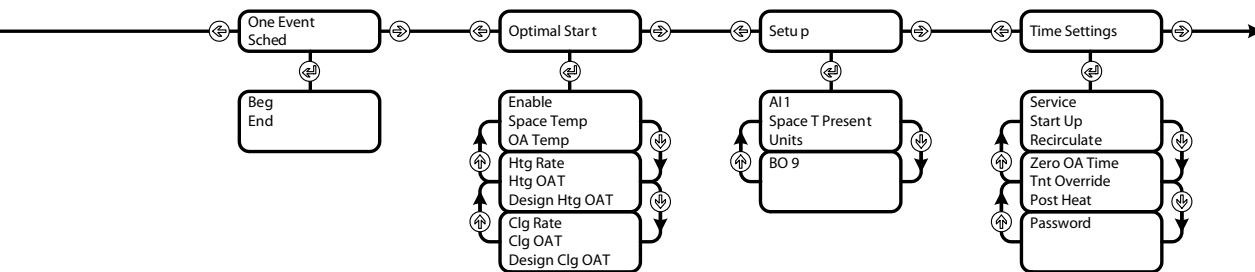
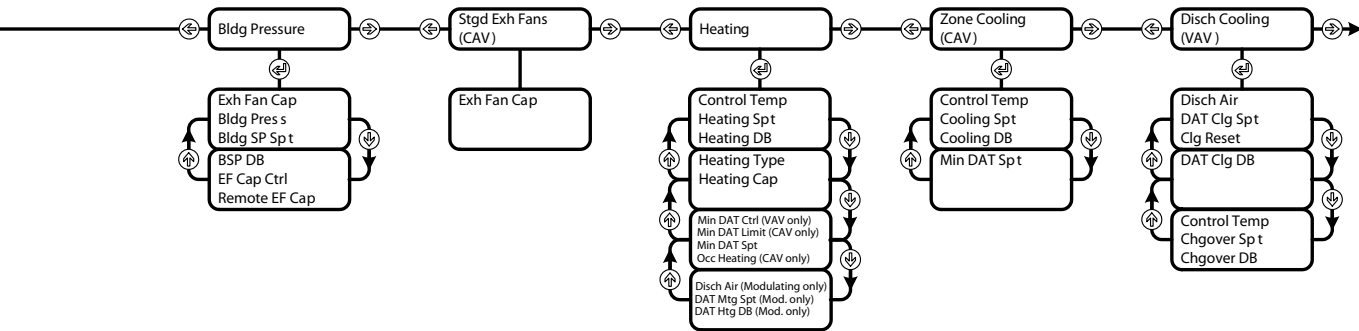
The following is a description of each menu and menu item within the rooftop MicroTech II menu structure. Tables are included which show every menu, item, and field in the menu structure of the program. These menus and items can all be displayed with the keypad/display.

The keypad display menus are divided into two sections. The first section is the standard menus which do not require a password to gain access. The second section is the extended menus which do require a password (“4545”, see Figure 2) to gain access.

Figure 2: Keypad/Display Menu Structure



Keypad/Display Menu Structure



Notes

1. Your display may not show all of these menus. Only the menus that apply to this configured unit will be available.
2. Hit Return (↵) to scroll through changeable variable on the current page.
3. When no alarm is active, hitting the menu key when cursor is at page header will return you to the System page. When any alarm is active, hitting the menu key will return you to the alarm page.
4. Hitting the menu key when cursor is not at page header will return you to the top of that page.

Menu Summary

Menu Summary

Table 1 lists basic unit operating status and control set point parameters. The “Range” column in the table lists all possible values for each item. The factory settings for the adjustable parameters are shown in the “Default” column.

Table 1: Menu Summary

Menu	Menu Item	Default	Range
Active Alarm			
Alarm Log			
System	Unit Status=	-	Off Startup Recirc Fan Only Min DAT Heating Econo Cooling
	Op Status=	-	Off Unocc Unocc Op Tnt Ovr Occ Op Off Net Off Alm Off Man Off Man Ctrl Off Emerg
	Ctrl Mode=	Off	Off Auto Heat Only Cool Only Fan Only
	Clg Status=	-	Enabled Off Man Off Net Off Alm Off Amb
	Htg Status=	-	Enabled None Off Man Of Net Off Amb
	Econo Status=	-	Enabled None Off Man Off Net Off Amb
	Clg Capacity=	-	0 - 100%
	Htg Capacity=	-	0 - 100%
	OA Damper Pos=	-	0 - 100%
	Emerg Mode=		Normal Shutdown
	Appl Mode=	Heat/Cool	Off Heat Only Cool Only Fan Only Heat/Cool

Menu Summary

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range	
Occupancy	Occupancy=	-	Occ Unocc Tnt Ovrđ	
	Occ Mode=	Auto	Auto Occ Unocc Tnt Ovrđ	
	Occ Src=		Int Sched Tstat Remote Sw Network Occ Mode	
	Tnt Ovrđ Time=	0 min	0 - 300	
Temperatures	Disch Air=	-	-45 - 212	
	Return Air=	-	-45 - 212	
	Space Temp=	-	-45 - 212	
	OA Temp=	-	-45 - 212	
Duct Pressure	Supply Fan Cap=	-	0 - 100	
	Duct Press=	-	0 - 5	
	DuctSP Spt=	1.00IWC	.20 - 4.00	
	DSP DB=	0.1IWC	.02 - .400	
	SF Cap Ctrl=	DuctPres	DuctPres Speed	
	Remote SF Cap=	25%	25 - 100	
Bldg Pressure (Exh Fan Ctrl=VFD)	Exh Fan Cap=	-	0 - 100	
	Bldg Press=	-	-.25 - .25	
	BldgSp Spt=	.050IWC	-.250 - .250	
	BSP DB=	.010IWC	.001 - .100	
	EF Cap Ctrl=	Bldg Pres	Bldg Pres Speed	
	Remote EF Cap=	25%	25 - 100	
StgdExh Fans (Exh Fan Ctrl=Stgd)	Exh Fan Cap=	-	0 - 100	
Heating (Any Heat)	Control Temp=	-	-45 - 212	
	Heating Spt=	70°F	32 - 100	
	Heating DB	2.0°F	1.0 - 9.9	
	Heating Type=			None
				2 Stg
				4 Stg
				ModLoGas
				ModHiGas
			Mod Water	
	Min DAT Ctrl=(VAV Only)	No	No/Yes	
Min DAT Limit=(CAV Only)	55°F	32 - 99.9		
Max DAT Spt=	105°F	50.0 - 120.0		
Occ Heating=(VAV Only)	Always	MWU/Always		
Mod Gas	Disch Air=			
	DAT Htg Spt=	100°F	0.0 - 120.0	
	DAT Htg DB=	2.0°F	1.0 - 9.9	
Zone Cooling (CAV)	Control Temp=	-	-45 - 212	
	Cooling Spt=	75.0°F	40.0 - 99.0	
	Cooling DB=	2.0°F	1.0 - 9.9	
	Min DAT Setpt=	55.0°F	40.0 - 99.0	

Menu Summary

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Discharge Cooling (VAV)	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	50.0 - 99.0
	Clg Reset=	None	None Network Space Return OAT Airflow Ext mA Ext V
	DAT Clg DB=	2.0°F	1.0 - 9.9
	Min Clg Spt=	55.0°F	50.0 - 99.0
	Min Clg Spt @	0.0	0.0 - 100.0
	Max Clg Spt=	65.0°F	50.0 - 99.0
	Max Clg Spt @	100.0	0.0 - 100.0
	Control Temp=	-	-45 - 212
	Chgover Spt=	75.0°F	32.0 - 99.0
	Chgover DB=	2.0°F	1.0 - 9.9
Condenser Fans	Cond Fan 2 Spt=	-	0 - 104
	Cond Fan 3 Spt=	-	0 - 104
	Cond Fan 4 Spt=	-	0 - 104
	Cond Fan Diff=	5.0°F	5 - 20
Economizer (Automatic or CAV)	Economizer Pos=	-	0 - 100
	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	50.0 - 99.0
	Min OA Pos=	-	0 - 100
	Chgover Temp=	60°F	32.0 - 99.0
	Chgover Diff=	10.0°F	5 - 20
Min OA Damper	Min OA Pos=	-	0 - 100
	Vent Limit=	20%	1 - 99
	DCV Limit=	10%	1 - 99
	Min OA Type=	None	None Network External IAQ
	xx.x% @ DCV Limit	0	0 - 100
	xx.x% @ Vent Limit	100	0 - 100
	Ext Percent =	-	0 - 100
	0% @ xx V/mA	4 mA	0 - 20
	100% @ xx V/mA	20 mA	0 - 20
	xxxx PPM @ DCV Limit	800	0 - 9999
	xxxx PPM @ Vent Limit	1000	0 - 9999
	xxxx PPM @ xx V/mA	0 4mA	0 - 9999
	xxxx PPM @ xx v/mA	2000 20mA	0 - 9999
	Min Clg Spd=	40%	1 - 99
LoFlo Vent Limit=	30%	1 - 99	
Daily Schedule	Mon=	00:00 - 00:00	00:00 - 23:59
	Tue=	00:00 - 00:00	00:00 - 23:59
	Wed=	00:00 - 00:00	00:00 - 23:59
	Thu=	00:00 - 00:00	00:00 - 23:59
	Fri=	00:00 - 00:00	00:00 - 23:59
	Sat=	00:00 - 00:00	00:00 - 23:59
	Sun=	00:00 - 00:00	00:00 - 23:59
	Hol=	00:00 - 00:00	00:00 - 23:59

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Holiday Schedule	Hol 1=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 2=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 3=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 4=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 5=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 6=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 7=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 8=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 9=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 10=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 11=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 12=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 13=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 14=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 15=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 16=	NA 00 - NA 00	Jan-Dec 0-31
One Event Sched	Beg=	NA 00 @ 00:00	Jan-Dec 00:00 - 23:59
	End=	NA 00 @ 00:00	Jan-Dec 00:00 - 23:59
Optimal Start	Enable=	No	No/Yes
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212
	Htg Rate=	.400	.000 - .999
	Htg OAT=	35°F	-40 - 60
	Design Htg OAT=	0°F	-40 - 60
	Clg Rate=	.400	.000 - .999
	Clg OAT=	85°F	60 - 140
Design Clg OAT=	95°F	60 - 140	
Setup	AI1=	RAT	None RAT SpaceSpt
	Space T Present=	Yes	No Yes
	Units=	English	English Metric
	B09=	Fan Op Output	Fan Op Output VAV Output
Time Settings	Service=	0 min	0 - 240
	Start Up=	180 sec	0 - 240
	Recirculate=	180 sec	120 - 3600
	Zero OA Time=	90 min	0 - 240
	Tnt Override=	120 min	0 - 300
	Post Heat=	0 sec	0 - 180
	Password=	15 min	5 - 60
Time/Date	Time=	-	00:00 - 23:59
	Date=	-	Jan-Dec 0-31 2000-2009
	Day=	-	Sunday - Saturday
StgdExh Fan Setup	Exh Fan # 1 On=	40%	0 - 99
	Exh Fan # 1 Off=	30%	0 - 99
	Exh Fan # 2 On=	55%	0 - 99
	Exh Fan # 2 Off=	40%	0 - 99
	Exh Fan # 3 On=	70%	0 - 99
	Exh Fan # 3 Off=	50%	0 - 99

Menu Summary

Table 1: Menu Summary (continued)

Menu	Menu Item	Default	Range
Heating Setup	Unocc Htg Spt=	55.0°F	32.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Htg Lock=	2.0°F	1.0 - 99.0
	OAT Lock Diff=		
	Stage Time=	5 min	4 - 60
Cooling Setup	Unocc Clg Spt=	55.0°F	32.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Clg Lock=	2.0°F	1.0 - 99.0
	OAT Lock Diff=		
	Stage Time=	5 min	4 - 60
Operating Hours	Supply Fan=	000,000	0 - 999999
	Exhaust Fan=	000,000	0 - 999999
	Mech Cool=	000,000	0 - 999999
	Comp # 1 =	000,000	0 - 999999
	Comp # 2 =	000,000	0 - 999999
	Comp # 3 =	000,000	0 - 999999
	Comp # 4 =	000,000	0 - 999999
	Heating=	000,000	0 - 999999
	Economizer=	000,000	0 - 999999
Tnt Override=	000,000	0 - 999999	

Table 1: Menu Summary (continued)

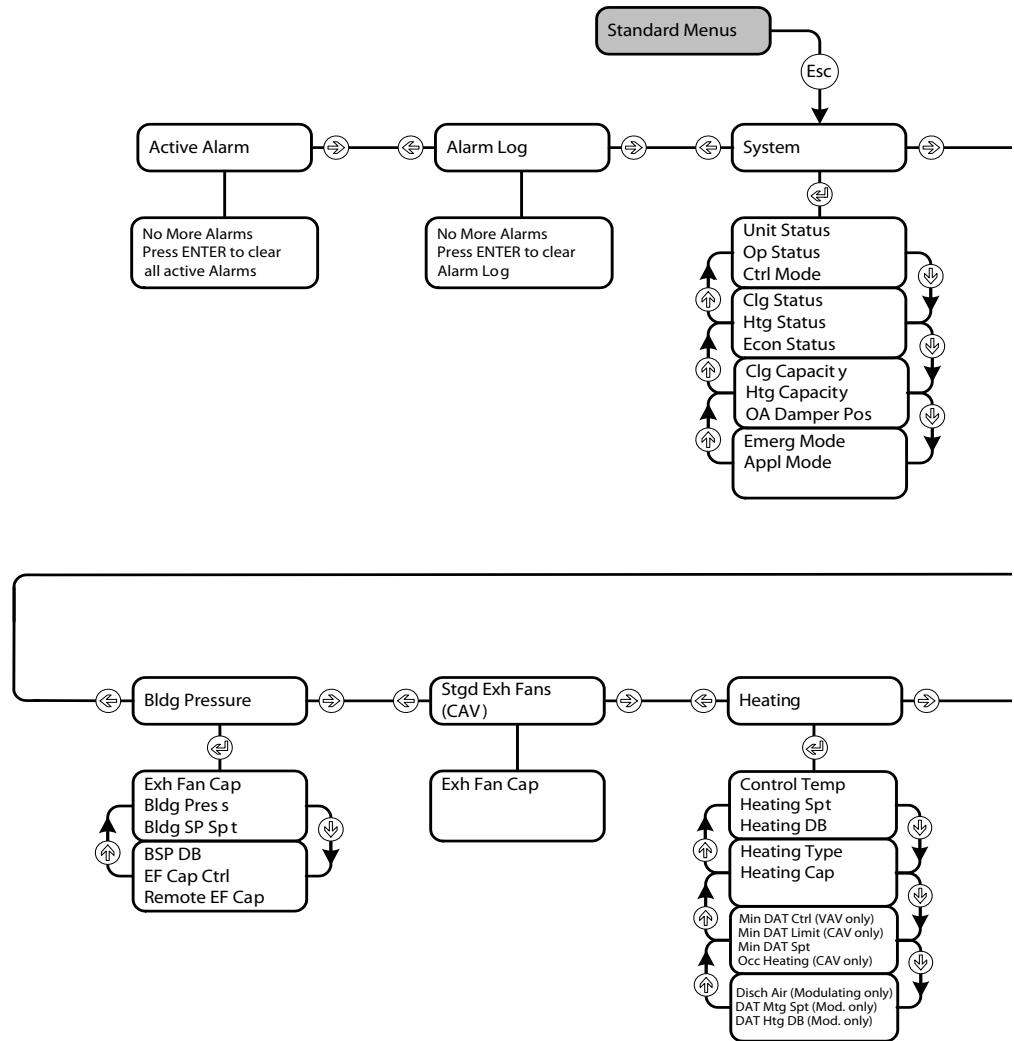
Menu	Menu Item	Default	Range
Manual Control	Manual Ctrl=	Off	On Off
	Supply Fan=	Off	On Off
	Comp # 1 =	Off	On Off
	Comp # 2 =	Off	On Off
	Comp # 3 =	Off	On Off
	Comp # 4 =	Off	On Off
	Cond Fan # 2 =	Off	On Off
	Cond Fan # 3 =	Off	On Off
	Heat # 1 =	Off	On Off
	Heat # 2 =	Off	On Off
	Heat # 3 =	Off	On Off
	Heat # 4 =	Off	On Off
	Exh Fan # 1 =	Off	On Off
	Exh Fan # 2 =	Off	On Off
	Alarm Out=	Off	On Off
	Vav/Fan Op Out=	Off	On Off
	Sup Fan Spd=	0.0%	0.0 - 100.0
	Exh Fan Spd=	0.0%	0.0 - 100.0
OA Damper Pos=	0.0%	0.0 - 100.0	
Htg Mod VLV	0	0.0 - 100.0	
Alarm Limits	Hi Disch Alm=	170	90 - 250
	Lo Disch Alm=	40	20 - 50
	Hi Return Alm=	120	90 - 150

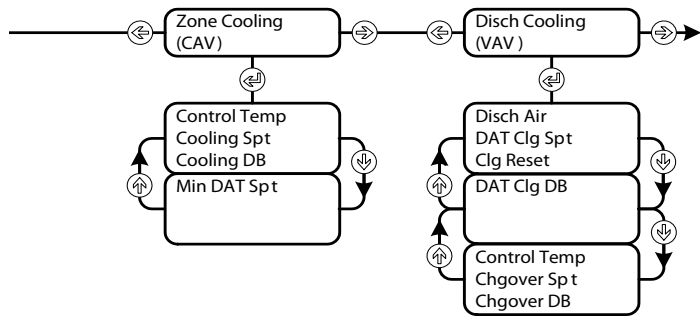
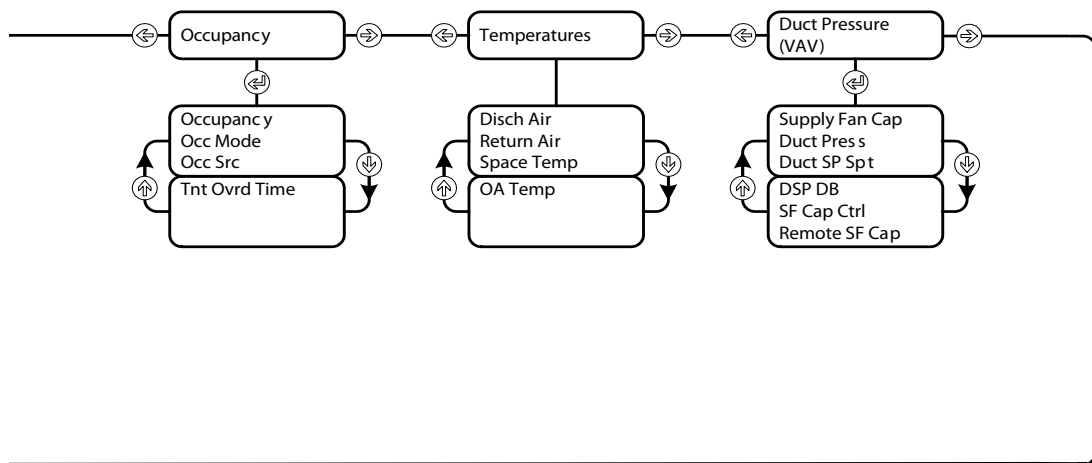
Standard Menu Structure

Standard Menu Structure

The Standard Menus are menu items that control the unit's day to day operation. The menus provide information about the units operation and its control parameters.

Figure 3: Keypad Standard Menu Structure





Notes

1. Your display may not show all of these menus. Only the menus that apply to this configured unit will be available.
2. Hit Return (↵) to scroll through changeable variable on the current page.
3. When no alarm is active, hitting the menu key when cursor is at page header will return you to the System page. When any alarm is active, hitting the menu key will return you to the alarm page.
4. Hitting the menu key when cursor is not at page header will return you to the top of that page.

Standard Menu Structure

System Menu

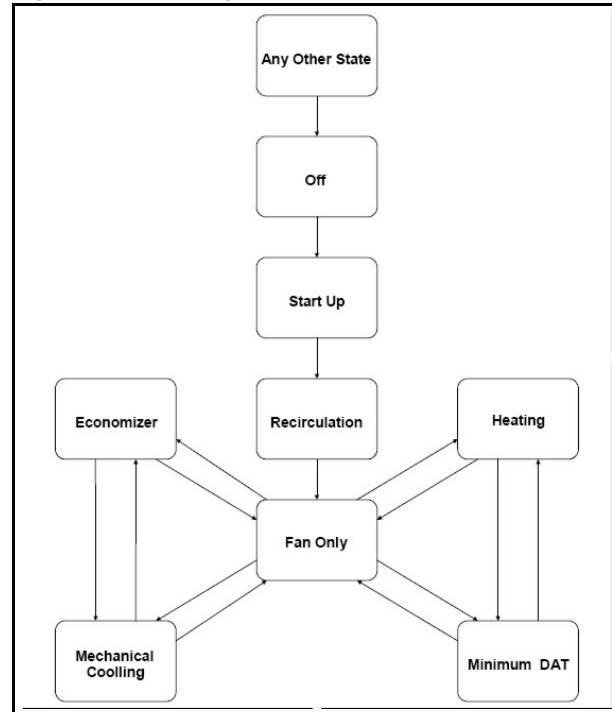
The “System” menu provides a summary of basic unit status and control items. This menu summarizes the current operating state of the unit, giving the operating state the unit is in, along with the current capacity level of that operating state.

Table 2: System Menu

Menu	Menu Item	Default	Range
System	Unit Status=	-	Off Startup Recirc Fan Only Min Dat Heating Econo Cooling
	Op Status=		Off Unocc Unocc Op Tnt Ovrde Occ Op Off Net Off Alrm Off Man Off Man Ctrl Off Emerg
	Ctrl Mode=	Off	Off Auto Heat/Cool Cool Only Fan Only
	Clg Status=	-	Enabled Off Man Off Net Off Alm Off Amb
	Htg Status=	-	Enabled None Off Man Of Net Off Amb
	Econo Status=	-	Enabled None Off Man Off Net Off Amb
	Clg Capacity=	-	0 - 100%
	Htg Capacity=	-	0 - 100%
	OA Damper Pos=	-	0 - 100%
	Emerg Mode=	Normal	Normal Shutdown
	Appl Mode=	Off Heat Only Cool Only Fan Only Heat/Cool	

UnitStatus= 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 in Figure 4.

Figure 4: State Diagram



The transition from any operating state to another is also 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. Next, it will transition into the “Recirculation” state of operation for another 3 minutes 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.

OpStatus= is a status only item which indicates the operating status of the unit. This menu item will indicate why the unit is running or why the unit is off.

Ctrl Mode= is an adjustable item which allows the unit to be set for off, auto heating/cooling operation, cooling only, heating only, and fan only.

Clg Status= is a status only item which indicates whether or not cooling (economizer and/or mechanical) 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.

EconoStatus= is a status only item which indicates whether or not the economizer is enabled

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.

OA Damper Pos= is a status only item which indicates the percentage that the outdoor damper is currently open.

EmergMode= is a status only item which indicates if the unit was shut down in an emergency situation.

Appl 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”.

Standard Menu Structure

Occupancy

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

Table 3: Occupancy Menu

Menu	Menu Item	Default	Range
Occupancy	Occupancy=	-	Occ Unocc Tnt Ovr
	Occ Mode=	Auto	Auto Occ Unocc Tnt Ovr
	Occ Src=		Int Sched Tstat Remote Sw Network Occ Mode
	Tnt Ovrde Time=	120min	0 - 300

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 bypass operation.

OccSrc= is a status only item which indicates the input source or function that is responsible for setting the Occupancy= parameter to “Occ”.

Tnt Ovrde= is a status only item which indicates the amount of time remaining for unit operation since the tenant override button was activated.

Temperatures

Menus in the Temperatures menu contain unit temperature status information.

Table 4: Temperatures Menu

Menu	Menu Item	Default	Range
Temperatures	Disch Air=	-	-45 - 212
	Return Air=	-	-45 - 212
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212

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). This sensor is standard on all units.

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, 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. This sensor is standard on all units.

Standard Menu Structure

Duct Pressure

The Duct Pressure menu provides a summary of the duct pressure items and parameters associated with variable air volume (VAV) fan control units. This menu is only available on VAV units. The supply air fan speed is controlled by a VFD that is mounted in the control cabinet. 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 reach 1.14 before the fan will increase in speed.

Table 5: Duct Pressure Menu

Menu	Menu Item	Default	Range
Duct Pressure	Supply Fan Cap=	-	0 - 100
	Duct Press=	-	0 - 5
	DuctSP Spt=	1.00IWC	.20 - 4.00
	DSP DB=	0.1IWC	.02 - .400
	SF Cap Ctrl=	DuctPres	DuctPres Speed
	Remote SF Cap=	25%	25 - 100

Supply Fan Cap= is a status only item which indicates the capacity of the supply air fan.

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.

Duct SP Spt= is an adjustable item which sets the duct static pressure set point used for controlling the VFD for the supply air fan. The VFD is modulated to maintain the duct pressure at this value.

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.

SF CAP Ctrl= is an adjustable parameter to control supply air fan by duct pressure or by a percentage of supply air fan speed from 25% to 100%. The speed option is only used with a building automation system.

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

Bldg Pressure

The Building Pressure menu provides a summary of the control parameters for the exhaust fans. This menu is only available on units with exhaust fans. The building pressure control application can be on CAV or VAV units.

Table 6: Bldg Pressure Menu

Menu	Menu Item	Default	Range
Bldg Pressure (Exh Fan Ctrl=VFD)	Exh Fan Cap=	-	0 - 100
	Bldg Press=	-	-.25 - .25
	BldgSp Spt=	.050IWC	-.250 - .250
	BSP DB=	.010IWC	.001 - .100
	EF Cap Ctrl=	Bldg Pres	Bldg Pres Speed
	Remote EF Cap=	25%	25 - 100

Exh Fan Cap= is a status only item which indicates the capacity of the exhaust air fans.

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

Bldg SP Spt= is an adjustable item which sets the building static pressure set point used for controlling the exhaust fan VFD. The Exhaust fan VFD is modulated to maintain the building static pressure sensor input at this set point.

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.

EF Cap Ctrl= is an adjustable parameter to control how the exhaust fans are to be controlled. The exhaust fans can be controlled by the building pressure or by a percentage of exhaust air fan speed from 25% to 100%. The speed option is only used with a building automation system.

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

Stgd Exh Fans

The Staged Exhaust Fans menu provides a summary of the control parameters for the exhaust fans. The staged exhaust fan control is only available on constant volume (CAV) units. The capacity of the exhaust fans are controlled by the position of the economizer dampers. As the OA damper position is increased the exhaust fans will stage up increasing in exhaust airflow capacity.

Table 7: Stgd Exh Fans Menu

Menu	Menu Item	Default	Range
Stgd Exh Fans (Exh Fan Ctrl=Stgd)	Exh Fan Cap=	-	0 - 100

Exh Fan Cap= is a status only menu to indicate the capacity of the exhaust air fans.

Heating

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 setpoint temperature. The unit goes into the heating mode of operation by analyzing the control temperature. The control temperature can be either the return temperature or the space temperature. The return temperature is typically used for VAV units and the space temperature is typically used for CAV units. The unit goes into the heating mode of operation when the control temperature (return or space temperature) is below the heating setpoint by more than ½ the deadband. Example - If the heating setpoint is 68.0°F and the deadband is 1.0°F, the unit will not go into the heating mode of operation until the control temperature reaches 67.4°F. When this occurs the heating mode of operation will begin and the 1st stage of heating operation will start. The next stage up/down will take place after 4 minutes. This “4 minutes” is called the stage timer. The gas heat module will continue to stage up as long as the control temperature is below the heating setpoint by more than ½ the heating setpoint deadband. The unit will stage down if the maximum discharge air temperature is reached. Units with one gas valve have 2 stages of heating and units with two gas valves have 4 stages of heating.

Table 8: Heating Menu

Menu	Menu Item	Default	Range	
Heating (Any Heat)	Control Temp=	-	-45 - 212	
	Heating Spt=	70°F	32 - 100	
	Heating DB	2.0°F	1.0 - 9.9	
	Heating Type=			None
				2 Stg
				4 Stg
				ModLoGas
				ModHiGas
			ModWtr	
	Min DAT Ctrl (VAV Only)=	No	No/Yes	
Min DAT Limit (CAV Only)=	55°F	32 - 99.9		
Max DAT Spt=	105°F	50.0 - 120.0		
Occ Heating (VAV Only)=	Always	MWU/Always		
Mod Gas	Disch Air=			
	DAT Htg Spt=	100°F	0.0 - 120.0	
	DAT Htg DB=	2.0°F	1.0 - 9.9	

Control Temp= is a status only item which indicates what the current control temperature is.

Heating Spt= is an adjustable item which sets the temperature in which the unit will go into the heating mode of operation.

Heating DB= is an adjustable item which sets a deadband around the Heating Spt= parameter. No heating control action (staging up or down) is taken when the control temperature is within this deadband around the setpoint.

Heating Type= is a status only item. 1) 2 Stg - is the low heat option with a single furnace. The furnace uses a two stage gas valve. 2) 4 Stg - is the high heat option with dual furnaces. Each furnace uses a two stage valve. 3) ModLoGas - is the modulating low heat option with a single furnace. The furnace uses a 25 - 100% modulating valve. 4) ModHiGas - is the modulating high heat option with dual furnaces. One furnace uses a 25 -100% modulating valve and the other uses a 2 stage valve. 5) ModWtr - is the modulating hot water heat option.

Min DAT Ctrl (VAV Only)= is an adjustable item which sets the minimum that the discharge air temperature can be. If the minimum is reached, the unit will stage up

Min DAT Limit (CAV Only)= is an adjustable item which sets the temperature on CAV units in which the heating mode of operation will start if the DAT reaches this temperature.

Max DAT Spt= is an adjustable item which sets the maximum that the discharge air temperature can be. If this maximum is reached then the unit will stage down.

Occ Heating (VAV Only)= is an adjustable item which allows a morning warm-up (MWU) cycle or an Always heating mode cycle for the heating mode of operation. If MWU is used the unit will only go into heating during the initial morning warm-up cycle. If Always is selected the unit can go into the heating mode of operation any time of the day.

Disch Air= is a measurement of the temperature at the discharge air sensor during the heating mode. It is used for modulating gas heat only.

DAT Htg Spt= is an adjustable item which sets the temperature of the discharge air when the unit is in heating mode. It is used for modulating gas heat only.

DAT Htg DB= is an adjustable item which sets a deadband around the DAT Htg Spt= parameter. No heating control action (staging up or down) is taken when the control temperature is within this deadband around the setpoint. It is used for modulating gas heat only.

Zone Cooling

The Zone Cooling menu provides a summary of the cooling control parameters for units with constant air volume control only. These units are equipped with the space comfort control (SCC) software.

The unit's cooling mode of operation is controlled by the control temperature and the cooling setpoint. The control temperature for a CAV unit is typically the space temperature. A space temperature sensor must be field installed into the occupied space and connected to the unit controller. The unit goes into the cooling mode of operation when the control temperature (space temperature) is above the cooling setpoint by more than ½ the deadband. Example - the cooling setpoint is set to 70.0°F and the deadband is 1.0°F, the unit will not go into the cooling mode of operation until the space sensor reaches 70.6°F. When this takes place the cooling mode of operation will begin and the 1st stage of compressor operation will start. The unit controller will turn on the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the cooling setpoint temperature within the deadband. When a compressor stage turns on, the next compressor stage up or down will not take place for the next 4 minutes. This “4 minutes” is called the stage time. Reference the Cooling Setup menu for the adjustable stage time value. When a cooling stage is initiated no further operation will take place within the stage timer limit. In the above example the unit will stage down or turn off the cooling mode of operation when the cooling setpoint reaches 69.4°F.

Table 9: Zone Cooling Menu

Menu	Menu Item	Default	Range
Zone Cooling (CAV)	Control Temp=	-	-45 - 212
	Cooling Spt=	75.0°F	32.0 - 99.0
	Cooling DB=	2.0°F	1.0 - 9.9
	Min DAT Spt=	55.0°F	40.0 - 99.0

Control Temp= is a status only item which indicates what the current control temperature is.

Cooling Spt= is an adjustable item which sets the temperature in which the unit will go into the cooling mode of operation.

Cooling DB= is an adjustable item which sets a deadband around the Cooling Spt= parameter. No cooling control action (staging up or down) is taken when the control temperature is within this deadband around the setpoint temperature.

Min DAT Spt= is an adjustable item which sets the minimum discharge air temperature allowed when the unit is in zone cooling. When the unit is in zone cooling the staging of

Standard Menu Structure

compressors is controlled by the Cooling setpoint, 75°F. The unit controller is also analyzing the discharge air temperature and will not allow operation below the Min DAT Spt.

Disch Cooling

The Discharge Cooling menu provides a summary to the cooling control parameters for units with variable air volume (VAV) control. These units are equipped with the discharge air control (DAC) software.

The unit's cooling mode of operation is controlled by the control temperature, the change over temperature and the discharge air temperature. The unit goes into the cooling mode of operation by analyzing the control temperature. The control temperature for a VAV system is the return temperature. The unit goes into the cooling mode of operation when the control temperature (return temperature) is above the change-over setpoint by more than ½ the deadband. Example - If the change over temperature is 70.0°F and the deadband is 1.0°F, the unit will not go into the cooling mode of operation until the return temperature reaches 70.6°F. When this takes place the cooling mode of operation will begin and the 1st stage of compressor operation will start. The unit controller will turn on the next stage of compressor operation, or turn off a stage of compressor operation, to maintain the discharge air temperature setpoint within the deadband. When a compressor stage turns on, the next compressor stage up or down will not take place for the next 4 minutes. This "4 minutes" is called the stage timer. When a cooling stage is initiated no further operation will take place within the stage timer limit. Reference the Cooling Setup menu for the adjustable stage time value. In the above example the unit will stage down or turn off the cooling mode of operation when the return temperature reaches 69.4°F.

Table 10: Disch Cooling Menu

Menu	Menu Item	Default	Range
Discharge Cooling (VAV)	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	50.0 - 99.0
	Control Temp=		
	Chgover Spt=	75.0°F	32.0 - 99.0
	Chgover DB=	2.0°F	1.0 - 9.9
	Clg Reset=	None	None Network Space Return OAT Airflow Ext mA Ext V
	DAT Clg DB=	2.0°F	1.0 - 9.9
	Min Clg Spt=	80.0°F	50.0 - 99.0
	Min Clg Spt @	0.0	0.0 - 100.0
	Max Clg Spt=	65.0°F	50.0 - 99.0
	Max Clg Spt @	35.0	0.0 - 100.0

Disch Air= is a status only item which indicates what the current discharge air temperature is.

DAT Clg Spt= is an adjustable item which sets the temperature that the DAT should be maintained at when it is in the cooling mode of operation.

DAT Clg DB= is an adjustable item which sets a deadband around the DAT Clg Spt. No cooling control action (staging up or down) is taken when the DAT is within this deadband around the setpoint temperature.

Control Temp= is a status only item which indicates what the current control temperature is.

Chgover Spt= is an adjustable parameter that puts the unit into the cooling mode of operation.

Chgover DB= is an adjustable item which sets a deadband around the ChgoverSpt.

Clg Reset is an adjustable item that allows the DAT to be reset based on one of the selected parameters. The setpoint is modulated between a minimum and maximum value at the respective conditions.

Figure 5 graphically shows the cooling reset operation. Example, The normal DAT cooling setpoint 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 55.0°F. This example would give the following inputs.

Min Clg Spt = 55.0°F

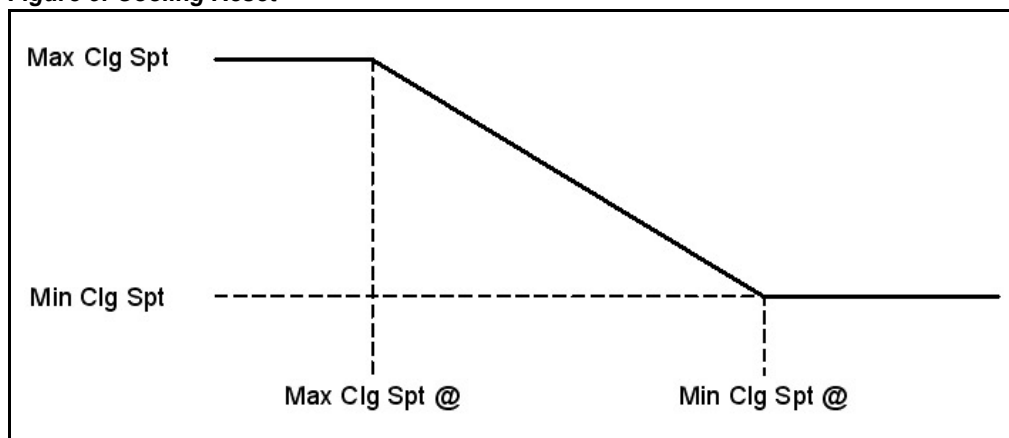
Min Clg Spt @ = 80%

Max Clg Spt = 65.0°F

Max Clg Spt @ = 35%

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

Figure 5: Cooling Reset



Alarms

Alarms are divided into three categories - Warnings, Problems, and Faults. These categories are prioritized with the Warnings being the least important and Faults being of the highest importance. When a unit enters into a fault alarm, the unit shuts down and requires a manual reset before the unit will start again. Fault alarms do not have an automatic reset to them.

Table 11: Alarms Menu

Menu	Alarm
Alarm Faults	Emergency Off=
	Control T Fail=
	Disch Sensor=
	Duct Hi Limit=
	Hi Return Tmp=
	Hi Disch Tmp=
	Lo Disch Tmp=
	Fan Fail=
Alarm Problems	OAT Sensor=
	Space Sensor=
	Return Sensor=
	Hi Pres-Ckt1=
	Hi Pres-Skt2=
	Lo Pres-Ckt1=
Lo Pres-Ckt2=	
Alarm Warning	Dirty Filter=

Alarm Out Faults

When the unit controller receives a fault alarm the unit responds by shutting down.

Emergency Off= is a notification that the unit has been shut down on emergency. This is done by a network communication or an external device. The external emergency off input is on TB2 at terminals 105 and 106. The return air smoke detector is on TB2 at terminals 104 and 105 and the supply air smoke detectors is on TB2 at terminals 103 and 104. All three external inputs are wired into the digital input ID1 on the unit controller which controls this alarm.

Control T Fail= is a notification that both the return air temperature and space temperature sensor are shorted or opened.

Disch Sensor= is a notification that the discharge air temperature sensor (DAT) has shorted or opened. Alarm will clear when the DAT sensor is replaced.

Duct Hi Limit= is a notification that the duct high limit (DHL) switch has tripped indicating that the duct static pressure has reached its maximum of 3.5" wc. Check all supply air ductwork dampers to confirm they are open.

Hi Return Tmp= is a notification that the RAT sensor has indicated a return air temperature equal to that set up for the HiReturnAlm= parameter in the Alarm Limits menu. Refer to the Alarm Limits menu for this temperature limit setting.

Hi Disch Tmp= is a notification that the DAT sensor has indicated a discharge air temperature equal to that set up for the HiDischAlm= parameter in the Alarm Limits menu. Refer to the Alarm Limits menu for this temperature limit setting.

Lo Disch Tmp= is a notification that the DAT sensor has indicated a discharge air temperature equal to that set up for the LowDischAlm= parameter in the Alarm Limits menu. Refer to the Alarm Limits menu for this temperature limit setting.

Fan Fail= is a notification that the proof of airflow switch (PC7) has not indicated any airflow. This can be caused by the belts being broken on the supply air fan. On CAV units, if the airflow switch is open, the unit will get a fan fail alarm. On VAV units, the fan fail alarm will occur if the PC7 switch is open and the duct static pressure (as measured by SPS1) is less than 1/2 of the setpoint. The duct static setpoint is "DuctSP SPT=" found in Table 5 on page 18. The PC7 switch is factory set a differential pressure of 0.25" ± 0.05".

Alarm Problems

Problem alarms will alter the unit operation by shutting down or a portion of its operation.

OAT Sensor= is a notification that the outdoor air temperature sensor (OAT) has shorted or opened. The alarm will clear automatically when the sensor is replaced.

Space Sensor= is a notification that the space temperature sensor has shorted or opened. The alarm will clear automatically when the sensor is replaced.

Return Sensor= is a notification that the return air temperature sensor (RAT) has shorted or opened. The alarm will clear automatically when the sensor is replaced.

Hi Pres-Ckt1= is a notification that the high refrigerant pressure switch has tripped and that the refrigerant pressure has exceeded 650 psi. This alarm will require a manual reset at the first condition of the alarm. This alarm is not an automatic reset.

Hi Pres-Ckt2= is a notification that the high refrigerant pressure switch has tripped and that the refrigerant pressure has exceeded 650 psi. This alarm will require a manual reset at the first condition of the alarm. This alarm is not an automatic reset.

Lo Pres-Ckt1= is a notification that the low refrigerant pressure switch has tripped and the unit could be low on refrigerant. This alarm will deactivate compressor circuit number 1 and require a manual reset after 3 attempts have been made in 24 hrs.

Lo Pres-Ckt2= is a notification that the low refrigerant pressure switch has tripped and the unit could be low on refrigerant. This alarm will deactivate compressor circuit number 2 and require a manual reset after 3 attempts have been made in 24 hrs.

Alarm Warning

Warnings will only give a notification and will not shut the unit operation down.

Dirty Filter= is a notification that the dirty filter switch has tripped and the filters need to be changed.

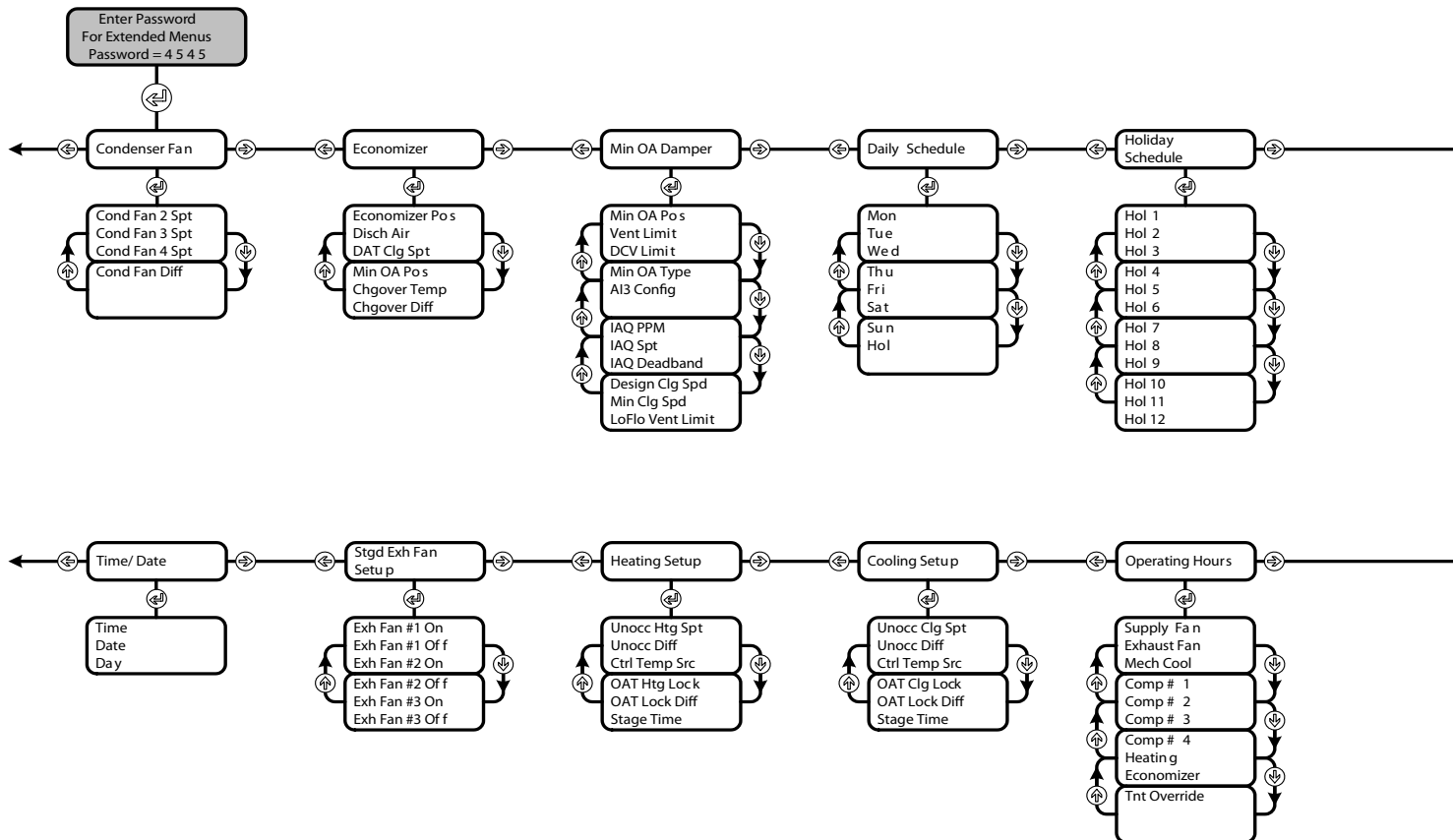
Extended Menus

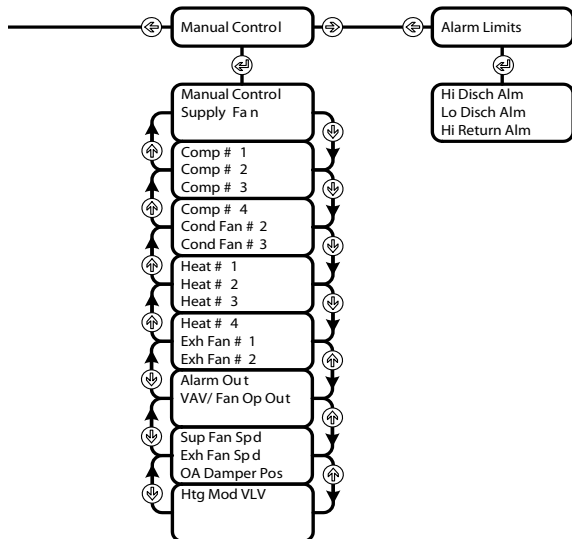
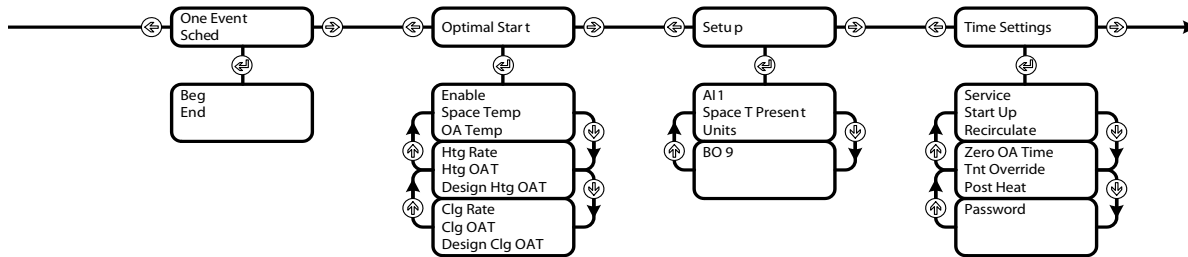
The Extended Menus are menu items that are used to set up the unit for its HVAC application. They are also used in servicing the rooftop equipment.

Password

Accessing the Extended Menus requires the operator to enter the four-digit password “4545”, (see Figure 6) using the keypad buttons located on the controller interface.

Figure 6: Keypad Extended Menu Structure





Notes

1. Your display may not show all of these menus. Only the menus that apply to this configured unit will be available.
2. Hit Return (↵) to scroll through changeable variable on the current page .
3. When no alarm is active, hitting Escape when cursor is at page header will return you to the System page. When any alarm is active, hitting Escape will return you to the alarm page.
4. Hitting Escape when cursor is not at page header will return you to the top of that page.

Condenser Fans

The Condenser Fan menu is used to set up the turning on and off of the condenser fans. The condenser fans are controlled by the outdoor air temperature. When compressor operation starts condenser fan #1 always comes on.

Table 12: System Summary Menus

Menu	Menu Item	Default				Range
		030A	035A	040A	050A	
Condenser Fan	Cond Fan 2 Spt=	55	50	45	35	0 - 104
	Cond Fan 3 Spt=	80	80	60	55	0 - 104
	Cond Fan 4 Spt=	n/a	n/a	80	80	0 - 104

Cond Fan 2 Spt= is an adjustable item that turns condenser fan number 2 on when the outdoor temperature reaches this setpoint.

Cond Fan 3 Spt= is an adjustable item that turns condenser fan number 3 on when the outdoor temperature reaches this setpoint.

Cond Fan 4 Spt= is an adjustable item that turns condenser fan number 4 on when the outdoor temperature reaches this setpoint. Not all units have four condenser fans.

Cond Fan Diff= is an adjustable item that sets the temperature differential with respect to the setpoint.

Economizer

The Economizer menu is used to set up the airside economizer operation.

Table 13: Economizer Menu

Menu	Menu Item	Default	Range
Economizer (Automatic or CAV)	Economizer Pos=	-	0 - 100
	Disch Air=	-	-45 - 212
	DAT Clg Spt=	55.0°F	40.0 - 99.0
	Min OA Pos=	-	0 - 100
	Chgover Temp=	60°F	32.0 - 99.0
	Chgover Diff=	2.0°F	1 - 10

Economizer Pos= is a status only item that is used to indicate percentage that the economizer dampers are open.

Disch Air= is a status only item that indicates the current discharge air temperature.

DAT Clg Spt= is an adjustable item which sets the temperature that the DAT should be maintained at.

Min OA Pos= is a status only item which indicates the current minimum position of the outdoor air damper (see “Min OA Damper” on page 29).

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

Chgover Diff= is an adjustable item which sets the temperature differential with respect to the Chgover Temp.

Min OA Damper

The Min OA Damper menu is used to set up the minimum damper position.

Figure 7 shows a graphical explanation of the control parameters. When a reset scheme is used (Min OA type=) the OA damper position can be reset, or the damper can be closed to a position not lower than the Demand Control Ventilation outdoor air damper position profile.

Figure 7: Damper Position vs. Fan Speed Chart

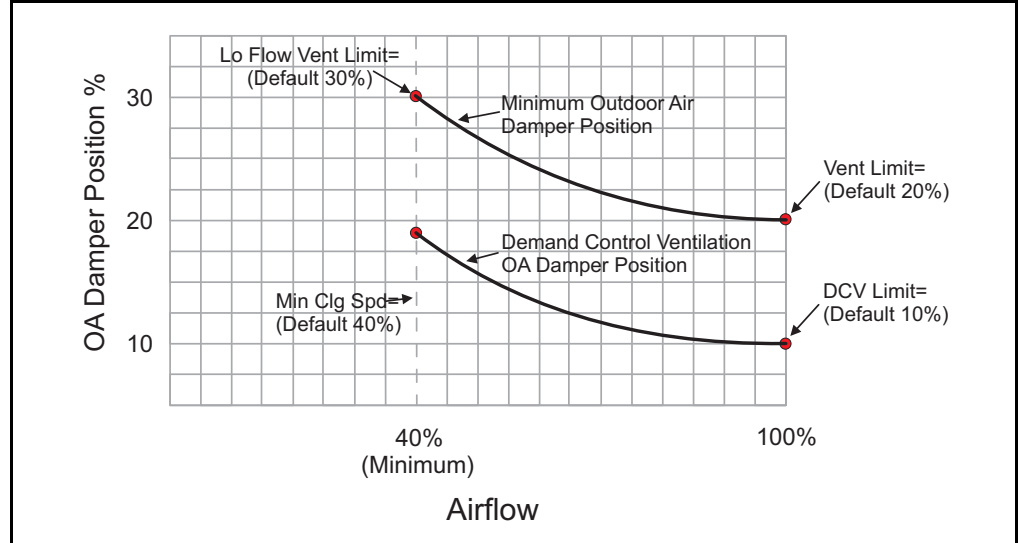


Table 14: Min OA Damper Menu

Menu	Menu Item	Default	Range
Min OA Damper (w/Econo)	Min OA Pos=		0 - 100
	Vent Limit=	20%	0 - 99
	DCV Limit=	0%	0 - 99
	Min OA Type=	None	None Network External IAQ
	% @ DCV Limit=	0	0 - 99.9
	% @ Vent Limit=	99.9	0 - 99.9
	PPM @ DCV Limit=	800	0 - 9999
	PPM @ Vent Limit=	1000	0 - 9999
	IAQ PPM=		
	PPM @	04 mA	0 - 20 mA/V
	PPM @	20 mA	0 - 20 mA/V
	Ext Percent=		
	Min OA Damper (VAV)	Min Clg Spd=	40%
LoFlo Vent Limit=		30%	0 - 99
Min OA Damper (no Econo)	Min OA Pos=		
	Min OA Spt=	20%	1 - 100

Min OA Pos= is a status only item which indicates the current minimum position of the outdoor damper. This value does not go above a value called the Ventilation Limit and does not go below a value called the Demand Control Ventilation Limit.

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 VFD speed goes from 100% down to the Min Clg Spd= value. The Demand Control Ventilation Limit in this is determined by the Ventilation Limit X DCV Limit=/Vent Limit=.

When the Min OA Type= parameter is set to “None” the Min OA Pos= value is set to the Ventilation Limit. If Min OA Type= is set to Network, External or IAQ, 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.

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 type=” is set to something other than “None”.

Min OA Type= 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 and the Demand Control Ventilation Limit parameter is ignored. When this is set to “Network”, “External”, or “IAQ”, 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.

Examples of typical Min OA reset schedules:

If IAQ is selected as the Min OA Type, the Minimum OA Position is calculated based on a 0-10V CO2 sensor input. The CO2 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 (DCV Limit) when the CO2 levels are less than 800PPM and to be at its maximum (Vent Limit) when the CO2 levels are greater than 1000PPM, the controller would be set up as follow:

Vent Limit = 100%
DCV Limit = 0%
Min OA reset type = IAQ
PPM@DCV Limit = 800
PPM@Vent Limit = 1000
IAQ PPM = Current PPM
0 PPM @ 0 V
2000 PPM @ 10 V
Min Clg Spd = 30%
LoFlo Vent Limit = 100%

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 External is selected as the Min OA Type, the Minimum OA Position is calculated based on an external DC voltage or mA signal. This calculated Minimum OA Position varies linearly from zero % 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 (DCV Limit) when the field supplied signal is at its minimum (0VDC) and to be at its maximum (Vent Limit) when the field supplied signal is at its maximum (10VDC), the controller would be set up as follow:

Vent Limit = 100%
DCV Limit = 0%
Min OA reset type = External
0% @ DCV Limit
100% @ Vent Limit
0% @ 0 V
100% @ 10 V
Min Clg Spd = 30%
LoFlo Vent Limit = 100%

In this example the Minimum OA Position would vary linearly from 0% outside air at 0 VDC to 100% outside air at 10 VDC.

XXX % @ DCV Limit= is an adjustable item used when Min OA Type= is set to “External” to define at what percent of the field input signal the Min OA Pos= is to be at the Demand Control Ventilation Limit value.

XXX % @ Vent Limit= is an adjustable item used when Min OA Type= is set to “External” to define at what percent of the field input signal the Min OA Pos= is to be at the Ventilation Limit value.

Ext Percent= is a status only item that indicates what percent the field signal currently is between the minimum and maximum value when Min OA Type= is set to “External”.

0 % @ XX V/mA= is an adjustable item that sets the minimum DC voltage or mA value of the field signal used when Min OA Type= is set to “External”.

100 % @ XX V/mA= is an adjustable item that sets the maximum DC voltage or mA value of the field signal used when Min OA Type= is set to “External”.

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

XXXX PPM @ Vent Limit= is an adjustable item used when Min OA Type= is set to “IAQ” 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 CO₂ sensor.

XXXX PPM @ XX V/mA= is an adjustable item that sets the minimum PPM value and the minimum DC voltage or mA value of the CO₂ sensor used when Min OA Type= is set to “IAQ”.

XXXX PPM @ XX V/mA= is an adjustable item that sets the maximum PPM value and the maximum DC voltage or mA value of the CO₂ sensor used when Min OA Type= is set to “IAQ”.

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.

Extended Menus

LoFlo Vent Limit= is an adjustable item that sets the maximum value for the Ventilation Limit on a VAV unit.

Daily Schedule

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

Menu	Menu Item	Default	Range
Daily Schedule	Mon=	00:00 - 00:00	00:00 - 23:59
	Tue=	00:00 - 00:00	00:00 - 23:59
	Wed=	00:00 - 00:00	00:00 - 23:59
	Thu=	00:00 - 00:00	00:00 - 23:59
	Fri=	00:00 - 00:00	00:00 - 23:59
	Sat=	00:00 - 00:00	00:00 - 23:59
	Sun=	00:00 - 00:00	00:00 - 23:59
	Hol=	00:00 - 00:00	00:00 - 23:59

Holiday Schedule

The Holiday Schedule is used to set the start and stop times for up to 16 different holidays.

Table 16: Holiday Schedule Menu

Menu	Menu Item	Default	Range
Holiday Schedule	Hol 1=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 2=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 3=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 4=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 5=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 6=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 7=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 8=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 9=	NA 00 - N A00	Jan-Dec 0-31
	Hol 10=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 11=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 12=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 13=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 14=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 15=	NA 00 - NA 00	Jan-Dec 0-31
	Hol 16=	NA 00 - NA 00	Jan-Dec 0-31

To enter a 1-day holiday, the start date and the end date must both be entered as the same day. For example: To enter a holiday of July 4th, the date must be entered as “Jul 04 - Jul 04”. If both the start and end dates are not entered, the unit will not recognize the holiday.

The start and stop times for the holidays must be entered at the daily schedule menu (Table 16). All 16 holidays will follow the start and stop times as indicated in the daily schedule for “hol=”.

One Event Sched

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

Table 17: One Event Sched Menu

Menu	Menu Item	Default	Range
One Event Sched	Beg=	NA 00 @ 00:00	Jan-Dec 00:00-23:59
	End=	NA 00 @ 00:00	Jan-Dec 00:00-23:59

Optimal Start

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

Menu	Menu Item	Default	Range
Optimal Start	Enable=	No	No/Yes
	Space Temp=	-	-45 - 212
	OA Temp=	-	-45 - 212
	Htg Rate=	.400	.000 - .999
	Htg OAT=	35°F	-40 - 60
	Design Htg OAT=	0°F	-40 - 60
	Clg Rate=	.400	.000 - .999
	Clg OAT=	85°F	60 - 140
Design Clg OAT=	95°F	60 - 140	

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

Space Temp= is a status only item that indicates the current space temperature. A space temperature sensor must be connected to the unit controller for this feature to function. Refer to “Space Sensor” on page 57.

OA Temp= is a status only item that indicates the current outdoor air temperature.

Htg Rate= is an adjustable item that sets the rate of temperature rise in degrees per minute when the unit was last started optimally in heating.

Htg OAT= is an adjustable item that sets the outdoor air temperature when the unit was last started optimally in heating.

Design Htg OAT= is an adjustable item that sets the outdoor air temperature at which the heating system could just hold the load. 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.

Setup

Table 19: Setup Menu

Menu	Menu Item	Default	Range
Setup	AI1=	RAT	None RAT SpaceSpt
	Space T Present=	Yes	No Yes
	Units=	English	English Metric
	B09=	Fan Op Output	Fan Op Output VAV Output

AI1= is an adjustable item to indicate what analog input B1 is being used for, a return air temperature sensor (RAT) or an adjustable space sensor setpoint. If a space sensor is connected to the unit but it does not have an adjustable setpoint adjustment knob this item should be set to none. This connection is made at TB2 terminal 108. If a space sensor with remote setpoint adjustment is used the RAT sensor wiring must be removed.

Space T Present= is an adjustable item to indicate if a space sensor is connected to the unit controller.

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

B09= is an adjustable item to configure binary output B09. This output can be configured for a fan operation output or a VAV box output.

Time Settings

Table 20: Time Settings Menu

Menu	Menu Item	Default	Range
Time Settings	Service=	0 min	0 - 240
	Start Up=	180 sec	0 - 240
	Recirculate=	180 sec	120 - 3600
	Zero OA Time=	90 min	0 - 240
	Tnt Override=	120 min	0 - 300
	Post Heat=	0 sec	0 - 180
	Password=	15 min	5 - 60

Service= is an adjustable item that sets the amount of time the unit can operate in manual control.

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.

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 button is activated on the space sensor.

Post Heat= is an adjustable item that sets the amount of time in seconds for the post heat operation.

Password= is an adjustable item that sets the amount of time in minutes that the unit will stay in the extended menus.

Time/Date

Table 21: Time/Date Menu

Menu	Menu Item	Default	Range
Time/Date	Time=	-	00:00 - 23:59
	Date=	-	Jan-Dec 0-31 2000-2009
	Day=	-	Sunday - Saturday

Time= is an adjustable item that sets the current time.

Date= is an adjustable item that sets the current date.

Day= is an adjustable item that sets the current day of the week.

Stgd Exh Fan Setup

The Stgd Exh Fan Setup is used to setup the operation of the exhaust fans for a CAV application. This menu is used to select at what OA damper position each of the exhaust fans will turn on and off.

Table 22: Stgd Exh Fan Setup Menu

Menu	Menu Item	Default	Range
StgdExh Fan Setup	Exh Fan # 1 On=	40%	0 - 99
	Exh Fan # 1 Off=	30%	0 - 99
	Exh Fan # 2 On=	55%	0 - 99
	Exh Fan # 2 Off=	40%	0 - 99
	Exh Fan # 3 On=	70%	0 - 99
	Exh Fan # 3 Off=	50%	0 - 99

Exh Fan #1 On= is an adjustable item that turns on exhaust fan #1 based on the economizer position.

Exh Fan #1 Off= is an adjustable item that turns off exhaust fan #1 based on the economizer damper position.

Exh Fan #2 On= is an adjustable item that turns on exhaust fan #2 based on the economizer damper position.

Exh Fan #2 Off= is an adjustable item that turn off exhaust fan #2 based on the economizer damper position.

Exh Fan #3 On= is an adjustable item that turns on exhaust fan #3 based on the economizer damper position.

Exh Fan #3 Off= is an adjustable item that turn off exhaust fan #3 based on the economizer damper position.

Heating Setup

The Heating Setup menu is used to configure the heating operation of the unit.

Table 23: Heating Setup Menu

Menu	Menu Item	Default	Range
Heating Setup	Unocc Htg Spt=	55.0°F	55.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Htg Lock=	60.0°F	1.0 - 99.0
	OAT Lock Diff=	3.0°F	1.0 - 9.9
	Stage Time=	4 min	4 - 60

Unocc Htg Spt= is an adjustable item that sets the temperature of the space sensor at which the heating operation will begin when the building is unoccupied. The optional space sensor must be connected to the unit for this function to operate.

Unocc Diff= is an adjustable item that sets the temperature differential for the setpoint. When the space temperature goes above the Unocc Htg Spt plus the Unocc Diff, the unit will transition out of the heating mode of operation.

CtrlTemp Src= is an adjustable item that sets the heating operation control source to either the space temperature sensor or the return air temperature sensor.

OAT Htg Lock= is an adjustable item that sets the maximum outdoor air temperature allowed for the heating mode of operation to take place.

OAT Lock Diff= is an adjustable item that sets the temperature differential for the OAT Htg Lock setpoint.

Stage Time= is an adjustable item that sets the timer between each of the heating stages. The unit will not stage up or down until this time has passed.

Cooling Setup

The Cooling setup menus is used to configure the cooling operation of the unit.

Table 24: Cooling Setup Menu

Menu	Menu Item	Default	Range
Cooling Setup	Unocc Clg Spt=	85°F	55.0 - 99.0
	Unocc Diff=	3.0°F	1.0 - 9.9
	CtrlTemp Scr=	Return	Return Space
	OAT Clg Lock=	55.0°F	1.0 - 99.0
	OAT Lock Diff=	2.0°F	1.0 - 9.9
	Stage Time=	4 min	4 - 60

Unocc Clg Spt= is an adjustable item that sets the temperature of the space sensor at which the cooling operation will begin when the building is unoccupied. The optional space sensor must be connected to the unit for this function to operate.

Unocc Diff= is an adjustable item that sets the temperature differential for the setpoint. When the space temperature falls below the Unocc Clg Spt minus the Unocc Diff, the unit will go out of the cooling mode of operation.

CtrlTemp Src= is an adjustable item that sets the cooling operation control source to either the space temperature sensor or the return air temperature sensor.

OAT Clg Lock= is an adjustable item that sets the minimum outdoor air temperature allowed for the cooling mode of operation to take place.

OAT Lock Diff= is an adjustable item that sets the temperature differential for the OAT Clg Lock setpoint.

Stage Time= is an adjustable item that sets the timer between each of the cooling stages. The unit will not stage up or down until this time has passed.

Operating Hours

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

Table 25: Operating Hours Menu

Menu	Menu Item	Default	Range
Operating Hours	Supply Fan=	000,000	0 - 999,999
	Exhaust Fan=	000,000	0 - 999,999
	Mech Cool=	000,000	0 - 999,999
	Comp # 1=	000,000	0 - 999,999
	Comp # 2=	000,000	0 - 999,999
	Comp # 3=	000,000	0 - 999,999
	Comp # 4=	000,000	0 - 999,999
	Heating=	000,000	0 - 999,999
	Economizer=	000,000	0 - 999,999
	Tnt Override=	000,000	0 - 999,999

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

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

Mech Cool= is a status item which gives the number of hours that mechanical cooling has operated.

Comp #1= is a status item which gives the number of hours that compressor #1 has operated.

Comp #2= is a status item which gives the number of hours that compressor #2 has operated.

Comp #3= is a status item which gives the number of hours that compressor #3 has operated.

Comp #4= is a status item which give the number of hours that compressor #4 has operated

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

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.

WARNING

Unit damage may occur when operating in manual control mode. Run in this condition by an experienced technician only.

WARNING

Operating the unit in manual control can cause personal injury or equipment damage.

Manual control operation must only be performed by personnel that are knowledgeable in the operation of the equipment.

Table 26: Manual Control Menu

Menu	Menu Item	Default	Range
Manual Control	Manual Ctrl=	Off	On Off
	Supply Fan=	Off	On Off
	Comp # 1=	Off	On Off
	Comp # 2=	Off	On Off
	Comp # 3=	Off	On Off
	Comp # 4=	Off	On Off
	Cond Fan # 2=	Off	On Off
	Cond Fan # 3=	Off	On Off
	Cond Fan # 4=	Off	On Off
	Heat # 1=	Off	On Off
	Heat # 2=	Off	On Off
	Heat # 3=	Off	On Off
	Heat # 4=	Off	On Off
	Exh Fan # 1=	Off	On Off
	Exh Fan # 2=	Off	On Off
	Alarm Out=	Off	On Off
	Vav/Fan Op Out=	Off	On Off
	Sup Fan Spd=	0.0%	0.0 - 100.0
	Exh Fan Spd=	0.0%	0.0 - 100.0
	OA Damper=	0.0%	0.0 - 100.0
Htg Mod VLV=	0.0%	0.0 - 100.0	

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 sequence are overridden in this state and can cause the unit to go into alarm.

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

Note: Turning on any one of the following compressors will automatically turn on condenser fan #1. Other condenser fans must be manually turned on to control the head pressure of the unit. Refrigerant gauges must be connected to the unit for observation of the head pressure in the manual control mode of operation. **Additional condenser fans must be turned on to maintain the head pressure.**

Comp # 1= is an adjustable item that turns on compressor #1.

Comp # 2= is an adjustable item that turns on compressor #2.

Comp # 3= is an adjustable item that turns on compressor #3.

Comp # 4= is an adjustable item that turns on compressor # 4 if unit has one.

Cond Fan # 2= is an adjustable item that turns on the condenser fan #2.

Cond Fan # 3= is an adjustable item that turns on the condenser fan #3.

Cond Fan # 4= is an adjustable item that turns on the condenser fan #4 if unit has one.

Heat # 1= is an adjustable item that turns on the first stage of heat.

Heat # 2= is an adjustable item that turns on the second stage of heat.

Heat # 3= is an adjustable item that turns on the third stage of heat.

Heat # 4= is an adjustable item that turns on the fourth stage of heat.

Exh Fan # 1= is an adjustable item that turns on the first stage of exhaust fans.

Exh Fan # 2= is an adjustable item that turns on the second stage of exhaust fans.

Sup Fan Spd= is an adjustable item only on VAV units that sets the speed of the supply air fan.

Exh Fan Spd= is an adjustable item for units with building pressure control (VFD on the exhaust fans) that sets the speed of the exhaust fans.

OA Damper Pos= is an adjustable item that sets the position of the outdoor damper.

Htg Mod VLV= is an adjustable item that allows the valve to be adjusted from its minimum open position to its full open position.

Note – The unit status will be OFF when the controller is taken out of Manual Control. To start the unit, change the control mode setting to a non off selection.

Alarm Limits

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

Table 27: Alarm Limits Menu

Menu	Menu Item	Default	Range
Alarm Limits	Hi Disch Alm=	170.0°F	90 - 250
	Lo Disch Alm=	40.0°F	20 - 50
	Hi Return Alm=	120.0°F	90 - 150

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.

Hidden Data Menus

Hidden information is accessed by pressing the Left and Down buttons at the same time. Information available on hidden data screens is shown below. The Hidden Menu include the most advanced items such as “unit configuration” parameters, Network configuration, and service related parameters. These generally do not needing changing or accessing unless there is a fundamental change to or a problem with the unit operation.

The following Menu items are meant to be used as a set up and/or troubleshooting tool and should only be accesses by trained Service Technicians.

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 the configuration variables within the MCB. These variables define things such as the Unit type, heating type, compressor type, exhaust fan control and the type of outside air damper control. 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”.

Table 28: Unit Configuration Menu

Menu	Menu Item	Default	Range
Unit Config	Unit Size=	40	1=MPS15, 2=MPS15.5 3=MPS20, 4=MPS25 5=MPS30, 6=MPS35 7=MPS40, 8=MPS50 9=MPS60, A=MPS70 B=MPS15A, C=MPS17.5A D=MPS17.5B, E=MPS20B
	Unit Type=	CAV	CAV VAV None, 2 Stg, 4 Stg, LoGas, HiGas, ModWtr*, ModElec*
	Heat Type =	None	* Later Versions
	Comp Type=	Danfoss	Danfoss Copeland
	Exh Fan Ctrl=	None	None Staged VFD
	OA Damper	Econo	No Econ Econ
	FixedOADMMax=	100%	0-100
	AppVersion=	1.07	1.00 - 9.99
	ServiceTime=	20sec	0-240
	RestoreDefaults?	No	No/Yes

Hidden Data Menus

Network Configuration

The MicroTech II Applied Air Handling Unit Controller contains data points or unit variables that are accessible from three user interfaces: the unit keypad, a BACnet network (BACnet/IP or MS/TP), or a LONWORKS network. Not all points are accessible from each interface. Refer to ED 15102-1 (available on www.mcquay.com) for Network Configuration details. ED 15102-1 contains the network details necessary to incorporate the MicroTech II Applied Air Handling Unit Controller into the network.

Table 29: Network Configuration Menu

Menu	Menu Item	Default	Range
Network Config	BAS Comm=	None	None LON BACnet MS/TP BACnet IP BACnet Ethernet
	RcvHrtBt=	30sec	0-3276.4sec
	Configure BACnet?	No	No/Yes
	nviSetpoint=		
	nviDACISP=		
	nviOAT=		
	nviSpaceT=		
	nviOccCmd=		
	nviAppMode=		
	nviEmerg=		
	nviOAMinPos=		
	nviSpaceIAQ=		
	nviDSP Spt=		
	nviBSP=		
	nviBSP Spt=		
	nviSupFanCap=		
	nviExhFanCap=		
	nviCurrSched=		
	nviNextSched=		
	nviTimeToNext=		
	nviCoolState=		
	nviCoolValue=		
	nviHeatState=		
	nviHeatValue=		
	nviEconoState=		
	nviClrAllAlms=		
	nviClrOneAlm=		
	nciOccCoolSpt=		
	nciOccHeatSpt=		
	nciDACISP=		
nciDACISP=			
Temp COV=			

Economizer Control

The control algorithm is a PI loop with the Integral gain adjusted based on OAT to provide accurate control over a wide range of outdoor air temperatures. Testing was conducted to determine operating parameters so no field adjustment should be required.

Table 30: Economizer Control Menu

Menu	Menu Item	Default	Range
Econ Zone Loop	Sample Time=	60sec	0-999
	PA Time=	600sec	0-999
	Gain=	100	0-999
Econ DAT Loop	Sample Time=	30sec	0-999
	PA Time=	60sec	0-999
	Gain=	10	0-999
	Actuator Time=	60sec	0-999
	Econ= 0% @ V	2	0-9.9
	Econ= 100% @ V	10	0-99.9

Duct Static Pressure Control

The control loop used to modulate the fan speed to maintain a measured duct static pressure at a setpoint is based on the fan laws. For a given system, duct static pressure varies with the square of the speed according to the fan laws.

Note – IMPORTANT: 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. The VFD ramp time value on the keypad must be changed whenever the ramp time of the VFD is changed. The ramp up time must equal the ramp down time to provide stable operation.

Table 31: Alarm Limits Menu

Menu	Menu Item	Default	Range
Duct Press Loop	MinSampleTime=	5sec	0-99
	VFD Ramp Time=	60sec	0-999
	Max VFD Chg=	15.00%	0-99.9
	MinSupFanSpd=	25%	0-99.9
	Speed= 0% @ V	0	0.0-9.9
	Speed=100% @ V	10	0.0-99.9
	DSP= 0 @ mA	4	0.0-9.9
	DSP= 5 @ mA	20	0.0-99.9
	DSP CtrlDelay=	30sec	0-999

Building Static Pressure Control

The modulated exhaust fans are turned on if the outside air dampers are controlled to at least their minimum position and the building static pressure is above the building static pressure setpoint by more than the deadband for longer than the Minimum Exhaust Fan Start Time (Default = 120 seconds).

The modulated exhaust fans are turned off when the supply fan is turned off. They are also turned off if the building static pressure is below the building static pressure setpoint by more than half the deadband and the Exhaust Fan capacity is at its minimum value (Default = 25%) for longer than the Min Exhaust Fan Stop Time (Default = 120 seconds).

A PI control loop is used to modulate the variable frequency drive of the exhaust fans to maintain a measured building static pressure at a setpoint.

Table 32: Building Pressure Loop Menu

Menu	Menu Item	Default	Range
Bldg Press Loop	Sample Time=	5sec	0-99sec
	PA Time=	0sec	0-999sec
	Gain=	50	0-999
	MinExhFanSpd=	25.00%	0-99.9%
	Speed= 0% @ V	0	0.0-9.9
	Speed=100% @ V	10	0.0-99.9
	ExhFanActTime=	120sec	0-999
	ExhStartTime=	120sec	0-999
	ExhStopTime=	120sec	0-999
	BSP=-.250IWC@ mA	4	0.0-9.9
BSP=+.250IWC@ mA	200	0.0-99.9	

Project Ahead Time - Zone Control

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.

Table 33: Zone Control Menu

Menu	Menu Item	Default	Range
Zone ControlPA	PA Time=	700sec	0-9999

Time Settings

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) after compressors shut down or heat is turned off.

Table 34: Time Settings Menu

Menu	Menu Item	Default	Range
Time SettingsOff	HtClDelay=	120sec	0-999

Operating Hours Config Menu

The current run times shown in the Op Hours Config Menu can be changed via the keypad. This may be used to set the value for a component to zero if it is replaced for example. The values in temporary memory are written to permanent memory at the Write Interval (Default period = 8 Hours) this value is editable in the first screen of the Op Hours Config menu. In the event of a power loss, the temporary values start from the permanent values so the number of operating hours that are lost would be between 0 and the Write Interval.

Table 35: Operating Hours Configuration Menu

Menu	Menu Item	Default	Range
Op Hours Config	Write Interval=	8Hrs	0-99
	Sec/Hr Adjust=	3600	0-9999
	Supply Fan=		
	Exhaust Fan=		
	Mech Cool=		
	Comp # 1 =		
	Comp # 2 =		
	Comp # 3 =		
	Comp # 4 =		
	Heating=		
	Economizer=		
	Tnt Override=		

Remote Alarm Output Configuration

The action of this output depends on the setup of each of the possible alarms. The output is on continuously (field relay energized) when there are no active alarms within the unit controller. Each alarm is then configured to cause the output to turn off, blink on and off rapidly, blink on and off slowly, or remain on (no alarm indication).

Table 36: Alarm Out Menu

Menu	Menu Item	Default	Range
Alarm Out Faults	Emergency Off=	Fast	Off Slow Fast On
	Control T Fail=	Fast	Same as Above
	Disch Sensor=	Fast	Same as Above
	Duct Hi Limit=	Fast	Same as Above
	Hi Return Tmp=	Fast	Same as Above
	Hi Disch Tmp=	Fast	Same as Above
	Lo Disch Tmp=	Fast	Same as Above
	Fan Fault=	Fast	Same as Above
Alarm Out Problems	OAT Sensor=	Slow	Same as Above
	Space Sensor=	Slow	Same as Above
	Return Sensor=	Slow	Same as Above
	Hi Pres-Ckt1=	Slow	Same as Above
	Hi Pres-Ckt2=	Slow	Same as Above
	Lo Pres-Ckt1=	Slow	Same as Above
Lo Pres-Ckt2=	Slow	Same as Above	
Alarm Out Warning	Dirty Filter =	Off	Same as Above

Alarm Delays

The Alarm Delays Setup Menu can be accessed when a password has been entered. The default settings are the result of many years of testing and should not be changed. The Alarm Delay Setup Menu should only be accessed by trained service personnel.

Table 37: Alarm Delays Menu

Menu	Menu Item	Default	Range
Alarm Delays	Airflow=	120sec	0-999
	Pressure=	10sec	0-999
	Low Pressure=	60sec	0-999
	Temperature=	30sec	0-999
	High Temp=	30sec	0-999
	Low Temp=	180sec	0-999
	Heat=	15sec	0-999
	Power Up=	5sec	0-999
	Alarm Output=	1sec	0-999

Controller

This section of the manual describes the MicroTech II Controller components, input/output configurations, field wiring options and requirements, and service procedures.

NOTICE

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, it can interfere with 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 users will be required to correct the interference at their own expense.

McQuay International 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 knowledgeable in the operation of the equipment being controlled.

WARNING

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

Protect the electrical components in the main control panel from precipitation.

CAUTION

Extreme temperature can damage system components.

This MicroTech II controller is designed to operate in ambient temperatures from -40°F to 158°F . It can be stored in ambient temperatures from -65°F to 176°F . The controller is designed to operate in a 10% to 90% RH (noncondensing) and be stored in a 5% to 95% RH (noncondensing) environment.

CAUTION

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

CAUTION

To prevent possible unit damage, before removing power to the controller, pump down compressor.

General Description

The MicroTech II Controller for Maverick Commercial Packaged Units is microprocessor-based and designed to provide sophisticated control of McQuay Maverick rooftop units. In addition to providing normal temperature, static pressure, and ventilation control, the controller can provide alarm monitoring and alarm-specific component shutdown if critical system conditions occur.

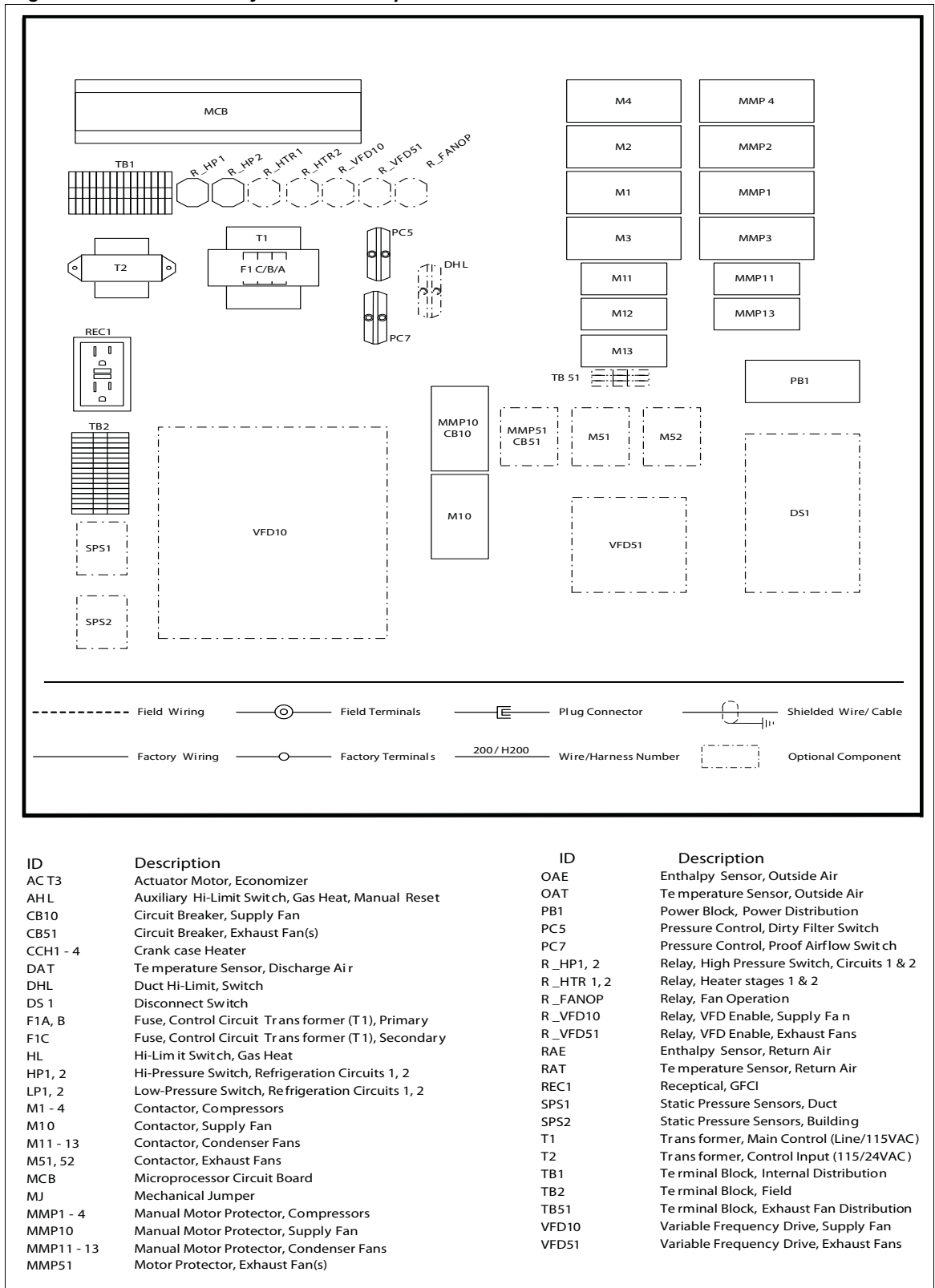
The operator can access temperatures, pressures, operating states, alarm messages, control parameters, and schedules with a 6-key keypad and a 4-line by 20-character display. The controller includes password protection against unauthorized or accidental control parameter changes.

This MicroTech II controller is capable of complete, stand-alone rooftop unit control, or it can be incorporated into a building-wide network using an optional plug-in communication module. Available communication modules include BACnet[®]/IP, BACnet MS/TP, BACnet Ethernet, LONMARK[®] Space Comfort Controller (SCC) and LONMARK Discharge Air Controller (DAC).

Control Panel

The unit control panel's main component is the controller as indicated in Figure 8. The controller along with the ancillary components of contactors, switches, motor protectors, and miscellaneous control items make up the complete unit control panel.

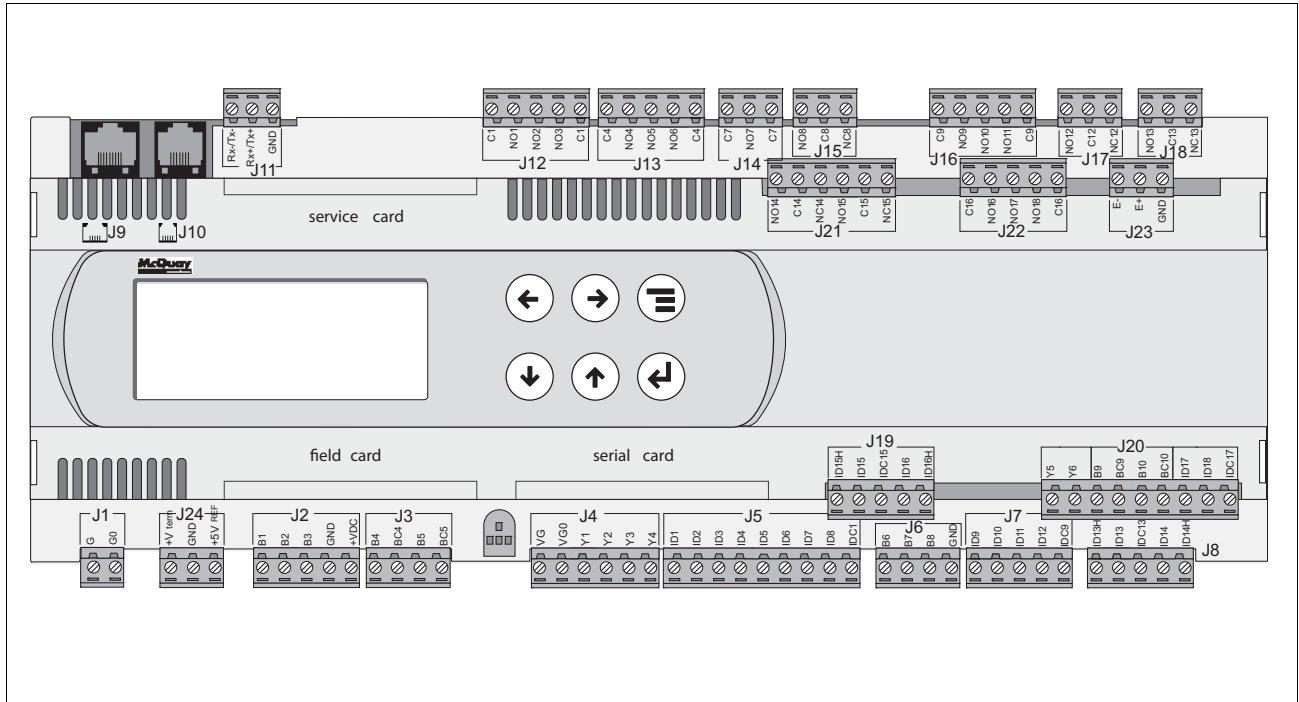
Figure 8: Control Panel Layout and Description



Unit Controller

The unit controller is made up of the integral keypad with LED display, digital inputs, digital outputs, analog inputs, and analog outputs. The MPS equipment has either a large or a medium unit controller depending if the rooftop unit has gas heat and a VAV application or not. The difference between a large and a small unit controller is the number of inputs and outputs it has. See Figure 9 for details on the unit controller.

Figure 9: Unit Controller



Analog Input

The unit controller receives up to 8 analog inputs. The sensors are described as follows:

Table 38: Analog Input

Controller Input	Description	Value
B1	RAT/Space setpoint	RTD
B2	Space temperature	RTD
B3	CO2/Ext. minimum position	Volts/mA
B4	Discharge air temperature	RTD
B5	Outdoor air temperature	RTD
B6	Duct static pressure	4-20 mA
B7	Building static pressure	4-20 mA
B8	DAT setpoint reset	Volts/mA

Analog Output

The unit controller receives up to 4 analog outputs. The sensors are described as follows:

Table 39: Analog Output

Controller Output	Description	Value
Y1	Economizer actuator	0-10 VDC
Y2	Supply fan VFD	0-10 VDC
Y3	Exhaust fan VFD	0-10 VDC
Y4	Modulating heating actuator	0-10 VDC

Binary Inputs

The unit controller receives up to 9 binary inputs. The device description is as follows:

Table 40: Binary Input

Controller Input	Description	24 V Present Indication
ID1	Remote start/stop	Enabled
ID2	Emergency stop	Operational
ID3	Airflow switch	Airflow detected
ID4	Enthalpy switch	Low OA ambient
ID5	Filter switch	Normal
ID6	High pressure/Low pressure 1	Normal
ID7	High pressure switch	Alarm
ID8	High pressure/Low pressure 2	Normal
ID9	Duct high limit	Normal

Fan Control

The supply air fan is controlled by the NO1 output. This output is wired in with the fan interlock and relay R_VFD10 for VAV units and relay M10 for CAV applications.

The exhaust fans are controlled by the NO3 output for building pressure control applications. This output is wired to relay R_VFD51. For CAV applications with staged control the exhaust fans are controlled by outputs NO3 and NO10. These outputs are wired to relays M51 and M52 respectively.

Table 41: Binary Output

Controller Output	Description	Energized Indication
NO1	Supply fan start/stop	On
NO2	Condenser fan #2	On
NO3	Exhaust fan #1	On
NO4	Heat stage 1	On
NO5	Heat stage 2	On
NO6	Compressor #1, circuit 1	On
NO7	Compressor #2, circuit 2	On

Table 41: Binary Output

Controller Output	Description	Energized Indication
NO8	Alarm	On
NO9	VAV/Fan operation output	On
NO10	Exhaust fan #2 and #3	On
NO11	Condenser fan #3	On
NO12	Compressor #2 and #3, circuit 1	On
NO13	Compressor #2 and #3, circuit 2	On
NO14	Condenser fan #4	On
NO15	N/A	N/A
NO16	Heat stage 3	On
NO17	Heat stage 4	On
NO18	N/A	N/A

Power Supply Terminals

Transformer T2 supplies 24 V (ac) power to the unit controller and connects at terminal G and GO. The analog input power supply is also supplied by T2 and is connected at VG and VGO.

Communication Modules

In systems that require networking, one of the following communication modules can be installed on the unit controller:

- BACnet/IP or BACnet Ethernet
- BACnet MS/TP
- LonWorks, Space Comfort Control (SCC)
- LonWorks, Discharge Air Control (DAC)

BACnet/IP or BACnet Ethernet

The BACnet/IP or BACnet Ethernet communication module is designed to be an add on module to the unit controller. The MicroTech II unit controller meets the requirements of ANSI/ASHRAE 135-2001 standard.

BACnet MS/TP

The BACnet MS/TP communication module is designed to be an add-on module to the unit controller. The MicroTech II unit controller meets the requirements of ANSI/ASHRAE 135-2001 standard for BACnet Master Slave/Token Passing protocol.

LonWorks SCC

The LonWorks communication module is designed to be an add-on module to the unit controller. The SCC module supports the LonMark Space Comfort Controller functional number 8504.

LonWorks DAC

The LonWorks communication module is designed to be an add-on module to the unit controller. The DAC module supports the LonMark Discharge Air Controller functional number 8610.

The installation of each of the above communication modules is further explained in each of the respective Engineering and Data (ED) documents.

Keypad/Display

The keypad display shown in Figure 1 is the operator interface to the unit controller. The keypad has 6 function keys that provide the navigation. The display is a 4 line display with each line made up of 20 characters. All operating conditions, system alarms, control parameters, and schedules can be monitored from the keypad/display.

Temperature Sensors

The MicroTech II controller uses passive negative temperature coefficient (NTC) thermistors. These sensors vary their input resistance to the controller as the temperature changes.

Table 42: Temperature/Resistance

Temperature °F	Resistance in Ohms
-40	336,050
-31	242,397
-22	176,785
-13	130,295
-4	96,999
5	72,906
14	55,301
23	42,315
32	32,650
41	25,394
50	19,903
59	15,714
68	12,493
77	10,000
86	8056
95	6530
104	5325
113	4367
122	3601
131	2985
140	2487
149	2082
158	1752
167	1480
176	1256
185	1070
194	915.9
203	786.8
212	678.4
221	587.1
230	509.8
239	444.2
248	388.3

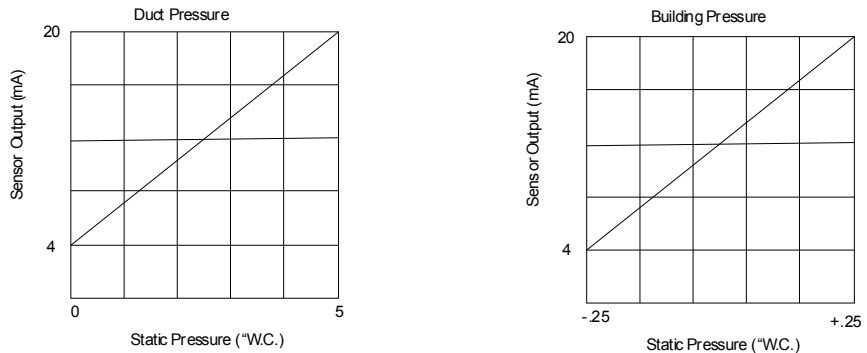
Table 43: Resistance vs. Temperature for Setpoint Adjustment

Ohms	T (°F)	T (°C)
5000	50	10
6000	54	12
7000	57	14
8000	61	16
9000	64	18
10,000	68	20
11,000	72	22
12,000	75	24
13,000	79	26
14,000	82	28
15,000	86	30

Pressure Transducers

The MicroTech II controller uses 0 to 5" wc, 4-20 mA static pressure transducers for measuring duct static pressure. If building static pressure control is provided, a -0.25" wc to 0.25" wc, 4-20 mA static pressure transducer is used.

Figure 10: Sensor Output



Actuators

The actuators are controlled by an analog signal from the unit controller.

Spring-return actuators are used for the 0 - 30% outdoor air and economizer dampers. The mixing dampers are normally closed to the outside air.

Variable Frequency Drives (VFDs)

When controlling the supply air fan or the exhaust fans with a variable frequency drive, the MicroTech II controller uses an analog output signals to modulate the drive speed.

Field Wiring

Field Output Signal

The following output signals may be available for field connections to a suitable device.

- Remote Alarm Output
- Fan Interlock
- VAV Box Output

The Remote Alarm Output and Fan Operation Output are available on all units. The VAV Box Output is available only on VAV units.

Remote Alarm Output

The remote alarm output, dry contact NO8, closes when the unit controller has an active alarm. To use this signal wire a field supplied 24 V (ac) relay/contact across terminals 120 and 122 on TB2. This and additional wiring information can be seen on the output wiring schematics at line number 334.

Fan Interlock

The output terminal on the unit controller, NO1, is energized when the supply fan is on. This output is wired to TB2 at terminals 118 and 119. All units should have a mechanical jumper (MJ118) installed at these terminals. This output supplies 115 V (ac) to these terminals. A fan interlock switch can be installed at this location to control the start of the fan. This and additional wiring information can be seen on the output wiring schematics at line number 303.

VAV Box Output/Fan Operation Output

This output is designed to coordinate the unit operation with VAV box control. The output terminal on the unit controller, NO9, is energized and provides 24 V (ac) to the relay R_FANOP. The normally open contacts of this relay are wired to TB2 at terminals 124 and 125. This and additional wiring information can be seen on the output wiring schematics at line number 336. When NO9 is configured for VAV Box Output operation the output is energized in the Cool mode and de-energized when in the Heat mode. The Fan Operation output is on when the unit is On. It is Off when the unit is Off and airflow is not detected.

Field Input Signal

The following field supplied input devices may be integrated with the unit's operation by the unit controller.

- Return and/or Supply Air Smoke Detectors
- External Time Clock
- External Discharge Air Temperature Reset Signal

Smoke Detectors

Field installed smoke detectors in the return air ductwork or the supply air ductwork can be coordinated with the units operation through the unit controller's binary input, ID2. This input is wired to TB2 and the supply air smoke detector can be wired between terminals 103 and 104 and the return air smoke detector can be wired between terminals 104 and 105. The T2 transformer supplies 24 V (ac) across each of these terminals and a dry set of contacts can be wired to these terminals respectively. This and additional wiring information can be seen on the input wiring schematics at line number 217.

External Time Clock

An external time clock can control the units occupied and unoccupied cycles by wiring it to the unit controller. A dry set of contacts can be wired between terminals 101 and 102 on TB2. The T2 transformer supplies 24 V (ac) across these contacts. This and additional wiring information can be seen on the input wiring schematics at line number 215.

External Discharge Air Temperature Reset

An external device on VAV units can reset the discharge air temperature. The input on the unit controller is at B8 and is wired to terminals 112 and 113 on TB2. The control signal can be 0-10 V (dc) or a 0-20 mA. The unit controller must be set up for the correct control signal under the Discharge Cooling menu. See Table 10 on page 22 for further discussions. When this option is used the DAT can be reset between the minimum and maximum cooling set points as configured at the Discharge Cooling menu. Example, for a 0-10 V (dc) control signal the controller configuration would be as follows for a discharge air temperature reset scheme between 55.0°F and 65.0°F.

Clg Reset = Ext V

Min Clg Spt = 55.0°F

Min Clg Spt @ = 0 (0 V (dc))

Max Clg Spt = 65.0°F

Max Clg Spt @ = 10 (10 V (dc))

The above setting will vary the discharge air temperature setpoint between 55.0 - 65.0°F with a control signal of 0 - 10 V (dc).

Space Sensor

CAV units may require the use of a space sensor. VAV units only require a space sensor if unoccupied heating and/or cooling is required. The space sensor be one of the two options:

- 1 Space sensor with tenant override.
- 2 Space sensor with tenant override and setpoint adjustment (for CAV units only).

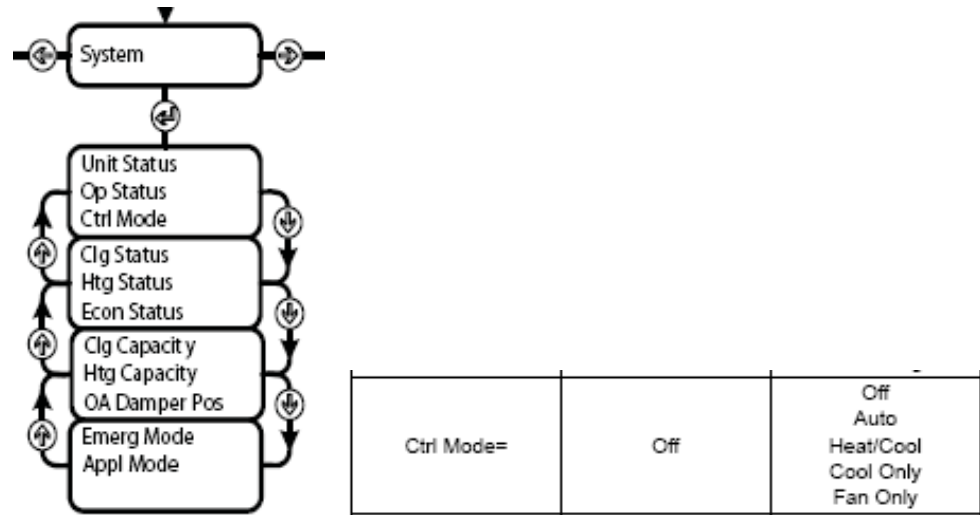
The space sensor with tenant override is connected to the unit at TB2 on terminals 109 and 110. The space sensor with tenant override and setpoint adjustment is connected to the unit at TB2 on terminals 108, 109, and 110. When the setpoint adjustment option is used the return air temperature sensor must be disconnected.

Loading New Application Code

The following information is with respect to uploading software into the McQuay MicroTech II unit controller for the Maverick II product line. Doing the following procedure will loose all internal setpoints and schedule and restore them to the original default values. Recording these values before the start of this procedure is recommended.

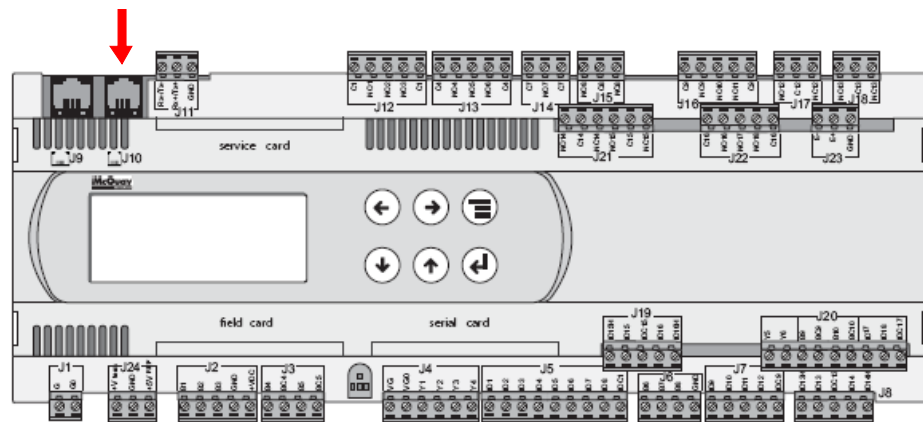
- 1 At the main unit controller, go to the System menu and scroll down to the Control Mode (Ctrl Mode) item (Figure 11). Hit enter and toggle to the control mode setting to off.

Figure 11: Control Mode Settings



- 2 Plug the software key into to the unit controller at the J10 port in the upper left hand of the unit controller (Figure 12).

Figure 12: J10 Port Location



- 3 The green light on the software key should light up and point away from the "start" button (Figure 13). If it is not press the mode key until the green air points away from the "start" button.

Figure 13: Smart Key



- 4 Press the start button. The green arrow will blink slowly while the program is downloading. This process should take less than 5 minutes. As the download process is getting close to being completed the green light will blink faster until at the end it will ‘beep’ at completion.
- 5 Unplug the software key from the main controller and cycle power to the unit.
- 6 Going through the above procedures will set the unit configuration and setpoints to the default settings. Navigate to the Hidden Menu on the Maverick Rooftop Unit Controller by pressing the upper left keypad button (with the left arrow icon) and lower left keypad button (with the down arrow icon) simultaneously. The following items will have to be selected for the specific unit configuration.
 1. Unit size
 2. Unit type
 3. Heat type
 4. Exhaust fan control
 5. OA damper type

Table 44: Unit Configuration Menu

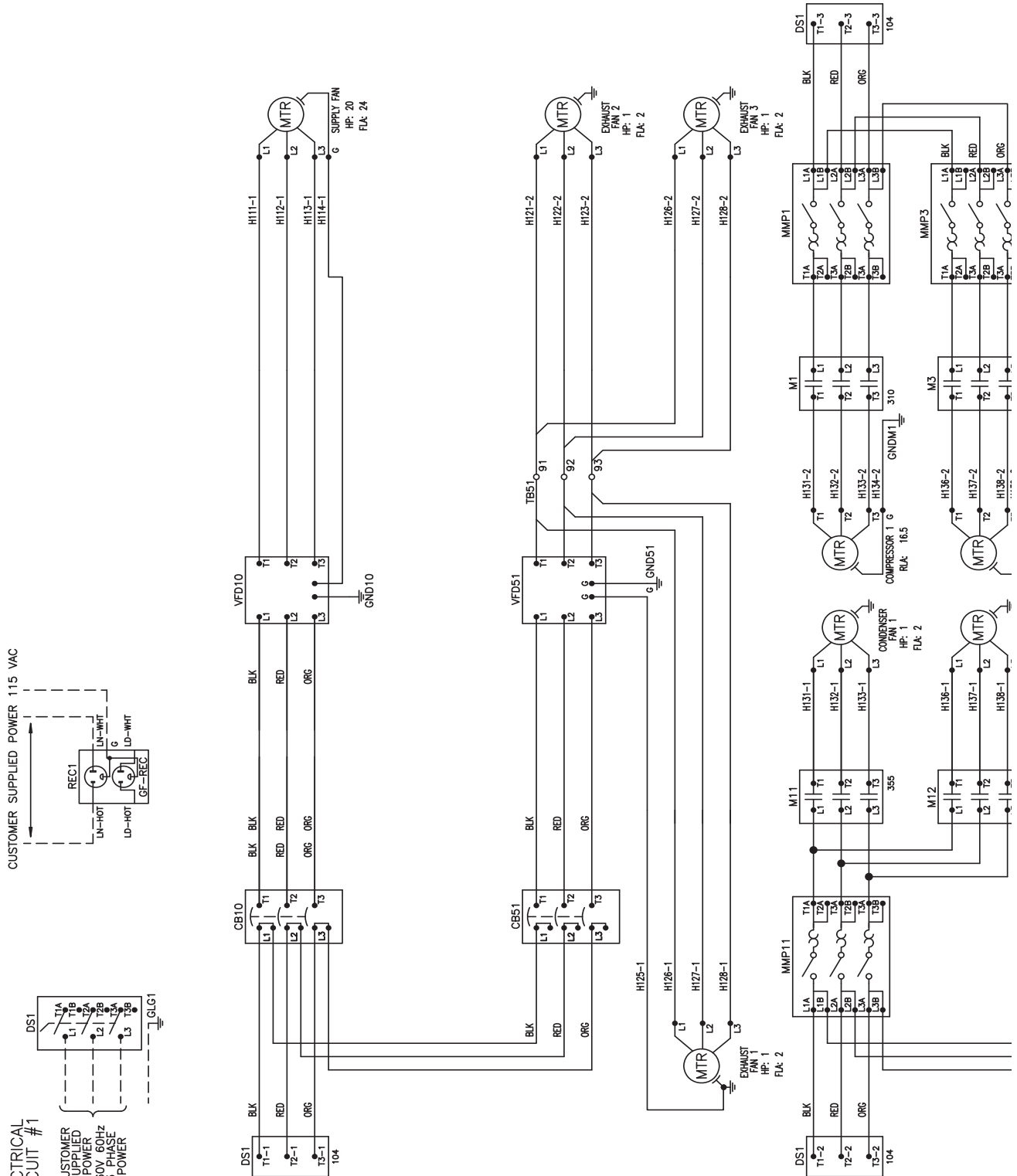
Menu	Menu Item	Default	Range
Unit Config	Unit Size=	40	1=MPS15, 2=MPS15.5 3=MPS20, 4=MPS25 5=MPS30, 6=MPS35 7=MPS40, 8=MPS50 9=MPS60, A=MPS70 B=MPS15A, C=MPS17.5A D=MPS17.5B, E=MPS20B
	Unit Type=	CAV	CAV VAV None, 2 Stg, 4 Stg, LoGas, HiGas, ModWtr*, ModElec*
	Heat Type =	None	* Later Versions
	Comp Type=	Danfoss	Danfoss Copeland
	Exh Fan Ctrl=	None	None Staged VFD
	OA Damper	Econo	No Econ Econ

- 6 The Network Configuration will have to be selected under the BAS Comm=
- 7 If the unit is being controlled by the internal schedule this information will have to be set up again.
- 8 All setpoints will also have to be set up per the jobsite requirements.

Typical Wiring Diagrams

Typical Wiring Diagrams

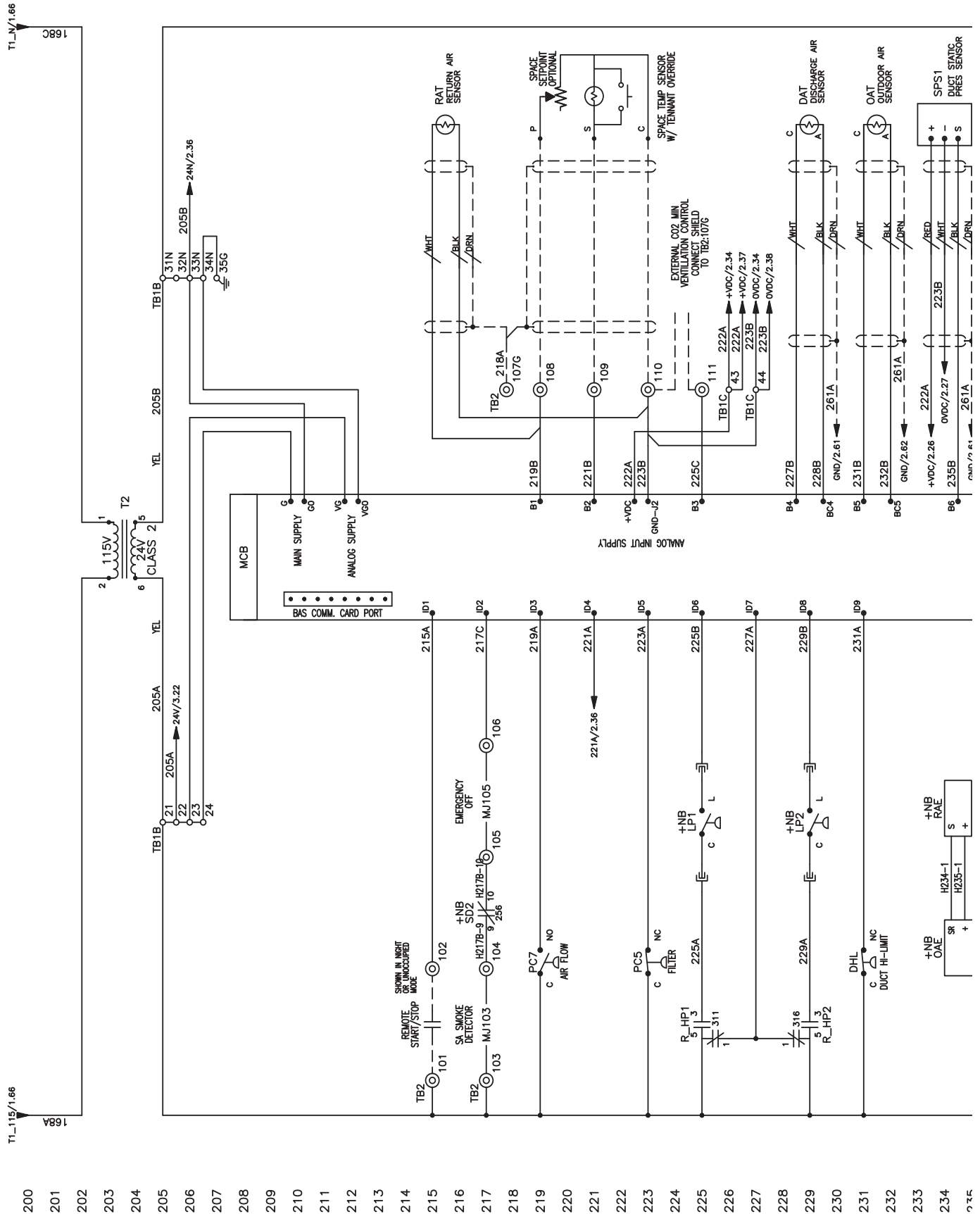
Figure 14: VAV Power



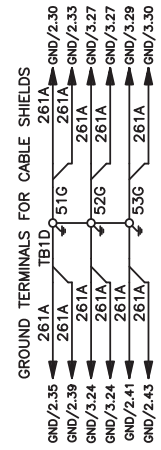
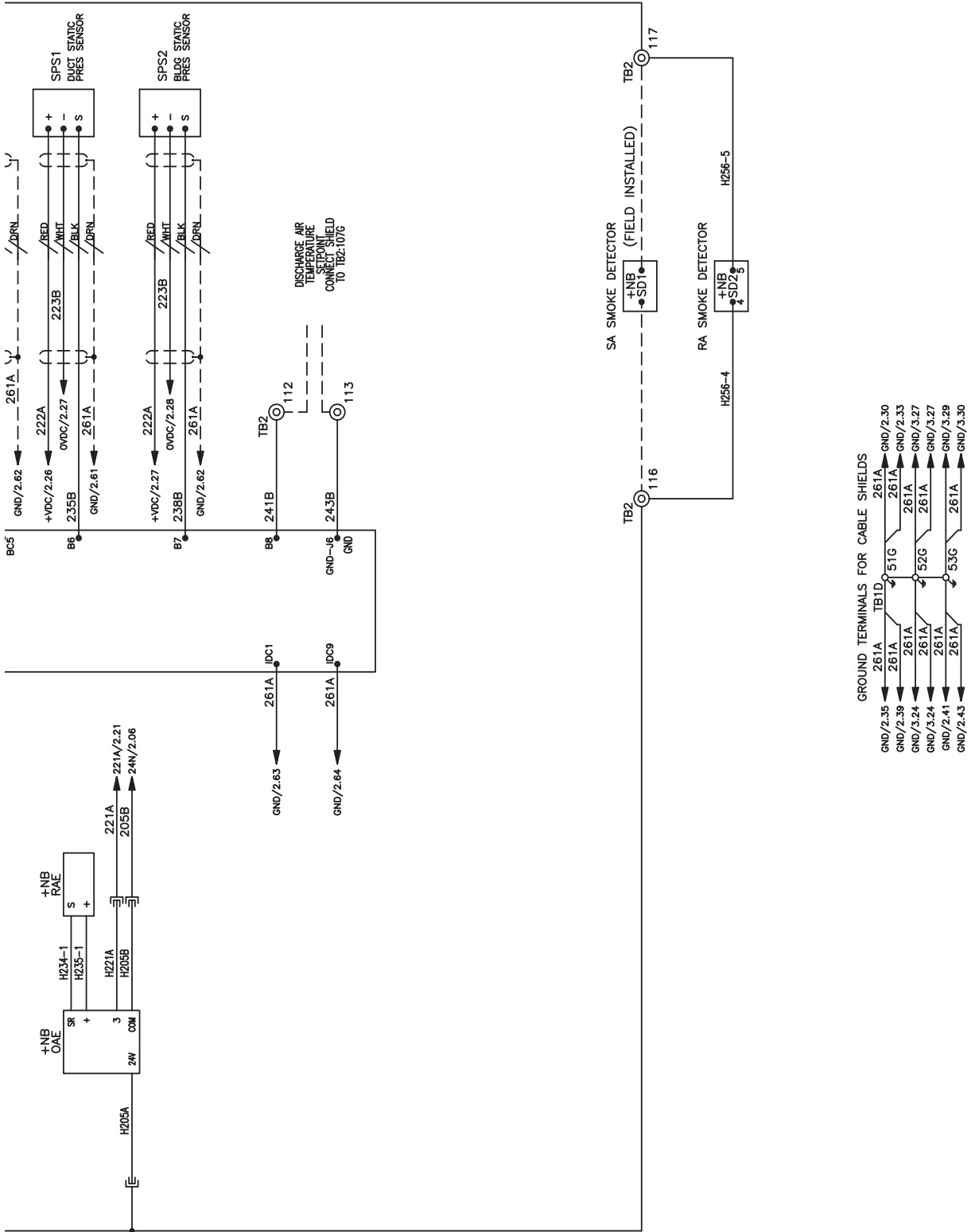
100
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102 ELECTRICAL CIRCUIT #1
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104 CUSTOMER SUPPLIED POWER 115 VAC
105 480 V, 60Hz
106 3-Phase
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Typical Wiring Diagrams

Figure 15: VAV Control—Inputs



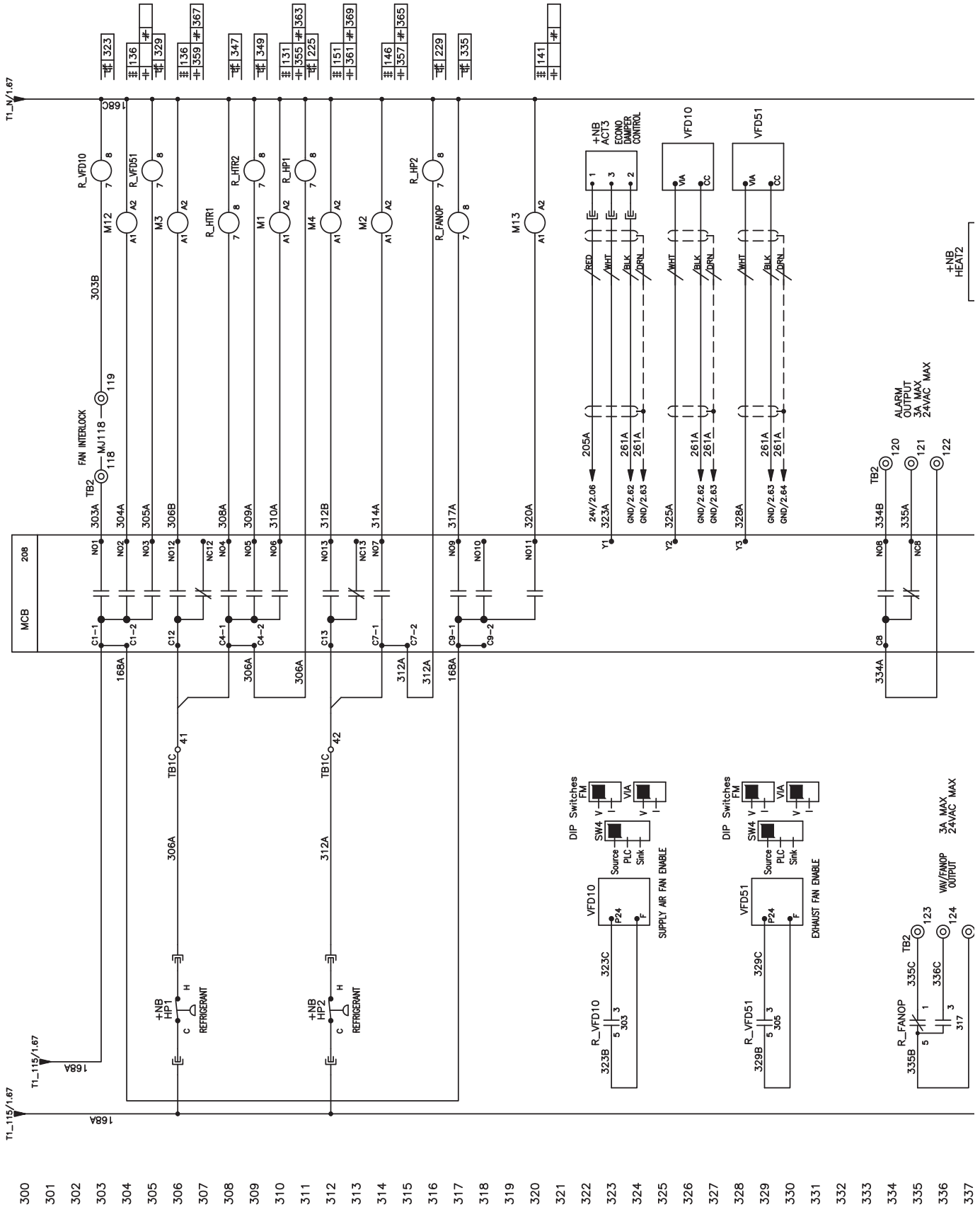
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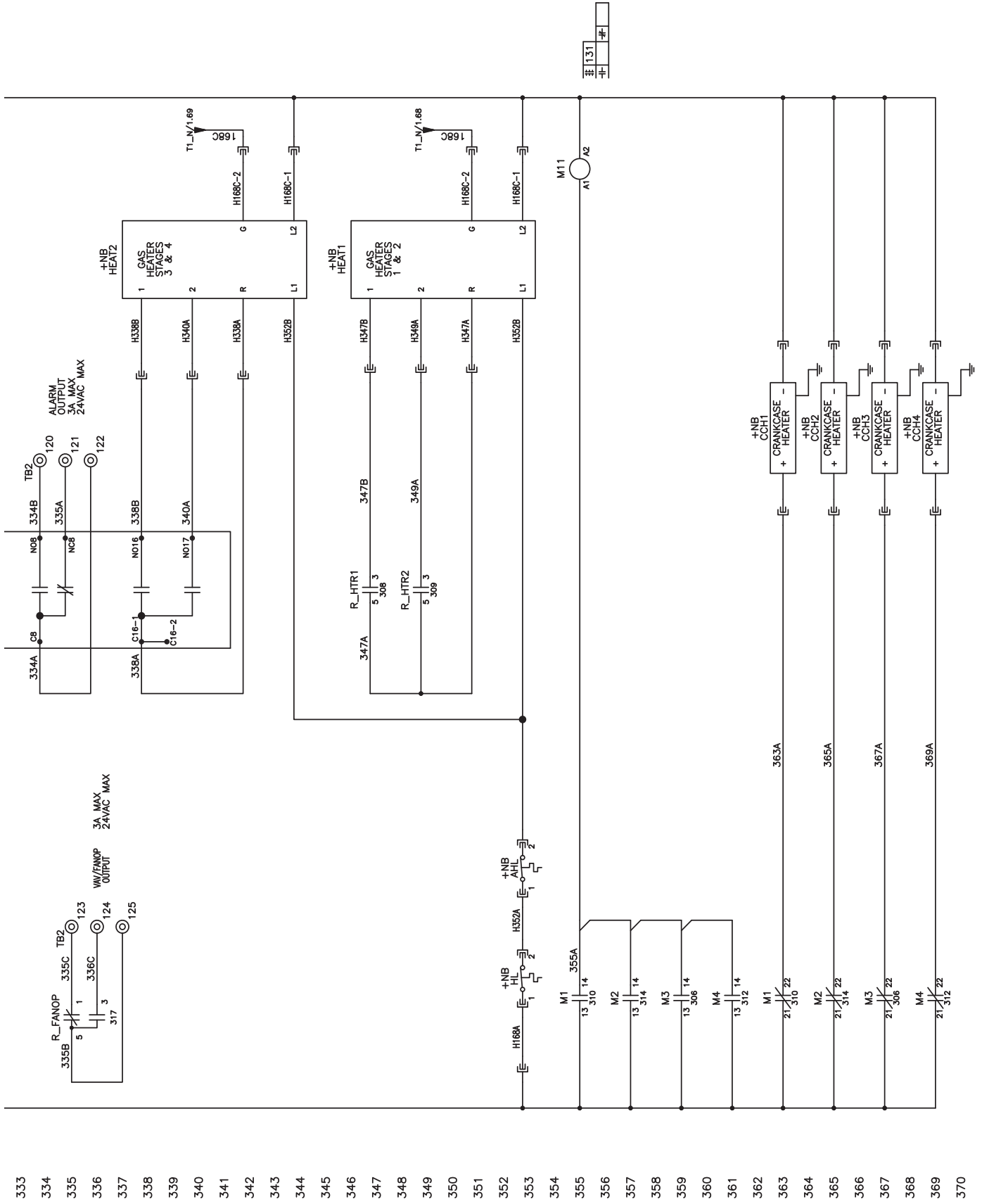


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Typical Wiring Diagrams

Figure 16: VAV Control—Outputs



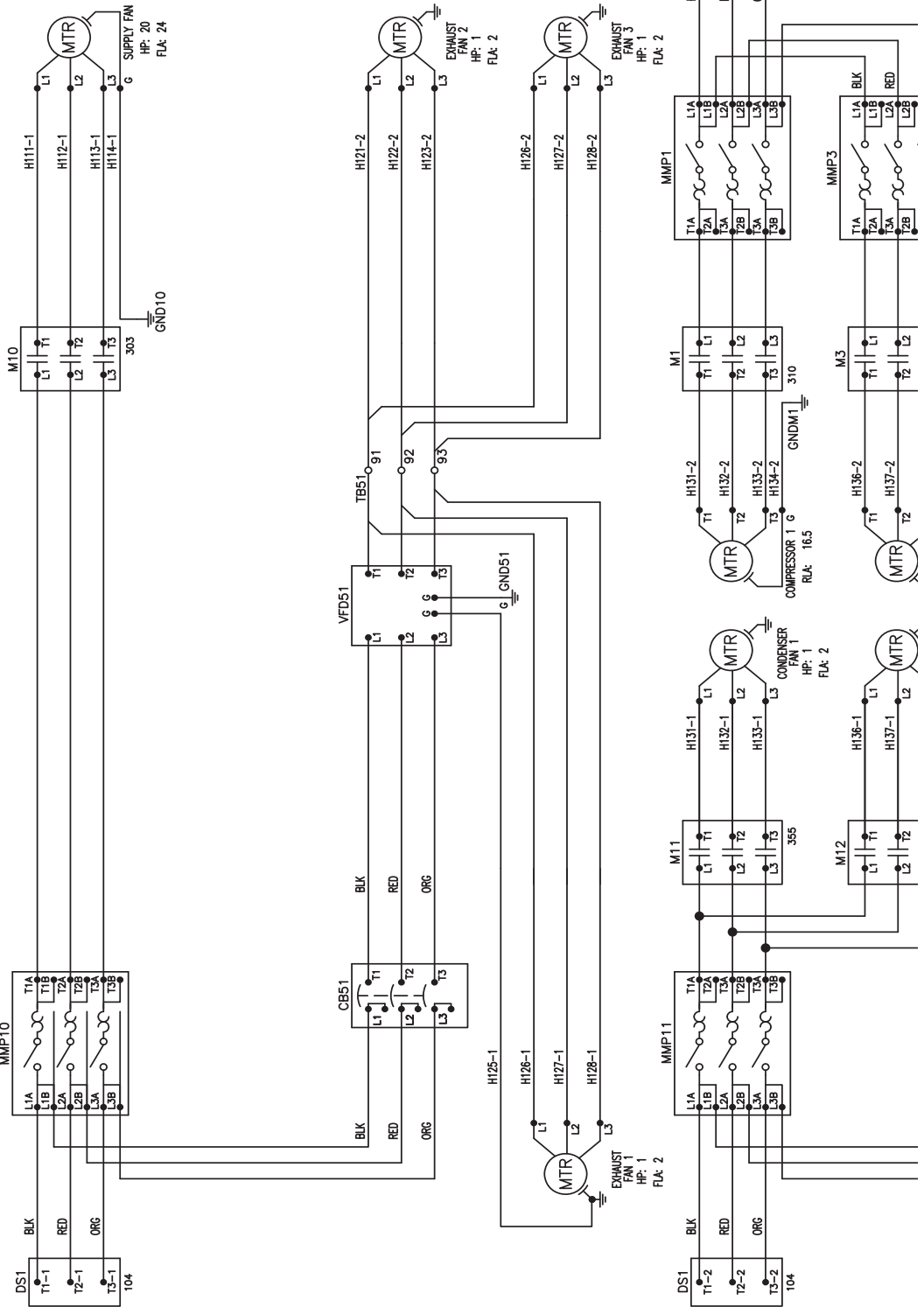
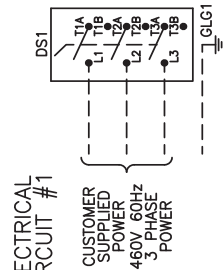
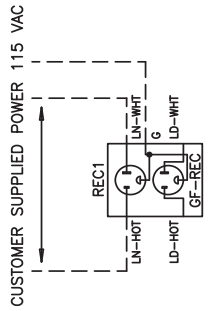


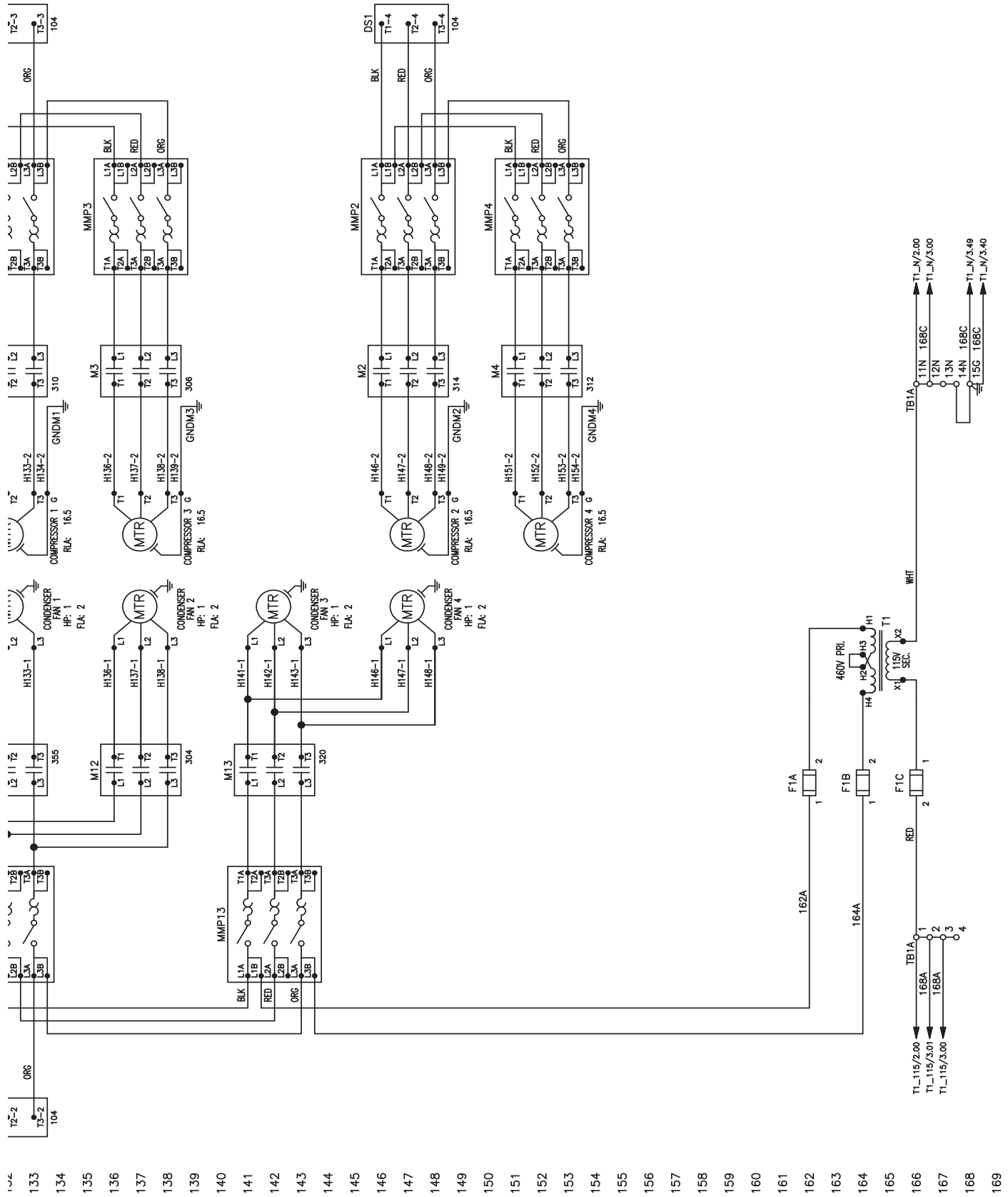
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Typical Wiring Diagrams

Figure 17: CAV Power

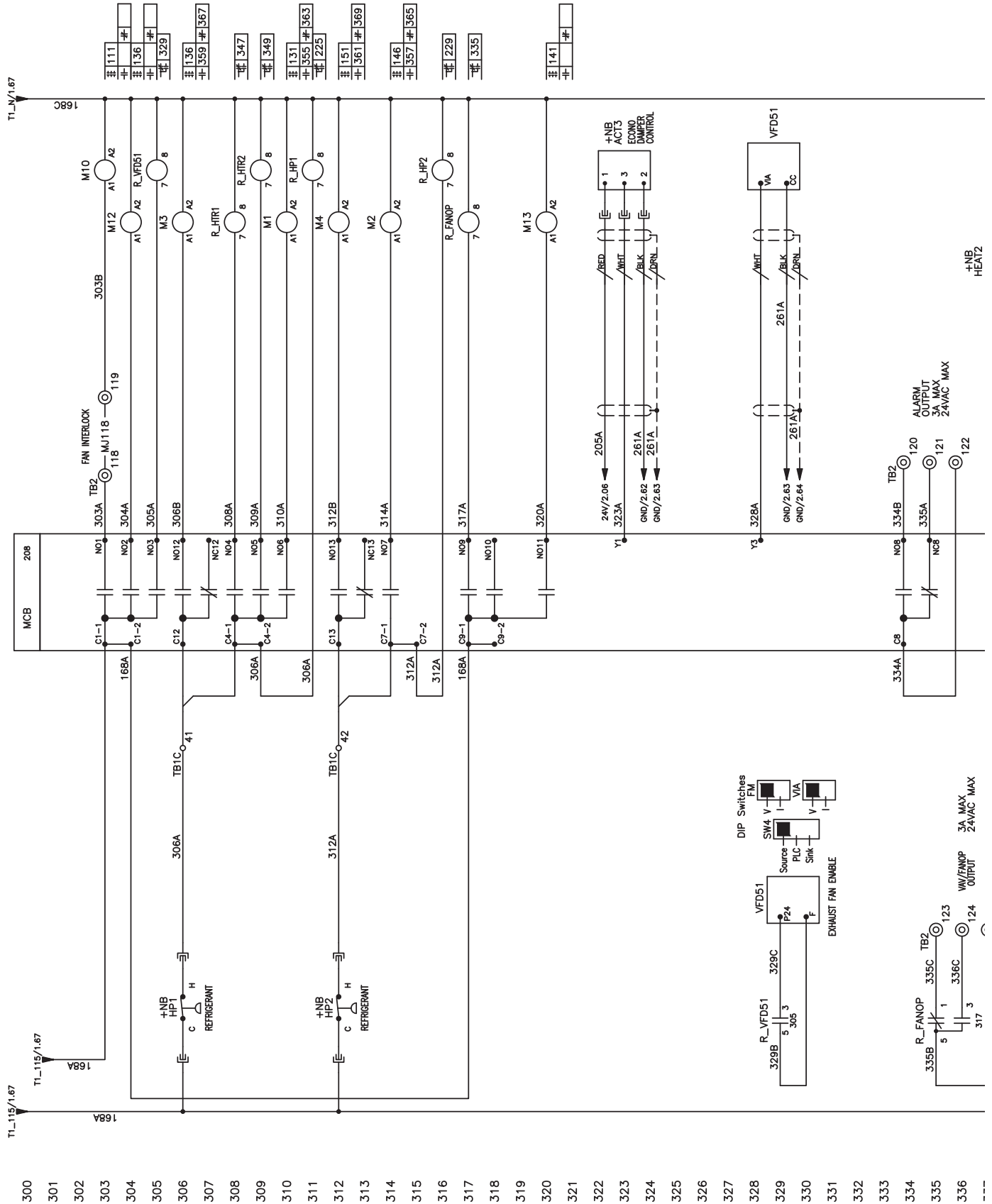
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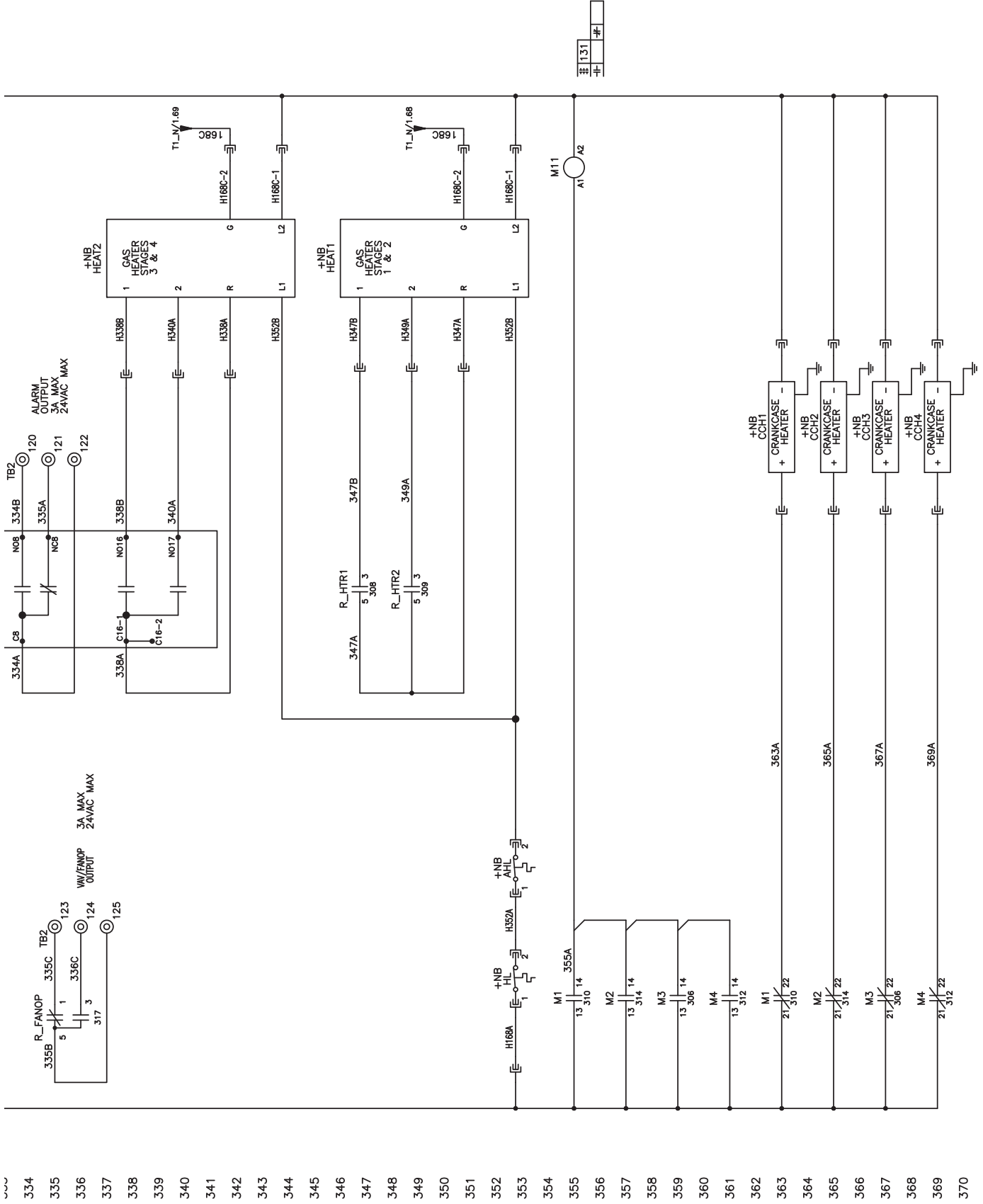




Typical Wiring Diagrams

Figure 19: CAV Control—Outputs (Staged)

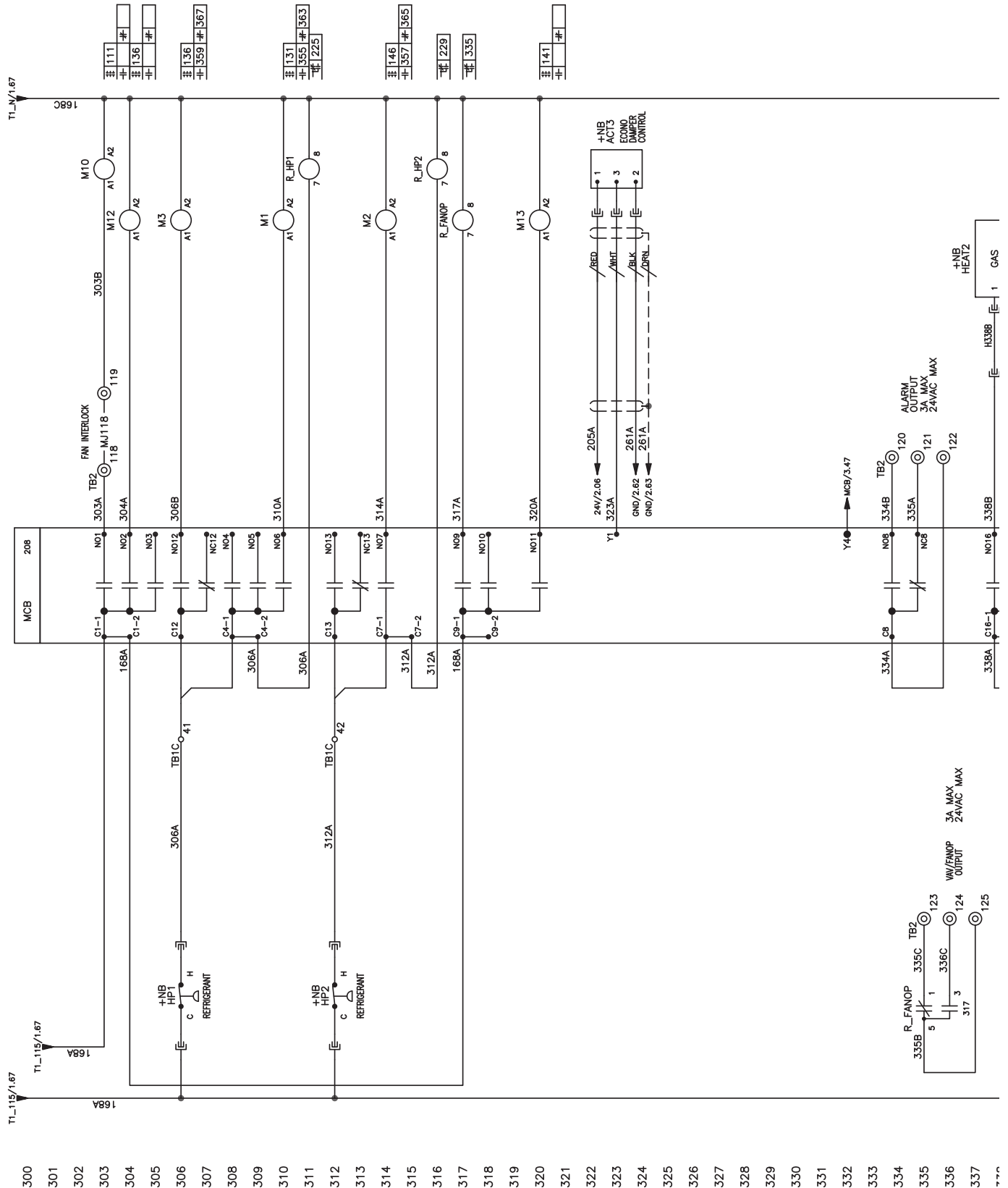


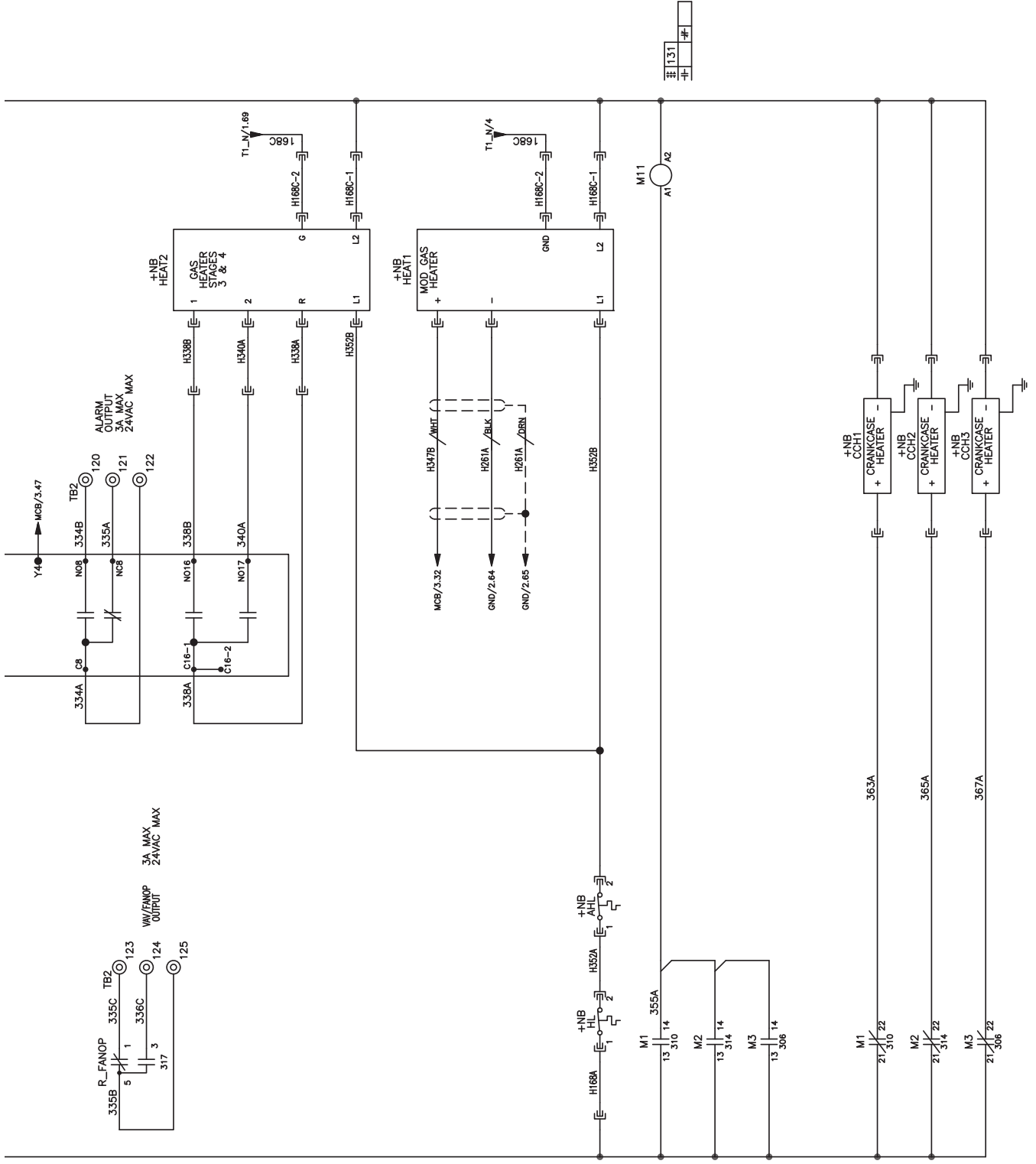


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Typical Wiring Diagrams

Figure 20: CAV Control—Outputs (Modulating)

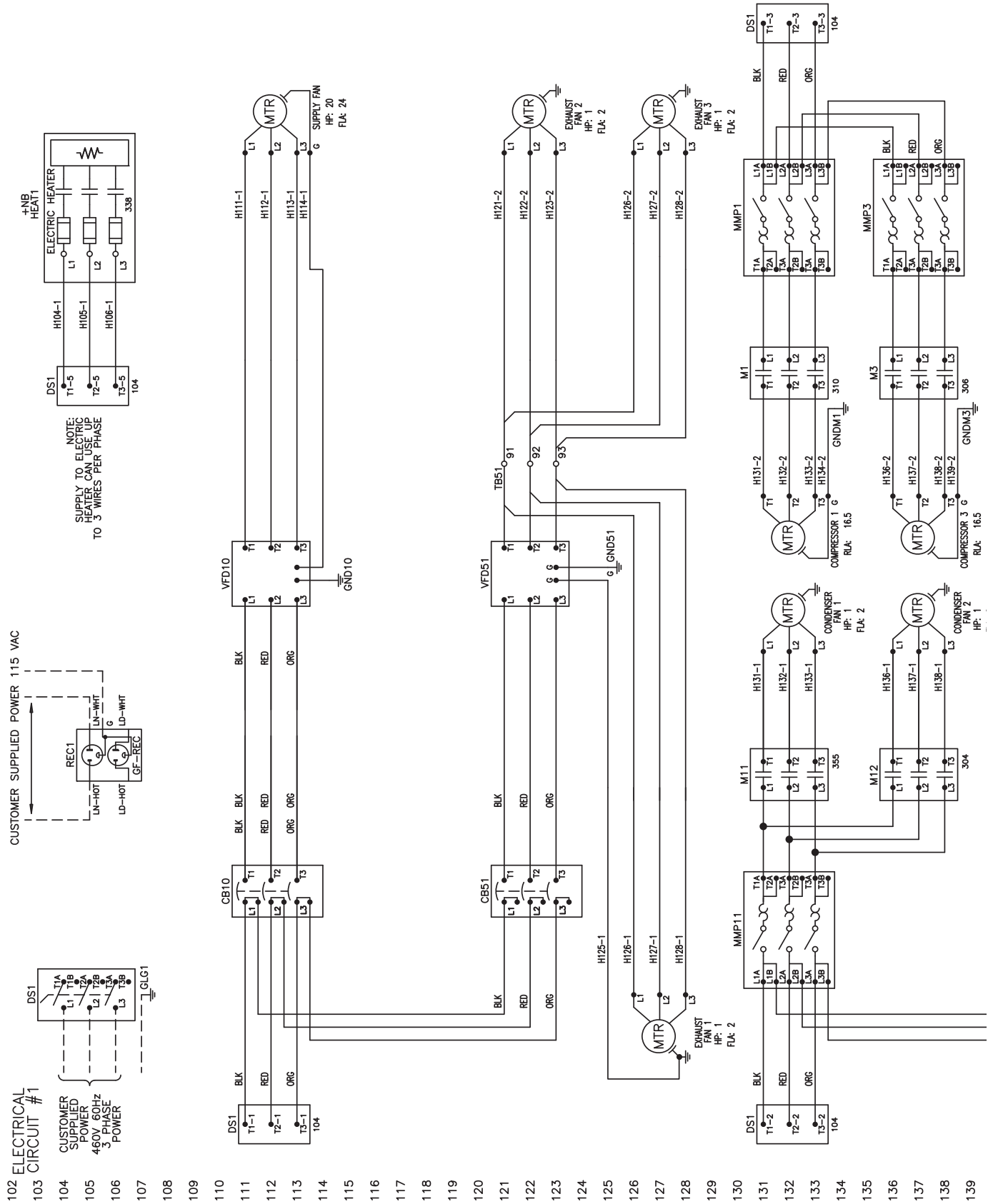


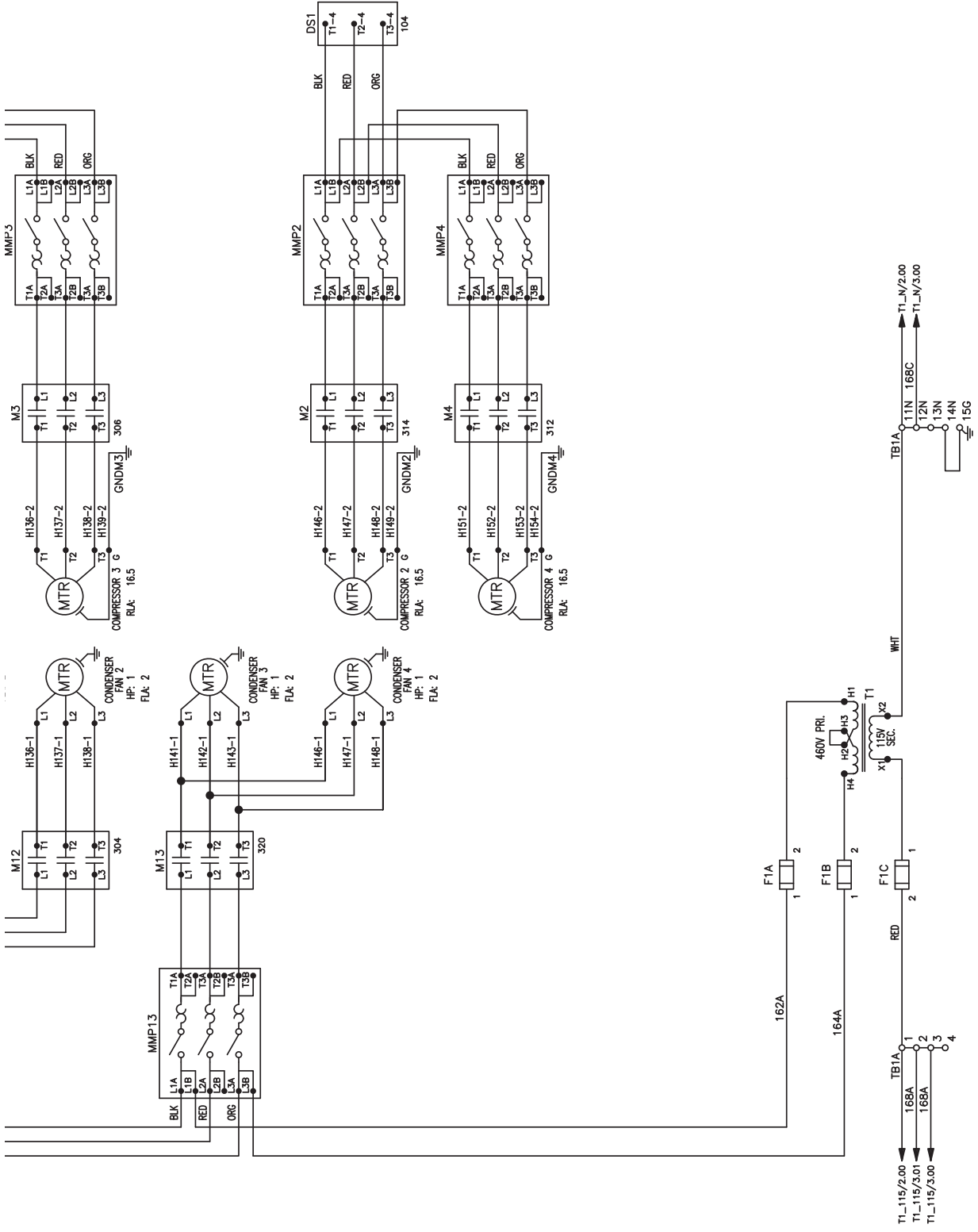


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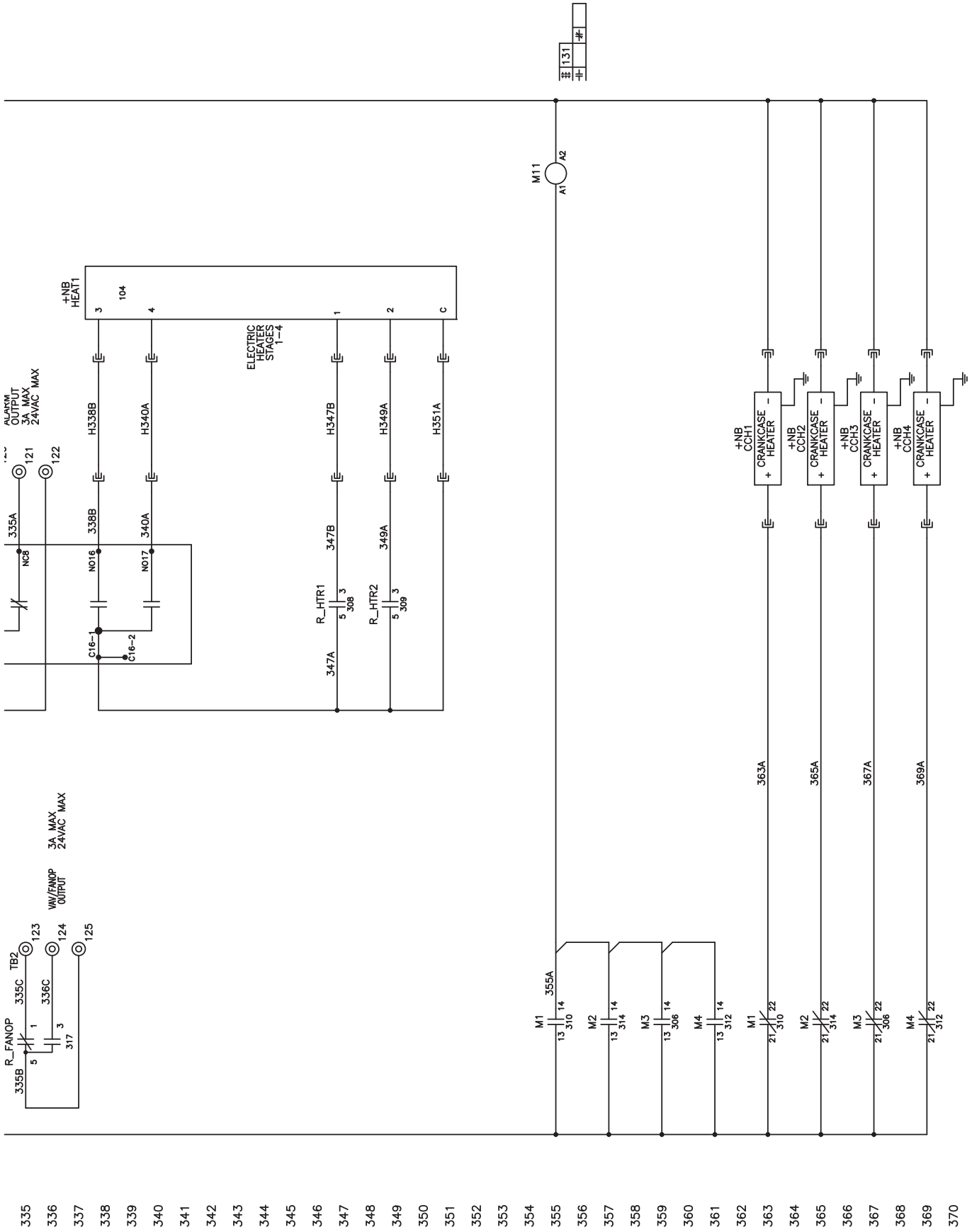
Typical Wiring Diagrams

Figure 21: Electric Heat Option Power





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